Government of the People's Republic of Bangladesh
Local Government Engineering Department (LGED)

OHS STANDARDS OF LGED

December, 2025

Message

It is a great satisfaction to introduce the "OHS Standards of LGED", a landmark document that translates LGED's policy commitments into measurable and implementable practices. As LGED continues to lead rural infrastructure development in Bangladesh, ensuring occupational health and safety at construction sites, worksites, and workplaces remains a fundamental priority.

These Standards incorporate both national and international benchmarks and specifications, making the provisions of the "OHS Policy of LGED" practical, enforceable, and accountable. They define general rules and essential practices, as well as technical parameters, thresholds, and units necessary for safeguarding health and safety. Each indicator is supported with examples of potential risks, mitigation measures, and the positive impacts of compliance, thereby transforming the Standards into a practical tool for establishing a culture of safety.

I firmly believe that the implementation of these Standards will strengthen LGED's institutional capacity, enhance accountability, and ensure that every project reflects responsibility, inclusiveness, and sustainability.

LGED reaffirms its commitment to uphold occupational health and safety as a cornerstone of development. Together, we will build a future where safe and secure workplaces are the foundation of resilient infrastructure.

I would like to express my sincere appreciation to the project and the World Bank Team members for their valuable contribution and guidance in preparing this Guideline and hope that this document will be used by all stakeholders in LGED works.

(Kazi Golam Mustafa)
Chief Engineer
Local Government Engineering Department

Message

The development of the **"OHS Standards of LGED"** marks a significant step forward in our collective journey toward safer and more sustainable infrastructure development. These Standards are the outcome of dedicated efforts, technical expertise, and collaborative contributions, ensuring that the provisions of the "OHS Policy of LGED" are translated into practical, measurable, and enforceable actions.

The Standards provide clear directions for contractors, engineers, and stakeholders to adopt standardized practices at construction sites and workplaces. They highlight workplace risk assessment, mitigation measures, grievance redress mechanisms, gender-sensitive practices, and compliance requirements, aligned with national laws and international conventions. Most importantly, they establish a culture where safety is mandatory, and where the rights and well-being of workers are protected.

As Project Director, I am confident that these Standards will serve as a practical framework for minimizing risks, enhancing accountability, and fostering safe, equitable, and productive workplaces.

I would like to extend my sincere appreciation to all who contributed to the preparation of these Standards. Together, we reaffirm our commitment to building infrastructure that is not only strong and resilient but also safe, responsible, and inclusive.

(Md. Belal Hossain)
Additional Chief Engineer
&
Project Director
Program for Supporting Rural Bridges (SupRB)

Acronyms

Acronym	Full Form with Year / Amendments
BLA	Bangladesh Labor Act, 2006 (Amended: 2013, 2018)
BLR	Bangladesh Labor Rules, 2015
ECA	Environment Conservation Act, 1995
ECR	Environment Conservation Rules, 1997
BNBC	Bangladesh National Building Code, 2020 (Revision of 2006 edition)
RAJUK	Rajdhani Unnayan Kartripakkha
DOE	Department of Environment
DIFE	Department of Inspection for Factories and Establishments
MoLE	Ministry of Labour and Employment
MoEFCC	Ministry of Environment, Forest and Climate Change (Renamed in 2013; formerly MoEF)
ILO	International Labor Organization, 1919
WHO	World Health Organization, 1948
UNDP	United Nations Development Programme, 1965
IFC	International Finance Corporation, 1956
WB	World Bank, 1944
ADB	Asian Development Bank, 1966
ISO	International Organization for Standardization (e.g., ISO 45001:2018), est. 1947
OSHA	Occupational Safety and Health Administration (USA), 1970
ANSI	American National Standards Institute, 1918
ASTM	American Society for Testing and Materials, 1898
ISEA	International Safety Equipment Association, 1933
NFPA	National Fire Protection Association, 1896
NIOSH	National Institute for Occupational Safety and Health (USA), 1970
GHS	Globally Harmonized System of Classification and Labelling of Chemicals, 2003 (Rev. 8 in 2019)
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMF	Environmental and Social Management Framework
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
IEE	Initial Environmental Examination
LEED	Leadership in Energy and Environmental Design
CAA	Clean Air Act
CDM	Clean Development Mechanism
GHG	Greenhouse Gas
SDG	Sustainable Development Goals
LEP	Livelihood Enhancement Program
RAP	Resettlement Action Plan
LMP	Labor Management Procedures
SEP	Stakeholder Engagement Plan
GRM	Grievance Redress Mechanism
OHS	Occupational Health and Safety
ERP	Emergency Response Plan
SWM	Solid Waste Management

Acronym	Full Form with Year / Amendments
WMP	Waste Management Plan
HIA	Health Impact Assessment
SIA	Social Impact Assessment
SEA	Strategic Environmental Assessment
NOC	No Objection Certificate
ECC	Environmental Clearance Certificate
LGED	Local Government Engineering Department
CE	Chief Engineer
ACE	Additional Chief Engineer
SE	Superintending Engineer
XEN	Executive Engineer
UE	Upazila Engineer
AE	Assistant Engineer
SAE	Sub-Assistant Engineer
TO	Technical Officer
PD	Project Director
DPD	Deputy Project Director
TL	Team Leader
QC	Quality Control
QA	Quality Assurance
OHS Officer	Occupational Health & Safety Officer
Safeguard Specialist	Environmental & Social Safeguard Specialist
MIS	Management Information System
GIS	Geographic Information System
PPE	Personal Protective Equipment
PFAS	Personal Fall Arrest System
FPE	Fall Protection Equipment
RPE	Respiratory Protective Equipment
LOTO	Lockout/Tagout
SWMS	Safe Work Method Statement
JSA	Job Safety Analysis
SSoW	Safe System of Work
TBT	Toolbox Talk
ERP	Emergency Response Plan
WAH	Work at Height
Confined Space	Confined Space Entry
HAZMAT	Hazardous Materials
SDS	Safety Data Sheet
GHS	Globally Harmonized System
ATPV	Arc Thermal Performance Value
MSDS	Material Safety Data Sheet
HIRA	Hazard Identification and Risk Assessment
MSDS	Material Safety Data Sheets
RID	Regulations for International Carriage of Dangerous Goods
VOC	Volatile Organic Compounds
ADR	Adverse Drug Reaction
HRC	Hazard Risk Classification
BA Set	Breathing Apparatus Set
SCBA	Self-Contained Breathing Apparatus
FR	Flame Resistant
TWA	Time-Weighted Average
PEL	Permissible Exposure Limit
IDLH	Immediately Dangerous to Life or Health
ISO 45001	International Organization for Standardization – ISO 45001: Occupational Health and Safety Management Systems
ANSI Z359	American National Standards Institute – Z359: Fall Protection Code
ASTM E1169	American Society for Testing and Materials – E1169: Standard Guide for Conducting OHS Audits

Acronym	Full Form with Year / Amendments
NFPA 70E	National Fire Protection Association – 70E: Electrical Safety in the Workplace
EN 361	European Norm – EN 361: Personal Protective Equipment – Full Body Harness
EN 388	European Norm – EN 388: Protective Gloves Against Mechanical Risks
EN 166	European Norm – EN 166: Personal Eye Protection
CSA Z259	Canadian Standards Association – Z259: Fall Protection Systems
AS/NZS 1891	Australian/New Zealand Standard – 1891: Industrial Fall-Arrest Systems and Devices
IEC 61482-2	International Electrotechnical Commission – 61482-2: Protective Clothing Against Thermal Hazards of Electric Arc
OSHA 1926	Occupational Safety and Health Administration – 1926: Safety and Health Regulations for Construction
ILO C167	International Labor Organization – Convention 167: Safety and Health in Construction
BS 5975	British Standard – 5975: Code of Practice for Temporary Works Procedures
ISO 3864	International Organization for Standardization – ISO 3864: Safety Colors and Safety Signs
ISO 7010	International Organization for Standardization – ISO 7010: Graphical Symbols for Safety Signs
ISO 14001	International Organization for Standardization – ISO 14001: Environmental Management Systems
CSEP	Confined Space Entry Permit
HWP	Hot Work Permit
EP	Excavation Permit
WHP	Work at Height Permit
LTP	Lifting Task Permit
EIP	Electrical Isolation Permit
MIP	Mechanical Isolation Permit
PWP	Permit to Work
FAP	Fire Access Permit
WDP	Water Diversion Permit
ERP Interface	Emergency Response Plan Interface
Regulatory Clearance	Regulatory Clearance Certificate
E Permit	Environmental Permit
Permit Log	Permit Register / Logbook

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1. INTRODUCTION

1.1 Context of Formulating the OHS Standards of LGRD

During the formulation of the Occupational Health and Safety (OHS) Standards for LGED workplaces, the provisions of LGED's "Occupational Health and Safety (OHS) Policy" have been thoroughly followed, so that each directive is institutionally integrated and practically implementable at the field level. To ensure a safe, healthy, and accountable working environment, the indicators of the OHS Policy have been prioritized in structuring the Standards.

In the formulation process, LGED's prevailing practices, practical experiences, and field-level applicability have been considered. Simultaneously, to make the Standards participatory, relevant, and realistic, the recommendations of the Technical Committee members responsible for evaluating, revising, and updating the documents submitted by consulting firms/individual consultants, as well as the officials of the Project Management Unit and subject-matter experts, have been incorporated.

In determining the Standards and Specifications, internationally recognized guidelines such as OSHA, ILO, EU, and other applicable directives have been followed. In addition, relevant provisions of nationally available laws and regulations—such as the Bangladesh National Building Code (BNBC), Labor Law, Environmental Conservation Act, and others—have been included. For those indicators that are not institutionally or routinely practiced as Key Performance Indicators (KPI) within LGED's operations, mandatory compliance has not been imposed. In such cases, a conditional clause of "if applicable" has been provided.

For each provision included in this Standards, the mode and scope of compliance shall be finalized by an authorized/empowered engineer of LGED, whose rank shall not be less than Executive Engineer. Through this, the implementation, supervision, and evaluation process of the Standards shall be conducted under a responsible and institutional framework.

1.2 What is OHS Standards

Occupational Health and Safety (OHS) Standards are regulations and guidelines designed to ensure the safety, health, and well-being of employees in the construction Sites/workplaces. They cover a range of practices, procedures, and policies aimed at preventing accidents, injuries, and illnesses. These standards are enforced by various government agencies and national and international organizations, such as the International Labor Organization (ILO) and national bodies like the Department of Inspection for Factories and Establishments (DIFE) under the Ministry of Labor and Employment.

Key components of OHS Standards generally include:

- *Identifying and mitigating workplace hazards.*
- *Providing proper training and education to employees.*
- *Implementing safety protocols and emergency procedures.*
- *Ensuring the use of protective equipment and gear.*

- *Regularly monitoring and assessing workplace conditions.*

By adhering to OHS Standards, employers can create a safer work environment, reduce the risk of workplace incidents, and promote overall employee well-being.

1.3 Why OHS Standard is Necessary for LGED!

Occupational Health and Safety (OHS) Standards are essential for the Local Government Engineering Department (LGED) for several critical reasons. Given LGED's extensive involvement in infrastructure development and various construction projects, ensuring the safety and well-being of its workforce is paramount. Here's why OHS Standards are necessary for LGED:

1.3.1 Worker Safety and Well-being

At the Heart of OHS: The primary purpose of OHS Standards is to safeguard the health, safety, and welfare of workers. LGED projects often involve high-risk activities such as construction, roadwork, and the operation of heavy machinery. By implementing OHS Standards, LGED can significantly reduce the risk of accidents, injuries, and occupational diseases among its workers.

1.3.2 Legal Compliance

Adhering to National and International Regulations: OHS Standards ensure that LGED complies with national laws and international regulations. Non-compliance can lead to legal penalties, fines, and potential project shutdowns, which can tarnish LGED's reputation and hinder its operations.

1.3.3 Improved Productivity

Healthy Workers are Productive Workers: A safe and healthy work environment leads to higher worker morale and productivity. When workers feel secure and valued, they are more likely to be engaged and perform their tasks efficiently. Reduced workplace accidents also mean fewer disruptions and delays in project timelines, contributing to overall productivity.

1.3.4 Cost Reduction

Preventing Incidents Saves Money: Accidents and occupational illnesses can result in significant financial costs due to medical expenses, compensation claims, and lost workdays. By adhering to OHS Standards, LGED can prevent these incidents, thereby saving costs associated with workplace injuries and illnesses.

1.3.5 Reputation and Credibility

Building Trust and Confidence: Adhering to OHS Standards enhances LGED's reputation as a responsible and ethical organization. It builds trust and confidence among stakeholders, including employees, contractors, government agencies, and the public. A strong safety record can also attract skilled workers and reliable partners to collaborate on projects.

1.3.6 Quality Assurance

Ensuring High Standards in Projects/Programs: OHS Standards contribute to the overall quality of construction projects/programs. Safe work practices lead to better workmanship

and fewer errors, ensuring that projects meet the required standards and specifications. This, in turn, reduces the need for costly rework and repairs.

1.3.7 Environmental Protection

Minimizing Environmental Impact: OHS Standards also encompass environmental safety, ensuring that construction activities do not harm the surrounding environment. By implementing these standards, LGED can minimize pollution, waste, and other environmental hazards, contributing to sustainable development.

1.3.8 Community Impact

Promoting a Safe and Healthy Community: LGED's adherence to OHS Standards extends beyond the workplace to the wider community. Safe construction practices protect not only workers but also the public who may be affected by construction activities. This helps maintain public safety and enhances the overall quality of life in the community.

1.3.9 Above All

A Commitment to Excellence: For LGED, implementing and adhering to OHS Standards is not just a regulatory requirement rather it is a commitment to excellence. It reflects LGED's dedication to creating a safe, healthy, and productive work environment for its employees and stakeholders. By prioritizing OHS, LGED can achieve its mission of sustainable infrastructure development while ensuring the well-being of its workforce and the community.

1.4 Objectives

The objective of this book of Occupational Health and Safety (OHS) standards is to:

a. Protect every laborer against the dangers of injury, sickness or death through safe and healthful working conditions;

b. Assure the conservation of the valuable manpower resources especially working in the construction industry within the jurisdiction of Local Government Engineering Department (LGED);

c. Prevention of loss or damages to lives and properties consistent with the national goal; and

d. Facilitate the upliftment of livelihood of laborers through total development by practicing the standards.

1.5 Scope

1.5.1 Work Jurisdiction

These STANDARDS applies to all ongoing civil works (worksites) of all Sectors of LGED; Namely, a) Rural Infrastructure Development, 2) Urban Infrastructure Development and Management, and 3) Small Scale Water Resources Development Sector.

1.5.2 Laborers/Workers Jurisdiction

These STANDARDS applies to all workers within the jurisdiction of LGED activities;

1.6 Definitions

For the purpose of this STANDARD (applicable to ongoing Civil work contracts under LGED authority concerned) the following terminologies shall mean:

a. **Contractor:** An organization or individual registered with LGED and/or other departments of the Government of Bangladesh who directly employs or engages workers/laborers or as part of their business carries out, manages or controls civil work (e.g., building, altering, maintaining or demolishing Roads/Road Structures/Water Structures/ Buildings etc.);

b. **Laborer/Worker:** Someone (irrespective of Gender) who is deployed/ hired/appointed and works for or under the control of a contractor on a construction site;

c. **Health:** A sound state of the body and mind of a laborer that enables him/her to perform his/her job normally in a state of well-being;

d. **Occupational Health:** The area of work in LGED to promote and maintain highest degree of physical, mental and social well-being of workers in all occupations being implemented under all sectors;

e. **Safety:** Physical and environmental conditions of work (worksite/ employment) that substantially comply with provisions of this STANDARD;

f. **Occupational Health and Safety (OHS):** The discipline dealing with the prevention of work-related injuries and diseases as well as the protection and promotion of the health of workers aiming at the improvement of working conditions and environment;

g. **Accident:** An unplanned/unexpected occurrence in the worksite that may or may not result in personal injury, damage of property, stoppage of hinderance in running work or any combination thereof holds in course of the contract implementation period;

h. **Injury:** Physical harm or damage to laborer's body caused by an accident/ instance/intervention in any worksite;

i. **Occupational Illness/Disease:** Any Illness/Disease or such condition caused primarily due to exposure to workplace hazards;

j. **Recognized Hazards:** Those hazards exist in the worksite and do not require any technical or testing devices to detect;

k) **Worksite:** Office, premises or worksite where the laborers/workers are habitually employed/deployed including the office or places where the laborers/ (having no or specified worksite) report for assignment he/they is/are responsible for;

l. **Approved:** Accepted by the LGED authority concerned based on the stage of approval;

m. **Policy:** A course or principle of action adopted or proposed by an organization or individual. For the purpose of this Standards it will "OHS Policy of LGED";

n. **Chief Engineer:** Chief Engineer (Head Executive) of LGED;

o. **Additional Chief Engineer (ACE):** Additional Chief Engineer, in Charge of Unit/Division of LGED;

p. **Project Director (PD):** Project Director/Manager of an ongoing Project under LGED;

q. **Superintending Engineer (SE):** Superintending Engineer in Charge of a Region of LGED unless otherwise mentioned;

r. **Executive Engineer (XEN):** Executive Engineer of District, unless otherwise specified;

s. **Upazila Engineer (UE):** Upazila Engineer in Charge of an Upazila under LGED;

t. **Standard:** Occupational Health and Safety Standards of LGED;

u. **Authorized Officer (AO):** Implementing/Supervising Engineer concerned of LGED who have the authority to enforce the provisions of the OHS Standards, unless otherwise mentioned;

v. **Authorized Representative (AR):** Officer/Staff/Person empowered to handle OHS issues by the line Departments/Agencies/Entities etc.

w. **Sheeting:** The vertical member of shoring and timbering which directly resists pressure from side of an excavation.

x. **Wale:** The longitudinal member of shoring and timbering which directly resists pressure from sheeting;

y. **Strut:** The transverse member of shoring and timbering which directly resists pressure from sheeting or wale;

z. **Scaffold:** A temporary structure made of timber or metal with a platform, used in construction, alteration, or demolition to support workers and their tools;

aa. **Standard of Scaffold:** The vertical member of scaffold transmitting the load to the ground or to a base plate;

bb. **Ledger or Stringer of Scaffold:** A scaffold bracing, which extends horizontally from standard to standard forming right angles with the putlogs to form a tie between the standards;

cc. **Putlogs or Bearer of Scaffold:** A member of scaffold across a ledger and a building wall or between two ledgers upon which the platform rests;

dd. **Brace of Scaffold:** A member of scaffold that holds standards in a fixed position to prevent lateral movement;

ee. **Hoist:** A lifting machine with a carriage/platform/cage generally uses to move on guides;

ff. **Lifting Appliance:** A winch, pulley block or similar system used for lifting or descending a hoist crane, sheer legs excavators, draglines, pile driver or pile excavators;

gg. **Lifting Gear:** A chain/rope sling, ring, link, hook, shackle, swivel or eyebolt;

hh. **Mobile Crane:** A crane capable of traveling under its own power;

ii. **Plant or Equipment:** Any plant or equipment gear, machinery, apparatus or appliances, or any part thereof.

1.7 Application, Enforcement and Authority

1.7.1 Local Government Engineering Department (LGED)

1.7.1.1 Administrative Authority

Local Government Engineering Department (LGED) shall administer and enforce the provisions of this STANDARDS;

1.7.1.2 Authority/Agency to Approve Access

Concerned Authority/Authorized officer of LGED shall be given access by Every Contractor to the premises/worksites, records for the purpose of determining compliance with the provisions of this STANDARDS;

1.7.1.3 Procedures of Visit/Inspection

Every worksite/Establishment under the contract shall be visited to determine the level/status of compliance of OHS issues at least:

a. *Weekly by the field level Consultant/Officer/staff (as applicable) responsible for Compliance of OHS issues;*
b. *Fortnightly by the Upazila Engineer concerned;*
c. *Monthly by the Executive Engineer;*
d. *As per available and affordable schedule by the Project Director/PMU Officials/Staff/Consultants (as applicable).*
e. *Quarterly by the Superintending Engineer of the Region concerned (He may authorize a representative if he remains occupied with other important issues);*
f. *As per available and affordable schedule by the Additional Chief Engineer of the Division concerned (He may authorize a representative if he remains occupied with other important issues).*

1.7.1.4 Recommendation of Time Period for Compliance

The investigating/Supervising officer concerned shall specify/ recommend reasonable time conforming to the contract agreement depending on the extent of non-compliance and gravity of the hazards and necessity of time to ensure the compliance.

1.7.2 Other Places of Enforcement

When a condition of employment in workplaces/worksites does not especially cover by this standard but is an issue of complaints then the provisions of this Standards shall apply as a matter of unavoidable circumstances.

1.7.3 Application in case of the works of other Line Agencies/ Departments/ Entities including LGIs

Local Government Engineering Department (LGED) shall remain solely responsible for the administration and application of this Standards at all worksites, irrespective of LGED-affiliated institutions/authorities including Local Government Institutions (LGIs) and, other line agencies/ departments/ organizations (where applicable).

1.8 Special Inspection, Investigation and Review

1.8.1 Appeal/Application/Requisition of Inspection/Visit

If any worker, laborer, or concerned person believes that a violation of OHS Standards is threatening physical harm or imminent danger to life, they should:

- *Report the Violation: Apply or request for an inspection.*
- *Whom to Contact: Reach out to the Superintending Engineer of the concerned region or the relevant Authority of LGED.*
- *Provide Details: Offer full particulars or details of the violation.*

This will ensure prompt and effective action to address the safety concerns.

1.8.2 Deployment of Representative(s)

Superintending Engineer may deploy his representative(s) with authority to investigate/inspect into the issue;

1.8.3 Special Inspection/Visit

IF the Superintending Engineer/Authorized Representative(s) find reasonable ground to believe that a violation has really been committed or danger practically exists, he shall conduct a special inspection/ investigation immediately;

1.8.4 Notification to Complainant

The complainant shall be notified about the outcome of such inspection/ investigation in writing immediately after completion of the intervention;

1.8.5 Review on Refusal in Taking Initiatives

In case of any failure or refusal in taking such initiatives by the Superintending Engineer, the Additional Chief Engineer of concerned Division shall review the matter (on his own initiatives or complaint) and issue order/ recommendation to ensure compliance to such complaint/ reported violation.

1.9 Commercial/Business Confidentiality: Context, Applicability and Importance in OHS Standards

1.9.1 What is Business Confidentiality?

Commercial/business confidentiality refers to such information that is preserved for the financial, technical, strategic, or administrative interests of any contractor, consultant, or implementing agency, and whose unauthorized disclosure may cause competitive loss, breach of contract, or legal complications. Such information is generally not publicly accessible and must be kept confidential. According to international guidelines of OSHA, ILO, and the EU, any information obtained during inspection or evaluation that may disclose business confidentiality shall be used only as required by the concerned authority and appropriate protection must be ensured.

To ensure that any such information obtained or reported by inspection officers, engineers, or authorized personnel that may disclose business confidentiality is considered "confidential" and disclosed only when required by the department/ project/program/contract, this provision has been included in LGED's OHS Standards

1.9.2 Multi-layered Applicability and Examples of Preserving Business/ Commercial Confidentiality at Construction Sites/Worksites

1.9.2.1 Tender Pricing and Pricing Strategy

In construction projects/programs/contracts, the BOQ (Bill of Quantities), rate analysis, and pricing strategy submitted by the contractor are sensitive information. This information determines the contractor's position in competitive bidding and is part of their business strategy.

Example: *Contractor "A" has reduced costs by using locally produced materials in their rate analysis. If this analysis is disclosed without authorization during inspection, other contractors may imitate it, thereby logically disrupting contractor "A"'s competitive advantage.*

1.9.2.2 Source and Supply Chain of Materials/Goods/Items

Contractors often enter into agreements with specific brands, sources, or suppliers, which play a supportive role in ensuring reliability, timeliness, and cost control. If this source or chain is disclosed, other contractors may use the same source, creating a risk of increased market competition.

Example: *Contractor "B" procures high-quality geotextile through a reliable foreign supplier. If this source is disclosed, other contractors may also reach the same supplier, thereby nullifying the exclusive advantage of contractor "B"'s supply chain.*

1.9.2.3 Worker/Laborer Management and Skills

The list of specially trained workers, supervisors, or technical staff engaged in work under the project/program/contract and their management strategies are often considered internal assets of the contractor. If this information is disclosed, skilled workers may transfer

to other contractors or the management strategy may be imitated, leading to undesirable situations for the concerned contractor.

Example: *Contractor "C" has trained workers in the use of personal protective equipment (PPE) through an internal training program. If the structure and results of this program are disclosed, other contractors may logically imitate it, and the exclusive outcome of "C"'s training investment will inevitably be lost.*

1.9.2.4 *Use of Safety Procedures and Technology*

Special equipment, software, or procedures used for dust control, traffic management, or PPE distribution at construction worksites are often considered proprietary innovations or purchased technologies of the contractor. If such technology or procedure is disclosed, it becomes imitable and the contractor's innovative value is lost.

Example: *Contractor "D" uses a mobile app to track the distribution and use of PPE among workers. If the operational method of this app is disclosed during inspection or investigation, other contractors may develop similar apps, potentially harming "D"'s technological advancement.*

Preserving business confidentiality at each of the above levels is not merely an ethical or administrative responsibility, but is essential for ensuring competitive fairness, contractual integrity, and project stability.

1.9.3 Importance of Preserving Business/Commercial Confidentiality: Detailed Explanation and Examples

1.9.3.1 *It protects the terms of the contract, where many items are marked as "confidential."*

Each construction contract contains certain specific information that is marked as "confidential"—such as tender price, source of materials/goods/ items, technical strategies, or worker/labor management methods, etc. These items are preserved as part of the contract and legally prohibited from being disclosed to third parties.

Example: *Contractor "A" has mentioned in their contract that the formula of the concrete mix used is confidential. If this formula is disclosed during inspection, the contract is violated and "A" may claim compensation.*

1.9.3.2 *It maintains the contractor's confidence and participation, which affects future tenders and projects*

If a contractor knows that their business information will remain secure, they are more willing to participate in the project and also in future tenders. If confidentiality is not maintained, contractors may avoid taking risks, which can harm the competitiveness and quality of the project.

Example: *In a contract under an LGED project, contractor "B" has increased work efficiency using a labor management software. If the operational strategy of this software is disclosed to other contractors, "B" may lose interest in future participation.*

1.9.3.3 *It helps avoid legal complications and complaints in case of unauthorized disclosure of information*

If confidential information is disclosed without authorization, the contractor or consultant may take legal action. This may lead to delays, complaints, and risks of administrative complications in the project.

Example: *Engineer "X" mentions the confidential source of materials of contractor "C" in an inspection report, which is later published in the media. "C" files a legal complaint against LGED, resulting in project delays.*

1.9.3.4 *It ensures fairness in a competitive environment, so that no party can use another party's confidential strategy*

When confidentiality is preserved, each contractor can work using their own strategies, skills, and experience. Otherwise, one party may imitate another's strategy and gain undue advantage, which undermines the fairness of competition.

Example: *Contractor "D" uses a special type of personal protective equipment (PPE) distribution system to ensure worker safety. If the detailed information of this system reaches other contractors, "D" loses their competitive advantage.*

1.9.3.5 *It ensures policy-based control over information usage and maintains project transparency and accountability*

When the prescribed policy is followed in using confidential information, all parties in the project—contractor, consultant, engineer—work within a transparent and accountable framework. This reduces misunderstandings, unintended data leaks, and administrative conflicts.

Example: *LGED issues a directive that any mention of a contractor's confidential information in an inspection report must be approved by the Chief Engineer. This ensures control over information usage and maintains project transparency.*

2. OTHER OHS SAFETY PROVISIONS

2.1 Amendment/Modification etc. of PROVISIONS

Safety and health PROVISIONS may be amended, modified, or revoked in the following manner:

2.1.1 Procedures for Primary Scrutiny

If any interested party believes a provision of the OHS Standards should be modified, amended, or upgraded, they should follow these steps:

a. *Draft the Proposal:*
   - *Create a proposed provision that aligns with the bilateral contract between LGED and the Contractor and the OHS Policy of LGED.*
   - *Submit the drafted proposal to the Chief Engineer, LGED.*

b. *Review by Chief Engineer:*
   - *The Chief Engineer, LGED, will refer the proposal to the relevant Unit/ Committee/Officer for assessment.*

c. *Consultation and Feedback:*
   - *The Authorized Unit/Committee/Officer may consult with individuals or organizations, both private and public, including recognized workers' and contractors' organizations.*
   - *Gather suggestions and advice from these entities, especially those with special knowledge of the proposal under consideration.*

This ensures that any changes to the OHS Standards are well-justified, properly reviewed, and based on expert input.

2.1.2 Finalization of the Proposal

The Authorized Unit/Committee/Officer shall finalize the proposal taking into consideration the suggestions/recommendations available;

2.1.3 Forwarding for Approval

The Authorized Unit/Committee/Officer shall forward the finalized proposal to the Chief Engineer, LGED for approval;

2.1.4 Time Limitation for the Approval of the Chief Engineer, LGED

The Chief Engineer, LGED shall provide his canescent (approval or rejection) within 60 (Sixty) days of the submission of the Proposal by the Authorized Unit/Committee/ Officer;

2.1.5 Action after Rejection (in appliable cases)

If rejected the Authorized Unit/Committee/Officer shall return the proposal to the party by whom it is proposed;

2.1.6 Resubmission of the Proposal

It can be resubmitted for reconsideration following the similar procedure as mentioned in (a);

2.1.7 Notification after Approval

If approved by the Chief Engineer, LGED, it should be notified to all concerned and published in the LGED website within not more than 7 (seven) working days;

2.1.8 Inclusion in the Revised Version

This amendment shall be included in the revised/upgraded version of the "OHS Standards of LGED" mandatorily;

2.1.9 Effectiveness of the Amendment

The amended Provision will be effective after 15 (Fifteen) days of the publication in LGED website.

2.2 Special Provisions

2.2.1 Working Conditions or Practices not Covered by this Standards

Any specific Provision applicable to a condition, practice, means, methods, operations or processes shall also apply to other similar work situations for which no specific Provision has been established in this Standards.

2.2.2 Handling Imminent Dangers

a. *Definition*

An imminent danger is a condition or practice that could reasonably be expected to cause death or serious physical harm before handling it within the procedure under the provisions;

b. *Procedures for Handling*

When concerned authority/Officer/Staff of LGED (Upazila Engineer's Office) finds that an imminent danger exists in a worksite:

i. *He shall inform the affected employer and workers about the danger;*

ii. *Shall recommend/request the Executive Engineer Concerned to issue an office Order for stop of operation or other appropriate action to avoid the danger;*

iii. *If the contractor desires that the Executive Engineer shall not issue the office Order to stop the work/operation and the employer shall take appropriate measures to protect the workers with emergency initiatives satisfactory to the Executive Engineer.*

iv. *Upon receipt of such recommendation/request from Upazila Engineer, the Executive Engineer shall immediately visit the worksite to be sure about the existence of danger;*

v. *If he becomes confident shall issue a Stoppage Order or take other appropriate action to minimize the danger;*

vi. *The stoppage order shall include:*

- Specific measures to be taken to avoid, correct or remove such imminent danger;
- Initiatives to prohibit the presence of any worker in such location where such danger exists (except those whose presence are necessary to avoid, correct or remove such danger or to maintain a continuous process or operation);
- Allowance of such correction, removal or avoidance of danger only where the same can be accomplished in a safe and orderly manner.

vii. *The Executive Engineer Concerned shall ensure the receipt of such order (along with a detailed description of the work conditions sought to be corrected, the safety and health Provision violated by the contractor and the corrective measures imposed);*

viii. *The Order shall remain in effect until danger is removed or corrected.*

2.3 Inapplicability of Standards (Provisions)

2.3.1 General Provisions

The Chief Engineer/Officer authorized by the Chief Engineer, LGED may issue to Contractor/applicant a temporary order suspending the effectivity date of a Provision/Provision or any part of this Standards for the following reasons:

a. *The unavailability of professional or technical personnel or of materials and equipment needed to comply with the Provision concerned;*
b. *Necessary construction or alteration of the prescribed facilities is not possible to be completed within the effectivity date as per provision of these standards;*
c. *If it is an experimental or training demonstration of new techniques to safeguard the safety and health of workers conducted by contractor on official approval of LGED;*

2.3.2 Justification of the Application

In such cases, the contractor (applicant) must justify the following:

a. *Reasons for Suspension:*
   - *Specify the provision/standard or portion they seek to suspend and the reasons for the application.*
b. *Safeguarding Measures:*
   - *Ensure all necessary steps to protect workers from the hazards covered by the provision/standard.*
   - *Prescribe and adopt necessary measures, methods, operations, and practices while the suspension is in effect.*
c. *Compliance Program:*
   - *Have an effective program for confirming compliance with the provision/standard as quickly as possible.*
   - *Specify a date for achieving compliance.*
d. *Notification to Workers:*
   - *Inform workers and their authorized representative about the application, providing a copy of the application and the reasons for it.*

This ensures transparency and continued safety even during periods of suspension.

2.3.3 Interim Order/Arrangement before Final Approval

Submission: The application shall be submitted to the Executive Engineer of the concerned district.

Hearing: The Executive Engineer hears from the laborers/workers or their authorized representative.

Evaluation and Recommendation: The Executive Engineer evaluates the application and recommends action to the Chief Engineer through the Superintending Engineer of the concerned region.

Interim Order: The Superintending Engineer may issue an interim order that remains effective until the Chief Engineer issues the suspension order.

2.3.4 Provisions that should be included in the Suspension Order

The suspension order (including the interim order) shall propose the practices, means, methods, operations, or processes which the Contractor must use and adopt while the order is in effect;

2.3.5 Effectiveness of the Suspension Order

The suspension order shall in be effect:

a. *No longer than the period needed by the Contractor to ensure compliance with the Provision/Provision/Standard, or one year, whichever is shorter;*
b. *Renewable for another year, subject to cancellation or shortening of the period by the Chief Engineer, LGED if such is warranted.*

2.4 Variation Order for OHS Provision/Provision

2.4.1 Issuance of Variation Order by the Executive Engineer

If practical difficulties or undesired hardships arise at a worksite, making it challenging to comply with any provision of these standards:

Recommendation:

The Executive Engineer of the concerned district assesses the situation and recommends a variation to the Chief Engineer, LGED.

Issuance of Variation Order:

The Chief Engineer, LGED, may issue an order allowing a variation in compliance with the requirements.

Conditions for Variation:

- *The purpose of the provision must be substantially served;*
- *The safety and health of the workers must remain ensured.*

This allows for flexibility while maintaining the primary objectives of safety and health.

2.4.2 Appeal to the Chief Engineer, LGED by the Affected Contractor

The Contractor affected by such Provision or provision/Standard may request the Chief Engineer, LGED in writing through the Superintending Engineer of concerned Region, to authorize such a variation stating the grounds for the request and the measures to be taken or already being taken;

2.4.3 Contents/Elements of the Application of Variation

An application for a variation shall contain:

a. *A specification of the Provision or provision or portion thereof from which the Contractor is seeking a variation;*
b. *An attestation from technically qualified person that the employer is unable to comply with the Provision and detailed reasons thereof;*
c. *A detailed statement of the measure he will take or is already taking to protect the workers against the hazards covered by the Provision or provision; and*
d. *A certification that the workers have been informed and a copy of the application has been furnished the workers or their duly authorized representative.*

2.4.4 Conditions of Variation Order

A variation order shall specify the conditions under which the variation is permitted and shall be applicable and effective only to the particular Contractor and operations covered by the Order;

2.4.5 Effectiveness of Variation Order

A variation order shall remain in effect until it is cancelled by the Chief Engineer, LGED.

2.5 Hazardous/Dangerous Workplace/Worksites

For purposes of this Standards, the following worksites will be considered as "Hazardous/Dangerous workplace/worksite" where:

2.5.1 Nature of work exposure to Laborers

The nature of work exposes the laborers/workers to dangerous environmental elements,

2.5.2 Working Conditions

Working conditions include ionizing, radiation, chemicals, fire, flammable substances, noxious components or contaminants and similar substances exist;

2.5.3 Types/Categories of Works

The laborers/workers are engaged in construction work, logging, firefighting and mechanized farming or similar works;

2.5.4 Types of Tools used

The laborers/workers use or are exposed to power driven or explosive powder actuated tools;

2.5.5 Exposure to Biological Agents

The laborers/workers are exposed to biological agents such as bacteria, fungi, viruses, protozoa, nematodes, and other parasites;

2.5.6 Existence of Environmental Pollutants

Environmental pollution agents like air/dust/flame etc. exist.

3. TRAINING ON OHS

3.1 Training Programs

3.1.1 Arrangement of Training

LGED shall either directly or through accredited organizations, provide training to increase the competence of personnel concerned both from Head Quarters and field level to establish compliance with the provisions of this Standards;

3.1.2 Inclusion of OHS Training Programs in Annual Training Callender

LGED shall include OHS training courses in the annual training calendar with necessary budget for LGED officials/Staff and multi-level stakeholders including Contractors/Representatives/Laborers/ Laborers representatives.

3.2 Certification

The Chief Engineer, LGED may issue certificate or give authority to recognized organizations (if they provide for training) or Chairperson, Central OHS Committee of LGED to issue certificates to the trainees after completion of any OHS training course.

3.3 Training Required Number of OHS Personnel/OHS Officer/ Safety officer

3.3.1 Training Course

The training course of LGED under this Provision shall be a pre-requisite for the appointment of OHS Personnel/OHS Officer/Safety officer in workplace/ worksites;

3.3.2 Number/Positions

The number of **OHS Personnel/OHS Officer/Safety officer** in any workplace shall depend on the number of laborers working at the worksite, size and criticality of the contract and as suggested by the Executive Engineer, LGED of the district concerned;

3.4 Establishing a Database for Information of Skilled and Unskilled Laborers/Workers Regarding Capacity, Experience and Training

Establishing a centralized, integrated, and digital database for storing, analyzing, and reusing information regarding the capacity, experience, and training of skilled and unskilled laborers/workers is an essential component of OHS management. To ensure worker safety, skill development, re-engagement, and gender sensitivity, the OHS Policy of LGED includes the policy directive for establishing this database under Sub-Chapter 6.5.

In order to make labor management in each project/program/contract data-driven, accountable, and humane, this Standards sub-chapter defines the structure, responsibilities, data elements, update procedures, and operational guidelines for field-level database management based on the directives of the aforementioned policy.

3.4.1 Database Structure and Access

a) *LGED shall operate a centralized, integrated, and digital database accessible to authorized officials at headquarters and field level.*
b) *The database shall be hosted on a secure server, and access shall be determined based on user level and responsibilities.*
c) *Each Upazila office shall designate users for data entry and updates and provide necessary training.*

3.4.2 Data Entry Elements

The following information must be included in the database for each laborer/ worker:

a) *Name, National ID/Birth Registration Number, contact information*
b) *Name, location, and duration of previously completed project/contract*
c) *Type of work and skill level (skilled/unskilled)*
d) *Type, date, and outcome of training*
e) *Health screening information*
f) *Record of personal protective equipment (PPE) usage*
g) *Observations related to safety behavior*
h) *Gender indicators and participation in grievance resolution for female workers*

3.4.3 Roles and Responsibilities

a) *The Upazila Engineer's Office shall be responsible for collecting, verifying, and uploading data.*
b) *Contractors, consultants, and labor organizations shall assist in providing and verifying data.*
c) *LGED Headquarters shall conduct annual verification and audits of the data.*

3.4.4 Data Update and Review

a) *The database must be updated at the beginning, mid-point, and completion of each project/contract.*
b) *Any change in worker status, training, or health must be updated within 7 working days.*
c) *Quarterly meetings must be organized to review the data.*

3.4.5 Use of the Database

The database shall be used to carry out the following activities:

a) *Prioritize re-engagement of workers based on skill and experience*
b) *Plan training programs and allocate budgets*
c) *Take data-driven actions to reduce safety risks*
d) *Ensure protection and participation of female workers*

3.4.6 Data Confidentiality and Security

a) *Personal and health-related data of workers must be encrypted and securely stored.*
b) *Only authorized LGED officials/users shall be allowed to view or edit the data.*
c) *Any breach of confidentiality shall be investigated under LGED's Information Security Policy.*

3.5 Requisite Qualification and Experience of OHS Consultants:

3.5.1 To be qualified as a safety consultant one should have

a. *Professional Experience as OHS Practitioner*

At least 5 (Five) Years of experience as Occupational Health *and Safety (OHS) practitioner; and*

b. *Necessary Training*

Has taken the necessary training prescribed by LGED/Similar Government Organizations;

c. *Experience in Related Fields of Occupational Health and Safety (OHS)*

Having at least 10 (ten) years of experience in related fields of occupational health and safety may not require training provided by LGED/Similar Government Organizations;

d. *Certification as OHS Consultants*

All Occupational Health and Safety (OHS) consultants or consulting organizations, shall preferably be certified by LGED/Similar Government Organizations;

e. *Preference of OHS Training/Experience from LGED*
In all cases training/experience from LGED will be given preference.

3.6 Preference in OHS Practice

Generally, for hiring or otherwise employing in the sole practice of Occupational Health and Safety (OHS), person or organization who/which complies with the requirements of this Provision will be given preference.

4. Responsibilities of OHS Committee, LGED, Contractor (including Supplier), Worker/Laborer, Contractor and Worker/ Laborers Organizations, and OHS Officer/Consultant at Construction Worksite

In this chapter, the responsibilities of all relevant parties have been defined in light of LGED's Occupational Health and Safety (OHS) Policy. According to provision 6.3 of the Policy, separate responsibilities have been determined for the central office, project management unit, divisional/regional/district/upazila level field offices, contractors, workers, consultants, and relevant organizations. These responsibilities are essential to ensure effective implementation, supervision, evaluation, and development of OHS activities.

Additionally, the formation of an effective OHS Committee at each construction site/ workplace is essential to ensure occupational health and safety (OHS).

Each responsibility has been defined based on applicable laws, regulations, contracts, and policies adopted by LGED. The purpose of this chapter is to clarify the scope of responsibilities at every level so that safety, health protection, and accountability at the workplace are ensured.

4.1 OHS Committee at Construction Site/Worksite

At each construction site/workplace, the formation of an effective OHS Committee is mandatory to ensure occupational health and safety (OHS). This committee shall be formed with representation from the concerned contractor, worker representative, Project Management Unit (PMU) (where applicable), relevant LGED field office, and consultant representatives.

The main objectives of the OHS Committee shall be:

1. *To supervise and coordinate occupational health and safety-related activities at the workplace;*
2. *To receive workers' concerns, complaints, and recommendations and present them to the relevant authority;*
3. *To observe and evaluate the effectiveness of daily Toolbox Meetings;*
4. *To review incidents of accidents, health risks, and safety violations and assist in taking preventive measures;*
5. *To ensure coordination among relevant parties in implementing OHS indicators.*

Detailed instructions regarding the formation of the committee, number of members, meeting frequency, reporting structure, and operational procedures shall be specified in the OHS Guidelines.

4.2 Responsibilities of LGED

As a central implementing agency, LGED leads the effective implementation of the Occupational Health and Safety (OHS) Policy. To fulfill this responsibility, a coordinated role among LGED's headquarters, project/program management unit (PMU), and subordinate field offices is essential. To ensure a safe, healthy, and dignified working environment and to maintain accountability and effectiveness among all relevant parties, the following responsibilities of LGED have been defined:

1. *Undertake and implement necessary measures for the implementation of LGED's Occupational Health and Safety (OHS) Policy in accordance with existing laws, regulations, or prevailing procedures, through discussion with contractor and worker representative organizations and consultation where applicable.*
2. *Ensure enforcement of laws and regulations related to occupational health and safety (OHS).*
3. *Establish acceptable and appropriate inspection systems to maintain a safe working environment.*
4. *Include acceptable and appropriate punitive measures for OHS violations in LGED's specifications/bidding documents.*
5. *Establish procedures for issuing notices related to occupational accidents, occupational diseases, insurance institutions, and relevant agencies.*
6. *Ensure arrangements for investigation in cases of serious occupational accidents, diseases, or health injuries.*
7. *Ensure punitive measures under prevailing laws/regulations against individuals proven guilty in investigations (regardless of position/designation/class/level).*
8. *Ensure compensation for workers/laborers in cases of serious accidents or diseases.*
9. *Include compensation-related conditions in specifications/bid documents and project documents.*
10. *Disseminate OHS guidelines and policies to LGED's divisional, regional, district, and upazila field offices.*
11. *Ensure publication of OHS-related information and measures taken on an annual basis.*
12. *Arrange health risk assessments for workers due to chemical, physical, and biological agents.*
13. *Ensure provision of necessary instructions for contractors and workers/laborers.*
14. *Include OHS training with budget in LGED's annual training plan.*
15. *Include specialized training/capacity building activities with budget in specifications/bid documents and project documents.*
16. *Form a central OHS Committee at LGED headquarters.*
17. *Implement the indicators described in Clause 5.2.5 of LGED's OHS Policy to ensure gender equality, safety, grievance redressal, and other facilities for female workers at construction sites.*
18. *Issue provisions for administrative and contractual punitive measures in case of non-compliance with gender indicators.*
19. *Establish a system for generating and preserving statistics through annual OHS performance auditing.*

20. *Introduce a system for reward/incentive based on performance.*
21. *Perform other applicable responsibilities in accordance with national and international OHS policies.*

4.3 Responsibilities of Project/Program Management Unit (PMU)

According to provision 6.3.2 of the Policy, the Project/Program Implementation Unit (PMU) acts as the central coordinating and supervisory body for implementing Occupational Health and Safety (OHS) activities in LGED's projects. To ensure proper implementation, evaluation, and development of project-based OHS policies, standards, and guidelines, the following responsibilities of PMU have been defined:

1. *Ensure compliance with OHS policies and guidelines in the implementation of civil works under the project/program.*
2. *Provide OHS-related instructions to relevant contractors, workers, consultants, and field offices under the project/program and assist in implementation.*
3. *Organize OHS-related discussions, review meetings, and training programs under the project/program and ensure participation of relevant parties.*
4. *Review gaps in OHS implementation under the project/program and ensure adoption and implementation of development plans through the concerned authority.*
5. *Comply with mandatory instructions for implementation as per OHS policies, standards, and guidelines issued by LGED headquarters.*
6. *Collect, preserve, and prepare reports on necessary data for OHS performance evaluation under the project/program.*
7. *Ensure implementation of indicators related to safety, gender equality, and grievance redressal for female workers under the project/program.*
8. *Assist field offices in forming OHS Committees under the project/program and monitor the effectiveness of the committees.*
9. *Perform additional OHS-related responsibilities as assigned by the Project Director/Program Manager.*

4.4 Responsibilities of Responsibilities of LGED Field Offices

LGED's field offices—namely divisional, regional, district, and upazila level offices—play a vital role in implementing the OHS Policy at the field level. In accordance with central directives, to carry out implementation, supervision, coordination, and evaluation activities in a well-defined manner, separate responsibilities have been assigned for each level of office as per provision 6.3.3 of the Policy.

4.4.1 Office of the Divisional Additional Chief Engineer

According to provision 6.3.3.1 of the Policy, the Office of the Divisional Additional Chief Engineer of LGED acts as the divisional coordinator for implementing the OHS Policy. This office leads the supervision of safety, issuance of directives, and adoption of development plans for civil works under implementation within the divisional jurisdiction. The responsibilities are outlined below:

1. *Follow LGED's OHS Policy and guidelines during supervision, observation, and investigation of civil works under implementation within the divisional jurisdiction.*
2. *Provide assistance to regional, district, and upazila offices in implementing OHS-related provisions/directives in civil works under implementation within LGED's jurisdiction.*

3. *Preside over discussions organized with contractors/organizations through LGED, PMU, and the office of the Superintending Engineer, and review gaps in OHS implementation to adopt development plans.*
4. *Ensure compliance with any implementable directives issued by LGED headquarters (Chief Engineer) in light of the OHS Policy.*

4.4.2 Office of the Superintending Engineer (Regional)

According to provision 6.3.3.2 of the Policy, the Office of the Superintending Engineer at the regional level of LGED acts as the mid-level coordinator for implementing the OHS Policy. This office plays an important role in supervising safety of civil works under implementation within the regional jurisdiction, providing directives to subordinate district and upazila offices, and ensuring implementation of central and divisional directives. The notable responsibilities are mentioned below:

1. *Follow LGED's OHS Policy and guidelines during supervision, observation, and investigation of civil works under implementation within the regional jurisdiction.*
2. *Provide assistance to district and upazila offices in implementing OHS-related provisions/directives in civil works under implementation within LGED's jurisdiction.*
3. *Implement OHS-related directives/advice/recommendations (if any) from LGED headquarters, Project/Program Implementation Unit (PMU), and divisional office through subordinate offices.*
4. *Participate in and preside over discussion meetings organized with contractors/organizations through LGED, PMU, and the Office of the Superintending Engineer, and review gaps in OHS implementation to adopt development plans.*
5. *Perform applicable roles and responsibilities of the Executive Engineer in implementing clauses 7, 8, 9, 10, 17, 18, 19, and 20 of provision 6.3.1 of the Policy.*
6. *Ensure compliance with any implementable directives issued by LGED headquarters (Chief Engineer) and PMU (Project Director/Program Manager) in light of the OHS Policy, Standards, and Guidelines.*

4.4.3 Office of the District Executive Engineer

According to provision 6.3.3.3 of the Policy, the Office of the District Executive Engineer of LGED acts as the principal field-level implementing agency for the OHS Policy. This office ensures safety, health protection, and accountability at construction sites through coordination with relevant upazila offices, contractors, workers, and consultants. The notable responsibilities are mentioned below:

1. *Follow LGED's OHS Policy and guidelines during supervision, observation, and investigation of civil works under implementation within the district jurisdiction.*
2. *Provide assistance to upazila offices in implementing OHS-related provisions/directives in civil works under implementation within LGED's jurisdiction.*
3. *Participate in and preside over discussions organized with contractors/organizations through LGED, PMU, and the Office of the Superintending Engineer, and review gaps in OHS implementation to adopt development plans.*
4. *Ensure compliance with any implementable directives issued by LGED headquarters, PMU, and the Office of the Superintending Engineer in light of the OHS Policy.*

5. *Ensure implementation of indicators related to safety, gender equality, and grievance redressal for female workers at construction sites.*
6. *Assist upazila offices in forming OHS Committees and monitor the effectiveness of the committees.*
7. *Organize and monitor the effectiveness of daily Toolbox Meetings at construction sites.*
8. *Ensure dissemination of OHS directives and policies at construction sites.*
9. *Assist upazila offices in implementing OHS training activities at construction sites.*
10. *Collect, preserve, and prepare reports on necessary data for OHS performance evaluation.*
11. *Perform responsibilities applicable to the Upazila Engineer in implementing clauses 7, 8, 9, 10, 17, 18, 19, and 20 of provision 6.3.1 of the Policy.*

4.4.4 Office of the Upazila Engineer

According to provision 6.3.3.4 of the Policy, the Office of the Upazila Engineer of LGED acts as the principal field-level implementing unit for the OHS Policy. This office plays an important role in implementing OHS activities at construction sites, coordinating between workers and contractors, conducting training, supervision, and preparing information reports. The notable responsibilities are mentioned below:

1. *Follow LGED's OHS Policy and guidelines during supervision, observation, and investigation of civil works under implementation within the upazila jurisdiction.*
2. *Ensure implementation of indicators related to safety, gender equality, and grievance redressal for female workers at construction sites.*
3. *Organize and monitor the effectiveness of daily Toolbox Meetings at construction sites.*
4. *Ensure dissemination of OHS directives and policies at construction sites.*
5. *Implement OHS training activities at construction sites.*
6. *Ensure formation and effectiveness of the OHS Committee.*
7. *Collect, preserve, and prepare reports on necessary data for OHS performance evaluation.*
8. *Ensure compliance with any implementable directives issued by LGED headquarters, PMU, Office of the Superintending Engineer, and Office of the District Executive Engineer in light of the OHS Policy.*
9. *Participate in discussions organized with contractors/organizations through LGED, PMU, and the Office of the Superintending Engineer, and review gaps in OHS implementation to adopt development plans.*
10. *Receive, review, and present OHS-related complaints at construction sites to the relevant authority.*
11. *Review incidents of OHS-related accidents, health risks, and safety violations at construction sites and assist in taking preventive measures.*
12. *Perform applicable responsibilities in implementing clauses 7, 8, 9, 10, 17, 18, 19, and 20 of provision 6.3.1 of the Policy.*

4.5 Responsibilities of Contractors Organizations/Associations

According to provision 6.3.3.5 of the Policy, contractor organizations/ associations engaged in the implementation of civil works under LGED are considered important partners in implementing the Occupational Health and Safety (OHS) Policy. The responsibilities of these organizations have been defined so that they can ensure awareness, training, coordination, and accountability regarding OHS among member contractors. The notable responsibilities are mentioned below:

1. *Assist in implementing the OHS Policy through member contractors in coordination with LGED, PMU, and divisional/regional/district/upazila offices.*
2. *Organize meetings, seminars, training, and awareness campaigns to enhance OHS awareness among member contractors.*
3. *Inform member contractors about the OHS Policy, Standards, and Guidelines and encourage them to reflect these in their activities.*
4. *Assist in forming OHS Committees, organizing Toolbox Meetings, and implementing indicators related to safety and gender equality for female workers at construction sites through member contractors.*
5. *Collect OHS-related complaints, accident or health risk information from member contractors and present them to the relevant LGED office.*
6. *Ensure participation of member contractors in OHS training activities and assist in post-training evaluation activities.*
7. *Provide recommendations for awarding/rewarding member contractors based on OHS performance evaluation.*
8. *Disseminate any OHS-related directives issued by LGED among members and assist in implementation.*
9. *Ensure dissemination of OHS directives and policies at construction sites through member contractors.*
10. *Ensure organization and effectiveness monitoring of daily Toolbox Meetings at construction sites through members.*
11. *Ensure implementation of OHS training activities at construction sites through members.*
12. *Monitor the effectiveness of OHS Committees and prepare reports through members.*
13. *Collect, preserve, and prepare reports on necessary data for OHS performance evaluation through members.*
14. *Ensure receipt, review, and presentation of OHS-related complaints at construction sites to the relevant authority through members.*
15. *Assist in taking preventive measures by reviewing incidents of OHS-related accidents, health risks, and safety violations at construction sites through members.*
16. *Ensure implementation of indicators related to safety, gender equality, and grievance redressal for female workers at construction sites through members.*
17. *Assist upazila offices in forming OHS Committees and monitor the effectiveness of the committees through members.*

18. *Participate in discussions organized through LGED, PMU, and the Office of the Superintending Engineer and assist in adopting development plans by reviewing gaps in OHS implementation through members.*
19. *Ensure performance of applicable responsibilities in implementing clauses 7, 8, 9, 10, 17, 18, 19, and 20 of provision 6.3.1 of the Policy through members.*

4.6 Responsibilities of Contractors/(Employers of Workers/ Laborers)

According to provision 6.3.3.6 of the Policy, contractors/(employers of workers/ laborers) engaged in the implementation of civil works under LGED are considered mandatory implementers of the Occupational Health and Safety (OHS) Policy. The responsibilities defined in this sub-chapter for contractors will help ensure a safe, healthy, and accountable working environment at the field level. The notable responsibilities are mentioned below:

1. *Ensure proper adherence to the OHS Policy at the workplace as per the contract.*
2. *Make guidelines on proper installation and use of equipment and tools easily accessible at the workplace.*
3. *Provide necessary information at the workplace to ensure safe use of hazardous chemicals, equipment, and materials.*
4. *Participate in OHS-related review and discussion meetings organized by LGED and exchange experiences.*
5. *Ensure daily Toolbox Meetings for workers and site managers before starting work.*
6. *Take measures to keep the workplace, equipment, and work processes safe and free from health risks.*
7. *Ensure that chemical, physical, and biological agents are kept free from health risks through appropriate safety measures.*
8. *Ensure provision of protective clothing and personal protective equipment (PPE) as needed.*
9. *Ensure training of workers on the use of personal protective equipment (PPE) at the contractor's own expense.*
10. *Ensure use of personal protective equipment (PPE) and make it mandatory as a precondition for full wage payment.*
11. *Ensure implementation of first aid, emergency response arrangements, and other OHS indicators.*
12. *Arrange regular health check-ups of workers/laborers at specific intervals to identify relevant health risks at the workplace.*
13. *Participate in and provide overall cooperation in occupational health surveillance activities (nationally and institutionally by LGED) for identifying occupational diseases.*
14. *Ensure the following arrangements for first aid and emergency response:*
    a) Contract a full-time/part-time ambulance with alternative arrangements as applicable;
    b) Contract a full-time/part-time experienced rural physician/doctor/ assistant doctor from a nearby government or private hospital for emergency medical services.
15. *Collect and preserve all OHS-related information (accidents, injuries, disabilities, diseases, deaths, treatment, compensation, legal cases, etc.).*
16. *Maintain close coordination with LGED and relevant agencies.*
17. *Share OHS-related information with labor organizations and raise awareness.*
18. *Bear all expenses for mandatory implementation of OHS measures as per the contract.*
19. *Perform additional OHS-related responsibilities as determined/provided by LGED.*

4.7 Role/Responsibilities of Worker/Laborer Organizations/ Trade Unions

According to provision 6.3.3.7 of the Policy, worker/laborer organizations (associations) and trade unions engaged in the implementation of civil works under LGED are considered supportive partners in implementing the Occupational Health and Safety (OHS) Policy. The responsibilities defined in this sub-chapter for these organizations will help ensure a safe, healthy, awareness-based, and accountable working environment at the field level. The notable responsibilities are mentioned below:

1. *Maintain understanding of laws, rights, and responsibilities related to OHS and provide information and guidance to workers/laborers to raise awareness.*
2. *Encourage union members to follow OHS laws and regulations and undertake awareness activities to bring behavioral change.*
3. *Participate in OHS-related initiatives taken by LGED and contractors/employers and provide necessary coordination and cooperation.*
4. *Update OHS-related activities in each worker/laborer organization/trade union according to contemporary concepts and establish a safety unit to work jointly with LGED and contractors/employers on behalf of workers/laborers.*
5. *Participate in bilateral and tripartite discussions on OHS issues and assist in implementing joint decisions.*
6. *Assist in raising awareness, implementing programs, and preparing reports for field-level implementation of the national OHS Policy.*
7. *Participate in health surveillance activities conducted by LGED and relevant authorities for identifying occupational diseases and provide necessary information and support.*

4.8 Responsibilities of Workers/Laborers

According to sub-clause 6.3.3.8 of the Policy, active participation of workers/ laborers engaged in the implementation of civil works under LGED is essential to ensure occupational health and safety (OHS). The responsibilities defined in this sub-chapter for workers/laborers will help establish a safe, healthy, and accountable working environment at the field level. The notable responsibilities are presented below:

1. *Work in accordance with the OHS conditions set by the contractor.*
2. *Wear protective clothing and personal protective equipment (PPE) during work.*
3. *Participate in the Toolbox Meeting before starting work each day.*
4. *Participate in OHS-related training and orientation programs.*
5. *Inform the supervisor of any situation involving risk to life or health.*

4.9 Responsibilities of Project Staff/Personnel/Consultants (if any) for Occupational Health and Safety (OHS) at Construction Worksite/ Workplace

According to sub-clause 6.3.3.9 of the Policy, project staff/personnel/consultants (if any and applicable) engaged in the implementation of civil works under LGED are considered supportive actors in the implementation of the Occupational Health and Safety (OHS) Policy. The responsibilities defined in this sub-chapter for them will help ensure a safe, healthy, accountable, and environmentally friendly working environment at the field level. The notable responsibilities are presented below:

1. *Supervise all activities to ensure compliance with OHS regulations in the assigned area.*
2. *Organize Toolbox Meetings as a routine activity at all sites before starting work each day.*
3. *Prepare a list of indicators in light of OHS regulations to evaluate the results of supervision and observation and to take further action.*
4. *Familiarize workers with OHS regulations, terminology, and indicators relevant to their respective work categories.*
5. *Ensure supply of OHS equipment as needed and encourage contractors/contractor representatives where necessary.*
6. *Ensure OHS facilities for workers (e.g., first aid box, separate toilets, etc.).*
7. *Ensure supply of personal protective equipment (PPE) as needed at all work locations.*
8. *Ensure use of PPE by workers during work.*
9. *Report any issues of OHS regulation violations in ongoing work to the relevant authority.*
10. *Fill out prescribed forms based on the results of inspections and follow-up inspections.*
11. *Provide training to workers/laborers, contractor representatives, and relevant officials/consultants.*
12. *Assist in the preparation of training materials and participate in the implementation of training activities.*
13. *Inspect the workplace, record compliance and non-compliance with OHS regulations, and prepare and submit reports to the relevant authority.*
14. *Evaluate the improvement in compliance with OHS regulations based on subsequent inspections and determine progress and provide recommendations by comparing with previous inspections.*
15. *Inform the relevant authority of the most hazardous situations and take action as per the advice provided.*
16. *Assist relevant parties in complying with environmental regulations and other related matters.*
17. *Perform applicable roles in implementing clauses 7, 8, 9, 10, 17, 18, 19, and 20 of sub-clause 6.3.1.*
18. *Perform other responsibilities as assigned by the Project Director.*

5. MEASURES FOR PREVENTING ACCIDENTS AND/OR OCCUPATIONAL DISEASES/ILLNESS INCLUDING NOTIFICATION AND RECORD KEEPING

5.1 Definitions

5.1.1 First Aid Injury

First Aid Injury shall mean an injury which does not result in disability and requires first aid and medical treatment to be cured;

5.1.2 Disability Injury

Disability Injury shall mean a work injury that results in total/ Partial disability with permanent/temporary effect;

5.1.3 Death

Death shall mean any fatality resulting from injury irrespective of intervening time between injury and death.;

5.1.4 Hazardous/Dangerous Incidences

The hazardous/dangerous incidences are those which needs to be investigated and reported. Following are the examples of hazardous/ dangerous instances:

5.1.4.1 Explosion

Any sort of explosion:

i. *From boilers used for power/electricity/heating etc.); OR*
ii. *From receiver or storage container resulting from gaseous/ liquid pressure;*

5.1.4.2 Failure/Bursting

Failure/bursting of mechanical power operated revolving wheel/grinder stone etc.

5.1.4.3 Breakdown/Collapse

Breakdown/collapse of hoist/crane/derrick/winch/similar appliances used in carrying /lifting laborers/goods or any part thereof;

5.1.4.4 Overturning

Overturning of a crane without breaking chain or rope sling;

5.1.4.5 Damages to structures etc.

Damage to the structure of any room or place where laborers/persons use to stay or any machine contained therein borne from fire explosion resulting in temporary suspension of routine work in such room or place, or use of machinery or plant;

5.1.4.6 Electric Short Circuit etc.

For any reason related to explosion/fire resulting electrical short circuit or failure of electricity, temporary nonfunctioning of machinery, plant or apparatus etc.

5.2 Classification of Accident/Illness Incidents

Any accident or occupational illness occurring at the construction site is significant for the life, health, work capacity of the worker, and for the safety and credibility of the project. In LGED's OHS management, it is mandatory to follow the prescribed framework for proper classification, reporting, investigation, and remedial measures of such incidents.

To ensure that each incident receives appropriate importance and that worker protection, compensation, and accountability are ensured, this sub-chapter of the Standards classifies accident and illness incidents into two categories:

1. **Disability-Causing Incidents**
2. **Fatal or Permanently Disabling Incidents**

5.2.1 Disability-Causing Accident or Illness

a) *Any accident or occupational illness occurring at the workplace or worksite that causes temporary or partial disability to the worker, or*

b) *Incidents that are identified as hazardous or unsafe occurrences,*

c) *Such incidents must be considered as "Disability-Causing Incidents."*

d) *This definition must be consistent with the definition of hazardous incidents described in Sub-Chapter 5.1.*

5.2.2 Fatal or Permanently Disabling Incidents

a) *Any occupational accident or illness occurring at the workplace that causes death or permanent disability of the worker,*

b) *Such incidents must be classified as "Fatal or Permanently Disabling Incidents."*

c) *Such incidents shall receive the highest priority in reporting, investigation, and compensation management, and must be reported immediately in accordance with Clauses 5.5.1 and 5.5.2.*

5.3 Contractor's Mandatory Compliance with Insurance Provisions

To ensure the safety of workers, third parties, assets, and the environment at construction sites, contract-based insurance coverage is an essential and mandatory requirement. This obligation is clearly defined in Sub-Chapter 6.6 of LGED's OHS Policy, which is applicable to all contracts as per Rule 31(3) of the Public Procurement Rules (PPR 2008).

In order to reduce risks for all parties engaged under the contract, ensure compensation, and establish safe construction management, this sub-chapter of the Standards outlines the procedures for field-level implementation of insurance coverage, verification, renewal, document upload, and actions in case of violation, based on the directives of the aforementioned policy.

5.3.1 Obligation to Obtain Insurance

a) *The contractor must obtain applicable insurance before the contract becomes effective.*
b) *Insurance-related conditions must be included in all tender documents (if not already included, they must be added).*
c) *As per Rule 31(3) of PPR 2008, the procuring authority must include insurance conditions in the contract, and the contract awardee must obtain such insurance before the contract becomes effective.*

5.3.2 Types and Scope of Insurance

The following insurance must be obtained under the contract:

a) *Insurance for compensation related to accidents, health risks, and death of workers/laborers;*
b) *Liability insurance for third-party (where applicable) damages or accidents at the construction site;*
c) *Insurance for damages to machinery, equipment, and assets;*
d) *Insurance for risks related to the project's stipulated timeline and safety.*

5.3.3 Document Upload in E-Contract System

For contract registration, the contractor must upload insurance-related documents (policy, receipt, validity, coverage) in the e-contract management system.

5.3.4 Insurance Verification and Approval

a) *The concerned field office (e.g., Executive Engineer of the respective district or the contract-executing authority) must verify and approve the insurance documents.*
b) *Insurance coverage must be confirmed before the contract becomes effective.*

5.3.5 Insurance Renewal and Updating

a) *If the insurance expires during the contract period, it must be renewed.*
b) *The renewed documents must be uploaded and approved in due time.*

5.3.6 Actions in Case of Insurance Violation

In case of failure to obtain insurance or submission of false documents by the contractor:

a) *Suspension/cancellation of the contract*
b) *Financial penalty*
c) *Disqualification from future tenders*

Appropriate punitive measures must be taken as applicable.

5.3.7 Annual Audit and Reporting

a) *Information regarding the contractor's insurance coverage and renewal must be included in the annual OHS performance audit.*
b) *It must be published in the form of a report.*

5.4 Actions in Case of Contractor's Non-Compliance or Violation of OHS Provisions

Ensuring occupational health and safety (OHS) at construction sites is a highly important and mandatory responsibility of contractors. If the provisions specified in Sub-Chapter 6.7 of LGED's OHS Policy are not properly complied with, it creates serious risks to the lives, health, and dignity of workers, as well as to the effectiveness and credibility of the project.

To ensure proper investigation, correction, punitive measures, and compensation for each violation, this sub-chapter of the Standards outlines a field-level response framework based on the directives of the aforementioned policy in case of contractor's violation of OHS provisions. This shall be considered an integral part of LGED's culture of accountability, commitment to worker protection, and ethical construction management.

5.4.1 Definition of OHS Provision Violation

Failure, negligence, or intentional breach by the contractor in complying with the OHS Policy, Standards, Guidelines, or contract-based safety conditions shall be considered as "Violation of OHS Provisions."

5.4.2 Investigation and Information Collection

a) *Upon receiving a complaint of "OHS Provision Violation," the concerned project/field office must immediately conduct an investigation.*
b) *Written information, testimony, and evidence must be collected.*

5.4.3 Initial Warning and Instruction

a) *In case of the first "OHS Provision Violation," a written warning must be issued.*
b) *Instructions must be given to take corrective measures within the specified timeframe.*

5.4.4 Punitive Measures for Repeated or Serious Violations

In case of repeated or serious violations, one or more of the following measures must be taken:

a) *Suspension/cancellation of specific parts of the contract*
b) *Imposition of financial penalty*
c) *Disqualification from future tenders*
d) *Obligation to provide compensation to workers*
e) *Inclusion of violation record in the contract document*

5.4.5 Measures in Case of Violation of Female Worker Indicators

If the indicators related to safety, gender equality, and grievance resolution for female workers described in Clause 5.2.5 of the OHS Policy are violated, administrative and contractual punitive measures must be taken.

5.4.6 Compensation and Rehabilitation

If "OHS Provision Violation" results in health damage, accident, or death of workers, the contractor must take legal measures to provide compensation and rehabilitation.

5.4.7 Reporting and Documentation

Reports of investigation, decisions, and actions taken for each "OHS Provision Violation" must be prepared and preserved at the concerned field office and LGED Headquarters.

5.4.8 Inclusion in Annual OHS Audit

a) *Incidents of "OHS Provision Violation" must be included in the annual OHS performance audit.*

b) *They must be considered in subsequent training and awareness activities.*

5.5 Reporting Requirements of Incidents/Accidents

Any incident related to occupational health and safety (OHS) at the construction site—such as accidents, injuries, hazardous conditions, violation of PPE provisions, violation of female worker safety, etc.—must be reported immediately.

Through reporting, LGED authorities can take timely action, reduce risks, and make data-driven decisions for the future.

This sub-chapter of the Standards defines the reporting structure, responsible persons, instructions for using the prescribed form, and the designated authorities. The prescribed form (Contractor's Incident Reporting Form to LGED Executive Engineer) shall be attached in the relevant section of LGED's OHS Guidelines.

5.5.1 Reporting by Contractor to Implementing Authority *(Concerned Executive Engineer, District)*

Any accident or illness related to occupational health and safety (OHS) at the construction site must be reported to LGED authorities within the specified timeframe.

Through reporting, worker protection, compensation, risk reduction, and future preventive measures can be ensured. This clause of the Standards defines the reporting structure, timeframe, responsible persons, authorities, and instructions for using the "Contractor's Incident Reporting Form to LGED Executive Engineer." The form shall be attached in the relevant section of LGED's OHS Guidelines.

5.5.1.1 Reporting Obligation and Authority

a) *The contractor/contractor's representative/OHS officer shall report any OHS-related accident or illness occurring at the workplace.*

b) *The report must be submitted using the "Contractor's Incident Reporting Form to LGED Executive Engineer."*

c) *Report receiving authorities:*
   - Executive Engineer of the concerned district;
   - If necessary, Upazila Engineer of the concerned Upazila

5.5.1.2 Reporting Timeframe and Method

a) *Details of the incident must be reported verbally/by telephone within 24 hours of occurrence.*

b) *The report must be submitted within 10 (ten) working days of the incident.*

c) *The report may be submitted directly to the office of the Executive Engineer or sent via email/digital means (where applicable).*

d) *In case of serious or fatal incidents, an immediate verbal report must be followed by a written report.*

5.5.1.3 Report Structure and Content

The "Contractor's Incident Reporting Form to LGED Executive Engineer" shall include the following information:

a) *Contractor and contract details (organization name, address, contract name, value, duration);*
b) *Identification of injured/ill worker, age, gender, occupation, wage, duration of employment;*
c) *Date, time, outcome, and cause of the accident;*
d) *Use of personal protective equipment (PPE);*
e) *Whether the worker was engaged in duty during the accident/illness;*
f) *Type of illness;*
g) *Source (waterborne/airborne), environmental cause;*
h) *Medical details;*
i) *Compensation, medical expenses, burial expenses (if applicable);*
j) *Damage and repair costs of equipment, materials, and property;*
k) *Name, designation, signature of the reporting person and organization seal;*
l) *Other necessary and relevant information related to the incident/accident/illness.*

5.5.1.4 *Report Preservation and Review*

a) *A copy of the report must be preserved at the concerned project/field office.*
b) *LGED Headquarters shall review the reports during the annual OHS audit.*
c) *Based on the report, training, awareness, and corrective measures shall be taken.*

5.5.1.5 *Receipt of Report/Documentation by Concerned Worker*

A copy of the report/documentation of any incident must be delivered to the concerned worker or their duly authorized representative.

5.5.2 Reporting by Executive Engineer to Higher Authority

Upon receiving the contractor's report on workplace accident or illness (in the "Contractor's Incident Reporting Form to LGED Executive Engineer"), the Executive Engineer of the concerned district shall report to the Chief Engineer and higher authorities based on the severity of the incident.

The purpose of this reporting is to ensure awareness at higher levels, policy decision-making, and necessary remedial actions. The report must be submitted using the "Executive Engineer's Reporting Form to Chief Engineer/Higher Authority." This form shall be attached in the relevant section of LGED's OHS Guidelines.

5.5.2.1 *Reporting Timeframe*

The Executive Engineer must submit the report within 10 (ten) working days of receiving the contractor's and investigation officer's report.

5.5.2.2 *Report Receiving Authorities*

a) *Chief Engineer, LGED;*
b) *Chairman of the Central/Head Office-level OHS Committee;*
c) *Additional Chief Engineer (as applicable);*

d) *The report must clearly mention the subject, package number, contractor's name, address, and Upazila name.*

5.5.2.3 *Report Structure and Content*

The "Executive Engineer's Reporting Form to Chief Engineer/Higher Authority" shall include the following information:

a) *Contractor and contract details (organization name, address, contract name, value, duration);*
b) *Identification of injured/ill worker, age, occupation, wage, duration of employment;*
c) *Date, time, outcome, and cause of the accident;*
d) *Details of property damage;*
e) *Use of personal protective equipment (PPE);*
f) *Details of remedial measures taken;*
g) *Type of illness, source (waterborne/airborne), environmental cause;*
h) *Medical details;*
i) *Compensation, medical expenses, burial expenses (if applicable);*
j) *Extent of asset damage and repair details;*
k) *Name, designation, signature of the reporting person and office monogram;*
l) *Other necessary and relevant information related to the incident/accident/illness.*

5.5.2.4 *Report Preservation and Review*

a) *A copy of the report must be preserved at the district office.*
b) *The OHS Committee at the Head Office shall review the report and take necessary action.*
c) *Reports must be included in the annual OHS performance audit.*

6. SAFETY PROVISIONS FOR WORKSITE ESTABLISHMENT

6.1 General Provisions

The construction sites/Worksites should have following common provisions irrespective of category and volume:

6.1.1 Fire, Emergency/Danger Sign and Safety Instructions

Worksite premises shall have adequate fire, emergency or danger sign and safety instructions of standard colors and sizes visible at all times, in accordance with ***Table 6-1*** as bellows:

Table 6-1: Standard Colors of Signs of Safety & Warning

Sl. No	COLOR	PURPOSE OF USE WITH PATTERN	LOCATION WITH EXAMPLE
1.	RED	To call attention to fire protection equipment/ apparatus/facilities	▪ Fire stations and equipment: o Extinguishers; o Pumps; o Buckets; o Hose; o Hydrants etc.; ▪ Fire extinguishing systems: o Valves; o Alarm; o Sprinkler; o Piping, etc. ▪ Fire protection materials; o Doors; o Blankets; o Extinguishing agents. Etc. ▪ Identification of Danger/Stop Signals: o Red lights placed on barricades at temporary obstruction; o Temporary construction; o Stop buttons for electrical switches used for emergency stopping of machinery; o Emergency stop sirens on hazardous machines.
2.	GREEN	Levelling Safety	▪ Indicating of Location of first-Aid equipment; ▪ Indicating Location of safety and connected devices; ▪ Indicating Safety bulletin boards.
3.	WHITE	Traffic and Housekeeping Marking:	▪ Housekeeping: o Location of waste bins;

Sl. No	COLOR	PURPOSE OF USE WITH PATTERN	LOCATION WITH EXAMPLE
		▪ White, black, or a combination are the basic colors to display traffic and housekeeping marking; ▪ Solid white, solid black, single-color stripping or alternate stripes of black and white are common pattern.	○ White corners for rooms or passageways; ○ Location of the source of Drinking water and food serving equipment/facilities etc.; ▪ Traffic: ○ Location and width of passageway; ○ Dead ends of passageways; ○ Stairways; and ○ Directional signs etc.
4.	YELLOW	Cautionary Marking: ▪ To assign caution and for marking physical hazards, such as striking against, stumbling, falling, tripping, and "caught in between"; ▪ Solid yellow, yellow and black stripes, yellow and black checkers or yellow with suitable contrasting background shall be used alternately so as to ensure the targeted attention.	▪ Construction Equipment: ○ Bull-dozers, tractors, handrails, guardrails; ▪ Stairways/top and bottom treads where caution is needed; ▪ Cranes and lower pulley blocks; ▪ Piping systems containing dangerous materials; ▪ Waste container for highly combustible materials.
5.	ORANGE	To Express Alertness: ▪ To assign dangerous parts of machines or equipment which may cut, crush, shock or otherwise injure; ▪ To emphasize such hazards when: ○ Doors of enclosure are open; ○ Gear, belt or other guards around moving equipment are open; ○ Unguarded hazards are removed, exposed.	▪ Show the sign "Do not open or remove"; ▪ The inside of movable protections; ▪ Starting buttons and boxes for Safety; ▪ Exposed parts of gears, pulleys, rollers, cutting devices; ▪ Inside the door of box or cover of open fuse, power and electrical switch boxes.
6.	Blue	To Denote Precaution: ▪ To denote caution; ▪ Limited to warning against starting;	▪ "Under Repair" signals warning *(regarding of danger of use)* while undergoing repairs of: ○ Elevators ○ Kiln;

Sl. No	COLOR	PURPOSE OF USE WITH PATTERN	LOCATION WITH EXAMPLE
		▪ Use of or the movement of equipment which is under repair or being worked upon.	○ Boilers; ○ Electrical controls; ○ Ladders; ○ Scaffolding; ○ Vaults, etc.
7.	Purple	To Denote Hazards: ▪ Purple is used in combination with Yellow for markers	▪ Tags; ▪ Labels; ▪ Signs; ▪ Floor markers etc.

6.1.2 Necessary Visible Signs

Visible signs that may be needed to direct the driver of motorized vehicle such as:

a. *STOP;*
b. *MAXIMUM SPEED IS 20 Km (As Applicable);*
c. *SLOW DOWN;*
d. *DO NOT ENTER;*
e. *CONSTRUCTION WORK IS GOING ON;*
f. *DIVERSION AHEAD; etc.*

Should be properly positioned within the compound of the worksite to increase safety especially during the night;

6.1.3 Necessary Visible Signs for PPE

Contractor shall display signage at specific places at the Construction Site where wearing PPE is mandatory as bellows:

a. *HEAD PROTECTION*
b. *EYE PROTECTION*
c. *PROTECTIVE FOOTWEAR*
d. *EYE AND FACE PROTECTION*
e. *EAR PROTECTION*
f. *RESPIRATORY PROTECTION EQUIPMENT*
g. *HAND GLOVES*
h. *BODY PROTECTION*
i. *SAFETY VESTS*

6.1.4 Safety for Handicapped Employees (if any)

Handicapped employees (if any) should be:

a. *Restricted to designated areas of worksite only;*
b. *Provided with facilities for safe and convenient movement within the worksite as far as practicable and feasible;*

6.1.5 Cleanliness

Good housekeeping shall be maintained at all times through cleanliness of:

a. *Labor camp,*

b. *Worksite Premises;*
c. *Yards (if any);*
d. *Machines;*
e. *Equipment;*
f. *Regular waste disposal;*
g. *Methodical arrangement of procedures and Operations;*
h. *Storage of materials; etc.*

6.1.6 Personal Facilities

a. *Adequate comfort rooms and separate lavatories for male and female workers in accordance with* ***article 5.2, Chapter:5*** *of OHS Policy for LGED;*
b. *Adequate dressing rooms for female workers and locker rooms for male workers shall be provided (in applicable cases).*

6.2 Safety of Workplaces/Worksites

6.2.1 Precautions

All types of appropriate precautions shall be taken to ensure:

a. *Workplaces/worksites are safe;*
b. *Free of the risk of injury;*
c. *Free from the risk of induced illness.*

6.2.2 Safe Entry and Exit

Safe means of:

a. *Access to the workplace/worksite shall be provided;*
b. *Exit from the workplaces/worksite should be provided, maintained and indicated (in applicable cases).*

6.2.3 Protection of laborers/persons present at or in the vicinity of construction site

All appropriate precautions shall be taken to protect laborers/persons present at or in the vicinity of construction site from all potential risks which may arise from such site.

6.2.4 Maintenance (Minor/Major/Rehabilitation/Capacity Expansion) and Replacement/ New Construction

a. *All constructions either permanent or temporary shall be structurally safe and sound enough to prevent their collapse;*
b. *Roof shall strong enough to withstand normal load, cyclone/ strong winds and able to carry suspended loads (in applicable cases);*
c. *Foundations and floors shall have sufficient strength to bear design loads safely and mandatorily no overloading;*
d. *Detail plans for the premises for proposed Maintenance (Minor/ Major/Rehabilitation/Capacity Expansion) and/or Replacement/ New Construction shall be submitted to the Executive Engineer, concerned district/Upazila Engineer, Concerned Upazila for examination and approval.*

6.2.5 Space Provision for Rooms

a. *Rooms shall be at* ***least 2.75 meters (9 ft.)*** *in height from the floor to the ceiling. For air-conditioned and option of free movement it may be* ***2.60 meter (8.5 ft.)***
b. *Adequate spaces shall be provided between machinery or equipment to allow normal operation, maintenance or repair and free flow of materials under process or in finished form;*
c. *Passageways between machinery or equipment shall not be* ***less than 60 cm. (24 in.).***

6.2.6 Surface Area for Walkways

a. *Potential Dangers:*
    i. *The floors shall be sufficiently even for safe walking and safe trucking of materials;*
    ii. *The walking area of floors shall be free from holes/splinters, improperly fitted channels etc. or conduits, nails and bolts, projecting*

valves or pipes, or other projections or obstructions that may cause harms.

b. *Potential Danger of Slipping:*

   i. *Under no circumstances, floors, stair-treads and landings shall remain slippery;*

   ii. *Floors, stair-treads and landings should not be made of such material that may become slippery enough through wear as a result of longer use causing harms.*

   iii. *Components with potential risk of slipping (such as Platforms stairways, ramps, elevator and similar places) shall be provided with non-slipping walkway surface.*

6.2.7 Openings in Floor and Wall (Window, Manhole, Stairway etc.)

a. *Opening for Movement/Placement of Ladders*

   i. *All exposed sides of the openings of floor for ladderway shall be guarded on by permanent railings and toe boards (except the entrance);*

   ii. *A barrier or gate shall be arranged in front of the passage of railings so that nobody can directly walk through the opening.*

b. *Openings for Stairway*

   i. *All exposed sides of the openings of floor for stairway shall be guarded on by permanent railings and toe boards (except the entrance);*

   ii. *Openings like hatch, chute and trap door shall be protected by:*

      - Removable railings with toe boards on two sides (maximum); and
      - Permanent railings with toe boards on all other exposed sides;
      - For openings of the floor for stairways, flush-hinged covers may be used.

c. *Openings for Manholes etc.*

   i. *Floor openings for manhole shall be protected by hinge-free and strong enough manhole covers;*

   ii. *Floor openings with possibility of accidental walk shall be protected either by permanent railings and toe boards on all exposed sides or by strong hinged covers;*

   iii. *If protection of type (1) or (2) mentioned above are not available, the opening shall be constantly attended to by someone or protected by portable enclosing railings;*

   iv. *Opening on the floor obstructed by fixed machinery, equipment or wall, shall be protected by covers having openings not more than 2.5 cm. (1 inch) in width;*

   v. *Openings on wall with a size less* ***than 75 cm (3.3 ft.) x 75 cm (2.5 ft.)*** *placed at height less* ***than I meter (3.3 ft.)*** *from the floor, shall be firmly enclosed or protected by strong barriers to tackle sufficient loads (e.g. wind etc.) applied from any direction at any point;*

   vi. *Openings on the wall with lower edge near the floor level on the rear side and* ***2 meters (6.6 ft.)*** *or more above ground or floor level on the far side (irrespective of their width) shall, be protected by:*

      - A toe board across the bottom of the opening;
      - A solid screen or grill with openings not more than 2.5 cm. (1 in.) in width capable of resisting sufficient horizontal loads/ thrust applied at any point.

6.2.8 Erection of Railings

a. *Railings shall be made of wood, pipe, metal or other material with satisfactory strength;*
b. *Height of the railings shall be not less than* ***1 meter (3.3 ft.)*** *from the floor level to the upper end of the top rail;*
c. *Spacing of railings posts shall be not more than* ***2 meters (6.6 ft.);***
d. *Intermediate rail shall be placed halfway between the top rail and the floor;*
e. *The dimensions of railings, posts, anchorage and framing of members shall be capable of sustaining sufficient load applied from any direction to any point of the top rail;*
f. *Railings shall be made of sound materials free from any types of defects;*
g. *All the sharp corners of railings and posts etc. shall be rounded and smoothly finished.*

6.2.9 Setting of Toe Boards

a. *The height of toe-boards shall be not less than* ***15 cm. (6 in.);***
b. *The material for construction may be wood, iron, steel or similar;*
c. *Shall be fastened securely with* ***maximum 6 mm. (0.3 in.)*** *clearance above the floor level.*

6.2.10 Construction of Stair (in applicable cases)

a. *Load Bearing Capacity*

   Stairs, landings and platforms shall be capable of bearing a live load and factor of safety as per ACI code and prevailing LGED practice.

b. *Clear Width*

   Minimum clear width of stairs (except service stairs) shall be 1.10 meters (3 ft. 7 in.), with handrails, and ***0.90 meter. (2 ft. 11 in.)*** *without handrails.*

c. *Pitch of Stair*

   The minimum and maximum pitch shall be as per ACI Code and prevailing LGED practice for structural design.

d. *Headroom Clearance*

   i. *Headroom clearance shall be provided at all applicable points in the stair;*
   ii. *Minimum vertical clearance shall* ***2.0 meters (6 ft. 7 in.)*** *from the top of the tread in line with the face of the riser.*

e. *Treads and Rises of the Stair*

   i. *Minimum width of treads shall* ***25cm. (9in.)*** *without nosing and projections (if any);*
   ii. *Maximum height of riser shall* ***25 cm. (9 in.);***
   iii. *In any flight there shall be no variation in width of treads and height of risers;*
   iv. *Top and bottom of the flight of stairs shall be clearly distinguished.*

f. *Railings for Stairs:*

   i. *Stairs with four or more risers shall be provided with railings on any open side (at least one side);*
   ii. *Railings shall be made with wood, pipe, metal or other adequately strong materials;*
   iii. *Stairways with a width less than* ***1.12 meters (3 ft. - 8 in.)*** *shall be provided with minimum one handrail preferably on the right-side descending;*

iv. *Stairways with a width greater than **1.12 meters (3 ft. - 8 in.)** shall be provided with one railing on each open side and one handrail on each enclosed side;*

v. *Limit of the height shall **be >= 90 cm. (35 in.) and <= 80 cm (31 in.)** (from the upper surface of the top rail to the surface of the tread in line with the face of the riser at the forward edge);*

vi. *Handrails shall be continuous without obstruction except those needed to prevent persons from sliding.;*

vii. *For mounting handrails directly on walls/partitions shall be fixed by brackets attached to the lower side of the rail so that it doesn't harm the smoothness of the surfaces of the rails;*

viii. *The spacing of brackets shall be less **than 2 meters (6 ft. - 6 in.) with** sufficient length to provide satisfactory clearance between the rails and the wall;*

g. *Ramps*

i. *For climbing or descending from one level to other, the rise of ramps shall not cross **1 in 10** conforming to all applicable construction requirements of stairs;*

ii. *For trucking or handling heavy loaded/stressed materials ramps shall be provided with heavier stock, closely spaced of posts, bracing etc.*

6.2.11 Opening for Windows

a. *Openings for window at stair landings, shall be protected by bars/ boards/grills/glass (as applicable and feasible) to prevent persons from falling through;*

b. *Opening for residential room windows (if any) should be placed/provided following the general provisions as per LGED practice in designing windows for residential purposes;*

c. *The openings of residential room windows (if any) shall be protected with bars/boards/grills/glass (as applicable and feasible).*

6.2.12 Fixed Ladders

a. *Where work cannot safely be done on or from the ground or from part of a Bridge /building/other permanent structure, a safe and suitable fixed ladders shall be provided and maintained or other equally safe and suitable provision shall be made;*

b. *Where there is no alternative safe means of access to elevated working places, suitable and sound ladders shall be provided. Fixed ladders used to ascend heights exceeding **9 meters (30 ft.)** shall be installed as follows:*

i. For each **6 meters (20 ft.)** or fraction thereof a landing platform shall be provided;

ii. The sections of the ladder shall be staggered;

iii. If (i) or (ii) is not applicable, other types of applicable protections shall be provided

c. *The fixed ladder shall be properly secured against involuntary movement.*

d. *Fixed ladders made of steel, wrought iron, cast iron or similar materials of equivalent strength shall be used;*

6.2.13 Stack Yards (for plant/storage etc.)

a. *Surface of Stackyard*

i. *Surface of yard shall be constructed providing appropriate drainage system and slopes/grades (where necessary) to facilitate:*

- Safe access to the construction site/worksite of bridge/ building/other structure;

- Safe handling of materials and equipment;

ii. *Providing necessary covering or protection to enclose:*

- Drain pools and catch basins;
- Ditches, pits, and other hazardous openings;

iii. *Walkways/roadways/railroad tracks (in applicable cases) shall be carefully placed to avoid potential dangers at slopes/ grades/crossings.*

b. *Walkways in Stackyard*

i. *Walkways shall be constructed following the shortest route among important points considering highest level of safety;*

ii. *Walkways shall not be constructed under attics/ cornice of structure (Bridge/building/Other structure) to avoid potential slipping danger;*

iii. *Protections (like railings/Fences) shall be provided:*

- On bridges, along walkways, on steep slopes, at slippery places;
- At places where there is possibility of injuries by passing vehicles.

c. *Roads in the Stackyard*

i. *Roads for vehicles movement (automobiles/tractors/ Trucks etc.) shall be constructed considering the highest level of quality and safety;*

ii. *Roads shall have sufficient width as per LGED provision for movement of applicable vehicles in context of the worksite/contract;*

iii. *Sufficient clearance from overhead structures shall be provided following prevailing convention of LGED;*

iv. *Necessary slopes/grades shall be provided in applicable cases with necessary engineering specification as per prevailing LGED convention;*

v. *Necessary railings/walls/fences shall be provided along bridges/slopes/grades/sharp curves etc. with necessary engineering specification as per prevailing LGED convention.*

6.2.14 Gates of the Premises/Yard

a. *In case of surrounded premises, separate entrance and exit gates shall be provided for pedestrian and vehicular traffic;*

b. *Pedestrian gates shall be:*

i. Located at a safe distance from gates for vehicular traffic;

ii. Provided with sufficient width to permit safe and easy and free passage during rush hours;

6.2.15 Parking for Vehicles

Where parking space is provided for automobiles, Provisions/regulations as per prevailing practice of LGED covering:

i. *The use of driveways for entry and exit;*

ii. *Speed limits;*

iii. *Space allocation;*

iv. *Methods of parking shall be provided and strictly enforced.*

6.2.16 Lighting Condition in the Construction Worksite

Proper lighting conditions are essential for ensuring the safety and efficiency of construction worksites. Here are comprehensive OHS provisions to manage lighting conditions:

a. *Adequate Illumination:*

- *Ensure all work areas, including pathways, stairways, and equipment, are adequately illuminated;*

- *Use lighting that provides sufficient brightness for the type of work being performed and the specific work environment.*

b. *Temporary Lighting:*
   - *Install temporary lighting in areas where permanent lighting is not yet available;*
   - *Ensure temporary lighting is securely mounted and protected from damage.*

c. *Emergency Lighting:*
   - *Provide emergency lighting to ensure safe egress in the event of power failure;*
   - *Test emergency lighting systems regularly to ensure they are functional.*

d. *Glare and Shadows:*
   - *Minimize glare and shadows that can obscure vision and create hazards;*
   - *Use diffused lighting or adjustable fixtures to reduce glare and evenly distribute light.*

e. *Portable Lighting:*
   - *Equip workers with portable lighting, such as headlamps or handheld torches for tasks in confined or poorly lit areas;*
   - *Ensure portable lighting devices are durable, explosion-proof (if necessary), and have adequate battery life.*

f. *Lighting Maintenance:*
   - *Regularly inspect and maintain all lighting fixtures to ensure they are operational and clean;*
   - *Replace burnt-out bulbs promptly and ensure all lighting equipment is in good working condition.*

g. *Specific Task Lighting:*
   - *Provide additional task lighting for activities that require precision or involve detailed work;*
   - *Ensure task lighting is adjustable and directed to the specific area where it is needed.*

h. *Night Work:*
   - *If work is conducted at night, ensure the entire worksite is adequately illuminated to replicate daylight conditions;*
   - *Implement additional safety measures, such as reflective clothing and signage, to enhance visibility.*

i. *Electrical Safety:*
   - *Ensure all lighting installations comply with electrical safety standards and are properly grounded;*
   - *Protect lighting cables from damage and avoid placing them in high-traffic areas where they could be tripped over or damaged.*

By adhering to these provisions, construction sites can ensure a safe and well-illuminated environment, reducing the risk of accidents and improving overall productivity.

7. KEY PERFORMANCE INDICATORS (KPIs)/ ISSUES OF OHS TO BE COMPLIED WITH AS PER PREVAILING LGED PRACTICE

In the context of Local Government Engineering Department (LGED) practices, it is crucial to establish and monitor Key Performance Indicators (KPIs) to ensure effective management and compliance with Occupational Health and Safety (OHS) standards. These KPIs serve as measurable values that demonstrate how effectively LGED is achieving its key business objectives, particularly in maintaining a safe and healthy work environment. The indicators those are in prevailing practice of LGED are as follows:

7.1 Safe Drinking Water at Construction Worksite

Safe drinking water is essential for the health and well-being of workers at construction sites. Proper management ensures a reliable supply of clean water, free from contaminants.

7.1.1 Examples of Contaminants that Require Compliance with Safe Drinking Water Provisions

- ***Bacteria and Viruses:*** *Pathogens such as E. coli, Salmonella, and Hepatitis A can contaminate water sources and cause illness.*
- ***Chemicals and Heavy Metals:*** *Contaminants like lead, arsenic, and pesticides can be harmful to health when present in drinking water.*
- ***Sediments and Particulates:*** *Physical contaminants such as dirt, sand, and rust particles can affect water quality and safety.*

7.1.2 Examples of Safe Drinking Water Measures

- ***Water Filtration Systems:*** *Devices that remove impurities and contaminants from water, ensuring it is safe for consumption.*
- ***Chlorination:*** *The process of adding chlorine to water to disinfect and kill harmful microorganisms.*
- ***Reverse Osmosis Systems:*** *Advanced filtration systems that remove a wide range of contaminants, including bacteria, viruses, and chemicals.*
- ***Boiling Water:*** *A simple and effective method to kill pathogens and make water safe for drinking.*

7.1.3 Negative Impacts of Unsafe Drinking Water

7.1.3.1 Health and Safety Impacts

- ***Increased Risk of Waterborne Diseases:*** *Contaminated water can lead to diseases such as cholera, dysentery, and typhoid fever.*
- ***Long-term Health Issues:*** *Prolonged consumption of contaminated water can cause chronic health problems, including kidney damage and gastrointestinal illnesses.*

7.1.3.2 Operational Impacts

- ***Decreased Productivity:*** *Health issues related to unsafe drinking water can result in absenteeism and decreased workforce productivity.*

- ***Increased Healthcare Costs:*** *Treating waterborne diseases and related health issues can lead to higher medical expenses for individuals and communities.*

7.1.3.3 Legal and Financial Impacts

- ***Fines and Penalties:*** *Non-compliance with water safety regulations can result in fines and penalties from health authorities.*
- ***Reputation Damage:*** *Failing to provide safe drinking water can tarnish the reputation of organizations and communities, affecting public trust and relationships.*

7.1.4 Positive Impacts for Compliance with Safe Drinking Water Standards

7.1.4.1 Health and Safety Impacts

- ***Prevention of Waterborne Diseases:*** *Providing safe drinking water helps prevent the spread of waterborne illnesses and improves overall health.*
- ***Enhanced Health Outcomes:*** *Access to clean water supports better hydration, digestion, and overall physical health.*

7.1.4.2 Operational Impacts

- ***Increased Productivity:*** *Healthy individuals are more productive and less likely to miss work due to water-related illnesses.*
- ***Community Well-being:*** *Access to safe drinking water enhances the quality of life and promotes the well-being of communities.*

7.1.4.3 Legal and Financial Impacts

- ***Compliance with Regulations:*** *Meeting water safety standards ensures compliance with health and environmental regulations, avoiding legal issues.*
- ***Cost Savings:*** *Reducing the incidence of waterborne diseases lowers healthcare costs and minimizes financial burdens on communities.*

7.1.5 General Provisions for Safe Drinking Water

To ensure the safety and health of all laborers, personnel, and other employees working at the worksites, the following general provisions shall be complied with at the worksite:

7.1.5.1 When to Use Safe Drinking Water Facilities

- ***Working with Heavy Machinery:*** *Ensuring workers remain hydrated to prevent fatigue and maintain safety.*
- ***Handling Hazardous Materials:*** *Providing clean water for washing hands and minimizing contamination.*
- ***Hot Weather Conditions:*** *Preventing heat-related illnesses by ensuring access to cool, potable water.*
- ***Extended Work Hours:*** *Offering hydration to sustain energy and focus during long shifts.*
- ***Remote Locations:*** *Guaranteeing safe drinking water where municipal supply may be limited.*
- ***Chemical Exposure:*** *Enabling rinsing and washing to prevent ingestion of harmful substances.*
- ***High Physical Exertion:*** *Supporting hydration for tasks requiring significant physical effort.*

- ***Community and Environmental Responsibility:*** *Promoting sustainable practices and ensuring workers' health.*

7.1.5.2 Where to Use Safe Drinking Water Facilities

- ***On scaffolding, ladders, and roofs:*** *Hydration stations accessible to workers at height to prevent dehydration and related risks.*
- ***When working on structural steel or high-rise buildings:*** *Easily accessible water sources on various levels to maintain hydration.*
- ***During demolition work:*** *Clean water points to wash off dust and contaminants.*
- ***Operating or working near heavy machinery and equipment:*** *Hydration stations positioned nearby to support worker safety and efficiency.*
- ***While handling hazardous materials:*** *Stations equipped with cleaning and hydration facilities to minimize risks.*
- ***On wet or uneven surfaces:*** *Water points designed to prevent slips while accessing hydration.*
- ***In areas where hazardous chemicals are used or stored:*** *Providing safe drinking water to prevent accidental ingestion.*
- ***When working near exposed wiring or electrical equipment:*** *Locations with safe access to water without electrical hazards.*
- ***When carrying or moving heavy materials:*** *Hydration stations to support worker health and reduce risk of injury.*

7.1.5.3 Provision of Safe Drinking Water

- *Ensure an adequate supply of clean and safe drinking water is available at all times;*
- *Clean, potable, cool drinking water needs to be provided for employees as drinking enough fluids is essential for normal body functioning;*
- *Regularly test water quality to ensure it meets safety standards.*

7.1.5.4 Water Dispensers and Containers

- *Provide safe, clean, and hygienic water dispensers and containers for water storage;*
- *Ensure water dispensers are easily accessible to all workers.*

7.1.5.5 Personal Hygiene

- *Educate workers on the importance of drinking safe water and maintaining personal hygiene;*
- *Provide adequate handwashing facilities near drinking water stations.*

7.1.5.6 Maintenance and Sanitation

- *Regularly clean and maintain water storage tanks and dispensers to prevent contamination;*
- *Implement proper waste disposal systems to prevent water source contamination.*

7.1.5.7 Accessibility

- *The water needs to be clean and accessible to all employees at all times particularly during hot weather;*

7.1.5.8 *Separate Outlets*

- *Outlets for drinking water shall be separated from washing/kitchen/ other facilities to avoid potential contamination.*

7.1.5.9 *Emergency Provisions*

- *Establish protocols for providing safe drinking water during emergencies, such as natural disasters or water supply interruptions;*
- *Maintain a stock of bottled water for emergency use.*

7.1.6 Standards/Specifications

The following standards/specifications shall be adhered to for managing safe drinking water at construction worksites:

7.1.6.1 *Water Quality Standards*

- *Ensure that drinking water meets the safety standards set by relevant health authorities;*
- *Conduct regular water quality testing and document results.*

7.1.6.2 *Water Source and Treatment*

- *Source drinking water from reliable and safe sources;*
- *Treat water using appropriate methods (e.g., filtration, chlorination) to ensure its safety.*

7.1.6.3 *Water Storage and Distribution*

- *Use food-grade materials for water storage tanks and distribution systems;*
- *Regularly inspect and maintain water storage and distribution systems to prevent contamination.*

7.1.6.4 *Worker/Laborer Education and Training*

- *Provide regular training sessions to educate workers about the importance of drinking safe water and proper hygiene practices;*
- *Distribute informational materials, such as posters and pamphlets, outlining safe water practices.*

7.1.6.5 *Communication and Coordination*

- *Establish and maintain clear communication channels for informing all workers about water safety and hygiene measures;*
- *Assign a designated employee responsible for monitoring water quality and coordinating emergency response actions.*

7.1.6.6 *Charge for Water*

- *Drinking water should be Free of charge;*

7.1.6.7 *User Threshold*

- *Quantity of supply from one supply point shall be made enough for minimum 40 employees or part thereof;*

7.1.6.8 *Distance of Supply Source*

- *Source of supply shall be nearby or within reach of employees so that they need not to leave their work/task for this purpose only;*

7.1.6.9 *Provision for Temporary Workplace*

- *In temporary workplaces/worksites for employees (like delivery workers, transport drivers, security personnel, sales representatives,*

emergency personnel, or mobile community health employees etc.) contractors shall identify nearby public drinking water facilities;

- *The employees mentioned above shall be provided with bottled water or containers to take water with them free of cost if no public/alternate facilities are not available in the reachable vicinity.*

7.1.6.10 Provision for Tube Well, Filter and others

Drinking water provided by the contractor shall be:

- ✓ Delivered through (preferably deep) tube well;
- ✓ From outlets separated from toilet/washing facilities to avoid potential contamination irrespective of source;
- ✓ Arranged for carrying and preserving the water hygienically disposable/washable containers/pots;
- ✓ Where provision of tube well is not feasible, water purifying apparatus like "water filters" shall be provided;
- ✓ The filters shall be tested, cleaned, changed and maintained regularly to avoid potential contamination and risk of water borne diseases.

7.1.7 Standard Values/Parameters

The Water Quality Parameters Bangladesh Standards as per WHO Guide lines are standardized by the Department od Public Health Engineering ***(Table 7-1)***. LOGED will follow the standard as per available laboratory facilities within the scope of the contract agreement concerned.

Table 7-1:Water Quality Parameters as per Bangladesh Standards & WHO Guide Lines*

Sl.	Water Quality Parameters	Bangladesh Standards (mg/L)	WHO Guide Line	Methods/ Equipment for Testing
1	Aluminum	0.2	-	Atomic Absorption Apectrophotometer (AAS)
2	Ammonia	0.5		UV-VIS
3	Arsenic	0.05	0.01	AAS
4	Barium	0.01	0.7	AAS
5	Benzene	0.01	0.01	Gas Chromatograph
6	BOD 5 Day, 200C	0.2	-	5 days Incubation
7	Boron	1.0	-	UV-VIS
8	Cadmium	0.005	0.003	AAS
9	Calcium	75	-	AAS
10	Chloride	150-600	-	Titrimetric
11	Chlorinated Alkenes			
11.1	Carbon tetrachloride	0.01	0.004	Gas Chromatograph
11.2	1.1 Dichloroethelene	0.001	0.03	Gas Chromatograph
11.3	1.2 Dichloroethelene	0.03	0.03	Gas Chromatograph
11.4	Tetrachloroethylene	0.03	0.04	Gas Chromatograph
11.5	Trichloroethylene	0.09	0.07	Gas Chromatograph
12.1	Pentachlorophrnol	0.03	0.009	Gas Chromatograph
12.2	2,4,6-Trichlorophenol	0.03	0.2	Gas Chromatograph
13	Chlorine (Residual)	0.2	-	Titrimetric

Sl.	Water Quality Parameters	Bangladesh Standards (mg/L)	WHO Guide Line	Methods/ Equipment for Testing
14	Chloroform	0.09	0.2	Gas Chromatograph
15	Chromium (Hexavalent)	0.05	-	Iron Chromatograph
16	Chromium (Total)	0.05	0.05(P)	AAS
17	COD	4	-	Closed Reflux Method
18	Coli form (Faecal)	0 CFU (N/100mL)	0	Membrane Filtration Method
19	Coli form (Total)	0 CFU (N/100mL)	0	Membrane Filtration Method
20	Color	15 Hazen	-	Color Comparator
21	Copper	1	2	AAS
22	Cyanide	0.1	0.07	UV-VIS/Specific Ion Electrode
23	Detergent	0.2	-	UV-VIS
24	DO	6	-	Multimeter
25	Electric Conductivity	-us/cm	-	Multimeter
26	Fluoride	1	1.5	UV-VIS
27	Hardness as $CaCO_3$	200-500	-	Titrimetric
28	Iodine	200-500	-	Titrimetric
29	Iron	0.3-1.0	-	AAS
30	Kjelhl Nitrogen (Total)	1	-	UV-VIS/ Digestion
31	Lead	0.05	0.01	AAS
32	Magnesium	30-35	-	AAS
33	Manganese	0.1	-	AAS
34	Mercury	0.001	0.001	Mercury Analyzer
35	Nickel	0.1	0.02(P)	AAS
36	Nitrate	10	50.0 as N	UV-VIS
37	Nitrite	<1	3.0(0.2)	UV-VIS
38	Oduor	Odorless	-	Threshold Method
39	ORP (Eh)	-	-	ORP meter
40	Oil and Grease	0.01	-	Oil and Grease meter
41	pH		6.5-8.5	pH Meter
42	Phenolic Compounds	0.002	-	Gas Chromatograph
43	Phosphate	6	-	UV-VIS
44	Phosphorus	0	-	Digestion
45	Potassium	12	-	AAS
46	Radioactive Materials (Gross Alpha Activity)	0.01 Bq/L	0.5 Bq/L	-
47	Radioactive Materials (Gross Beta Activity)	0.1 Bq/L	1.0 Bq/L	-

Sl.	Water Quality Parameters	Bangladesh Standards (mg/L)	WHO Guide Line	Methods/ Equipment for Testing
48	Salinity	-%o	-	Multimeter
49	Selenium	0.01	0.01	AAS
50	Silver	0.02	-	AAS
51	Sodium	200	-	AAS
52	Suspended Solids	10	-	Filtration and Drying
53	Sulphide	0	-	UV-VIS
54	Sulphate	400	-	UV-VIS
55	Taste	-	-	Threshold Method
56	Total Alkalinity	-	-	Titrimetric
57	Total Dissolved Solid	1000	-	Multimeter
58	Temperature	20-30C		Thermometer
59	Tin	2	-	AAS
60	Turbidity	10 NTU	-	Turbidity meter
61	Zinc	5	-	AAS

**Adapted from Department of Public Health Engineering Website*

7.1.8 Key Obligations

7.1.8.1 LGED Authority Concerned

The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.1.8.2 Contractor Concerned

The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.6 Section:6)***

7.1.8.3 Laborer Concerned

The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.8, Section:6).***

7.2 Sanitation Facilities at Construction Worksite

Access to proper sanitation facilities is crucial for maintaining the health, hygiene, and well-being of workers at construction sites. Effective management of sanitation ensures a safe and clean environment, reducing the risk of illness and promoting productivity.

7.2.1 Examples of Contaminants That Require Compliance with Provisions for Sanitation Facilities

- ***Human Waste:*** *Proper disposal is necessary to prevent the spread of diseases and contamination of water sources.*
- ***Chemical Waste:*** *Safe disposal of chemicals used in construction to avoid harmful exposure.*
- ***Debris and Trash:*** *Regular removal of construction debris and trash to maintain cleanliness and prevent hazards.*

7.2.2 Examples of Sanitation Measures

- ***Portable Toilets:*** *Ensuring availability and regular maintenance of portable toilets to provide workers with clean facilities.*
- ***Handwashing Stations:*** *Providing handwashing stations equipped with soap and clean water to promote hygiene.*
- ***Waste Disposal Systems:*** *Implementing proper waste disposal systems to manage both human and chemical waste effectively.*
- ***Regular Cleaning:*** *Scheduling regular cleaning and maintenance of sanitation facilities to ensure their continued hygiene and functionality.*

7.2.3 Negative Impacts of Poor Sanitation Facilities

7.2.3.1 Health and Safety Impacts

- ***Increased Risk of Disease:*** *Poor sanitation can lead to the spread of diseases such as diarrhea, cholera, and hepatitis.*
- ***Long-term Health Issues:*** *Continued exposure to unsanitary conditions can cause chronic health problems, including gastrointestinal illnesses and skin infections.*

7.2.3.2 Operational Impacts

- ***Decreased Productivity:*** *Health issues related to poor sanitation can result in absenteeism and decreased workforce productivity.*
- ***Increased Healthcare Costs:*** *Treating diseases and health issues arising from poor sanitation can lead to higher medical expenses for individuals and communities.*

7.2.3.3 Legal and Financial Impacts

- ***Fines and Penalties:*** *Non-compliance with sanitation regulations can result in fines and penalties from health authorities.*
- ***Reputation Damage:*** *Failing to provide adequate sanitation facilities can tarnish the reputation of organizations and communities, affecting public trust and relationships.*

7.2.4 Positive Impacts for Compliance with Sanitation Standards

7.2.4.1 Health and Safety Impacts

- ***Prevention of Diseases:*** *Proper sanitation facilities help prevent the spread of diseases and improve overall health.*

- ***Enhanced Health Outcomes:*** *Access to clean and sanitary facilities supports better hygiene and overall physical health.*

7.2.4.2 *Operational Impacts*

- ***Increased Productivity:*** *Healthy individuals are more productive and less likely to miss work due to health issues related to poor sanitation.*
- ***Community Well-being:*** *Access to proper sanitation enhances the quality of life and promotes the well-being of communities.*

7.2.4.3 *Legal and Financial Impacts*

- ***Compliance with Regulations:*** *Meeting sanitation standards ensures compliance with health and environmental regulations, avoiding legal issues.*
- ***Cost Savings:*** *Reducing the incidence of diseases related to poor sanitation lowers healthcare costs and minimizes financial burdens on communities.*

7.2.5 General Provisions for Sanitation Facilities

To ensure the health and well-being of all laborers, personnel, and other employees working at the worksites, the following general provisions shall be complied with at the worksite:

7.2.5.1 *When to Use Sanitation Facilities*

- ***Working with Hazardous Materials:*** *Ensuring proper disposal and cleanliness to prevent contamination.*
- ***Heavy Physical Work:*** *Providing sanitation facilities for workers to freshen up after intensive tasks.*
- ***Extended Work Hours:*** *Maintaining hygiene during long shifts.*
- ***Remote Locations:*** *Ensuring sanitary facilities where access may be limited.*
- ***Chemical Exposure:*** *Allowing workers to cleanse and prevent skin irritation or burns.*
- ***Community and Environmental Responsibility:*** *Promoting cleanliness and health standards.*
- ***High Workforce Density:*** *Supporting hygiene in crowded work environments.*
- ***Bridge Construction Specific:***
- ***Weather Conditions:*** *Facilities equipped to handle extreme weather conditions, ensuring cleanliness and usability.*
- ***Height and Accessibility:*** *Easily accessible sanitation units on high structures, ensuring safety and hygiene.*

7.2.5.2 *Where to Use Sanitation Facilities*

- ***Near Workstations:*** *Easily accessible sanitation units close to work areas to maintain hygiene.*
- ***On scaffolding, ladders, and roofs:*** *Temporary sanitation facilities to prevent contamination and maintain hygiene.*
- ***When working on structural steel or high-rise buildings:*** *Sanitary facilities on various levels for worker access.*
- ***During demolition work:*** *Sanitation stations to cleanse after exposure to debris.*
- ***Operating or working near heavy machinery and equipment:*** *Facilities nearby to ensure quick access for workers.*

- ***While handling hazardous materials:*** *Sanitation points to prevent contamination and promote health.*
- ***On wet or uneven surfaces:*** *Sanitation facilities designed for stability and safety.*
- ***In areas where hazardous chemicals are used or stored:*** *Special sanitary facilities to cleanse and prevent chemical burns.*
- ***When carrying or moving heavy materials:*** *Sanitation points to clean up after heavy lifting.*
- ***Bridge Construction Specific:***
    - **On Bridge Decks:** Portable sanitation facilities to support workers on the bridge surface.
    - **Under the Bridge Structure:** Sanitation units to accommodate workers handling foundational and substructure tasks.
    - **Near Water Bodies:** Ensuring sanitation facilities are positioned to prevent water contamination and support worker hygiene.
    - **Elevated Areas:** Safe and stable sanitation facilities for workers on elevated sections of the bridge.

7.2.5.3 *Provision for Sanitation Facilities*

- *Ensure an adequate number of clean and hygienic toilets and washrooms are available for all workers;*
- *Separate sanitation facilities for male and female workers should be provided where applicable.*

7.2.5.4 *Maintenance and Cleaning*

- *Regularly clean and maintain sanitation facilities to prevent contamination and ensure hygiene;*
- *Implement a schedule for routine cleaning and restocking of essential supplies (e.g., soap, toilet paper).*

7.2.5.5 *Personal Hygiene*

- *Educate workers on the importance of proper sanitation and personal hygiene practices;*
- *Provide adequate handwashing facilities with soap and clean water near sanitation facilities.*

7.2.5.6 *Waste Disposal*

- *Implement proper waste disposal systems to manage human waste and maintain a clean environment;*
- *Ensure that waste disposal systems comply with local regulations and health standards.*

7.2.5.7 *Accessibility and Convenience*

- *Ensure that sanitation facilities are easily accessible to all workers, regardless of their location on the worksite;*
- *Provide adequate lighting and signage to guide workers to the nearest sanitation facilities.*

7.2.6 Standards/Specifications for Sanitation Facilities

The following standards/specifications shall be adhered to for managing sanitation facilities at construction worksites:

7.2.6.1 Gender Considerations

- *For each sex, separate toilet rooms/toilet facilities shall be provided in all workplaces/worksites;*
- *The number of facilities to be provided for each sex shall be based on the number of employees of that sex for whom the facilities shall be furnished;*

7.2.6.2 Sanitation Facility Standards

- *Ensure that toilets and washrooms meet the safety and hygiene standards set by relevant health authorities;*
- *Conduct regular inspections to ensure compliance with sanitation facility standards;*
- *Each washroom should have a minimum size of* ***1.5 meters by 1.5 meters;***
- *Provide at least one wash basin for every 20 workers;*
- *Provide at least one toilet seat and one urinal per 40 male workers/laborers;*
- *Provide at least* ***one toilet seat per 20 female workers.***
- *Where toilet rooms will be occupied by one person (either male or female) at a time, locking facilities form inside shall be provided;*
- *Toilet of the category as mentioned in (iii) shall contain at least one water closet;*
- *For such single toilets with facility mentioned above shall be allocated for the use of employees (both for female and male) as pe following table (Table: 7-2)*

Table 7-2 : Allocation of Toilet for Employees*

Number of Employees	Minimum Number of Toilet with Water Closets
1 to 15	1
16 to 35	2
36 to 55	3
56 to 80	4
81 to 110	5
111 to 150	6
Over 150	1 (One) Additional Facilities for Each 40 (Forty) Additional Employees

*Adapted from OSHA Guidelines

7.2.6.3 The sewage disposal system shall be

- ***Safe and riskless*** *for the health of employees;*
- *As per engineering considerations as practiced by LGED and as mentioned in the OHS Policy of LGED* ***(Section:5, Sub-Section:5.2).***

7.2.6.4 Facility Design and Construction

- *Design and construct sanitation facilities using* ***materials that are easy to clean and maintain;***
- *Provide* ***adequate ventilation and lighting*** *in all sanitation facilities.*

7.2.6.5 Worker/Laborer Education and Training

- *Provide **regular training sessions** to educate workers about the importance of proper sanitation and personal hygiene practices;*
- ***Distribute informational materials**, such as posters and pamphlets, outlining proper sanitation practices.*

7.2.6.6 Communication and Coordination

- *Establish and maintain **clear communication channels** for informing all workers about sanitation and hygiene measures;*
- *Assign a **designated safety officer** responsible for monitoring sanitation conditions and coordinating maintenance activities.*

7.2.7 Key Obligations

7.2.7.1 LGED Authority Concerned

*The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.2.7.2 Contractor Concerned

*The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.6 Section:6).***

7.2.7.3 Laborer Concerned

*The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.8, Section:6).***

7.3 Waste Management at Construction Worksite

7.3.1 Solid Waste

Solid waste comprises non-liquid and non-hazardous materials generated at construction sites. Proper management of solid waste at construction sites is essential for maintaining a clean and safe work environment. Effective solid waste management practices prevent health hazards, promote sustainability, and ensure compliance with regulations.

7.3.1.1 Examples of Solid Waste at Construction Sites

- ***Construction Debris:*** *Materials such as concrete, bricks, and wood from construction and demolition activities.*
- ***Packaging Waste:*** *Wrapping materials, plastic, and cardboard used for packaging construction supplies.*
- ***Hazardous Waste:*** *Chemicals, paints, and solvents that require special handling and disposal.*

7.3.1.2 Examples of Solid Waste Borne Hazards that Require OHS Measures

- ***Exposure to Hazardous Substances:*** *Handling and disposing of chemicals and solvents can pose risks to workers' health and safety.*
- ***Sharp Objects:*** *Construction debris may contain sharp objects that can cause injuries.*
- ***Tripping and Falling:*** *Accumulation of waste materials can create tripping hazards.*

7.3.1.3 Examples of Solid Waste Management Measures

- ***Waste Segregation:*** *Separating different types of waste (e.g., recyclable, non-recyclable, hazardous) to facilitate proper disposal and recycling.*
- ***Recycling Programs:*** *Implementing recycling initiatives for materials such as metal, wood, and plastic to reduce waste sent to landfills.*
- ***Proper Disposal:*** *Ensuring safe and appropriate disposal of hazardous waste to prevent environmental contamination.*
- ***Waste Reduction Practices:*** *Adopting practices to minimize waste generation, such as reusing materials and optimizing resource use.*

7.3.1.4 Negative Impacts of Poor Solid Waste Management

a) **Health and Safety Impacts:**
   - **Increased Risk of Injuries:** Accumulation of waste can create tripping hazards and unsafe working conditions.
   - **Health Issues:** Improper disposal of hazardous waste can lead to exposure to harmful chemicals and pollutants, causing health problems.

b) **Operational Impacts:**
   - **Decreased Productivity:** An untidy worksite can hinder work efficiency and reduce productivity.
   - **Increased Cleanup Costs:** Poor waste management can lead to higher costs associated with cleaning up and disposing of accumulated waste.

c) **Environmental Issue:**
   - **Environmental Pollution:** Improper disposal of solid waste can lead to the contamination of soil and water sources.

- **Threat to Wildlife:** This can harm local wildlife and disrupt ecosystems. For example, plastics and other non-biodegradable materials can persist in the environment for decades.
- **Aesthetic Degradation:** Piles of solid waste can make the worksite look unprofessional and poorly managed. This can affect the morale of workers and the perception of clients and visitors.

d) Legal and Financial Impacts:

- **Fines and Penalties:** Non-compliance with waste management regulations can result in fines and penalties from environmental authorities.
- **Reputation Damage:** Failing to manage waste properly can harm the reputation of companies, affecting relationships with clients and stakeholders.

7.3.1.5 *Positive Impacts for Compliance with Solid Waste Management Standards*

a) Health and Safety Impacts:

- **Improved Safety:** Proper waste management reduces the risk of accidents and injuries at the worksite.
- **Enhanced Health Outcomes:** Safe disposal of hazardous waste prevents exposure to harmful substances, protecting workers' health.

b) Operational Impacts:

- **Increased Efficiency:** A clean and organized worksite promotes efficient work processes and productivity.
- **Cost Savings:** Effective waste management reduces cleanup costs and can generate revenue from recycling programs.

c) Legal and Financial Impacts:

- **Compliance with Regulations:** Adhering to waste management standards ensures compliance with environmental regulations, avoiding legal issues.
- **Enhanced Reputation:** Demonstrating commitment to proper waste management enhances the company's image and builds trust with clients and stakeholders.

7.3.1.6 *General Provisions for Solid Waste*

Solid waste includes all non-liquid, tangible materials generated during construction activities. Proper management is essential to maintain safety, cleanliness, and operational efficiency at the worksite while minimizing environmental impact. Following provisions should be complied with for management of solid waste at construction worksites:

a) When to Implement Solid Waste Management:

- **Working with Hazardous Materials:** Proper disposal to prevent environmental contamination and health hazards.
- **Heavy Physical Work:** Ensuring a clean work environment to prevent injuries and maintain safety.
- **Extended Work Hours:** Maintaining cleanliness during long shifts to enhance productivity.
- **Remote Locations:** Providing waste management solutions where municipal services may be limited.
- **Community and Environmental Responsibility:** Promoting sustainable practices and protecting the local environment.

- **High Workforce Density:** Efficient waste management in crowded work environments to maintain hygiene.
- **Bridge Construction Specific:**
  - ***Weather Conditions:*** *Facilities equipped to handle extreme weather conditions, ensuring waste containment and sanitation.*
  - ***Height and Accessibility:*** *Easily accessible waste disposal units on high structures to ensure safety and cleanliness.*

b) **Where to Implement Solid Waste Management:**

- **Near Workstations:** Waste disposal units close to work areas to maintain cleanliness.
- **On scaffolding, ladders, and roofs:** Temporary waste disposal facilities to prevent littering and maintain safety.
- **When working on structural steel or high-rise buildings:** Waste management solutions on various levels for easy access.
- **During demolition work:** Facilities to manage debris and hazardous waste.
- **Operating or working near heavy machinery and equipment:** Waste disposal units nearby to support cleanliness.
- **While handling hazardous materials:** Special waste management points to prevent contamination.
- **On wet or uneven surfaces:** Stable waste disposal facilities to prevent spills and accidents.
- **In areas where hazardous chemicals are used or stored:** Proper disposal units to manage chemical waste and prevent contamination.
- **When carrying or moving heavy materials:** Waste management points to dispose of packaging and debris.
- **Bridge Construction Specific:**
  - ***On Bridge Decks:*** *Portable waste disposal units to support cleanliness on the bridge surface.*
  - ***Under the Bridge Structure:*** *Waste management facilities for workers handling foundational tasks.*
  - ***Near Water Bodies:*** *Ensuring waste management solutions to prevent water contamination.*
  - ***Elevated Areas:*** *Stable and secure waste disposal units for workers on elevated sections of the bridge.*

c) **Waste Segregation:**

- Provide separate bins for different types of solid waste, such as construction debris, packaging materials, and wood scraps.
- Use color-coded systems to ensure clarity in waste separation.
- Include instructions for segregating waste in multiple languages.

d) **Collection and Disposal:**

- Schedule daily or weekly collection to prevent accumulation of solid waste.

- Partner with certified waste handlers to ensure environmentally safe disposal.
- Maintain a disposal log for tracking solid waste management activities.

e) **Site Cleanliness:**
- Designate cleanup crews to remove debris and clear walkways regularly.
- Install temporary waste chutes for easy disposal of waste from elevated areas.
- Ensure the site is inspected periodically to identify and address waste management issues.

f) **Recycling Practices:**
- Promote onsite sorting of recyclable materials, such as metals, wood, and plastics.
- Provide training for workers to identify recyclable waste easily.
- Partner with recycling facilities to maximize recovery of useful materials.

g) **Emergency Management:**
- Establish procedures for handling large volumes of unexpected waste, such as post-demolition debris.
- Equip the site with tools like shovels, wheelbarrows, and containers for quick cleanup.

7.3.1.7 *Standards/Specifications for Solid Waste:*

Solid waste refers to all non-liquid waste generated during construction activities, including materials such as debris, packaging, and scraps. Effective management of solid waste is vital to maintaining a clean, safe, and organized worksite while reducing environmental impact. Following standards/ specifications should be complied with for management of solid waste at construction worksites:

a) **Waste Segregation and Labeling:**
- Separate waste bins for categories such as debris, packaging, and recyclable materials.
- Clearly label bins to avoid confusion and improve compliance among workers.
- Use color-coded bins for better visual guidance.

b) **Bin Placement and Capacity:**
- Place bins within 20 meters of all active work areas for easy accessibility.
- Ensure bins have a minimum capacity of 240 liters for efficient collection.
- Provide at least one bin per 20 workers onsite.

c) **Collection Frequency:**
- Schedule waste collection daily to prevent overflow and maintain cleanliness.
- Monitor bin usage to adjust collection schedules as needed during peak activity.

d) **Waste Storage Area:**
- Allocate sufficient space for waste segregation and temporary storage.
- Standard size: **1 cubic meter per 10 workers.**

- Keep the storage area covered and shielded from rain and pests.

e) **Recycling Practices:**
   - Sort out recyclable materials, such as metal, wood, and plastics, for recovery.
   - Aim to recycle at least 70% of recyclable solid waste.
   - Partner with certified recycling facilities to process and reuse materials.

f) **Safety Measures:**
   - Ensure all waste handling equipment, like gloves and carts, is available and in good condition.
   - Train workers on safe handling practices to avoid injuries from sharp objects like nails or glass.

g) **Disposal of Non-Recyclables:**
   - Dispose of non-recyclable solid waste at approved landfills in compliance with local regulations.
   - Maintain a record of waste sent for disposal to track the site's environmental footprint.

h) **Emergency Management:**
   - Develop contingency plans for managing excess waste from unexpected events, such as heavy demolition activities.
   - Have tools like shovels, wheelbarrows, and tarps readily available to address urgent cleanup needs.

7.3.2 Liquid Waste

Liquid waste comprises non-solid and often hazardous materials generated at construction sites. Proper management of liquid waste is essential for maintaining a safe and environmentally friendly work environment. Effective liquid waste management practices prevent health hazards, reduce environmental impact, and ensure compliance with regulations.

7.3.2.1 Examples of Liquid Waste at Construction Worksite

- ***Chemical Waste:*** *Liquids such as paints, solvents, adhesives, and other chemicals used in construction activities.*
- ***Wastewater:*** *Water used in construction processes that may be contaminated with chemicals, oils, and other pollutants.*
- ***Oil and Grease:*** *Lubricants and oils from machinery and equipment that need proper disposal.*

7.3.2.2 Examples of Liquid Waste Borne Hazards That Require OHS Measure

- ***Chemical Exposure:*** *Handling and disposing of chemical waste can pose serious health risks to workers, including skin burns, respiratory issues, and poisoning.*
- ***Water Contamination:*** *Improper disposal of liquid waste can lead to contamination of local water sources, posing risks to both human health and the environment.*
- ***Slip Hazards:*** *Spilled liquids can create slippery surfaces, increasing the risk of slips, trips, and falls.*

7.3.2.3 *Examples of Liquid Waste Management Measures*

- ***Proper Storage:*** *Using appropriate containers and storage facilities for hazardous liquids to prevent leaks and spills.*
- ***Wastewater Treatment:*** *Implementing treatment processes to remove contaminants from wastewater before it is discharged.*
- ***Spill Response Plans:*** *Developing and maintaining spill response plans to address and mitigate spills quickly and effectively.*
- ***Regular Inspections:*** *Conducting regular inspections of storage facilities and equipment to ensure they are in good condition and not at risk of leaking.*

7.3.2.4 *Negative Impacts of Poor Liquid Waste Management*

a) Health and Safety Impacts:
   - **Increased Risk of Injuries:** Exposure to hazardous liquids can cause health issues such as chemical burns, respiratory problems, and poisoning.
   - **Environmental Health Issues:** Improper disposal of liquid waste can lead to water contamination, affecting both human health and ecosystems.

b) Operational Impacts:
   - **Decreased Productivity:** Health issues related to chemical exposure and slip hazards can result in absenteeism and decreased workforce productivity.
   - **Increased Cleanup Costs:** Poor liquid waste management can lead to higher costs associated with cleaning up spills and remediating contaminated areas.

c) Environmental Issues:
   - **Water Pollution:** Improper disposal of liquid waste can lead to the contamination of water bodies, impacting aquatic life and drinking water sources.
   - **Soil Contamination:** Spilled liquids can seep into the soil, affecting its quality and potentially harming plant life.

d) Legal and Financial Impacts:
   - **Fines and Penalties:** Non-compliance with liquid waste management regulations can result in fines and penalties from environmental authorities.
   - **Reputation Damage:** Failing to manage liquid waste properly can harm the reputation of companies, affecting relationships with clients and stakeholders.

7.3.2.5 *Positive Impacts for Compliance with Liquid Waste Management Standards*

a) Health and Safety Impacts:
   - **Improved Safety:** Proper liquid waste management reduces the risk of exposure to hazardous chemicals, protecting workers' health.
   - **Enhanced Health Outcomes:** Safe disposal and treatment of liquid waste prevent contamination of water sources, ensuring the health of the community and environment.

b) Operational Impacts:
   - **Increased Efficiency:** A clean and safe worksite promotes efficient work processes and productivity.

- **Cost Savings:** Effective liquid waste management reduces cleanup costs and prevents costly environmental remediation efforts.

c) **Legal and Financial Impacts:**
   - **Compliance with Regulations:** Adhering to liquid waste management standards ensures compliance with environmental regulations, avoiding legal issues.
   - **Enhanced Reputation:** Demonstrating commitment to proper liquid waste management enhances the company's image and builds trust with clients and stakeholders.

7.3.2.6 General Provisions for Liquid Waste

Liquid waste consists of any unwanted fluids generated from construction processes. Effective handling and disposal practices are vital to prevent contamination, ensure worker safety, and comply with environmental regulations. Following provisions should be complied with for management of liquid waste at construction worksites:

a) **When to Implement Liquid Waste Management:**
   - **Working with Hazardous Materials:** Proper disposal to prevent environmental contamination and health hazards.
   - **Heavy Physical Work:** Ensuring a clean work environment to prevent injuries and maintain safety.
   - **Extended Work Hours:** Maintaining cleanliness during long shifts to enhance productivity.
   - **Remote Locations:** Providing liquid waste management solutions where municipal services may be limited.
   - **Community and Environmental Responsibility:** Promoting sustainable practices and protecting the local environment.
   - **High Workforce Density:** Efficient liquid waste management in crowded work environments to maintain hygiene.
   - **Bridge Construction Specific:**
     - ***Weather Conditions:*** *Facilities equipped to handle extreme weather conditions, ensuring waste containment and sanitation.*
     - ***Height and Accessibility:*** *Easily accessible waste disposal units on high structures to ensure safety and cleanliness.*

b) **Where to Implement Liquid Waste Management:**
   - **Near Workstations:** Liquid waste disposal units close to work areas to maintain cleanliness.
   - **On scaffolding, ladders, and roofs:** Temporary liquid waste disposal facilities to prevent contamination and maintain safety.
   - **When working on structural steel or high-rise buildings:** Waste management solutions on various levels for easy access.
   - **During demolition work:** Facilities to manage liquid waste from deconstruction activities.
   - **Operating or working near heavy machinery and equipment:** Waste disposal units nearby to support cleanliness.

- **While handling hazardous materials:** Special waste management points to prevent contamination.
- **On wet or uneven surfaces:** Stable liquid waste disposal facilities to prevent spills and accidents.
- **In areas where hazardous chemicals are used or stored:** Proper disposal units to manage chemical waste and prevent contamination.
- **When carrying or moving heavy materials:** Waste management points to dispose of liquid waste from packaging and operations.
- **Bridge Construction Specific:**
  - ***On Bridge Decks:*** *Portable liquid waste disposal units to support cleanliness on the bridge surface.*
  - ***Under the Bridge Structure:*** *Waste management facilities for workers handling foundational tasks.*
  - ***Near Water Bodies:*** *Ensuring liquid waste management solutions to prevent water contamination.*
  - ***Elevated Areas:*** *Stable and secure waste disposal units for workers on elevated sections of the bridge.*

c) **Storage and Handling:**
- Utilize secure, labeled containers for storing paints, solvents, oils, and other liquid waste.
- Implement secondary containment systems to prevent spills or leaks from reaching the ground.
- Ensure liquid waste storage areas are shaded or covered to minimize evaporation.

d) **Disposal Practices:**
- Identify and work with authorized liquid waste disposal services.
- Treat wastewater onsite, if feasible, before releasing it into the environment.
- Document the type, quantity, and destination of liquid waste disposed of to maintain compliance.

e) **Spillage Prevention:**
- Install drip trays under machinery to collect accidental leaks or spills.
- Train workers to react quickly to spills, including how to use spill kits effectively.
- Conduct regular maintenance of equipment to minimize risks of leaks.

f) **Minimizing Wastewater:**
- Recycle water from cleaning activities where possible, such as for washing tools or dust control.
- Use water-efficient practices and equipment during construction work.

g) **Environmental Safeguards:**
- Prevent liquid waste from entering nearby water bodies or storm drains.
- Monitor nearby soil and water for potential contamination caused by liquid waste.

7.3.2.7 *Standards/Specifications for Liquid Waste*

Liquid waste includes all unwanted fluids generated during construction activities, such as paints, solvents, and wastewater. Effective management is necessary to prevent environmental contamination and ensure worker safety. Following Standards/Specifications should be complied with for management of liquid waste at construction worksites:

a) **Storage and Containment**
   - Store liquid waste in **leak-proof, labeled containers** made of chemical-resistant materials.
   - Use bunded storage areas with a containment capacity of at least **110% of the stored liquid's volume** to prevent spillage.
   - Separate incompatible liquids (e.g., oils and acids) by a minimum distance of **2 meters** to avoid reactions.

b) **Treatment and Disposal**
   - Treat wastewater to meet the local environmental standards for discharge, maintaining pH between **6.5 and 8.5**.
   - Ensure grease and oil concentrations in treated wastewater are below **10 mg/L**.
   - Engage certified disposal services for hazardous liquid waste such as solvents and chemicals.

c) **Spillage Prevention and Control**
   - Install spill containment trays under machinery to collect leaks or drips.
   - Provide spill kits in high-risk areas, including absorbent pads, gloves, and disposal bags.
   - Train workers to handle spills and conduct periodic spill response drills.

d) **Collection Frequency and Monitoring**
   - Collect and transport liquid waste weekly or when storage containers reach **75% capacity**, whichever occurs first.
   - Monitor liquid waste generation trends and adjust storage and treatment capacities accordingly.

e) **Inspection and Maintenance**
   - Conduct **bi-weekly inspections** of storage tanks and containment areas to check for cracks, leaks, or corrosion.
   - Perform routine maintenance of waste-handling equipment and replace damaged containers promptly.

f) **Rainwater Management**
   - ***Drainage Systems:***
     - *Install drainage channels capable of handling a rainfall intensity of **50 mm/hour**, suitable for areas with heavy rainfall.*
     - *Ensure that drainage systems have a slope gradient of at least **1:100** to allow smooth water flow.*
   - ***Rainwater Diversion:***
     - *Use barriers or gutters to divert rainwater away from waste storage areas.*
     - *Rainwater runoff should be channeled into designated collection points located at least **10 meters** away from storage zones.*

- ***Rainwater Collection Systems:***
  - *Provide covered rainwater collection tanks with a capacity of at least **5,000 liters** to store and reuse rainwater for non-potable purposes such as tool cleaning or dust suppression.*
  - *Ensure collection tanks are equipped with filtration screens to prevent debris entry.*
- ***Rainproof Covers for Waste Areas:***
  - *Install waterproof covers for all outdoor waste storage areas. Covers should withstand winds up to **80 km/h** and be made of durable materials such as PVC.*
  - *Secure covers to prevent displacement during strong winds or heavy rain.*
- ***Overflow Management:***
  - *Design overflow outlets for collection tanks, ensuring excess rainwater is directed to soak pits or stormwater drains without causing flooding.*
  - *Include emergency overflow alarms for tanks that reach **90% capacity**.*
- ***Regular Maintenance:***
  - *Inspect rainwater drainage systems weekly during the monsoon season to clear debris and maintain functionality.*
  - *Clean filtration screens in collection tanks every **two weeks** to ensure proper water flow.*
- ***Erosion Control:***
  - *Implement soil stabilization techniques, such as planting grass or laying geotextiles, around drainage outlets to prevent erosion caused by high water flow.*
  - *Maintain outlet flow velocity at **<1.5 m/s** to minimize the risk of soil washout.*
- ***Water Quality Monitoring:***
  - *Test collected rainwater quarterly for pollutants such as oil or heavy metals. Ensure oil concentration does not exceed **5 mg/L** for reuse.*
  - *Maintain proper records of water quality tests to ensure compliance with environmental standards.*

7.3.3 Hazardous Waste

Hazardous waste includes materials that pose a significant risk to human health and the environment. Proper management of hazardous waste is crucial to ensuring a safe and environmentally friendly work environment. Effective hazardous waste management practices prevent health hazards, reduce environmental impact, and ensure compliance with regulations.

7.3.3.1 Examples of Hazardous Waste at Construction Worksite

- ***Asbestos:*** *Used in older construction materials and can be harmful if inhaled.*
- ***Lead-Based Paint:*** *Common in older buildings and can cause lead poisoning if not handled properly.*
- ***Contaminated Soil:*** *Soil that has been polluted with hazardous substances like chemicals, heavy metals, or oil.*
- ***Batteries:*** *Contain hazardous materials such as lead, cadmium, and mercury.*
- ***Fluorescent Lamps:*** *Contain mercury, which is harmful to human health and the environment.*

7.3.3.2 Examples of Hazardous Waste Borne Hazards that Require OHS Measures

- ***Chemical Exposure:*** *Handling and disposing of hazardous waste can pose serious health risks to workers, including skin burns, respiratory issues, and poisoning.*
- ***Air Pollution:*** *Improper disposal or handling of hazardous waste can release harmful chemicals into the air, posing risks to human health and the environment.*
- ***Fire and Explosions:*** *Certain hazardous wastes are flammable or reactive, posing risks of fire or explosions.*
- ***Environmental Contamination:*** *Hazardous waste can contaminate soil and water sources, affecting ecosystems and human health.*

7.3.3.3 Examples of Hazardous Waste Management Measures

- ***Proper Storage:*** *Using appropriate containers and storage facilities for hazardous materials to prevent leaks and spills.*
- ***Labeling:*** *Clearly labeling hazardous waste containers to identify their contents and associated risks.*
- ***Training:*** *Providing workers with training on handling, storing, and disposing of hazardous waste safely.*
- ***Waste Treatment:*** *Implementing treatment processes to neutralize or reduce the hazards of waste before disposal.*
- ***Emergency Response Plans:*** *Developing and maintaining emergency response plans to address spills, fires, and other hazardous waste incidents quickly and effectively.*
- ***Regular Inspections:*** *Conducting regular inspections of storage facilities and equipment to ensure they are in good condition and not at risk of leaking.*

7.3.3.4 Negative Impacts of Poor Hazardous Waste Management

a) **Health and Safety Impacts**
   - ***Increased Risk of Injuries:*** *Exposure to hazardous waste can cause health issues such as chemical burns, respiratory problems, and poisoning.*
   - ***Environmental Health Issues:*** *Improper disposal of hazardous waste can lead to air, soil, and water contamination, affecting both human health and ecosystems.*

b) **Operational Impacts**
   - ***Decreased Productivity:*** *Health issues related to chemical exposure can result in absenteeism and decreased workforce productivity.*

- ***Increased Cleanup Costs:*** *Poor hazardous waste management can lead to higher costs associated with cleaning up spills and remediating contaminated areas.*

c) **Environmental Issues**

- ***Air Pollution:*** *Improper disposal of hazardous waste can release harmful chemicals into the air, affecting air quality.*
- ***Soil and Water Pollution:*** *Spilled hazardous waste can contaminate soil and water bodies, impacting plant life, aquatic life, and drinking water sources.*

d) **Legal and Financial Impacts**

- ***Fines and Penalties:*** *Non-compliance with hazardous waste management regulations can result in fines and penalties from environmental authorities.*
- ***Reputation Damage:*** *Failing to manage hazardous waste properly can harm the reputation of companies, affecting relationships with clients and stakeholders.*

7.3.3.5 Positive Impacts for Compliance with Hazardous Waste Management Standards

a) **Health and Safety Impacts**

- ***Improved Safety:*** *Proper hazardous waste management reduces the risk of exposure to harmful chemicals, protecting workers' health.*
- ***Enhanced Health Outcomes:*** *Safe disposal and treatment of hazardous waste prevent contamination of air, soil, and water, ensuring the health of the community and environment.*

b) **Operational Impacts**

- ***Increased Efficiency:*** *A clean and safe worksite promotes efficient work processes and productivity.*
- ***Cost Savings:*** *Effective hazardous waste management reduces cleanup costs and prevents costly environmental remediation efforts.*

c) **Legal and Financial Impacts**

- ***Compliance with Regulations:*** *Adhering to hazardous waste management standards ensures compliance with environmental regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper hazardous waste management enhances the company's image and builds trust with clients and stakeholders.*

7.3.3.6 General Provisions for Hazardous Waste

Hazardous waste includes materials that pose significant risks to health, safety, or the environment due to their chemical or physical properties. Stringent measures are required for handling, storing, and disposing of such waste to mitigate potential dangers. Following provisions should be complied with for management of hazardous waste at construction worksites:

a) **When to Implement Hazardous Waste Management**

- **Working with Hazardous Materials:** Ensuring proper disposal to prevent environmental contamination and health hazards.

- **Chemical Exposure:** Proper handling and disposal of chemical waste to prevent harm.
- **Heavy Physical Work:** Ensuring a clean work environment to prevent injuries and maintain safety.
- **Extended Work Hours:** Maintaining cleanliness during long shifts to enhance productivity.
- **Remote Locations:** Providing hazardous waste management solutions where municipal services may be limited.
- **Community and Environmental Responsibility:** Promoting sustainable practices and protecting the local environment.
- **High Workforce Density:** Efficient hazardous waste management in crowded work environments to maintain hygiene.
- ***Bridge Construction Specific:***
  - ***Weather Conditions:*** *Facilities equipped to handle extreme weather conditions, ensuring waste containment and sanitation.*
  - ***Height and Accessibility:*** *Easily accessible hazardous waste disposal units on high structures to ensure safety and cleanliness.*

b) Where to Implement Hazardous Waste Management

- **Near Workstations:** Hazardous waste disposal units close to work areas to maintain cleanliness and safety.
- **On scaffolding, ladders, and roofs:** Temporary hazardous waste disposal facilities to prevent contamination and maintain safety.
- **When working on structural steel or high-rise buildings:** Waste management solutions on various levels for easy access.
- **During demolition work:** Facilities to manage hazardous waste from deconstruction activities.
- **Operating or working near heavy machinery and equipment:** Waste disposal units nearby to support cleanliness and safety.
- **While handling hazardous materials:** Special waste management points to prevent contamination and health risks.
- **On wet or uneven surfaces:** Stable hazardous waste disposal facilities to prevent spills and accidents.
- **In areas where hazardous chemicals are used or stored:** Proper disposal units to manage chemical waste and prevent contamination.
- **When carrying or moving heavy materials:** Waste management points to dispose of hazardous waste from packaging and operations.
- **Bridge Construction Specific**:
  - ***On Bridge Decks:*** *Portable hazardous waste disposal units to support cleanliness and safety on the bridge surface.*
  - ***Under the Bridge Structure:*** *Waste management facilities for workers handling foundational tasks.*

- ***Near Water Bodies:*** *Ensuring hazardous waste management solutions to prevent water contamination.*
- ***Elevated Areas:*** *Stable and secure hazardous waste disposal units for workers on elevated sections of the bridge.*

c) **Identification and Segregation**
   - Develop a hazard classification system to categorize and store hazardous waste appropriately.
   - Use secure, clearly marked containers for hazardous materials like chemicals and asbestos.

d) **Worker Safety**
   - Conduct regular safety drills to prepare workers for emergencies involving hazardous waste.
   - Replace worn-out PPE promptly to maintain safety standards.

e) **Safe Storage**
   - Store hazardous waste in ventilated areas to prevent the buildup of fumes.
   - Keep an inventory of hazardous materials onsite and update it regularly.

f) **Disposal Compliance**
   - Follow strict guidelines for the transportation and disposal of hazardous waste.
   - Maintain a record of disposal activities for legal and regulatory audits.

g) **Emergency Preparedness**
   - Equip worksites with fire extinguishers and first aid kits for hazardous waste-related incidents.
   - Assign trained personnel to oversee hazardous waste management and respond to emergencies.

7.3.3.7 Standards/Specifications for Hazardous Waste

Hazardous waste includes materials that pose risks to health, safety, or the environment due to their toxic, corrosive, flammable, or reactive properties. Proper handling, storage, and disposal of hazardous waste are essential to prevent accidents, injuries, and environmental damage. Following Standards/Specifications should be complied with for management of Hazardous waste at construction worksites:

a) **Identification and Classification**
   - Categorize hazardous waste as per relevant standards (e.g., **EPA Hazardous Waste Codes** or National Equivalent if available and applicable).
   - Label all hazardous waste containers with details such as type, hazards, and date of storage.

b) **Following concerned Provisions as per prevailing Laws/Acts/ Rules etc. of Government of Bangladesh**
   - **Environment Conservation Act, 1995**
     - ***Section 6:*** *Prohibits the discharge of any hazardous waste into the environment without proper treatment.*
     - ***Section 12:*** *Requires industries, including construction sites, to obtain an Environmental Clearance Certificate before starting*

operations, ensuring compliance with waste management regulations.

- **Environment Conservation Rules, 1997:**
  - ***Rule 12:*** *Outlines the standards for the discharge of hazardous waste and effluents, applicable to construction sites.*
- **Hazardous Waste and Ship Breaking Waste Management Rules, 2011:**
  - ***Rule 4:*** *Mandates the proper labeling and storage of hazardous waste at construction sites.*
  - ***Rule 8:*** *Requires the submission of a hazardous waste management plan by construction companies.*
  - ***Rule 15:*** *Specifies the procedures for the transportation and disposal of hazardous waste from construction sites.*
- **National Building Code of Bangladesh (BNBC), 2006:**
  - ***Part 7:*** *Provides detailed guidelines on construction site safety, including the handling and disposal of hazardous materials.*
  - ***Part 8:*** *Specifies the requirements for fire safety and emergency preparedness, which include measures for managing hazardous waste.*

c) Storage and Containment

- Store hazardous waste in **chemical-resistant containers** to prevent leaks and reactions.
- Ensure containers are compatible with the waste type; for example:
  1. ***Acids and bases:*** *Store in high-density polyethylene (HDPE) containers.*
  2. ***Solvents:*** *Store in metal drums.*
- Maximum storage duration onsite: **30 days**, unless permitted otherwise by local regulations.

d) Safety Measures

- Maintain a **10-meter safety perimeter** around hazardous waste storage areas.
- Provide fire extinguishers (foam or CO_2-based) near flammable waste storage.
- Equip storage areas with ventilation to prevent the accumulation of toxic fumes.

e) Collection and Transport

- Collect hazardous waste weekly or whenever containers are **75% full**, whichever occurs first.
- Use certified hazardous waste transporters for safe and legal movement to disposal sites.
- Maintain a manifest of transported hazardous waste, including type, quantity, and destination.

f) Disposal Standards

- Dispose of hazardous waste at licensed facilities that comply with local and international standards.

- Incinerate toxic or flammable waste at **1,100°C** or higher in approved incinerators to ensure complete breakdown of harmful compounds.
- Avoid landfilling hazardous waste unless it has been treated to neutralize its risks.

g) **Worker Safety and Training**
- Provide all workers handling hazardous waste with **applicable PPE** (e.g., chemical-resistant gloves, goggles, respirators).
- Conduct monthly training sessions on safe handling practices, emergency response, and waste identification.

h) **Emergency Preparedness**
- Designate spill containment kits at high-risk zones. Kits should include:
  - *Absorbent materials (e.g., sand, chemical pads).*
  - *Neutralizing agents (e.g., soda ash for acids).*
  - *Disposal bags and gloves.*
- Conduct emergency response drills every **6 months** to prepare workers for accidental spills or exposure.

i) **Environmental Monitoring**
- Test soil and groundwater around hazardous waste storage areas quarterly for contamination.
- Maintain heavy metal levels in soil below **100 mg/kg** (for lead and arsenic) as per safe thresholds.

j) **Record keeping**
- Maintain detailed records of hazardous waste generation, storage, transport, and disposal for at least **3 years.**
- Provide periodic reports to regulatory authorities as required by law.

7.3.4 Organic Waste

Organic waste includes biodegradable materials that come from plant or animal sources. While it is typically less hazardous than chemical or hazardous waste, proper management of organic waste is crucial to maintain a clean and environmentally friendly work environment. Effective organic waste management practices prevent health hazards, reduce environmental impact, and ensure compliance with regulations.

7.3.4.1 Examples of Organic Waste at Construction Sites

- ***Vegetable and Fruit Peels:*** *Potato skins, banana peels, apple cores, and orange rinds.*
- ***Leftover Food:*** *Uneaten portions of meals, such as rice, curry, bread, or noodles.*
- ***Eggshells:*** *Discarded shells from cooking or baking.*
- ***Coffee Grounds and Tea Leaves:*** *Residues from brewed coffee or steeped tea.*
- ***Expired Food:*** *Spoiled fruits, vegetables, and dairy products.*
- ***Bones and Meat Scraps:*** *Leftovers from meat preparation or consumption.*
- ***Cooked Oils and Grease:*** *Small quantities of cooking oil or grease.*
- ***Herbs and Spices:*** *Expired or unused spices, chopped herbs, or seasoning remnants.*
- ***Stale Bread and Baked Goods:*** *Bread that has gone hard or pastries no longer edible.*

- ***Shells:*** *Shells from nuts or seafood, like pistachio shells or shrimp shells.*
- ***Food Scraps:*** *Leftover food from worker meals and on-site catering.*
- ***Landscaping Debris:*** *Grass clippings, leaves, branches, and other plant materials from landscaping activities.*
- ***Wood Waste:*** *Scrap wood from construction activities, including sawdust and wood shavings.*
- ***Paper and Cardboard:*** *Packaging materials and paper waste generated from on-site activities.*

7.3.4.2 Examples of Organic Waste Borne Hazards that Require OHS Measures

- ***Biohazardous Risks:*** *Organic waste can attract pests and vermin, which may carry diseases and pose health risks to workers.*
- ***Slip and Trip Hazards:*** *Accumulation of organic waste can create slippery surfaces or obstacles, increasing the risk of slips, trips, and falls.*
- ***Decomposition Odors:*** *Organic waste can produce unpleasant odors as it decomposes, affecting air quality and worker comfort.*

7.3.4.3 Examples of Organic Waste Management Measures

- ***Segregation and Collection:*** *Separating organic waste from other types of waste and using designated bins for collection.*
- ***Composting:*** *Implementing on-site composting facilities or partnering with local composting services to process organic waste.*
- ***Regular Removal:*** *Scheduling regular removal of organic waste to prevent accumulation and associated hazards.*
- ***Pest Control:*** *Implementing pest control measures to prevent attraction of vermin to organic waste areas.*
- ***Proper Storage:*** *Using covered and secure containers to store organic waste before removal or processing.*

7.3.4.4 Negative Impacts of Poor Organic Waste Management

a) **Health and Safety Impacts**
   - **Increased Risk of Illness:** Poor management of organic waste can attract pests and vermin, leading to the spread of diseases.
   - **Odor Issues:** Decomposing organic waste can produce foul odors, affecting air quality and worker comfort.
   - **Slip and Trip Hazards:** Accumulation of organic waste can create hazards that increase the risk of injuries.

b) **Operational Impacts**
   - **Decreased Productivity:** Health issues related to poor organic waste management can result in absenteeism and decreased workforce productivity.
   - **Increased Cleanup Costs:** Improper organic waste management can lead to higher costs associated with cleaning up and managing waste.

c) **Environmental Issues**
   - **Soil and Water Pollution:** Poorly managed organic waste can leach into the soil and water bodies, affecting plant life and water quality.
   - **Greenhouse Gas Emissions:** Decomposing organic waste in landfills can produce methane, a potent greenhouse gas that contributes to climate change.

d) **Legal and Financial Impacts**

- **Fines and Penalties:** Non-compliance with organic waste management regulations can result in fines and penalties from environmental authorities.
- **Reputation Damage:** Failing to manage organic waste properly can harm the reputation of companies, affecting relationships with clients and stakeholders.

7.3.4.5 *Positive Impacts for Compliance with Organic Waste Management Standards*

a) Health and Safety Impacts
- **Improved Hygiene:** Proper organic waste management reduces the risk of attracting pests and vermin, protecting workers' health.
- **Enhanced Comfort:** Effective management of organic waste prevents unpleasant odors, improving air quality and worker comfort.

b) Operational Impacts
- **Increased Efficiency:** A clean and safe worksite promotes efficient work processes and productivity.
- **Cost Savings:** Effective organic waste management reduces cleanup costs and prevents pest control expenses.

c) Legal and Financial Impacts
- **Compliance with Regulations:** Adhering to organic waste management standards ensures compliance with environmental regulations, avoiding legal issues.
- **Enhanced Reputation:** Demonstrating commitment to proper organic waste management enhances the company's image and builds trust with clients and stakeholders.

7.3.4.6 *General Provisions for Organic Waste*

Organic waste encompasses biodegradable materials derived from natural sources, such as food scraps and vegetation. Although less harmful, improper disposal of organic waste can lead to pest infestations, unpleasant odors, and greenhouse gas emissions.

a) When to Implement Organic Waste Management
- **Food Waste from Workers:** Ensuring proper disposal to prevent pests and odors.
- **Landscaping and Vegetation:** Managing organic waste from site clearing and landscaping activities.
- **Community and Environmental Responsibility:** Promoting sustainable practices and reducing landfill waste.
- **Remote Locations:** Providing organic waste management solutions where municipal services may be limited.
- **High Workforce Density:** Efficient organic waste management in crowded work environments to maintain hygiene.
- **Bridge Construction Specific:**
- **Weather Conditions:** Facilities equipped to handle organic waste in various weather conditions, ensuring waste containment and sanitation.
- **Height and Accessibility:** Easily accessible organic waste disposal units on high structures to ensure safety and cleanliness.

b) Where to Implement Organic Waste Management

- **Near Workstations:** Organic waste disposal units close to work areas to maintain cleanliness and prevent pests.
- **On scaffolding, ladders, and roofs:** Temporary organic waste disposal facilities to prevent littering and maintain safety.
- **When working on structural steel or high-rise buildings:** Waste management solutions on various levels for easy access.
- **During demolition work:** Facilities to manage organic waste from deconstruction activities.
- **Operating or working near heavy machinery and equipment:** Waste disposal units nearby to support cleanliness and safety.
- **While handling organic materials:** Special waste management points to prevent contamination and health risks.
- **On wet or uneven surfaces:** Stable organic waste disposal facilities to prevent spills and accidents.
- **In areas where landscaping or vegetation work is conducted:** Proper disposal units to manage organic waste and prevent contamination.
- **When carrying or moving organic materials:** Waste management points to dispose of organic waste from packaging and operations.
- **Bridge Construction Specific:**
  - ***On Bridge Decks:*** *Portable organic waste disposal units to support cleanliness on the bridge surface.*
  - ***Under the Bridge Structure:*** *Waste management facilities for workers handling foundational tasks.*
  - ***Near Water Bodies:*** *Ensuring organic waste management solutions to prevent water contamination.*
  - ***Elevated Areas:*** *Stable and secure organic waste disposal units for workers on elevated sections of the bridge.*

c) Composting Initiatives

- Provide onsite compost bins or pits for biodegradable organic waste like food and garden waste.
- Turn organic waste regularly to accelerate the composting process.

d) Odor and Pest Control

- Use sealed, ventilated containers to store organic waste temporarily.
- Introduce natural pest repellents near storage areas to deter rodents and insects.

e) Minimizing Food Waste

- Implement policies to reduce food wastage during worker meal distributions.
- Educate workers about the environmental impact of food waste.

f) Methane Emission Control

- Use aerobic composting methods to reduce methane emissions from decaying organic waste.
- Partner with biogas facilities to convert large amounts of organic waste into renewable energy.

g) **Health and Hygiene**
- Ensure timely collection and disposal of organic waste to maintain hygiene standards.
- Train workers to handle organic waste with care to avoid exposure to bacteria and fungi.

7.3.4.7 *Standards/Specifications for Organic Waste*

Organic waste consists of biodegradable materials derived from natural sources, such as food scraps and vegetation. While less harmful than hazardous waste, improper management of organic waste can lead to issues such as odor, pest infestation, and greenhouse gas emissions. Following Standards/Specifications should be complied with for management of Organic waste at construction worksites:

a) **Segregation and Storage**
- Provide designated, covered bins for organic waste, with a minimum capacity of **120 liters** per bin.
- Use green-colored bins to identify organic waste clearly.
- Place bins within **25 meters** of food preparation or worker dining areas for convenience.

b) **Collection Frequency**
- Collect organic waste daily to prevent decay and odor build-up.
- Monitor collection frequency during peak worksite activity to ensure timely removal.

c) **Composting Standards**
- Set up onsite composting areas for biodegradable waste. Composting pits should be at least **1 cubic meter** per **500 kg/day** of organic waste generated.
- Maintain composting piles at a temperature between **55°C and 60°C** to accelerate decomposition and eliminate harmful bacteria.

d) **Odor and Pest Control**
- Use tightly sealed, ventilated bins to minimize odors and deter pests like rats and flies.
- Introduce natural pest repellents, such as neem leaves or citronella oil, around waste bins and composting areas.

e) **Reuse and Recycling**
- Divert surplus edible food waste to local shelters or charities in compliance with food safety laws.
- Collaborate with biogas plants to repurpose organic waste exceeding **500 kg/day** into renewable energy.

f) **Methane Emission Reduction**
- Implement aerobic composting methods to minimize the release of methane, a potent greenhouse gas.
- Monitor methane levels in composting areas using portable gas analyzers, ensuring emissions do not exceed **25 ppm**.

g) **Worker Safety and Training**
- Train workers to handle organic waste safely, including the use of protective gloves and masks.

- Conduct periodic awareness sessions to educate workers on the benefits of composting and organic waste management.

h) **Emergency Management:**
- Maintain spill kits and cleaning tools near composting and waste storage areas to handle any accidental leaks.
- Monitor weather conditions (e.g., heavy rain) to prevent waterlogging or contamination of compost pits.

7.3.5 Inorganic Waste

Inorganic waste includes materials that are non-biodegradable and often require special handling and disposal methods. Proper management of inorganic waste is crucial to ensure a safe and environmentally friendly work environment. Effective inorganic waste management practices prevent health hazards, reduce environmental impact, and ensure compliance with regulations.

7.3.5.1 Examples of Inorganic Waste at Construction Sites

- ***Metal Scraps:*** *Waste metals from construction activities, such as steel, aluminum, and copper.*
- ***Concrete Debris:*** *Broken concrete, bricks, and other Masonry and General Construction materials.*
- ***Plastic Waste:*** *Plastics used in construction, including packaging materials, pipes, and insulation.*
- ***Glass:*** *Broken glass from windows, doors, and other fixtures.*
- ***Drywall:*** *Gypsum board scraps from construction and renovation projects.*

7.3.5.2 Examples of Inorganic Waste Borne Hazards that Require OHS Measures

- ***Physical Injury:*** *Handling and disposing of inorganic waste can pose risks of cuts, bruises, and other physical injuries to workers.*
- ***Air Pollution:*** *Dust and particles from inorganic waste can be released into the air, posing respiratory risks to workers.*
- ***Environmental Contamination:*** *Improper disposal of inorganic waste can lead to soil and water pollution, affecting ecosystems and human health.*

7.3.5.3 Examples of Inorganic Waste Management Measures

- ***Proper Segregation:*** *Separating inorganic waste from other types of waste and using designated bins for collection.*
- ***Recycling:*** *Implementing recycling programs to process and reuse inorganic waste materials.*
- ***Safe Handling:*** *Providing workers with training on safe handling and disposal of inorganic waste.*
- ***Waste Disposal:*** *Partnering with authorized waste disposal services to ensure proper disposal of inorganic waste.*
- ***Dust Control:*** *Implementing dust control measures to prevent the release of particles into the air.*

7.3.5.4 Negative Impacts of Poor Inorganic Waste Management

a) **Health and Safety Impacts**
- **Increased Risk of Injuries:** Poor handling of inorganic waste can cause physical injuries such as cuts and bruises.
- **Respiratory Issues:** Improper management of inorganic waste can release dust and particles into the air, leading to respiratory problems.

b) Operational Impacts
- **Decreased Productivity:** Health issues related to poor inorganic waste management can result in absenteeism and decreased workforce productivity.
- **Increased Cleanup Costs:** Improper inorganic waste management can lead to higher costs associated with cleaning up and managing waste.

c) Environmental Issues
- **Soil and Water Pollution:** Improper disposal of inorganic waste can contaminate soil and water bodies, affecting plant life and water quality.
- **Air Pollution:** Dust and particles from inorganic waste can contribute to air pollution, affecting air quality.

d) Legal and Financial Impacts
- **Fines and Penalties:** Non-compliance with inorganic waste management regulations can result in fines and penalties from environmental authorities.
- **Reputation Damage:** Failing to manage inorganic waste properly can harm the reputation of companies, affecting relationships with clients and stakeholders.

7.3.5.5 *Positive Impacts for Compliance with Inorganic Waste Management Standards*

a) Health and Safety Impacts
- **Improved Safety:** Proper inorganic waste management reduces the risk of physical injuries and respiratory issues, protecting workers' health.
- **Enhanced Air Quality:** Effective management of inorganic waste prevents the release of dust and particles, improving air quality.

b) Operational Impacts
- **Increased Efficiency:** A clean and safe worksite promotes efficient work processes and productivity.
- **Cost Savings:** Effective inorganic waste management reduces cleanup costs and prevents environmental remediation expenses.

c) Legal and Financial Impacts
- **Compliance with Regulations:** Adhering to inorganic waste management standards ensures compliance with environmental regulations, avoiding legal issues.
- **Enhanced Reputation:** Demonstrating commitment to proper inorganic waste management enhances the company's image and builds trust with clients and stakeholders.

7.3.5.6 *General Provisions for Inorganic Waste*

Inorganic waste includes non-biodegradable materials such as plastics, glass, and metals. Efficient handling and recycling of these materials are crucial to reduce environmental pollution and enhance resource recovery.

a) When to Implement Inorganic Waste Management
- **Working with Construction Materials:** Ensuring proper disposal of materials like concrete, metal, and plastic to prevent environmental contamination.
- **Chemical Exposure:** Proper handling and disposal of inorganic chemicals to prevent harm.

- **Heavy Physical Work:** Maintaining a clean work environment to prevent injuries and maintain safety.
- **Extended Work Hours:** Keeping the worksite clean during long shifts to enhance productivity.
- **Remote Locations:** Providing inorganic waste management solutions where municipal services may be limited.
- **Community and Environmental Responsibility:** Promoting sustainable practices and recycling to reduce landfill waste.
- **High Workforce Density:** Efficient inorganic waste management in crowded work environments to maintain hygiene.
- **Bridge Construction Specific:**
  - ***Weather Conditions:*** *Facilities equipped to handle inorganic waste in various weather conditions, ensuring waste containment and sanitation.*
  - ***Height and Accessibility:*** *Easily accessible inorganic waste disposal units on high structures to ensure safety and cleanliness.*

b) **Where to Implement Inorganic Waste Management**

- **Near Workstations:** Inorganic waste disposal units close to work areas to maintain cleanliness and prevent littering.
- **On scaffolding, ladders, and roofs:** Temporary inorganic waste disposal facilities to maintain safety and cleanliness.
- **When working on structural steel or high-rise buildings:** Waste management solutions on various levels for easy access.
- **During demolition work:** Facilities to manage inorganic waste from deconstruction activities.
- **Operating or working near heavy machinery and equipment:** Waste disposal units nearby to support cleanliness and safety.
- **While handling construction materials:** Special waste management points to prevent contamination and health risks.
- **On wet or uneven surfaces:** Stable inorganic waste disposal facilities to prevent spills and accidents.
- **In areas where inorganic chemicals are used or stored:** Proper disposal units to manage chemical waste and prevent contamination.
- **When carrying or moving construction materials:** Waste management points to dispose of inorganic waste from packaging and operations.
- **Bridge Construction Specific:**
  - ***On Bridge Decks:*** *Portable inorganic waste disposal units to support cleanliness on the bridge surface.*
  - ***Under the Bridge Structure:*** *Waste management facilities for workers handling foundational tasks.*

- ***Near Water Bodies:*** *Ensuring inorganic waste management solutions to prevent water contamination.*
- ***Elevated Areas:*** *Stable and secure inorganic waste disposal units for workers on elevated sections of the bridge.*

c) **Recycling Programs**
- Set up separate collection points for recyclable inorganic waste like metal, glass, and plastics.
- Work with recycling facilities to ensure proper processing and reuse of materials.

d) **Proper Storage**
- Designate specific areas for sharp or hazardous inorganic waste like broken glass.
- Stack or store bulky items, such as scrap metal, to minimize space usage and hazards.

e) **Resource Recovery**
- Identify innovative ways to repurpose inorganic materials (e.g., metal scraps for reinforcement).
- Use leftover materials like broken tiles or bricks in landscaping or other secondary applications.

f) **Disposal of Non-Recyclables**
- Contract with certified waste management services for non-recyclable materials.
- Avoid open burning or dumping of inorganic materials to protect the environment.

g) **Awareness and Training**
- Organize awareness campaigns to educate workers on proper handling and disposal of inorganic waste.
- Conduct frequent audits to ensure compliance with inorganic waste management policies.

7.3.5.7 *Standards/Specifications for Inorganic Waste*

Inorganic waste includes non-biodegradable materials such as plastics, metals, and glass. Proper management is crucial to minimize environmental impact, improve resource recovery, and ensure worker safety at the worksite. Following Standards/Specifications should be complied with for management of Inorganic waste at construction worksites:

a) **Segregation and Storage**
- Provide separate collection bins for metals, plastics, and glass, with a minimum capacity of 240 liters per bin.
- Use sturdy, color-coded containers:
  - ✓ Blue for plastics.
  - Yellow for metals.
  - Transparent or labeled bins for glass.
- Store sharp materials like glass in containers with a wall thickness of **at least 5 mm** to prevent injuries.

b) **Collection and Sorting**
- Set up onsite sorting stations within 50 meters of major work areas to ensure efficient separation.
- Ensure workers sort inorganic waste into recyclable and non-recyclable categories within 24 hours of generation.

c) **Recycling Targets**

- Aim to recycle at least 50% of recyclable inorganic waste generated onsite.
- Partner with authorized recycling vendors for the collection of materials such as plastic sheets, metal scraps, and broken glass.

d) **Reuse Initiatives**
- Repurpose at least 10% of non-recyclable inorganic waste:
  - *Use broken tiles for pathways or landscaping.*
  - *Melt and reshape scrap metal for use in minor structural reinforcements.*

e) **Disposal of Non-Recyclables**
- Send non-recyclable waste to authorized sanitary landfills that comply with local regulations.
- Avoid burning inorganic waste to reduce harmful emissions.

f) **Safety Measures**
- Provide workers handling inorganic waste with appropriate PPE, including heavy-duty gloves and safety boots.
- Train workers to safely handle sharp or jagged materials such as glass or metal.

g) **Storage Area Requirements**
- Allocate storage space of 0.5 cubic meters per 100 workers for inorganic waste.
- Ensure storage areas are well-organized and sheltered from rain to prevent material degradation.

h) **Waste Transport**
- Transport sorted inorganic waste weekly using vehicles equipped with appropriate compartments for safe handling.
- Maintain records of transported waste, including type and destination, for compliance and tracking.

i) **Innovative Practices:**
- Explore innovative waste-to-value options, such as converting waste plastics into fuel through pyrolysis.
- Implement programs to encourage the use of eco-friendly, reusable materials onsite.

j) **Awareness and Monitoring:**
- Conduct monthly awareness campaigns on inorganic waste recycling and reuse practices.
- Monitor the quantity and types of inorganic waste generated and provide periodic reports to stakeholders.

7.3.6 Key Obligations

7.3.6.1 LGED Authority Concerned

The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.3.6.2 Contractor Concerned

The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.6 Section:6).***

7.3.6.3 *Laborer Concerned*

The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.8, Section:6).***

7.4 First Aid Facilities at Construction Worksites

First aid facilities at construction worksites are essential for ensuring the immediate care and treatment of injuries, illnesses, or emergencies that occur onsite. Properly equipped and maintained first aid facilities can significantly reduce the severity of injuries, improve worker safety, and comply with occupational health and safety regulations.

7.4.1 Components of First Aid Facilities at Construction Worksite

- ***First Aid Kits:*** *Well-stocked and easily accessible first aid kits containing essential medical supplies such as bandages, antiseptics, gauze pads, scissors, adhesive tape, and more.*
- ***First Aid Stations:*** *Designated areas equipped with first aid kits, medical supplies, and information on emergency contacts and procedures.*
- ***Trained First Aiders:*** *Workers trained in first aid procedures who can provide immediate assistance in case of injuries or health issues.*
- ***Emergency Communication:*** *Systems in place to quickly communicate with emergency services and medical professionals in case of severe injuries or health emergencies.*
- ***First Aid Signage:*** *Clear and visible signs indicating the location of first aid kits and stations.*

7.4.2 Examples of Common Injuries and Health Issues at Construction Sites

- ***Cuts and Lacerations:*** *Caused by sharp objects or tools, requiring immediate cleaning and dressing.*
- ***Burns:*** *Resulting from contact with hot surfaces, chemicals, or electrical sources, requiring cooling and treatment.*
- ***Fractures and Sprains:*** *Caused by falls or heavy lifting, requiring immobilization and medical assessment.*
- ***Eye Injuries:*** *Resulting from exposure to dust, debris, or chemicals, requiring immediate flushing and protection.*
- ***Heat-Related Illnesses:*** *Caused by prolonged exposure to high temperatures, requiring hydration and cooling measures.*

7.4.3 Examples of First Aid Measures for Common Injuries

- ***For Cuts and Lacerations:***
  - *Clean the wound with antiseptic.*
  - *Apply sterile gauze and bandage.*
  - *Seek medical attention if the cut is deep or doesn't stop bleeding.*
- ***For Burns:***
  - *Cool the burn with running water for at least 10 minutes.*
  - *Cover with a sterile, non-stick dressing.*
  - *Seek medical attention for severe burns.*
- ***For Fractures and Sprains:***
  - *Immobilize the injured area with a splint or sling.*
  - *Apply ice to reduce swelling.*
  - *Seek medical attention for further assessment and treatment.*
- ***For Eye Injuries:***
  - *Flush the eye with clean water or saline solution.*

- *Cover with an eye pad or sterile dressing.*
- *Seek medical attention immediately.*

- ***For Heat-Related Illnesses:***
  - *Move the person to a cool, shaded area.*
  - *Encourage hydration with water or electrolyte solutions.*
  - *Apply cool, wet cloths to the skin.*
  - *Seek medical attention if symptoms worsen or don't improve.*

7.4.4 Examples of Maintenance and Management of First Aid Facilities

- ***Regular Inspections:*** *Conducting regular inspections of first aid kits and stations to ensure they are well-stocked and in good condition.*
- ***Updating Supplies:*** *Replenishing medical supplies as needed to ensure availability of essential items.*
- ***Training Programs:*** *Providing ongoing training and refresher courses for workers on first aid procedures and emergency response.*
- ***Record Keeping:*** *Maintaining records of first aid incidents and treatments provided to monitor and improve safety measures.*
- ***Emergency Drills:*** *Conducting regular emergency drills to ensure workers are familiar with first aid procedures and emergency response plans.*

7.4.5 Positive Impacts of Well-Maintained First Aid Facilities

7.4.5.1 Health and Safety Impacts

- ***Reduced Severity of Injuries:*** *Immediate access to first aid reduces the severity of injuries and promotes faster recovery.*
- ***Improved Health Outcomes:*** *Proper first aid treatment prevents complications and improves overall health outcomes for injured workers.*
- ***Enhanced Worker Confidence:*** *Knowing that first aid facilities are available and well-maintained boosts worker confidence and morale.*

7.4.5.2 Operational Impacts

- ***Increased Productivity:*** *Quick and effective first aid treatment minimizes downtime and allows workers to return to work sooner.*
- ***Cost Savings:*** *Proper first aid treatment reduces the need for extensive medical care and associated costs.*

7.4.5.3 Legal and Financial Impacts

- ***Compliance with Regulations:*** *Adhering to first aid requirements ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to worker safety and health enhances the company's image and builds trust with clients and stakeholders.*

7.4.6 Negative Impacts of Inadequate First Aid Facilities

7.4.6.1 Health and Safety Impacts

- ***Increased Severity of Injuries:*** *Without immediate access to first aid, minor injuries can become severe, leading to prolonged recovery times.*

- ***Poor Health Outcomes:*** *Lack of proper first aid treatment can result in complications and deteriorating health for injured workers.*
- ***Reduced Worker Confidence:*** *Workers may feel unsafe and less confident if they know that first aid facilities are inadequate or poorly maintained.*

7.4.6.2 *Operational Impacts*

- ***Decreased Productivity:*** *Delays in receiving first aid can result in extended downtime for injured workers, reducing overall productivity.*
- ***Higher Medical Costs:*** *Inadequate first aid can lead to more serious injuries, requiring costly medical treatments and emergency care.*

7.4.6.3 *Legal and Financial Impacts*

- ***Non-Compliance Penalties:*** *Failure to meet first aid regulations can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Poor first aid facilities can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*

7.4.7 General Provisions for First Aid Facilities

To ensure the availability of adequate first aid facilities and trained personnel to provide immediate medical assistance in the event of an injury or illness at the workplace. Following General Provisions shall be complied with to ensure first aid facilities at construction worksites:

7.4.7.1 *When to Implement First Aid Facilities*

- ***Working with Hazardous Materials:*** *Ensuring immediate medical response for exposure or injuries.*
- ***Heavy Physical Work:*** *Providing care for injuries like cuts, bruises, and sprains.*
- ***Extended Work Hours:*** *Maintaining health and safety during long shifts.*
- ***Remote Locations:*** *Ensuring access to medical care where immediate professional help may be limited.*
- ***Community and Environmental Responsibility:*** *Promoting a safe work environment and quick response to injuries.*
- ***High Workforce Density:*** *Efficient first aid management in crowded work environments.*
- ***Bridge Construction Specific:***
  - **Weather Conditions:** Facilities equipped to handle medical needs in various weather conditions.
  - **Height and Accessibility:** Easily accessible first aid units on high structures to ensure safety and prompt care.

7.4.7.2 *Where to Implement First Aid Facilities*

- ***Near Workstations:*** *First aid kits and facilities close to work areas for quick access.*
- ***On scaffolding, ladders, and roofs:*** *Temporary first aid stations to ensure immediate response to injuries.*
- ***When working on structural steel or high-rise buildings:*** *First aid facilities on various levels for easy access.*
- ***During demolition work:*** *First aid stations to handle injuries from debris and hazardous materials.*

- ***Operating or working near heavy machinery and equipment:*** *First aid units nearby to support quick medical response.*
- ***While handling hazardous materials:*** *Special first aid points to manage exposure and injuries.*
- ***On wet or uneven surfaces:*** *Stable first aid stations to prevent further injury during treatment.*
- ***In areas where hazardous chemicals are used or stored:*** *Proper first aid units to treat chemical burns and exposure.*
- ***When carrying or moving heavy materials:*** *First aid points to provide care for injuries like sprains and strains.*
- ***Bridge Construction Specific:***
  - ***On Bridge Decks:*** *Portable first aid units to support medical* response on the bridge surface.
  - **Under the Bridge Structure:** First aid facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring first aid solutions to handle injuries and prevent water-related incidents.
  - **Elevated Areas:** Stable and secure first aid stations for workers on elevated sections of the bridge.

7.4.7.3 Location and Accessibility

- *Position first aid facilities* ***within a 100-meter radius*** *of major work areas.*
- *Ensure easy access without obstructions at all times.*

7.4.7.4 First Aid Personnel

- *Assign at least* ***one first aider per 20 workers****, with additional personnel during high-risk activities.*
- *Conduct regular refresher training sessions for first aiders every 6 months.*

7.4.7.5 Facilities and Equipment

- *Equip the first aid room with a stretcher, treatment table, running water, and basic medical supplies.*
- *Provide portable first aid kits throughout the worksite, particularly near high-risk zones.*

7.4.7.6 Recordkeeping

- *Maintain detailed records of first aid incidents, including the type of injury, treatment provided, and follow-up actions.*
- *Update inventory logs for first aid supplies monthly to ensure availability.*

7.4.7.7 Awareness and Signage

- *Install clear, visible signage to direct workers to the nearest first aid facility or kit.*
- *Conduct regular awareness sessions to familiarize workers with first aid procedures.*

7.4.8 Standards/Specifications for First Aid Facilities

To ensure the safety and well-being of workers at construction sites, it is essential to provide adequate first aid facilities. The following standards and specifications outline the requirements for establishing and maintaining first aid facilities at construction worksites, ensuring prompt and effective medical assistance in case of injuries or emergencies:

7.4.8.1 Facility Requirements

- ***First Aid Room Size:*** *Minimum* ***7 square meters*** *for ease of movement and equipment arrangement.*
- ***Ventilation and Lighting:*** *Adequate natural or artificial lighting and ventilation to ensure hygiene and comfort.*
- ***Water Supply:*** *Running water with a minimum flow rate of* ***5 liters per minute.***

7.4.8.2 First Aid Kits and Supplies

- *One first aid kit per* ***20 workers****, placed at easily accessible locations.*
- *Minimum contents of each kit:*
  - **10 adhesive bandages** of various sizes.
  - **5 sterile gauze pads** (10 cm x 10 cm).
  - **2 triangular bandages** for slings or immobilization.
  - **1 CPR mask** for resuscitation.
  - **1 pair of sterile gloves** per kit.
  - **1 eye wash solution** (250 ml).

7.4.8.3 Classification of First Aid Kits

- ***Class A Kits:*** *Designed for common workplace injuries such as minor wounds, cuts, abrasions, and burns.*
- ***Class B Kits:*** *Intended for more complex or high-risk environments, with a broader range and quantity of supplies.*

7.4.8.4 Required Contents for First Aid Kits

The following items (as per Table: 7-3) shall be included in first aid kits, with quantities and specifications as per the standard:

Table 7-3: Minimum Requirement of Materials Quantities in First Aid Kit

Item	Class A Quantity	Class B Quantity	Specifications
Adhesive Bandages	16	50	Minimum size: 2.5 cm x 7.6 cm (1 in x 3 in)
Adhesive Tape	1 Roll	2 Rolls	Minimum width: 2.5 cm (1 in)
Antibiotic Application	10 Packets	25 Packets	Minimum size: 0.5 g (0.03 oz) per packet
Antiseptic	10 Packets	50 Packets	Minimum size: 0.5 g (0.03 oz) per packet
Breathing Barrier	1	1	Single-use, with one-way valve
Burn Dressing	1	2	Minimum size: 10 cm x 10 cm (4 in x 4 in)
Burn Treatment	10 Packets	25 Packets	Minimum size: 0.5 g (0.03 oz) per packet
Cold Pack	1	2	Minimum size: 10 cm x 12 cm (4 in x 5 in)
Eye Covering	2	2	Minimum size: 6 cm^2 (2.5 in^2)
Eye/Skin Wash	1 L (33.8 oz)	1 L (33.8 oz)	Sterile solution
First Aid Guide	1	1	Comprehensive and easy to understand
Hand Sanitizer	6 Packets	10 Packets	Minimum size: 0.9 g (0.03 oz) per packet
Medical Exam Gloves	2 Pairs	4 Pairs	Nitrile or latex, powder-free
Roller Bandage	1	2	Minimum size: 7.6 cm x 4.6 m (3 in x 15 ft)
Scissors	1	1	Capable of cutting through clothing and bandages
Sterile Pads	2	4	Minimum size: 7.6 cm x 7.6 cm (3 in x 3 in)
Trauma Pads	2	4	Minimum size: 12.7 cm x 22.8 cm (5 in x 9 in)
Triangular Bandages	1	2	Minimum size: 96 cm x 96 cm x 137 cm (37 in x 37 in x 54 in)

Adapted from ANSI/ISEA Z308.1-2015 Standards outline for the minimum requirements for workplace first aid kits and supplies

7.4.8.5 Kit Design and Durability

- *Kits shall be **portable**, **mountable**, and resistant to **water**, **corrosion**, and **impact**.*
- *Containers shall be clearly labeled as **Class A** or **Class B**.*

7.4.8.6 Trained Personnel and Staffing

- *At least one trained first aider per **20 workers** onsite.*
- *First aiders must hold a certification valid for at least **2 years**.*

7.4.8.7 Emergency Communication

- *Install an emergency communication system to quickly summon additional medical help when required.*
- *Maintain a list of emergency contact numbers, including nearby hospitals and clinics.*

7.4.8.8 Inspection and Maintenance

- *Inspect first aid facilities and kits **weekly** to ensure supplies are replenished and functional.*
- *Replace expired or damaged items promptly to maintain readiness.*

7.4.8.9 Legal Compliance:

- *Comply with Occupational health and safety standards as provided in OHS policy of LGED (Sub-Section-5.5, Section:5), as mandatory.*
- *Follow manufacturer guidelines for storing and maintaining medical equipment.*

7.4.9 Key Obligations

7.4.9.1 LGED Authority Concerned

*The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/ workplaces **(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.4.9.2 Contractor Concerned

*The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.6 Section:6)***

7.4.9.3 Laborer Concerned

*The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/ workplaces **(Provisions of Sub-section: 6.8, Section:6)***

7.5 Dust Controlling/Suppression

Dust control and suppression are critical measures for maintaining a safe and healthy environment at construction worksites. Dust generated from construction activities can pose significant health risks to workers, cause environmental pollution, and negatively impact surrounding communities. Implementing effective dust control strategies helps ensure compliance with safety standards and improves overall site efficiency.

7.5.1 Sources of Dust at Construction Worksite

- ***Excavation:*** *Digging and earth-moving activities can generate large amounts of dust.*
- ***Demolition:*** *Breaking down structures releases dust from materials such as concrete, brick, and drywall.*
- ***Sanding and Cutting:*** *Sanding, cutting, and grinding materials like wood, metal, and concrete produce dust.*
- ***Transport:*** *Movement of vehicles and machinery on unpaved surfaces stirs up dust.*
- ***Material Handling:*** *Loading, unloading, and transferring materials can generate dust, especially with dry bulk materials.*

7.5.2 Examples of Dust-Related Hazards that Require OHS Measures

- ***Respiratory Issues:*** *Inhalation of dust can cause respiratory problems, such as asthma, bronchitis, and silicosis.*
- ***Eye Irritation:*** *Dust can cause irritation and damage to the eyes, leading to discomfort and potential injury.*
- ***Slip Hazards:*** *Accumulation of dust on surfaces can create slippery conditions, increasing the risk of slips and falls.*

7.5.3 Examples of Dust Control Measures

- ***Water Sprays:*** *Using water sprays to dampen dust at its source and prevent it from becoming airborne.*
- ***Dust Suppressants:*** *Applying chemical dust suppressants to unpaved surfaces and material piles to reduce dust generation.*
- ***Covering Materials:*** *Using tarps or covers to enclose material piles and prevent dust from being blown away by wind.*
- ***Windbreaks:*** *Installing barriers or windbreaks to reduce wind speed and limit dust dispersion.*
- ***Vehicle Washing Stations:*** *Setting up washing stations for vehicles and equipment to reduce dust tracked onto and off the site.*
- ***Regular Cleaning:*** *Implementing regular cleaning routines to remove dust from surfaces and equipment.*
- ***Personal Protective Equipment (PPE):*** *Providing workers with appropriate PPE, such as masks and goggles, to protect against dust exposure.*

7.5.4 Negative Impacts of Poor Dust Control

7.5.4.1 Health and Safety Impacts

- ***Increased Respiratory Issues:*** *Poor dust control can lead to respiratory problems for workers, affecting their health and well-being.*

- ***Eye Injuries:*** *Dust can cause eye irritation and injuries, leading to discomfort and potential vision problems.*
- ***Slip and Fall Hazards:*** *Accumulation of dust can create slippery conditions, increasing the risk of slips and falls.*

7.5.4.2 *Operational Impacts*

- ***Decreased Productivity:*** *Health issues related to dust exposure can result in absenteeism and decreased workforce productivity.*
- ***Increased Cleanup Costs:*** *Poor dust control can lead to higher costs associated with cleaning up and managing dust.*

7.5.4.3 *Environmental Issues*

- ***Air Pollution:*** *Poor dust control can contribute to air pollution, affecting air quality for workers and the surrounding community.*
- ***Soil and Water Contamination:*** *Dust can settle on soil and water bodies, leading to contamination and environmental harm.*

7.5.4.4 *Legal and Financial Impacts*

- ***Fines and Penalties:*** *Non-compliance with dust control regulations can result in fines and penalties from environmental authorities.*
- ***Reputation Damage:*** *Failing to manage dust properly can harm the company's reputation, affecting relationships with clients and stakeholders.*

7.5.5 Positive Impacts for Compliance with Dust Control Standards

7.5.5.1 *Health and Safety Impacts*

- ***Improved Respiratory Health:*** *Effective dust control reduces the risk of respiratory issues, protecting workers' health.*
- ***Enhanced Eye Protection:*** *Proper dust control measures prevent eye irritation and injuries, ensuring workers' comfort and safety.*
- ***Reduced Slip Hazards:*** *Controlling dust accumulation minimizes the risk of slips and falls, promoting a safer work environment.*

7.5.5.2 *Operational Impacts*

- ***Increased Efficiency:*** *A clean and dust-free worksite promotes efficient work processes and productivity.*
- ***Cost Savings:*** *Effective dust control reduces cleanup costs and prevents environmental remediation expenses.*

7.5.5.3 *Legal and Financial Impacts*

- ***Compliance with Regulations:*** *Adhering to dust control standards ensures compliance with environmental regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper dust control enhances the company's image and builds trust with clients and stakeholders.*

7.5.6 General Provisions for Dust Controlling/Suppression

Dust generation at construction sites poses significant health and safety hazards to workers and nearby communities. Effective dust control measures are essential to maintain a safe work environment, prevent respiratory illnesses, and minimize environmental impact. The following provisions outline the key strategies for planning, implementing, and maintaining dust suppression protocols at

construction sites, ensuring compliance with Occupational Health and Safety (OHS) standards:

7.5.6.1 When to Implement Dust Control Measures

- ***Site Preparation and Excavation:*** *Preventing dust from spreading during initial groundwork.*
- ***Demolition Activities:*** *Controlling dust generated by tearing down structures.*
- ***Material Handling:*** *Managing dust from moving and storing construction materials.*
- ***Heavy Machinery Operations:*** *Reducing dust from machinery movement and operation.*
- ***Cutting, Grinding, and Sanding:*** *Controlling dust generated from construction processes.*
- ***Community and Environmental Responsibility:*** *Minimizing the impact of construction dust on nearby communities and the environment.*
- ***Health and Safety Concerns:*** *Protecting workers from respiratory issues and other health hazards caused by dust inhalation.*
- ***Bridge Construction Specific:***
  - **High-Wind Conditions:** Implementing measures to control dust during windy conditions.
  - **Height and Accessibility:** Ensuring dust control at elevated construction sites to maintain safety and visibility.

7.5.6.2 Where to Implement Dust Control Measures

- ***Near Workstations:*** *Dust control solutions close to work areas to maintain cleanliness and visibility.*
- ***On scaffolding, ladders, and roofs:*** *Temporary dust control measures to prevent contamination and maintain safety.*
- ***When working on structural steel or high-rise buildings:*** *Dust control solutions on various levels for easy access.*
- ***During demolition work:*** *Dust control measures to handle debris and reduce airborne particles.*
- ***Operating or working near heavy machinery and equipment:*** *Dust control units nearby to support cleanliness and safety.*
- ***While handling construction materials:*** *Special dust control points to prevent contamination and health risks.*
- ***On wet or uneven surfaces:*** *Stable dust control facilities to prevent spills and accidents.*
- ***In areas where cutting, grinding, or sanding is conducted:*** *Proper dust control units to manage dust generation.*
- ***When carrying or moving construction materials:*** *Dust control points to minimize dust from packaging and operations.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable dust control units to support cleanliness on the bridge surface.
  - **Under the Bridge Structure:** Dust control facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring dust control solutions to prevent water contamination.

- **Elevated Areas:** Stable and secure dust control units for workers on elevated sections of the bridge.

7.5.6.3 Planning and Assessment

- *Before the commencement of any construction work under project/contract, it is indispensable to formulate a comprehensive dust management plan;*
- *Dust Management plan shall outline the procedures and measures to be adopted in order to minimize dust emissions;*
- *The procedure shall include the following:*
  - ✓ *Appropriate storage of materials;*
  - ✓ *Regular maintenance of construction/worksite;*
  - ✓ *The use of effective dust control equipment.*
- *Identify high dust-risk zones, such as excavation sites and unpaved roads, during site assessments.*
- *Include dust control measures in the Environmental Management Plan (EMP).*
- *Appoint a dedicated* ***Dust Control Officer*** *to oversee dust suppression activities onsite.*

7.5.6.4 Water Usage for Dust Control

- *Use fine mist sprays for efficient dust suppression without creating muddy surfaces.*
- *Limit water application rates to* ***5 liters per square meter per application****, ensuring appropriate wetness.*
- *Implement alternative dust control methods, such as* ***hydro mulch****, in areas with water scarcity.*

7.5.6.5 Equipment and Technology

- *Equip vehicles and machinery with wheel-wash systems to minimize dust from tire movements.*
- *Use dust extraction systems with an efficiency rating of* ***99% particulate capture*** *for cutting and drilling activities.*
- *Install sprinkler systems with automated timers to ensure regular and consistent dust suppression.*

7.5.6.6 Worker Safety

- *Provide additional PPE* ***(such as dust-proof goggles)*** *for workers operating in high-dust zones.*
- *Assign designated pedestrian pathways to reduce worker exposure to dust-prone areas.*
- *Rotate worker schedules in dusty zones to limit prolonged exposure.*

7.5.6.7 Monitoring and Maintenance

- *Use personal dust exposure monitors for workers in high-risk zones and ensure exposure levels stay below* ***0.05 mg/m³*** *for respirable silica dust.*
- *Regularly inspect and clean dust suppression equipment, such as nozzles and hoses, to ensure optimal performance.*
- *Monitor wind speed using onsite anemometers, suspending dust-prone activities if speeds exceed* ***25 km/h****.*

7.5.7 Standards/Specifications for Dust Control/Suppression

Establishing comprehensive standards and specifications is crucial for the effective implementation of dust control measures at construction sites. These guidelines ensure consistent application of best practices, compliance with regulatory requirements, and protection of worker health and environmental quality. The following standards and specifications detail the technical criteria, equipment requirements, and operational procedures necessary to achieve optimal dust suppression outcomes and maintain Occupational Health and Safety (OHS) compliance:

7.5.7.1 Permissible Dust Levels

- *Maintain dust particle levels below **50 µg/m³ (PM10)** for ambient air, as recommended by WHO guidelines.*
- *Ensure respirable dust **(PM2.5)** levels stay within **25 µg/m³** over a **24-hour average.***

7.5.7.2 Water Application

- *Wet down haul roads and exposed surfaces at least **three times daily** during dry weather.*
- *Maintain a water flow rate of **15–20 liters per minute** for spray systems used in demolition and cutting operations.*

7.5.7.3 Windbreaks and Barriers

- *Deploy wind fences made of geotextiles or mesh with **50% air permeability** to reduce dust dispersal.*
- *Position windbreaks at a distance of no more than **5 meters** from the dust-generating activity.*

7.5.7.4 Vehicle Movement

- *Limit vehicle movements in high-dust areas during peak wind hours (e.g., midday).*
- *Apply gravel or soil stabilizers to unpaved roads to reduce dust from vehicle operations by **up to 80%.***

7.5.7.5 Chemical Stabilizers

- *Use dust suppressants that are environmentally safe, such as calcium chloride or lignosulfonate, following the manufacturer's application rates.*
- *Reapply chemical stabilizers **every 30 days** or after heavy rainfall to maintain effectiveness.*

7.5.7.6 Monitoring and Reporting

- *Use handheld particulate monitors with a detection range of **0.001–1 mg/m³** to track dust levels.*
- *Submit weekly dust monitoring reports to site supervisors and environmental regulators for review.*
- *Keep historical records of dust control measures for at least **2 years** for audit purposes.*

7.5.7.7 Community Protection

- *Notify nearby communities about dust-generating activities in advance to mitigate concerns.*
- *Set up temporary air quality monitoring stations within a **500-meter radius** of the worksite to assess offsite dust impacts.*

7.5.7.8 *Innovative Techniques*

- *Explore advanced technologies, such as fog cannons and electrostatic precipitators, for high-dust activities like blasting.*
- *Use dust-binding agents combined with recycled water to reduce dust generation sustainably.*

7.5.7.9 *Innovative Local Approaches*

Reduction of dust pollution in construction/worksites is a demanding concern both for public health and environmental sustainability. Therefore:

- *Introducing local/traditional interventions simultaneously with mechanical systems shall be encouraged to facilitate dust suppression systems;*
- *Such combinations may help contractor significantly in mitigating the intensity and impact of dust pollution;*
- *These measures will not only ensure the well-being of laborers and neighboring residents but also contribute to a cleaner, greener environment for all.*

7.5.8 Key Obligations

7.5.8.1 *LGED Authority Concerned*

The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/ workplaces ***(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.5.8.2 *Contractor Concerned*

The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.6 Section:6)***

7.5.8.3 *Laborer Concerned*

The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/ workplaces ***(Provisions of Sub-section: 6.8, Section:6)***

7.6 Warning Signs at Construction Worksite

Warning signs at construction worksites are essential tools for maintaining safety, communicating hazards, and ensuring compliance with legal and regulatory requirements. These signs act as visual cues to alert workers, visitors, and the public about potential dangers, restricted areas, and safety protocols. Proper installation and maintenance of warning signs contribute to a safer and more efficient worksite.

7.6.1 Types of Warning Signs at Construction Worksites

- ***Danger Signs:*** *Indicate immediate hazards that pose a high risk of injury or death (e.g., "Danger: High Voltage").*
- ***Caution Signs:*** *Warn of potential hazards that could cause minor or moderate injuries (e.g., "Caution: Wet Floor").*
- ***Mandatory Signs:*** *Indicate actions that must be taken to ensure safety (e.g., "Wear Hard Hats").*
- ***Prohibition Signs:*** *Indicate actions that are not allowed to prevent accidents (e.g., "No Smoking").*
- ***Emergency Information Signs:*** *Provide information on emergency procedures, equipment, and exits (e.g., "First Aid Kit" or "Emergency Exit").*

7.6.2 Examples of Hazards that Require Warning Signs

- ***Electrical Hazards:*** *Areas with live electrical equipment or high voltage cables.*
- ***Chemical Hazards:*** *Areas where hazardous chemicals are stored or used.*
- ***Slip and Trip Hazards:*** *Wet or uneven surfaces that can cause slips, trips, and falls.*
- ***Noise Hazards:*** *Areas with high noise levels that require hearing protection.*
- ***Construction Zones:*** *Areas where heavy machinery and construction activities are taking place.*
- ***Confined Spaces:*** *Areas with limited entry and exit points, posing risks of suffocation or entrapment.*

7.6.3 Placement and Design of Warning Signs

- ***Visibility:*** *Ensure signs are placed in clear and visible locations where they can be easily seen by workers and visitors.*
- ***Contrast:*** *Use high-contrast colors (e.g., black and yellow for caution signs, red and white for prohibition signs) to make signs stand out.*
- ***Legibility:*** *Use large, bold fonts and simple graphics to ensure signs are easy to read and understand.*
- ***Consistency:*** *Use standardized symbols and wording to ensure consistency and familiarity across all signs.*
- ***Lighting:*** *Ensure signs are well-lit and visible in all lighting conditions, including low light and nighttime.*

7.6.4 Negative Impacts of Poor Warning Signage

7.6.4.1 Health and Safety Impacts

- ***Increased Risk of Injuries:*** *Without proper warning signs, workers and visitors may be unaware of hazards, leading to accidents and injuries.*

- ***Confusion and Uncertainty:*** *Inadequate or unclear signage can create confusion and uncertainty, increasing the likelihood of unsafe behavior.*

7.6.4.2 Operational Impacts

- ***Decreased Productivity:*** *Accidents and injuries resulting from poor warning signage can lead to downtime and decreased productivity.*
- ***Increased Accident Rates:*** *Poor signage can result in higher accident rates, requiring more time and resources for incident management.*

7.6.4.3 Legal and Financial Impacts

- ***Non-Compliance Penalties:*** *Failure to provide adequate warning signs can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate warning signage can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*

7.6.5 Positive Impacts for Compliance with Warning Signage Standards

7.6.5.1 Health and Safety Impacts

- ***Reduced Risk of Injuries:*** *Effective warning signage helps prevent accidents and injuries by alerting workers and visitors to potential hazards.*
- ***Improved Safety Awareness:*** *Clear and visible warning signs enhance safety awareness and promote safe behavior.*

7.6.5.2 Operational Impacts

- ***Increased Efficiency:*** *A well-marked worksite promotes efficient work processes and reduces the likelihood of accidents and disruptions.*
- ***Cost Savings:*** *Effective warning signage reduces the need for incident management and associated costs.*

7.6.5.3 Legal and Financial Impacts

- ***Compliance with Regulations:*** *Adhering to warning signage standards ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper warning signage enhances the company's image and builds trust with clients and stakeholders.*

7.6.6 General Provisions for Warning Signs

Effective warning signs are a critical component of safety management at construction sites, ensuring that workers and visitors are adequately informed of potential hazards and necessary precautions. Proper placement, visibility, and clarity of warning signs play a crucial role in preventing accidents, enhancing situational awareness, and promoting a culture of safety. The following provisions outline the essential requirements and best practices for designing, installing, and maintaining warning signs at construction sites, in compliance with Occupational Health and Safety (OHS) standards:

7.6.6.1 When to Implement Warning Signs

- ***Working with Hazardous Materials:*** *Clearly indicating areas with potential chemical or physical hazards.*
- ***Heavy Machinery Operations:*** *Marking zones where heavy machinery is in operation to alert workers and visitors.*
- ***Excavation and Demolition Activities:*** *Warning signs to prevent unauthorized access and inform about the risks.*

- ***Restricted Access Areas:*** *Indicating restricted zones to prevent unauthorized entry.*
- ***Height and Fall Risks:*** *Signs to highlight areas where there is a risk of falling.*
- ***Electrical Hazards:*** *Warning of areas with exposed wiring or electrical equipment.*
- ***Community and Environmental Responsibility:*** *Informing and protecting the surrounding community from construction hazards.*
- ***Bridge Construction Specific:***
  - **High-Wind Conditions:** Warning of potential dangers due to weather conditions.
  - **Height and Accessibility:** Signs to indicate risk areas at elevated construction sites.

7.6.6.2 Where to Implement Warning Signs

- ***Near Workstations:*** *Signs close to work areas to provide immediate information and warnings.*
- ***On scaffolding, ladders, and roofs:*** *Temporary warning signs to inform about the risks and maintain safety.*
- ***When working on structural steel or high-rise buildings:*** *Warning signs on various levels to alert workers and visitors.*
- ***During demolition work:*** *Signs to inform about the presence of debris, falling objects, and restricted access.*
- ***Operating or working near heavy machinery and equipment:*** *Signs to indicate operational zones and safety precautions.*
- ***While handling hazardous materials:*** *Special signs to inform about potential risks and safety measures.*
- ***On wet or uneven surfaces:*** *Signs to warn about slips, trips, and falls.*
- ***In areas where hazardous chemicals are used or stored:*** *Proper signs to indicate chemical hazards and safety instructions.*
- ***When carrying or moving heavy materials:*** *Warning signs to alert about moving loads and potential injuries.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable signs to inform about construction activities and safety measures.
  - **Under the Bridge Structure:** Warning signs for workers handling foundational tasks.
  - **Near Water Bodies:** Signs to indicate potential water hazards and safety precautions.
  - **Elevated Areas:** Stable and secure warning signs to inform about height-related risks.

7.6.6.3 Placement of Warning Signs

- *Install signs at eye level or a height of **1.5 to 2 meters** above ground for optimal visibility.*
- *Position signs at least **10 meters** before the hazard to allow sufficient reaction time.*

7.6.6.4 Sign Visibility and Readability

- *Use reflective or illuminated materials for visibility in low-light conditions.*
- *Ensure signs are legible from a distance of **at least 10 meters**, with bold lettering and standardized symbols.*

7.6.6.5 Language and Symbols

- *Display warning signs in the local language and include universally recognized symbols for accessibility.*
- *Use multilingual signs in worksites with diverse language-speaking workers.*

7.6.6.6 Maintenance and Inspection

- *Inspect all warning signs weekly to ensure they are clean, visible, and securely mounted.*
- *Replace damaged or faded signs promptly to maintain effectiveness.*

7.6.6.7 Awareness and Training:

- *Conduct orientation sessions for workers to familiarize them with the meaning of site-specific warning signs.*
- *Update training programs annually or when new signage is introduced.*

7.6.6.8 Placement of Warning Signs

- *Install signs at all entrances and access points to restricted or hazardous zones.*
- *For long pathways or corridors, place warning signs at intervals of* ***5–10 meters*** *to maintain visibility.*
- *Add directional signs to guide workers to safety zones such as muster points or emergency exits.*

7.6.6.9 Sign Visibility and Readability

- *Ensure signs are visible under all working conditions, including low light or foggy weather.*
- *Use bold, sans-serif fonts (e.g., Arial or Helvetica) for improved readability from a distance.*
- *Position signs at an angle of* ***90 degrees*** *to the line of sight for direct visibility.*

7.6.6.10 Language and Symbols

- *Include Braille for visually impaired individuals in high-traffic areas.*
- *Use only ISO-standardized symbols to ensure universal understanding.*

7.6.6.11 Maintenance and Inspection

- *Check for signs obscured by vegetation, construction materials, or machinery and clear the obstructions immediately.*
- *Test the reflectiveness of signs quarterly to ensure they meet visibility standards during nighttime operations.*

7.6.6.12 Temporary Warning Signs

- *Use portable, collapsible signs for temporary hazards like wet floors or live equipment testing.*
- *Ensure temporary signs are secured to prevent tipping or displacement by wind or movement.*

7.6.6.13 Specialized Signs for High-Risk Zones

- *Display "Overhead Hazard" signs near scaffolding and cranes.*
- *Place "Noise Hazard" signs in areas exceeding* ***85 dB*** *to warn workers to wear ear protection.*

7.6.6.14 Training and Awareness

- *Incorporate warning sign education into site induction programs.*

- *Conduct simulated hazard drills to evaluate workers' awareness and response to site warnings.*

7.6.7 Standards/Specifications for Warning Signs

Setting precise standards and specifications for warning signs at construction sites is essential to ensure effective communication of hazards and safety information. These guidelines provide a framework for the design, placement, and maintenance of warning signs, ensuring they are easily visible, understandable, and compliant with regulatory requirements. The following standards and specifications outline the criteria for the materials, size, color, and wording of warning signs, as well as best practices for their deployment and upkeep, to maintain a safe and informed work environment in alignment with Occupational Health and Safety (OHS) protocols:

7.6.7.1 Sign Dimensions and Materials:

- ***Minimum size: 300 mm x 450 mm** for general warning signs.*
- ***Material: Weather-resistant materials** such as aluminum or durable plastic, with UV-resistant coatings for outdoor use.*

7.6.7.2 Font and Colors

- *Font size: Minimum **50 mm** for primary text to ensure readability.*
- *Color coding:*
  - ✓ Red for danger or prohibition signs (e.g., "**Do Not Enter**").
  - ✓ Yellow with black text for cautionary signs (e.g., "**Caution: Wet Floor**").
  - ✓ Blue for mandatory actions (e.g., "**Wear PPE**").

7.6.7.3 Illumination and Reflectivity

- *Use signs with reflective surfaces (minimum reflectivity grade: **Class 1**) for nighttime visibility.*
- *Ensure illumination levels around signs are at least **100 lux** in low-light conditions.*

7.6.7.4 Distance and Positioning

- *Place signs at a safe viewing distance relative to the hazard:*
  - ✓ **10 meters** for general hazards.
  - ✓ **5 meters** for confined spaces or immediate risks.
  - ✓ At all access points for restricted zones.

7.6.7.5 Regulatory Compliance

- *Ensure all signs comply with ISO 7010:2019 for safety symbols or equivalent local standards.*
- *Adhere to national occupational safety and health regulations for signage design and placement.*

7.6.7.6 Temporary Signs

- *Use temporary signs for dynamic hazards, such as moving heavy equipment or temporary road closures.*
- *Ensure these signs are securely mounted and removed once the hazard no longer exists.*

7.6.7.7 Sign Durability

- *Weatherproof to withstand temperature ranges of **-10°C to 50°C**.*
- *Rated for a minimum lifespan of **5 years** under normal site conditions.*

7.6.7.8 Proximity to Equipment and Risks

- *Place signs near equipment, such as cranes, to warn of falling objects or overhead loads.*
- *Install barricades and additional signage near open trenches or high-risk zones for enhanced safety.*

7.6.7.9 Sign Dimensions and Materials:

- *Danger and prohibition signs: Minimum size **600 mm x 900 mm** for high-visibility locations.*
- *Use materials with fire resistance ratings of at least **Class B** under ISO 13501-1 for safety in flammable areas.*

7.6.7.10 Font and Colors

- *Text-to-background contrast ratio: At least **70%** for high readability.*
- *Mandatory signs (e.g., "Hard Hat Area") must have a blue background with white text as per ISO 3864.*

7.6.7.11 Illumination and Reflectivity

- *Install backlit signs in tunnels or enclosed spaces to ensure continuous visibility.*
- *Reflective coating must have a luminance intensity of at least **300 cd/lx/m²**.*

7.6.7.12 Distance and Positioning

- *Install signs warning of vehicle movement at least **50 meters** before the worksite entrance to provide sufficient reaction time.*
- *Use hanging signs or boom-mounted signs for high-traffic areas with multiple overlapping hazards.*

7.6.7.13 Durability and Resistance

- *Signs must withstand exposure to UV rays, heavy rain, and winds up to **100 km/h**.*
- *Replace signs with text or images faded by more than **25%** to maintain compliance and effectiveness.*

7.6.7.14 Proximity to High-Risk Zones

- *Install trip hazard signs within **1 meter** of temporary cables, hoses, or uneven surfaces.*
- *Surround deep excavations with signs placed at **3-meter intervals** along the perimeter.*

7.6.7.15 Regulatory Compliance

- ***International standards OR equivalent national standards** for the design and layout of safety signage may be used if available and applicable;*
- *Government of Bangladesh have **"Bangladesh Road Sign Manual"** where provisions are provided for Safety Signages for roads. The following Standards/ Specifications shall be used in applicable cases:*

  a) **Design and Use (Clause E2.1)**

  - ✓ **Color:** Regulatory signs use red, white, and black for clarity and visibility.
  - ✓ **Shape:** Circular signs indicate mandatory actions, while triangular signs indicate warnings.
  - ✓ **Lettering:** Minimum height of letters should be **60 mm** for regulatory signs.

b) Sizes and Siting (Clause E2.2)
   - ✓ **Height Above Ground:** The bottom edge of the sign should be at least **1.5 meters** above ground level.
   - ✓ **Distance from Road:** Signs should be placed at least **0.5 meters** from the edge of the road.
   - ✓ **Visibility Distance:** Signs should be visible from a minimum distance of **75 meters.**

c) Materials and Manufacture (Clause G1.1)
   - ✓ **Materials:** Signs should be made of retro-reflective materials for night visibility.
   - ✓ **Thickness:** Sign plates should be at least **1.2 mm** thick.
   - ✓ **Reflectivity:** Signs should have a reflectivity of at least **70 cd/lux/m²**.

d) Maintenance (Clause I2.1)
   - ✓ **Inspection Frequency:** Signs should be inspected every **6 months.**
   - ✓ **Cleaning:** Signs should be cleaned as needed to maintain visibility.
   - ✓ **Repairs:** Damaged signs should be repaired or replaced within **24 hours.**

e) Compliance with International Standards (Clause A)
   - ✓ **Standards:** Aligns with the United Nations Convention on Road Signs and Signals (Vienna Convention).
   - ✓ **Symbols:** Uses internationally recognized symbols for consistency.

- *Conduct an annual audit of all warning signage to ensure compliance with local occupational safety guidelines.*

7.6.7.16 Technology Integration:

- *Use digital, LED-based warning signs in areas with frequently changing hazards (e.g., overhead crane operations).*
- *Integrate motion sensors with hazard signs to activate flashing lights or alarms when individuals approach restricted zones.*

7.6.8 Key Obligations

7.6.8.1 LGED Authority Concerned

The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/ workplaces ***(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.6.8.2 Contractor Concerned

The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.6 Section:6)***

7.6.8.3 Laborer Concerned

The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.8, Section:6)***

7.7 Noise Management at Construction Worksite

Noise management is essential at construction worksites to minimize health risks, improve worker productivity, and comply with regulatory standards. Excessive noise from construction activities can cause hearing loss, stress, and communication challenges, as well as disrupt nearby communities. Effective noise management ensures a safe and productive working environment while reducing environmental impacts.

7.7.1 Sources of Noise at Construction Worksites

- ***Heavy Machinery:*** *Equipment such as bulldozers, excavators, and cranes generate significant noise (typically producing 80–120 dB(A).*
- ***Power Tools:*** *Tools like jackhammers, drills, and saws produce loud and continuous noise (levels of 90–110 dB(A)).*
- ***Demolition Activities:*** *Breaking down structures creates high levels of noise from impacts and vibrations.*
- ***Transport:*** *Movement of vehicles and delivery trucks on-site contributes to noise levels.*
- ***Construction Activities:*** *General construction work, such as hammering, cutting, and assembling materials, generates noise.*

7.7.2 Examples of Noise-Related Hazards that Require OHS Measures

- ***Hearing Loss:*** *Prolonged exposure to high noise levels can lead to temporary or permanent hearing loss.*
- ***Stress and Fatigue:*** *Excessive noise can cause stress, fatigue, and decreased concentration among workers.*
- ***Communication Barriers:*** *High noise levels can make it difficult for workers to communicate effectively, increasing the risk of accidents.*

7.7.3 Examples of Noise Management Measures

- ***Noise Assessments:*** *Conducting regular noise assessments to identify sources of noise and measure exposure levels.*
- ***Engineering Controls:*** *Implementing engineering controls, such as noise barriers, acoustic enclosures, and mufflers, to reduce noise at the source.*
- ***Administrative Controls:*** *Scheduling noisy activities during off-peak hours, rotating workers to minimize exposure, and providing quiet areas for breaks.*
- ***Personal Protective Equipment (PPE):*** *Providing workers with hearing protection, such as earplugs and earmuffs, to reduce noise exposure.*
- ***Training:*** *Educating workers on the risks of noise exposure and the importance of using hearing protection.*
- ***Monitoring:*** *Continuously monitoring noise levels to ensure they remain within acceptable limits and adjusting measures as needed.*

7.7.4 Negative Impacts of Poor Noise Management

7.7.4.1 Health and Safety Impacts

- ***Hearing Damage:*** *Poor noise management can lead to hearing loss and other auditory issues for workers.*
- ***Increased Stress:*** *Excessive noise can cause stress, fatigue, and decreased concentration, affecting workers' mental and physical health.*
- ***Accident Risks:*** *Difficulty in communication due to high noise levels can increase the risk of accidents and injuries.*

7.7.4.2 *Operational Impacts*

- ***Decreased Productivity:*** *Health issues related to noise exposure can result in absenteeism and decreased workforce productivity.*
- ***Higher Turnover Rates:*** *Prolonged exposure to high noise levels can lead to worker dissatisfaction and higher turnover rates.*

7.7.4.3 *Environmental Issues*

- ***Community Disruption:*** *Poor noise management can disturb the surrounding community, leading to complaints and potential legal issues.*

7.7.4.4 *Legal and Financial Impacts*

- ***Non-Compliance Penalties:*** *Failure to manage noise levels properly can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate noise management can harm the company's reputation, affecting relationships with clients, stakeholders, and the community.*

7.7.5 Positive Impacts for Compliance with Noise Management Standards

7.7.5.1 *Health and Safety Impacts*

- ***Protected Hearing:*** *Effective noise management helps prevent hearing loss and other auditory issues, protecting workers' health.*
- ***Reduced Stress:*** *Proper noise management reduces stress and fatigue, promoting better mental and physical health among workers.*
- ***Improved Communication:*** *Lower noise levels facilitate better communication, reducing the risk of accidents and injuries.*

7.7.5.2 *Operational Impacts*

- ***Increased Efficiency:*** *A quieter work environment promotes efficient work processes and productivity.*
- ***Enhanced Worker Satisfaction:*** *Effective noise management improves worker satisfaction and reduces turnover rates.*

7.7.5.3 *Environmental Impacts*

- ***Community Relations:*** *Proper noise management reduces disturbances to the surrounding community, fostering better relationships.*

7.7.5.4 *Legal and Financial Impacts*

- ***Compliance with Regulations:*** *Adhering to noise management standards ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper noise management enhances the company's image and builds trust with clients, stakeholders, and the community.*

7.7.6 General Provisions for Noise Management

Effective noise management at construction sites is crucial to protect workers' hearing, reduce disturbances to surrounding communities, and comply with regulatory requirements. Implementing comprehensive noise control measures ensures a safer and more comfortable work environment while minimizing the impact on nearby residents and businesses. The following provisions outline the key strategies for planning, implementing, and maintaining noise management protocols at construction sites, in alignment with Occupational Health and Safety (OHS) standards:

7.7.6.1 When to Implement Noise Management Measures

- ***Operating Heavy Machinery:*** *Reducing noise levels from machinery operations to protect worker hearing.*
- ***Demolition Activities:*** *Controlling noise generated by tearing down structures.*
- ***Material Handling and Transportation:*** *Minimizing noise from moving and storing construction materials.*
- ***Construction Processes:*** *Reducing noise from cutting, grinding, and other construction activities.*
- ***Community and Environmental Responsibility:*** *Limiting the impact of construction noise on nearby communities and the environment.*
- ***Health and Safety Concerns:*** *Protecting workers from hearing loss and other health issues related to excessive noise.*
- ***Bridge Construction Specific:***
  - **High-Wind Conditions:** Implementing measures to manage noise levels in windy conditions.
  - **Height and Accessibility:** Ensuring noise control at elevated construction sites to maintain safety and communication.

7.7.6.2 Where to Implement Noise Management Measures

- ***Near Workstations:*** *Noise control solutions close to work areas to maintain a safe and comfortable environment.*
- ***On scaffolding, ladders, and roofs:*** *Temporary noise control measures to reduce sound exposure and maintain safety.*
- ***When working on structural steel or high-rise buildings:*** *Noise management solutions on various levels for effective control.*
- ***During demolition work:*** *Noise control measures to handle the loud sounds from demolition activities.*
- ***Operating or working near heavy machinery and equipment:*** *Noise control units nearby to support a quieter work environment.*
- ***While handling construction materials:*** *Special noise control points to manage sound from material handling.*
- ***On wet or uneven surfaces:*** *Stable noise control facilities to prevent accidents due to impaired hearing.*
- ***In areas where cutting, grinding, or sanding is conducted:*** *Proper noise control units to manage noise generation.*
- ***When carrying or moving construction materials:*** *Noise control points to minimize sound from operations.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable noise control units to support a quieter work environment on the bridge surface.
  - **Under the Bridge Structure:** Noise management facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring noise control solutions to prevent disturbance to aquatic life.
  - **Elevated Areas:** Stable and secure noise control units for workers on elevated sections of the bridge.

7.7.6.3 Noise Risk Assessment

- *Conduct a detailed noise risk assessment before starting construction to identify high-noise activities and areas.*
- *Measure baseline noise levels in surrounding areas using sound level meters.*

7.7.6.4 *Control Measures*

- *Isolate noisy equipment in designated areas far from worker rest zones and residential neighborhoods.*
- *Limit the operation of heavy machinery to specific time windows (e.g., **7:00 AM–6:00 PM**) to avoid disturbing nearby communities.*

7.7.6.5 *Monitoring and Reporting*

- *Install fixed noise monitoring stations at key points on-site to track noise levels in real time.*
- *Maintain logs of noise measurements and submit regular reports to regulatory authorities.*

7.7.6.6 *Worker Protection*

- *Provide hearing protection devices (e.g., earplugs or earmuffs) for workers exposed to noise levels above **85 dB(A)**.*
- *Implement job rotation schedules to limit individual worker exposure to high-noise environments.*

7.7.6.7 *Community Engagement*

- *Notify nearby residents and businesses about planned noisy activities and their expected duration.*
- *Establish a grievance redressal mechanism to address noise-related complaints promptly.*

7.7.7 Standards/Specifications for Noise Management

Establishing clear standards and specifications for noise management is essential to effectively mitigate noise-related issues at construction sites. These guidelines ensure consistent application of best practices, compliance with regulatory requirements, and protection of workers' hearing and community well-being. The following standards and specifications provide the technical criteria, equipment requirements, and operational procedures necessary to achieve optimal noise control and maintain Occupational Health and Safety (OHS) compliance:

7.7.7.1 *Permissible Noise Levels:*

- *Ensure overall noise exposure does not exceed **85 dB(A)** over an 8-hour workday.*
- *For tasks generating noise above **90 dB(A)**, limit exposure to **2 hours per worker per shift** without adequate hearing protection.*
- *Peak noise levels, such as those from impact tools, must not exceed **140 dB(C)**.*
- *The following table (Table:7-3) illustrates the maximum allowable levels of noise in different locations and time range of day and night including occupational Health and Safety:*

Table 7-4:Regulatory Provisions for Safe Noise Levels in Bangladesh *

Zone	Time Period	Maximum Allowable Noise Level	Unit	Clause
Silent Zone	Daytime (6 AM - 9 PM)	**50**	**dB(A)**	E2.1
	Nighttime (9 PM - 6 AM)	**40**	**dB(A)**	E2.1

Zone	Time Period	Maximum Allowable Noise Level	Unit	Clause
Residential Zone	Daytime (6 AM - 9 PM)	**55**	**dB(A)**	E2.2
	Nighttime (9 PM - 6 AM)	**45**	**dB(A)**	E2.2
Mixed Zone	Daytime (6 AM - 9 PM)	**60**	**dB(A)**	E2.2
	Nighttime (9 PM - 6 AM)	**50**	**dB(A)**	E2.2
Commercial Zone	Daytime (6 AM - 9 PM)	**70**	**dB(A)**	E2.2
	Nighttime (9 PM - 6 AM)	**60**	**dB(A)**	E2.2
Industrial Zone	Daytime (6 AM - 9 PM)	**75**	**dB(A)**	E2.2
	Nighttime (9 PM - 6 AM)	**70**	**dB(A)**	E2.2
Occupational Health and Safety	General Limit (8-hour period)	**85**	**dB(A)**	G1.1
	Peak Sound Pressure	**140**	**dB(C)**	G1.1
	Average Maximum	**110**	**dB(A)**	G1.1

As per Noise Pollution (Control) Rules-2006

7.7.7.2 Noise Barriers and Insulation

- *Construct temporary acoustic walls around equipment producing noise greater than **90 dB(A)**, with materials achieving a **10 dB(A)** noise reduction.*
- *Use prefabricated enclosures for stationary generators or compressors with a minimum NRC (Noise Reduction Coefficient) of **0.9**.*
- *Ensure barriers are placed no further than **2 meters** from the noise source to optimize shielding effectiveness.*

7.7.7.3 Machinery and Equipment

- *Ensure newly purchased machinery complies with low-noise standards (e.g., maximum **75 dB(A)** for loaders and excavators).*
- *Replace worn machinery parts, such as exhaust mufflers, annually or upon showing visible signs of wear.*
- *Calibrate and maintain noise-reducing attachments, such as silencers, to function within **95% efficiency**.*

7.7.7.4 Monitoring and Measurement

- *Deploy sound level meters capable of measuring in the range of **30–140 dB(A)**, with an accuracy of **±1 dB(A)**.*
- *Conduct noise level measurements every **4 hours** at high-activity zones and compare with permissible limits.*
- *Use noise mapping tools to identify hotspots and implement targeted control measures.*

7.7.7.5 Worker Protection

- *Equip workers in high-noise zones with earmuffs or earplugs offering a Noise Reduction Rating (NRR) of at least **25 dB**.*

- *Test hearing protection devices annually to ensure compliance with international standards such as EN 352 or ANSI S12.6.*
- *Install hearing protection stations within **20 meters** of high-noise zones to ensure easy access.*

7.7.7.6 Scheduling and Coordination

- *Restrict operation of high-noise equipment to **9:00 AM–5:00 PM** in residential or noise-sensitive areas.*
- *Combine noisy activities into a single shift to minimize overall disruption throughout the day.*
- *Avoid simultaneous operation of multiple high-noise machines to keep cumulative noise levels below **100 dB(A)**.*

7.7.7.7 Community Engagement

- *Erect temporary soundproof shelters in residential areas within **200 meters** of the worksite for public use during high-noise activities.*
- *Publish weekly schedules of planned noisy activities to keep the community informed.*
- *Maintain noise exposure within **10 dB(A)** above ambient levels in community-sensitive zones.*

7.7.7.8 Legal Compliance and Audits

- *Conduct noise exposure audits bi-annually to ensure alignment with national and international noise guidelines (e.g., OSHA, ISO 9612, or BS 5228, Noise Pollution (Control) Rules, 2006 etc.) **as per applicability**.*
- *Record and maintain noise monitoring data for 3 years to comply with regulatory requirements.*
- *Obtain noise management approval from local environmental agencies before initiating high-noise operations.*

7.7.7.9 Innovative Noise Reduction Strategies

- *Use active noise cancellation (ANC) systems in enclosed spaces to counteract high-frequency noise.*
- *Install vibration isolation pads beneath stationary equipment to reduce low-frequency noise by **15–20 dB(A)**.*
- *Introduce quiet construction methods, such as pre-cast components, instead of onsite cutting or grinding.*

7.7.7.10 Temporary Noise Management Zones

- *Establish low-noise rest zones onsite with noise levels below **50 dB(A)** for workers to take breaks safely.*
- *Create "**Restricted Noise Zones**" in high-risk areas to limit entry to authorized personnel with proper protection.*

7.7.7.11 Applying/Using Comparatively Quieter Work Methods

- *In applicable cases, hydraulic breaking or bursting techniques rather than pneumatic impact breaking methods for demolition;*
- *Gas cutters (preferable) to cut metal rather than using grinding methods in dismantling metal structures/metal cutting works;*
- *Pressing methods instead of hammering shall preferably be used.*
- *Bored (in-situ) piling shall preferably be used instead of precast piling except unavoidable engineering considerations.*
- *In case of precast piling equipment with low noise shall preferably be used for driving;*

- *Electrical power operated equipment shall preferably be used instead of generators/direct power operated equipment;*

7.7.7.12 Methods/Procedures for Reducing Noise Exposure

Following methods shall be used to reduce noise exposure:

- *The compliance of equipment brought onto site with specifications shall be checked (By obtaining information available from suppliers or by onsite noise assessments);*
- *Under/Over/unspecified equipment shall be avoided;*
- *Proper maintenance for all equipment/machineries/plants shall be ensured especially, all noise control options/parts like silencers and enclosures etc.;*
- *Work schedules for carrying out noisy works shall be checked and monitored whether it is carried out as specified, away from other workers, outside hours, etc.*
- *Noisy areas shall be identified, marked properly and monitored so that the laborers/employee concerned can avoid unwanted entry;*
- *Implementation of specified training programs for laborers/ employees shall be ensured;*
- *If personal hearing protection is applicable, wearing, use and appropriate maintenance protective devices shall be ensured by the contractor;*
- *Safety toolbox meetings shall be held daily to provide and obtain feedback on:*
    - ✓ The effectiveness of noise control measures;
    - ✓ Use of personal hearing protection devices from laborers and contractors;
    - ✓ Posting of noise information on safety notice boards.
- *Barriers/Enclosures (as per applicability) shall be used;*
- *Maintenance restricted hours (As per direction of concerned supervising Engineer of LGED) shall be furnished;*
- *Rotation of workers in noisy areas (As per direction of concerned supervising Engineer of LGED) shall be ensured to minimize the number of laborers to noise exposure;*
- *Number of laborers onsite during activities that generate hazardous noise shall be limited (As per direction of concerned supervising Engineer of LGED) to reduce the effect of noise exposure;*
- *Warning signs for noisy equipment shall be erected in appropriate locations;*
- *Site instructions for laborers including noise levels and noise controls shall be posted at noticeable locations/ distributed to the laborers/employees concerned;*
- *Schedules of noisy plant and estimation of exposure for each phase of work shall be prepared;*
- *Site lay out shall be prepared to separate noisy activities from quieter ones;*
- *Noisy activities shall be scheduled to implement when the minimum number of nearby workers are present to avoid neighborhood annoyance (as per environmental restriction);*
- *Laborers shall be rostered to minimize exposure times to hazardous noise;*
- *Guidance for laborers on hazards and the methods to reduce noise shall be prepared by the contractor with the help of officers/personnel of LGED concerned;*

- *It shall be ensured by the contractor that the laborers are well trained, instructed and supervised in noise matters and responsibilities including correct use and maintenance of personal hearing protectors/aids.*

7.7.7.13 Use/Provision of Personal Hearing Protector/Aid

- *The contractor shall provide appropriate personal hearing protection/Aid in applicable cases.*
- *Correct use and maintenance of personal hearing protector selection for laborers/employees concerned shall be ensured;*

7.7.7.14 Implementation Stage Wise Management of Noise

Effective and practical action shall preferably be ensured to manage hazardous noise in every stage of the construction process:

a) Planning/Tendering Stage

LGED may include noise control requirements in the workplace in the specification and in the tender document to help avoid unexpected consequences/events during the implementation phase. It will allow tenderers to plan how to overcome noise problems at the worksite in advance. In the specification, LGED may include:

- ✓ *Specified noise exposure levels during construction/ implementation phase;*
- ✓ *Minimum exposure standard;*
- ✓ *Use of quiet/silenced equipment adopting quieter, alternative techniques;*
- ✓ *Noise control measures like silencers, barriers, enclosures erecting warning signs to identify hazardous noise areas using time restrictions;*
- ✓ *Provision of personal hearing aid;*
- ✓ *Provisions for noise control/management related training.*

b) Tender Submission/Evaluation Stage

- ✓ *The tenderer's proposal shall address all of the specifications regarding occupational noise management for the package concerned;*
- ✓ *The proposal shall preferably include site specific safety management plan detailing the actions required to achieve the specified noise exposure levels.*
- ✓ *The occupational noise management plan shall be based on the results of any noise assessment and should include:*
  - Measurement of noise levels to confirm that control measures;
  - Description of any training and supervision;
  - Control measures for temporary work areas;
  - Timeframes for reviewing noise assessments;
  - It may also include information on how the tenderer is planning to meet its obligations, such as:
    - *A list of equipment to be used - with noise levels at operator and other relevant worker positions;*

c) Implementation Stage (Site Planning)

- ✓ *The contractor shall have a realistic so that no laborer/ employee concerned shall unnecessarily expose to hazardous noise;*
- ✓ *As a good practice an occupational noise management plan for this stage shall be prepared and one employee concerned shall be deployed to coordinate all noisy activities.*

d) Implementation Stage (Construction)

- ✓ *Once the construction work is in progress, the implementation of the occupational noise management plan shall essentially be monitored;*
- ✓ *Monitoring of general and specified provisions shall be carried out by concerned implementing/ supervising office (Executive Engineer's Office/ Upazila Engineer's Office) as well as the contractor.*

7.7.7.15 Using/Ensuring Best Practices for Noise Control/Solutions

Best practices are always the preferable options irrespective of the types/ categories of worksites. Therefore, it should be encouraged and practiced without prejudice.

a) Isolation Techniques

- ✓ Noisy plants (e.g., generators, compressors, pumps concrete batching plant etc.) shall preferably be located as far as possible from sensitive boundaries and main work areas, as running work allows;
- ✓ Noise sources shall preferably be isolated in an insulated room or enclosure;
- ✓ Laborer shall preferably be isolated from the noise source or be placing in enclosed operator locations;
- ✓ Noisy work-related activities shall be moved away from non-related laborers/employees.

b) Engineering Considerations

- ✓ Equipment shall preferably be placed on dampening material instead of directly onto concrete/similar material to reduce noise;
- ✓ If possible and applicable, vibrating parts shall be isolated;
- ✓ If possible and applicable, silencers and/or baffles shall be fitted to machinery and combustion engines;
- ✓ Muffling/similar things may be fitted to mobile equipment like hand-held concrete breakers;
- ✓ In case of saw blades, low noise one shall preferably be used;
- ✓ Barriers made of absorptive materials shall be used to reduce reflected sound;
- ✓ Floating slab arrangement may be used to control ground-borne noise and vibration;
- ✓ Partitions or screens shall be used to deflect or absorb sound.

c) Administrative Controls

- ✓ Noise levels of plant/machinery shall be checked through test run before purchase;
- ✓ Regular servicing of vehicles and machineries shall be ensured. As because, worn-out parts generate high level

of noise whereas well maintained equipment make less noise;

- ✓ Safe work procedures shall be developed to reduce noise from plant/machineries/vehicles/equipment that may include:
  - Turning off engines or reducing them to idle when they are not in use;
  - Checking and reporting if the brakes are properly adjusted;
  - Checking engine oil levels regularly to avoid not unnecessary roaring of engine;
  - Using the horn in emergencies only;
  - Keeping covers and panels of machinery/ equipment closed when in use, ensuring that they are well fitted;
  - keeping bolts/fasteners tightly secured to avoid crashes;
  - Restricting access of unauthorized persons to noisy areas;
  - Organizing work schedules in such a way so that:
    - *Exposure to hazardous noise of laborer becomes limited;*
    - *Rotate activities of laborers.*
  - Make the laborers/concerned employees trained about all noise control measures for the site and how to use them safely.

d) Persons/Employees to be Trained

- ✓ Contractors/representatives preparing the tender documentation to ensure that will control noise;
- ✓ Managers, so that they can meet their duties regarding control and record keeping;
- ✓ Laborers, who need to know how and why to use work equipment and control measures to minimize exposure to noise;
- ✓ Laborers who are new, young or vulnerable.

e) Use of Personal Protective Equipment (PPE)

If hearing PPE is required, contractor responsible must make sure they are chosen for their:

- ✓ Noise reduction characteristics, comfort, suitability for the job;
- ✓ If hearing PPE is provided, Contractor must provide adequate supervision, training and instruction to laborers on the correct use, maintenance and storage of the PPE;
- ✓ Contractor and LGED authority concerned shall make sure that the laborers understand that they need to wear the PPE provided and wear it correctly;
- ✓ Regular supervision shall be performed to ensure that laborers are wearing their PPE and immediately replacing any damaged hearing PPE;
- ✓ laborers must wear their hearing PPE at all times during a noisy shift in order to get the full protection.

7.7.8 Key Obligations

7.7.8.1 LGED Authority Concerned

The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/ workplaces ***(Provisions of Sub-section: 6.1,6.2,6.3, 6.4 & 6.9, Section:6).***

7.7.8.2 Contractor Concerned

The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.6 Section:6)***

7.7.8.3 Laborer Concerned

The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.8, Section:6)***

7.8 Child Labor at Construction Worksite

Child labor at construction worksites is a critical issue that violates fundamental human rights, disrupts children's education, and exposes them to hazardous conditions. Preventing child labor not only ensures compliance with legal and ethical standards but also promotes safer and more responsible workplace practices.

7.8.1 Examples of the Forms/Categories of Child Labor at Construction Worksites

- ***Manual Labor:*** *Children engaged in physically demanding tasks such as carrying heavy loads, digging, and mixing concrete.*
- ***Hazardous Work:*** *Children exposed to dangerous machinery, toxic substances, and unsafe working conditions.*
- ***Long Working Hours:*** *Children working long hours without adequate rest, affecting their health and education.*
- ***Low Wages:*** *Children receiving minimal or no wages for their work, leading to exploitation and economic hardship.*

7.8.2 Examples of Hazards Faced by Child Laborers that Require OHS Measures

- ***Physical Injuries:*** *Children are at higher risk of injuries due to their lack of experience and physical development.*
- ***Health Issues:*** *Exposure to hazardous substances and strenuous work can lead to long-term health problems.*
- ***Psychological Impact:*** *Child labor can cause stress, anxiety, and trauma, affecting children's mental well-being.*
- ***Educational Deprivation:*** *Working long hours prevents children from attending school and receiving an education.*
- ***Common Locations:***
  - Informal or unregulated construction sites in rural or low-income urban areas.
  - Subcontracted small-scale projects where oversight is often weak.
- ***Legal Examples***
  - International labor laws such as the **ILO Minimum Age Convention No. 138**, which sets the general minimum working age at **15 years** (or **18 years** for hazardous work).
  - In Bangladesh, child labor laws are designed to protect children from exploitation and hazardous work environments. Here are some key provisions:
    - ***The Bangladesh Labor Act, 2006:***
      - *This is the primary legislation governing labor standards in Bangladesh.*
      - *It prohibits the employment of children under the age of 14 in any sector.*
    - ***The National Child Labor Elimination Policy, 2010:***
      - *This policy aims to eliminate child labor in Bangladesh.*
      - *It emphasizes the importance of education and social protection for children.*
    - ***International Conventions:***

- *Bangladesh has ratified the ILO Worst Forms of Child Labor Convention (C182).*
- *Bangladesh has also ratified the UN Convention on the Rights of the Child.*

7.8.3 Measures to Prevent Child Labor

- ***Strict Hiring Policies:*** *Implementing strict hiring policies to ensure that no children are employed at construction sites.*
- ***Age Verification:*** *Verifying the age of all workers through official documents to prevent the employment of underage workers.*
- ***Awareness Programs:*** *Conducting awareness programs for employers, workers, and the community about the harmful effects of child labor and the importance of education.*
- ***Monitoring and Inspections:*** *Regularly monitoring and inspecting construction sites to ensure compliance with child labor laws and regulations.*
- ***Support Services:*** *Providing support services for children and their families, such as access to education, healthcare, and social services.*

7.8.4 Negative Impacts of Child Labor

7.8.4.1 Health and Safety Impacts

- ***Increased Risk of Injuries:*** *Child laborers are more susceptible to injuries due to their lack of experience and physical development.*
- ***Long-Term Health Issues:*** *Exposure to hazardous substances and strenuous work can lead to chronic health problems.*
- ***Psychological Harm:*** *Child labor can cause stress, anxiety, and trauma, affecting children's mental well-being.*

7.8.4.2 Operational Impacts

- ***Decreased Productivity:*** *Child laborers may not perform tasks as efficiently as adult workers, leading to decreased productivity.*
- ***High Turnover Rates:*** *Child laborers are more likely to leave work due to health issues or the need to attend school, leading to high turnover rates.*

7.8.4.3 Legal and Financial Impacts

- ***Non-Compliance Penalties:*** *Employing child labor can result in fines and penalties from labor authorities.*
- ***Reputation Damage:*** *The use of child labor can harm the company's reputation, affecting relationships with clients, stakeholders, and the community.*

7.8.5 Positive Impacts for Compliance with Child Labor Laws

7.8.5.1 Health and Safety Impacts

- ***Protected Childhood:*** *Ensuring that children are not employed in hazardous work protects their health and well-being.*
- ***Improved Mental Health:*** *Preventing child labor reduces stress and anxiety, promoting better mental health for children.*

7.8.5.2 Operational Impacts

- ***Increased Efficiency:*** *Employing experienced adult workers leads to more efficient work processes and productivity.*

- ***Enhanced Worker Satisfaction:*** *Ensuring ethical labor practices improves worker satisfaction and reduces turnover rates.*

7.8.5.3 Legal and Financial Impacts

- ***Compliance with Regulations:*** *Adhering to child labor laws ensures compliance with labor regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to ethical labor practices enhances the company's image and builds trust with clients, stakeholders, and the community.*

7.8.6 General Provisions for Child Labor

Preventing child labor at construction sites is of utmost importance to protect children's rights, ensure their safety, and comply with international labor standards and regulations. Establishing clear policies and procedures helps to eliminate the exploitation of children and promotes ethical labor practices within the construction industry. The following provisions outline the essential measures for preventing child labor, including age verification processes, employee education, and collaboration with regulatory authorities to maintain a child-free workforce, in alignment with Occupational Health and Safety (OHS) standards:

7.8.6.1 When to Implement Measures Against Child Labor

- ***Legal Compliance:*** *Ensuring adherence to national and international laws prohibiting child labor.*
- ***Ethical Responsibility:*** *Upholding ethical standards and protecting the rights of children.*
- ***Community and Environmental Responsibility:*** *Promoting a safe and healthy environment for all workers.*
- ***Health and Safety Concerns:*** *Protecting children from hazardous work conditions and ensuring their well-being.*
- ***Education and Development:*** *Supporting the education and development of children by preventing their involvement in labor.*
- ***Bridge Construction Specific:***
  - **High-Risk Activities:** Ensuring children are not involved in high-risk construction activities.
  - **Height and Accessibility:** Preventing children from accessing elevated and dangerous construction sites.

7.8.6.2 Where to Implement Measures Against Child Labor

- ***Near Workstations:*** *Monitoring and ensuring that no children are employed in work areas.*
- ***On scaffolding, ladders, and roofs:*** *Preventing children from accessing high-risk areas.*
- ***When working on structural steel or high-rise buildings:*** *Ensuring that only qualified adult workers are involved.*
- ***During demolition work:*** *Strictly prohibiting the involvement of children in hazardous demolition activities.*
- ***Operating or working near heavy machinery and equipment:*** *Ensuring that children are not exposed to dangerous machinery.*
- ***While handling hazardous materials:*** *Preventing children from being involved in handling or exposure to hazardous materials.*
- ***On wet or uneven surfaces:*** *Ensuring that children are not present in areas with high risk of slips and falls.*

- ***In areas where hazardous chemicals are used or stored:*** *Strictly prohibiting children from accessing these areas.*
- ***When carrying or moving heavy materials:*** *Ensuring that only adult workers are involved in heavy lifting and material handling.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Preventing children from accessing the bridge surface during construction.
  - **Under the Bridge Structure:** Ensuring that children are not involved in foundational tasks.
  - **Near Water Bodies:** Preventing children from being present in areas with water-related hazards.
  - **Elevated Areas:** Ensuring that children are not present in elevated sections of the bridge construction site.

7.8.6.3 Prohibition of Child Labor

- *Strictly enforce the policy of banning the employment of individuals below the legal working age (minimum **18 years** for hazardous work) as per provisions under The Bangladesh Labor Act-2006 and Labor and The National Child Labor Elimination Policy, 2010.*
- *Display the anti-child labor policy prominently at all worksites and in employment contracts.*

7.8.6.4 Age Verification Mechanisms

- *Verify the age of all workers through government-issued identification (e.g., birth certificates, national ID cards, or passports).*
- *Maintain a central database of worker records to monitor compliance.*

7.8.6.5 Worker Recruitment Practices

- *Use formal recruitment channels and vetted contractors to ensure no underage workers are hired.*
- *Conduct audits of subcontractors and labor suppliers to verify compliance with child labor laws.*

7.8.6.6 Awareness and Training

- *Organize workshops for site supervisors and contractors on the ethical, legal, and social implications of child labor.*
- *Distribute educational materials to workers and families about the importance of education and the risks of child labor.*

7.8.6.7 Community Engagement

- *Collaborate with local communities to create awareness campaigns discouraging child labor.*
- *Partner with NGOs and educational institutions to offer alternative support for families and children at risk.*

7.8.7 Standards/Specifications for Child Labor

Establishing stringent standards and specifications for preventing child labor is essential to uphold children's rights and ensure compliance with international and national labor laws. These guidelines provide a framework for implementing robust age verification processes, conducting regular audits, and promoting awareness among employees about the importance of eradicating child labor. The following standards and specifications detail the criteria for hiring practices, monitoring mechanisms, and collaboration with regulatory bodies to create a child-labor-free workplace, in alignment with Occupational Health and Safety (OHS) protocols:

7.8.7.1 Legal Compliance

The contractor shall mandatorily comply with the clauses under Section-34 of Labor Act-2016 of Bangladesh along with latest amendments regarding Restrictions on employment of children and adolescents. The leading clauses are as bellows:

- ***Clause-34-1:*** *No child shall be employed or permitted to work in any occupation or establishment;*
- ***Clause-34-2:*** *No adolescent shall be employed or permitted to work in any occupation or establishment, unless:*
- ***Sub-Clause: 34-2-a:*** *A certificate of fitness in the form prescribed by PROVISIONS, and granted to him by a registered medical practitioner is in the custody of the employer; and*
- ***Sub-Clause: 34-2-b:*** *He carries, while at work, a token containing a reference to such certificate;*
- ***Sub-Clause: 34-3:*** *Nothing of sub-section (2) shall apply to the employment of any adolescent in any occupation or establishment either as an apprentice or for receiving vocational training;*
- ***Sub-Clause: 34-4:*** *The Government may, if it thinks that an emergency exists and it is necessary in the public interest, by notification in the official Gazette, suspend the application of sub-section (2) for such period as may be specified therein.*
- *Ensure compliance with international conventions, such as the* ***ILO Conventions No. 138.***
- *Conduct annual legal audits to verify compliance with child labor regulations.*

7.8.7.2 Minimum Working Age

- *Enforce a minimum working age of* ***15 years*** *for non-hazardous roles and* ***18 years*** *for hazardous occupations like construction.*

7.8.7.3 Age Verification Documentation

- *Workers must provide valid documentation proving their age before being hired.*
- *Acceptable documents include birth certificates, school enrollment records, and government IDs.*

7.8.7.4 Audits and Inspections

- *Conduct random onsite inspections* ***quarterly*** *to identify and prevent the presence of child labor.*
- *Engage third-party auditors to review labor practices and issue compliance certificates.*

7.8.7.5 Reporting and Accountability

- *Establish confidential reporting mechanisms for workers and community members to report suspected child labor.*
- *Investigate all reports within* ***7 days*** *and take corrective actions, including termination of offending contractors.*

7.8.7.6 Support for Families

- *Offer financial assistance or job training programs to families that may rely on child labor due to economic hardship.*
- *Collaborate with schools and organizations to ensure children have access to free or subsidized education.*

7.8.7.7 Awareness Campaigns

- *Allocate at least 1% **of the project budget** to awareness and anti-child labor programs.*
- *Conduct monthly workshops or events at the construction site to educate workers about child labor laws and ethical practices.*

7.8.7.8 Penalties for Violations

- *Impose strict penalties on contractors or subcontractors found employing underage workers, including fines of up to **BDT 10,000** per child and immediate termination of contracts.*
- *Report repeating offenders to legal authorities for further action.*

7.8.8 Key Obligations

7.8.8.1 LGED Authority Concerned

*The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.8.8.2 Contractor Concerned

*The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.6 Section:6)***

7.8.8.3 Laborer Concerned

*The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.8, Section:6)***

7.9 Personal Protection Equipment (PPE) at Construction Worksite

Ensuring the safety and well-being of workers at construction sites requires Personal Protective Equipment (PPE), which is extremely important. LGED's construction projects include a wide range of activities, from road construction to infrastructure development, that expose workers to various risks. To protect workers from these risks, different types of Personal Protective Equipment (PPE) are used. The proper selection, use, and maintenance of PPE play a crucial role in preventing injuries, illnesses, and fatalities at LGED construction sites. Following PPE guidelines and standards creates a safe working environment, promotes a culture of safety, and ensures compliance with occupational health and safety regulations. To effectively reduce risks and successfully complete projects, it is essential to raise awareness among LGED management and construction workers about the importance and application of PPE.

7.9.1 Most common of the essential PPE used at LGED construction sites include

- **Hard Hats and Helmets:** Protect workers' heads from falling objects and impacts.
- **Safety Belts and Harnesses:** Ensure workers' safety when working at heights by preventing falls.
- **Safety Nets and Lifelines:** Provide fall protection for workers and catch falling tools and debris.
- **Reflective Vests:** Enhance visibility of workers, especially in low-light conditions or around moving machinery.
- **Safety Glasses and Goggles:** Shield eyes from dust, debris, and harmful substances.
- **Gloves and Arm Protection:** Protect hands from cuts, abrasions, and chemical exposure.
- **Respiratory Protection:** Safeguard against inhalation of dust, fumes, and other airborne hazards.

The proper selection, use, and maintenance of PPE are essential in preventing injuries, illnesses, and fatalities at LGED sites. Adhering to PPE guidelines and standards is fundamental to creating a safe working environment, promoting a culture of safety, and ensuring compliance with occupational health and safety regulations. Understanding the importance and application of PPE is crucial for both LGED management and construction workers to mitigate risks effectively and ensure the successful completion of projects. The following sections and sub-sections illustrate the detailed Provisions, Standards/Specifications for PPEs those are in prevailing practice of LGED.

7.9.2 PPE for Eye and Face Protection

Eye protection is a critical component of Personal Protective Equipment (PPE) for construction worksites, safeguarding workers from a range of hazards including flying debris, chemical splashes, dust, and intense light. Proper eye protection minimizes the risk of injuries that could lead to

temporary or permanent vision loss, while ensuring compliance with safety regulations.

7.9.2.1 Examples of Eye and Face Hazards at Construction Sites

- ***Flying Debris:*** *Particles and debris from cutting, grinding, and drilling activities.*
- ***Chemical Splashes:*** *Exposure to hazardous chemicals during handling and mixing.*
- ***Dust and Particles:*** *Dust generated from sanding, sawing, and other construction activities.*
- ***Radiation:*** *Exposure to harmful UV and infrared radiation from welding and cutting operations.*
- ***Impact Hazards:*** *Risks from falling or swinging objects that could strike the face or eyes.*

7.9.2.2 Types of Eyes and Face Protection PPE

- ***Safety Glasses:*** *Provide basic protection against flying debris and particles. Often equipped with side shields for additional coverage.*
- ***Goggles:*** *Offer a higher level of protection against dust, chemical splashes, and impact hazards. Can be vented or non-vented.*
- ***Face Shields:*** *Provide full-face protection against flying debris, chemical splashes, and radiation. Typically used in conjunction with safety glasses or goggles.*
- ***Welding Helmets:*** *Protect against harmful radiation, flying debris, and sparks during welding operations. Equipped with tinted lenses to shield eyes from UV and infrared light.*
- ***Respirators with Eye Protection:*** *Combine respiratory protection with integrated eye protection to safeguard against dust, chemicals, and fumes.*

7.9.2.3 Examples of Eye and Face Protection Measures

- ***Proper Selection:*** *Choosing the appropriate type of eye and face protection PPE based on the specific hazards present.*
- ***Correct Fit:*** *Ensuring that PPE fits properly and comfortably to provide effective protection without obstructing vision.*
- ***Maintenance:*** *Regularly inspecting and maintaining PPE to ensure it is in good condition and free from damage.*
- ***Training:*** *Providing workers with training on the correct use, care, and limitations of eye and face protection PPE.*
- ***Replacement:*** *Promptly replacing damaged or worn-out PPE to maintain effective protection.*

7.9.2.4 Negative Impacts of Poor Eye and Face Protection

a. **Health and Safety Impacts**
   - ***Eye Injuries:*** *Lack of proper protection can lead to eye injuries such as cuts, punctures, and chemical burns.*
   - ***Facial Injuries:*** *Inadequate face protection can result in bruises, lacerations, and fractures.*
   - ***Long-Term Vision Problems:*** *Exposure to harmful substances and radiation can cause long-term vision impairment or blindness.*

b. **Operational Impacts**
   - ***Decreased Productivity:*** *Eye and facial injuries can result in downtime and decreased workforce productivity.*

- ***Higher Medical Costs:*** *Injuries related to poor eye and face protection can lead to costly medical treatments and rehabilitation.*

c. **Legal and Financial Impacts**
   - ***Non-Compliance Penalties:*** *Failure to provide adequate eye and face protection can result in fines and penalties from health and safety authorities.*
   - ***Reputation Damage:*** *Inadequate protection measures can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*

7.9.2.5 Positive Impacts for Compliance with Eye and Face Protection Standards

a. **Health and Safety Impacts**
   - ***Reduced Risk of Injuries:*** *Proper use of eye and face protection PPE helps prevent injuries and ensures worker safety.*
   - ***Improved Vision Health:*** *Effective protection measures reduce the risk of long-term vision problems and eye-related health issues.*

b. **Operational Impacts**
   - ***Increased Efficiency:*** *A safer work environment promotes efficient work processes and productivity.*
   - ***Cost Savings:*** *Proper eye and face protection reduces the need for medical treatments and associated costs.*

c. **Legal and Financial Impacts**
   - ***Compliance with Regulations:*** *Adhering to eye and face protection standards ensures compliance with health and safety regulations, avoiding legal issues.*
   - ***Enhanced Reputation:*** *Demonstrating commitment to proper eye and face protection enhances the company's image and builds trust with clients, stakeholders, and the community.*

7.9.2.6 General Provisions for Eye and Face Protection PPE

Providing adequate eye and face protection is crucial to safeguarding workers from various hazards present at construction sites, such as flying debris, chemical splashes, and harmful radiation. Implementing comprehensive personal protective equipment (PPE) protocols ensures that workers are equipped with the necessary gear to prevent injuries and maintain a safe working environment. The following provisions outline the essential requirements and best practices for selecting, using, and maintaining eye and face protection PPE, in compliance with Occupational Health and Safety (OHS) standards:

a. **When to Use Eye and Face Protection**
   - ***Working with Hazardous Materials:*** *Protecting eyes and face from chemical splashes, fumes, and debris.*
   - ***Cutting, Grinding, and Sanding:*** *Preventing injuries from flying particles and dust.*
   - ***Welding and Soldering:*** *Shielding against intense light, sparks, and hot metal.*
   - ***Demolition Activities:*** *Guarding against debris and falling objects.*
   - ***Heavy Machinery Operations:*** *Protecting from impact hazards and moving parts.*

- ***Handling Sharp Materials:*** *Preventing cuts and puncture wounds.*
- ***High-Pressure Systems:*** *Guarding against unexpected releases and bursts.*
- ***Bridge Construction Specific:***
  - **Height and Accessibility:** Ensuring protection from falling debris at elevated sites.
  - **High-Wind Conditions:** Protecting against wind-blown particles and debris.

b. **Where to Use Eye and Face Protection**

- ***Near Workstations:*** *Eye and face protection available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary eye and face protection measures to prevent injuries.*
- ***When working on structural steel or high-rise buildings:*** *Protection on various levels for easy access.*
- ***During demolition work:*** *Eye and face protection to guard against debris and hazardous materials.*
- ***Operating or working near heavy machinery and equipment:*** *Eye and face protection to support safety.*
- ***While handling hazardous materials:*** *Special protection points to prevent exposure to chemicals.*
- ***On wet or uneven surfaces:*** *Stable eye and face protection facilities to prevent accidents.*
- ***In areas where cutting, grinding, or sanding is conducted:*** *Proper eye and face protection units to manage dust and particles.*
- ***When carrying or moving sharp materials:*** *Eye and face protection to avoid injuries.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable eye and face protection units to support safety on the bridge surface.
  - **Under the Bridge Structure:** Protection facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring eye and face protection solutions to prevent water-related injuries.
  - **Elevated Areas:** Stable and secure eye and face protection units for workers on elevated sections of the bridge.

c. **Assessment of Hazards**

- *Conduct risk assessments for specific activities to determine the required level of eye protection.*
- *Identify hazards such as projectiles, chemicals, or intense light before assigning PPE.*

d. **Distribution and Accessibility**

- *Provide appropriately rated eye protection for all workers based on identified hazards.*
- *Ensure PPE is available at every designated high-risk area on the site.*

e. **Maintenance and Cleaning**

- *Clean all eye protection PPE daily with approved solutions to avoid contamination and ensure visibility.*
- *Replace scratched, damaged, or worn-out eye protection immediately to maintain safety standards.*

f. **Training and Awareness**

- *Train workers on the proper selection, use, and maintenance of eye protection PPE.*

- *Conduct refresher courses **every 6 months** to ensure adherence to safety protocols.*

g. **Signage and Guidelines**
   - *Install signs in high-risk areas reminding workers to wear eye protection.*
   - *Display pictorial instructions for putting on, adjusting, and caring for eye protection equipment.*

h. **Storage of PPE**
   - *Provide designated PPE storage areas to keep eye protection clean and protected when not in use.*
   - *Use labeled boxes or compartments to organize different types of eye protection.*

7.9.2.7 *Standards/Specifications for Eye and Face Protection PPE*

Establishing clear standards and specifications for eye and face protection PPE is essential to ensure workers are adequately protected from potential hazards at construction sites. These standards/specifications provide a framework for selecting, fitting, and maintaining protective equipment to safeguard workers' eyes and faces from injury. The following standards and specifications outline the criteria for the design, materials, performance, and usage of eye and face protection PPE, ensuring compliance with Occupational Health and Safety (OHS) regulations and promoting a safe working environment:

a. **Design and Material**
   - *Safety glasses and goggles shall preferably comply with **ANSI Z87.1/EN 166 (European Standard) / ISO standards/ equivalent national Standards if available and applicable** to ensure compliance and safety at worksites. The standards shall be finalized by the authorized Engineer of LGED as per applicability.*
     - ***ANSI Z87.1: American Standard for Safety Goggles and Glasses***
       - ✓ ***Impact Resistance:** Safety glasses and goggles shall withstand high-velocity impacts of up to **150 feet per second** to prevent eye injuries.*
       - ✓ ***Lens Markings:** Lenses shall be marked with **Standards** for basic impact protection and for high-impact resistance.*
       - ✓ ***UV Protection:** Lenses shall provide **99.9% UV protection** to shield eyes from harmful radiation.*
       - ✓ ***Chemical Resistance:** Safety goggles shall be resistant to liquid splashes and airborne particles, meeting **D3 (splash), D4 (dust), and D5 (fine dust) ratings**.*
       - ✓ ***Optical Clarity:** Lenses shall meet optical clarity standards to minimize distortion and ensure clear vision.*
       - ✓ ***Anti-Fog Coating:** Lenses shall be treated with anti-fog coatings to maintain visibility in humid environments.*
     - ***EN 166: European Standard for Safety Goggles and Glasses***

- ✓ ***Mechanical Strength:*** *Safety eyewear shall withstand impact speeds of* ***120 m/s (394 ft/s)*** *without fracturing.*
- ✓ ***Field of Vision:*** *Goggles shall provide full coverage of the eye area, including the sides and back.*
- ✓ ***Chemical Resistance:*** *Lenses shall resist penetration from airborne particles and liquid splashes.*
- ✓ ***Electrical Insulation:*** *Safety goggles shall provide insulation against AC voltages up to* ***4 kV.***
- ✓ ***Headband Requirements:*** *Adjustable headbands shall be at least* ***10 mm wide*** *to ensure comfort and stability.*
- ✓ ***Optical Clarity:*** *Lenses shall meet optical clarity standards to prevent distortion and ensure visibility.*

- ***ISO Standard for Safety Goggles and Glasses***
  - ✓ ***Impact Resistance:*** *Safety goggles shall withstand high-velocity impacts without fracturing.*
  - ✓ ***Optical Clarity:*** *Lenses shall meet optical clarity standards to minimize distortion and ensure clear vision.*
  - ✓ ***UV Protection:*** *Lenses shall provide adequate shielding against harmful ultraviolet radiation.*
  - ✓ ***Chemical Resistance:*** *Goggles shall resist penetration from airborne particles and liquid splashes.*
  - ✓ ***Head-form Testing:*** *Protective eyewear shall be tested on standardized head-forms to ensure proper fit and coverage.*
  - ✓ ***Labeling and Markings:*** *Safety goggles shall be marked with relevant certification details for identification.*

- *Lenses must be made from impact-resistant materials, such as polycarbonate, with a minimum thickness of* ***2 mm.***
- *Face shields and welding helmets should feature adjustable headbands for a secure fit.*

b. Impact Resistance

- *All eye protection must pass an impact test withstanding projectiles traveling at* ***150 feet/second.***

c. Lens Properties

- *Anti-fog coatings for goggles used in humid environments.*
- *UV-protective lenses with a minimum protection level of* ***99%*** ***UVB and UVA*** *for outdoor work.*

d. Chemical Resistance

- *Eye protection for chemical handling must resist splashes of acidic or basic substances with concentrations up to* ***10 mol/L.***

e. Radiation Protection for Welders

- *Welding helmets shall preferably meet shade requirements for arc welding (Shade* ***10-14****) and gas welding (Shade* ***5-8****).*
- *Filter lenses block* ***100% infrared radiation*** *(IR) and at least* ***99.9% UV radiation shall be ensured.***

f. **Weight and Comfort**
   - *PPE weight preferably not exceed **50 grams** for safety glasses or **200 grams** for goggles, ensuring long-term comfort.*

g. **Inspection and Replacement**
   - *Inspect PPE weekly for damage such as cracks, scratches, or loose fittings.*
   - *Replace lenses showing more than **10% wear or clarity reduction.***

h. **Emergency Preparedness**
   - *Install eye wash stations within **10 seconds** walking distance of high-risk areas.*
   - *Ensure stations provide at least **1.5 liters/minute** of clean water for **15 minutes** of continuous use.*

i. **Worker Feedback**
   - *Conduct monthly surveys to assess worker satisfaction with PPE and gather suggestions for improvement.*

j. **Minimum Compliance Requirements**

Contractor shall supply/provide eye and face protective equipment complying with the following minimum requirements:

- *Be able to provide expected protection against specific dangers for which they are designed or intended;*
- *Be reasonably comfortable to use;*
- *Be fitted comfortably and shall not unduly hinder with the movements of the user/laborer/employee concerned;*
- *Be durable, easily cleanable and capable of being disinfected;*
- *Be reserved clean and in good condition;*
- *Be approved by the concerned Supervising Engineers/Officials of LGED.*

k. **Types of Goggles/spectacles**

Whenever eye protection is needed, persons whose visions require the use of corrective lenses shall wear goggles or spectacles of any of the following types:

- *Spectacles with provision of optical correction;*
- *Goggles that can be worn over corrective spectacles without disturbing the adjustment of the spectacles; OR*
- *Goggles with corrective lenses mounted behind the protective lenses.*

7.9.3 Artificial Respiratory System (In applicable Cases)

Artificial respiratory systems, commonly referred to as respiratory protection equipment, are essential at construction worksites to safeguard workers from inhaling harmful airborne contaminants. These systems protect against dust, fumes, vapors, and other hazardous particles that can cause severe respiratory illnesses. Proper implementation of respiratory protection ensures worker safety, compliance with regulations, and a healthier work environment.

7.9.3.1 Examples of Situations Requiring Artificial Respiratory Systems

- ***Respiratory Failure:** When a worker's lungs are unable to provide adequate oxygenation or remove carbon dioxide.*
- ***Exposure to Toxic Substances:** Inhalation of hazardous chemicals or gases that impair breathing.*

- ***Severe Injuries:*** *Trauma to the chest or respiratory system that affects breathing.*
- ***Medical Emergencies:*** *Conditions such as cardiac arrest, drowning, or severe allergic reactions that require assisted breathing.*

7.9.3.2 Types of Artificial Respiratory Systems

- ***Manual Resuscitators:*** *Hand-operated devices, such as bag-valve masks, used to provide ventilation in emergency situations.*
- ***Mechanical Ventilators:*** *Machines that provide controlled ventilation by moving air in and out of the lungs. These can be invasive (e.g., endotracheal tube) or non-invasive (e.g., mask ventilation).*
- ***Oxygen Therapy Devices:*** *Equipment that delivers supplemental oxygen to individuals with compromised breathing.*
- ***Continuous Positive Airway Pressure (CPAP) Devices:*** *Machines that provide a constant flow of air to keep airways open, commonly used for sleep apnea and respiratory distress.*

7.9.3.3 Examples of Respiratory Protection Equipment

- ***Disposable Dust Masks (N95):*** *Protect against non-oil-based particulates like dust and pollen.*
- ***Half-Face Respirators:*** *Provide protection against dust, fumes, and certain chemical vapors when equipped with appropriate filters.*
- ***Full-Face Respirators:*** *Offer comprehensive protection for the eyes and respiratory system against hazardous particles and gases.*
- ***Powered Air-Purifying Respirators (PAPRs):*** *Use a battery-powered blower to provide filtered air, suitable for high-risk environments.*

7.9.3.4 Examples of Artificial Respiratory System Measures

- ***Proper Training:*** *Ensuring that workers are trained in the use of artificial respiratory systems and emergency response procedures.*
- ***Regular Maintenance:*** *Conducting regular inspections and maintenance of respiratory equipment to ensure it is in good working condition.*
- ***Emergency Preparedness:*** *Having artificial respiratory systems readily available and accessible in case of emergencies.*
- ***Monitoring and Assessment:*** *Continuously monitoring the respiratory status of workers using artificial respiratory systems to ensure effective ventilation.*
- ***Personal Protective Equipment (PPE):*** *Providing appropriate PPE, such as masks and respirators, to protect workers from inhaling hazardous substances.*

7.9.3.5 Negative Impacts of Poor Artificial Respiratory System Management

a. Health and Safety Impacts

- ***Inadequate Ventilation:*** *Poor management of artificial respiratory systems can lead to insufficient oxygenation and removal of carbon dioxide, posing serious health risks.*
- ***Equipment Malfunction:*** *Lack of proper maintenance can result in equipment failure, compromising the safety and well-being of workers.*

- ***Delayed Response:*** *Inadequate training and preparedness can lead to delays in providing necessary respiratory support during emergencies.*

b. **Operational Impacts**
   - ***Decreased Productivity:*** *Health issues related to poor respiratory support can result in absenteeism and decreased workforce productivity.*
   - ***Higher Medical Costs:*** *Inadequate management of artificial respiratory systems can lead to costly medical treatments and emergency care.*

c. **Legal and Financial Impacts**
   - ***Non-Compliance Penalties:*** *Failure to properly manage artificial respiratory systems can result in fines and penalties from health and safety authorities.*
   - ***Reputation Damage:*** *Inadequate respiratory support measures can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*

7.9.3.6 Positive Impacts for Compliance with Artificial Respiratory System Standards

a. **Health and Safety Impacts**
   - ***Improved Respiratory Health:*** *Proper management of artificial respiratory systems ensures adequate ventilation and oxygenation, protecting workers' health.*
   - ***Enhanced Emergency Response:*** *Effective training and preparedness improve the ability to respond quickly and effectively to respiratory emergencies.*

b. **Operational Impacts**
   - ***Increased Efficiency:*** *A safer work environment promotes efficient work processes and productivity.*
   - ***Cost Savings:*** *Proper management of artificial respiratory systems reduces the need for emergency medical treatments and associated costs.*

c. **Legal and Financial Impacts**
   - ***Compliance with Regulations:*** *Adhering to artificial respiratory system standards ensures compliance with health and safety regulations, avoiding legal issues.*
   - ***Enhanced Reputation:*** *Demonstrating commitment to proper respiratory support enhances the company's image and builds trust with clients, stakeholders, and the community.*

7.9.3.7 General Provisions for Artificial Respiratory System PPE

Ensuring that workers have access to appropriate artificial respiratory system personal protective equipment (PPE) is crucial for protecting their respiratory health in environments with potential exposure to harmful airborne contaminants. Implementing comprehensive respiratory protection protocols helps to prevent respiratory illnesses and ensures a safer working environment. The following provisions outline the essential requirements and best practices for selecting, fitting, and maintaining artificial respiratory system PPE, in compliance with Occupational Health and Safety (OHS) standards:

a. **When to Use Artificial Respiratory Systems**

- ***Emergency Situations:*** *Providing immediate respiratory support during incidents like drowning, choking, or suffocation.*
- ***Exposure to Hazardous Materials:*** *Ensuring respiratory assistance in cases of chemical inhalation or poisoning.*
- ***Severe Respiratory Distress:*** *Offering support for workers experiencing acute respiratory failure.*
- ***High-Risk Activities:*** *Ensuring availability during tasks with high exposure to respiratory hazards.*
- ***Bridge Construction Specific:***
  - **Height and Accessibility:** Ensuring respiratory support for workers at elevated sites.
  - **High-Wind Conditions:** Providing respiratory assistance in windy conditions where dust and debris are prevalent.

b. Where to Use Artificial Respiratory Systems

- ***Near Workstations:*** *Respiratory systems available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary respiratory support measures to prevent respiratory distress.*
- ***When working on structural steel or high-rise buildings:*** *Respiratory systems on various levels for easy access.*
- ***During demolition work:*** *Respiratory support to handle dust and hazardous materials.*
- ***Operating or working near heavy machinery and equipment:*** *Respiratory systems nearby to support safety.*
- ***While handling hazardous materials:*** *Special respiratory support points to prevent inhalation of harmful substances.*
- ***On wet or uneven surfaces:*** *Stable respiratory support facilities to prevent accidents.*
- ***In areas where cutting, grinding, or sanding is conducted:*** *Proper respiratory systems to manage dust and particles.*
- ***When carrying or moving heavy materials:*** *Respiratory support to avoid distress from exertion.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable respiratory systems to support safety on the bridge surface.
  - **Under the Bridge Structure:** Respiratory support facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring respiratory systems to handle water-related incidents.
  - **Elevated Areas:** Stable and secure respiratory support units for workers on elevated sections of the bridge.

c. Hazard Assessment

- *Conduct a thorough assessment of airborne hazards before starting construction activities.*

- *Identify tasks that generate dust, fumes, or vapors and determine the appropriate level of respiratory protection.*

d. **Selection of Respiratory Equipment**
   - *Choose respirators based on the type and concentration of airborne contaminants.*
   - *Ensure all equipment complies with relevant safety standards, such as NIOSH or EN 149 certifications.*

e. **Fit Testing and Training**
   - *Conduct fit tests for all workers to ensure a proper seal and effective protection.*
   - *Train workers on the correct use, maintenance, and limitations of respiratory equipment.*

f. **Maintenance and Storage**
   - *Clean and inspect reusable respirators daily to ensure functionality.*
   - *Store respiratory equipment in a clean, dry, and secure location to prevent contamination or damage.*

g. **Monitoring and Supervision**
   - *Monitor air quality regularly using particulate or gas detectors to ensure safe working conditions.*
   - *Assign a designated safety officer to oversee the implementation of respiratory protection measures.*

h. **Accomplishment of Accepted/best practices**

   This prevention shall preferably be accomplished through the use/application of accepted/best practiced engineering control measures like:

   - *Confinement/Enclosure of the operation concerned;*
   - *Necessary general and local ventilation;*
   - *Replacement of less toxic materials or a reasonable/ safe combination;*
   - *When effective engineering control measures are unavailable/ not feasible, provision for appropriate respirators shall be ensured.*

7.9.3.8 Standards/Specifications for Artificial Respiratory System PPE

Establishing clear standards and specifications for artificial respiratory system personal protective equipment (PPE) is essential to ensure workers are adequately protected from airborne hazards. These guidelines provide a framework for the selection, fitting, and maintenance of respiratory protection equipment, ensuring optimal performance and compliance with regulatory requirements. The following standards and specifications detail the criteria for design, materials, performance, and usage of artificial respiratory system PPE, in alignment with Occupational Health and Safety (OHS) standards, to safeguard workers' respiratory health and create a safe working environment:

a. **Respirator Performance**
   - *Disposable masks (e.g., N95) must filter at least **95%** of airborne particles larger than **0.3 microns**.*
   - *Half-face and full-face respirators must meet a minimum Assigned Protection Factor (APF) of **10** for general construction tasks.*

- *PAPRs must provide an APF of **25–1000**, depending on the filter and configuration.*

b. **Filter and Cartridge**
   - *Use **P100 filters** for protection against oil-based and non-oil-based particulates.*
   - *Chemical cartridges must be rated for specific hazards, such as organic vapors or acid gases, and replaced according to manufacturer guidelines.*

c. **Fit Testing**
   - *Conduct qualitative or quantitative fit tests annually for all workers using tight-fitting respirators.*
   - *Ensure a fit factor of at least **100** for half-face respirators and **500** for full-face respirators during quantitative testing.*

d. **Air Quality**
   - *Ensure oxygen levels in confined spaces are between **19.5%** **and 23.5%** to prevent hypoxia or oxygen toxicity.*
   - *The National Ambient Air Quality Standards (NAAQS) are set by the Department of Environment. Maintain the following key standards:*
     - ✓ **PM10:** 50 µg/m³ (annual), 150 µg/m³ (24 hours)
     - ✓ **PM2.5:** 35 µg/m³ (annual), 65 µg/m³ (24 hours)
     - ✓ **CO:** 5 mg/m³ (8 hours), 20 mg/m³ (1 hour)
     - ✓ **NOx:** 40 µg/m³ (annual), 80 µg/m³ (24 hours)
     - ✓ **O3:** 100 µg/m³ (8 hours), 180 µg/m³ (1 hour)
     - ✓ **SO2:** 80 µg/m³ (24 hours)

e. **Inspection and Maintenance**
   - *Inspect respirators for damage, such as cracks or worn seals, before each use.*
   - *Replace filters and cartridges when breathing resistance increases or after **8 hours** of continuous use in high-contaminant environments.*

f. **Emergency Preparedness**
   - *Provide escape respirators for workers in areas with potential exposure to toxic gases or oxygen-deficient atmospheres.*
   - *Train workers on emergency evacuation procedures and the use of self-contained breathing apparatus (SCBA).*

g. **Regulatory Compliance**
   - *Adhere (Preferably and in applicable cases) to OSHA's Respiratory Protection Standard (**29 CFR 1910.134**) or equivalent national regulations.*
   - *Conduct annual audits to ensure compliance with respiratory protection policies and standards.*

h. **Worker Comfort and Usability**
   - *Select lightweight respirators with adjustable straps to enhance comfort during prolonged use.*
   - *Provide respirators with anti-fog lenses for workers in humid or high-temperature environments.*

i. **Development of Standard Procedure**

Standard procedures shall preferably be developed to ensure proper use of respirators. These may include:

- *All necessary information and guidelines for:*
  - ✓ Their proper selection;

- ✓ Use and care:
- ✓ Plan for possible emergency uses;

j. Preparation of Written Procedure

- *Written procedures shall preferably be prepared covering safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies;*

k. Familiarization of LGED officials with Procedures

- *All the officials/engineers of concerned offices of LGED shall be familiar with these procedures and the available respirators to be used.*

l. Maintenance of Respirators

Proper arrangement for the maintenance and care of respirators shall be adopted conforming to the:

- *Type of plant;*
- *Working conditions; and*
- *Hazards involved*

m. Maintenance Services

Arrangement for the maintenance and care of respirators shall preferably include the following basic services:

- *Regular inspection for defects (including check for leakage);*
- *Cleaning and disinfecting;*
- *Repair and safe storage.*

7.9.4 Head Protection PPE

Head protection is one of the most critical components of Personal Protective Equipment (PPE) at construction worksites. Hard hats and safety helmets provide vital protection against impact, penetration, and electrical hazards, reducing the risk of head injuries. Implementing proper head protection protocols ensures worker safety, compliance with regulatory standards, and the smooth progress of construction activities.

7.9.4.1 Examples of Head Related Hazards at Construction Sites

- ***Falling Objects:*** *Tools, equipment, or materials falling from heights.*
- ***Collisions:*** *Bumping into stationary objects or moving machinery.*
- ***Electrical Hazards:*** *Contact with live electrical wires or equipment.*
- ***Impact from Machinery:*** *Strikes from moving parts of machinery or equipment.*
- ***Slip and Fall Incidents:*** *Head injuries resulting from slips, trips, or falls on the worksite.*

7.9.4.2 Examples/Types of Head Protection PPE

- ***Hard Hats:*** *Provide protection against impact and penetration from falling objects. Often equipped with suspension systems to absorb shock.*
- ***Bump Caps:*** *Lightweight head protection designed to protect against minor bumps and scrapes. Not suitable for protection against falling objects.*
- ***Full-Brim Hard Hats:*** *Offer additional protection from the sun and rain, as well as enhanced impact protection.*
- ***Electrical Insulating Helmets:*** *Designed to provide protection against electrical hazards and reduce the risk of electric shock.*

- ***Climbing Helmets:*** *These are used in industries like tree trimming or tower climbing, where workers are at risk of falling from heights*
- ***Safety Helmets:*** *These offer more comprehensive protection and may include features like integrated face shields for work involving chemicals or welding*
- ***Examples of Head Protection PPE:***
  - **Type I Hard Hats:** Protect against impacts from above.
  - **Type II Hard Hats:** Protect against lateral impacts as well as top-down impacts.
  - **Class G (General):** Provide low-voltage electrical protection up to 2,200 volts.
  - **Class E (Electrical):** Provide high-voltage electrical protection up to 20,000 volts.
  - **Class C (Conductive):** Offer protection from impacts but no electrical protection

7.9.4.3 *Examples of Head Protection Measures*

- ***Proper Selection:*** *Choosing the appropriate type of head protection PPE based on the specific hazards present.*
- ***Correct Fit:*** *Ensuring that PPE fits properly and comfortably to provide effective protection without obstructing vision.*
- ***Maintenance:*** *Regularly inspecting and maintaining head protection PPE to ensure it is in good condition and free from damage.*
- ***Training:*** *Providing workers with training on the correct use, care, and limitations of head protection PPE.*
- ***Replacement:*** *Promptly replacing damaged or worn-out PPE to maintain effective protection.*

7.9.4.4 *Negative Impacts of Poor Head Protection*

a. Health and Safety Impacts

- ***Head Injuries:*** *Lack of proper head protection can lead to head injuries such as cuts, bruises, fractures, and concussions.*
- ***Long-Term Health Issues:*** *Severe head injuries can result in long-term health problems, including brain injuries and cognitive impairments.*

b. Operational Impacts

- ***Decreased Productivity:*** *Head injuries can result in downtime and decreased workforce productivity.*
- ***Higher Medical Costs:*** *Injuries related to poor head protection can lead to costly medical treatments and rehabilitation.*

c. Legal and Financial Impacts

- ***Non-Compliance Penalties:*** *Failure to provide adequate head protection can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate protection measures can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*
- ***Increased Insurance Costs:*** *Companies that fail to comply with safety standards may see a rise in insurance premiums due to the higher risk of workplace accidents.*

- ***Legal Fees and Settlements:*** *Non-compliance can lead to costly legal battles and settlements if workers are injured due to inadequate protection.*
- ***Operational Disruptions:*** *Incidents resulting from lack of head protection may lead to downtime and productivity losses, impacting the company's bottom line.*
- ***Worker Compensation Claims:*** *Financial compensation for injured workers can be a significant expense for companies, especially if the injuries are severe.*

7.9.4.5 Positive Impacts for Compliance with Head Protection Standards

a. Health and Safety Impacts

- ***Reduced Risk of Injuries:*** *Proper use of head protection PPE helps prevent head injuries and ensures worker safety.*
- ***Improved Long-Term Health:*** *Effective protection measures reduce the risk of long-term health issues and head-related health problems.*

b. Operational Impacts

- ***Increased Efficiency:*** *A safer work environment promotes efficient work processes and productivity.*
- ***Cost Savings:*** *Proper head protection reduces the need for medical treatments and associated costs.*

c. Legal and Financial Impacts

- ***Compliance with Regulations:*** *Adhering to head protection standards ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper head protection enhances the company's image and builds trust with clients, stakeholders, and the community.*
- ***Cost Savings:*** *Investing in proper head protection can reduce the likelihood of accidents and injuries, leading to lower medical and compensation costs.*
- ***Productivity Benefits:*** *Ensuring the safety of workers can lead to increased productivity and reduced downtime caused by workplace accidents.*
- ***Insurance Premiums:*** *Complying with safety standards may result in lower insurance premiums due to the reduced risk of workplace injuries.*
- ***Attracting Talent:*** *A strong safety record and commitment to employee well-being can attract top talent to the company, as workers value a safe working*

7.9.4.6 General Provisions for Head Protection PPE

At construction sites, head protection is paramount to ensure worker safety. To prevent head injuries from falling objects, collisions, and other potential hazards, it's critical to establish robust personal protective equipment (PPE) protocols. This section outlines essential guidelines for selecting, utilizing, and maintaining head protection PPE, ensuring compliance with Occupational Health and Safety (OHS) standards. These following measures help create a secure and injury-free work environment:

a. When to Use Head Protection PPE

- ***Working with Heavy Machinery:*** *Protecting the head from falling objects and equipment.*

- ***Demolition Activities:*** *Guarding against debris and falling objects.*
- ***High-Pressure Systems:*** *Shielding the head from unexpected releases and bursts.*
- ***Handling Sharp or Heavy Materials:*** *Preventing injuries from dropped or moving materials.*
- ***Operating Cranes and Hoists:*** *Protecting against suspended loads and overhead hazards.*
- ***Low Clearance Areas:*** *Preventing head injuries in areas with limited headroom.*
- ***Community and Environmental Responsibility:*** *Ensuring worker safety and promoting a safe work environment.*
- ***Bridge Construction Specific:***
  - **Height and Accessibility:** Ensuring protection from falling debris at elevated sites.
  - **High-Wind Conditions:** Protecting against wind-blown objects and debris.

b. Where to Use Head Protection

- ***Near Workstations:*** *Head protection available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary head protection measures to prevent injuries.*
- ***When working on structural steel or high-rise buildings:*** *Protection on various levels for easy access.*
- ***During demolition work:*** *Head protection to guard against debris and hazardous materials.*
- ***Operating or working near heavy machinery and equipment:*** *Head protection to support safety.*
- ***While handling sharp or heavy materials:*** *Special protection points to prevent head injuries.*
- ***On wet or uneven surfaces:*** *Stable head protection facilities to prevent accidents.*
- ***In areas with low clearance:*** *Proper head protection units to manage head injury risks.*
- ***When carrying or moving heavy materials:*** *Head protection to avoid injuries from dropped objects.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable head protection units to support safety on the bridge surface.
  - **Under the Bridge Structure:** Protection facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring head protection solutions to prevent water-related injuries.
  - **Elevated Areas:** Stable and secure head protection units for workers on elevated sections of the bridge.

c. PPE Selection and Suitability

- *Select hard hats based on specific site hazards, including impact, penetration, and electrical risks.*
- *Ensure that hard hats comply with industry standards, such as **ANSI Z89.1** or equivalent national standards.*

d. Training and Awareness

- *Train workers on the importance of head protection, including the proper fit and adjustment of hard hats.*

- *Conduct safety induction sessions to educate workers about site-specific hazards requiring head protection.*

e. **Inspection and Maintenance**

- *Inspect hard hats daily for cracks, dents, or damage, replacing any that show signs of wear.*
- *Check suspension systems for deformation or loss of elasticity and replace them every **12 months** or as per manufacturer guidelines.*

f. **Distribution and Accessibility:**

- *Provide head protection PPE to all workers before they enter active construction zones.*
- *Ensure PPE is readily available at designated storage points for visitors and subcontractors.*

g. **Signage and Compliance:**

- *Post "Hard Hat Area" signs prominently in all designated zones where head protection is mandatory.*
- *Regularly monitor and enforce compliance through supervisor checks and audits.*

h. **Customization and Comfort:**

- *Allow adjustments to internal suspension systems for a snug fit.*
- *Provide optional chin straps to secure helmets in high-wind or overhead work conditions.*

7.9.4.7 *Standards/Specifications for Head Protection PPE*

Ensuring proper head protection at construction sites involves adhering to stringent standards and specifications. This section provides comprehensive guidelines for the selection, fitting, and maintenance of head protection PPE, ensuring optimal safety for workers. Key criteria include the materials, design, and performance of the protective equipment. By following these standards and specifications, construction sites can ensure compliance with Occupational Health and Safety (OHS) regulations and create a safer working environment for all personnel:

a. **Impact Resistance:**

- *Hard hats must pass impact tests capable of withstanding a dropped object weighing **1 kg** from a height of **1 meter**.*
- *Hard hats must withstand an impact force of at least 53 joules for top-down protection.*
- *Type II hard hats must also withstand lateral impact forces without deformation or failure.*

b. **Electrical Resistance:**

- *Class G hard hats must resist low-voltage electrical exposure up to **2,200 volts**.*
- *Class E hard hats must resist up to **20,000 volts RMS for 3 minutes** without breakdown or **leakage exceeding 9 milliamperes**.*

c. **Temperature Tolerance:**

- *Ensure hard hats remain effective at temperatures ranging from **-20°C to +50°C** for outdoor use.*

d. **Material and Construction**

- *Hard hats must be constructed from durable, non-conductive materials such as high-density polyethylene (HDPE) or ABS plastic.*
- *Suspension systems must include at least **4-point** or **6-point** harnesses to distribute impact forces evenly.*
- *Materials must be flame-resistant, with no melting or dripping observed when exposed to temperatures of **260°C for 5 seconds**.*
- *Hard hats must also resist degradation from UV radiation, retaining **at least 90% structural integrity after 1,000 hours of UV exposure** in testing conditions.*

e. **Inspection Frequency**

- *Inspect hard hats for signs of wear weekly and perform in-depth inspections every **6 months**.*
- *Replace hard hats every **5 years** regardless of visible wear, or sooner if exposed to a significant impact.*

f. **Compliance Certification**

- *Preferably hard hats are certified to **ANSI Z89.1 (USA)/ CSA Z94.1 (Canada)/EN 397 (Europe)/ ISO 3873** standards.*
- *Maintain records of PPE certification and procurement for review during safety audits.*

g. **Weight and Comfort**

- *Hard hats must weigh no more than 450 grams to minimize strain on the neck and shoulders.*
- *Include ventilation holes for improved airflow in non-electrical zones to enhance worker comfort.*

h. **Additional Features**

- *Provide hard hats with reflective strips for visibility in low-light conditions.*
- *Offer attachment points for accessories such as face shields, ear muffs, or mounted lights.*

i. **Emergency Preparedness**

- *Keep spare hard hats at emergency assembly points to ensure uninterrupted head protection during evacuations.*
- *Include hard hat PPE in emergency rescue kits for responders.*

j. **Suspension System Design**

- *Hard hats must include a **4-point or 6-point suspension system** to distribute impact forces evenly.*
- *Suspension straps should maintain a minimum clearance of **25–32 mm** between the shell and the wearer's head for adequate cushioning.*

k. **Adjustment Mechanisms:**

- *Equip hard hats with adjustable headbands accommodating sizes **52–64 cm** to fit a wide range of users.*
- *Include a ratchet adjustment system for quick and secure fitting.*

l. **Chin Straps:**

- *Chin straps should withstand forces up to **150 Newtons** without breaking, ensuring the helmet remains secured.*

- *Mandatory for work at heights or in high-wind environments to prevent helmet dislodgement.*

m. **Reflective Features:**

- *Hard hats used for nighttime or low-visibility conditions must include **360-degree reflective strips** with a luminance of at least **300 cd/m²**.*

n. **Attachments and Accessories Compatibility:**

- *Hard hats must include accessory slots compatible with ear muffs, face shields, and headlamps.*
- *Ensure that accessories do not compromise the helmet's structural integrity or performance.*

o. **Temperature Resistance:**

- *Hard hats must remain effective in temperature ranges from **-30°C to +60°C**, suitable for extreme working environments.*

p. **Water and Chemical Resistance:**

- *Materials must resist absorption of water up to **0.5% by weight** after **24 hours** of submersion.*
- *Hard hats must resist degradation or chemical reactions when exposed to common industrial chemicals such as acids, alkalis, or solvents.*

q. **Helmet Marking and Identification:**

- *Each hard hat must include the following permanent markings:*
  - ✓ Manufacturer's name or logo.
  - ✓ ANSI, ISO, or CSA certification codes.
  - ✓ Date of manufacture (must be within **5 years** of use).

r. **Durability Testing:**

- *Hard hats must pass a penetration test where a **1 kg steel rod** is dropped from a height of **1 meter**, ensuring no contact with the head form underneath.*
- *Must endure a crush test under a load of **250 kilograms** without cracking.*

s. **Service Life and Replacement:**

- *Replace hard hats every **3–5 years**, depending on exposure to sunlight, heat, and impact forces.*
- *Helmets exposed to a significant impact must be replaced immediately, even if no visible damage is observed.*

t. **Ventilation Features:**

- *For non-electrical use, provide hard hats with **ventilation slots** to ensure airflow and reduce heat buildup.*
- *Slots must not compromise the impact resistance or electrical protection of the helmet.*

u. **Emergency Provisions:**

- *Ensure that hard hats are stocked at emergency assembly points for immediate use during rescue or evacuation scenarios.*
- *Maintain a supply of at least **10 spare hard hats per 100 workers** for emergencies.*

v. **Inspection Protocols:**

- *Conduct visual inspections of hard hats weekly for cracks, scratches, or deformation.*
- *Use advanced methods such as ultraviolet (UV) degradation testing to assess material performance quarterly.*

w. **Lightweight Design:**

- *Hard hats should not exceed **450 grams**, ensuring prolonged use without causing neck fatigue.*

x. **Environmental Sustainability:**

- *Encourage the use of recyclable materials in helmet manufacturing to reduce environmental impact.*
- *Partner with suppliers offering take-back or recycling programs for old or damaged helmets.*

y. **Compliance Requirements for Contractors**

For effective implementation of the provisions of Sub-section/ Clause: 7.9.3.7, the contractor shall comply with the following steps:

- *Hard hats shall be provided by the contractor for compliance with the general provisions;*
- *Hard hats provided by the contractor shall be used properly by the laborers/employees concerned;*
- *Hard hats shall be made of non-combustible or slow-burning materials;*
- *For using during works in electrical environment hard hats shall be made of electrically non-conductor materials;*
- *The total weight of complete hard hat shall preferably not be more than 0.45 kgs. (16 ounces);*
- *(In applicable cases) hard hats shall have a brim all around to ensure protection for the head, face and back of the neck;*
- *Hard hats without brims and low crowns may be allowed only in confined spaces where brims and crowns may cause harms;*
- *The hard hats shall preferably remain detachable cradle and sweatband of shall be detachable to enable replacement if necessary;*
- *For using during works in environment with excessive moisture, hard hats made of water-proof-material shall be used.*

z. **Precautions for Labors with Long Hair**

- *Laborers/employees having long hair deployed around any machinery shall completely cover their hair with well-fitting caps or other equivalent protection;*

aa. **Provisions for Cap for Labors with Long Hair**

Such caps shall be:

- *Made of inflammable materials;*
- *Durable adequately to withstand regular washing, disinfecting and cleaning.*

7.9.5 Hand and Arm Protection PPE

Hand and arm protection are crucial components of Personal Protective Equipment (PPE) at construction worksites. Gloves and arm guards provide essential protection against cuts, abrasions, punctures, chemical exposures, and electrical hazards, reducing the risk of injuries. Implementing proper hand and

arm protection protocols as per following Provisions and Standards/ Specifications will ensure worker safety, compliance with regulatory standards, and the smooth progress of construction activities:

7.9.5.1 *Examples of Hand and Arm Hazards at Construction Sites*

- ***Cuts and Lacerations:*** *Sharp tools, materials, and equipment that can cause cuts and lacerations.*
- ***Chemical Exposure:*** *Contact with hazardous chemicals and substances that can cause burns, irritation, and allergic reactions.*
- ***Thermal Hazards:*** *Exposure to extreme heat or cold from machinery, equipment, or environmental conditions.*
- ***Impact and Vibration:*** *Repetitive impact or vibration from tools and machinery that can cause injuries.*
- ***Electrical Hazards:*** *Contact with live electrical wires or equipment that can result in electric shock.*

7.9.5.2 *Examples/Types of Hand and Arm Protection PPE*

- ***Cut-Resistant Gloves:*** *Provide protection against cuts and lacerations from sharp objects and materials.*
- ***Chemical-Resistant Gloves:*** *Protect hands from hazardous chemicals and substances, offering resistance to chemical burns and irritation.*
- ***Heat-Resistant Gloves:*** *Provide protection against extreme heat and thermal hazards, suitable for tasks involving hot equipment or materials.*
- ***Cold-Resistant Gloves:*** *Offer insulation and protection against cold temperatures, suitable for working in freezing conditions.*
- ***Impact-Resistant Gloves:*** *Designed to absorb impact and reduce the risk of hand injuries from repetitive impact and vibration.*
- ***Electrical-Insulating Gloves:*** *Provide protection against electric shock by insulating hands from live electrical wires and equipment.*
- ***Arm Guards:*** *Extend protection to the forearms, offering additional coverage against cuts, chemical exposure, and impact.*

7.9.5.3 *Examples of Hand and Arm Protection Measures*

- ***Proper Selection:*** *Choosing the appropriate type of hand and arm protection PPE based on the specific hazards present.*
- ***Correct Fit:*** *Ensuring that PPE fits properly and comfortably to provide effective protection without restricting movement.*
- ***Maintenance:*** *Regularly inspecting and maintaining hand and arm protection PPE to ensure it is in good condition and free from damage.*
- ***Training:*** *Providing workers with training on the correct use, care, and limitations of hand and arm protection PPE.*
- ***Replacement:*** *Promptly replacing damaged or worn-out PPE to maintain effective protection.*

7.9.5.4 *Negative Impacts of Poor Hand and Arm Protection*

a. Health and Safety Impacts

- ***Hand Injuries:*** *Lack of proper protection can lead to hand injuries such as cuts, burns, chemical exposure, and fractures.*
- ***Long-Term Health Issues:*** *Repetitive strain and exposure to hazards can result in long-term health*

problems, including musculoskeletal disorders and nerve damage.

b. **Operational Impacts**

- ***Decreased Productivity:*** *Hand and arm injuries can result in downtime and decreased workforce productivity.*
- ***Higher Medical Costs:*** *Injuries related to poor hand and arm protection can lead to costly medical treatments and rehabilitation.*

c. **Legal and Financial Impacts**

- ***Non-Compliance Penalties:*** *Failure to provide adequate hand and arm protection can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate protection measures can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*
- ***Increased Insurance Costs:*** *Companies that do not comply with safety standards may experience higher insurance premiums due to increased risk of workplace injuries.*
- ***Legal Fees and Settlements:*** *Non-compliance can lead to expensive legal proceedings and settlements if employees are injured due to insufficient protection.*
- ***Operational Disruptions:*** *Accidents resulting from lack of hand and arm protection can cause work stoppages and lost productivity, negatively impacting the company's financial performance.*
- ***Worker Compensation Claims:*** *Financial compensation for injured employees can be a substantial expense for companies, especially if injuries are severe.*

7.9.5.5 *Positive Impacts for Compliance with Hand and Arm Protection Standards*

a. **Health and Safety Impacts**

- ***Reduced Risk of Injuries:*** *Proper use of hand and arm protection PPE helps prevent injuries and ensures worker safety.*
- ***Improved Long-Term Health:*** *Effective protection measures reduce the risk of long-term health issues and hand-related health problems.*

b. **Operational Impacts**

- ***Increased Efficiency:*** *A safer work environment promotes efficient work processes and productivity.*
- ***Cost Savings:*** *Proper hand and arm protection reduces the need for medical treatments and associated costs.*

c. **Legal and Financial Impacts**

- ***Compliance with Regulations:*** *Adhering to hand and arm protection standards ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper hand and arm protection enhances the company's image and builds trust with clients, stakeholders, and the community.*

- ***Cost Savings:*** *Investing in proper hand and arm protection can reduce the likelihood of accidents and injuries, leading to lower medical and compensation costs.*
- ***Productivity Benefits:*** *Ensuring the safety of workers can lead to increased productivity and reduced downtime caused by workplace accidents.*
- ***Insurance Premiums:*** *Complying with safety standards may result in lower insurance premiums due to the reduced risk of workplace injuries.*
- ***Attracting Talent:*** *A strong safety record and commitment to employee well-being can attract top talent to the company, as workers value a safe working environment.*

7.9.5.6 General Provisions for Hand and Arm Protection PPE

Hand and arm protection is essential for safeguarding workers from injuries such as cuts, abrasions, chemical exposure, and impact hazards at construction sites. Implementing comprehensive personal protective equipment (PPE) protocols ensures that workers are equipped with the necessary gear to protect their hands and arms while performing various tasks. This section outlines key guidelines for selecting, utilizing, and maintaining hand and arm protection PPE. Compliance with following Occupational Health and Safety (OHS) provisions will ensure and promote a safe working environment:

a. When to Use Hand and Arm Protection PPE

- ***Working with Hazardous Materials:*** *Protecting hands and arms from chemical burns, cuts, and punctures.*
- ***Cutting, Grinding, and Sanding:*** *Preventing injuries from sharp and abrasive materials.*
- ***Handling Sharp or Heavy Materials:*** *Protecting against cuts, punctures, and crushing injuries.*
- ***Welding and Soldering:*** *Shielding hands and arms from heat, sparks, and molten metal.*
- ***Operating Heavy Machinery:*** *Preventing injuries from moving parts and equipment.*
- ***Demolition Activities:*** *Guarding against debris and sharp objects.*
- ***High-Pressure Systems:*** *Protecting hands and arms from unexpected releases and bursts.*
- ***Bridge Construction Specific:***
  - **Height and Accessibility:** Ensuring protection from falling objects and sharp edges at elevated sites.
  - **High-Wind Conditions:** Protecting against wind-blown particles and debris.

b. Where to Use Hand and Arm Protection

- ***Near Workstations:*** *Hand and arm protection available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary hand and arm protection measures to prevent injuries.*
- ***When working on structural steel or high-rise buildings:*** *Protection on various levels for easy access.*
- ***During demolition work:*** *Hand and arm protection to guard against debris and hazardous materials.*

- ***Operating or working near heavy machinery and equipment:*** *Hand and arm protection to support safety.*
- ***While handling sharp or heavy materials:*** *Special protection points to prevent injuries.*
- ***On wet or uneven surfaces:*** *Stable hand and arm protection facilities to prevent accidents.*
- ***In areas where cutting, grinding, or sanding is conducted:*** *Proper hand and arm protection units to manage dust and particles.*
- ***When carrying or moving sharp or heavy materials:*** *Hand and arm protection to avoid injuries.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable hand and arm protection units to support safety on the bridge surface.
  - **Under the Bridge Structure:** Protection facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring hand and arm protection solutions to prevent water-related injuries.
  - **Elevated Areas:** Stable and secure hand and arm protection units for workers on elevated sections of the bridge.

c. **PPE Selection and Suitability**

- *Select gloves and arm protection based on specific site hazards, including cuts, chemical exposure, and electrical risks.*
- *Ensure that gloves comply with industry standards, such as ANSI/ISEA 105 or equivalent national standards.*

d. **Training and Awareness**

- *Train workers on the importance of hand and arm protection, including the proper fit and use of gloves.*
- *Conduct safety induction sessions to educate workers about site-specific hazards requiring hand and arm protection.*

e. **Inspection and Maintenance**

- *Inspect gloves and arm guards daily for tears, punctures, or degradation, replacing any that show signs of wear.*
- *Follow manufacturer guidelines for the care, cleaning, and replacement of gloves and arm protection.*

f. **Distribution and Accessibility**

- *Provide hand and arm protection PPE to all workers before they enter active construction zones.*
- *Ensure PPE is readily available at designated storage points for visitors and subcontractors.*

g. **Signage and Compliance**

- *Post "Hand and Arm Protection Area" signs prominently in all designated zones where protection is mandatory.*
- *Regularly monitor and enforce compliance through supervisor checks and audits.*

h. **Customization and Comfort**

- *Allow adjustments to glove sizes and fit for a snug and comfortable fit.*

- *Provide gloves with additional features such as padding or grip enhancements for specific tasks.*

7.9.5.7 *Standards/Specifications for Hand and Arm Protection PPE*

Adhering to clear standards and specifications for personal protective equipment (PPE) for hand and arm protection is vital to prevent injuries from cuts, abrasions, chemical exposure, and impact hazards at construction sites. This section provides comprehensive guidelines for the selection, fitting, and maintenance of hand and arm protection PPE, ensuring workers are adequately protected. Key criteria include the materials, design, and performance of the protective gear. By following the following standards and specifications, construction sites can ensure compliance with Occupational Health and Safety (OHS) regulations and promote a safe working environment for all personnel:

a. Cut Resistance

- *Gloves must meet cut resistance standards, such as **ANSI/ISEA 105: Level A1-A9**, depending on the hazard level and finalized by the authorized Engineer of LGED OR equivalent national Standards/Specifications if available and applicable:*

ANSI/ISEA 105 Cut Resistance Levels and Specifications

The standard establishes cut resistance levels for protective gloves, ensuring worker safety in environments with sharp objects and cutting hazards. The cut resistance levels range from **A1 to A9**, with increasing protection against cuts. The following table (Table-7.5) illustrates details:

Table 7-5 : Cut Resistance Levels, Range and Specifications as per ANSI/ISEA 105

Level	Cut Resistance Capacity	Appropriate Work Type
A1	200–499 grams	General handling, warehousing tasks
A2	500–999 grams	Wire assembly, fastening, light metal pressing
A3	1,000–1,499 grams	Glass handling, stamping, body shop tasks
A4	1,500–2,199 grams	Metal parts assembly, automated welding
A5	2,200–2,999 grams	Waste handling, heavy lifting, glass sheet handling
A6	3,000–3,999 grams	Maintenance and material/equipment handling
A7	4,000–4,999 grams	Cutting dry, painted or galvanized metal
A8	5,000–5,999 grams	Heavy assembly and machine processing tasks
A9	6,000 grams or more	Maximum protection for metal pressing and primary assembly

- *Ensure gloves provide sufficient protection against sharp objects and materials.*

b. Chemical Resistance

- *Chemical-resistant gloves must withstand exposure to specific chemicals for a defined duration without degradation.*
- *Follow manufacturer guidelines for chemical compatibility and usage limits.*

c. Heat Resistance

- *Heat-resistant gloves must withstand temperatures up to a specified limit, such as **250°C** for welding gloves.*
- *Ensure gloves provide adequate protection against burns and thermal hazards.*

d. Electrical Resistance

- *Electrical-resistant gloves preferably comply with standards such as **ASTM D120** or equivalent national Standards/ Specification if available and applicable for voltage protection as finalized by authorized Engineer in Charge of LGED:*

Key Specifications of Globes for Electrical Resistance (Adapted from ASTM D120)

*The **following** standard/ specifications specifies requirements for rubber insulating gloves designed to protect workers from electrical shock. It includes classifications, testing procedures, and performance criteria to ensure safety and reliability as per following table (table-5.7):*

- **Types of Gloves:**
  - ✓ **Type I:** Non-resistant to ozone; ***suitable for general electrical work.***
  - ✓ **Type II:** Resistant to ozone; ***ideal for environments with ozone exposure.***
- **Class of Gloves:**

Following table (Table-7.6) illustrates the Standards/ specifications of Electrical safety as per classes:

Table 7-6: Standards/Specifications for Electrical Safety Gloves (Types & Classes)

Class	Maximum Use Voltage	Proof Tested at	Suitability of Use
Class 00	500 volts AC	2,500 volts AC	For low-voltage electrical work and basic insulation
Class 0	1,000 volts AC	5,000 volts AC	For general electrical tasks up to 1,000 volts
Class 1	7,500 volts AC	10,000 volts AC	For utility and industrial electrical work at medium voltage
Class 2	17,000 volts AC	20,000 volts AC	For high-voltage maintenance and substation operations
Class 3	26,500 volts AC	30,000 volts AC	For heavy-duty high- voltage industrial and utility applications

- **Physical Properties:**
  - ✓ **Tensile Strength:** Gloves shall have a minimum tensile strength of **17 MPa**.
  - ✓ **Elongation:** Gloves shall exhibit an elongation of at least **600%** before breaking.
  - ✓ **Puncture Resistance:** Gloves shall resist punctures with a force of at least **18 N**.
- **Testing Requirements:**

- ✓ **AC Proof Test:** Gloves shall be tested at specified proof voltages to ensure insulation integrity.
- ✓ **DC Proof Test:** Gloves shall undergo testing at higher DC voltages for additional verification.
- ✓ **Chemical Resistance Test:** Gloves shall be tested for resistance to oils, acids, and other chemicals.

- **Markings:**
  - ✓ Gloves shall be marked with the class, type, and manufacturer details for identification.
  - ✓ Markings shall be durable and legible under normal usage conditions.

e. **Impact Resistance**

- *Impact-resistant gloves must include padding or reinforced areas to absorb and dissipate impact forces.*
- *Ensure gloves provide protection against crush injuries and heavy impacts.*

f. **Material Requirements**

- *Gloves must be made from materials suitable for the specific hazards, such as Kevlar for cut resistance or nitrile for chemical resistance.*
- *Materials should be flame-resistant, with no melting or dripping observed when exposed to high temperatures.*

g. **Adjustment Mechanisms**

- *Equip gloves with adjustable wrist closures or straps for a secure fit.*
- *Ensure gloves can be easily donned and doffed without compromising protection.*

h. **Reflective Features**

- *Gloves used for nighttime or low-visibility conditions must include reflective strips or elements for visibility.*

i. **Attachments and Accessories Compatibility**

- *Ensure gloves are compatible with additional PPE, such as wrist supports or forearm guards.*
- *Accessories should not compromise the glove's structural integrity or performance.*

j. **Temperature Resistance**

- *Gloves must remain effective in temperature ranges suitable for the work environment, such as* ***-20°C to +150°C*** *for general use.*

k. **Water and Chemical Resistance**

- *against liquid Materials must resist absorption of water and chemicals, providing protection hazards.*

l. **Glove Marking and Identification**

- *Each glove must include permanent markings indicating the manufacturer, standards compliance, and date of manufacture.*

m. **Durability Testing**

- *Gloves must pass testing for abrasion resistance, puncture resistance, and tear strength.*
- *Ensure gloves maintain structural integrity after repeated use and exposure to hazards.*

n. **Service Life and Replacement**

- *Replace gloves regularly based on exposure to hazards, wear and tear, and manufacturer recommendations.*
- *Gloves exposed to significant damage must be replaced immediately.*

o. **Ventilation Features**

- *Provide gloves with ventilation features to reduce heat buildup and improve comfort during prolonged use.*
- *Ventilation must not compromise the glove's protection against hazards.*

p. **Emergency Provisions**

- *Ensure that gloves and arm protection are stocked at emergency assembly points for immediate use during rescue or evacuation scenarios.*
- *Maintain a supply of spare gloves for emergencies.*

q. **Inspection Protocols**

- *Conduct visual inspections of gloves and arm guards weekly for signs of damage or wear.*
- *Use advanced methods such as chemical degradation testing to assess material performance quarterly.*

r. **Lightweight Design**

- *Gloves should be lightweight to ensure prolonged use without causing hand or arm fatigue.*

s. **Environmental Sustainability**

- *Encourage the use of recyclable materials in glove manufacturing to reduce environmental impact.*
- *Partner with suppliers offering take-back or recycling programs for old or damaged gloves.*
- *Maintain certifications on file for review during audits by occupational safety regulators.*

t. **Common Types of Globes with Options of Use**

Contractors shall comply with the following table (Table:7-4) illustrating the most common types of gloves for protection during work, leading feature and the types of hazards they can guard against:

Table 7-7: Common Types of Gloves for Protection During Work with Leading Feature and Potential Types of Hazards

Sl. No	Type of Glove	Leading Feature	Guarding Against Hazards
1.	Disposable Gloves	i. Usually lightweight; ii. Made of plastic.	i. Guards against mild irritants.
2.	Fabric Gloves	i. Made of cotton or fabric blends.	i. Generally used to improve grip when handling slippery objects; ii. Help insulate hands from mild heat or cold.
3.	Leather Gloves	i. Made of leather	i. Guards against injuries from sparks or scraping against rough surfaces; ii. Used with an insulated liner when working with electricity.
4.	Metal Mesh Gloves	i. Made of metal mesh	i. Protect hands from accidental cuts and scratches; ii. Commonly used with cutting tools or other sharp instruments.
5.	Aluminized Gloves	i. Made of aluminized fabric	i. Insulate hands from intense heat; ii. Most commonly used by persons working with molten materials.
6.	Chemical Resistance Gloves	i. Made of rubber, neoprene, polyvinyl alcohol or vinyl, etc.	i. Protect hands from corrosives, oils and solvents etc.;

u. Contractor's Close Liaison with PPE Suppliers and LGED Authority Concerned

Contractors shall work closely with PPE suppliers and concerned authority of LGED to select appropriate hand protection equipment/ gloves. The contractor and concerned officers/ Engineers of LGED shall consider the following factors for selecting appropriate hand protection equipment/gloves:

- *Specific task(s) being performed by the laborers/ employees concerned;*
- *Prevailing environmental conditions while executing the task;*
- *Duration of use of hand protection equipment/ gloves while performing the task;*
- *The real dangers;*
- *Probable dangers.*

v. Tasks of Laborers/Employees

- *The task/activities of the laborers/employees concerned shall also be considered to determine the following:*
  - ✓ The degree of handiness required;
  - ✓ The duration of the task;
  - ✓ The frequency of the task;
  - ✓ Degree of exposure of the hazard to laborer/ employee concerned;
  - ✓ Level of physical stresses that will be needed to apply.

7.9.6 Safety Belts/Lifelines/Safety Nets/Safety Harnesses

7.9.6.1 Safety Belts

Safety belts are crucial components of fall protection systems at construction worksites. They provide restraint to prevent falls by securing workers to anchor points.

a. Examples of Hazards Requiring Safety Belts

- *Working on scaffolding, ladders, or elevated platforms.*
- *Performing tasks on roofs or other high structures.*

b. Examples of Safety Belts

- ***Full-Body Harness:*** *Distributes fall forces across the body, reducing injury risk.*
- ***Positioning Belt:*** *Allows workers to maintain hands-free work positions.*

c. Negative Impacts for Non-compliance of Safety Belts

i. Health and Safety Impacts

- ***Increased Risk of Injuries:*** *Workers without safety belts are at a higher risk of falls, which can lead to severe injuries or fatalities.*
- ***Long-term Health Issues:*** *Falls can result in long-term impairments, including spinal injuries, fractures, and traumatic brain injuries.*

ii. Operational Impacts

- ***Reduced Productivity:*** *Injuries from falls can lead to downtime and reduced productivity as workers may need time off to recover.*
- ***Higher Accident Rates:*** *Non-compliance can result in more frequent accidents, disrupting work schedules and causing project delays.*

iii. Legal and Financial Impacts

- ***Fines and Penalties:*** *Companies may face fines and penalties from safety regulators for not adhering to PPE standards.*
- ***Increased Medical Costs:*** *Non-compliance can lead to higher medical costs and liability claims associated with fall injuries.*
- ***Damage to Reputation:*** *A reputation for poor safety practices can deter clients and damage the company's image.*
- ***Operational Disruptions:*** *Injuries resulting from inadequate fall protection can cause work stoppages and reduced productivity, impacting the company's financial performance.*
- ***Insurance Premiums:*** *Companies with poor safety records may experience increased insurance premiums due to the higher risk of workplace injuries.*

- ***Legal Fees and Settlements:*** *Non-compliance can lead to costly legal battles and settlements if workers are injured due to insufficient fall protection.*

d. Positive Impacts of Compliance with Safety Belts

i. Health and Safety Benefits

- ***Reduced Risk of Injuries:*** *Workers using safety belts are at a significantly lower risk of falls, reducing the likelihood of severe injuries or fatalities.*
- ***Improved Long-term Health:*** *By preventing falls, safety belts help avoid long-term impairments, such as spinal injuries, fractures, and traumatic brain injuries.*

ii. Operational Benefits

- ***Enhanced Productivity:*** *With fewer injuries, workers experience less downtime and maintain higher productivity, as they don't need time off to recover.*
- ***Lower Accident Rates:*** *Compliance with safety standards results in fewer accidents, leading to smoother operations and timely project completion.*

iii. Legal and Financial Benefits

- ***Avoidance of Fines and Penalties:*** *Companies adhering to PPE standards can avoid fines and penalties from safety regulators.*
- ***Reduced Medical Costs:*** *Compliance helps minimize medical costs and liability claims associated with fall injuries.*
- ***Strengthened Reputation:*** *A strong safety record enhances a company's reputation, attracting clients and fostering a positive image.*
- ***Insurance Premium Reductions:*** *Compliance with safety standards can lead to lower insurance premiums due to the decreased risk of workplace injuries.*
- ***Increased Productivity:*** *Ensuring employee safety can lead to a more productive workforce, as fewer accidents result in less downtime and higher efficiency.*
- ***Employee Satisfaction and Retention:*** *A commitment to safety can improve employee morale and loyalty, leading to higher retention rates and a more motivated workforce.*

e. General Provisions for Safety Belts

Ensuring that workers use safety belts is vital for preventing falls and minimizing the risk of injuries at construction sites. Implementing robust protocols for the use of safety belts helps to secure workers when working at heights or in precarious positions. This section outlines the following essential guidelines for selecting, using, and maintaining safety belts, ensuring compliance with Occupational Health and Safety (OHS) standards and promoting a safe working environment:

i. *When to Use Safety Belts*

- ***Working at Heights:*** *Preventing falls from elevated work areas such as scaffolding, ladders, roofs, and structural steel.*
- ***Bridge Construction:*** *Ensuring worker safety when working on bridge decks, under bridge structures, and at elevated heights.*
- ***Operating Cranes and Hoists:*** *Securing operators and workers to prevent falls.*
- ***High-Pressure Systems:*** *Providing fall protection during maintenance and inspection of high-pressure systems.*
- ***Demolition Activities:*** *Preventing falls during the demolition of high structures.*
- ***Installing and Maintaining Overhead Structures:*** *Ensuring safety when working on overhead installations.*
- ***Community and Environmental Responsibility:*** *Promoting a safe work environment and protecting workers from fall hazards.*
- ***Adverse Weather Conditions:*** *Providing additional security during high winds, rain, or other adverse weather conditions.*

ii. *Where to Use Safety Belts*

- ***Near Workstations:*** *Safety belts available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary safety belts to prevent falls and maintain safety.*
- ***When working on structural steel or high-rise buildings:*** *Safety belts on various levels for easy access.*
- ***During bridge construction:*** *Safety belts to ensure worker safety on bridge decks, under the bridge structure, and at elevated heights.*
- ***Operating or working near cranes and hoists:*** *Safety belts to support operator and worker safety.*
- ***While handling high-pressure systems:*** *Special safety belt points to prevent falls during maintenance and inspection.*
- ***On wet or uneven surfaces:*** *Stable safety belt facilities to prevent accidents.*
- ***In areas with low clearance:*** *Proper safety belt units to manage fall risks.*
- ***When installing or maintaining overhead structures:*** *Safety belts to prevent falls from elevated positions.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable safety belt units to support safety on the bridge surface.
  - **Under the Bridge Structure:** Safety belt facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring safety belt solutions to prevent water-related falls.
  - **Elevated Areas:** Stable and secure safety belt units for workers on elevated sections of the bridge.

iii. *Safety Belt Selection and Suitability*

- *Select safety belts based on specific site hazards and work environment.*
- *Preferably ensure compliance with international standards or equivalent national standards (in applicable cases and if available) as finalized by the authorized Engineer in Charge of LGED.*

iv. *Training and Awareness*

- *Train workers on the importance of fall protection and proper use of safety belts.*
- *Conduct safety induction sessions to educate workers about site-specific hazards.*

v. *Inspection and Maintenance:*

- *Inspect safety belts daily for wear or damage, replacing any that show signs of wear.*
- *Follow manufacturer guidelines for care and replacement.*

vi. *Distribution and Accessibility*

- *Provide safety belts to all workers before they enter areas with fall hazards.*
- *Ensure availability at designated storage points for visitors and subcontractors.*

vii. *Signage and Compliance*

- *Post **"Fall Protection Required"** signs in all designated zones.*
- *Regularly monitor and enforce compliance through supervisor checks and audits.*

viii. *Customization and Comfort*

- *Allow adjustments for a secure and comfortable fit.*
- *Provide features such as padding for additional comfort.*

f. **Standards/Specifications for Safety Belts**

Ensuring the proper use and effectiveness of safety belts involves adhering to rigorous standards and specifications. This section provides detailed guidelines for the selection, fitting, and maintenance of safety belts to guarantee maximum protection for workers. Key factors include the materials, design, and performance requirements of the safety belts. By following the following standards and specifications, construction sites can ensure compliance with Occupational Health and Safety (OHS) regulations and foster a secure working environment for all personnel:

i. *When and Where to Use*

- *Laborers need to climb and work on top of poles at a height of six **(6) meters or more** shall use safety belts;*
- *On top of structures where there is **no place to strap a safety belt**, a runner line/similar arrangement shall be installed for strapping the safety belt.*

ii. *Impact Resistance*

- *Safety belts must withstand an impact force of at least **22 kN**.*
- *The safety belt shall be:*

- ✓ **11.5 cm. (4 1/2 in.)** wide and **0.65 cm. (1/4 in.)** thick;
- ✓ Strong enough to support minimum **weight of 114 kgs. (250 lbs.)** without breaking/failing.

- *Hardware used for safety belts should have a strength of approximately equal to the full strength of the waist band;*
- *Buckles shall be capable of holding securely without slippage or other failure;*
- *The holding power of the belt shall be ensured through a single insertion of the strap through the buckle in the normal/usual way of use;*
- *Belt anchors should be capable of supporting a pull of minimum 2000 kgs. (4,400 lbs.) without fracture applied in the direction a fall of laborer concerned which the anchor must withstand;*

iii. Material Requirements

- *Should be made from durable materials, such as high-strength polyester or nylon.*
- *Should be resistant to **UV radiation**, chemicals, and abrasion.*
- *Safety belts shall be made of tanned leather/ linen/cotton webbing or other suitable materials;*
- *Belt anchors shall be made of nickel copper alloy and/or stainless-steel metals;*
- *Belt anchors shall be made of forged/ heat treated/ bar stock machined metal.*

iv. Suspension System Design

- *Include a **5-point or 6-point** suspension system.*
- *Provide adequate support to prevent suspension trauma.*

v. Adjustment Mechanisms

- *Should have adjustable straps and buckles for a secure fit.*
- *Quick-release mechanisms for easy donning and doffing.*
- *All anchors and fastenings for the belt shall be provided with arrangements to prevent turning, backing off or loosening;*

vi. Reflective Features

- *Should include reflective strips for visibility in low-light conditions.*

vii. Attachments and Accessories Compatibility

- *Should be compatible with additional PPE, such as tool lanyards.*
- *Accessories should not compromise structural integrity.*

viii. Temperature Resistance

- *Should be effective in temperatures from **-30°C to +60°C**.*

ix. Water and Chemical Resistance

- *Belts should bear the quality to resist absorption of water and chemicals.*

x. Equipment Marking and Identification

- *There should be permanent markings of safety Belts indicating manufacturer, standards compliance, and date of manufacture.*

xi. *Durability Testing*

- *Should pass tests for abrasion resistance, tensile strength, and impact absorption.*
- *Integrity after repeated use and exposure to hazards should be maintained.*

xii. *Service Life and Replacement*

- *Regular replacement should be ensured based on exposure to hazards and wear and tear.*
- *Safety Belts exposed to significant impact should be replaced immediately.*

xiii. *Emergency Provisions*

- *Belts should be in stock at emergency assembly points for immediate use during rescue or evacuation scenarios.*
- *Spare safety harnesses should be maintained for emergencies.*

xiv. *Inspection Protocols*

- *Weekly visual inspections should be conducted for signs of damage or wear.*
- *Advanced tensile testing should be performed quarterly to assess material performance.*

xv. *Lightweight Design*

- *The design should be lightweight to ensure prolonged use without causing fatigue.*

xvi. *Environmental Sustainability*

- *Recyclable materials should be used to reduce environmental impact.*
- *Partnerships should be established with suppliers offering take-back or recycling programs.*

7.9.6.2 *Lifelines*

Lifelines are essential components of fall protection systems, providing fall arrest protection by connecting to safety harnesses.

a. **Examples of Hazards Requiring Lifelines**

- ***Working on Temporary Supports:*** *Working on scaffolding, ladders, or elevated platforms.*
- ***Performing Tasks on Height:*** *Performing tasks on roofs or other high structures.*

b. **Examples of Lifelines**

- ***Vertical Lifeline:*** *Used with a full-body harness for vertical movement.*
- ***Horizontal Lifeline:*** *Allows horizontal movement while providing fall arrest protection.*

c. **Negative Impacts for Non-compliance of Life Lines**

i. *Health and Safety Impacts*

- ***Increased Risk of Falls:*** *Workers without life lines are at a higher risk of falls, which can lead to severe injuries or fatalities.*
- ***Long-term Health Issues:*** *Falls can result in long-term impairments, including spinal injuries, fractures, and traumatic brain injuries.*

ii. Operational Impacts

- ***Reduced Productivity:*** *Injuries from falls can lead to downtime and reduced productivity as workers may need time off to recover.*
- ***Higher Accident Rates:*** *Non-compliance can result in more frequent accidents, disrupting work schedules and causing project delays.*

iii. Legal and Financial Impacts

- ***Fines and Penalties:*** *Companies may face fines and penalties from safety regulators for not adhering to PPE standards.*
- ***Increased Medical Costs:*** *Non-compliance can lead to higher medical costs and liability claims associated with fall injuries.*
- ***Damage to Reputation:*** *A reputation for poor safety practices can deter clients and damage the company's image.*
- ***Operational Disruptions:*** *Injuries resulting from inadequate fall protection can cause work stoppages and reduced productivity, impacting the company's financial performance.*
- ***Insurance Premiums:*** *Companies with poor safety records may experience increased insurance premiums due to the higher risk of workplace injuries.*
- ***Legal Fees and Settlements:*** *Non-compliance can lead to costly legal battles and settlements if workers are injured due to insufficient fall protection.*

d. Positive Impacts of Compliance with Life Lines

i. Health and Safety Benefits

- ***Reduced Risk of Falls:*** *Workers using life lines are at a significantly lower risk of falls, reducing the likelihood of severe injuries or fatalities.*
- ***Improved Long-term Health:*** *By preventing falls, life lines help avoid long-term impairments, such as spinal injuries, fractures, and traumatic brain injuries.*

ii. Operational Benefits

- ***Enhanced Productivity:*** *With fewer injuries, workers experience less downtime and maintain higher productivity, as they don't need time off to recover.*
- ***Lower Accident Rates:*** *Compliance with safety standards results in fewer accidents, leading to smoother operations and timely project completion.*

iii. Legal and Financial Benefits

- ***Avoidance of Fines and Penalties:*** *Companies adhering to PPE standards can avoid fines and penalties from safety regulators.*

- ***Reduced Medical Costs:*** *Compliance helps minimize medical costs and liability claims associated with fall injuries.*
- ***Strengthened Reputation:*** *A strong safety record enhances a company's reputation, attracting clients and fostering a positive image.*
- ***Insurance Premium Reductions:*** *Compliance with safety standards can lead to lower insurance premiums due to the decreased risk of workplace injuries.*
- ***Increased Productivity:*** *Ensuring employee safety can lead to a more productive workforce, as fewer accidents result in less downtime and higher efficiency.*
- ***Employee Satisfaction and Retention:*** *A commitment to safety can improve employee morale and loyalty, leading to higher retention rates and a more motivated workforce.*

e. **General Provisions for Lifelines**

The implementation of lifelines is critical for ensuring worker safety at construction sites, particularly when working at heights. Lifelines provide secure anchorage points that help prevent falls and ensure safe movement across elevated work areas. This section outlines key guidelines for selecting, installing, and maintaining lifelines, ensuring compliance with Occupational Health and Safety (OHS) standards and promoting a safe working environment. The following provisions help protect workers from fall-related injuries and enhance overall site safety:

i. *When to Use Lifelines*

- ***Working at Heights:*** *Providing fall protection and securing workers during tasks on elevated structures such as scaffolding, ladders, roofs, and structural steel.*
- ***Bridge Construction:*** *Ensuring worker safety when working on bridge decks, under bridge structures, and at elevated heights.*
- ***Operating Cranes and Hoists:*** *Securing operators and workers to prevent falls.*
- ***High-Pressure Systems:*** *Providing fall protection during maintenance and inspection of high-pressure systems.*
- ***Demolition Activities:*** *Preventing falls during the demolition of high structures.*
- ***Installing and Maintaining Overhead Structures:*** *Ensuring safety when working on overhead installations.*
- ***Community and Environmental Responsibility:*** *Promoting a safe work environment and protecting workers from fall hazards.*
- ***Adverse Weather Conditions:*** *Providing additional security during high winds, rain, or other adverse weather conditions.*

ii. *Where to Use Lifelines*

- ***Near Workstations:*** *Lifelines available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary lifelines to prevent falls and maintain safety.*

- ***When working on structural steel or high-rise buildings:*** *Lifelines on various levels for easy access.*
- ***During bridge construction:*** *Lifelines to ensure worker safety on bridge decks, under the bridge structure, and at elevated heights.*
- ***Operating or working near cranes and hoists:*** *Lifelines to support operator and worker safety.*
- ***While handling high-pressure systems:*** *Special lifeline points to prevent falls during maintenance and inspection.*
- ***On wet or uneven surfaces:*** *Stable lifeline facilities to prevent accidents.*
- ***In areas with low clearance:*** *Proper lifeline units to manage fall risks.*
- ***When installing or maintaining overhead structures:*** *Lifelines to prevent falls from elevated positions.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable lifeline units to support safety on the bridge surface.
  - **Under the Bridge Structure:** Lifeline facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring lifeline solutions to prevent water-related falls.
  - **Elevated Areas:** Stable and secure lifeline units for workers on elevated sections of the bridge.

iii. PPE Selection and Suitability

- *Lifelines should be selected based on specific site hazards and work environment.*
- *Compliance with industry standards, such as OSHA 1926 Subpart M or equivalent national standards, should preferably be ensured (in applicable cases).*

iv. Training and Awareness

- *Workers should be trained on the importance of fall protection and proper use of lifelines.*
- *Safety induction sessions should be conducted to educate workers about site-specific hazards.*

v. Inspection and Maintenance

- *Lifelines should be inspected daily for wear or damage, with replacements made for any that show signs of wear.*
- *Manufacturer guidelines for care and replacement should be followed.*

vi. Distribution and Accessibility

- *Lifelines should be provided to all workers before they enter areas with fall hazards.*
- *Availability at designated storage points for visitors and subcontractors should be ensured.*
- *On top of structures where there is no place to strap a safety belt, a runner line/similar arrangement shall be installed for strapping the life line.*

vii. Signage and Compliance

- *"Fall Protection Required" signs should be posted in all designated zones.*
- *Compliance should be regularly monitored and enforced through supervisor checks and audits.*

viii. Customization and Comfort

- *Adjustments should be allowed for a secure and comfortable fit.*
- *Features such as padding for additional comfort should be provided.*

f. Standards/Specifications for lifelines

To ensure the highest level of safety at construction sites, especially when working at heights, it is crucial to adhere to stringent standards and specifications for lifelines. This section provides detailed guidelines on selecting, installing, and maintaining lifelines to guarantee optimal protection. Key considerations include the materials, design, and performance requirements of the lifelines. By following the standards and specifications bellow, construction sites can achieve compliance with Occupational Health and Safety (OHS) regulations and maintain a secure working environment for all personnel:

i. Access to Working Places

- *Laborers shall be secured by life lines when working in:*
  - ✓ Unguarded surface above open pits or tanks;
  - ✓ Steep slopes;
  - ✓ Moving machinery and similar locations;
  - ✓ From unguarded surfaces six (6) meters (20 ft.) or more above water or ground;
  - ✓ Temporary/permanent floor platform;
  - ✓ Scaffold construction;
  - ✓ Locations exposed to the possibility of falls hazardous to life or limb;
- *In circumstances, where using life lines in locations like guarded platforms/ scaffolds/ temporary floors etc. are not feasible, safety nets shall be provided and installed and used for safety.*
- *Cleaners/washers window /working outside of bridges/buildings/structure under construction/ implementation six (6) meters (20 ft.) or more above the ground or other surfaces unless protected from falling by other means, shall use safety belts and life lines attached to suitable anchors;*
- *Laborers/employees concerned entering a sewer/vent/ duct/other similar confined places shall be provided with and wear safety belts with life lines attached and held by another person stationed at the opening ready to respond to agreed signals;*

ii. Impact Resistance

- *A minimum breaking strength of **5,000 pounds (22.24 kN)** must be supported by lifelines.*

iii. Material Requirements

- *Durable materials, such as high-strength polyester or nylon, should be used.*

- *Lifelines should be resistant to* ***UV radiation, chemicals,*** *and* ***abrasion.***
- *Life lines shall be:*
  - ✓ Made of good quality manila rope of at least **1.9 cm. (3/4 in.)** diameter; or
  - ✓ Equivalent material like nylon rope of **at least 1.27 cm. (1/2 in.)** diameter;

iv. ***Adjustment Mechanisms***

- *Lifelines should be adjustable for a secure fit.*
- *Quick-release mechanisms should be included for easy use.*

v. ***Reflective Features***

- *Reflective strips should be included for visibility in low-light conditions.*

vi. ***Attachments and Accessories Compatibility***

- *Lifelines should be compatible with additional PPE, such as safety harnesses.*
- *Accessories should not compromise structural integrity.*

vii. ***Temperature Resistance***

- *Lifelines should be effective in temperatures from* ***-30°C to +60°C.***

viii. ***Water and Chemical Resistance***

- *Lifelines should resist the absorption of water and chemicals.*

ix. ***Equipment Marking and Identification***

- *Permanent markings indicating the manufacturer, standards compliance, and date of manufacture should be included.*

x. ***Durability Testing***

- *Lifelines should pass tests for abrasion resistance, tensile strength, and impact absorption.*
- *The integrity of lifelines should be maintained after repeated use and exposure to hazards.*

xi. ***Service Life and Replacement***

- *Regular replacement should be based on exposure to hazards and wear and tear.*
- *Equipment exposed to significant impact should be replaced immediately.*

xii. ***Emergency Provisions***

- *Lifelines should be stocked at emergency assembly points for immediate use during rescue or evacuation scenarios.*
- *Spare lifelines should be maintained for emergencies.*

xiii. ***Inspection Protocols***

- *Weekly visual inspections for signs of damage or wear should be conducted.*
- *Advanced tensile testing should be performed quarterly to assess material performance.*

xiv. ***Lightweight Design***

- *Lifelines should be lightweight to ensure prolonged use without causing fatigue.*

xv. *Environmental Sustainability*

- *Recyclable materials should be used to reduce environmental impact.*
- *Partnerships should be established with suppliers offering take-back or recycling programs.*

7.9.6.3 *Safety Nets*

Safety nets are essential components of fall protection systems, installed below work areas to catch falling workers and debris:

a. **Examples of Hazards Requiring Safety Nets**

- ***Working on Temporary Supports:*** *Safety nets are essential for workers operating on scaffolding, ladders, or elevated platforms to prevent falls and ensure safety.*
- ***Performing Tasks on Height:*** *Safety nets are necessary for tasks performed on roofs or other high structures to provide fall arrest protection and minimize the risk of injury.*

b. **Examples of Safety Nets**

- ***Vertical Safety Net:*** *Used for fall protection when working at heights and allows for vertical movement.*
- ***Horizontal Safety Net:*** *Provides fall arrest protection for workers moving horizontally, ensuring safety on scaffolding, walkways, and similar structures.*
- ***Perimeter Safety Net:*** *Installed along the edges of buildings or structures to catch falling workers or debris, preventing them from hitting the ground.*
- ***Debris Safety Net:*** *Designed to catch and contain falling debris, tools, or materials, ensuring that the worksite remains safe for workers below.*
- ***Safety Net Fan:*** *Installed at an angle, these nets are used to catch falling workers and debris, providing an additional layer of protection around the perimeter of a structure.*
- ***Temporary Bridge Safety Net:*** *Used under temporary bridges or platforms to catch workers or materials in case of a fall, ensuring safety during construction or maintenance.*
- ***Rescue Safety Net:*** *Used in emergency situations to safely lower or raise workers from heights or confined spaces during rescue operations.*

c. **Negative Impacts for Non-compliance of Safety Nets**

i. *Health and Safety Impacts*

- ***Increased Risk of Falls:*** *Workers without safety nets are at a higher risk of falls, which can lead to severe injuries or fatalities.*
- ***Long-term Health Issues:*** *Falls can result in long-term impairments, including spinal injuries, fractures, and traumatic brain injuries.*

ii. *Operational Impacts*

- ***Reduced Productivity:*** *Injuries from falls can lead to downtime and reduced productivity as workers may need time off to recover.*

- ***Higher Accident Rates:*** *Non-compliance can result in more frequent accidents, disrupting work schedules and causing project delays.*

iii. *Legal and Financial Impacts*

- ***Fines and Penalties:*** *Companies may face fines and penalties from safety regulators for not adhering to PPE standards.*
- ***Increased Medical Costs:*** *Non-compliance can lead to higher medical costs and liability claims associated with fall injuries.*
- ***Damage to Reputation:*** *A reputation for poor safety practices can deter clients and damage the company's image.*
- ***Operational Disruptions:*** *Injuries resulting from inadequate PPE can cause work stoppages and reduced productivity, impacting the company's financial performance.*
- ***Insurance Premiums:*** *Companies with poor safety records may experience increased insurance premiums due to the higher risk of workplace injuries.*
- ***Legal Fees and Settlements:*** *Non-compliance can lead to costly legal battles and settlements if workers are injured due to insufficient PPE.*

d. Positive Impacts of Compliance with Safety Nets

i. *Health and Safety Benefits*

- ***Reduced Risk of Falls:*** *Workers using safety nets are at a significantly lower risk of falls, reducing the likelihood of severe injuries or fatalities.*
- ***Improved Long-term Health:*** *By preventing falls, safety nets help avoid long-term impairments, such as spinal injuries, fractures, and traumatic brain injuries.*

ii. *Operational Benefits*

- ***Enhanced Productivity:*** *With fewer injuries, workers experience less downtime and maintain higher productivity, as they don't need time off to recover.*
- ***Lower Accident Rates:*** *Compliance with safety standards results in fewer accidents, leading to smoother operations and timely project completion.*

iii. *Legal and Financial Benefits*

- ***Avoidance of Fines and Penalties:*** *Companies adhering to PPE standards can avoid fines and penalties from safety regulators.*
- ***Reduced Medical Costs:*** *Compliance helps minimize medical costs and liability claims associated with fall injuries.*
- ***Strengthened Reputation:*** *A strong safety record enhances a company's reputation, attracting clients and fostering a positive image.*
- ***Insurance Premium Reductions:*** *Compliance with safety standards can lead to lower insurance premiums due to the decreased risk of workplace injuries.*

- ***Increased Productivity:*** *Ensuring employee safety can lead to a more productive workforce, as fewer accidents result in less downtime and higher efficiency.*
- ***Employee Satisfaction and Retention:*** *A commitment to safety can improve employee morale and loyalty, leading to higher retention rates and a more motivated workforce.*

e. General Provisions for Safety Nets

Safety nets play a crucial role in preventing fall-related injuries by providing an additional layer of protection for workers at construction sites. These nets are designed to catch workers and debris, reducing the risk of serious injuries and fatalities. This section outlines essential guidelines for selecting, installing, and maintaining safety nets, ensuring they are used effectively to enhance overall site safety. By implementing the following provisions, construction sites can comply with Occupational Health and Safety (OHS) standards and create a safer working environment for all personnel:

i. *When to Use Safety Nets*

- ***Working at Heights:*** *Providing fall protection for workers operating at elevated levels such as scaffolding, ladders, roofs, and structural steel.*
- ***Bridge Construction:*** *Ensuring worker safety when working on bridge decks, under bridge structures, and at elevated heights.*
- ***Operating Cranes and Hoists:*** *Securing areas where there is a risk of falling materials or workers.*
- ***High-Pressure Systems:*** *Providing fall protection during maintenance and inspection of high-pressure systems.*
- ***Demolition Activities:*** *Preventing injuries from falling debris and protecting workers during demolition.*
- ***Installing and Maintaining Overhead Structures:*** *Ensuring safety when working on overhead installations.*
- ***Community and Environmental Responsibility:*** *Promoting a safe work environment and protecting workers from fall hazards.*
- ***Adverse Weather Conditions:*** *Providing additional security during high winds, rain, or other adverse weather conditions.*

ii. *Where to Use Safety Nets*

- ***Near Workstations:*** *Safety nets installed close to work areas for immediate protection.*
- ***On scaffolding, ladders, and roofs:*** *Temporary safety nets to prevent falls and maintain safety.*
- ***When working on structural steel or high-rise buildings:*** *Safety nets on various levels for easy access.*
- ***During bridge construction:*** *Safety nets to ensure worker safety on bridge decks, under the bridge structure, and at elevated heights.*
- ***Operating or working near cranes and hoists:*** *Safety nets to support worker and material safety.*

- ***While handling high-pressure systems:*** *Special safety net points to prevent falls during maintenance and inspection.*
- ***On wet or uneven surfaces:*** *Stable safety net facilities to prevent accidents.*
- ***In areas with low clearance:*** *Proper safety net units to manage fall risks.*
- ***When installing or maintaining overhead structures:*** *Safety nets to prevent falls from elevated positions.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable safety net units to support safety on the bridge surface.
  - **Under the Bridge Structure:** Safety net facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring safety net solutions to prevent water-related falls.
  - **Elevated Areas:** Stable and secure safety net units for workers on elevated sections of the bridge.

iii. PPE Selection and Suitability

- *Safety nets should be selected based on specific site hazards and work environment.*
- *Compliance with international standards, or equivalent national standard/specifications shall preferably be ensured as finalized by the authorized Engineer in Charge of LGED.*

iv. Training and Awareness

- *Workers should be trained on the importance of fall protection and proper use of safety nets.*
- *Safety induction sessions should be conducted to educate workers about site-specific fall hazards.*

v. Inspection and Maintenance

- *Safety nets should be inspected daily for wear, damage, or defects, with replacements made for any that show signs of wear.*
- *Manufacturer guidelines for care and replacement should be followed.*

vi. Distribution and Accessibility

- *Safety nets should be provided to all workers before they enter areas with fall hazards.*
- *Availability at designated storage points for visitors and subcontractors should be ensured.*

vii. Signage and Compliance

- ***"Fall Protection Required"*** *signs should be posted in all designated zones.*
- *Compliance should be regularly monitored and enforced through supervisor checks and audits.*

viii. Customization and Comfort

- *Adjustments should be allowed for a secure and comfortable fit.*

- *Features such as padding for additional comfort should be provided.*

f. Standards/Specifications for Safety Nets

To maximize safety at construction sites, it is essential to adhere to stringent standards and specifications for safety nets. This section provides comprehensive guidelines on selecting, installing, and maintaining safety nets to ensure optimal protection. Key considerations include the materials, design, and performance requirements of the safety nets. By following the standards and specifications illustrated bellow, construction sites can achieve compliance with Occupational Health and Safety (OHS) regulations and maintain a secure working environment for all personnel:

i. Impact Resistance

- *The impact force of a falling worker must be withstood by safety nets without tearing or breaking.*
- *The mesh size should prevent the passage of a* ***6-inch*** *diameter object.*

ii. Material Requirements

- *Durable materials, such as high-strength synthetic fibers, should be used.*
- *Safety nets should be resistant to* ***UV radiation, chemicals****, and* ***abrasion****.*
- *Safety nets shall be:*
  - ✓ Made of good quality rope/other materials that can absorb the impact of a falling body equally;
  - ✓ Minimum diameter of mesh ropes/ other materials shall be **0.94 cm. (3/8 in.);**
  - ✓ Minimum diameter of border (perimeter) ropes/ other materials shall be **1.90 cm. (3/4 in.);**
  - ✓ The mesh of the net shall be arranged **within 15.25 cm. (6 in.)** on canters positively and securely attached to avoid wear at each crossing point and at points of contact with the border.
  - ✓ Safety nets shall be equipped with satisfactorily padded protector sockets/equivalent arrangements of attachments;

iii. Suspension System Design

- *Safety nets should be properly anchored to support structures to ensure stability and effectiveness.*
- *Adequate overlap between adjacent nets should be ensured to prevent gaps.*
- *Safety nets shall have supports and anchorages of sufficient size and strength to catch any falling laborer/ employee;*
- *Safety nets shall be:*
  - ✓ Attached to sufficient supports outside and beyond the area of possible fall;
  - ✓ Supported at sufficient heights to prevent sagging to any solid object beneath when cushioning the fall of a laborer/employer.

iv. Adjustment Mechanisms

- *Adjustable anchoring points should be provided for a secure fit.*
- *Quick-release mechanisms should be included for easy deployment and removal.*

v. ***Reflective Features***

- *Reflective strips should be included for visibility in low-light conditions.*

vi. ***Attachments and Accessories Compatibility***

- *Safety nets should be compatible with additional PPE, such as safety harnesses.*
- *Accessories should not compromise structural integrity.*

vii. ***Temperature Resistance***

- *Safety nets should be effective in temperatures from -30°C to +60°C.*

viii. ***Water and Chemical Resistance***

- *Safety nets should resist the absorption of water and chemicals.*

ix. ***Equipment Marking and Identification***

- *Permanent markings indicating the manufacturer, standards compliance, and date of manufacture should be included.*

x. ***Durability Testing***

- *Safety nets should pass tests for abrasion resistance, tensile strength, and impact absorption.*
- *The integrity of safety nets should be maintained after repeated use and exposure to hazards.*

xi. ***Service Life and Replacement***

- *Regular replacement should be based on exposure to hazards and wear and tear.*
- *Equipment exposed to significant impact should be replaced immediately.*

xii. ***Emergency Provisions***

- *Safety nets should be stocked at emergency assembly points for immediate use during rescue or evacuation scenarios.*
- *Spare safety nets should be maintained for emergencies.*

xiii. ***Inspection Protocols***

- *Weekly visual inspections for signs of damage or wear should be conducted.*
- *Advanced tensile testing should be performed quarterly to assess material performance.*

xiv. ***Lightweight Design***

- *Safety nets should be lightweight to ensure prolonged use without causing fatigue.*

xv. ***Environmental Sustainability***

- *Recyclable materials should be used to reduce environmental impact.*

- *Partnerships should be established with suppliers offering take-back or recycling programs.*

7.9.6.4 *Safety Harnesses*

Safety Harnesses are critical components of fall protection systems, worn by workers to prevent falls and ensure safety.

a. Examples of Hazards Requiring Safety Harnesses

- ***Working at Heights:*** *Safety harnesses are essential for workers performing tasks on roofs, scaffolding, or elevated platforms to prevent falls and ensure safety.*
- ***Confined Spaces:*** *Safety harnesses are necessary for tasks performed in confined spaces where there is a risk of falls or entrapment.*

b. Examples of Safety Harnesses

- ***Full Body Harness:*** *Provides comprehensive fall protection, distributing the impact force of a fall across the body.*
- ***Chest Harness:*** *Used for specific tasks where only upper body support is needed, providing limited fall protection.*
- ***Suspension Harness:*** *Designed for workers who need to be suspended in the air for extended periods, offering comfort and support.*

c. Negative Impacts for Non-compliance of Safety Harnesses

i. Health and Safety Impacts

- ***Increased Risk of Falls:*** *Workers without safety harnesses are at a higher risk of falls, which can lead to severe injuries or fatalities.*
- ***Long-term Health Issues:*** *Falls can result in long-term impairments, including spinal injuries, fractures, and traumatic brain injuries.*

ii. Operational Impacts

- ***Reduced Productivity:*** *Injuries from falls can lead to downtime and reduced productivity as workers may need time off to recover.*
- ***Higher Accident Rates:*** *Non-compliance can result in more frequent accidents, disrupting work schedules and causing project delays.*

iii. Legal and Financial Impacts

- ***Fines and Penalties:*** *Companies may face fines and penalties from safety regulators for not adhering to PPE standards.*
- ***Increased Medical Costs:*** *Non-compliance can lead to higher medical costs and liability claims associated with fall injuries.*
- ***Damage to Reputation:*** *A reputation for poor safety practices can deter clients and damage the company's image.*
- ***Operational Disruptions:*** *Injuries resulting from inadequate PPE can cause work stoppages and reduced productivity, impacting the company's financial performance.*

- ***Insurance Premiums:*** *Companies with poor safety records may experience increased insurance premiums due to the higher risk of workplace injuries.*
- ***Legal Fees and Settlements:*** *Non-compliance can lead to costly legal battles and settlements if workers are injured due to insufficient PPE.*

d. Positive Impacts of Compliance with Safety Harnesses

i. Health and Safety Benefits

- ***Reduced Risk of Falls:*** *Workers using safety harnesses are at a significantly lower risk of falls, reducing the likelihood of severe injuries or fatalities.*
- ***Improved Long-term Health:*** *By preventing falls, safety harnesses help avoid long-term impairments, such as spinal injuries, fractures, and traumatic brain injuries.*

ii. Operational Benefits

- ***Enhanced Productivity:*** *With fewer injuries, workers experience less downtime and maintain higher productivity, as they don't need time off to recover.*
- ***Lower Accident Rates:*** *Compliance with safety standards results in fewer accidents, leading to smoother operations and timely project completion.*

iii. Legal and Financial Benefits

- ***Avoidance of Fines and Penalties:*** *Companies adhering to PPE standards can avoid fines and penalties from safety regulators.*
- ***Reduced Medical Costs:*** *Compliance helps minimize medical costs and liability claims associated with fall injuries.*
- ***Strengthened Reputation:*** *A strong safety record enhances a company's reputation, attracting clients and fostering a positive*

e. General Provisions for Safety Harnesses

Safety harnesses play a crucial role in preventing fall-related injuries by providing an additional layer of protection for workers at construction sites. These harnesses are designed to catch and support workers, reducing the risk of serious injuries and fatalities. This section outlines essential guidelines for selecting, wearing, and maintaining safety harnesses, ensuring they are used effectively to enhance overall site safety. By implementing the following provisions, construction sites can comply with Occupational Health and Safety (OHS) standards and create a safer working environment for all personnel:

i. When to Use Safety Harnesses

- ***Working at Heights:*** *Providing fall protection for workers operating at elevated levels such as scaffolding, ladders, roofs, and structural steel.*
- ***Bridge Construction:*** *Ensuring worker safety when working on bridge decks, under bridge structures, and at elevated heights.*
- ***Operating Cranes and Hoists:*** *Securing operators and workers to prevent falls.*

- ***High-Pressure Systems:*** *Providing fall protection during maintenance and inspection of high-pressure systems.*
- ***Demolition Activities:*** *Preventing falls during the demolition of high structures.*
- ***Installing and Maintaining Overhead Structures:*** *Ensuring safety when working on overhead installations.*
- ***Community and Environmental Responsibility:*** *Promoting a safe work environment and protecting workers from fall hazards.*
- ***Adverse Weather Conditions:*** *Providing additional security during high winds, rain, or other adverse weather conditions.*

ii. Where to Use Safety Harnesses

- ***Near Workstations:*** *Safety harnesses available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary safety harnesses to prevent falls and maintain safety.*
- ***When working on structural steel or high-rise buildings:*** *Safety harnesses on various levels for easy access.*
- ***During bridge construction:*** *Safety harnesses to ensure worker safety on bridge decks, under the bridge structure, and at elevated heights.*
- ***Operating or working near cranes and hoists:*** *Safety harnesses to support operator and worker safety.*
- ***While handling high-pressure systems:*** *Special safety harness points to prevent falls during maintenance and inspection.*
- ***On wet or uneven surfaces:*** *Stable safety harness facilities to prevent accidents.*
- ***In areas with low clearance:*** *Proper safety harness units to manage fall risks.*
- ***When installing or maintaining overhead structures:*** *Safety harnesses to prevent falls from elevated positions.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable safety harness units to support safety on the bridge surface.
  - **Under the Bridge Structure:** Safety harness facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring safety harness solutions to prevent water-related falls.
  - **Elevated Areas:** Stable and secure safety harness units for workers on elevated sections of the bridge.

iii. PPE Selection and Suitability

- *Safety harnesses should be selected based on specific site hazards and work environment.*
- *Compliance with international standards OR equivalent national Standards/Specifications should preferably be ensured (inapplicable cases) as finalized by the authorized Engineer in Charge of LGED.*

iv. Training and Awareness

- *Workers should be trained on the importance of fall protection and proper use of safety harnesses.*
- *Safety induction sessions should be conducted to educate workers about site-specific fall hazards.*

v. *Inspection and Maintenance*

- *Safety harnesses should be inspected daily for wear, damage, or defects, with replacements made for any that show signs of wear.*
- *Manufacturer guidelines for care and replacement should be followed.*

vi. *Distribution and Accessibility*

- *Safety harnesses should be provided to all workers before they enter areas with fall hazards.*
- *Availability at designated storage points for visitors and subcontractors should be ensured.*

vii. *Signage and Compliance*

- ***"Fall Protection Required"** signs should be posted in all designated zones.*
- *Compliance should be regularly monitored and enforced through supervisor checks and audits.*

viii. *When to Use Safety Harnesses*

- *Working at Heights*
  - ✓ **Construction Sites:** When working on scaffolding, roofs, or tall structures.
  - ✓ **Maintenance and Repairs:** While performing maintenance or repairs on elevated platforms or structures.
  - ✓ **Window Cleaning:** During the cleaning of windows on high-rise buildings.
- *Confined Spaces*
  - ✓ **Tanks and Silos:** Entering and working inside tanks, silos, or other confined spaces with limited access and egress.
  - ✓ **Underground Utilities:** Working in manholes, tunnels, or other underground utility spaces.
- *Emergency Situations*
  - ✓ **Rescue Operations:** During rescue operations to safely lower or raise individuals from heights or confined spaces.
  - ✓ **Evacuations:** In emergency evacuations where workers need to be safely extracted from elevated or hazardous areas.

ix. *Where to Use Safety Harnesses*

- *Construction Sites*
  - ✓ On scaffolding, ladders, and roofs.
  - ✓ When working on structural steel or high-rise buildings.

x. *Customization and Comfort*

- *Adjustments should be allowed for a secure and comfortable fit.*

- *Features such as padding for additional comfort should be provided.*

f. Standards/Specifications for Safety Harnesses

To maximize safety at construction sites, it is essential to adhere to stringent standards and specifications for safety harnesses. This section provides comprehensive guidelines on selecting, wearing, and maintaining safety harnesses to ensure optimal protection. Key considerations include the materials, design, and performance requirements of the safety harnesses. By following the standards and specifications illustrated below, construction sites can achieve compliance with Occupational Health and Safety (OHS) regulations and maintain a secure working environment for all personnel:

i. Impact Resistance

- *The impact force of a falling worker must be withstood by safety harnesses without tearing or breaking.*
- *The harness should distribute the impact force evenly across the body.*

ii. Material Requirements

- *High-strength Synthetic Fibers:*
  - ✓ **Material:** Polyester, Nylon, Kevlar
  - ✓ **Breaking Strength:** Minimum **22 kN** (kilonewtons)
  - ✓ **Abrasion Resistance:** Must withstand **1,000 cycles** of abrasion testing without significant wear
  - ✓ **UV Resistance:** Must retain at least **90%** of its original strength after **500 hours** of UV exposure
- *Steel or Aluminum Alloy:*
  - ✓ **Material:** Steel, Aluminum Alloy
  - ✓ **Tensile Strength:** Steel: Minimum **500 MPa** (megapascals), Aluminum Alloy: Minimum **310 MPa**
  - ✓ **Corrosion Resistance:** Must withstand exposure to salt spray for **96 hours** without signs of corrosion (per **ASTM B117** standard)
- *Padding Materials:*
  - ✓ **Material:** Foam Padding (Polyurethane, EVA foam)
  - ✓ **Density:** Minimum **50 kg/m³** (kilograms per cubic meter)
  - ✓ **Compression Set:** Must retain at least **80%** of its original thickness after **24 hours** under **50% compression**
- *Stitching Thread:*
  - ✓ **Material:** Polyester, Nylon
  - ✓ **Tensile Strength:** Minimum **40 N** (newtons)
  - ✓ **Stitch Count:** Minimum **6 stitches per inch**
- *Materials should be durable such as high-strength synthetic fibers, should be used.*
- *Safety harnesses should be resistant to UV radiation, chemicals, and abrasion.*

iii. Adjustment Mechanisms

- *Adjustable straps should be provided for a secure fit.*

- *Quick-release mechanisms should be included for easy deployment and removal.*

iv. *Reflective Features*

- *Reflective strips should preferably be included for visibility in low-light conditions (in applicable cases).*

v. *Attachments and Accessories Compatibility*

- *Safety harnesses should be compatible with additional PPE, such as lanyards and lifelines.*
- *Accessories should not compromise structural integrity.*

vi. *Temperature Resistance*

- *Safety harnesses should be effective in temperatures from -30°C to +60°C.*

vii. *Water and Chemical Resistance*

- *Safety harnesses should resist the absorption of water and chemicals.*

viii. *Equipment Marking and Identification*

- *Permanent markings indicating the manufacturer, standards compliance, and date of manufacture should be included.*

ix. *Durability Testing*

- ***Abrasion Resistance, Tensile Strength, and Impact Absorption:*** *Safety harnesses should pass tests for abrasion resistance, tensile strength, and impact absorption.*
- ***Integrity Maintenance:*** *The integrity of safety harnesses should be maintained after repeated use and exposure to hazards.*

x. *Service Life and Replacement*

- ***Regular Replacement:*** *Regular replacement of safety harnesses should be based on exposure to hazards and wear and tear.*
- ***Immediate Replacement:*** *Equipment exposed to significant impact should be replaced immediately.*

xi. *Emergency Provisions*

- ***Stocking at Emergency Points:*** *Safety harnesses should be stocked at emergency assembly points for immediate use during rescue or evacuation scenarios.*
- ***Spare Safety Harnesses:*** *Spare safety harnesses should be maintained for emergencies.*

xii. *Inspection Protocols*

- ***Weekly Visual Inspections:*** *Weekly visual inspections for signs of damage or wear should be conducted.*
- ***Advanced Tensile Testing:*** *Advanced tensile testing should be performed quarterly to assess material performance.*

xiii. *Lightweight Design*

- ***Lightweight Construction:*** *Safety harnesses should be lightweight to ensure prolonged use without causing fatigue.*

xiv. Environmental Sustainability

- ***Recyclable Materials:*** *Recyclable materials should be used to reduce environmental impact.*
- ***Supplier Partnerships:*** *Partnerships should be established with suppliers offering take-back or recycling programs.*

7.9.7 Foot and Leg Protection

Foot and leg protection PPE (Personal Protective Equipment) is essential to prevent injuries from falling objects, sharp materials, and other workplace hazards.

7.9.7.1 Examples of Hazards Requiring Foot and Leg Protection at Construction Worksite

- ***Working with Heavy Machinery:*** *Foot and leg protection is essential for workers operating heavy machinery to prevent injuries from falling objects and equipment.*
- ***Falling Debris:*** *Workers on construction sites often face the risk of falling objects such as bricks, tools, or building materials. Sturdy, protective footwear helps prevent injuries from these hazards.*
- *Sharp Objects: Construction sites can be littered with nails, screws, metal fragments, and other sharp objects. Proper footwear protects against puncture wounds and cuts.*
- ***Chemical Exposure:*** *Construction workers may encounter hazardous chemicals, such as cement, solvents, or adhesives. Chemical-resistant footwear helps protect against burns and irritations.*
- ***Slippery Surfaces:*** *Wet or uneven surfaces are common on construction sites, increasing the risk of slips and falls. Non-slip footwear provides better traction and stability.*
- ***Electric Shock:*** *Working near electrical equipment or exposed wiring poses a risk of electric shock. Electrically insulated footwear helps mitigate this danger.*
- ***Heavy Loads:*** *Construction workers often carry or move heavy materials, which can lead to foot and leg injuries if dropped. Protective boots with steel toes and metatarsal guards offer added protection.*

7.9.7.2 Examples of Foot and Leg Protection PPE

- ***Steel-toe Boots:*** *Provide protection against falling objects and compression with a minimum impact resistance of* ***200 Joules.***
- ***Metatarsal Guards:*** *Protect the upper part of the foot and the toes.*
- ***Puncture-resistant Soles:*** *Prevent injuries from sharp objects penetrating the sole with a minimum penetration resistance of* ***1,100 Newtons.***
- ***Leggings:*** *Provide additional protection for the legs against heat, sparks, and hazardous materials.*

7.9.7.3 Negative Impacts for Non-compliance of Foot and Leg Protection

a) **Health and Safety Impacts**

- ***Increased Risk of Injuries:*** *Workers without proper foot and leg protection are at a higher risk of injuries from falling objects, sharp materials, and hazardous substances.*
- ***Long-term Health Issues:*** *Injuries can result in long-term impairments, including fractures, puncture wounds, and chronic pain.*

b) Operational Impacts

- ***Reduced Productivity:*** *Injuries can lead to downtime and reduced productivity as workers may need time off to recover.*
- ***Higher Accident Rates:*** *Non-compliance can result in more frequent accidents, disrupting work schedules and causing project delays.*

c) Legal and Financial Impacts

- ***Fines and Penalties:*** *Companies may face fines and penalties from safety regulators for not adhering to PPE standards.*
- ***Increased Medical Costs:*** *Non-compliance can lead to higher medical costs and liability claims associated with foot and leg injuries.*
- ***Damage to Reputation:*** *A reputation for poor safety practices can deter clients and damage the company's image.*

7.9.7.4 Positive Impacts of Compliance with Foot and Leg Protection

a) Health and Safety Benefits

- ***Reduced Risk of Injuries:*** *Workers using proper foot and leg protection are at a significantly lower risk of injuries, reducing the likelihood of severe injuries or fatalities.*
- ***Improved Long-term Health:*** *By preventing injuries, foot and leg protection helps avoid long-term impairments, such as fractures, puncture wounds, and chronic pain.*

b) Operational Benefits

- ***Enhanced Productivity:*** *With fewer injuries, workers experience less downtime and maintain higher productivity, as they don't need time off to recover.*
- ***Lower Accident Rates:*** *Compliance with safety standards results in fewer accidents, leading to smoother operations and timely project completion.*

c) Legal and Financial Benefits

- ***Avoidance of Fines and Penalties:*** *Companies adhering to PPE standards can avoid fines and penalties from safety regulators.*
- ***Reduced Medical Costs:*** *Compliance helps minimize medical costs and liability claims associated with foot and leg injuries.*
- ***Strengthened Reputation:*** *A strong safety record enhances a company's reputation, attracting clients and fostering a positive image.*

7.9.7.5 General Provisions for Foot and Leg Protection

Foot and leg protection plays a crucial role in preventing injuries by providing an additional layer of protection for workers in hazardous environments. This section outlines essential guidelines for selecting, wearing, and maintaining foot and leg protection, ensuring they are used effectively to enhance overall site safety. By implementing the following provisions, worksites can comply with Occupational Health and Safety (OHS) standards and create a safer working environment for all personnel:

a) When to Use Foot and Leg Protection

- ***Working with Heavy Machinery:*** *To prevent injuries from falling objects and equipment.*

- ***Handling Sharp Materials:*** *To prevent puncture wounds and cuts.*
- ***Protects Against Hazards:*** *Such as falling debris, heavy equipment, and sharp objects.*
- ***Chemical Exposure:*** *Prevents burns and irritations from hazardous chemicals.*
- ***Slippery Surfaces:*** *Provides better traction and stability to prevent slips and falls.*
- ***Electrical Work:*** *Protects against electric shock from exposed wiring or electrical equipment.*
- ***Carrying Heavy Loads:*** *Offers protection against foot and leg injuries from dropped materials.*
- ***Bridge Construction Specific:***
  - **High-Wind Conditions:** Ensuring protection from wind-blown debris and materials.
  - **Height and Accessibility:** Providing stable and secure foot and leg protection at elevated sites.

b) Where to Use Foot and Leg Protection

- ***Near Workstations:*** *Foot and leg protection available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary foot and leg protection measures to prevent injuries.*
- ***When working on structural steel or high-rise buildings:*** *Protection on various levels for easy access.*
- ***During demolition work:*** *Foot and leg protection to guard against debris and hazardous materials.*
- ***Operating or working near heavy machinery and equipment:*** *Foot and leg protection to support safety.*
- ***While handling sharp materials:*** *Special protection points to prevent puncture wounds and cuts.*
- ***On wet or uneven surfaces:*** *Stable foot and leg protection facilities to prevent slips and falls.*
- ***In areas where hazardous chemicals are used or stored:*** *Proper protection units to prevent burns and irritations.*
- ***When carrying or moving heavy materials:*** *Foot and leg protection to avoid injuries from dropped objects.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable foot and leg protection units to support safety on the bridge surface.
  - **Under the Bridge Structure:** Protection facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring foot and leg protection solutions to prevent water-related injuries.
  - **Elevated Areas:** Stable and secure foot and leg protection units for workers on elevated sections of the bridge.

c) PPE Selection and Suitability

- *Foot and leg protection should be selected based on specific site hazards and work environment.*
- *Compliance with international standards, or national equivalent standards should preferably be ensured (in applicable cases) as finalized by the authorized Engineer in Charge of LGED.*

- *The brand and type of protective shoes/footwears shall be finalized by the OHS personnel/consultant (if any)/ concerned officials or supervising Engineers of LGED and contractor/representative;*
- *Contractor shall ensure the use of footwears by the laborers/employees concerned during the execution of related tasks;*
- *The laborers/employee concerned shall report/inform the immediate higher authority for any damage of footwears/ shoes immediately;*
- *The contractor shall ensure repair (if repairable)/ replacement of the damaged footwear within shortest possible time of being informed of the instance.*

d) Training and Awareness

- *Workers should be trained on the importance of foot and leg protection and proper use of PPE.*
- *Safety induction sessions should be conducted to educate workers about site-specific hazards.*

e) Inspection and Maintenance

- *Foot and leg protection should be inspected daily for wear, damage, or defects, with replacements made for any that show signs of wear.*
- *Manufacturer guidelines for care and replacement should be followed.*

f) Distribution and Accessibility

- *Foot and leg protection should be provided to all workers before they enter areas with hazards.*
- *Availability at designated storage points for visitors and subcontractors should be ensured.*

g) Signage and Compliance

- ***"Foot and Leg Protection Required"** signs should be posted in all designated zones.*
- *Compliance should be regularly monitored and enforced through supervisor checks and audits.*

h) Customization and Comfort

- *Adjustments should be allowed for a secure and comfortable fit.*
- *Features such as padding for additional comfort should be provided.*

7.9.7.6 Standards/Specifications for Foot and Leg Protection

To maximize safety at worksites, it is essential to adhere to stringent standards and specifications for foot and leg protection. This section provides comprehensive guidelines on selecting, wearing, and maintaining foot and leg protection to ensure optimal protection. Key considerations include the materials, design, and performance requirements of the PPE. By following the standards and specifications illustrated below, worksites can achieve compliance with Occupational Health and Safety (OHS) regulations and maintain a secure working environment for all personnel:

a) Impact, Compression and Other Resistance:

- *The following impact and compression standards should preferably be complied with for steel-toe boots:*

1. Impact Resistance

- ***Test Method:***
  - ✓ A **50-pound weight** shall be dropped from a height of **18 inches** onto the toe cap of the boot.
  - ✓ The test simulates the impact of heavy objects falling on the foot.
- **Performance Requirement:**
  - ✓ The toe cap shall withstand an impact **force of 75 foot-pounds** without causing injury to the foot.
  - ✓ After the test, the clearance under the toe cap shall be:
    - **0.500 inches (12.7 mm)** for men's footwear;
    - **0.468 inches (11.9 mm)** for women's footwear.

2. Compression Resistance

- **Test Method:**
  - ✓ A compressive force of up to **2,500 pounds** shall be applied to the toe cap.
  - ✓ The test simulates the pressure exerted by heavy loads or equipment.
- **Performance Requirement:**
  - ✓ The toe cap shall resist compression forces up to **2,500 pounds** without collapsing.
  - ✓ The clearance under the toe cap after testing shall meet the same requirements as for impact resistance:
    - **0.500 inches (12.7 mm)** for men's footwear;
    - **0.468 inches (11.9 mm)** for women's footwear.

3. Other Standards/Specifications (Optional)

- ✓ **Electrical Hazard (EH) Protection:** Footwear shall provide secondary protection against accidental contact with live electrical circuits up to **18,000 volts** under dry conditions.
- ✓ **Metatarsal Protection (Mt):** Metatarsal guards shall protect the upper foot from impacts of **75 foot-pounds**.
- ✓ **Conductive (Cd) Footwear:** Designed to discharge static electricity, with electrical resistance between **0 and 500,000 ohms**.

- *The impact force of falling objects must be withstood by foot and leg protection without breaking.*
- *The protection should distribute the impact force evenly across the foot and leg.*

b) **Puncture Resistance:**

- *Puncture-resistant soles must withstand a penetration force of **270 pounds (1200 newtons).***

c) **Chemical Resistance**

- *Chemical-resistant boots must withstand exposure to specific chemicals for a defined duration without degradation.*
- *Manufacturer guidelines for chemical compatibility and usage limits should be followed.*

d) **Slip Resistance**

- *Slip-resistant footwear must have outsoles designed to prevent slips and falls on wet or oily surfaces.*
- *Slip resistance testing standards should preferably be passed in applicable cases.*

e) **Material Requirements**

- ***High-strength Synthetic Fibers:***
  - **Material:** Polyester, Nylon, Kevlar
  - **Breaking Strength:** Minimum **22 kN (kilonewtons)**
  - **Abrasion Resistance:** Must withstand **1,000 cycles** of abrasion testing without significant wear
  - **UV Resistance:** Must retain at least **90%** of its original strength after **500 hours** of UV exposure
- ***Steel or Aluminum Alloy:***
  - **Material:** Steel, Aluminum Alloy
  - **Tensile Strength:** Steel: Minimum **500 MPa (megapascals)**, Aluminum Alloy: Minimum **310 MPa**
  - **Corrosion Resistance:** Preferably withstand exposure to salt spray for 96 hours without signs of corrosion (per ASTM B117 standard) in applicable cases.
- ***Padding Materials:***
  - **Material:** Foam Padding **(Polyurethane, EVA foam).**
  - **Density:** Minimum **50 kg/m³ (kilograms per cubic meter).**
  - **Compression Set:** Must retain **at least 80%** of its original thickness after **24 hours under 50% compression.**
- ***Stitching Thread:***
  - **Material:** Polyester, Nylon
  - **Tensile Strength:** Minimum **40 N (newtons)**
  - **Stitch Count:** Minimum **6 stitches per inch**
- ***Soles and Insoles:***
  - **Material:** Rubber, Polyurethane
  - **Slip Resistance:** Must meet the minimum coefficient of friction for slip resistance
  - **Oil and Chemical Resistance:** Must resist degradation when exposed to oils and chemicals
  - **Shock Absorption:** Must provide adequate cushioning to reduce impact on the feet.
- ***Toe Caps:***
  - **Material:** Steel, Composite Materials.

- **Impact Resistance:** Must withstand impacts of up to **200 joules.**
- **Compression Resistance:** Must withstand a minimum compression force of **15 kN.**

- ***Overall Durability:***
  - Materials should be durable and able to withstand harsh working conditions.
  - Foot and leg protection should be resistant to UV radiation, chemicals, and abrasion

f) Adjustment Mechanisms

- *Adjustable straps and laces should be provided for a secure fit.*
- *Quick-release mechanisms should be included for easy deployment and removal.*

g) Reflective Features

- *Reflective strips should be included for visibility in low-light conditions.*

h) Attachments and Accessories Compatibility

- *Foot and leg protection should be compatible with additional PPE, such as ankle supports and shin guards.*
- *Accessories should not compromise structural integrity.*

i) Temperature Resistance

- *Foot and leg protection PPE should be effective in temperatures from at least 0°C to +50°C preferably conforming to the Bangladeshi critical climatic conditions.*

j) Water and Chemical Resistance

- *Foot and leg protection should resist the absorption of water and chemicals.*

k) Equipment Marking and Identification

- *Permanent markings indicating the manufacturer, standards compliance, and date of manufacture should be included.*

l) Service Life and Replacement

- *Regular replacement of foot and leg protection should be based on exposure to hazards and wear and tear.*
- *Equipment exposed to significant impact should be replaced immediately.*

m) Emergency Provisions

- *Foot and leg protection should be stocked at emergency assembly points for immediate use during rescue or evacuation scenarios.*
- *Spare foot and leg protection should be maintained for emergencies.*

n) Inspection Protocols

- *Weekly visual inspections for signs of damage or wear should be conducted.*
- *Advanced tensile testing should preferably be performed quarterly to assess material performance in applicable cases.*

o) Lightweight Design

- *Lightweight Construction: Foot and leg protection should be lightweight to ensure prolonged use without causing fatigue.*

p) **Environmental Sustainability**

- *Recyclable materials should be used to reduce environmental impact.*
- *Partnerships should be established with suppliers offering take-back or recycling programs.*

7.9.8 Safety Vests and Other Safety Clothing

Safety vests and other safety clothing are crucial components of Personal Protective Equipment (PPE) at construction worksites. High-visibility vests, protective suits, and weather-resistant clothing provide essential protection against a variety of hazards, including visibility, impact, chemical exposure, and weather conditions. Implementing proper safety clothing protocols ensures worker safety, compliance with regulatory standards, and the smooth progress of construction activities.

7.9.8.1 Examples of Hazards Requiring Vests and Other Safety Clothing at Construction Worksites

- ***Low Visibility Conditions:*** *High-visibility vests are essential for workers in areas with low visibility, such as night work or foggy conditions.*
- ***Chemical Exposure:*** *Chemical-resistant clothing protects workers from hazardous chemicals and substances.*
- ***Extreme Temperatures:*** *Insulated clothing helps protect workers from extreme cold or heat conditions.*
- ***Fire Hazards:*** *Flame-resistant clothing is necessary for workers exposed to fire hazards or working with flammable materials.*
- ***Sharp Objects:*** *Cut-resistant clothing provides protection against cuts and abrasions from sharp objects.*
- ***Impact Protection:*** *Padded vests can help protect workers from impacts and blunt force trauma.*

7.9.8.2 Examples of Vests and Other Safety Clothing

- ***High-Visibility Vests:*** *Enhance visibility and reduce the risk of accidents in low visibility conditions.*
- ***Chemical-Resistant Clothing:*** *Protects against exposure to hazardous chemicals and substances.*
- ***Insulated Clothing:*** *Provides protection against extreme cold or heat conditions.*
- ***Flame-Resistant Clothing:*** *Protects against fire hazards and flammable materials.*
- ***Cut-Resistant Clothing:*** *Prevents injuries from cuts and abrasions.*
- ***Padded Vests:*** *Provide impact protection against blunt force trauma.*

7.9.8.3 Negative Impacts for Non-compliance of Vests and Other Safety Clothing

a) **Health and Safety Impacts**

- ***Increased Risk of Injuries:*** *Workers without proper safety clothing are at a higher risk of injuries from exposure to hazardous substances, extreme temperatures, and reduced visibility.*
- ***Long-term Health Issues:*** *Injuries can result in long-term impairments, including burns, chemical exposure, and chronic health conditions.*

b) **Operational Impacts**

- ***Reduced Productivity:*** *Injuries can lead to downtime and reduced productivity as workers may need time off to recover.*
- ***Higher Accident Rates:*** *Non-compliance can result in more frequent accidents, disrupting work schedules and causing project delays.*

c) **Legal and Financial Impacts**

- ***Fines and Penalties:*** *Companies may face fines and penalties from safety regulators for not adhering to PPE standards.*
- ***Increased Medical Costs:*** *Non-compliance can lead to higher medical costs and liability claims associated with injuries.*
- ***Damage to Reputation:*** *A reputation for poor safety practices can deter clients and damage the company's image.*

7.9.8.4 Positive Impacts of Compliance with Vests and Other Safety Clothing

a) **Health and Safety Benefits**

- ***Reduced Risk of Injuries:*** *Workers using proper safety clothing are at a significantly lower risk of injuries, reducing the likelihood of severe injuries or fatalities.*
- ***Improved Long-term Health:*** *By preventing injuries, safety clothing helps avoid long-term impairments, such as burns, chemical exposure, and chronic health conditions.*

b) **Operational Benefits**

- ***Enhanced Productivity:*** *With fewer injuries, workers experience less downtime and maintain higher productivity, as they don't need time off to recover.*
- ***Lower Accident Rates:*** *Compliance with safety standards results in fewer accidents, leading to smoother operations and timely project completion.*

c) **Legal and Financial Benefits**

- ***Avoidance of Fines and Penalties:*** *Companies adhering to PPE standards can avoid fines and penalties from safety regulators.*
- ***Reduced Medical Costs:*** *Compliance helps minimize medical costs and liability claims associated with injuries.*
- ***Strengthened Reputation:*** *A strong safety record enhances a company's reputation, attracting clients and fostering a positive image.*

7.9.8.5 General Provisions for Vests and Other Safety Clothing

Vests and other safety clothing play a crucial role in preventing injuries by providing an additional layer of protection for workers in hazardous environments. This section outlines essential guidelines for selecting, wearing, and maintaining vests and other safety clothing, ensuring they are used effectively to enhance overall site safety. By implementing the following provisions, worksites can comply with Occupational Health and Safety (OHS) standards and create a safer working environment for all personnel:

a) **When to Use Vests and Other Safety Clothing**

- ***High-Visibility Requirements:*** *Ensuring workers are easily seen in low-light or high-traffic areas.*

- ***Working with Heavy Machinery:*** *Enhancing visibility to prevent accidents with moving equipment.*
- ***Demolition Activities:*** *Providing protection from debris and hazardous materials.*
- ***Operating Cranes and Hoists:*** *Ensuring operators and workers are visible and safe.*
- ***High-Temperature Environments:*** *Protecting against heat and burns with specialized clothing.*
- ***Chemical Exposure:*** *Preventing skin contact with hazardous chemicals through protective clothing.*
- ***Extreme Weather Conditions:*** *Offering protection from rain, wind, and cold temperatures.*
- ***Community and Environmental Responsibility:*** *Promoting a safe work environment and protecting workers from hazards.*
- ***Bridge Construction Specific:***
  - **High-Wind Conditions:** Providing additional security and visibility during windy conditions.
  - **Height and Accessibility:** Ensuring visibility and protection at elevated construction sites.

b) Where to Use Vests and Other Safety Clothing

- ***Near Workstations:*** *Safety clothing available close to work areas for immediate use.*
- ***On scaffolding, ladders, and roofs:*** *Temporary safety clothing measures to maintain visibility and protection.*
- ***When working on structural steel or high-rise buildings:*** *Safety clothing on various levels for easy access.*
- ***During demolition work:*** *Vests and protective clothing to guard against debris and hazardous materials.*
- ***Operating or working near heavy machinery and equipment:*** *Safety clothing to support visibility and safety.*
- ***While handling hazardous materials:*** *Special protective clothing points to prevent skin contact and contamination.*
- ***On wet or uneven surfaces:*** *Stable safety clothing facilities to prevent slips and falls.*
- ***In areas with high-temperature environments:*** *Proper safety clothing units to manage heat and burns.*
- ***When carrying or moving heavy materials:*** *Vests and protective clothing to enhance visibility and prevent injuries.*
- ***Bridge Construction Specific:***
  - **On Bridge Decks:** Portable vests and safety clothing units to support visibility and protection on the bridge surface.
  - **Under the Bridge Structure:** Safety clothing facilities for workers handling foundational tasks.
  - **Near Water Bodies:** Ensuring vests and protective clothing solutions to prevent water-related injuries.
  - **Elevated Areas:** Stable and secure safety clothing units for workers on elevated sections of the bridge.

c) Laborers Should/Shouldn't Wear

- ***All laborers shall wear:***
  - Shirts with sleeves;
  - Long working pants;

- Overalls (in applicable cases) and
- Sturdy work shoes or boots when working at a construction/maintenance worksite;
- Clothing shall be conforming to the seasonal requirement like, light clothing during summer, considerably thick/ heavy clothing during cold etc.

- ***All laborers shall not wear***
  - Sleeveless Shirts
  - Tank top shirts;
  - Short pants;
  - Sweatpants;
  - Sneakers;
  - Sandals;
  - High-heeled shoes;
  - Open-toed shoes.

d) Safety Clothing Selection and Suitability for Construction Worksites

- ***Hazard Assessment***
  - Conduct a thorough assessment of the construction site to identify specific hazards that workers may face.
  - Evaluate risks such as low visibility, chemical exposure, extreme temperatures, and physical hazards (e.g., sharp objects, impact risks).
- ***Tailored Protection***
  - Select safety clothing specifically designed to address the identified hazards.
  - For visibility concerns, choose high-visibility vests.
  - For chemical exposure risks, select chemical-resistant clothing.
- ***Material Selection***
  - Choose materials that provide the necessary level of protection and comfort for workers.
  - High-visibility vests should be made of durable, reflective materials that enhance visibility in low-light conditions.
  - Chemical-resistant clothing should be made of materials that offer protection against specific chemicals used on the site.
- ***Proper Fit***
  - Ensure that safety clothing fits properly and does not impede movement.
  - Provide a range of sizes to accommodate different body types.

e) Training and Awareness

- *Workers should be trained on the importance of safety clothing, including proper fit and adjustment.*
- *Safety induction sessions should be conducted to educate workers about site-specific hazards requiring safety clothing.*

f) Inspection and Maintenance

- *Safety clothing should be inspected daily for wear, damage, or degradation, with replacements made for any that show signs of wear.*

- *Manufacturer guidelines for the care, cleaning, and replacement of safety clothing should be followed.*

g) **Distribution and Accessibility**

- *Safety clothing should be provided to all workers before they enter active construction zones.*
- *PPE should be readily available at designated storage points for visitors and subcontractors.*

h) **Signage and Compliance**

- ***"Safety Clothing Required"** signs should be posted prominently in all designated zones where safety clothing is mandatory.*
- *Compliance should be regularly monitored and enforced through supervisor checks and audits.*

i) **Customization and Comfort**

- *Adjustments should be allowed for a secure and comfortable fit.*
- *Features such as padding, ventilation, and moisture-wicking should be provided for additional comfort.*

j) **Environmental Factors**

- *Environmental factors such as weather conditions should be Considered when selecting safety clothing.*
- *In hot weather, lightweight, breathable materials should be chosen to prevent heat stress.*
- *In cold weather, insulated, wind-resistant clothing should be selected.*

7.9.8.6 Standards/Specifications

To ensure maximum protection and visibility at construction sites, adhering to strict standards and specifications for vests and other safety clothing is crucial. This section provides detailed guidelines on selecting, using, and maintaining these garments to guarantee optimal safety. Key considerations include the materials, design, and performance requirements to ensure that safety clothing meets regulatory standards. By complying with the following standards and specifications, construction sites can ensure compliance with Occupational Health and Safety (OHS) regulations and create a secure working environment for all personnel:

a) **General Standards**

- ***Safety Vests***
  - Safety vests shall be highly visible during the daytime, when there are low light conditions or at night;
  - The safety vest shall ensure the laborer stands out and is set apart from the background including heavy equipment, machinery, materials, motor vehicles.
  - Approved safety vest shall have Velcro (fastening consisting of two strips of nylon fabric, one having tiny hooked threads and the other a coarse surface, that form a strong bond when pressed together) or snap enclosures;
  - Laborers engaged in temporary traffic management generally use to work in all types of weather during all hours of the day. Therefore, visibility of vests shall be considered with top priority and considerations;

- The color of the vest shall be chosen as per prevailing provisions/ practices in LGED and recommendation of concerned LGED officials;
- Typically, the color of the safety vest shall preferably be a neon orange or yellow;
- Safety vest shall have reflective strips to catch headlights to aid visibility especially for those working at night;
- A laborer shall ensure proper caution while providing signals to any drive wearing the vest the driver approach the area;
- Safety vest shall ensure that the wearer shall feel that wearing the vest is a benefit and not a burden;
- The laborer/employee concerned that wear a vest shall be ensure that the cut allows for easy access to their sidearm, flashlight, and handcuffs;
- While carrying essential equipment and materials the shape of the vest shall accommodate necessary easement and comfort.

▪ ***Protective Clothing***

- Protective clothing shall include covering or replacing personal clothing of the laborer/protector;
- Protective clothing shall be designed to provide protection against one or more hazards.
- The design and comfort of the protective clothing shall be ensured;
- Protective clothing shall be complied with the following provisions:
  - *Remains in place during work;*
  - *Allows for movement and postures that the wearer could reasonably expect to adopt during their work;*
  - *Ensures full protection of the body (e.g. a requirement that a jacket should not rise above the waist, when arms are raised) of the laborer/user;*
  - *Shall not impair laborer's vision;*
  - *Shall not injure the wearer/laborer;*
  - *Shall be perfectly comfortable;*
  - *Shall not feature rough or sharp elements;*
  - *Shall not be so heavy or tight/loose that it restricts movement of the laborer/user;*
  - *Shall not adversely affect the health or hygiene of the laborer/user;*
  - *Shall not release toxic/cancer-causing/ allergic substances;*

b) Compliance with International Standards

▪ ***High-Visibility Clothing***

- Compliance with international standards (such as **ANSI/ISEA 107)** OR equivalent national Standards if available for high-visibility clothing should preferably be ensured in applicable cases as finalized by the authorized Engineer in Charge of LGED.
- Equivalent national standards relevant to construction worksites should be considered (if available and applicable).

- ***Chemical-Resistant Clothing***
  - Chemical-resistant clothing that meets relevant standards, such as those set by **ASTM International** (e.g., **ASTM F739** for permeation of liquids and gases through protective clothing materials OR equivalent national Standards/specifications if available), should preferably be selected (in applicable cases) as finalized by the authorized Engineer in Charge of LGED.
- ***Flame-Resistant Clothing***
  - Flame-resistant clothing that meets standards *(such as **NFPA 2112** Standard on Flame-Resistant Clothing for Protection of LGED/Department of Environment Personnel Against Flash Fire)* should preferably be selected in applicable cases for workers exposed to fire hazards as finalized by the authorized Engineer in Charge of LGED.
  - Temperatures **up to 500°C** must be withstood without ignition or melting.
- ***Cold and Heat Protection***
  - Insulated clothing for extreme temperature conditions should preferably comply with standards such as **EN 342** (Protective Clothing - Ensembles and Garments for Protection Against Cold) or equivalent national standards(if available and applicable) as finalized by the authorized Engineer in Charge of LGED.
  - Contractor shall ensure wearing/using fire resistant clothing for laborers working near welding equipment or other sources of sparks or heat;
  - In applicable cases, fire resistant/protective clothing shall be worn/used following the provisions of the Department of Fire Service and Civil Defense.

c) Weather Resistance

- *Weather-resistant clothing must provide insulation against temperatures ranging from **0°C to +50°C** (conforming to the prevailing worst weather conditions of the country).*
- *Clothing must be waterproof and windproof, with a minimum water resistance rating of **5,000 mm**.*

d) Material Requirements

- ***High-Visibility Materials***
  - **Material:** Reflective Tape, Fluorescent Fabrics **(Polyester, Nylon)**
  - **Reflective Properties:** The minimum retroreflective performance standards (e.g., **ANSI/ISEA 107** for high-visibility clothing) shall preferable be met inapplicable cases as finalized by the authorized Engineer in Charge of LGED.
  - **Color:** Fluorescent colors such as yellow-green, orange-red must be used for high visibility in daylight and low-light conditions.
  - **UV Resistance:** At least **90%** of its original visibility must be retained after **500 hours** of UV exposure.
- ***Chemical-Resistant Materials***
  - **Material:** Laminated Fabrics **(Polyethylene, Polypropylene, PVC)**

- **Chemical Resistance:** Exposure to specific hazardous chemicals used on the construction site (e.g., solvents, acids) must be withstood without degradation.
- **Permeation Testing:** Permeation tests for relevant chemicals as per **ASTM F739 OR equivalent national** standards shall preferably be performed if available in applicable cases as finalized by the authorized Engineer in Charge of LGED.

- ***Flame-Resistant Materials***
  - Material: Flame-Resistant Fabrics (**Nomex, Kevlar, Modacrylic**)
  - Flame Resistance: The minimum flame-resistance performance standards (e.g., **NFPA 2112** for protection against flash fire) preferably be met in applicable cases.
  - Heat Resistance: High temperatures must be withstood without melting or igniting.
- ***Insulating Materials***
  - **Material:** Insulated Fabrics (**Thinsulate, Fleece**)
  - **Thermal Insulation:** The minimum thermal insulation standards (e.g., **EN 342** or equivalent national standards if available for protection against cold environments) should preferably be met (in applicable cases) as finalized by the authorized Engineer in Charge of LGED.
  - **Breathability:** Moisture vapor should be allowed to escape to prevent overheating.
- ***Cut-Resistant Materials***
  - **Material:** High-Strength Fibers (Preferably **Kevlar, Dyneema, Spectra**)
  - Cut Resistance: The minimum cut resistance performance standards (e.g., **ASTM F2992** OR equivalent national standards if available for measuring cut resistance of materials) should preferably be met (in applicable cases) as finalized by the authorized Engineer in Charge of LGED.
  - Durability: Repeated abrasion and cuts must be withstood without significant wear.
- ***Padding Materials***
  - **Material:** Foam Padding (Preferably **Polyurethane, EVA foam**)
  - **Density:** Minimum **50 kg/m³** (kilograms per cubic meter)
  - **Compression Set:** At least **80%** of its original thickness must be retained after **24 hours** under **50%** compression.
- ***Stitching Thread***
  - Material: **Polyester, Nylon**
  - Tensile Strength: Minimum **40 N** (newtons)
  - Stitch Count: Minimum **6 stitches per inch**
- ***Overall Durability***
  - Material Durability: Materials should be durable and able to withstand harsh working conditions.
  - Resistance Properties: Safety vests and protective clothing should be resistant to UV radiation, chemicals, and abrasion.

- Compliance with Standards: All materials should comply with relevant standards to ensure adequate protection and safety.
- Materials should be flame-resistant, UV-resistant, and resistant to degradation from chemicals.

e) **Adjustment Mechanisms**

- *Adjustable straps, zippers, or closures should be provided for a secure fit.*
- *Quick-release mechanisms should be included for easy donning and doffing.*

f) **Reflective Features**

- *Reflective strips should be included for visibility in low-light conditions.*

g) **Attachments and Accessories Compatibility**

- *Safety clothing should be compatible with additional PPE, such as harnesses or tool belts.*
- *Accessories should not compromise the clothing's structural integrity or performance.*

h) **Temperature Resistance:**

- *Safety clothing should be effective in temperatures ranging from* ***0°C to +50°C****, suitable for extreme working environments conforming to the prevailing practice of LGED.*

i) **Water and Chemical Resistance**

- *Materials must resist absorption of water and chemicals, providing protection against liquid hazards.*

j) **Equipment Marking and Identification**

- *Each piece of safety clothing must include permanent markings indicating the manufacturer, standards compliance, and date of manufacture.*

k) **Service Life and Replacement**

- *Safety clothing should be regularly replaced based on exposure to hazards, wear and tear, and manufacturer recommendations.*
- *Clothing exposed to significant damage must be replaced immediately.*

l) **Ventilation Features**

- *Clothing with ventilation features should be provided to reduce heat buildup and improve comfort during prolonged use.*
- *Ventilation must not compromise the clothing's protection against hazards.*

m) **Emergency Provisions**

- *Safety clothing should be stocked at emergency assembly points for immediate use during rescue or evacuation scenarios.*
- *A supply of spare safety clothing should be maintained for emergencies.*

n) **Inspection Protocols**

- *Visual inspections of safety clothing should be conducted weekly for signs of damage or wear.*

- *Advanced methods such as chemical degradation testing should be used to assess material performance quarterly.*

o) Lightweight Design

- *Safety clothing should be lightweight to ensure prolonged use without causing fatigue.*

p) Environmental Sustainability

- *The use of recyclable materials in the manufacturing of safety clothing should be encouraged to reduce environmental impact.*
- *Partnerships should be established with suppliers offering take-back or recycling programs for old or damaged clothing.*

7.9.9 Key Obligations

7.9.9.1 LGED Authority Concerned

The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.9.9.2 Contractor Concerned

The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.6 Section:6).***

7.9.9.3 Laborer Concerned

The obligation of laborers concerned shall be as mentioned in the OHS `Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.8, Section:6).***

7.10 Covid-19 at Construction Worksite

7.10.1 General Provisions

COVID-19 has been a devastating pandemic throughout the world causing unusual death and damages irrespective of counties/ nations/societies. Although the emergency situation has been overcome at this moment but there is no certainty that it will not appear again. Therefore, the following general provisions shall be complied with at the worksite:

7.10.1.1 Washing Hands and Faces repeatedly

- *Washing with soap/disinfectants every now and then, especially:*
  - Hands Before eating anything;
  - Hands/Legs/Face:
  - Before meal (breakfast/launch/dinner);
  - After using Toilets/Urinals;
  - After handling any hazardous materials;
  - After working with any Chemicals;
  - After working with dusty construction materials like sand/cement etc.
- *Reuse of sweated out garment shall be avoided;*
- *Garments shall be cleaned washed regularly;*
- *A realistic cleanliness shall be maintained all the way during staying at the worksite;*
- *Ensure that no laborer affected by cold/cough/similar difficulties to facilitate COVID-19/similar diseases;*
- *If any laborer feels that he has symptoms like COVID-19/ CORONA, s(he) shall then and there inform the manager/ concerned employee to take necessary action;*
- *LGED officials concerned/responsible for supervision/ implementation of the worksite shall ensure necessary preventive measures through contractor/representatives.*

7.10.2 Standards/Specifications

Government of Bangladesh has introduced necessary Guidelines to face the crisis of COVID-19. LGED shall follow the guidelines conforming to the applicable provisions within its jurisdiction. The Guideline is "কর্মক্ষেত্রে কোভিড-১৯ প্রতিরোধ ও প্রতিকারে পেশাগত সুরক্ষা ও স্বাস্থ্য বিষয়ক নির্দেশিকা" । Other necessary provisions for pandemics like COVID-19 shall be followed as per government provisions applicable for construction worksites,

7.10.3 Key Obligations

7.10.3.1 LGED Authority Concerned

The obligation of LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.1,6.2,6.3.6.4 & 6.9, Section:6).***

7.10.3.2 Contractor Concerned

The obligation of Contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/ workplaces ***(Provisions of Sub-section: 6.6 Section:6).***

7.10.3.3 Laborer Concerned

The obligation of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.8, Section:6).***

8. NON-KPI IINDICATORS AS PER PREVAILING/NON-PREVAILING PRACTICE OF LGED

There are quite good numbers of indicators in the prevailing practice of LGED at the worksites as per decision and requirement of authority concerned including development partners. Here some indicators are illustrated those are integrated and needs to be practiced as per practical necessity. These indicators are not evaluated in determining the key OHS performances as per prevailing practice of LGED. These are as follows:

8.1 Lightning at Construction Worksite

Lightning during thunderstorms poses a significant risk to workers at construction sites. Proper safety measures and protocols are crucial to protect workers from lightning strikes, which can cause severe injuries or fatalities. Effective lightning safety practices ensure a safe work environment and compliance with health and safety regulations.

8.1.1 Examples of Lightning Hazards at Construction Worksite

- ***Direct Strikes:*** *Lightning directly striking a person or structure.*
- ***Ground Currents:*** *Electrical currents traveling through the ground after a lightning strike, posing risks to anyone in the vicinity.*
- ***Side Flashes:*** *Lightning jumping from a taller object to a nearby person or structure.*
- ***Conducted Currents:*** *Electrical currents traveling through conductive materials such as metal pipes, wiring, and fences.*
- ***Blast Waves:*** *The explosive force of a lightning strike, causing physical trauma or injuries from flying debris.*

8.1.2 Examples of Lightning Safety Measures

- ***Weather Monitoring:*** *Regularly monitoring weather forecasts and using lightning detection systems to stay informed about approaching thunderstorms.*
- ***Emergency Action Plan:*** *Developing and implementing an emergency action plan for lightning safety, including procedures for halting work and seeking shelter.*
- ***Safe Shelter:*** *Identifying and providing access to safe shelter areas, such as buildings with electrical and plumbing systems, fully enclosed vehicles, or designated lightning shelters.*
- ***Suspending Work:*** *Ceasing all outdoor work and activities at the first sign of lightning or thunder, and not resuming until 30 minutes after the last observed lightning or thunder.*
- ***Avoiding Conductive Materials:*** *Instructing workers to stay away from tall objects, metal structures, and conductive materials during thunderstorms.*
- ***Proper Training:*** *Providing workers with training on lightning safety, including recognizing warning signs and knowing the emergency procedures to follow.*

8.1.3 Negative Impacts of Poor Lightning Safety

8.1.3.1 Health and Safety Impacts

- ***Severe Injuries:*** *Poor lightning safety can lead to severe injuries such as burns, neurological damage, and cardiac arrest.*
- ***Fatalities:*** *Lightning strikes can be fatal, posing a significant risk to the lives of workers.*
- ***Trauma:*** *The explosive force of a lightning strike can cause physical trauma and injuries from flying debris.*

8.1.3.2 Operational Impacts

- ***Work Disruptions:*** *Lightning-related incidents can result in work stoppages and delays, affecting project timelines.*
- ***Increased Medical Costs:*** *Injuries related to lightning strikes can lead to costly medical treatments and rehabilitation.*

8.1.3.3 Legal and Financial Impacts

- ***Non-Compliance Penalties:*** *Failure to implement proper lightning safety measures can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate lightning safety can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*
- ***Increased Insurance Costs:*** *Companies that neglect lightning safety may face higher insurance premiums due to the increased risk of accidents and damages.*
- ***Legal Fees and Settlements:*** *Non-compliance can lead to expensive legal proceedings and settlements if employees or property are affected by lightning incidents.*
- ***Operational Disruptions:*** *Lightning incidents can cause work stoppages and reduce productivity, impacting the company's financial performance.*
- ***Worker Compensation Claims:*** *Financial compensation for injuries caused by lightning incidents can be a significant expense for companies.*

8.1.4 Positive Impacts for Compliance with Lightning Safety Standards

8.1.4.1 Health and Safety Impacts

- ***Reduced Risk of Injuries and Fatalities:*** *Proper lightning safety measures protect workers from the risks of lightning strikes, ensuring their safety and well-being.*
- ***Improved Emergency Preparedness:*** *Effective safety protocols enhance the ability to respond quickly and efficiently to thunderstorms, reducing the risk of harm.*

8.1.4.2 Operational Impacts

- ***Increased Efficiency:*** *A safer work environment promotes efficient work processes and minimizes disruptions caused by lightning-related incidents.*
- ***Cost Savings:*** *Proper lightning safety reduces the need for medical treatments and associated costs, as well as potential downtime.*

8.1.4.3 *Legal and Financial Impacts*

- ***Compliance with Regulations:*** *Adhering to lightning safety standards ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper lightning safety enhances the company's image and builds trust with clients, stakeholders, and the community.*

8.1.5 General Provisions

To ensure the safety of all laborers, personnel and other employees working at the worksites, the following general provisions shall be complied with at the worksite:

8.1.5.1 *Suspension of Work*

- *All outdoor work activities shall be suspended immediately when lightning is detected within a specified radius (e.g., 10 kilometers) of the worksite;*
- *Work shall only resume after a specified time (e.g., 30 minutes) has passed since the last lightning strike within the specified radius.*

8.1.5.2 *Safe Sheltering*

- *Designate safe shelter areas for workers to take refuge during thunderstorms;*
- *Safe shelters should be fully enclosed structures with plumbing and electrical wiring, such as site offices or vehicles.*

8.1.5.3 *Equipment and Machinery Safety*

- *Ensure all metal structures, machinery, and equipment are grounded to prevent lightning-induced electrical hazards;*
- *Disconnect and safely store electrical tools and equipment during thunderstorms.*

8.1.5.4 *Personal Safety Measures*

- *Educate workers on the dangers of lightning and proper safety protocols;*
- *Encourage workers to avoid open spaces, high ground, isolated trees, and conductive materials during thunderstorms.*

8.1.5.5 *Communication and Coordination*

- *Establish clear communication channels to inform all workers about lightning risks and necessary safety measures;*
- *Assign a designated safety officer responsible for monitoring weather conditions and coordinating emergency response actions.*

8.1.6 Standards/Specifications

The following standards/specifications shall be adhered to for managing lightning risks at construction worksites:

8.1.6.1 *Lightning Detection and Warning Systems*

- *Install and maintain lightning detection and warning systems at the worksite to provide real-time monitoring of lightning activity.*
- *Ensure the system covers a specified radius (e.g., 10 kilometers) around the worksite.*
- *Implement automated alerts to notify workers and supervisors when lightning is detected within the specified radius.*

8.1.6.2 Suspension of Work Activities

- *Establish clear protocols for the immediate suspension of all outdoor work activities upon detection of lightning within the specified radius.*
- *Define a safe period (e.g., 30 minutes) after the last detected lightning strike before resuming work.*
- *Ensure compliance with suspension protocols through regular drills and training sessions.*

8.1.6.3 Safe Sheltering and Evacuation

- *Identify and designate safe shelter areas for workers to take refuge during thunderstorms. These shelters should be fully enclosed structures with proper plumbing and electrical wiring.*
- *Ensure that all workers are aware of the location and capacity of designated shelters.*
- *Develop and implement evacuation plans for safely moving workers to shelters during thunderstorms.*

8.1.6.4 Equipment and Machinery Safety

- *Ground all metal structures, machinery, and equipment to prevent electrical hazards from lightning strikes.*
- *Disconnect and safely store electrical tools and equipment during thunderstorms to prevent damage and reduce fire hazards.*
- *Conduct regular inspections and maintenance of grounding systems to ensure their effectiveness.*

8.1.6.5 Worker/Laborer Education and Training

- *Provide regular training sessions to educate workers about the dangers of lightning and the importance of adhering to safety protocols.*
- *Distribute informational materials, such as posters and pamphlets, outlining safe practices during thunderstorms.*
- *Encourage workers to avoid open spaces, high ground, isolated trees, and conductive materials during thunderstorms.*

8.1.6.6 Communication and Coordination

- *Establish and maintain clear communication channels for informing all workers about lightning risks and necessary safety measures.*
- *Assign a designated safety officer responsible for monitoring weather conditions, issuing alerts, and coordinating emergency response actions.*
- *Conduct regular safety meetings to review and update lightning safety protocols based on feedback and observations.*

8.1.6.7 Compliance and Monitoring

- *Regularly audit the worksite to ensure compliance with lightning safety standards and guidelines.*
- *Document and report any incidents or near-misses related to lightning strikes to the relevant authorities.*
- *Continuously review and update lightning safety measures based on evolving best practices and technological advancements.*

By adhering to these standards/specifications, construction worksites can significantly reduce the risks associated with lightning and ensure the safety of all workers and equipment.

8.1.7 Key Obligations

8.1.7.1 LGED Authority Concerned

The obligations of the LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.1, 6.2, 6.3, 6.4 & 6.9, Section:6).***

8.1.7.2 Contractor Concerned

The obligations of the contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.6, Section:6).***

8.1.7.3 Laborer Concerned

The obligations of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.8, Section:6).***

These provisions ensure that all parties involved are aware of their responsibilities and take appropriate measures to protect workers from lightning hazards at construction worksites.

8.2 Temperature Extremes at Construction Worksite

Managing temperature extremes at construction sites is crucial to protect workers from heat-related illnesses and cold-related conditions. Effective temperature management practices ensure a safe work environment, enhance productivity, and comply with health and safety regulations.

8.2.1 Examples of Temperature Extremes at Construction Worksites

- ***High Temperatures:*** *Working in hot weather or environments with high ambient temperatures.*
- ***Low Temperatures:*** *Working in cold weather or environments with low ambient temperatures.*
- ***Heat Sources:*** *Exposure to heat from machinery, equipment, or processes.*
- ***Cold Sources:*** *Exposure to cold from environmental conditions or refrigeration units.*

8.2.2 Examples of Hazards Related to Temperature Extremes

- ***Heat-Related Illnesses:*** *Heat stress, heat exhaustion, heat cramps, and heatstroke due to prolonged exposure to high temperatures.*
- ***Cold-Related Conditions:*** *Frostbite, hypothermia, and cold stress due to prolonged exposure to low temperatures.*
- ***Dehydration:*** *Loss of fluids due to sweating in hot environments, leading to dehydration and related health issues.*
- ***Reduced Dexterity:*** *Loss of fine motor skills and dexterity in cold conditions, increasing the risk of accidents.*

8.2.3 Examples of Temperature Management Measures

- ***Hydration:*** *Encouraging workers to drink plenty of water and stay hydrated, especially in hot weather.*
- ***Rest Breaks:*** *Implementing regular rest breaks in shaded or warm areas to allow workers to recover from temperature extremes.*
- ***Protective Clothing:*** *Providing appropriate clothing for temperature extremes, such as lightweight, breathable fabrics for hot weather and insulated clothing for cold weather.*
- ***Environmental Controls:*** *Using fans, shade structures, and ventilation to reduce heat exposure, and heaters or windbreaks to protect against cold.*
- ***Acclimatization:*** *Gradually acclimatizing workers to extreme temperatures by progressively increasing exposure time.*
- ***Monitoring:*** *Continuously monitoring weather conditions and worker health to identify signs of heat or cold stress.*
- ***Emergency Procedures:*** *Developing and implementing emergency procedures for heat-related and cold-related conditions, including first aid and medical response.*

8.2.4 Negative Impacts of Poor Temperature Management

8.2.4.1 Health and Safety Impacts

- ***Heat-Related Illnesses:*** *Poor temperature management can lead to heat stress, heat exhaustion, heat cramps, and heatstroke, posing serious health risks.*
- ***Cold-Related Conditions:*** *Inadequate protection against cold can result in frostbite, hypothermia, and cold stress.*
- ***Dehydration:*** *Insufficient hydration can lead to dehydration and related health issues, affecting worker well-being.*
- ***Increased Accident Risks:*** *Extreme temperatures can impair judgment, dexterity, and reaction times, increasing the risk of accidents and injuries.*

8.2.4.2 Operational Impacts

- ***Decreased Productivity:*** *Health issues related to temperature extremes can result in absenteeism and decreased workforce productivity.*
- ***Higher Medical Costs:*** *Injuries and illnesses related to poor temperature management can lead to costly medical treatments and rehabilitation.*

8.2.4.3 Legal and Financial Impacts

- ***Non-Compliance Penalties:*** *Failure to implement proper temperature management measures can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate temperature management can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*
- ***Increased Operational Costs:*** *Poor temperature management can lead to higher energy consumption and equipment wear and tear, resulting in increased operational costs.*
- ***Loss of Revenue:*** *If products are damaged or spoiled due to improper temperature control, the company can face significant revenue losses.*
- ***Insurance Premiums:*** *Inadequate temperature management may lead to higher insurance premiums as the risk of claims increases.*

8.2.5 Positive Impacts for Compliance with Temperature Management Standards

8.2.5.1 Health and Safety Impacts

- ***Reduced Risk of Illnesses and Injuries:*** *Proper temperature management measures protect workers from heat-related illnesses and cold-related conditions, ensuring their safety and well-being.*
- ***Improved Comfort:*** *Effective temperature management enhances worker comfort and reduces the risk of dehydration and other health issues.*

8.2.5.2 Operational Impacts

- ***Increased Efficiency:*** *A safer and more comfortable work environment promotes efficient work processes and productivity.*
- ***Cost Savings:*** *Proper temperature management reduces the need for medical treatments and associated costs, as well as potential downtime.*

8.2.5.3 *Legal and Financial Impacts*

- ***Compliance with Regulations:*** *Adhering to temperature management standards ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper temperature management enhances the company's image and builds trust with clients, stakeholders, and the community.*
- ***Cost Savings:*** *Efficient temperature management can reduce energy consumption and maintenance costs, leading to significant cost savings.*
- ***Revenue Protection:*** *Proper temperature control helps prevent product spoilage and loss, protecting the company's revenue stream.*
- ***Risk Mitigation:*** *Effective temperature management reduces the risk of costly insurance claims and potential legal liabilities.*

8.2.6 General Provisions for Heat Extremes at Construction Worksite

To ensure the safety of all laborers, personnel, and other employees working at the worksites, the following general provisions shall be complied with at the worksite:

8.2.6.1 *When to Apply Temperature Management Measures at Construction Worksites*

- ***High Temperatures:***
  - During summer months or heatwaves.
  - When working in direct sunlight or enclosed spaces with poor ventilation.
  - When the Heat Index (a measure that combines air temperature and humidity) reaches hazardous levels.
- ***Low Temperatures:***
  - During winter months or cold snaps.
  - When working early in the morning or late at night when temperatures drop significantly.
  - When wind chill factors make the perceived temperature much colder.
- ***Heat Sources:***
  - When working near machinery, equipment, or processes that generate significant heat.
  - During activities like welding, cutting, or using heavy equipment.
- ***Cold Sources:***
  - When working near refrigeration units or in cold storage areas.
  - During tasks that require prolonged exposure to cold environments.

8.2.6.2 *Where to Apply Temperature Management Measures at Construction Worksites*

- ***Outdoor Work Areas:***
  - Construction sites exposed to varying weather conditions.
  - Areas where workers are directly exposed to the sun, wind, or precipitation.
- ***Enclosed or Partially Enclosed Workspaces:***
  - Tents, scaffolding, or temporary structures that may trap heat or cold.
  - Indoor spaces under construction without completed HVAC systems.
- ***High Heat Zones:***

- Areas near heavy machinery, boilers, or processes that generate heat.
- Locations where workers use tools or equipment that radiate heat.

- ***Cold Zones:***
  - Sites near refrigeration units or cold storage areas.
  - Construction areas exposed to cold drafts or high wind speeds.
- ***Break Areas:***
  - Designated areas where workers can rest and recover from temperature extremes.
  - Zones equipped with fans, shade structures, heaters, or windbreaks.

8.2.6.3 Work Adjustments

- *Work schedules should be modified to avoid the hottest or coldest parts of the day.*
- *Shorter work shifts and longer rest periods should be implemented during extreme temperature conditions..*

8.2.6.4 Hydration and Nutrition

- *Ample drinking water should be provided and regular hydration encouraged.*
- *Electrolyte-replenishing drinks and balanced meals should be supplied to maintain energy levels.*

8.2.6.5 Protective Clothing and Equipment

- ***HEAT:** Lightweight, breathable clothing and wide-brimmed hats should be provided for heat.*
- ***COLD:** Thermal clothing, gloves, and hats should be ensured for cold.*

8.2.6.6 Shelter and Rest Areas

- *Shaded or air-conditioned rest areas should be established for workers to cool down during breaks in hot weather.*
- *Heated shelters should be provided for workers to warm up during breaks in cold weather.*

8.2.6.7 Equipment and Machinery Safety

- *Equipment should be inspected and maintained to ensure suitability for operation in extreme temperatures.*
- *Machinery and tools that are designed to withstand temperature extremes should be used.*

8.2.6.8 Personal Safety Measures

- *Workers should be educated on the risks associated with extreme temperatures and proper safety protocols.*
- *Workers should be encouraged to recognize the signs and symptoms of heat and cold stress and to report any discomfort immediately.*

8.2.6.9 Communication and Coordination

- *Clear communication channels should be established to inform all workers about temperature-related risks and necessary safety measures.*

- *A designated safety officer should be assigned to monitor weather conditions and coordinate emergency response actions.*

8.2.7 Standards/Specifications for Managing Temperature Extremes

The following standards/specifications shall be complied with to manage the risks associated with temperature extremes at construction worksites:

8.2.7.1 Heat Management Standards

a. **Work Schedules and Breaks**

- Work schedules should be adjusted to avoid the peak heat hours (usually between **10 a.m. and 4 p.m.**).
- Mandatory breaks should be implemented in shaded or air-conditioned areas during extreme heat conditions (temperature exceeding **35°C/95°F**).

b. **Hydration and Nutrition**

- Access to an adequate supply of cool drinking water should be ensured, and workers should be encouraged to drink water every **15-20 minutes**.
- Electrolyte-replenishing drinks should be provided, and balanced meals should be made available.

c. **Protective Clothing**

- Lightweight, light-colored, and breathable clothing made of moisture-wicking materials should be supplied.
- The use of wide-brimmed hats and sunscreen with a minimum SPF 30 to protect against UV radiation should be encouraged.

d. **Cooling Measures**

- Misting fans, air-conditioned rest areas, and other cooling devices should be installed at the worksite.
- Workers/laborers should be encouraged to use personal cooling devices such as cooling towels or vests.

e. **Training and Education**

- Workers/laborers should be trained to recognize the symptoms of heat-related illnesses, such as heatstroke and heat exhaustion, and the steps to take if they or their coworkers are affected.
- Workers/laborers should be educated on the importance of hydration and proper nutrition during hot weather.

f. **Cold Management Standards**

- ***Work Schedules and Breaks***
  - Work schedules should be adjusted to avoid the coldest parts of the day (early morning and late evening, generally below **5°C/41°F**).
  - Mandatory breaks should be implemented in heated shelters during extreme cold conditions (temperature **below-0°C**).
- ***Protective Clothing***
  - Thermal clothing, insulated gloves, hats, and boots should be provided to protect against cold exposure.
  - Workers should have access to windproof and waterproof outer layers.
- ***Warming Measures***

- Heated shelters or rest areas where workers can warm up during breaks should be established.
- Access to warm beverages such as tea or hot chocolate should be provided to help maintain body temperature.

g. **Training and Education**

- Workers/laborers should be trained to recognize the symptoms of cold-related illnesses, such as hypothermia and frostbite, and the steps to take if they or their coworkers are affected.
- Workers/laborers should be educated on the importance of layering clothing and staying dry during cold weather.

8.2.7.2 Other Standards

a. **Monitoring and Communication**

- Weather conditions should be monitored regularly, and any extreme temperature warnings should be communicated to all workers.
- A designated safety officer responsible for monitoring temperature conditions and coordinating response actions should be assigned.

b. **Equipment and Machinery**

- Equipment should be inspected and maintained to ensure it can operate safely in extreme temperatures.
- Machinery and tools that are designed to withstand temperature extremes and prevent overheating or freezing should be used.

c. **Emergency Preparedness**

- Emergency action plans for dealing with temperature extremes should be developed and implemented, including procedures for evacuating workers to safe areas if necessary.
- First aid kits should be well-stocked, and trained personnel should be available to handle temperature-related emergencies.

These guidelines aim to protect workers from the hazards associated with temperature extremes and ensure a safe and productive working environment at construction sites.

8.2.8 Key Obligations

8.2.8.1 LGED Authority Concerned

The obligations of the LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.1, 6.2, 6.3, 6.4 & 6.9, Section:6).***

8.2.8.2 Contractor Concerned

The obligations of the contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.6, Section:6).***

8.2.8.3 Laborer Concerned

The obligations of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces ***(Provisions of Sub-section: 6.8, Section:6).***

These provisions ensure that all parties involved are aware of their responsibilities and take appropriate measures to protect workers from temperature extremes at construction worksites.

8.3 Soil and Ground Stability at Worksite

Ensuring soil and ground stability at construction sites is crucial to prevent ground subsidence, landslides, and structural failures. Proper soil and ground stability management practices ensure a safe work environment, protect workers, and comply with health and safety regulations.

8.3.1 Examples of Soil and Ground Stability Hazards at Construction Worksites

- ***Ground Subsidence:*** *The gradual sinking of the ground due to underground voids or the removal of soil.*
- ***Landslides:*** *The movement of a mass of earth or rock down a slope, posing risks to workers and structures.*
- ***Erosion:*** *The removal of soil by water or wind, leading to instability and loss of support for structures.*
- ***Soil Compaction:*** *The increase in soil density due to construction activities, affecting water drainage and root penetration.*
- ***Excavation Collapse:*** *The collapse of excavated trenches or pits, posing risks to workers within the excavation area.*

8.3.2 Examples of Soil and Ground Stability Management Measures

- ***Geotechnical Assessments:*** *Conducting geotechnical assessments to evaluate soil properties, ground conditions, and potential stability issues.*
- ***Soil Reinforcement:*** *Implementing soil reinforcement techniques such as soil nailing, grouting, and the use of geotextiles to enhance stability.*
- ***Erosion Control:*** *Implementing erosion control measures such as silt fences, erosion control blankets, and vegetation cover to prevent soil erosion.*
- ***Proper Excavation Practices:*** *Using safe excavation practices, including shoring, trench boxes, and sloping, to prevent excavation collapse.*
- ***Drainage Management:*** *Implementing effective drainage systems to manage surface and groundwater, reducing the risk of erosion and subsidence.*
- ***Monitoring:*** *Continuously monitoring soil and ground conditions to detect signs of instability and take corrective actions.*

8.3.3 Negative Impacts of Poor Soil and Ground Stability Management

8.3.3.1 Health and Safety Impacts

- ***Ground Subsidence:*** *Poor soil management can lead to ground subsidence, posing risks to workers and structures.*
- ***Landslides:*** *Inadequate stability measures can result in landslides, causing injuries and damage to property.*
- ***Excavation Collapse:*** *Failure to implement proper excavation practices can lead to trench or pit collapses, endangering workers.*

8.3.3.2 Operational Impacts

- ***Work Disruptions:*** *Soil and ground stability issues can result in work stoppages and delays, affecting project timelines.*
- ***Higher Remediation Costs:*** *Poor stability management can lead to costly remediation efforts to address ground subsidence and erosion.*

8.3.3.3 Legal and Financial Impacts

- ***Non-Compliance Penalties:*** *Failure to implement proper soil and ground stability measures can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate stability management can harm the company's reputation, affecting relationships with clients, stakeholders, and potential employees.*
- ***Increased Operational Costs:*** *Poor soil and ground stability management can lead to higher maintenance and repair costs, resulting in increased operational expenses.*
- ***Loss of Revenue:*** *If construction projects are delayed or compromised due to unstable soil conditions, the company can face significant revenue losses.*
- ***Insurance Premiums:*** *Inadequate stability management may lead to higher insurance premiums as the risk of claims increases.*

8.3.4 Positive Impacts for Compliance with Soil and Ground Stability Standards

8.3.4.1 Health and Safety Impacts

- ***Reduced Risk of Accidents:*** *Proper soil and ground stability measures protect workers from the risks of ground subsidence, landslides, and excavation collapse.*
- ***Improved Site Safety:*** *Effective stability management enhances overall site safety, reducing the risk of injuries and accidents.*

8.3.4.2 Operational Impacts

- ***Increased Efficiency:*** *A stable worksite promotes efficient work processes and minimizes disruptions caused by stability issues.*
- ***Cost Savings:*** *Proper soil and ground stability management reduces the need for remediation efforts and associated costs.*

8.3.4.3 Legal and Financial Impacts

- ***Compliance with Regulations:*** *Adhering to soil and ground stability standards ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper stability management enhances the company's image and builds trust with clients, stakeholders, and the community.*
- ***Cost Savings:*** *Efficient soil and ground stability management can reduce the need for expensive repairs and maintenance, leading to significant cost savings.*
- ***Revenue Protection:*** *Proper stability measures help prevent project delays and disruptions, protecting the company's revenue stream.*
- ***Risk Mitigation:*** *Effective stability management reduces the risk of costly insurance claims and potential legal liabilities.*

8.3.5 General Provisions for Soil and Ground Stability

To ensure the safety of all laborers, personnel, and other employees working at the worksites, the following general provisions shall be complied with at the worksite:

8.3.5.1 When to Apply OHS Measures for Soil and Ground Stability

- ***Initial Site Assessment:***
  - *Prior to the commencement of construction activities.*

- *When geotechnical surveys are conducted to evaluate soil composition, load-bearing capacity, and potential hazards.*

- ***Ground Preparation:***
  - *During soil compaction activities.*
  - *When installing geotextiles, geogrids, and other reinforcement materials.*
  - *While setting up effective drainage systems to control water flow and prevent erosion.*
- ***Excavation Activities:***
  - *Before, during, and after any excavation work.*
  - *When there are visible signs of ground movement, such as cracks, fissures, or soil settlement.*
- ***Protective Structure Installation:***
  - *During the design and installation of retaining walls, sheet piling, and ground anchors.*
  - *When performing regular inspections and maintenance of protective structures.*
- ***Equipment and Machinery Operation:***
  - *While operating machinery designed for unstable ground conditions.*
  - *During training sessions for equipment operators to recognize signs of ground instability.*
- ***Ongoing Monitoring and Communication:***
  - *Continuously throughout construction activities.*
  - *When monitoring soil and ground conditions using instruments such as inclinometers, piezometers, and settlement plates.*
  - *During regular safety meetings and communication updates.*
- ***Emergency Preparedness:***
  - *Prior to and during construction activities.*
  - *When updating and reviewing emergency action plans.*
  - *In the event of any ground instability incidents requiring emergency response.*

8.3.5.2 Where to Apply OHS Measures for Soil and Ground Stability

- ***Construction Worksites:***
  - *Across the entire construction site, especially areas with known soil and ground stability risks.*
- ***Excavation Sites:***
  - *Specific locations where excavation activities are taking place.*
  - *Areas prone to soil settlement, cracking, or ground movement.*
- ***Areas Requiring Protective Structures:***
  - *Locations where retaining walls, sheet piling, or ground anchors are needed to support unstable slopes and prevent soil movement.*
- ***Machinery and Equipment Zones:***
  - *Areas where heavy machinery and equipment designed for unstable ground conditions are operated.*
- ***Monitoring Stations:***
  - *Locations where soil and ground conditions are monitored using specialized instruments.*
  - *Designated areas for regular data recording and analysis.*

- ***Emergency Response Zones:***
  - *Designated safe areas for evacuation in case of soil and ground instability emergencies.*
  - *Locations where first aid kits and trained personnel are available to handle soil-related emergencies.*

8.3.5.3 Ground Stabilization Measures

- *Appropriate ground stabilization techniques such as compaction, dewatering, or the use of geotextiles should be implemented to enhance soil stability.*
- *Proper drainage systems should be ensured to prevent water accumulation and soil erosion.*

8.3.5.4 Excavation Safety

- *Safe excavation practices, including proper shoring, benching, and sloping of excavation sites, should be followed.*
- *Excavation sites should be inspected regularly to identify signs of ground movement or instability.*

8.3.5.5 Protective Structures

- *Protective structures such as retaining walls, sheet piling, or ground anchors should be installed to support unstable slopes and prevent soil movement.*
- *It should be ensured that protective structures are designed and installed by qualified professionals.*

8.3.5.6 Equipment and Machinery Safety

- *Specialized equipment designed for working on unstable ground conditions should be used.*
- *Machinery operators should be trained to recognize and respond to signs of ground instability.*

8.3.5.7 Personal Safety Measures

- *Workers should be educated on the risks associated with soil and ground instability and proper safety protocols.*
- *Personal protective equipment (PPE) such as hardhats, gloves, and safety boots should be provided.*

8.3.5.8 Communication and Coordination

- *Clear communication channels should be established to inform all workers about soil stability risks and necessary safety measures.*
- *A designated safety officer responsible for monitoring ground conditions and coordinating emergency response actions should be assigned.*

8.3.6 Standards/Specifications for Soil and Ground Stability

Proper management of soil and ground stability is critical to maintaining a safe and efficient construction worksite. Soil and ground instability can lead to significant hazards, including collapses, landslides, and erosion, which can pose serious risks to the safety and well-being of workers. By adhering to established standards and implementing best practices for soil and ground stability, construction sites can minimize these risks and ensure a secure and stable work environment.

The Standards/Specifications outlined below provide a comprehensive framework for assessing, stabilizing, and managing soil and ground

conditions at construction sites. These measures encompass a range of activities, from initial site assessments to ongoing monitoring and communication, to ensure that all potential hazards are identified and addressed promptly.

Key areas of focus include site assessment, ground stabilization, excavation safety, protective structures, equipment and machinery safety, personal safety measures, and communication and coordination. Each section bellow provides specific guidelines and actions that must be taken to maintain soil and ground stability and protect the health and safety of all personnel on the worksite:

8.3.6.1 Site Assessment Standards

- *Geotechnical surveys should be conducted to assess soil composition, load-bearing capacity, and potential hazards. Surveys should be conducted at a depth of at least **3 meters (10 feet)**.*
- *Detailed reports outlining soil conditions and recommended stabilization measures should be prepared, including **soil classification, bearing capacity in kPa (kilopascals), and groundwater level**.*

8.3.6.2 Ground Stabilization Standards

- *Compaction techniques such as rolling, tamping, or vibrating should be implemented to improve soil density and stability. A minimum density of **95% of the Standard Proctor Density** should be achieved.*
- *Geotextiles, geogrids, or other reinforcement materials should be used to enhance soil strength and prevent erosion. Materials should meet a minimum tensile strength of **200 kN/m (kilonewtons per meter)**.*
- *Effective drainage systems, including French drains, catch basins, and drainage pipes, should be installed to control water flow and prevent soil erosion. Drainage systems should have a minimum slope of **1%**.*

8.3.6.3 Excavation Safety Standards

- *Proper shoring, benching, and sloping practices as per OSHA guidelines should be followed to prevent excavation site collapse. For example, a slope of **1.5:1** (horizontal to vertical) for Type B soil should be maintained.*
- *Excavation sites should be inspected regularly to identify signs of ground movement, such as cracks, fissures, or soil settlement. Inspections should be conducted at least **twice daily**.*

8.3.6.4 Protective Structures Standards

- *Retaining walls, sheet piling, or ground anchors should be designed and installed based on geotechnical engineering recommendations. Retaining walls should be designed to withstand a lateral earth pressure of **30 kN/m² (kilonewtons per square meter)**.*
- *Protective structures should be regularly inspected and maintained to ensure their effectiveness. Inspections should occur **monthly**.*

8.3.6.5 Equipment and Machinery Standards

- *Equipment designed for stability and equipped with features such as wide tracks, stabilizers, and outriggers should be used. A minimum track width of **600 mm (24 inches)** should be ensured.*
- *Equipment operators should be trained to recognize ground instability signs, such as shifting soil, uneven ground, or sinking equipment. Training should be conducted **annually**.*

8.3.6.6 Personal Safety Measures

- *Appropriate PPE, including hardhats, gloves, and safety boots, should be provided to workers to protect against ground instability hazards. PPE should preferably comply with **EN 397** for hardhats and **EN ISO 20345** for safety boots or national standards if available and applicable.*
- *Workers should be trained to recognize the hazards related to soil instability at the worksite. Training sessions should be held **quarterly**.*

8.3.6.7 Monitoring and Communication Standards

- *Soil and ground conditions should be monitored regularly using instruments such as inclinometers, piezometers, and settlement plates. Data should be recorded **daily** and analyzed for any signs of instability.*
- *Clear communication channels should be established to inform all workers about soil stability risks and necessary safety measures. **Two-way radios** should be used for immediate communication.*
- *A designated safety officer responsible for monitoring ground conditions and coordinating emergency response actions should be assigned. The safety officer should be on-site at all times during construction activities.*

8.3.6.8 Emergency Preparedness Standards

- *Emergency action plans for dealing with soil and ground instability should be developed and implemented, including procedures for evacuating workers to safe areas if necessary. Plans should be reviewed and updated **annually**.*
- *First aid kits should be well-stocked, and trained personnel should be available to handle soil-related emergencies. First aid kits should preferably comply with **ANSI/ISEA Z308.1-2015 or national standards** if available and applicable.*

8.3.7 Key Obligations

8.3.7.1 LGED Authority Concerned

*The obligations of the LGED Authority concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.1, 6.2, 6.3, 6.4 & 6.9, Section:6)**.*

8.3.7.2 Contractor Concerned

*The obligations of the contractor concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.6, Section:6)**.*

8.3.7.3 Laborer Concerned

*The obligations of laborers concerned shall be as mentioned in the OHS Policy of LGED in complying with the OHS provisions at the worksite/workplaces **(Provisions of Sub-section: 6.8, Section:6)**.*

These provisions ensure that all parties involved are aware of their responsibilities and take appropriate measures to protect workers from soil instability related hazards.

8.4 Emergency Preparedness at Construction Worksites

Emergency preparedness at construction sites is crucial to ensure the safety of workers and minimize the impact of unexpected events. Effective emergency preparedness practices help prevent injuries, protect property, and ensure compliance with health and safety regulations.

8.4.1 Examples of Emergencies at Construction Worksites

- ***Fire:*** *Fires caused by flammable materials, electrical faults, or equipment malfunction.*
- ***Medical Emergencies:*** *Health incidents such as cardiac arrest, severe injuries, or allergic reactions.*
- ***Natural Disasters:*** *Events such as earthquakes, floods, storms, and extreme weather conditions.*
- ***Chemical Spills:*** *Accidental release of hazardous chemicals, posing risks to health and the environment.*
- ***Structural Failures:*** *Collapse of scaffolding, buildings, or other structures, endangering workers and equipment.*
- ***Utility Failures:*** *Power outages, gas leaks, or water supply disruptions affecting site operations.*

8.4.2 Examples of Emergency Preparedness Measures

- ***Emergency Action Plan:*** *Developing and implementing a comprehensive emergency action plan (EAP) that outlines procedures for different types of emergencies.*
- ***Training and Drills:*** *Providing regular training and conducting emergency drills to ensure that workers are familiar with emergency procedures and response actions.*
- ***Emergency Contacts:*** *Maintaining an updated list of emergency contacts, including local fire departments, medical services, and utility providers.*
- ***First Aid Facilities:*** *Ensuring the availability of well-equipped first aid kits and trained first aid personnel on-site.*
- ***Emergency Exits:*** *Clearly marking and maintaining emergency exits, ensuring they are accessible and free from obstructions.*
- ***Fire Safety Equipment:*** *Installing and maintaining fire extinguishers, fire alarms, and sprinkler systems at appropriate locations.*
- ***Communication Systems:*** *Implementing reliable communication systems, such as two-way radios and public address systems, to coordinate emergency response.*
- ***Assembly Points:*** *Designating safe assembly points where workers can gather during an evacuation.*

8.4.3 Negative Impacts of Poor Emergency Preparedness

8.4.3.1 Health and Safety Impacts

- ***Increased Risk of Injuries:*** *Poor emergency preparedness can lead to injuries or fatalities due to inadequate response during emergencies.*
- ***Delayed Medical Response:*** *Lack of proper planning and training can result in delays in providing medical assistance to injured workers.*

8.4.3.2 Operational Impacts

- ***Work Disruptions:*** *Emergencies can cause significant disruptions to site operations, leading to project delays and increased costs.*
- ***Property Damage:*** *Inadequate emergency preparedness can result in extensive property damage during events such as fires or structural failures.*

8.4.3.3 Legal and Financial Impacts

- ***Non-Compliance Penalties:*** *Failure to implement proper emergency preparedness measures can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate emergency preparedness can harm the company's reputation, affecting relationships with clients, stakeholders, and the community.*
- ***Operational Disruption:*** *Emergency situations can cause significant disruptions to daily operations, leading to prolonged downtime and lost revenue.*
- ***Increased Financial Costs:*** *The costs associated with emergencies can escalate quickly, including expenses for repairs, equipment replacement, relocation, legal fees, and public relations efforts.*
- ***Loss of Productivity and Efficiency:*** *Without proper emergency preparedness, employees may not be adequately trained to handle crises, resulting in reduced productivity and inefficient response measures.*
- ***Employee Safety and Well-being:*** *Neglecting emergency preparedness can put employees at risk, leading to potential costs related to medical expenses, workers' compensation claims, and higher turnover rates.*

8.4.4 Positive Impacts of Compliance with Emergency Preparedness Standards

8.4.4.1 Health and Safety Impacts

- ***Enhanced Safety and Well-being:*** *Comprehensive emergency preparedness ensures the safety and well-being of employees, reducing the risk of accidents and injuries.*
- ***Improved Medical Response:*** *Proper planning and training ensure timely medical assistance to injured workers, minimizing the impact of injuries.*

8.4.4.2 Operational Impacts

- ***Business Continuity:*** *By having a robust emergency plan, businesses can minimize disruptions and ensure continuity of operations, maintaining productivity and service delivery.*
- ***Property Protection:*** *Effective emergency preparedness can prevent or minimize property damage during events such as fires or structural failures.*

8.4.4.3 Legal and Financial Impacts

- ***Regulatory Compliance:*** *Adhering to emergency preparedness regulations and standards ensures legal compliance and avoids penalties.*
- ***Financial Savings:*** *Investing in preparedness can lead to long-term cost savings by preventing costly damages, reducing downtime, and avoiding hefty fines.*
- ***Reputation Boost:*** *A well-prepared organization gains trust and confidence from clients, stakeholders, and the community, enhancing its reputation and brand value.*

- ***Operational Efficiency:*** *Proper emergency preparedness ensures employees are adequately trained to handle crises, resulting in improved productivity and efficient response measures.*
- ***Employee Morale:*** *Knowing that their safety is a priority, employees feel valued and are more likely to be motivated and committed to their work.*
- ***Resilience and Adaptability:*** *Prepared organizations are better equipped to respond to and recover from emergencies, demonstrating resilience and adaptability in the face of challenges.*

8.4.5 General Provisions for Emergency Preparedness at Construction Worksites

Ensuring the safety and preparedness of construction worksites is crucial. The following general provisions outline the necessary measures to implement effective emergency preparedness and response plans:

8.4.5.1 Where Emergency Preparedness Provisions are Applicable in Construction Worksites

- ***Construction Sites in Urban Areas:*** *Emergency preparedness measures should be implemented to ensure the safety of workers and nearby residents in case of emergencies.*
- ***Construction Sites Near Natural Habitats:*** *Construction projects near forests, wetlands, or other natural habitats should include emergency plans to protect both workers and the environment.*
- ***Temporary Structures and Camps:*** *On-site temporary accommodations and structures should have emergency response plans in place to handle any incidents that may arise.*
- ***Excavation and Groundworks:*** *Areas where extensive digging and ground disturbance occur should have specific emergency plans to address potential hazards.*

8.4.5.2 When Emergency Preparedness Provisions are Applicable in Construction Worksites

- ***Site Assessment and Planning:*** *During initial site assessments and planning phases to identify potential emergency hazards and develop response plans.*
- ***Daily Operations:*** *Throughout daily construction activities, ensuring workers are prepared to respond to emergencies at any time.*
- ***Waste Management:*** *When managing waste materials, particularly hazardous waste, emergency plans should be in place to handle spills or other incidents.*
- ***Worker Training:*** *Providing regular safety training and education to workers about emergency response procedures and protocols.*
- ***Machinery and Equipment Use:*** *Ensuring that emergency procedures are in place when using construction machinery and equipment that may pose risks.*
- ***Environmental Regulations Compliance:*** *Ensuring compliance with environmental regulations related to emergency preparedness and response.*

8.4.5.3 Emergency Preparedness Plans and Suitability

- *Emergency response and evacuation plans should be developed and implemented based on specific site hazards and risks.*
- *Compliance with industry standards, such as OSHA regulations or equivalent national standards, must be ensured.*

8.4.5.4 Training and Awareness

- *Workers should be trained on emergency preparedness procedures, including evacuation, first aid, and emergency communication.*
- *Regular emergency drills and training sessions should be conducted to ensure workers are familiar with emergency procedures.*

8.4.5.5 Inspection and Maintenance

- *Emergency equipment, such as fire extinguishers, first aid kits, and communication systems, should be regularly inspected and maintained.*
- *Manufacturer guidelines for the care and replacement of emergency equipment and materials should be followed.*

8.4.5.6 Distribution and Accessibility

- *Access to emergency equipment and resources should be provided at all stages of the construction process.*
- *Emergency equipment and resources should be readily available and accessible to all workers, subcontractors, and visitors.*

8.4.5.7 Signage and Compliance:

- *"Emergency Procedures" signs should be posted prominently in all designated zones where emergency equipment is located.*
- *Compliance should be regularly monitored and enforced through supervisor checks and audits.*

8.4.5.8 Customization and Comfort:

- *Emergency preparedness measures should be customized to suit specific site conditions and requirements.*
- *Resources and support for workers to adopt emergency procedures comfortably and effectively should be provided.*

8.4.6 Standards/Specifications for Emergency Preparedness at Construction Worksites

Ensuring comprehensive emergency preparedness at construction worksites is essential for the safety and well-being of workers. The following standards and specifications outline the necessary measures to implement effective emergency response plans, evacuation procedures, communication systems, and more. By adhering to the following standards/specifications, construction sites can minimize the impact of emergencies and maintain smooth project operations while complying with regulatory requirements:

8.4.6.1 Emergency Response Plans

- *Comprehensive emergency response plans should be developed, including procedures for different types of emergencies.*
- *Plans must be regularly reviewed, updated, and communicated to all workers.*

8.4.6.2 Evacuation Plans

- *Clear and detailed evacuation plans, including designated evacuation routes and assembly points, should be developed.*
- *Evacuation plans must be regularly reviewed, updated, and communicated to all workers.*
- *Regular evacuation drills should be conducted to ensure workers are familiar with evacuation procedures.*

8.4.6.3 Emergency Communication Systems

- *Reliable emergency communication systems, such as alarms, public address systems, and two-way radios, should be implemented.*
- *Communication systems must be regularly tested, maintained, and accessible to all workers.*

8.4.6.4 First Aid and Medical Response

- *Well-stocked first aid kits and medical supplies should be provided at strategic locations throughout the worksite.*
- *Workers should be trained in first aid and CPR, with designated first aid responders on site.*
- *Protocols for contacting emergency medical services and transporting injured workers to medical facilities must be established.*

8.4.6.5 Emergency Drills and Training

- *Regular emergency drills and training sessions should be conducted to ensure workers are familiar with emergency procedures.*
- *The effectiveness of drills and training sessions must be evaluated, and necessary improvements to emergency plans should be made.*

8.4.6.6 Material Requirements

- *Emergency equipment and materials must be durable, reliable, and meet industry standards.*
- *Guidelines for the selection, use, and maintenance of emergency equipment and materials should be followed.*

8.4.6.7 Adjustment Mechanisms

- *Adjustable systems and technologies to optimize emergency response measures and efficiency should be implemented.*
- *Systems must be easily adapted to changing conditions and requirements.*

8.4.6.8 Reflective Features

- *Reflective materials should be included in emergency signage and equipment to improve visibility in low-light conditions.*

8.4.6.9 Attachments and Accessories Compatibility

- *Compatibility with additional emergency response technologies and practices must be ensured.*
- *Accessories should not compromise the performance or reliability of emergency equipment.*

8.4.6.10 Temperature Resistance

- *Emergency equipment and materials should be effective in a wide range of temperatures, suitable for various working environments.*

8.4.6.11 Water and Chemical Resistance

- *Emergency equipment and materials must be resistant to water and chemical exposure, enhancing durability and reliability.*

8.4.6.12 Equipment Marking and Identification:

- *Each piece of emergency equipment must include permanent markings indicating the manufacturer, standards compliance, and date of manufacture.*

8.4.6.13 Durability Testing:

- *Emergency equipment must pass tests for durability, reliability, and performance.*

- *Integrity and functionality must be maintained after repeated use and exposure to emergency conditions.*

8.4.6.14 Service Life and Replacement

- *Emergency equipment should be regularly replaced based on performance, reliability, and manufacturer recommendations.*
- *Equipment exposed to significant degradation or use must be replaced immediately.*

8.4.6.15 Emergency Provisions:

- *Emergency equipment and resources should be available for immediate use during emergencies.*
- *A supply of spare emergency equipment and materials for emergencies must be maintained.*

8.4.6.16 Inspection Protocols

- *Regular inspections of emergency equipment and resources should be conducted to ensure performance and compliance.*
- *Advanced methods such as emergency simulations and audits should be used to monitor emergency preparedness.*

8.4.6.17 Environmental Sustainability:

- *The use of environmentally friendly materials in the manufacturing of emergency equipment should be encouraged.*
- *Partnerships with suppliers offering take-back or recycling programs for old or damaged equipment should be established.*

By implementing these detailed provisions for emergency preparedness, construction worksites can ensure the safety and well-being of workers, minimize the impact of emergencies, and maintain smooth project operations while complying with regulatory standards.

8.5 Disaster Management at Construction Worksites

Disaster management at construction worksites is crucial for ensuring the safety and well-being of workers, minimizing the impact of disasters, and maintaining smooth project operations. Implementing proper disaster management protocols ensures compliance with regulatory standards, enhances worker confidence, and promotes a safe working environment. It is essential to prepare for, respond to, and recover from natural and man-made disasters. Effective disaster management practices as per following provisions and Standards/Specifications shall ensure the safety of workers, protect property, and minimize the impact of disasters on construction projects:

8.5.1 Examples of Disasters at Construction Sites

- ***Natural Disasters:*** *Earthquakes, floods, hurricanes, tornadoes, landslides, and extreme weather conditions.*
- ***Fires:*** *Fires caused by flammable materials, electrical faults, or equipment malfunction.*
- ***Chemical Spills:*** *Accidental release of hazardous chemicals, posing risks to health and the environment.*
- ***Structural Failures:*** *Collapse of scaffolding, buildings, or other structures, endangering workers and equipment.*
- ***Utility Failures:*** *Power outages, gas leaks, or water supply disruptions affecting site operations.*
- ***Terrorism and Vandalism:*** *Deliberate acts of violence or sabotage that pose risks to workers and property.*

8.5.2 Examples of Disaster Management Measures

- ***Risk Assessment:*** *Conducting thorough risk assessments to identify potential disaster scenarios and vulnerabilities at the construction site.*
- ***Disaster Preparedness Plan:*** *Developing and implementing a comprehensive disaster preparedness plan that outlines procedures for different types of disasters.*
- ***Training and Drills:*** *Providing regular training and conducting disaster drills to ensure that workers are familiar with disaster response procedures.*
- ***Emergency Communication:*** *Implementing reliable communication systems, such as two-way radios and public address systems, to coordinate disaster response and disseminate information.*
- ***Evacuation Procedures:*** *Establishing clear and well-marked evacuation routes and assembly points to facilitate safe evacuation during disasters.*
- ***Resource Allocation:*** *Ensuring the availability of necessary resources, such as first aid kits, fire extinguishers, emergency lighting, and backup power systems, to respond to disasters.*
- ***Coordination with Authorities:*** *Establishing communication and coordination with local emergency services, such as fire departments, medical services, and law enforcement agencies.*

8.5.3 Negative Impacts of Poor Disaster Management

8.5.3.1 Health and Safety Impacts

- ***Increased Risk of Injuries and Fatalities:*** *Poor disaster management can lead to injuries or fatalities due to inadequate response during disasters.*
- ***Delayed Medical Response:*** *Lack of proper planning and training can result in delays in providing medical assistance to injured workers.*

8.5.3.2 Operational Impacts

- ***Work Disruptions:*** *Disasters can cause significant disruptions to site operations, leading to project delays and increased costs.*
- ***Property Damage:*** *Inadequate disaster management can result in extensive property damage during events such as fires, floods, or structural failures.*

8.5.3.3 Legal and Financial Impacts

- ***Non-Compliance Penalties:*** *Failure to implement proper disaster management measures can result in fines and penalties from health and safety authorities.*
- ***Reputation Damage:*** *Inadequate disaster management can harm the company's reputation, affecting relationships with clients, stakeholders, and the community.*
- ***Operational Disruption:*** *Disasters can cause significant disruptions to daily operations, leading to prolonged downtime and lost revenue.*
- ***Increased Financial Costs:*** *The costs associated with disasters can escalate quickly, including expenses for repairs, equipment replacement, relocation, legal fees, and public relations efforts.*
- ***Loss of Productivity and Efficiency:*** *Without proper disaster management, employees may not be adequately trained to handle crises, resulting in reduced productivity and inefficient response measures.*
- ***Employee Safety and Well-being:*** *Neglecting disaster management can put employees at risk, leading to potential costs related to medical expenses, workers' compensation claims, and higher turnover rates.*
- ***Insurance Premiums:*** *Poor disaster management can lead to increased insurance premiums due to higher perceived risks by insurance companies.*
- ***Regulatory Fines:*** *Failure to comply with disaster management regulations can result in significant fines and legal fees.*

8.5.4 Positive Impacts for Compliance with Disaster Management Standards

8.5.4.1 Health and Safety Impacts

- ***Reduced Risk of Injuries and Fatalities:*** *Proper disaster management measures protect workers from injuries and fatalities during disasters.*
- ***Timely Medical Response:*** *Effective planning and training ensure quick and efficient medical assistance to injured workers.*

8.5.4.2 Operational Impacts

- ***Increased Efficiency:*** *A well-prepared worksite minimizes disruptions and ensures a swift response to disasters, promoting efficient work processes.*
- ***Property Protection:*** *Proper disaster management helps protect property and equipment from damage during disasters.*

8.5.4.3 Legal and Financial Impacts

- ***Compliance with Regulations:*** *Adhering to disaster management standards ensures compliance with health and safety regulations, avoiding legal issues.*
- ***Enhanced Reputation:*** *Demonstrating commitment to proper disaster management enhances the company's image and builds trust with clients, stakeholders, and the community.*
- ***Cost Savings:*** *Effective disaster management reduces the financial burden associated with disaster response, medical treatments, and property damage. It also helps avoid penalties and fines related to non-compliance with regulations.*
- ***Operational Continuity:*** *Proper disaster management ensures that business operations can continue with minimal disruption, preventing revenue loss.*
- ***Insurance Benefits:*** *Effective disaster management may lead to reduced insurance premiums due to lower perceived risks by insurance companies.*
- *Asset Protection: Implementing disaster management measures helps in protecting valuable assets and infrastructure from damage, preserving their value.*
- ***Investment Opportunities:*** *A strong disaster management plan can attract investors who value risk management and business continuity.*
- ***Employee Retention:*** *Ensuring the safety and well-being of employees through disaster management measures can reduce turnover rates and associated recruitment and training costs.*

8.5.5 General Provisions for Disaster Management at Construction Worksite

Ensuring comprehensive disaster management at construction worksites is crucial for safeguarding the lives of workers, protecting valuable assets, and maintaining uninterrupted operations. Proper disaster management involves thorough planning, training, and the implementation of effective measures to mitigate the risks associated with natural and man-made disasters. The General provisions outline the necessary steps to develop robust disaster management plans, ensure regulatory compliance, and foster a culture of safety and preparedness at construction sites. By adhering to he following provisions, construction worksites can minimize the impact of disasters, enhance resilience, and promote a safer working environment for all:

8.5.5.1 Where Disaster Management Provisions are Applicable in Construction Worksites

- ***Construction Sites in Urban Areas:*** *Disaster management measures should be implemented to protect workers, nearby residents, and infrastructure in case of disasters.*
- ***Construction Sites Near Natural Habitats:*** *Projects near forests, wetlands, or other natural habitats should include disaster management plans to protect both workers and the environment.*
- ***Temporary Structures and Camps:*** *On-site temporary accommodations and structures should have disaster response plans in place to handle any incidents that may arise.*
- ***Excavation and Groundworks:*** *Areas where extensive digging and ground disturbance occur should have specific disaster management plans to address potential hazards.*

- ***High-Risk Areas:*** *Construction sites located in areas prone to natural disasters (e.g., flood zones, earthquake-prone regions) should have enhanced disaster management measures.*

8.5.5.2 When Disaster Management Provisions are Applicable in Construction Worksites

- ***Site Assessment and Planning:*** *During initial site assessments and planning phases to identify potential disaster hazards and develop response plans.*
- ***Daily Operations:*** *Throughout daily construction activities, ensuring workers are prepared to respond to disasters at any time.*
- ***Waste Management:*** *When managing waste materials, particularly hazardous waste, disaster plans should be in place to handle spills or other incidents.*
- ***Worker Training:*** *Providing regular safety training and education to workers about disaster response procedures and protocols.*
- ***Machinery and Equipment Use:*** *Ensuring that disaster response procedures are in place when using construction machinery and equipment that may pose risks.*
- ***Environmental Regulations Compliance:*** *Ensuring compliance with environmental regulations related to disaster management and response.*
- ***Weather Monitoring:*** *Continuously monitoring weather conditions and other potential disaster indicators to ensure timely response and preparedness.*

8.5.5.3 Disaster Management Plans and Suitability:

- *Disaster response and evacuation plans should be developed and implemented based on specific site hazards and risks.*
- *Compliance with industry standards, such as OSHA regulations or equivalent national standards, must be ensured.*

8.5.5.4 Training and Awareness:

- *Workers should be trained on disaster management procedures, including evacuation, first aid, and disaster communication.*
- *Regular disaster drills and training sessions should be conducted to ensure workers are familiar with disaster procedures.*

8.5.5.5 Inspection and Maintenance:

- *Disaster equipment, such as fire extinguishers, first aid kits, and communication systems, should be regularly inspected and maintained.*
- *Manufacturer guidelines for the care and replacement of disaster equipment and materials should be followed.*

8.5.5.6 Distribution and Accessibility:

- *Access to disaster equipment and resources should be provided at all stages of the construction process.*
- *Disaster equipment and resources should be readily available and accessible to all workers, subcontractors, and visitors.*

8.5.5.7 Signage and Compliance:

- *"Disaster Procedures" signs should be posted prominently in all designated zones where disaster equipment is located.*
- *Compliance should be regularly monitored and enforced through supervisor checks and audits.*

8.5.5.8 Customization and Comfort:

- *Customization of disaster management measures to suit specific site conditions and requirements should be allowed.*
- *Resources and support should be provided for workers to adopt disaster procedures comfortably and effectively.*

8.5.6 Standards/Specifications for Disaster Management at Construction Worksites

Ensuring comprehensive disaster management at construction worksites is crucial for safeguarding the lives of workers, protecting valuable assets, and maintaining uninterrupted operations. Proper disaster management involves thorough planning, training, and the implementation of effective measures to mitigate the risks associated with natural and man-made disasters. The standards and specifications outlined the necessary steps to develop robust disaster management plans, ensure regulatory compliance, and foster a culture of safety and preparedness at construction sites. By adhering to the following standards, construction worksites can minimize the impact of disasters, enhance resilience, and promote a safer working environment for all:

8.5.6.1 Disaster Response Plans

- *Comprehensive disaster response plans should be developed, including procedures for different types of disasters.*
- *Plans must be regularly reviewed, updated, and communicated to all workers.*

8.5.6.2 Evacuation Plans

- *Clear and detailed evacuation plans, including designated evacuation routes and assembly points, should be developed.*
- *Evacuation plans must be regularly reviewed, updated, and communicated to all workers.*
- *Regular evacuation drills should be conducted to ensure workers are familiar with evacuation procedures.*

8.5.6.3 Disaster Communication Systems

- *Reliable disaster communication systems, such as alarms, public address systems, and two-way radios, should be implemented.*
- *Communication systems must be regularly tested, maintained, and accessible to all workers.*

8.5.6.4 First Aid and Medical Response

- *Well-stocked first aid kits and medical supplies should be provided at strategic locations throughout the worksite* ***(Threshold: every 50 meters).***
- *Workers should be trained in first aid and CPR, with designated first aid responders on site.*
- *Protocols for contacting emergency medical services and transporting injured workers to medical facilities must be established.*

8.5.6.5 Disaster Drills and Training

- *Regular disaster drills and training sessions should be conducted to ensure workers are familiar with disaster procedures* ***(Frequency: quarterly).***
- *The effectiveness of drills and training sessions must be evaluated, and necessary improvements to disaster plans should be made.*

8.5.6.6 Material Requirements

- *Disaster equipment and materials must be durable, reliable, and preferably meet industry standards (e.g., ISO 22301 or equivalent national standards) if available and applicable .*
- *Guidelines for the selection, use, and maintenance of disaster equipment and materials should be followed.*

8.5.6.7 Adjustment Mechanisms

- *Adjustable systems and technologies to optimize disaster response measures and efficiency should be implemented.*
- *Systems must be easily adapted to changing conditions and requirements.*

8.5.6.8 Reflective Features:

- *Reflective materials should be included in disaster signage and equipment to improve visibility in low-light conditions.*

8.5.6.9 Attachments and Accessories Compatibility

- *Compatibility with additional disaster response technologies and practices must be ensured.*
- *Accessories should not compromise the performance or reliability of disaster equipment.*

8.5.6.10 Temperature Resistance

- *Disaster equipment and materials should be effective in a wide range of temperatures, suitable for various working environments (Range: 0°C to 60°C).*

8.5.6.11 Water and Chemical Resistance

- *Disaster equipment and materials must be resistant to water and chemical exposure, enhancing durability and reliability.*

8.5.6.12 Equipment Marking and Identification

- *Each piece of disaster equipment must include permanent markings indicating the manufacturer, standards compliance, and date of manufacture.*

8.5.6.13 Durability Testing

- *Disaster equipment must pass tests for durability, reliability, and performance.*
- *Integrity and functionality must be maintained after repeated use and exposure to disaster conditions.*

8.5.6.14 Service Life and Replacement

- *Disaster equipment should be regularly replaced based on performance, reliability, and manufacturer recommendations (**Service Life: typically 5 years**).*
- *Equipment exposed to significant degradation or use must be replaced immediately.*

8.5.6.15 Emergency Provisions

- *Disaster equipment and resources should be available for immediate use during disasters.*
- *A supply of spare disaster equipment and materials for emergencies must be maintained.*

8.5.6.16 Inspection Protocols

- *Regular inspections of disaster equipment and resources should be conducted to ensure performance and compliance (Frequency: monthly).*
- *Advanced methods such as disaster simulations and audits should be used to monitor disaster preparedness.*

8.5.6.17 Environmental Sustainability

- *The use of environmentally friendly materials in the manufacturing of disaster equipment should be encouraged.*
- *Partnerships with suppliers offering take-back or recycling programs for old or damaged equipment should be established.*

By implementing these detailed provisions for disaster management, construction worksites can ensure the safety and well-being of workers, minimize the impact of disasters, and maintain smooth project operations while complying with regulatory standards.