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# JICA STANDARD SAFETY SPECIFICATION (JSSS)

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***ACKNOWLEDGEMENTS***

*JICA have referred to other publications during the preparation of this document and parts of such other publications have been used in the preparation hereof. JICA acknowledges and gives credit to these sources/publications which include:*

*1) Japanese Acts, Orders and Ordinances including:*

*Industrial Safety and Health Act*

*Order for Enforcement of Industrial Safety and Health Act*

*Ordinance on Industrial Safety and Health*

*Safety Ordinance for Cranes*

*Ordinance on Safety and Health of Work under High Pressure*

*Ordinance on Prevention of Anoxia, etc.*

*Ordinance on Prevention of Hazards Due to Dust*

*Explosives Control Act*

*Order for Enforcement of Explosives Control Act*

*Ordinance on Explosives Control*

*2) OSHA Standards as written in Code of Federal Regulation (29 CFR) and published by the Occupational Safety and Health Administration, U.S. Department of Labor.*

*3) Construction (Design and Management) Regulations 2015, published by the UK Health and Safety Executive.*

*4) Conditions of Contract for Construction for Building and Engineering Works Designed by The Employer (Multilateral Development Bank Harmonised Edition June 2010) published by Fédération Internationale des Ingénieurs-Conseils (FIDIC)*



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# JICA STANDARD SAFETY SPECIFICATION (JSSS)

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# CHAPTER 1: GENERAL REQUIREMENTS

## 1.1 SAFETY DECLARATION

1.1.1 Adopting the slogan "SAFETY FIRST", the Contractor shall proactively aim to achieve "Zero-Accident" by applying the highest achievable standards of health and safety management.

1.1.2 A Safety Declaration shall be submitted with the Bid, declaring the Bidder's commitments and obligations, in accordance with JSSS Annex 1.3 [*Additional Contractor Forms*], Form JSSS/BSD - Bidder's Safety Declaration.

## 1.2 GENERAL REFERENCE NOTES

1.2.1 For Definitions, abbreviations and standards contained in JSSS, refer to JSSS Annex 1.1 [*Definitions and Abbreviations*].

1.2.2 The following further general reference notes apply to the content of JSSS:

(1) References to "Bid" and "Contract" and to "Bidder" and "Contractor" shall be interchangeable according to the context of their use. "Bid" and "Bidder" shall become "Contract" and "Contractor" after the Contract Agreement has been executed.

(2) Any reference to "Safety" unless otherwise evident from the text shall also be construed as reference to "Health and Safety".

(3) Any reference to academic, educational or vocational qualification within this document, shall mean a valid qualification demonstrated by a certified true copy of a diploma, degree, or other official certification issued by an acknowledged educational institution of the Country or an equivalent alternative certification issued by an acknowledged educational institution of another country.

(4) Unless otherwise stated in JSSS, any reference in JSSS to the Site, shall also be deemed to include other places (if any) where the Contractor intends to execute or is executing the Works including for example offsite storage, fabrication and assembly areas and any other working areas outside the Site boundary.

(5) JSSS requires the provision of safety management services and facilities by the Contractor to Contractor's Personnel and unless otherwise stated this shall also be deemed to include the provision by the Contractor of the same services and facilities (including for example training, accident response, healthcare, records, reports, control of hazards and risks, use of Temporary Works, and the like) to any Subcontractors, suppliers and others for whom the Contractor is responsible including Employer's Personnel and all other persons that are entitled to be on the Site.

(6) Any reference in JSSS to "relevant authority" or "relevant authorities" shall mean one (1) or more legally constituted public authorities that own or have legal jurisdiction over the work or property concerned.

(7) JSSS shall form a part of the Contract for the Works and therefore the definitions contained in the Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer, Multilateral Development Bank Harmonised Edition June 2010, General Conditions together with the Particular Conditions Part A - Contract Data and Part B - Specific Provisions, as applied to that Contract, apply equally and are used in JSSS.

Unless specified otherwise or instructed by the Engineer, the issue of JSSS to be used for the Contract shall be that which is applicable at the Base Date.

## 1.3 INCORPORATION OF JSSS INTO THE CONTRACT

1.3.1 JSSS shall form a part of the Safety Specification which, in turn forms a part of the Specification. The Safety Specification shall have priority over the other parts of the Specification in respect

of health and safety matters. Within the Safety Specification, the Particular Safety Specification shall have priority over JSSS.

1.3.2 The Annexes to JSSS Chapter 1 [*General Requirements*] shall be read and construed as an integral part of JSSS.

## 1.4 COMPLIANCE WITH JSSS AND OTHER REGULATIONS

1.4.1 JSSS specifies the minimum health and safety requirements to be complied with by the Contractor.

1.4.2 JSSS shall not limit the Contractor's statutory or regulatory duties and responsibilities under the Laws of the Country and/or the specific health and safety requirements of the Contract.

1.4.3 The Contractor shall comply fully with the requirements of the Safety Specification.

1.4.4 If there are no or insufficient safety provisions in the Laws of the Country, in JSSS or in the Particular Safety Specification for the particular part of the Works, the Contractor shall propose suitable internationally acceptable safety regulations for the Engineer's consent.

1.4.5 Specified Standards

(1) Unless otherwise instructed by the Engineer, a reference to any standard (hereinafter deemed to include specified safety regulations or codes) shall mean a reference to the latest issued edition of that standard as at the Base Date.

(2) Standards specified in JSSS can be substituted with an equivalent alternative in the following manner:

(a) The Contractor submits a formal request with particulars to the Engineer; and

(b) The Engineer shall give such consent only if, in his opinion, the alternative is internationally acceptable and of an equivalent or higher standard than the standard or regulation specified in JSSS.

(3) Application of detailed parts of any standards specified in JSSS may be waived at the formal request of the Contractor, only if the Contractor justifies with supporting particulars that those detailed parts are not relevant to the Contract and the Engineer gives his consent to such Contractor's request.

(4) Where JSSS refers to the standards of other countries, such reference is only to the technical requirements contained in such standards and not to any related Laws or legal enforceability of any of those countries.

1.4.6 Where there is any reference to OSHA and unless otherwise evident from the text, the words "team leader", "supervisor", "supervision", "superintendent" and the like shall be collectively construed as reference to the appropriate member of the Contractor's Personnel. Any reference to the "safety and health manager of the Contractor" and the like shall be construed as reference to the HSO and "The construction plan and safety and health plan", shall be construed as the "Method Statement" and "Safety Plan", respectively.

1.4.7 If any ambiguity or discrepancy is found in or between the various Chapters of JSSS or any reference documents and JSSS, the Engineer shall issue any necessary clarification or instruction. For the purposes of interpretation:

(1) The requirements of JSSS Chapter 1 [*General Requirements*], shall prevail over the requirements of other Chapters of the document.

(2) JSSS Chapter 2 to Chapter 6 contain requirements which are of general application and the content of each shall apply to content of all others unless otherwise stated or unless the context is otherwise clear.

1.4.8 Unless otherwise stated in JSSS or in the Particular Safety Specification, the Contractor shall comply with the requirements of JSSS throughout the execution of the Works.

1.4.9 The Contractor shall fully inform his personnel, his Subcontractors, suppliers and consultants and all other parties who are associated with the Works of the existence, content, purpose and objectives of JSSS.

## 1.5 CONTRACTOR'S SAFETY MANAGEMENT SYSTEM

1.5.1 The Contractor shall institute a health and safety management system in accordance with ISO 45001.

1.5.2 Alternatively, the Contractor may institute his own safety management system and regularly conduct audits in accordance with JSSS 1.17 [*Compliance Monitoring and Auditing*].

1.5.3 The safety management system shall be proposed as a part of the Contractor's Safety Plans to the Engineer for his consent.

## 1.6 CHECKING AND VALIDATION OF SUBMISSIONS

1.6.1 The Contractor shall demonstrate that his internal procedures for checking and validation of all submissions properly function through written confirmation and signature of each of the Contractor's responsible personnel, including for example the Contractor's Representative, HSO, Temporary Works coordination, design and supervision staff and any independent checkers as appropriate. This requirement relates to all submissions for the safety, including Safety Plans, Method Statements, Temporary Works (such as drawings, designs and calculations) and of all supporting documents.

## 1.7 CONTRACTOR'S SAFETY PLANS

1.7.1 The Contractor shall prepare Safety Plans for the Works showing the Contractor's proposed health and safety management policies, systems and plans specifically prepared for all parts of the Works.

1.7.2 The Safety Plans shall set out or refer to all the health and safety requirements:

(1) That are stated in JSSS.

(2) That comply with the Contractor's health and safety obligations under the Laws of the Country and the Contract.

(3) That are necessary to effect and maintain a healthy and safe working environment for all Contractor's Personnel.

1.7.3 The Contractor shall be required to prepare and submit the Safety Plans principally at three (3) stages:

(1) Bid Stage Safety Plan (Outline Overall Safety Plan).

(2) Baseline Safety Plan (Updated Bid Stage Safety Plan).

(3) Particular Safety Plans (Separate plans if necessary for particular parts of the Works).

1.7.4 The Safety Plans shall ultimately provide an accurate and comprehensive description of the Contractor's arrangements to ensure that health and safety management is maintained at a high level.

1.7.5 Submission of any Safety Plan and inclusion in the Bid or Contract or any further submission to the Engineer, shall not place any limit upon the Contractor's obligations. Any additional requirements as determined by the Contract or consequent to instructions of the Engineer or by requirements at the Site, shall be complied with by the Contractor under his own responsibility.

1.7.6 Bid Stage Safety Plan:

(1) This shall be an outline plan, containing indicative content for all of the subjects listed in JSSS Annex 1.2 [*Content of Bid Stage Safety Plan*].

(2) The plan shall demonstrate that the Bidder has a clear understanding of the health and safety requirements for the Works and contain clear and sufficient detail of each item to

indicate the Bidder's intentions, so that this can be understood and properly evaluated.

1.7.7 Baseline Safety Plan

(1) This shall be submitted within twenty-eight (28) days after the Commencement Date and before commencing any work at the Site.

(2) This shall be an updated Safety Plan for the whole of the Works showing the Contractor's proposed health and safety management policies, systems and plans etc. specifically prepared for all parts of the Works.

(3) This shall be based upon the Bid Stage Safety Plan, further developed as necessary by the HSO to provide a comprehensive overall Safety Plan demonstrating the Contractor's intended compliance with the Contract.

(4) If, at any time, the Engineer gives notice to the Contractor that the Baseline Safety Plan fails (to the extent stated) to comply with the Contract or to be consistent with the Contractor's stated intentions, and that cannot be corrected by the issue of a Particular Safety Plan, the Contractor shall submit a revised Baseline Safety Plan to the Engineer in accordance with this Clause.

1.7.8 Particular Safety Plans

(1) These shall be prepared as necessary to suit changing circumstances or conditions at the Site, or following the issue of Method Statements, or where considered necessary by the HSO or when required by the Engineer.

1.7.9 Procedures for Submission and Review

(1) The Contractor shall submit the Baseline Safety Plan and the Particular Safety Plans showing details of the health and safety arrangements which the Contractor proposes to adopt for the execution of the Works or any part of the Works.

(2) The Contractor shall submit:

(a) The Baseline Safety Plan in accordance with JSSS 1.7.7 [*Baseline Safety Plan*]; and

(b) The Particular Safety Plans by the date fourteen (14) days prior to the commencement of each particular part of the Works where sufficient detail has not been included in the Baseline Safety Plan and/or within fourteen (14) days after the date of the Engineer's request.

(3) Requirements for response (if any) by the Engineer and any re-submission by the Contractor and, shall be as follows:

(a) The Engineer may review the Safety Plans and may give notice of non-compliance to the Contractor stating the extent to which the Safety Plan does not comply with the Contract. Within fourteen (14) days after receiving any such notice the Contractor shall rectify any non-compliance and resubmit to the Engineer; and

(b) If the Engineer gives no such notice of non-compliance for the original Baseline Safety Plan within twenty-one (21) days of the date of receipt or for original Particular Safety Plans and the resubmitted ones (either of the Baseline or Particular Safety Plan) within fourteen (14) days of receipt, the Contractor shall proceed in accordance with the Safety Plan subject to complying with his other obligations under the Contract.

1.7.10 The Contractor shall maintain records and make reports in accordance with JSSS and the applicable health and safety regulations, and further comply with any reasonable requests by the Engineer (if any).

1.7.11 Compliance with the Safety Plan and JSSS shall not relieve the Contractor from any duty,

obligation or responsibility under or in connection with the Contract.

1.7.12 The Contractor shall also consider the opinions of his workers in preparing Safety Plans or updated Safety Plans.

## 1.8 RISK ASSESSMENT

1.8.1 In performing risk assessments, the Contractor shall find and correct all potential risks and hazards primarily by trying to eliminate or reduce such risks and hazards through making feasible changes in working conditions rather than relying on PPE.

1.8.2 The Contractor shall fully inform Contractor's Personnel of hazards and risks on the Site.

1.8.3 The procedural flow of risk assessment shall be as follows.

(1) Identifying hazards.

(2) Evaluating risks.

(3) Determining measures of risk reduction or elimination.

1.8.4 The procedural flow for risk reduction measures shall be as follows with earlier listed items having higher priority:

(1) Removal of hazards such as eliminating dangerous methods of construction.

(2) Changing to a safer construction method and alternating to low risk processes, operations, materials or equipment.

(3) Engineering measures.

(4) Management measures including improving skills with additional training.

(5) Use of PPE.

## 1.9 CONTRACTOR'S METHOD STATEMENTS

1.9.1 The Contractor shall prepare Method Statements for all parts of the Works with details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works.

1.9.2 Method Statements shall be developed taking account of the results of risk assessment in accordance with JSSS 1.8 [*Risk Assessment*] and include details of all Permanent Works and Temporary Works with supporting documents such as:

(1) Studies, investigations and designs.

(2) Structural calculations and any other calculations.

(3) Specifications and technical details.

(4) Proposed construction procedure, sequence and method.

(5) Construction resources including superintendents, workers, Operation Leaders and Contractor's Equipment.

(6) Inspection and monitoring plan.

1.9.3 The Contractor shall demonstrate in the Method Statements that he has put internal procedures in place to encourage the systematic approach to performing the Works in an efficient, safe and environmentally compliant manner.

1.9.4 The Contractor shall submit Method Statements showing details of the arrangements and methods which the Contractor proposes to adopt for the execution of any part of the Works. Whenever the Engineer requires further information, the Contractor shall submit the required information within fourteen (14) days of the request.

1.9.5 Requirements for submission by Contractor and response (if any) by the Engineer to Method Statements, shall be as follows:

(1) The Engineer may review the Method Statements and may give notice of non-compliance to the Contractor stating the extent to which the Method Statements do not comply with the Contract. Within fourteen (14) days after receiving any such notice the Contractor shall rectify any non-compliance and resubmit to the Engineer.

(2) If the Engineer gives no such notice of non-compliance for the original Method Statement within twenty-one (21) days of the date of receipt or for the resubmitted within fourteen (14) days of receipt, the Contractor shall proceed in accordance with the Method Statement.

(3) The Contractor shall submit a revised Method Statement whenever required by the Engineer or when any previous Method Statement for any part of the Works is inconsistent with actual conditions or requirements prevailing at the Site.

(4) The Method Statement shall be revised as necessary by the Contractor or the HSO and each revision shall be submitted promptly to the Engineer.

## 1.10 ENGINEER'S SAFETY REPRESENTATIVE

1.10.1 The Engineer may delegate his power and authority to any of his assistants at the Site who shall act as the Engineer's health and safety representative for the purpose of complying with any health and safety obligations under JSSS.

1.10.2 The terms of the appointment shall be in accordance with GC 3.2 [*Delegation by the Engineer*].

1.10.3 Whenever the term "Engineer" is used in JSSS this shall be deemed to include the resident engineer or any other assistant of the Engineer if so appointed in accordance with the terms of their delegated authority.

## 1.11 SAFETY COMPLIANCE INSTRUCTIONS FROM THE ENGINEER

1.11.1 Without affecting or diminishing the Contractor's responsibility under GC 4.1 [*Contractor's General Obligations*] and to ensure the adequacy, stability and safety of all Site operations and of all methods of construction, the Engineer shall observe the Contractor's performance at the Site and if in his opinion the Contractor is failing or has failed to carry out any part of the Works in accordance with the Safety Plan or other health and safety requirements of the Contract, the Engineer may give notice and instruct the Contractor to take necessary corrective and preventive measures to comply with the Contract.

1.11.2 If any part of the Works is considered by the Engineer to pose a danger and which in his opinion could result in an accident, the Engineer may instruct the Contractor to suspend such part of the Works under GC 8.8 [*Suspension of Work*] until the Contractor has advised the Engineer of the proposed corrective and preventive measures, obtained the Engineer's consent and implemented such measures to ensure that such danger is eliminated.

1.11.3 If an accident has occurred, the Engineer may instruct the Contractor to suspend the Works or any part of the Works under GC 8.8 [*Suspension of Work*] and not allow work to recommence until such time as:

(1) All circumstances have been investigated and the cause of the accident has been established by the HSO.

(2) Corrective and preventive measures have been formulated by the HSO and proposed to the Engineer.

(3) The Engineer's consent has been obtained for such measures.

(4) The measures have been implemented to ensure that no such accident can reoccur.

1.11.4 The actions arising as above shall be deemed to be the responsibility of the Contractor irrespective of the issue of any action or instruction by the Engineer.

## 1.12 HEALTH AND SAFETY OFFICER AT THE SITE (HSO)

1.12.1 Requirements for the HSO:

(1) The Contractor shall assign the HSO at the Site on or before the Commencement Date who is capable to manage health and safety issues at the Site in accordance with JSSS and any other legal or contractual requirements.

(2) The Contractor shall ensure that the Contractor's Personnel respect instructions issued by HSO in the health and safety aspects.

(3) If the named person is for any reason unavailable or if the appointed person fails to act as HSO and is removed from the Site, the Contractor shall submit the name and particulars of a suitable and equally experienced and qualified replacement to the Engineer for his consent.

(4) The HSO shall be an employee of the Contractor or a specialist health and safety consultant and unless otherwise specified in the Particular Safety Specification, the HSO shall be assigned full time upon the Works.

(5) The Contractor shall not revoke the appointment of the HSO or appoint a replacement without the prior consent of the Engineer.

(6) The HSO shall, where possible, be fluent in the ruling language of the Contract and also the language for communications stated in the Contract as defined in GC 1.4 [*Law and Language*]. It is acceptable for the HSO to use a translator for either or both of these languages.

(7) The HSO shall possess appropriate educational qualification for such position and (if so required by the Laws of the Country) shall be licensed or registered in the Country and perform such duties as are legally mandated.

(8) Unless otherwise specified in the Particular Safety Specification, the HSO shall have minimum five (5) years' work experience in the construction industry of which minimum two (2) years shall be in health and safety management.

(9) The HSO shall be a person that the Contractor considers is qualified, experienced and able to perform the duties competently and his appointment shall be subject to receiving the consent of the Engineer.

1.12.2 Supporting Personnel

(1) The Contractor shall also appoint such further supporting personnel as the HSO may from time to time deem necessary or as may be instructed by the Engineer, to permit the HSO to perform his duties.

(2) Such further supporting personnel may include Operation Leaders and/or other senior specialist and qualified Contractor's Personnel.

(3) Irrespective of any such appointment the HSO shall remain singularly responsible for the actions of such supporting personnel in terms of health and safety management.

(4) Any reference in JSSS to the HSO performing inspections or the like for the health and safety aspects of any parts of the Works, shall be understood to include any inspections performed by any of these supporting personnel on behalf of the HSO and for which the HSO shall remain responsible.

(5) The HSO shall prepare an internal procedure for the management of his supporting personnel, to ensure that:

(a) Supporting personnel are made aware of the requirements for any inspection and the details thereof;

(b) Supporting personnel immediately advise the HSO of any unsafe conditions with recommendations to prohibit the start or to stop or to change safety practices for

the particular work; and

(c) Communications and submissions between HSO and supporting personnel are efficient, timely and clear.

Following implementation and compliance with the above procedure, the HSO shall sign all inspection records as if the inspection has been carried out by the HSO.

(6) Where the Works or any part of the Works is to be performed in shifts or in excess of normal working hours, or over an extensive working area or where major works are being undertaken simultaneously, or like circumstances, the Contractor shall appoint additional qualified supporting personnel for the HSO all as necessary to ensure that the HSO is always able to perform his duties efficiently and effectively and so that health and safety management is not adversely affected.

1.12.3 Inspections

(1) The HSO shall be responsible for ensuring:

(a) That all working areas are inspected on a regular basis (at least once every working day or as otherwise required by JSSS) to detect if any unsafe practices, works or conditions exist and that all required safety measures are in place;

(b) That if such unsafe practices, works or conditions are found to exist, then to immediately issue instructions to all affected persons and immediately implement corrective measures in cooperation with such personnel or if this is not possible then to temporarily stop all construction activity on that part of the Works until such corrective action has been taken; and

(c) That all inspection requirements of JSSS are complied with including the requirements of JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*].

(2) Any site inspections attended by the HSO, may also include the attendance of the Engineer at the option of the Engineer.

## 1.13 HSO - SCOPE OF DUTIES AND AUTHORITY

1.13.1 The HSO shall devote his full time and attention to maintaining health and safety upon the Works and protecting against accidents.

1.13.2 The particular scope of duties and authority of the HSO shall cover (but shall not be limited to) the following:

(1) Preparation and submission of Safety Plans, implementation, evaluation, improvement and revision thereof.

(2) Preparation of monthly schedule of health and safety management activities, informing the Contractor's Personnel.

(3) Regular (daily) inspections of the Works at the Site to ensure the Contractor's compliance with the Safety Plan.

(4) Temporarily stopping the Works or any part of the Works following any accident or where the HSO considers it unsafe to continue or where there is unsafe behaviour or practices of the Contractor's Personnel or any non-compliance with the Safety Plan.

(5) Temporarily stopping the Works or any part of the Works where the Engineer so instructs in accordance with JSSS 1.11 [*Safety Compliance Instructions from the Engineer*].

(6) Investigating accidents, establishing cause, formulating and implementing preventive measures to avoid risk and prevent reoccurrence.

(7) Preparing proposals, reporting and consulting with the Engineer, especially when an accident occurs or any risk or hazardous situation is likely.

(8) Instructing Operation Leaders in the health and safety aspects of their work including requirements for inspection and confirmation of results to HSO.

(9) Instructing the Contractor's Personnel to take improvement measures for maintaining health and safety and preventing accidents.

(10) Assisting with the selection and assignment of workers and other Contractor's Personnel, including ascertaining the physical and mental health, age and capability in consideration of the nature of work to be carried out.

(11) Planning and implementation of various training and education implementation plans.

(12) Creating and implementing procedures for monitoring and maintaining accident and safety statistics, including fatalities, lost time records and near-miss cases.

(13) Preparing regular internal and external reports on health and safety activities.

(14) Hazard prediction activity.

## 1.14 PROCEDURE FOR RESUMING THE WORKS

1.14.1 If the Engineer has issued an instruction under JSSS 1.11 [*Safety Compliance Instructions from the Engineer*] or if the HSO has temporarily stopped the Works or any part of the Works in accordance with JSSS 1.13.2 (4), then, unless otherwise instructed by the Engineer, the procedure for resuming the Works or any part of the Works, shall be as follows:

(1) The Contractor (represented by the HSO) shall investigate and establish the cause, formulate preventive measures to ensure that the risk is avoided and accident cannot occur/reoccur.

(2) The Contractor (represented by the HSO), shall prepare and submit his proposal describing the investigation, cause and preventive measures to the Engineer.

(3) The Engineer shall review the Contractor's proposal and may give notice of non-compliance to the Contractor stating the extent to which the proposal does not comply with the Contract. Within seven (7) days after receiving any such notice the Contractor shall rectify such non-compliance and resubmit to the Engineer.

(4) If the Engineer gives no such notice of non-compliance for the original proposal within seven (7) days of the date of receipt or for the resubmitted proposal within seven (7) days of receipt, the Contractor shall resume the Works or part thereof in accordance with the proposal by giving a prior notice in writing of the resumption date.

To be proactive, the Engineer may give consent at any stage within the above stated time scales.

(5) The Contractor resumes the Works or part of the Works on the due date.

(6) The Contractor verifies the effectiveness of the preventive measures and informs the Engineer.

(7) The Contractor carries out a risk assessment and revises the Safety Plan and Method Statements as necessary.

## 1.15 CONTRACTOR'S SAFETY MANAGEMENT ACTIVITIES

1.15.1 The Contractor shall faithfully implement the Safety Plan performing all necessary management activities to ensure total compliance.

1.15.2 In addition to the tasks of the HSO described above, the Contractor's health and safety management activities shall include (but are not limited to):

(1) Overall Safety Management Activities:

(a) Instruction on safety matters in the Toolbox Meetings (TBM);

(b) Pre-work meetings, pre-start meetings, schedule meetings and other internal meetings; and

(c) Monitoring the implementation of the Safety Plan.

(2) Daily Safety Management of Contractor's Personnel:

(a) Instruction and management on health and safety at general morning meetings, pre-work meetings, TBM;

(b) Providing specific advice and instructions to all Contractor's Personnel on their assigned work tasks in advance of starting so that all workers are aware of the requirements of the Method Statements and Safety Plan including work place, scope, methods, PPE, timing and safety procedures;

(c) Instruction and management of traditional Japanese cleanliness safety campaigns known in Japan as:

5S ACTIVITIES where: Seiri = sorting, Seiton = tidying, Seiso = cleaning, Seiketsu = cleanliness and Shituke = discipline;

(d) Instruction and management of safety education and training;

(e) Instruction and management of all safety measures; and

(f) Site Safety Inspections.

## 1.16 JOINT SITE SAFETY INSPECTIONS

1.16.1 In addition to the HSO's own daily Site Safety Inspections, the HSO shall conduct regular Joint Site Safety Inspections with the Engineer. Respective safety staff may also attend.

1.16.2 Frequency of Joint Site Safety Inspections shall be at least once a week.

1.16.3 Where any safety risks are detected during the inspections, the Contractor shall take immediate action.

1.16.4 The Engineer may be invited or may choose to participate in the Contractor's daily site safety inspections which will then be deemed to be a Joint Site Safety Inspection.

1.16.5 The Contractor shall prepare a report of each Joint Site Safety Inspection and submit this to the Engineer within seven (7) days after the inspection. A further copy shall be included in the Contractor's monthly progress report.

## 1.17 COMPLIANCE MONITORING AND AUDITING

1.17.1 The HSO shall develop and implement systems to ensure that compliance with the Safety Plan is ensured. Such compliance shall be monitored efficiently and transparently at all times, for which purpose the Contractor shall:

(1) Create checklists for monitoring.

(2) Carry out regular and random inspections.

(3) Analyse unsafe or non-compliant conditions and determine the effective measures in ensuring safety and minimising accidents.

(4) Create storage and filing systems for the monitoring records.

(5) Copy safety information to the Engineer as may be necessary for the Engineer's file if so requested by the Engineer.

1.17.2 Safety inspections are intended to search for risks and hazards which present a threat to safe working.

1.17.3 The Contractor shall also carry out regular health and safety audits, to ascertain if the Contractor's Safety Plan and health and safety management systems are working by focussing

basically on the following five questions:

(1) Does the Safety Plan cover all regulatory and construction industry best practice requirements?

(2) Are the Safety Plan requirements being met?

(3) Is there documented proof of compliance?

(4) Is health and safety training effective?

(5) Is the Contractor's health and safety management system working effectively?

1.17.4 The persons or team designated to conduct the audits should take a fact-finding approach to gather data and members shall be familiar with the Safety Plan and the nature of the Works.

1.17.5 The audit procedures shall be prepared by a senior member of the Contractor's head office health and safety section and shall require the consent of the Engineer.

1.17.6 The audit shall be headed by a senior member of the Contractor's head office health and safety section.

1.17.7 Audits may be outsourced by the Contractor to a health and safety company subject to obtaining the consent of the Engineer.

1.17.8 The HSO may attend audits but only in an advisory capacity.

1.17.9 The Contractor shall invite the Engineer to attend in the capacity of a witness ensuring that the audit is being carried out effectively and with a balanced, fair and non-biased approach.

1.17.10 The health and safety audits are primarily to check the effectiveness of the Safety Plan, the Contractor's health and safety personnel and the Contractor's health and safety management systems. The Audits shall not replace the regular health and safety inspections.

1.17.11 The audits shall be conducted at least once a year and without giving notice to the Contractor's Personnel or others when any audit is to take place.

1.17.12 An audit report shall be prepared by the leader of the audit team, detailing the findings of the team and submitted to the HSO, with a copy to the Engineer within ten (10) days after the audit. The report shall be signed by all attendees of the Contractor to certify their agreement to the content and to any recommendations for improvement.

1.17.13 The HSO shall analyse the findings of the audit, revise the Safety Plan and change health and safety management practices as necessary to ensure the required improvement. The Engineer shall be fully informed of all such revisions and changes.

## 1.18 PROPER PLACEMENT OF CONTRACTOR'S PERSONNEL

1.18.1 To a varying extent, many types of construction works are inherently dangerous and accordingly the Contractor under his duty of care must ensure that risks arising from all such potential dangers are avoided and Contractor's Personnel consequently protected.

1.18.2 In compliance with GC 6.9 [*Contractor's Personnel*], the Contractor shall assign only those personnel who are appropriately qualified, skilled and experienced in their respective trades or occupations. Contractor's Personnel shall also be suitable and capable of performing the work tasks for which they are selected in consideration of their physical fitness, mental condition, age and capability, all shall be equipped with correct PPE, tools, equipment and safety equipment.

1.18.3 Workers and unskilled workers shall never be assigned to any work on Site on their own, all shall be assigned in groups and each work group must always include an Operation Leader to ensure compliance with the Contractor's safety regulations.

1.18.4 The correct grades and numbers of Contractor's Personnel shall be assigned to respective work tasks and reasonable times and durations and support facilities shall be afforded by the

Contractor to promote the safe and effective discharge of duties.

1.18.5 The Contractor shall keep all records confirming that each member of the Contractor's Personnel is appropriately qualified, skilled and experienced in their respective trades or occupations prior to their placement. These records shall be made available for inspection by the Engineer.

1.18.6 Suitability of Contractor's Personnel and their work assignment shall be assessed by the Contractor with the assistance of the HSO in consideration of:

(1) Work content and work environment.

(2) Educational or vocational qualifications, practical experience, skill training and eligibility for category, title, rank or position by virtue of their achieved and demonstrated capability.

(3) Physical and mental health condition upon commencement of employment and on a regular basis before daily work starts.

(4) Allocation of an achievable and safe work volume and time.

(5) Allocation of suitable work to older workers and also to workers under 18. In particular, the Contractor shall not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Where the relevant labour laws of the Country have provisions for employment of minors, the Contractor shall follow those laws applicable to the Contractor. Children below the age of 18 years shall not be employed in dangerous work..

1.18.7 If the Laws of the Country require operating, supervising or management staff or any other Contractor's Personnel to have a licence, particular academic, educational or vocational qualification, diploma, registration or certification for any of their services or operations at Site, the Contractor shall ascertain that all such Contractor's Personnel possess such documents.

1.18.8 The Contractor shall ascertain the authenticity and validity of licenses and all other documentation for Contractor's Personnel and if necessary shall independently test all personnel to ascertain that they do possess sufficient knowledge, academic, educational or vocational qualification, experience and skills.

1.18.9 The Contractor shall implement an identification (ID) pass system whereby all Contractor's Personnel carry ID passes with name, photograph, blood type, official ID number and statement of the skill and position for which the worker is qualified and assigned. This shall be clearly displayed by the person and be available for inspection and validation by the Engineer at all times. If any of the Contractor's Personnel is found not to have such valid ID for the position upon which he is assigned, the Engineer will instruct that person directly to stop work immediately, contact the HSO immediately and instruct that the HSO resolves the situation without delay by immediately removing the offending person from the particular work being undertaken and assigning a suitable replacement, unless otherwise instructed by the Engineer.

## 1.19 SAFETY TRAINING GENERALLY

1.19.1 The Contractor shall conduct health and safety education and training for all the Contractor's Personnel.

1.19.2 The Contractor shall describe in the Safety Plan the outline of the health and safety training plans describing participants, time, teaching materials, policy for selecting trainers, etc. In addition, the Contractor shall submit full details of all health and safety training to the Engineer for information before the start of any training.

1.19.3 Training shall be provided free-of-charge to all participants and conducted during normal working hours, all trainees shall be paid their normal wages during training and the Contractor shall bear all necessary associated costs and expenses.

1.19.4 Training shall be provided in a language which the persons to be trained fully understand (i.e. the language of the persons to be trained or the language for communications as defined in GC 1.4 [*Law and language*] as appropriate.

1.19.5 Training Personnel

(1) Trainers (which description shall include teachers and educators also) can be personnel employed by the Contractor or external trainers for whom the Contractor shall remain responsible, all experienced, academically, educationally or vocationally qualified and (if required by the Laws of the Country) formally registered as trainers, teachers and educators.

(2) All trainers shall be fluent in the language to be used in the training. Where necessary, proficient translators familiar with construction safety terms shall be provided by the Contractor.

(3) In case of absence of availability of suitable trainers in the Country, the Contractor shall mobilise personnel from other countries whom the Contractor considers possess the necessary academic, educational or vocational qualification, ability and experience, subject to receiving the advance consent of the Engineer.

1.19.6 Records of Education and Training

The Contractor shall create and maintain records of all trainees, showing full details of training subjects and their capability, achievements etc., and all shall be made available for the inspection of the Engineer.

## 1.20 SAFETY INDUCTION TRAINING

1.20.1 Safety induction training shall be provided by the Contractor for all Contractor's Personnel, any Subcontractors, suppliers and others for whom he is responsible, including the Employer's Personnel and all other persons who are entitled to be on the Site at the request of the Employer or Engineer.

1.20.2 The safety induction training shall include classroom-based training course and practical on-site demonstration, in which the following subjects shall be covered:

(1) Responsible persons, chain of command and means of communication.

(2) Use of Contractor's Equipment, small tools and tackle, machinery, Temporary Works, Goods, materials; potential danger and required care.

(3) Working procedures generally.

(4) Inspections before starting and during execution of any work, reporting unsafe working conditions and equipment.

(5) Dangerous Work; General rules, locations, posting warning signs, precautions and general working requirements. Refer to JSSS 1.22 [*Dangerous Work*] for additional training requirements.

(6) PPE and other safety devices; use, handling and care, reporting worn, damaged or defective equipment.

(7) Maintaining all working areas in an orderly, tidy and clean condition at all times.

(8) Accidents; action, evacuation and treatment, basic first-response medical aid, reporting.

(9) Firefighting; actions, precautions and control.

(10) Health and safety rules.

(11) Causes and prevention of diseases and conditions which may be injurious to health that may occur in relation to the work concerned.

(12) Emergency Response Plan; evacuation and calling list.

(13) Other related health and safety matters.

## 1.21 SKILL TRAINING

1.21.1 The Contractor shall ensure that all Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations in accordance with JSSS 1.18.2.

1.21.2 The Contractor is also reminded of his obligations under GC 6.1 [*Engagement of Staff and Labour*] according to which the Contractor is encouraged, to the extent practicable and reasonable, to mobilise the local human resources with appropriate qualifications and experience. However, if the qualified, skilled and experienced Contractor's Personnel required by the Contract is not available in the Country or not available in the numbers or of the standards of for the periods required, the Contractor shall:

(1) Source and assign upon the Works Contractor's Personnel (of at least Operation Leader and skilled worker status) from other countries, and/or

(2) Recruit candidates in the Country and train them to provide the skill required to properly perform their assignments.

This shall be in such numbers and for such periods as are necessary to maintain the required standards of performance, quality, health and safety throughout the execution of the Works.

(1) The Contractor shall test and qualify such personnel and provide them with formal written confirmation of their training, testing and academic, educational or vocational qualification, with copies provided to the Engineer if so requested by the Engineer.

(2) Outline of such training shall be submitted with the Bid Stage Safety Plan. Details of the training shall be further developed in the Baseline Safety Plan and onward.

(3) Skill Training may be omitted in full or in part for any Contractor's Personnel who, the Contractor has ascertained, hold valid academic, educational or vocational qualification and who are appropriately skilled and experienced in their respective trades or occupations in full compliance with GC 6.9 [*Contractor's Personnel*]. The Contractor shall report the names of any such Contractor's Personnel to the Engineer for his information.

1.21.3 Further Training of Operation Leaders and Skilled Workers

(1) Unless otherwise specified in the Particular Safety Specification and without limiting or changing the Contractor's obligations under the Contract, the Contractor shall be required to select candidates from his local skilled and unskilled workforce that he considers are suitable to act as future Operation Leaders and skilled workers, respectively.

(2) Training of Operation Leaders

(a) The Contractor shall ensure that his personnel work closely with and transfer necessary knowledge and skills via OJT to such candidates to develop their management abilities, skill levels and awareness of international safety and quality standards; and

(b) To compliment the OJT, the Contractor shall provide classroom-based training courses and assign qualified instructors to develop the ability, skills and awareness and also to pass on their knowledge in future to their working colleagues and compatriots.

(3) Training of Skilled Workers

(a) The Contractor shall ensure that his personnel work closely with and transfer necessary knowledge and skills via OJT to such candidates to develop their skill levels and awareness of international safety and quality standards; and

(b) To compliment the OJT, the Contractor shall provide classroom-based training

courses and assign qualified instructors to develop the ability, skills and awareness according to the work and also to pass on their knowledge in future to their working colleagues and compatriots.

(4) The Contractor shall develop the syllabus and teaching hours appropriately and submit details to the Engineer for his information. Wherever appropriate, the syllabus shall also include health and safety training to an international level of appreciation with a general introduction to OSHA and other applicable international safety standards and regulations.

1.21.4 Unless otherwise specified in the Particular Safety Specification, the Contractor shall not bring into the Country for use upon the Works any unqualified, unskilled or inexperienced foreign Contractor's Personnel.

## 1.22 DANGEROUS WORK

1.22.1. Examples of Dangerous Work

For clarity "Dangerous Work" shall also include the following examples:

(1) The delivery, storage and/or use of harmful, dangerous or explosive materials, chemicals, gases or the like to be used in the Works or for use in or which are the product of the manufacturing or treatment process of the finished Works or in Operational Areas.

(2) Welding work, hot cutting work or demolition work.

(3) Work in areas where Contractor's Personnel are already performing work that may become more hazardous if anyone other than authorised personnel enter, for example Scaffolding erection, use and dismantling, and areas where Contractor's Equipment is operating and the HSO considers there to be a risk of any accident.

(4) Work in areas where very hot or cold objects are being handled and/or the working area itself is extremely hot or cold.

(5) Work in areas where there is potential exposure to harmful radiation or ultrasound.

(6) Work in areas where the concentration of gases, dust and any other dangerous or harmful materials exceed the limits specified in JSSS 2.1 [*Work Environment*].

(7) Work in areas where Permanent Works or Temporary Works have not been performed completely or properly and/or which are therefore unsound, unstable or unsafe.

(8) Work in areas under, within or adjacent to existing buildings, roads, bridges or other structures which are unstable and/or unsafe and which pose risks to safety unless additional support and strengthening measures are implemented.

(9) Work in areas which may have been damaged and otherwise rendered dangerous by adverse climatic, natural or seismic conditions.

1.22.2. Particular care shall be taken by the Contractor when performing any Dangerous Work.

1.22.3. Contractor's Personnel who are to perform or be involved at the Site in the performance of Dangerous Work, in addition to the usual safety induction training, shall be given further special training according to the nature of the Dangerous Work upon which they are to be engaged so that they can safely perform such work.

1.22.4. The HSO shall check and certify that each of the trained workers are authorised to be engaged upon particular types of Dangerous Work, by issuing an official permit in accordance with JSSS 1.23 [*Permit to Work System – Dangerous Work*] that is to be worn conspicuously and be available for validation by the Engineer.

1.22.5. The HSO shall ensure where Dangerous Work is to be performed, that preparatory pre-work inspections are carried out to investigate and assess the work to be performed and ascertain the conditions likely to be encountered. Such inspection work shall be carried out by specially trained personnel. The Contractor shall prepare safety procedures to ensure that any such

inspection personnel are not placed at risk because of any unsafe environmental or other adverse or dangerous conditions.

1.22.6. A specially trained Operation Leader shall always be assigned to work full-time with every worker or team of workers engaged upon Dangerous Work.

1.22.7. The Contractor shall train and equip teams of selected workers at the Site for emergency rescue operation in accordance with JSSS 1.24 [*Accident Response Plan*].

1.22.8. The Contractor shall prepare and implement procedures for effective safety control of Dangerous Work. Such procedures may include zoning arrangements whereby different degrees of risk are separately categorised into different levels of requirement. The contents of this shall be included in the Method Statement and Safety Plan.

1.22.9. Signage shall clearly describe the Dangerous Work and state the reasons why the area is dangerous.

1.22.10. For measures for prohibiting entry, methods of demarcation and further definition of Dangerous Work, refer to JSSS 2.3 [*Prohibition of Entry*].

1.22.11. Hazardous Substances.

(1) If the Contractor during the execution of the Works, encounters and is required by the Particular Safety Specification or instructed by the Engineer to remove any Hazardous Substances (for example: asbestos and similarly dangerous or hazardous materials), the Contractor shall employ suitable specialists that are appropriately and specifically qualified, skilled and experienced in the safe and environmentally acceptable removal and disposal of the Hazardous Substances.

(2) The Contractor shall submit Safety Plans and Method Statements with respect to the removal and disposal of the Hazardous Substances to the Engineer in accordance with JSSS 1.7 [*Contractor's Safety Plans*] and JSSS 1.9 [*Contractor's Method Statements*].

## 1.23 PERMIT TO WORK SYSTEM – DANGEROUS WORK

1.23.1 The Contractor shall prepare and implement a "Permit to Work System" and a description of this shall be included in the Safety Plan.

1.23.2 The system shall be designed to control safety for Dangerous Work.

1.23.3 The system shall ensure that all foreseeable risks have been considered and that the required control measures for safe working have been implemented before any specific work is permitted to proceed.

1.23.4 Permits shall certify that workers are protected when they perform and workers shall sign the permit and register to show that they understand the risks and the precautions necessary.

1.23.5 The HSO shall assess the work and check safety at each stage and manage the Permit to Work System.

## 1.24 ACCIDENT RESPONSE PLAN

1.24.1 The Contractor shall be responsible for responding to and treating accidents at the Site in an efficient and dedicated manner with the provision of rescue and treatment services using trained personnel with experienced and qualified medical staff and adequate and equipped facilities at the Site.

1.24.2 Medical, first aid and related services and facilities at the Site for accidental injuries shall be made available free of charge for Contractor's and Employer's Personnel. If so specified in the Particular Safety Specification, such services and facilities shall also be made available free of charge for the family members of such Contractor's and Employer's Personnel.

1.24.3 The Contractor shall prepare an Accident Response Plan as a part of the Safety Plan.

1.24.4 The Contractor shall provide the following medical and first aid services and facilities on the

Site:

(1) Appropriate first aid appliances, aids, instruments and medicines.

(2) Trained first aiders.

(3) Communication facilities and measures for Emergency Response.

(4) Medical facilities on the Site together with suitable medical equipment and consumables.

(5) Temporary water and power supply to maintain use during mains supply failure.

(6) Transportation to be provided to efficiently and carefully transport casualties to medical facilities on the Site or hospitals off the Site.

(7) Additional facilities specified in the Particular Safety Specification, if any.

1.24.5 Where the Site is located at an excessive distance from urban areas and/or where there is a lack of immediate availability of medical services and facilities, or where local health authorities do not exist or are lacking in capability or standard of care, or where so required by the nature of the Works, the Contractor shall be responsible for providing additional services and facilities at the Site to comply with his obligations as specified in the Particular Safety Specification and as are necessary to fully protect all relevant personnel.

1.24.6 The Contractor shall train selected Contractor's Personnel to perform emergency rescue in a safe manner in the event of any accident. Workers so trained are called upon in the event of any emergency to rescue any person(s) who may become trapped or injured or otherwise affected or incapacitated and provide suitable, specialist and appropriate first aid treatment. They shall be allowed to continue with their normal work when not required for emergency rescue.

1.24.7 Rescue equipment shall include respiratory protective equipment for rescue operations, where the nature of the Works would dictate, safety extraction belts/harnesses/ropes.

1.24.8 Workers trained for emergency rescue, in addition to normal first aid treatment, shall be trained to Cardiopulmonary Resuscitation (CPR) and also to operate an Automatic External Defibrillator (AED) in accordance with the requirements of JSSS 2.9 [*PPE and First Aid*].

1.24.9 Adequate first aid equipment and supplies shall in any case be readily available at the Site and as referred to in JSSS 2.9 [*PPE and First Aid*].

## 1.25 MEASURES AT THE TIME ACCIDENTS OCCUR

1.25.1 When an accident occurs, the HSO shall immediately discontinue the concerned work, inform the Engineer and take all efforts to:

(1) Safely locate and extract casualties.

(2) Provide first aid treatment at the Site.

(3) Implement Secondary accident prevention activities, including:

(a) Preserving the accident site, make safe and prohibit any personnel to engage in rescue activities who are not trained to do so;

(b) Discontinuing construction work related to or in the vicinity of the accident; and

(c) Implementing any further measures instructed by the Engineer.

1.25.2 Report of Accident Occurrence, Cause, Investigation, Result and Recurrence Prevention Measures.

(1) At occurrence of any accident, the HSO shall promptly inform the Engineer and thereafter submit details of the accident within twenty-four (24) hours after its occurrence.

(2) Having investigated and established the cause of any accident, the HSO shall report the detail and conclusion of the investigation as soon as practicable.

(3) The accident report shall include details of the countermeasures to prevent any reoccurrence and shall be in the format included in JSSS Annex 1.3 [*Additional Contractor Forms*].

1.25.3 For resumption of work procedures, refer to JSSS 1.14 [*Procedure for Resuming the Works*].

## 1.26 EMERGENCY RESPONSE PLAN

1.26.1 To the extent reasonably possible, the Contractor shall keep himself fully informed at all times of likely forecasted climatic conditions, from TV, radio and internet and shall be aware when heavy winds, storms, rainfall or snowfall and electrical storms or other adverse climatic conditions are likely and can be reasonably anticipated.

1.26.2 The Contractor shall take all necessary measures to protect Contractor's Personnel, the Works and all Goods for incorporation therein from injury or damage caused by any such adverse climatic conditions, and to avoid, overcome or lessen the effects to a reasonable extent.

1.26.3 The Contractor shall keep all areas of the Site, free from surface water and ground water at all times and by whatever means are necessary. This shall include all newly exposed ground surfaces, excavated areas and/or excavations for structures, piling, trenches, pits, shafts, tunnels and the like, as necessary to ensure:

(1) The safety of all persons entitled to be on the Site, whether engaged in construction operations or otherwise on or in the vicinity of or adjacent to the Site.

(2) The safety and stability of the Works and Goods.

(3) The safety and stability of all ground surfaces, excavated areas and/or excavations for structures, piling, trenches, pits, shafts, tunnels and the like, to prevent landslides due to surface and/or underground water from rainfall and snowmelt, tidal water, ground water and any changes in ground water level, river or stream erosion, human activity and the like.

1.26.4 Where, due to the location of the Site, there is a risk of flooding, earthquake or volcanic activity, the Contractor shall take measures to prevent damage including damage from landslides and consequent injury, damage from such flooding, earthquake or volcanic activity.

Such measures to be implemented shall include:

(1) Avoiding the use of permanent or temporary earth dams, enclosures, containment structures, spoil heaps or the like where the effect of the above described climatic, seismic or volcanic conditions could weaken or destroy such structures and potentially create the consequent risk of danger to all relevant persons, including third parties and property not connected with the Works but potentially affected thereby.

(2) Provision of temporary support to all sides and soffits of excavations or portal of tunnelling of sufficient strength, durability and suitability.

(3) Provision of sufficient temporary drains and drain trenches to assist the flow of water and any further measures to prevent the effect of water entry to the Works, including pumping and provision of power for such measures.

1.26.5 The Contractor shall prepare an Emergency Response Plan as a part of the Safety Plan.

1.26.6 The Emergency Response Plan, shall cover:

(1) Evacuation plan, showing evacuation routes and assembly points.

(2) Emergency communication facilities such as telephones, radios, transceivers, loudspeakers, sirens, etc. Such facilities shall be inspected by the HSO and maintained at all times so that they can be utilised in any emergency.

(3) Emergency contact system.

(4) Use of existing and available medical and other related facilities.

(5) Emergency stocks of bottled water, lights, ropes, shovels.

The Contractor shall provide and maintain in a state of readiness such equipment described above, that will remain useable in the case of an emergency. Where applicable sufficient back-up power shall be provided when power may be knocked out, long-life batteries, power generators with fuel capacity to allow long term use and the like.

1.26.7 The emergency contact system shall describe measures for quickly establishing locations and methods of contact with a listing of the persons, organisations and departments, that need to be located and contacted in the event of an emergency.

The list shall be posted in a visible location in the Contractor's Site office with a copy in the Employer's and Engineer's Site offices so that all personnel are informed.

The emergency contact list shall include name(s) of the person(s) responsible for making the contact, relevant contact persons, all with their respective telephone numbers and where relevant their radio contact.

The list shall include contact details and any further relevant information for the following parties, and define the extent to which contact is to be made in accordance with the type of emergency:

(1) Employer's Personnel at the Site and also at their respective head office.

(2) Relevant government authorities and agencies, administrative agencies, police stations, ambulance and fire stations, and the like.

(3) Contractor's Personnel at the Site and also at the head office.

(4) Subcontractors personnel and the personnel of any other contractors or suppliers at the Site and also at the head office.

1.26.8 Unless otherwise specified in the Particular Safety Specification, the Contractor shall conduct Emergency Response training based on the Emergency Response Plan at least every six (6) months, including training all personnel at the Site on evacuation plan and emergency contact system.

Details of the training shall be included as a part of the Emergency Response Plan and included with the Safety Plan.

1.26.9 If and when an emergency occurs, the Contractor shall share necessary information amongst prescribed persons on the emergency contact list described above and take appropriate measures including work discontinuation, evacuation of workers, making the Works, all premises and Contractor's Equipment safe, etc., all as circumstances reasonably permit and as instructed by the Engineer.

## 1.27 CONTRACTOR'S SAFETY COMMITTEE AND REGULAR SAFETY MEETINGS

1.27.1 The Contractor shall create an internal Safety Committee to assist with promoting and maintaining effective health and safety management.

1.27.2 Members of the Contractor's Safety Committee shall include:

(1) Contractor's Representative.

(2) HSO.

(3) Medical and first aid staff.

(4) Contractor's senior site staff.

(5) Contractor's head office safety manager (as necessary).

(6) Subcontractors' representatives, health and safety personnel, site staff.

(7) Representative of labour union, if any.

(8) (If necessary) Representatives of the relevant government authorities and agencies.

(9) Any other necessary personnel.

1.27.3 The HSO shall be the chairperson of the Safety Committee.

1.27.4 The Contractor shall arrange regular Safety Committee Meetings for the purpose of sharing information regarding health and safety management among the Contractor's Personnel:

(1) Frequency of the meetings: At least once a month (until issue of the Taking-Over Certificate of the entire Works).

(2) Agenda:

(a) Accidents, fatalities, injuries occurred in the previous month and measures to be taken to prevent any reoccurrence;

(b) Monthly or weekly schedule of important health and safety matters;

(c) Feedback on the regular safety, coordination and other meetings with the Engineer;

(d) Safety instructions received from the Engineer;

(e) Items to be coordinated with police, fire department and other related organisations;

(f) Compliance and registration requirements under the Laws of the Country;

(g) Safety and health awards, media attention and the like;

(h) Hazards, safety and health problems identified by any members of the Safety Committee;

(i) Effectiveness of existing Safety Plans and suggestions for revision and improvement; and

(j) Other matters.

1.27.5 Report on the Safety Committee Meetings

The HSO shall prepare a report summarising the concerns raised and conclusions of all items listed in the agenda as above.

A copy of this report shall be submitted to the Engineer within seven (7) days after the meeting and a further copy shall be included in the Contractor's monthly progress report.

## 1.28 ENGINEER'S REGULAR SAFETY MEETINGS

1.28.1 The Engineer will arrange and host a regular safety meeting to be attended by representatives of the Employer and the Contractor for the purpose of sharing information regarding health and safety management among the representatives of the Employer and the Contractor. Parties present shall have the authority to represent the organisation they belong to on health and safety matters:

(1) Frequency of the meetings: Once a month (until issue of the Taking-Over Certificate of the entire Works).

(2) Agenda:

(a) Effectiveness of existing Safety Plans and suggestions for revision and improvement;

(b) Monthly or weekly schedule of important health and safety matters;

(c) Accidents, fatalities, injuries in the previous month and measures to be taken to prevent any reoccurrence;

(d) Hazards, safety and health problems identified by any members of the Safety

Committee;

(e) Status of resolution of previous problems;

(f) Items to be coordinated with police, fire department and other related organisations;

(g) Compliance and registration requirements under the Laws of the Country; and

(h) Safety and health awards, media attention and the like.

1.28.2 Report on the Engineer's Regular Safety Meetings:

(1) The Engineer shall prepare a report summarising the concerns raised and conclusions of all items listed in the agenda as above.

(2) A copy of this report shall be submitted to the Contractor and Employer within seven (7) days after the meetings.

(3) A further copy shall be included in the Engineer's Monthly Report submitted to the Employer.

(4) The Contractor shall act immediately upon any oral instruction which is a consequence of the Contractor's failure to comply with his obligations under the Contract.

(5) The Engineer shall issue a formal instruction for any variation requests.

## 1.29 PROJECT SAFETY COMMITTEE

1.29.1 On larger Projects with multiple contract packages, if so stated in the Particular Safety Specification, the Employer shall create a Project Safety Committee for the purpose of ensuring mutual understanding and effective implementation of health and safety management of the entire Project.

1.29.2 Unless otherwise agreed, the members of the Project Safety Committee shall include:

(1) The Employer.

(2) The Engineer(s).

(3) The Contractor's Representative(s) and HSO.

(4) Representatives and health and safety officers of all contractors.

1.29.3 The chairperson of the Safety Committee shall be the Employer.

1.29.4 The Project Safety Committee meetings periodically takes place as requested by the Employer. The Contractor shall participate in the same whenever requested by the Employer until issue of the Taking-Over Certificate of the entire Works.

1.29.5 The Employer shall prepare a report summarising the concerns raised and conclusions of all items discussed at the Project Safety Committee Meeting.

## 1.30 HEALTH AND SAFETY COORDINATION WITH OTHER CONTRACTORS

1.30.1 Refer to GC 2.3 [*Employer's Personnel*] and GC 4.6 [*Co-operation*] regarding the respective obligations and requirements for the Contractor regarding co-operation with:

(1) The Employer's Personnel.

(2) Any other contractors employed by the Employer.

(3) The personnel of any relevant authorities.

In relation to the above, the Employer shall ensure that all of the above personnel and contractors co-operate with the Contractor's efforts and that they take actions similar to those that the Contractor is required to take under relevant parts of GC 4.8 [*Safety Procedures*] and GC 4.18 [*Protection of the Environment*].

The Contractor shall provide sufficient information to the Employer who shall then ensure that all of the above personnel and contractors are fully informed of the Contractor's Safety Plan and that their personnel comply with the Contractor's Safety Plan.

When preparing the Safety Plan, the Contractor shall identify the hazards and assess the risks of all aspects. To do this properly, information (including Method Statements, risk assessments and safety plans) may be needed from other contractors who will be working at the Site. The Employer shall therefore ensure that the Contractor is provided with all such other information as may be requested by the Contractor necessary so that this can be incorporated into the Safety Plan.

When risks arise because of potential interactions between the Contractor and other personnel or contractors (e.g. site transport matters) or a number of contractors are exposed to a common risk (e.g. from the site electrical distribution system), the Employer shall instruct these other contractors to adopt the same principles of risk prevention and control that are applied by the Contractor unless otherwise agreed.

1.30.2 If any other contractors are employed by the Employer and are working on or near the Site of any work, the Employer shall arrange and host Health and Safety Coordination Meetings:

(1) Frequency of the meetings: as and when considered necessary by Engineer.

(2) Unless otherwise agreed, attendees shall include representatives of the Employer, Contractor and any other contractors employed by the Employer and relevant authorities who are concerned with the execution of any work on or near the Site not included in the Contract.

(3) Agenda should relate to coordination among different contractors including for example:

(a) Effectiveness of existing Safety Plans and suggestions for revision and improvement;

(b) Issues, problems and response due to the mutual impact of the work of the Contractor, Employer's Personnel, the Employer's other contractors and the works of any relevant authorities;

(c) Accidents, fatalities and injuries in the previous period and measures to be taken to prevent any reoccurrence;

(d) Status of resolution of previous problems;

(e) Items to be coordinated with police, fire department and other related organisations;

(f) Compliance and registration requirements under the Laws of the Country;

(g) Safety and health awards, media attention and the like; and

(h) Other matters.

1.30.3 Report on the Health and Safety Coordination Meetings:

(1) The Employer shall prepare a report summarising the concerns raised and conclusions of all items listed in the agenda as above.

(2) This report shall be submitted to the Engineer, Contractor and other attendees within seven (7) days after the meeting.

(3) A further copy shall be included in the Contractor's monthly progress report.

## 1.31 SAFETY STATISTICS

1.31.1 The Contractor shall collect and compile statistical data for safety performance on the Works in order to permit monitoring of achievement and prevention of reoccurrence of accidents, near-misses and the like, therefore contributing to the improvement of safety on the Works.

1.31.2 Actual statistics shall include the following:

(1) Accident: description, casualties, location, time, type and cause.

(2) Near-miss: description, location, time, type and cause.

(3) Lost-time: lost hours of casualties, duration of discontinuation.

(4) Total working hours for calculation of frequency rate, severity rate and annual incident rate.

(5) Number of users of the first aid station, number of people treated for disease/injury, description of disease/injury, causes.

(6) Number of health and safety staff.

(7) Number of candidates given safety induction and other training.

(8) Number of safety inspections.

(9) Number of detections of non-compliant, unsafe or lack of Contractor's Equipment.

(10) Number of instructions issued for failure to use PPE, or inadequate or ineffective PPE.

(11) Number of Engineer's Instructions issued for work suspension.

(12) Number of HSO instructions issued for work stoppage.

(13) Others.

1.31.3 All data shall be in a format and content given consent by the Engineer.

1.31.4 The data shall subsequently be compiled and included in the Contractor's Monthly Safety Report to be submitted under JSSS 1.33 [*Safety Reports*].

## 1.32 HEALTH AND SAFETY RECORDS

1.32.1 The Contractor shall keep health and safety records for the following:

(1) Inspection records and checklists.

(2) Meetings for safety and health management.

(3) Monitoring of safety and health management activities.

(4) Health and safety education and training for the Contractor's Personnel.

(5) Health management for the Contractor's Personnel, documents regarding workers' health conditions (such as medical history and medical examination results) shall be stored in compliance with the Laws of the Country.

(6) Work environment records and other records required by JSSS Chapter 2 [*General Safety Measures*] and other parts of JSSS.

(7) Record of reports as may be required by government authorities.

(8) Detection of non-compliant, unsafe or lack of Contractor's Equipment.

(9) Instructions issued for unsafe behaviour or unsafe site conditions.

(10) Instructions issued for failure to use PPE, or inadequate or ineffective PPE.

(11) Engineer's Instructions issued for work suspension.

(12) HSO instructions issued for work stoppage.

(13) Others.

1.32.2 All records shall be in a format and content given consent by the Engineer and all shall be made available for inspection by the Engineer.

1.32.3 A summary of the above records shall be submitted to the Engineer as a part of the Contractor's Monthly Safety Report to be submitted under JSSS 1.33 [*Safety Reports*].

## 1.33 SAFETY REPORTS

1.33.1 The Contractor shall provide regular safety reports to the Engineer to keep him fully informed of compliance with the Safety Plan and all matters of health and safety. Reports shall include:

(1) Daily Safety Report: number of workers, works in progress (outline), statistical results in accordance with JSSS 1.31.2, near-misses/incidents/accidents, safety findings, actions taken, for improvement.

(2) Contractor/HSO and Joint Site Safety Inspection Reports.

(3) Weekly Safety Report: summary of safety matters of the week.

(4) Monthly Safety Report: summary of safety matters for the month, monthly and cumulative safety statistics. The Monthly Safety Report shall be submitted as a part of the Contractor's monthly progress report, required by GC 4.21 [*Progress Reports*].

## 1.34 HEALTH AND SAFETY INCENTIVE SCHEMES

1.34.1 The Contractor shall consistently enforce work rules (whether or not an injury or illness is reported) to demonstrate his commitment to creating a culture of safety, not just the appearance of reducing rates. Action should not be taken to penalise any worker for reporting a work-related injury or illness rather than for the purpose of promoting workplace safety.

1.34.2 It is considered that incentive schemes are an important tool to promote an improvement in workplace health and safety and the Contractor is therefore required to develop and implement such health and safety incentive schemes.

1.34.3 It is suggested that workers should be rewarded for reporting near-misses or hazards, as this promotes worker involvement in the health and safety management process.

1.34.4 Consideration should also be given to rate-based incentive schemes which concentrate on reducing the number of reported injuries and illnesses by rewarding workers with certification and/or prizes or bonuses at the end of an injury-free period and which also could reward Operation Leaders or managers based on the elimination of injuries within their respective teams.

1.34.5 Any scheme must however be implemented in such a manner that it does not discourage reporting by workers, such as taking negative action against a worker by withholding a prize or bonus because of a reported injury.

1.34.6 The Contractor shall introduce adequate precautions to ensure that workers feel free to report an injury or illness.

1.34.7 As an alternative to rate-based incentive schemes, incentive schemes that take positive steps to emphasise safety, not just incident rates are often useful such as schemes that reward workers for identifying potentially unsafe, dangerous or hazardous conditions on the Site.

1.34.8 The Contractor shall describe the proposed health and safety incentive scheme in the Safety Plan and shall also inform the Employer and Engineer about the progress and achievement of such schemes through their Monthly Safety Report submitted under JSSS 1.33 [*Safety Reports*].

## 1.35 CONTRACTOR'S EQUIPMENT, TEMPORARY WORKS, SAFETY EQUIPMENT AND PPE

1.35.1 Contractor's Equipment, Temporary Works, Safety Equipment and PPE to be used upon the Works, (for example electrical systems, welding and cutting equipment, Scaffolding, Formwork and Falsework, etc.) together with all components, systems, materials and equipment, safety equipment and PPE (referred to collectively in this Section as Contractor's Equipment and Temporary Works), shall be suitable and fit for the purpose for which they are intended.

All shall be used in full accordance with the manufacturer's printed instructions or accepted industry practice and shall be used, stored, handled, assembled, erected, installed, maintained and dismantled by qualified, skilled, specially trained and experienced personnel.

1.35.2 The Contractor shall ensure that all items of Contractor's Equipment and Temporary Works for use upon the Works are inspected by the HSO at the required location before the commencement of any operation or use and regularly inspected thereafter to ensure continued compliance with the foregoing. Following any such inspection, all tested items shall be labelled by the Contractor with clear, durable and weatherproof labels confirming the last/current date of inspection, date of next inspection and signed by the HSO, thereby certifying the items as being safe for use.

If the HSO ascertains at any time that any items are not suitable for use, he shall immediately stop all use of that item, label the item as not being safe for use, stop all work for which that item and any associated items is being used and cease any such work until the situation is corrected by repair, re-testing and certifying. Similarly, the Engineer may issue instructions to stop all use of any item and stop all work for which that item and any associated items is used when it is discovered that the certification is not available or is not currently valid.

1.35.3 The Engineer may also instruct that any Contractor's Equipment and Temporary Works shall be subjected to examination, inspection, measurement or testing, by the Contractor. The Contractor shall submit the report of such examination, inspection, measurement or testing to the Engineer.

If, as a result, any such Contractor's Equipment and Temporary Works is found to be defective, or otherwise not in accordance with JSSS or the Contract, the Engineer may reject such Contractor's Equipment and Temporary Works by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the defect and ensure by repair/replacement as necessary and re-testing that the rejected item(s) complies with the Contract.

1.35.4 As confirmed in Form JSSS/BSD Bidder's Safety Declaration (refer to JSSS Annex 1.3 [*Additional Contractor Forms*]), the Contractor shall mobilise for use upon the Works:

(1) New (or recent) or duly maintained Personal Protective Equipment (PPE) and other safety equipment of an international standard, suitable and fit for the purpose for which it is intended, in full working order, complete with all necessary spare parts and consumables, suitable and safe for use on the Works, all to meet with the consent of the Engineer and in sufficient quantities to allow for replacement in the case of being worn-out, lost or damaged.

(2) New (or recent) or duly maintained Contractor's Equipment and Temporary Works, all suitable and fit for the purpose for which it is intended, in full working order, clean, non-polluting, complete with all necessary spare parts and consumables, suitable and safe for use on the Works.

## 1.36 HEALTH MATTERS

1.36.1 The Contractor is reminded of his obligations under GC 6.7 [*Health and Safety*] to take all reasonable precautions, at all times to maintain the health of the Contractor's Personnel and ensure that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. Under other Clauses of the Contract, the Contractor is required to protect the Contractor's Personnel from insect and pest nuisance, and to take other measures to reduce danger to their health.

1.36.2 Healthcare services and facilities at the Site shall be made available free of charge for Contractor's and Employer's Personnel. If so specified in the Particular Safety Specification, such healthcare services and facilities shall also be made available free of charge for the family members of such Contractor's and Employer's Personnel.

1.36.3 Occupational health care shall be provided by the Contractor and shall include:

(1) Environmental health care with consideration and precautions against asbestos, dust, lead and other metals, gases, hazardous and toxic chemicals, sunlight, engine exhaust emissions, (refer also to JSSS 2.1 [*Work Environment*]).

(2) Measures against noise, frequent or excessive use of vibrating tools.

(3) Avoiding frequent or excessive manual handling of loads, stress and fatigue.

(4) Fitness to work based on the physical mobility and capability of the Contractor's Personnel.

1.36.4 The Contractor shall prepare a Health Care Plan as a part of the Safety Plan including descriptions and where necessary details or quantities of:

(1) Health care staff to be assigned at the Site.

(2) Provision of anti-mosquito measures including nets, medications and the like in malarial prone areas.

(3) Healthcare services to be provided including lectures and education on health matters.

(4) Healthcare treatment facilities and medicines on the Site together with description of equipment and consumables.

(5) Occupational healthcare proposal.

(6) Temporary water and power supply to maintain use during mains supply failure.

1.36.5 Where the Site is located at an excessive distance from urban areas and/or where there is a lack of immediate availability of healthcare services and facilities, or where local health authorities do not exist or are lacking in capability or standard of care, or where so required by the nature of the Works, the Contractor shall be responsible for providing additional healthcare services and facilities at the Site to comply with his obligations as specified in the Particular Safety Specification and as are necessary to fully protect all relevant personnel.

1.36.6 Report of Serious Illness

(1) The Contractor shall inform the Engineer and submit details of any serious illness.

(2) Having investigated and established the cause of any serious illness, the Contractor shall report the detail and conclusion of the investigation as soon as practicable to the Engineer.

(3) The report shall include details of the HSO's recommended countermeasures.

(4) The Engineer is to be consulted on the types of illness for which reports are to be informed.

## 1.37 DESIGN AND MANAGEMENT OF TEMPORARY WORKS

1.37.1 Unless otherwise specified in the Particular Safety Specification, the Contractor is required to comply with Sections 1 and 2 of BS5975 [*Code of Practice for Temporary Works Procedures and the Permissible Stress Design of Falsework*] as management standard with respect to design, erection, use and dismantling of Temporary Works.

1.37.2 An alternative standard is acceptable by reference to JSSS 1.4.5 [*Specified Standards*] providing that the proposed alternative also contains equivalent or higher standards for the management of Temporary Works.

1.37.3 It is to be noted that Sections 1 and 2 of BS5975 constitutes guidance and recommendations and it is not quoted herein as if it constitutes a specification or an integral part of JSSS. The Contractor shall however justify in writing any course of action that deviates from the recommendations of Sections 1 and 2 of BS5975 and shall submit such justification to the Engineer for his information and consent.

1.37.4 It is to be noted that certain design standards included or referred to in the BS (for example wind loadings), are restricted to use in the United Kingdom, in which case the Contractor shall

be assumed to have adopted the design standards applicable in the Country.

1.37.5 The Contractor shall prepare and implement suitable procedures whereby all Temporary Works staff during the course of their work and on completion shall prepare and sign formal records of all Temporary Works under their management and control, thereby certifying that all has been performed, completed and validated in accordance with Sections 1 and 2 of BS5975. All such records shall be in a format and content subject to the consent of the Engineer and all shall be made available for inspection by the Engineer.

1.37.6 Without affecting the Contractor's responsibilities for design of the Temporary Works, the Engineer shall cooperate with the Contractor's Temporary Works staff and shall provide pertinent information about the design of the Permanent Works which may be of relevance and assistance to the Contractor with the Temporary Works design.

The Contractor shall submit Method Statements for any parts of the Temporary Works (including designs and calculations of Falsework) as may be requested by the Engineer for his review in accordance with JSSS 1.9 [*Contractor's Method Statements*]. If the Engineer chooses to review same, this shall not be construed as a check or validation of the Contractor's design or methods.

The Engineer may review Temporary Works design for those parts which he considers to be of vital importance for safety. The Contractor shall cooperate and work with the Engineer on this task to demonstrate that the Contractor has systems in place to ensure compliance with Sections 1 and 2 of BS 5975 or any other acceptable standard in accordance with JSSS 1.37.2.

1.37.7 For further information on monitoring the performance of Temporary Works, refer to JSSS 6.1.3 [*Monitoring*].

1.37.8 Irrespective of any legal requirement under the Laws of the Country, all of the Contractor's Temporary Works staff shall have appropriate academic, educational or vocational qualification for Temporary Works coordination, design or supervision as appropriate. Such staff shall also have work experience in construction and in Temporary Works design or supervision as appropriate. The Contractor shall ascertain for himself that all such staff are qualified to perform their duties.

## 1.38 UNEXPLODED ORDNANCE (UXO)

1.38.1 If there is a possibility that any UXO may exist at the Site, then unless otherwise specified in the Particular Safety Specification, this shall be surveyed and investigated by the Employer and the result of this investigation shall be clearly stated and full information including survey and investigation results shall be provided by the Employer in the Particular Safety Specification.

1.38.2 Unless otherwise specified in the Particular Specification, clearance of UXO shall be undertaken by the Employer and at the cost of the Employer.

1.38.3 Completion of clearance shall be evidenced through the issue by the Employer's specialist remover of a certificate of UXO clearance from the Site. Unless otherwise approved by the Engineer, no work shall commence in affected areas of the Site until the receipt of a copy of this certificate.

1.38.4 Should the Contractor encounter any UXO, after a clearance certificate has been issued in accordance with the above, he shall immediately stop all affected work at the affected area of the Site, clear the area of all Contractor's Personnel, Employer's Personnel and all other persons and notify the Engineer and relevant authorities.

1.38.5 Unless otherwise agreed between Employer and Contractor, the Employer shall then make further arrangements for removal and disposal, then obtain and issue a further clearance certificate. Work shall resume in the affected areas after the Contractor has received a copy if the further clearance certificate together with any further instructions from the Engineer.

## ANNEXES TO CHAPTER 1: GENERAL REQUIREMENTS

### Annex 1.1: Definitions and Abbreviations

A1.1.1 The following words and expressions in JSSS relating to the Conditions of Contract and the content of JSSS shall have the definitions stated:

(1) "**GC**" followed immediately by a reference number means respectively General Conditions of Contract Clause or Sub-Clause.

(2) "**Health and Safety Officer**" or "**HSO**" means the Contractor's health and safety officer at the Site to be appointed by the Contractor in accordance with GC 6. 7 [*Health and Safety*]. For the purposes of interpretation under JSSS, the reference to "accident prevention officer at the Site" in GC 6.7 [*Health and Safety*], shall be construed as "Health and Safety Officer at the Site".

(3) "**JICA Standard Safety Specification**" or "**JSSS**" means the document of this title published officially by JICA on their website as may be further modified by the Particular Safety Specification for the Works.

(4) "**Method Statement**" means a document that shows the details of the arrangements, methods and resources that the Contractor proposes to adopt for the execution of the Works or any part of the Works, as referred to in GC 4.1 [*Contractor's General Obligations*] and supplemented by JSSS 1.9 [*Contractor's Method Statements*].

(5) **"Operation Leader" (**also known variously as a "Ganger", "Leading Hand", "Foreman" (working and non-working), "Team Leader", "Superintendent", "Supervisor" and the like) means a member of the Contractor's workforce who through experience, training and testing is deemed by the Contractor to be appropriately qualified, skilled and experienced in their respective trade or occupation to work with, lead and/or supervise the teams of workers, directing them and/or superintending them in the performance of their assigned duties and to ensure their compliance with the Contractor's safety regulations and who can also be referred to within the OSHA definition as a "Competent Person".

(6) "**OSHA**" means the technical requirements of the OSHA standard(s) from the Code of Federal Regulations (29 CFR) published by the Occupational Safety and Health Administration, U.S. Department of Labor.

(7) "**Particular Safety Specification**" means the document that contains the particular additions and modifications to JSSS, necessary to create a precise and relevant specification of the health and safety requirements for the Works.

(8) "**Project**" means the particular Works and services to be implemented by the Borrower and described in the loan agreement, utilising the funds provided by JICA under the terms mutually agreed for that purpose.

(9) "**Safety**" shall also mean "occupational health and safety" and "health and safety".

(10) "**Safety Plan**" means a document (or documents) that contains the overall risk assessments together with the details of all health and safety arrangements, methods and resources that the Contractor proposes to adopt for health and safety management of the entire Works or any Section or part of the Works, as referred to in GC 4.1 [*Contractor's General Obligations*] as supplemented by JSSS 1.7 [*Contractor's Safety Plans*].

(11) "**Safety Specification**" means the document that contains Part 1 [*JSSS*] and Part 2 [*Particular Safety Specification*].

A1.1.2 The following words and expressions in JSSS relating to the technical content of JSSS shall have the definitions stated:

(1) "**Accident Response**" means the requirements for the Contractor's response to an accident at the Site, as further referred to in JSSS 1.24 [*Accident Response Plan*].

(2) "**Blasting**" means blowing-up or breaking apart solid rock with the use of Explosives.

(3) "**Blasting Exclusion Zone**" means an area from which all unauthorised Contractor's Personnel, unauthorised Employer's Personnel and any other unauthorised personnel or the general public are prohibited to enter due to the risk of their being affected by the Blasting Works. Unauthorised personnel in this context shall have the same meaning as that stated in JSSS Clause 2.3.1.

(4) **"Confined Spaces"** means spaces that are not designed for continuous occupation but are provided for persons to enter and perform certain works (including inspection, maintenance and repairs) and that consequently may have limited or restricted means for entry or exit. Due to the likelihood of insufficient ventilation, the Contractor shall be aware of a potentially unhealthy or dangerous environment and he shall be deemed to have investigated and taken measures against such risks in every case.

(5) **"Cofferdam"** means a temporary enclosing wall constructed in water, to permit the enclosed area to be pumped out and used as safe and accessible working space.

(6) **"Dangerous Goods"** means corrosive, flammable, explosive, spontaneously combustible, toxic, oxidising, or water-reactive materials. They must be identified in the workplace (and when being transported) by different coloured 'diamond' symbols classified on the basis of immediate physical or chemical effects, such as fire, explosion, corrosion and poisoning. An accident involving Dangerous Goods could seriously injure persons and seriously damage property and/or the environment.

(7) **"Dangerous Work"** means Permanent or Temporary Works to be executed by the Contractor in Confined Spaces, Hazardous Areas, or Operational Areas or in the presence of or requiring the use of Hazardous Substances or Dangerous Goods or other work which is especially and potentially dangerous and which requires the use of specialist skills, safety equipment, safety measures and PPE.

(8) "**Earthwork Support**" means the permanent or temporary structural support arrangements to prevent the collapse or weakening of the surfaces of any excavation including for example basement, pit, trench or slope excavation.

(9) "**Elevated Access Structures**" means substantial, elevated, temporary working platforms, usually comprised of structural steel columns, beams, framing and floor decking and used for performing works on Sites with difficult access or restricted space, on steeply sloping or Sites in water.

(10) "**Emergency Response**" means the requirements for the Contractor's response to any Emergency at the Site or Sites, as further referred to in JSSS 1.26 [*Emergency Response Plan*].

(11) "**Explosives**" means any substance or mixture of substances that is manufactured to produce an explosive effect and which term includes any Blasting explosive, Blasting agent and Blasting supplies such as detonators, cords and detonating equipment.

(12) "**Falling Objects**" means objects falling from heights including displaced, dropped, or blown Goods, tools, debris or waste material.

(13) "**Falsework**" means temporary supporting structures used to support parts of the Temporary Works or Permanent Works during construction, until the latter are stable, self-supporting and safe.

(14) "**Formwork**" means temporary containment structures for cast-in-place (poured or pumped) concrete and the immediately supporting members in advance of the concrete achieving sufficient strength to support its own weight and act safely as a structural component.

(15) **"Hazardous Areas"** means areas where there is a risk of explosion due to the presence of flammable or explosive gases, vapours, mists or dusts.

(16) **"Hazardous Substances"** means any substance, whether solid, liquid or gas, that may cause harm to health.

(17) "**Hoisting Equipment**" means Contractor's Equipment such as cranes, hoists, chain-blocks, pulleys and the like which constitute the prime mover that, when used with Rigging Equipment, permits loads to be hoisted or lowered and positioned.

(18) "**Hoisting Operation**" means the selection of Hoisting Equipment appropriate to the purpose, preparation of Method Statements and Safety Plans and safely implementing the hoisting and placing of loads in position.

(19) "**Operational Area**" means an area in a functioning process, treatment, manufacturing or like facility where the Contractor is required to perform work while the Employer is continuing operations.

(20) "**Other Properties**" means buildings, structures, ground surfaces and substrata, paved areas, roads, footpaths, fences, railways, waterways, drainage, utilities and other services or the like or any other property on the Site or outside the Site which may be in some way affected by the execution of the Works.

(21) "**Personal Fall Arrest System**" or "**PFAS**" means a fall protection system that is designed to arrest a worker in a fall from a working level.

(22) "**Personal Fall Restraint System**" or "**PFRS**" (also referred to as a "Positioning Device System") means a fall protection system that is designed to restrict the movement of workers, preventing them from reaching the edge of any working area and therefore eliminating the risk of a fall.

(23) "**Personal Protective Equipment**" or "**PPE**" means equipment that is worn by the person to minimise exposure to hazards that cause serious workplace injuries and illnesses, which may result from Falling Objects, excessive noise, dust, contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards.

(24) "**Rated Capacity**" (referred to occasionally in OSHA and elsewhere as "Safe Working Load") means the maximum load capacity for items of Contractor's Equipment and Temporary Works, as officially recommended by the manufacturer. The Rated Capacity may be dependent upon the configuration and conditions of use (e.g. length, angle of boom and the like).

(25) "**Rigger**" means a competent person who is certified by the HSO as suitable for assignment to Hoisting and Rigging in accordance with JSSS 1.18 [*Proper Placement of Contractor's Personnel*].

(26) "**Rigging Equipment**" means the ropes, webbing, chains and slings together with all associated accessories such as hooks, hoisting points, shackles, etc. that, when used with Hoisting Equipment, permits loads to be hoisted or lowered, and positioned.

(27) "**Safety Belt**" means a sufficiently substantial strap to be secured about the waist for attaching to a lanyard or line to restrain the movement of workers and prevent them from reaching locations from where they may be at risk of falling.

(28) "**Safety Harness**" means a sufficiently substantial harness to be secured about the body for attaching to a lanyard, lifeline and deceleration device to safely arrest and support any worker during a fall.

(29) "**Scaffold**" or "**Scaffolding**" means a temporary structure or structures that provide access on or from which persons work or to support Goods.

(30) "**Skill Training"** means additional training to be provided by the Contractor for the Contractor's Personnel to develop and improve their trade skills in performing their work at the Site and shall include OJT and theoretical training in accordance with JSSS 1.21 [*Skill Training*]. Such training shall also include examining and testing by the Contractor and certification of attainment in such skills.

(31) "**Spotter**" means a member of the Contractor's Personnel who is generally responsible for warning other Contractor's and Employer's Personnel and other persons and keeping them away from working operations and areas, for assisting drivers of trucks and operators of Contractor's Equipment in positioning their vehicles and equipment particularly when reversing, positioning or hoisting, and such further duties as are assigned to them in JSSS 2.4 [*Spotters*].

Any reference to a "Spotter" in JSSS shall also be deemed to include a reference to a banksman or flagman.

(32) "**Trade Effluent**" means any liquid waste (effluent) that is discharged from premises being used for a business, trade or industrial process, other than surface water and domestic sewage.

(33) "**Unexploded Ordnance**" or "**UXO**" means unexploded bombs, or explosive remnants of war or explosive weapons(such as bombs, shells, grenades, land mines, naval mines, cluster munition, and the like) that did not explode when they were employed and still pose a risk of detonation, sometimes long after they were used or discarded.

(34) "**Working Platform**" means a platform on or within a Scaffold that is intended and designed to support persons or Goods.

A1.1.3 The following abbreviations of technical terms shall have the meanings stated:

| | |
|---|---|
| AED | Automatic External Defibrillator |
| BMGV | Biological Monitoring Guidance Values |
| CPR | Cardiopulmonary Resuscitation |
| GFCI | Ground Fault Circuit Interrupter |
| ODA | Official Development Assistance |
| OJT | On the Job Training |
| PFAS | Personal Fall Arrest System |
| PFRS | Personal Fall Restraint System |
| PPE | Personal Protective Equipment |
| RCD | Residual Current Device |
| TBM | Tool Box Meetings |
| TWA | Time Weighted Average |
| WEL | Workplace Exposure Limits |

A1.1.4 The following abbreviations of standards, codes and the like shall have the meanings stated:

| | |
|---|---|
| ACI | American Concrete Institute |
| ANSI | American National Standards Institute |
| ASHTO | American Association of State of Highway Transportation Officials |
| ASME | American Society of Mechanical Engineers |

| | |
|---|---|
| ASTM | American Society for Testing and Materials. |
| BS | British Standard |
| BS EN | British Standard European Norm |
| HSE | UK Health and Safety Executive |
| ISO | International Organization for Standardization |
| ILO | International Labour Organization |
| JIS | Japanese Industrial Standards |

## Annex 1.2: Content of Bid Stage Safety Plan

A1.2.1 This Annex lists the required content for the Bid Stage Safety Plan as referred to in JSSS 1.7 [*Contractor's Safety Plans*]. Unless otherwise specified in the Particular Safety Specification, the Bidder shall follow this format and structure in the Bid Stage Safety Plan. The same format and structure shall be used later for the Baseline Safety Plan but with the content developed as necessary to show the required detail.

A1.2.2 The Bid Stage Safety Plan shall be an outline plan but it must cover each of the items listed below with sufficient detail provided to demonstrate that the Bidder understands the requirements and indicates the Bidder's intentions, so that this can be understood and properly evaluated.

(1) Description of the Works

A description of the Works supported by overall layout plan(s) to provide a clear understanding of the overall layout and content of the Works and showing main construction items and areas, roads, Site access and egress locations, working areas, storage areas, temporary offices, laydown areas, warehouses and like facilities and including a summary of principal work items and significant quantities, etc.

(2) Bidder's Corporate Policy on Health and Safety Management

A description of the Bidder's corporate health and safety management policy covering the aims and intentions for improving the level of health and safety. The policy shall include a description of the purpose of health and safety (prevention of occupational accidents, maintenance of physical and mental health of workers, etc.), a description of the basic company policies on risk assessment and health and safety management.

(3) Health and Safety Management System, Responsibility and Authority of Bidder's Personnel

A description of the health and safety management organisation at the Site headed by the Bidder's Health and Safety Officer (HSO) and showing the approximate numbers, responsibilities and authority of any other Contractor's Personnel involved in health and safety management at the Site.

A description of the responsibilities and authority of the Bidder's head office health and safety personnel together with the communication procedures for contact and support for the Site safety teams.

(4) Health and Safety Laws

A list of Laws (including all standards) of the Country which require the Bidders compliance for the health and safety of his workers and for the health and safety management of the Works. If the Bidder considers any parts to be superseded by JSSS then the relevant Clause number of JSSS shall be inserted.

(5) Bidder's Safety Management System

Refer to JSSS 1.5 [*Contractor's Safety Management System*].

Describe the scheme that the Bidder is proposing and how he intends to implement same.

(6) Temporary Works

Refer to JSSS 1.37 [*Design and Management of Temporary Works*].

A Safety Plan for Temporary Works listing the principal items, describing the content, and specifying the outline of safety measures to be applied to ensure compliance with the requirements.

(7) Temporary Facilities on Site

The plan shall include a description of the general health and safety rules (e.g. smoking areas, traveling speed on Site, cleanliness, tidiness, latrines, wash rooms, shelters, etc.).

(8) Safety Measures for Contractor's Design of the Permanent Works

If, under GC 4.1 [*Contractor's General Obligations*], the Contract specifies that the Contractor shall design any part of the Permanent Works, the Bidder shall provide a description of the arrangements for controlling risks arising from such design of the Permanent Works.

(9) Safety Plan for the Works

A Safety Plan for the whole of the Works with separate parts provided for each part of the Works, including descriptions of the likely risks and measures for preventing accidents on the Site.

(10) Safety Plan for Dangerous Work.

Refer to JSSS 1.22 [*Dangerous Work*].

A listing of any Dangerous Work which will be encountered on the Site and general details of the Safety Plan for such Dangerous Work by reference to JSSS Annex 1.1 [*Definitions and Abbreviations*] and GC 4.1 [*Contractor's General Obligations*].

(11) Permit to Work System

Refer to JSSS 1.23 [*Permit to Work System – Dangerous Work*].

A listing of all high-risk areas of the Works that shall be subject to the Permit to Work System together with a description of proposed procedure.

(12) Safety Measures for Contractor's Equipment

Refer to JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*].

A description of the procedures for inspecting and maintaining the Contractor's Equipment together with all spare parts, including inspections prior to shipment, after arrival at the Site and during use to ensure that all Contractor's Equipment at the Site is maintained in a safe, efficient, non-polluting and acceptable condition. It shall include a general description of all regular maintenance and repair activities.

(13) Proposed Health and Safety Incentive Scheme

Refer to JSSS 1.34 [*Health and Safety Incentive Schemes*].

A description of the Proposed Health and Safety Incentive Scheme, designed to encourage conscious consideration of health and safety by Contractor's Personnel and to reward improvement.

(14) Safety Information Sharing and Communications Policy

A description of the information sharing and communication systems for health and safety within the organisation of the Contractor and between the Contractor and Employer, Engineer and relevant government agencies, etc. Reference shall be made to the various health and safety meetings described in JSSS.

A description of safety management activities for Contractor's Personnel shall be included together with the method for giving and receiving feedback and opinions regarding health and safety.

(15) Health and Safety Equipment, Facilities and Personal Protective Equipment (PPE)

Refer to JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*].

A description of the intended policies for the deployment of safety equipment, facilities and PPE to reduce health and safety risks, detailing the items and methods for providing and replacing (when worn, lost or damaged) general PPE and the use of additional PPE for particular working locations, environments and conditions.

(16) Site Inspection Plan

A description of the methods for Site inspections by the HSO, types of inspection and frequency.

The description shall also include the methods for reporting, recording and utilising results and also for posting warnings, no entry notices, giving instructions and stopping work.

(17) Site Security

A description of the proposed Site security methods explaining how access to the Site by third parties, neighbours, nearby residents and any trespassers upon the Site will be prevented or (if and when applicable) permitted.

The description shall include the provision and control of entry and exit gates, barriers etc., security posts, security patrols and any other measures to reasonably ensure the security of the Site.

(18) Policy for Preventing Traffic Accidents

A description of the measures to be implemented for the prevention of traffic accidents on the public roads outside the Site and on roads and all other trafficked areas within the Site.

A description of the measures to be implemented to prevent workers riding in the back of pick-ups or trucks, or boarding or alighting from them near the Site, compulsory wearing of seat belts.

(19) Reporting Procedure for Unsafe Conditions and Behaviour

A procedure for the reporting of unsafe conditions and unsafe behaviour on the Site (including near-misses) together with improvement actions including instructions, implementation and the recording of improvement measures.

(20) Accident Response Plan

Refer to JSSS 1.24 [*Accident Response Plan*].

The Plan shall describe the facilities to be provided and also cover the preparation and submission of the accident report, describing when an accident report will be prepared and submitted, the method of investigation of causes, planning and implementation of preventive measures against recurrence.

(21) Health Care Plan

Refer to JSSS 1.36 [*Health Matters*].

A description of the proposed facilities, furniture and equipment for rest stations, restroom, dining facilities, canteens, sanitary facilities, sports and leisure facilities, shower facilities, changing room etc.

A health care plan with services and facilities for maintaining the health and occupational health of all Contractor’s Personnel.

(22) Environmental, Temporary Works and Structural Monitoring Plans

Refer to JSSS 2.1.7 [*Monitoring and Records*].

A description of the proposed monitoring equipment, instruments, Contractor's Personnel and methods for monitoring and control of the working environment, the performance of the Works and the avoidance of damage to Other Properties.

(23) Fire Response Plan

Refer to JSSS 2.8 [*Fire Prevention*].

Details of the fire prevention services to be provided at the Site.

(24) Emergency Response Plan

Refer to JSSS 1.26 [*Emergency Response Plan*]

Details of the Emergency Response Plan.

(25) Monitoring and Review of Health and Safety Management Activities

The procedures for monitoring and reviewing the purpose, method, timing, utilisation of results, development, etc. of health and safety management activities such as safety inspections, TBM, 5S activities (refer to JSSS 1.15 [*Contractor's Safety Management Activities*]).

(26) Safety Induction Training

Refer to JSSS 1.20 [*Safety Induction Training*].

An outline description of the required safety induction training for all proposed health and safety training plans, describing methods, facilities, time, teaching materials, policies for selecting trainers, etc. and covering safety induction.

Details of special training required for Dangerous Work shall also be included.

(27) Skill Training

Refer to JSSS 1.21 [*Skill Training*].

An outline description of the proposed Skill Training plans for local counterpart Operation Leaders, describing OJT and classroom components, facilities, participants, time, teaching materials, policies for selecting trainers and the counterparts.

(28) Legal Requirements

A description in brief with references to the legal requirements and remedies in the Country for injuries and death at work and for persons affected by illness, together with a summary of any workmen's accident compensation insurance or stating that there are no such legal requirements if that is the case, and any other legal obligations and remedies.

## Annex 1.3: Additional Contractor Forms

Attached Forms:

**Form JSSS/BSD – Bidder's Safety Declaration**

**Form JSSS/SAR – Sample Accident Report**

**Form JSSS/BSD – Bidder's Safety Declaration**

*[This form is to be inserted in the Bidding Documents after the existing Form-ACK, with new page number, renumbering existing pages appropriately and inserting suitable reference in the Table of Forms]*

I, *[insert name and position of authorised signatory]*, being duly authorised by *[insert name of Bidder/members of joint venture ("JV")]* (hereinafter referred to as the "Bidder") to execute this Form JSSS/BSD, hereby declare our commitment to comply with the health and safety requirements of the Contract.

The Bidder declares, that if selected to undertake the Works, he will ensure that the Site is established and maintained as a healthy and safe workplace for the Contractor's Personnel, the Employer's Personnel and all other persons entitled to be thereon or that may be affected by operations thereby.

The Bidder hereby declares that after investigation and research of resources within the Country, he has given full and careful consideration and fully accepts the need and has made full allowance for the importation, the use upon the Works and subsequent re-export in accordance with the Contract of all required Contractor's Equipment, Temporary Works, PPE and all other safety resources necessary to maintain the international level of health and safety upon the Works.

The Bidder declares that he will mobilise for use upon the Works:

1. New (or recent) or duly maintained PPE and other safety equipment of an international standard, suitable and fit for the purpose for which it is intended, in full working order, complete with all necessary spare parts and consumables, suitable and safe for use on the Works, all to meet with the consent of the Engineer and in sufficient quantities to allow for replacement in the case of being worn-out, lost or damaged, and
2. New (or recent) or duly maintained Contractor's Equipment and Temporary Works, all suitable and fit for the purpose for which it is intended, in full working order, clean, non-polluting, complete with all necessary spare parts and consumables, suitable and safe for use on the Works.

The Bidder further declares that he shall:

1. Carry out regular and thorough safety inspections, find and correct any health and safety problems on the Works, primarily by trying to eliminate or reduce hazards through making feasible changes in working conditions rather than relying on PPE to reduce risks.
2. Employ workers with appropriate skill, educational or vocational qualification, experience and capability.
3. Fully inform workers about hazards.
4. Provide health and safety training to all Contractor's Personnel, any Subcontractors, suppliers and others for whom the Contractor is responsible, the Employer's Personnel and all other persons who are entitled to be on the Site, in a language and vocabulary they can understand.
5. Keep accurate records of work-related injuries and illnesses.
6. Perform tests in the workplace, such as air sampling as required by the Safety Specification.
7. Provide required new PPE at no cost to workers and ensure that this is used properly, kept in good condition and replaced in the case of being worn-out, lost or damaged.
8. Assign only workers who, in consideration of health, physical condition and age are suited to the operations to which they are assigned.
9. Provide eyesight, hearing and mobility examinations and other medical tests required by the Contract.
10. Post injury and illness information and data where workers can see them.

11. At occurrence of any accident, promptly inform the Engineer and thereafter submit details of the accident within twenty-four (24) hours after its occurrence.

12. Not retaliate against workers for using their rights under the Laws of the Country.

The requirements of this declaration shall apply fully to all of the Bidder's proposed Subcontractors, suppliers and specialists engaged by the Bidder on the Works, for whom the Bidder shall remain fully responsible.

The Bidder also affirms that if the Bid is successful, the Health and Safety Officer, named below and also included in Bidding Form, Form PER -1: Proposed Personnel, unless otherwise required by the Bidding Documents, shall be assigned from the Commencement Date, full-time upon the Site and shall not be replaced or substituted at any time except with the consent of the Engineer.

If the Bid is accepted the Bidder agrees that this Declaration shall form a part of the Contract, at and from which time all references to "Bidder" shall be construed as references to "Contractor".

| | |
|---|---|
| Signed: | Signed: |
| _____ | _____ |
| (Bidder's Official Representative) | (Bidder's Proposed Health and Safety Officer at Site*)<br>Or<br>Bidder's Head Office Health and Safety Manager*) |
| Name: | Name: |
| _____ | _____ |
| Date: _____ | Date: _____ |

*(*Delete as applicable)*

**Form JSSS/SAR – Sample Accident Report**

*[The form is to be completed by the Contractor, submitted to the Engineer when applicable and in accordance with JSSS 1.25 [Measures at the Time Accidents Occur]*

| **CONTRACT INFORMATION:** | |
|---|---|
| 1) Name of Project: | |
| 2) Project Reference Number：<br>（e.g. L/A No.） | |
| 3) Contract Number: | |
| 4) Package Description: | |
| 5) Employer: (name and nationality) | |
| 6) Contractor: (name and nationality)<br>(If casualty(ies) is(are) belonging to Subcontractor)<br>Subcontractor: (name and nationality) | |
| 7) Engineer: (name and nationality) | |
| 8) Press Report about the Accident (Name of Media, Date, and Copy of Report to be attached) | |

*(above to be inserted before all reports)*

| **FIRST REPORT INFORMATION:** | |
|---|---|
| 1) Date and time of accident occurrence (local time): | |
| 2) Date and time of first verbal report to Engineer: | |
| 3) Exact location of accident occurrence: | |
| 4) Brief background and apparent cause: | |
| 5) (i) Number of casualty(ies)/<br>(ii) Information of casualty(ies) (Nationality, Age, Sex, Position, Experience Year)/<br>(iii) Description of injuries incurred | |
| 6) Physical damages to the Works, Site and any properties of the third parties | |
| 7) Present medical status of casualty(ies): | |
| 8) Present work status: | |
| 9) List attached information (e.g. Layout and sketch drawings, photographs, notes and report): | |
| 10) Accident Report Submission Date | |

| **SUBSEQUENT REPORT INFORMATION (POST-INVESTIGATION):** | |
|---|---|
| 1) Cause(s) of the accident: | |
| 2) Countermeasures proposed by the Contractor to avoid recurrence of similar accidents and risks: | |
| 3) Number of reported accident(s) occurred in the past one (1) year in the same Contract Package as the accident occurred: | |
| 4) Number of reported near misses occurred in the past one (1) year in the same Contract Package as the accident occurred: | |
| 5) Other Information: | |

| | |
|---|---|
| Report Prepared by:<br>(name): _____<br>(sign) : _____<br>Report Submission Date(s) _____<br>Time: _____ | Contractor's Health and Safety Officer (HSO) |
| Receipt acknowledged by:<br>(name): _____<br>(sign): _____<br>Report Receipt Date(s) _____<br>Time: _____ | Engineer |

*(above to be inserted with detail and signatures at end of each report)*

# CHAPTER 2: GENERAL SAFETY MEASURES

## 2.1 WORK ENVIRONMENT

Contractor's Personnel shall be provided with a safe and healthy occupational environment. The Contractor shall implement all necessary measures to avoid the creation of and/or any contact with Hazardous Substances, intense noise, heat, cold or similar and potentially harmful conditions or to provide protection against such conditions.

2.1.1 Hazardous Substances

(1) Definitions

Refer to the definition of Hazardous Substances in JSSS Annex 1.1 [*Definitions and Abbreviations*].

(2) Compliance Standards

By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any Hazardous Substances either existing on the Site, used in or encountered on the Works, the Contractor shall take necessary measures for work environment complying with EH40/2005 Workplace Exposure Limits, issued by HSE, including monitoring such substances to ensure that the Short Term and Long-Term exposure limits in HSE Table 1 are not exceeded.

2.1.2 Dust

(1) Dust

Dust of any kind when present at a concentration in air shall not be equal to or greater than:

(a) 10mg/m3 (8-hour Time Weighted Average: TWA) of inhalable dust; or

(b) 4mg/m3 (8-hour TWA) of respirable dust.

(2) Prevention

(a) The Contractor shall prevent dust emission, by keeping the source moist and covering dust creating areas and materials with suitable dust-proof sheeting; and/or

(b) The Contractor shall provide all necessary Contractor's Equipment and Temporary Works to achieve this including water-bowsers, spraying equipment, extract ventilation and filtration equipment.

(3) PPE

(a) If, in the opinion of the HSO, it is not reasonably practicable to reduce dust to acceptable levels, PPE (Breathing Apparatus) shall be provided for all relevant Contractor's Personnel; and

(b) For details of PPE refer to JSSS 2.9.1 [*PPE*].

(4) Asbestos

(a) The Contractor shall be aware that asbestos causes occupational fatalities. It is commonly found in older buildings frequently in ceiling and floor cavities, insulation, sprayed coatings, floor tiles and composites, asbestos-cement sheets and roofing felt;

(b) If the scope of the Works requires removal of any of the above materials then the Contractor shall check for asbestos content, then remove and dispose of such materials in compliance with L143 Approved Code of Practice and guidance, for Managing and Working with Asbestos, issued by HSE; and

(c) If the Particular Safety Specification specifies that asbestos may exist at the Site

and that the Contractor is responsible for the removal and disposal or if it is discovered during the execution of the Works and the Contractor is instructed by the Engineer to remove it, then the Contractor shall take measures in accordance with the requirements of JSSS 1.22 [*Dangerous Work*]; and comply with L143 Approved Code of Practice and guidance, for Managing and Working with Asbestos, issued by HSE; for the controlled safe removal and disposal of asbestos.

2.1.3 Poor Ventilation

(1) The Contractor shall inspect and carry out monitoring to ensure that all working areas have adequate and healthy natural ventilation.

(2) If any areas do not have adequate and healthy natural ventilation, the Contractor shall provide suitable and efficient mechanical ventilation systems with fans, ducting and all associated devices and services to improve the working environment to acceptable safe levels.

(3) If this is not completely possible then PPE (breathing apparatus) shall be used in accordance with the requirements of JSSS 2.9.1 (8) [*Respiratory Protection Equipment (RPE)*].

(4) The Contractor shall generally prohibit the use of internal combustion engines in internal areas. When the use of such engines is unavoidable, the Contractor shall provide exhaust systems which safely and efficiently collect, contain and expel exhaust gases to external areas and provide additional adequate ventilation.

2.1.4 Noise

(1) Compliance Standards

(a) By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any items in this Clause or relevant to the subject of this Clause and which are not fully covered by JSSS, the Contractor shall take necessary measures for noise exposure and control complying with OSHA 1926.52 [*Occupational noise exposure*]; and

(b) The Contractor shall provide equipment such as, sound level meters, noise dosimeters, or octave band analysers to determine what sound levels exist and whether they are within the levels in Table D-2 in OSHA 1926.52 or not.

(2) Preventive Measures

To prevent noise damage to Contractor's Personnel, which may occur when noise levels exceed 90dBA (referred to as "intense noise" in JSSS), or if for any reason sound levels cannot be determined as above the Contractor shall:

(a) Reduce sound levels through feasible administrative or engineering controls to within the levels of Table 2.1.1 [*OSHA Table D-2: Permissible Noise Exposures*], if at all possible:

**Table 2.1.1: OSHA Table D-2: Permissible Noise Exposures**

| Duration per day, hours | Sound level dBA slow response | Duration per day, hours | Sound level dBA slow response |
|---|---|---|---|
| 8 | 90 | 1½ | 102 |
| 6 | 92 | 1 | 105 |
| 4 | 95 | ½ | 110 |
| 3 | 97 | ¼ or less | 115 |
| 2 | 100 | | |

(b) If such controls are not possible or if they fail to reduce sound levels within the levels of OSHA Table D-2, provide PPE (Ear Protection) for relevant Contractor's Personnel as specified in JSSS 2.9.1 (7) [*Ear Protection*] in consideration of the noise level and length of noise exposure at the working area in accordance with the provisions of the OSHA Standard;

(c) Post warning signs at the working area to make all Contractor's Personnel aware that ear protection must be worn; and

(d) In all cases where the sound levels exceed the values shown OSHA Table D-2, a Continuing Effective Hearing Conservation Program specified in (3) below shall be implemented.

(3) Hearing Conservation Program

(a) The Contractor shall implement a hearing protection and conservation program whereby noise exposure levels are monitored in order to accurately identify any Contractor's Personnel that are exposed to noise at or above 90dBA averaged over 8 working hours, or an 8-hour time TWA;

(b) Further to JSSS 2.1.4 [*Noise*] the Contractor shall comply with OSHA 1910.95 [*Occupational noise exposure*], in respect of exposure to impulsive or impact noise;

(c) Exposure to impulsive or impact noise shall not exceed 140dBC peak sound pressure level; and

(d) The Contractor shall monitor all workers whose noise exposure is equivalent to or greater than a noise exposure received in eight (8) hours where the noise level is constantly 85dBA. The exposure measurement must include all continuous, intermittent, and impulsive noise within an 80dBA to 130dBA range and must be taken during a typical work situation. The Contractor shall choose the monitoring method that best suits each individual situation.

2.1.5 Further Requirements for Dangerous Work

Further to the requirements of JSSS 1.22 [*Dangerous Work*] and in relation to work in Confined Spaces, Hazardous Areas, or Operational Areas or in the presence of or requiring the use of Hazardous Substances or Dangerous Goods or other work which is especially and potentially dangerous, requiring the application of special skills, safety equipment, safety measures and PPE, the Contractor shall establish systems and procedures to ensure the safety of all Contractor's Personnel engaged upon or supervising or managing such Dangerous Work, and for this purpose the Contractor shall:

(1) Measure the concentration of oxygen, hydrogen sulphide, carbon dioxide, carbon monoxide, chlorine, chlorine dioxide, Trade Effluent and any other potentially harmful materials, gases and chemicals, or other work environment items before starting any work.

(2) Safely isolate the supply and flow of any Trade Effluent, or other potentially harmful materials, gases and chemicals during the period of any work and safely reconnect or continue same after the work is finished.

(3) Improve and maintain the work environment for example by mechanical ventilation and filtration if the result of the work environment measurement in (1) above violates the limits specified in this JSSS Chapter 2 [*General Safety Measures*].

(4) For further information on the removal and disposal of Hazardous Substances refer to JSSS 1.22 [*Dangerous Work*].

(5) For further information on prohibition of entry to areas where Dangerous Work is being performed refer to JSSS 2.3 [*Prohibition of Entry*].

2.1.6 High and Low Temperatures and Humidity

(1) To avoid health hazards due to excessively hot, cold or humid working environments, the Contractor shall improve the work environment for all Contractor's Personnel by:

(a) Providing temporary covers and shade to protect workers from rain, hail, snow, sunlight and reflection from the surrounding wall and ground;

(b) Providing protection from any heat or cold source and provide adequate ventilation, heating or air conditioning for indoor working;

(c) Where permitted by the Engineer in hot climates, carrying out work during the night when temperatures and humidity are lower;

(d) Providing drinking water and supplement that allow salt replenishment at the work place;

(e) Providing a rest station with heating, air conditioning or shade near the work place, or providing other facilities equipped with accommodation that allow personnel who fall ill to lie down and recover;

(f) Allowing work breaks and reducing excessive and continuous working times; and

(g) Allowing an initial acclimatisation period for Contractor's Personnel to become used to the heat or cold.

(2) The Contractor shall ensure that workers wear moisture-permeable and loose-fitting clothing in hot climates and suitably warm, insulated and waterproof clothes in cool or cold climates.

(3) If any undesirable conditions are detected, the Contractor shall take appropriate measures to correct the situation, allowing Contractor's Personnel to rest or temporarily stop the work until the conditions improve.

(4) The Contractor shall monitor the health of Contractor's Personnel before and during the work, allowing Contractor's Personnel to take a rest and/or rehydrate as necessary and take further action if any additional abnormalities are observed.

2.1.7 Monitoring and Records

(1) The Contractor shall monitor the working environment and prepare regular daily, weekly and monthly records of dust, noise, air and water quality, inadequate natural ventilation, rainfall, snowfall, temperatures, humidity, wind speed and direction, regularly until completion and taking over under GC 10 [*Employer's Taking Over*].

(2) The procedure for preparation and submission of such records shall be as stated in JSSS 1.32 [*Health and Safety Records*].

(3) The Contractor's monitoring and recording shall also cover:

(a) The pre-existent conditions for all periods of Dangerous Work;

(b) Dust at work places where excessive dust and waste material such as dirt, rocks, minerals, metals, carbon, cement, etc. is generated;

(c) Noise levels at work places that generate intense noise;

(d) Ventilation volume, temperature and concentration of carbon dioxide, carbon monoxide, oxygen, hydrogen sulphide, other toxic or dangerous gases at work places including tunnels and deep pits and Confined Spaces; and

(e) Illuminance at work place and walkways.

(4) The above monitoring shall be conducted separately from the environmental monitoring that may be required by the Laws of the Country and any environmental monitoring that may be separately specified in the Contract.

(5) For the following measurement items, if the following limits are violated, the Contractor shall take the measures prescribed in JSSS 1.22 [*Dangerous Work*], JSSS 2.1.5 [*Further Requirements for Dangerous Work*] and JSSS 2.3 [*Prohibition of Entry*].

(a) Values of limits of measurement items:

(i) Oxygen concentration less than 19.0% and more than 23.5%;

(ii) Hydrogen sulphide concentration more than 10 ppm (short-term exposure limit) or 5 ppm (long term exposure limit);

(iii) Carbon dioxide concentration more than 15,000 ppm (short-term exposure limit) or 5,000 ppm (long term exposure limit); and

(iv) Other Hazardous Substances either existing on the Site, used in or encountered on the Works: values of limits for other substances given in EH40/2005 Workplace Exposure Limits, issued by HSE, Table 1.

(b) Combustible gas and vapor concentration: in excess of 10% of the lower limit of flammability.

(6) The Contractor shall also monitor any vibration, settlement and other adverse effects arising out of the execution of the Works to ascertain if these are causing any adverse effect to the Works or to Other Properties whilst ensuring that no damage or weakening is caused.

(7) Monitoring shall be accomplished by the Contractor through regular inspection, measurement, survey, instrument monitoring and recording as determined by the nature and scope of the Works taking account of any additional requirements which may be specified in the Particular Safety Specification.

(8) Works that require monitoring shall include the following where any risk of damage is perceived by the HSO or Engineer:

(a) Excavation Works;

(b) Foundation Piling Works;

(c) Ground improvement;

(d) Temporary ground dewatering;

(e) Temporary Works such as major items of Earthwork Support, Cofferdams and the like; to demonstrate that they are performing safely, to the designed limits and for the intended purpose;

(f) Other parts of the Works which may be specified in the Contract or the Safety Plan.

(9) The Contractor shall prepare a monitoring plan as a part of the Safety Plan or Method Statement for the above Works which shall describe:

(a) The Contractor's proposed monitoring criteria for vibration, settlement and all other potential effects of the Works, which by the Contractor's own calculations will ensure that no damage or weakening is caused to Other Properties;

(b) The types, locations and numbers of monitoring instruments and other equipment;

(c) The measurement frequency and recording methods; and

(d) The countermeasures to be applied when the actual measured values are close to or exceed the various minimum, intermediate and maximum criteria.

(10) The Contractor shall:

(a) Provide and maintain all survey equipment, monitoring and recording equipment to provide comprehensive, accurate and contemporary or live data with records,

showing the performance characteristics of the Works;

(b) Provide qualified staff to perform the monitoring;

(c) Maintain and calibrate the monitoring instruments and equipment as necessary throughout the execution of the Works;

(d) Perform survey and monitoring on a regular basis throughout the execution of the Works;

(e) Confirm the occurrence and extent of any adverse effect arising out of the execution of the Works by means of regular inspections of all Other Properties;

(f) Take the measures prescribed when necessary to comply with the Contractor's obligations, propose remedial measures and implement such measures after receiving the consent of the Engineer;

(g) Evaluate the measurement results and modify the monitoring criteria as necessary; and

(h) Submit an evaluation report if necessary with any changes to the Safety Plan for Works to the Engineer before proceeding with the Works.

(11) Requirements for instrumentation systems shall be as follows:

(a) The Contractor shall select instruments and measurement methods that meet the purpose of the monitoring;

(b) The Contractor shall determine locations and numbers of measurement points which meet the purpose of monitoring and need for safety management. The locations of measurement shall be where measurement can be continuously made throughout the period of working;

(c) The instrumentation shall be regularly calibrated and protected against damage by the Contractor;

(d) The HSO and other relevant Contractor's Personnel shall analyse the data and take all necessary corrective action consequent to such monitoring to ensure the continued compliant and safe performance of the Works; and

(e) The Engineer shall be invited to attend the inspections and data collection to ensure the Contractor's compliance in accordance with JSSS 1.10 [*Engineer's Safety Representative*], JSSS 1.11 [*Safety Compliance Instructions from the Engineer*] and JSSS 1.16 [*Joint Site Safety Inspections*].

(12) Management based on Monitoring and Inspection

(a) Management by Visual Inspection:

If and when the Contractor finds any irregularity through visual inspection, the Contractor shall take necessary measures in accordance with the degree of abnormality, including detailed research, urgent countermeasures, evacuation of workers.

(b) Management by Instrument Measurement:

Unless otherwise specified in the Particular Safety Specification, the Contractor shall determine control limit values based initially upon the allowable displacement or stress in the design, then the following stepwise control values shall be established by the Contractor and necessary measurement and related actions shall be taken.

The Contractor shall provide the following three (3) critical limits in his arrangements for the performance of the Works or in his design of the Temporary Works, and shall take appropriate action when any of these limits is reached:

(i) Primary Limit:

When measured values reach this limit, the Contractor shall increase the degree of care on the incident over inspections and commence preparing countermeasures which will be implemented if and when the measurement value reaches the Secondary Limit and obtain the Engineer's consent for such countermeasures.

The Contractor shall submit the measured values on a weekly basis to the Engineer unless otherwise instructed by the Engineer.

(ii) Secondary Limit:

When measured values reach this limit, the Contractor shall stop the relevant part of the Works and implement the countermeasures.

(iii) Control Limit:

When measured values reach this limit, the Contractor shall immediately stop the relevant part of the Works, advise all affected persons, prohibit entry of any unauthorised persons to the affected area(s), take countermeasures to prevent failure, review and revise the Method Statement and Safety Plan, and comply with the Engineer's Instructions before proceeding.

(13) Contractor's Responsibility against damage to Property

Notwithstanding the requirements of this Clause of JSSS, the Contractor is reminded of his overall responsibility under the Contract in respect of damage to property.

The Contractor shall satisfy himself that the monitoring criteria and requirements specified above, or in other respective Chapters of JSSS and/or in the Particular Safety Specification, are sufficient to comply with his obligations under the Contract and he shall take any additional measures necessary to avoid damage to property.

## 2.2 RISK CONTROL AROUND THE SITE

2.2.1 General

(1) The Contractor is reminded of his obligations under GC 4.8 [*Safety Procedures*] and GC 4.22 [*Security of the Site*] to keep any unauthorised persons off the Site, and without prejudice to such obligations the Contractor shall take all necessary further measures under this Section to prevent any such unauthorised persons (including third parties, neighbours and particularly children) who may for example be living or working around the boundary of the Site or adjacent thereto, from entering the Site.

(2) In addition, the Contractor shall help to maintain communications with the local community near the Site in accordance with JSSS 2.2.6 [*Community Relations*].

(3) In addition to taking necessary action to keep any unauthorised persons off the Site the Contractor shall fully inform the relevant local organisations (e.g. police force) and if necessary request assistance to remove any trespassers from the Site. When requested by the Contractor, the Employer shall provide reasonable assistance to coordinate with the local organisations (including the police force).

(4) Such measures shall include (but are not restricted to) the following requirements of this Section.

(5) The Contractor shall also prevent access to the Site by any persons, including Contractor's and Employer's Personnel and any others who are under the influence of drink or drugs and also to prevent alcohol and drugs being brought onto the Site.

2.2.2 Working Area Perimeter

(1) Unless otherwise specified in the Particular Safety Specification, the Contractor shall:

(a) Enclose the perimeter of all working areas with secure fencing to prevent access to the Site by unauthorised persons;

(b) Maintain all such fencing in good condition, until such fencing is no longer needed and reinstate all affected areas;

(c) Provide secure entry points with lockable gates or barrier;

(d) Provide and maintain signs clearly advising/warning against entry; and

(e) Provide watchmen and lighting where, when and to the extent necessary to apprehend and evict any unauthorised persons (particularly children) from the working area, where such persons have breached the Site Perimeter and working area perimeter fencing.

(2) Unless otherwise specified in the Particular Safety Specification, working area perimeter fencing shall be temporary, constructed of new and durable materials and fit for the purpose intended.

(3) Full details of working area perimeter fencing including scope, dimensions and specifications shall be given in the Method Statement.

(4) The Contractor shall provide fall prevention measures such as temporary covers or barriers, with lighting and warning signs for any excavations outside the working area perimeter.

2.2.3 Measures for Road Occupation

(1) Before the Contractor carries out work on, in or under a public road, or uses it for access to the Site, based on the prior coordination with the relevant authorities by the Employer, in order to ensure safe and smooth traffic flow on the road, the Contractor shall:

(a) Prepare a road usage plan and submit it to the relevant authorities, and obtain necessary permits, prior to road use;

(b) Obtain the approval and necessary permits of the relevant authorities before any road closure, diversion or other traffic restrictions are applied;

(c) Take necessary measures to ensure safe and smooth traffic flow on the road during the entire road usage period; and

(d) Take safety measures specified in JSSS 2.2.2 [*Working Area Perimeter*].

(2) The Contractor shall provide a Spotter (refer to JSSS 2.4 [*Spotters*] full time upon the Works (including all non-working periods) so that the Contractor's Personnel and the general public including road users, pedestrians and all others are effectively informed, controlled and protected against accident.

2.2.4 Temporary Road Signs

(1) For disseminating necessary information on roads adjacent to the Site, the Contractor shall:

(a) Provide standard road signs in the same colours and format as those used by the relevant authorities in the Country such as construction signs, direction, speed restriction, detour and roadwork signs;

(b) Signs shall be set in suitable places so as to give due warning, information and guidance to road-users and pedestrians alike; and

(c) Signs shall be fit for purpose, fixed firmly so as not to break, fall or otherwise be damaged due to vibration, wind or other natural causes.

(2) Maintain the various signs regularly, including repairing, painting and cleaning. Ensure that all are clearly visible, well-lit or made of reflective materials so that they can be seen clearly from a distance at night.

2.2.5 Traffic Accident Prevention at Site Entrance

(1) In order to prevent traffic accidents occurring at or near the Site entrance, the Contractor shall:

(a) Provide warning signs adjacent to the Site entrance to inform drivers on the public road that the Site entrance exists and to inform of the possible emergence of construction traffic/equipment;

(b) Provide temporary traffic signals or Spotters for safe control of traffic (including construction traffic) and Contractor's Equipment, Contractor's Personnel and the general public including road users, pedestrians and all others to protect against accident;

(c) Provide designated areas for anyone entering the Site to board or be discharged from public and private transport;

(d) Provide pedestrian crossings and passages with Spotters or traffic signals; and

(e) Give priority to pedestrians and passing vehicles at the entrance.

2.2.6 Community Relations

(1) In order to maintain communications and improve safety for the local community near the Site, the Contractor shall:

(a) Cooperate with the Employer and assist in dissemination of comprehensive information about the Project to the nearby community; and

(b) If so required by the Particular Safety Specification, Conduct traffic safety and awareness activities for the local community.

(2) The Contractor shall ensure that all Contractor's Personnel are informed of the safety rules and any precautions regarding the safe passage of construction vehicles/equipment especially when children are arriving at or leaving from school.

(3) The Contractor shall report immediately to the Engineer if the local community raises any complaints or issues any requests to the Contractor.

## 2.3 PROHIBITION OF ENTRY

2.3.1 General

(1) The Contractor shall prohibit unauthorised personnel from entering areas where Dangerous Work is being undertaken.

(2) For general requirements of Dangerous Work refer to JSSS 1.22 [*Dangerous Work*].

(3) "Unauthorised personnel" in this context shall mean Contractor's Personnel, Employer's Personnel and any other persons who have not been properly trained or who are not properly equipped with PPE (including rescue equipment) and who are not carrying and displaying an official permit issued to them by the HSO, for that specific work place in accordance with JSSS 1.23 [*Permit to Work System – Dangerous Work*].

(4) Workers assigned to Dangerous Work shall be subject to the Permit to Work System described in JSSS 1.23 [*Permit to Work System – Dangerous Work*].

2.3.2 Demarcation and Requirements

(1) The Contractor shall clearly demarcate all areas where Dangerous Work is being carried out by the use of appropriate fencing, barriers, signage and lighting and shall control access to such areas with the full-time assignment of a Spotter.

(2) The Spotter shall be established outside the working area, and shall prevent the entry of unauthorised personnel and shall constantly communicate with and monitor the safety of assigned workers. The Spotter shall be equipped with radio or other efficient means of communication to act as a liaison with other relevant Contractor's Personnel.

(3) No-one, no matter their position of authority, should be allowed to enter, if not so authorised to do so and the Contractor shall ensure that Spotters do not face any adverse repercussions because of a refusal to allow access.

## 2.4 SPOTTERS

### 2.4.1 Definitions

For the definition of "Spotter", refer to JSSS Annex1.1 [*Definitions and Abbreviations*].

### 2.4.2 Duties

Duties include for example:

(1) Preventing unauthorised personnel from entering areas where Dangerous Work is being carried out.

(2) Giving appropriate guidance and signals during operation of Contractor's Equipment to prevent the equipment tipping, overturning or falling.

(3) Giving appropriate guidance and signals to prevent Contractor's Personnel from being struck or pinned by Contractor's Equipment.

(4) Assisting drivers of vehicles including trucks and operators of other Contractor's Equipment in positioning their vehicles particularly when manoeuvring.

(5) Directing operators and drivers to prevent Contractor's Personnel, Contractor's Equipment, Goods in transit, transport and the like from coming into contact with Overhead Services as defined in JSSS Chapter 3 [*Existing Underground, Concealed and Overhead Services*] when working within close proximity and preventing same from encroaching upon minimum allowable distance from Overhead Services.

(6) Controlling pedestrian and vehicular traffic, Contractor's Personnel and Contractor's Equipment on roads and footpaths on or adjacent to the Site, adjacent to buildings, Operational Areas, places with poor visibility, slopes and vertical drops, places where there is risk of falling or landslide and places where excavation and transporting equipment perform Excavation Works close to workers.

(7) Monitoring working locations and conditions and preventing any persons from entering areas where Dangerous Work is being carried out or where there is any risk of potential injury and accident.

(8) Any other similar duties and assistance.

### 2.4.3 Placement

(1) The Contractor shall provide Spotters as appropriate to the Site situation and the work methods employed.

(2) The Contractor shall ensure that the Spotters are informed about the Site conditions and accident prevention.

### 2.4.4 Safety

The Contractor shall:

(1) Ensure the safety of Spotters when directing vehicles or Contractor's Equipment.

(2) Ensure that Spotters and drivers agree on hand signals before assisting with vehicle manoeuvring.

(3) Instruct Spotters to maintain visual contact at all times with the driver during vehicle manoeuvring.

(4) Instruct drivers to stop manoeuvring immediately if they lose sight of the Spotter.

(5) Not give Spotters additional duties while they are already acting as Spotters.

(6) Instruct Spotters not to use personal mobile phones, personal headphones, or other items which could pose a distraction during spotting activities.

(7) Provide Spotters with high-visibility clothing, especially during night operations.

2.4.5 Signals

(1) To avoid the risk of injury to the Contractor's Personnel when operating Contractor's Equipment, the Contractor shall establish a standardised signal system and appoint a Spotter to give necessary signals to the Contractor's Personnel.

(2) The Contractor shall ensure that all Contractor's Personnel understand and comply with the signals relating to their assigned work task.

(3) The Contractor shall inform and remind all Contractor's Personnel including those designated as Spotters, of the established standardised signal system as follows:

(a) By training all personnel when they first start work at the Site;

(b) By re-confirming with the all personnel in the TBM before the start of work each day; and

(c) By posting signboards on Site where required showing the standardised signals and placing a smaller-sized sticker version directly on the concerned Contractor's Equipment.

2.4.6 Qualification of Personnel

The Contractor shall ensure that all Spotters possess sufficient experience and ability and are adequately trained and supervised to perform their duties.

2.4.7 Communication Tools

The Contractor shall, when necessary, provide and maintain any necessary equipment such as hand-held radios, to ensure effective and safe communications and train all Spotters in their use.

2.4.8 PPE

The Contractor shall ensure that all Spotters are provided with PPE including hats, whistles, high visibility jackets, flags, illuminated batons, etc. to safely and adequately perform their duties.

## 2.5 FALL PREVENTION

2.5.1 General

(1) By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any items in this Section or relevant to the subject of this Section and which are not fully covered by JSSS, the Contractor shall take necessary measures for fall prevention complying with OSHA 1926 Subpart E [*Personal Protective and Life Saving Equipment*], Subpart M [*Fall Protection*] and the further requirements for fall protection for workers contained in the following Subparts of OSHA:

(a) OSHA 1926 Subpart L [*Scaffolds*];

(b) OSHA 1926 Subpart CC [*Cranes and Derricks in Construction*];

(c) OSHA 1926 Subpart R [*Steel Erection*];

(d) OSHA 1926 Subpart S [*Underground Construction, Caissons, Cofferdams and Compressed Air*];

(e) OSHA 1926 Subpart V [*Electric Power Transmission and Distribution*]; and

(f) OSHA 1926 Subpart X [*Stairways and Ladders*].

(2) This Section provides fall prevention solutions for a typical range of example circumstances but this is not intended to be restrictive in extent. The Contractor shall provide fall prevention solutions wherever demanded by the nature of the particular part of the Works.

(3) As a general rule, the Contractor shall take Personal Fall Restraint System (PFRS) measures wherever practicable rather than Personal Fall Arrest System (PFAS) measures.

2.5.2 Height Thresholds

The threshold for fall protection in construction work is 2m.

The Contractor shall provide fall protection for all personnel, removing all fall hazards whenever any personnel are working 2m or more above a lower level.

2.5.3 Facilities for Ascending and Descending

When carrying out work at heights of 2m or more, the Contractor shall provide facilities that enable the Contractor’s Personnel to safely ascend and descend from such work levels.

2.5.4 Risk Assessments

(1) Where there is any risk of fall for any part of the Works at the Site, the Contractor shall conduct a pre-assessment of the various types of fall protection systems to be used and the selected alternatives shall be shown in the Safety Plan.

(2) In advance of the commencement of any parts of the Works, the Contractor shall carry out such further risk assessment as necessary, including checking the following and recording the results:

(a) Working areas and the conditions of adjacent areas;

(b) Position, condition and surroundings at each anchorage for separately securing working line, lifeline or nets;

(c) Status of access leading to working areas and any anchorages; and,

(d) The presence or absence of protrusions where there is a risk of cutting or chafing of working line or lifeline or other fall prevention systems and their position and condition.

2.5.5 Handrails

(1) The Contractor shall provide handrails at places where there is risk of fall.

(2) Handrails shall be complete with top-rails, minimum 85cm high and mid-rails at a height of 35 – 50cm.

(3) Top-rails shall be designed to withstand 90kgf (approx. 880N) of horizontal force and mid-rails, 70kgf (approx. 690N) of horizontal force and sufficient uprights shall be provided to sustain these forces.

(4) Handrails shall be fit for purpose, of rigid and sound condition, securely fixed, without excessive corrosion, deformity or damage of any kind.

(5) If handrails are temporarily removed for example to permit work to be carried out, the Contractor shall provide alternative safety measures including for example:

(a) Displaying appropriate warning signs;

(b) Assigning a Spotter to direct non-essential Contractor's Personnel away;

(c) Providing alternative fall prevention systems to Contractor's Personnel in that area including for example PFRS or PFAS or safety nets;

(d) Prohibiting entry to the working area of any unauthorised Contractor's Personnel; and

(e) Handrails shall be restored immediately after the necessity for removal has ended.

2.5.6 Toeboards

(1) Toeboards shall be provided to bottom of all handrails to prevent risk of Falling Objects.

(2) Toeboards shall be minimum 10cm high from top edge to the level of the Working Platform, runway or ramp.

(3) Where material is piled to such height that a 10cm toeboard does not provide protection, panelling from floor to mid-rail, or to top-rail shall be provided.

2.5.7 Preventing Falls from Walkways

(1) Walkways

For the purposes of interpretation:

"walkways" mean route or passage for safe movement of pedestrians including walkways, bridge type walkways, covered walkways, ramps, stairways, ladders and stepladders.

(2) Safe Routes

The Contractor shall provide walkways leading to, within and around the Site and any working areas within the Site.

These shall be designed and constructed to ensure the safe passage of Contractor's Personnel and shall be provided with temporary lighting and effectively maintained at all times.

The Contractor shall display signs clearly indicating the location, intended use and any restrictions and extent with directions so that the Contractor's Personnel can adhere to the routes.

Other construction activities will be prevented from obstructing these routes.

(3) Handrails

At any point where there may be a risk of Contractor's Personnel falling from temporary walkways, the Contractor shall provide handrails as specified in JSSS 2.5.5 [*Handrails*].

Alternatively, the Contractor shall provide fall prevention equipment with the same or better functionality.

2.5.8 Preventing Falls by Providing Temporary Working Platforms

(1) The Contractor shall provide a temporary Working Platform where Contractor's Personnel are carrying out any operation at a height 2m or more above the base and where there is any risk that Contractor's Personnel may fall.

(2) Temporary Working Platforms shall be constructed from steel tubular Scaffolding, system Scaffolding or other safe and secure types.

(3) Temporary Working Platform shall always have handrails.

(4) If handrails are temporarily removed for construction purposes, the Contractor shall take the measures described in JSSS 2.5.5 [*Handrails*].

2.5.9 Preventing Falls from the Ends and Openings of Working Platforms

(1) The Contractor shall take measures to prevent any falls from ends, edges and around any openings in Working Platform.

(2) The Contractor shall provide handrails to all ends, edges and openings.

(3) Alternatively, the Contractor may place covers over any openings, each of sound construction and designed with a bearing capacity of at least twice any likely superimposed load, including any materials, Plant or Contractor's Personnel.

(4) If for any reason it is not possible to provide handrails around working areas, or to provide covers or when covers are temporarily removed for construction purposes, the Contractor shall take the measures described in JSSS 2.5.5 [*Handrails*].

2.5.10 Preventing Falls during Excavation Works

The Contractor shall take all necessary measures to prevent falls during Excavation Works including for example:

(1) Providing fall prevention systems including temporary handrails or barriers, PFRS, PFAS or rope access.

(2) Taking appropriate measures to ensure that earth slopes do not collapse due to the fixing of any fall prevention system or to any contact of the ropes with the slope surfaces.

(3) Providing safe measures to allow Contractor's Personnel to escape from or move around any excavated slope. If it is not possible to take such measures due to the nature of the work, the Contractor shall install main ropes and have Contractor's Personnel use PFRS or PFAS. In such case, the main ropes shall be anchored securely to prevent them becoming loose or detached.

(4) Installing handrails where the slope shoulder is used as a walkway or passageway.

(5) Installing safe crossings over trench excavations at a maximum of 30m intervals and prohibiting all Contractor's Personnel from crossing on the shoring system.

(6) Providing safe means of access and egress using stairways, ladders, ramps and the like to all excavations such as trench, basement, footing excavations, which are 1.2m or more in depth, generally requiring no more than 7.5m of lateral travel for Contractor's Personnel.

(7) Prohibiting all Contractor's Personnel from crossing on struts of Earthwork Support.

2.5.11 Preventing Falls during Rope Access Work

(1) The Contractor shall take all necessary measures to prevent falls during rope access work including for example:

(a) Installing a lifeline to which the PFAS is attached in addition to the working line to which the PFRS is attached; and

(b) Ensuring that the working line, lifeline and harness have sufficient strength and that they have not suffered any damage, abrasion, deformation or corrosion and that the Contractor's Personnel are trained in the use and that they use them properly.

(2) In relation with the working line, lifeline and harness, the Contractor shall ensure that:

(a) The working line and lifeline are securely anchored to independent rigid supports vertically above the work location and cannot be detached;

(b) The working line and lifeline are of sufficient length to allow the Contractor's Personnel to move up and down safely;

(c) Measures have been taken to prevent cutting or chafing, such as providing covers, where there is a risk that the working line or lifeline may be cut or chafed due to protrusions;

(d) That the working line is anchored to two or more independent strong supports; and

(e) The positioning device shall be securely connected to the working line with connectors and the connecting devices shall be compatible with the working line used.

(3) The Contractor shall provide the following particular information in the Safety Plan and shall ensure that all Contractor's Personnel engaged in rope work are fully qualified and informed when doing so, including advising them of:

(a) Location of each anchorage used to secure the working line and lifeline;

(b) Types and strengths of the working line and lifeline to be used;

(c) Lengths of the working line and lifeline to be used;

(d) Protrusions where the ropes may be cut or chaffed and measures to prevent this; and

(e) Measures to prevent Contractor's Personnel engaged in securing the working line and lifeline to the anchorages from falling.

(4) The Contractor shall also provide measures to prevent the risk of accident to any personnel from Falling Objects; by using covered walkways and PPE.

(5) The Contractor shall appoint an Operation Leader who shall work with the rope work team at all times throughout their assignment and direct the work based on the Safety Plan and perform the following duties:

(a) Inform all Contractor's Personnel engaged in rope work of the content of the Method Statement and Safety Plan before commencement of the work;

(b) Check all equipment to be used on the day prior to commencement of the work, and repair, maintain or replace any equipment immediately if any defect is identified;

(c) Permit the Contractor's Personnel to commence work only after the measures have been taken to provide all working lines, lifelines, PFRS, PFAS and PPE; and

(d) Ensure Contractor's Personnel use PFRS and PFAS correctly and have them fix the PFAS to the life lines.

2.5.12 Further Measures for Contractor's Personnel

The Contractor shall take all necessary further measures to prevent falls during the Works including, for example, taking the following measures before any work commences:

(1) Conduct safety induction and education courses regarding fall risks for all Contractor's Personnel who shall work on locations and operations where there is a risk of falling.

(2) Prohibit the unauthorised removal of any fall prevention equipment and educate Contractor's Personnel on the dangers of this action.

(3) Educate Contractor's Personnel on the proper storage and management of all safety equipment, including for example PFRS, PFAS and PPE.

(4) Stop the work if there is a risk of bad weather such as strong wind, heavy rain, or snow.

2.5.13 PPE

The Contractor shall comply with the following requirements when Contractor's Personnel are subject to fall risks:

(1) The Contractor shall provide PFRS as follows:

(a) PFRS shall be the same as PFAS specified below but designed to restrict the movement of workers and prevent them from reaching the edge of or any openings in the working area and therefore eliminating the risk of a fall; and

(b) PFRS shall comprise of either a Safety Belt or Safety Harness, together with an anchorage, connectors and other necessary equipment, typically including a lanyard, lifeline and other devices.

(2) The Contractor shall provide PFAS as follows:

(a) The PFAS shall be the full harness type and shall comprise of a body harness, connectors, lanyard, deceleration device, lifeline, anchorage, or suitable combination of these;

(b) The use of a Safety Belt for PFAS is prohibited except where there is any risk of the Contractor's Personnel hitting the lower surface when the full harness type is used and the total fall clearance distance calculated as below, is less than the distance between the point at which a worker would be anchored and any lower level;

The total fall clearance distance for PFAS with a shock-absorbing lanyard is calculated as the total of free fall distance, deceleration distance, D-ring shift, back D-ring height, and safety factor. (Refer to OSHA Technical Manual General Information, Section V: Chapter 4 [*Fall Protection in Construction*], III. [*Measurements for Assessing Fall Hazards and Controls*], A. [*Total Fall Clearance Distance for PFAS*].).

(c) PFAS shall withstand the total force exerted on the system by the Contractor's Personnel falling, including the weight of the system itself; and

(d) For shock absorbers, an appropriate specification and type shall be selected according to the free fall distance calculated from the Contractor's Personnel's working position (height of anchor point, length of lanyard, etc.).

(3) The PFRS and PFAS shall bear the name of the manufacturer and the date of manufacture and shall be easily visible.

(4) Inspection of any safety equipment.

Before starting work using PFRS or PFAS, the systems and anchorages to which the systems are to be attached shall be inspected and defective, damaged, worn-out or missing parts or components shall be replaced.

2.5.14 Ladders and Stepladders

For further requirements, refer to JSSS 6.4 [*Walkways*].

2.5.15 Work on Roofs and Other Areas

(1) Where Contractor's Personnel are carrying out work on roof at a height of 2m or more, PFRS or PFAS shall be used with secure and safe anchorages.

(2) The Contractor shall, ensure that PFRS or PFAS are inspected before each use and declared safe for use with no defective, damaged, worn-out or missing parts or components.

(3) Prevention of Fall Risks on Floors, Fragile Roofs and Other Surfaces

When working on, accessing or crossing, floor or roof areas (including uncompleted areas under construction), or fragile roofs such as those covered with slates, tiles or other non-loadbearing coverings or where there is any risk of breaking and/or falling through such areas, the Contractor shall provide continuous bearing boards for workers to walk on, with a minimum width of 60cm or sufficiently wider to provide safe transit and where necessary to spread the bearing load on the surface and avoid penetration. The boards shall be fixed together and secured to the underlying surface by tying with ropes or clips to prevent any movement.

Unless otherwise approved by the HSO, handrails shall be provided to one or both sides.

If the underlying surface or roofing is too fragile for such measures and access is required, the Contractor shall provide an independent Scaffolding boarded walkway with handrails both sides, which does not bear upon the existing roof but that is supported independently by a Scaffolding structure.

(4) Demolition or Alteration of Buildings and Structures

When carrying out demolition or alteration of buildings or structures and where there is a risk of Contractor's Personnel falling, the Contractor shall take the following measures:

(a) Appoint an Operation Leader to be engaged on the work;

(b) Safely supervise the work; and

(c) Inform and train Contractor's Personnel engaged in the said work so that they are aware in advance of the work methods and procedures.

2.5.16 Safety Nets

(1) The Contractor shall provide safety nets when workplaces are more than 7.50m above the lower ground level or water surface level and where the use of another type of fall prevention system is impractical or has been removed.

(2) Operations shall not be undertaken until the net is in place and has been inspected and tested.

(3) Nets shall extend 2.5m beyond the edge of the work surface where Contractor's Personnel may be at risk and shall be installed as close under the working surface as practical but in no case more than 7.50m below such work surface.

(4) Nets shall be hung with sufficient clearance to prevent user's contact with the surfaces or structures below. Such clearances shall be determined by impact load testing.

(5) The mesh size of nets shall not exceed 15cm by 15cm. All new nets shall bear a label of proof test from the manufacturer that they can withstand 17,500lbf・ft (approx. 23.7kNm) minimum impact resistance. Edge ropes shall provide a minimum breaking strength of 5,000lbf (approx. 22.2kN).

(6) Forged steel safety hooks or shackles shall be used to fasten the net to its supports.

## 2.6 FALLING OBJECTS

### 2.6.1 General

The Contractor shall take all necessary measures to avoid danger and prevent damage and injury to Contractor's Personnel, Employer's Personnel and any other persons including third parties that are on or adjacent to or in the vicinity of the Site whether connected with the Works or otherwise, and who may be at risk from Falling Objects.

In general, this shall be accomplished by:

(1) Providing secure temporary barriers to prevent or capture Falling Objects, designed by the Contractor to be of sufficient strength to capture all Falling Objects without perforating to be approved by the Engineer.

(2) Providing a safe means of raising and lowering Goods, tools, waste and debris.

(3) Providing an exclusion zone with temporary barriers and all other necessary measures to prevent persons and traffic from entering areas where Falling Objects could be a risk, including providing pedestrian and traffic diversions.

Exclusion zone shall also be provided where protective debris nets (mesh sheets) or toeboard are not installed or where they are temporarily removed due to the nature of the work.

(4) Using PPE.

(5) Providing coloured warning tape, barriers and signage warning of "DANGER FALLING OBJECTS" in addition to all other preventive measures.

### 2.6.2 General Preventive Measures

(1) All horizontal boarded areas of Scaffolding shall be provided with substantial and continuous toeboards to all edges in accordance with JSSS 2.5.6 [*Toeboards*].

(2) Debris net shall be provided under and around all edges to cover all openings of Scaffolding horizontal boarded areas.

(3) Continuous and secure debris nets shall be provided to vertical sides of all Scaffolding or openings of external walls where there is no Scaffolding.

(4) Safe walkways with secure roof and walls shall be provided over entrances and exits.

(5) Protective canopies, safety fans or projecting shelves shall be provided to the edge of all roofs and to all vertical faces wherever there is a risk particularly over entrance and exits, working areas, walkways and roads, including those on areas beyond the Site boundary.

(6) Protective roofs shall be provided wherever there is a risk over working areas, walkways, footpaths and roads.

(7) All protective structures including roofs, canopies, safety fans, projecting shelves over walkways shall be fit for the purpose intended and provide a secure protective barrier capable of supporting Falling Objects and of sufficient size and dimensions to give full coverage and protection.

(8) Personnel must be prevented from entering any areas below Scaffolding where there is a risk of Falling Objects through the provision of barriers and signage.

(9) If any protection is temporarily removed then a Spotter shall be assigned to prevent personnel entering the hazard area.

(10) A Spotter shall also be assigned to direct traffic and pedestrians where diversions are necessary.

(11) Use and control of debris net (mesh sheet) to prevent objects from falling shall be as follows:

(a) Debris net shall have a mesh size of 12mm or less or a mesh size corresponding to the size of expected Falling Objects;

(b) Debris net shall comply with BS 7955 [*containment nets and sheets on construction works - Specification for performance and test methods*], composed of polyester material, reinforced as necessary to withstand the impact load of Falling Objects;

(c) Debris nets that are damaged or which contain any irregularity shall not be used;

(d) If Debris net is removed temporarily to suit the work operation, measures must be applied to avoid any risk of accident whilst it is removed and it must be restored immediately after the work operation is completed;

(e) Debris nets shall be inspected at least once a week and replaced immediately if any damage is found; and

(f) If there are any Falling Objects on thedebris nets, these shall be removed before any work starts. The occurrence shall be reported to and investigated by the HSO to prevent any reoccurrence.

(12) When the work place is close to public or private areas, roads, footpaths, buildings or houses and the like along or outside the Site boundary and where there is any risk that Falling Objects could endanger the safety of traffic and third parties in such areas, and in addition to the above preventive measures, the Contractor shall take all responsibility, make all necessary arrangements with such third parties and/or all relevant authorities, insure, serve all notices, pay all charges and provide all necessary protective services and facilities including:

(a) Provision of debris nets, safety fans, projecting shelves, temporary roofs over walkways or the like to protect such public or private areas, roads, footpaths, buildings or houses and all property, traffic, pedestrians and other persons thereon; and

(b) Safe and efficient diversion of all traffic and persons (in addition to the above or if the above measures cannot be taken) by providing all temporary barriers, signals, lighting and signs and placing a Spotter to direct traffic and pedestrians.

2.6.3 Falling Tools and Equipment

(1) The Contractor shall take appropriate measures to avoid the risk of injury or damage arising from dropped or falling tools including for example the following:

(a) Securing tools and materials;

(b) Use tool holsters, pouches, lanyards, etc.;

(c) Use debris nets, catch platforms or canopies to catch or deflect falling tools; and

(d) Use tethered tools, either with built-in connection points placed by the manufacturer or retrofitted connection points and connect tools to a lanyard. Tools can either be connected to a worker through a tool belt, harness or wristband, or anchored to a fixed structure.

2.6.4 Safety Measures against Dust and Debris

(1) For work where there is a risk of ejected or windblown dust and debris, (for example from stone crushing, concrete batching, cutting and grinding operations and the like), the Contractor shall:

(a) Enclose areas where such operations are taking place and provide protective screens or covers on storage areas;

(b) Maintain equipment and tools in good condition, use of covers and safety guards

and procedures for preventing danger due to tool breakage etc.; and

(c) Ensure that workers use appropriate PPE such as head, face and eye protection to prevent accident or injury.

(2) In strong winds and storms, the Contractor shall take measures to prevent wind-borne materials, etc. according to JSSS 2.7.3 [*Safety Measures for Strong Wind and Storms*].

2.6.5 Safety Measures against Dropping Objects

(1) The Contractor shall prohibit Contractor's Personnel from throwing or dropping objects (e.g. Scaffolding clips), generally and in no event from heights of 3m or above.

(2) The Contractor shall use a crane to bring objects down from heights of 3m or above. Alternatively, the Contractor may provide enclosed chutes to bring down objects and in addition, shall prohibit entry to the chute area or assign a Spotter.

(3) Chutes shall be designed to prevent objects being scattered over the surrounding area.

2.6.6 Preventing Accumulation of Goods at Height

(1) The Contractor shall prohibit the accumulation and storage of Goods at high levels particularly on Scaffolding and in locations where such Goods are at any risk of falling due to the effect of wind, vibration, water or gradient.

(2) Goods shall generally not be stored or allowed to accumulate within 1m of platform or work floor edges and openings or the like.

(3) When temporarily stored at height, Goods shall be restrained by ropes or sheets to prevent them from falling or slipping.

(4) Goods that are likely to scatter or spread, shall be suitably constrained by tying, boxing or bagging.

2.6.7 Working Above or Below Other Persons

(1) As a general and prevailing rule, the Contractor shall prohibit his workers from working concurrently above or below other persons. To achieve this the Contractor shall carefully coordinate the work location, content, timing of the work operations between his assigned workers.

(2) In exceptional circumstances where this is unavoidable due to the nature of the work, the Contractor shall increase the supervision and the safety procedures described in this Section to ensure that the risk from Falling Objects is avoided. Workers shall be given further training, provided with PPE and additional working equipment (e.g. slings for tools, safety nets and/or hanging bags) in order to provide additional protection and a Spotter shall be assigned while such overhead operations are being carried out.

2.6.8 Loose Rock, Boulders and the like

(1) If loose rock, boulders, trees and the like, are positioned above working areas and where there is any risk that these may pose a danger to Contractor's Personnel or Contractor's Equipment working below, unless otherwise instructed by the Engineer, the Contractor shall carefully remove such items and if necessary:

(a) Propose further safety measures to the Engineer;

(b) Consult with the Engineer and if appropriate, obtain the Engineer's Instructions for the required further measures to be taken, such as installation of temporary protective barriers; and

(c) Prohibiting Contractor's Personnel from entering the working areas until the above items have been removed or the further measures have been taken.

## 2.7 ADVERSE WEATHER REQUIREMENTS

2.7.1 Preventive Measures

(1) Whenever adverse climatic conditions render it dangerous to continue, the Contractor shall stop affected work at the Site, take preventive measures to ensure the safety of all Contractor's Personnel engaged on that work and inform the Engineer accordingly.

(2) Before, during or after adverse climatic conditions, the Contractor shall:

(a) Stop work at heights if there is any danger of falling;

(b) Stop work if there is a possibility that such work may be dangerous due to possibility of electrical shock, slippery conditions or poor visibility and the like during rain, snow or fog, and inform the Engineer accordingly;

(c) Inspect the Works and all Goods intended to be incorporated in the Works or used thereon (including any temporary structures) for damage and risk of causing any danger before resuming work. If any damage or risk is found, the Contractor shall immediately take necessary action to prohibit entry in accordance with JSSS 2.3 [*Prohibition of Entry*], inform the Engineer accordingly and if appropriate, request his instructions; and

(d) Inspect Goods for damage and risk of any danger before resuming work. If any damage and risk is found, use Contractor's Equipment and Temporary Works only after making the necessary repairs or replacement.

2.7.2 Safety Measures for Heavy Rain

When heavy rainfall takes place or is anticipated at the Site and the surrounding area, the Contractor shall:

(1) Take measures to prohibit entry in accordance with JSSS 2.3 [*Prohibition of Entry*] at the following locations:

(a) Places where landslides could be anticipated;

(b) Places where there is a risk of flow of material and equipment and soil runoff; and

(c) Places where there is a risk of damage due to flash floods, lake or river flooding.

(2) Take measures to prevent the Goods from being submerged, washed away or overturning, for example preparing, wherever possible, stock yard at a safe place, evacuating materials and equipment to a safe place, etc.

2.7.3 Safety Measures for Strong Wind and Storms

For strong wind and storms at the Site and the surrounding area, the Contractor shall:

(1) Take measures to prevent capsize, overturn or movement of Contractor's Equipment particularly tall equipment such as cranes, pile drivers, pile drilling rigs and the like.

Where possible, lower the boom of tall equipment and tie to a secure anchor with steel cable to ensure stability and prevent any risk of overturning.

(2) Always store and/or if necessary evacuate Goods to a sufficient distance away from overhead power and communication lines to prevent damage and injury.

(3) Take the following measures, as necessary, for Scaffolding and Working Platforms.

(a) Remove or furl mesh sheets to reduce wind load;

(b) Prevent Scaffolding from collapsing or sliding by dismantling Scaffolding or adding or reinforcing wall connectors;

(c) Dismantle or reinforce Scaffolding projecting from buildings by supporting ropes, cables or additional struts and bracing; and

(d) Securing Goods on Scaffolding, or lowering them to ground level.

(4) Discontinue work at elevated places.

(5) Take measures to prevent scattering of Goods, waste and debris.

2.7.4 Safety Measures for Heavy Snow and Ice

For heavy snow or ice at the Site and the surrounding area, the Contractor shall:

(1) Take fall prevention measures in snow such as setting of poles or red flags to demarcate roads, footpaths and waterways.

(2) Take fall prevention measures for workers in icy conditions or snow, by ice or snow removal on roads, platforms, stairs, ramps, slopes, passages, Scaffolding, canopies, safety fans, projecting shelves and the like.

(3) Remove snow from roofs, canopies and signs, notice boards.

(4) Prohibit works on Scaffolding, Working Platforms or staging if snow or ice is present except after its careful removal.

2.7.5 Safety Measures for Lightning

(1) Where there is any risk that lightning may affect work on or near tall objects, or near explosive or conductive metals, the Contractor should recognise lightning as an occupational hazard and take precautions to prevent exposure of all Contractor's Personnel thereto.

(2) Before commencing any outdoor work, the HSO shall ensure that local weather forecasts have been checked and wherever necessary and possible, that work has been rescheduled to avoid Contractor's Personnel being caught in hazardous weather conditions.

(3) When working outdoors, Operation Leaders and workers shall continuously monitor weather conditions so that wherever possible they remain aware of the likelihood of thunderstorms.

(4) The HSO shall identify and inform workers of buildings to be used for shelter when thunder is heard or lightning is observed. Such shelters shall be fully enclosed, substantial and preferably shall have earthed electrical wiring and plumbing. Contractor's Personnel shall remain in shelters for at least 30 minutes after hearing the last noise of thunder.

(5) If suitable buildings are not immediately available, Contractor's Personnel shall be instructed to shelter in enclosed rubber-tyre vehicles with windows closed and to remain there for at least 30 minutes after hearing the last noise of thunder. Tracked excavators, cranes or similar types of Contractor's Equipment shall not be used.

(6) The Safety Plan shall include lightning safety procedures which shall:

(a) Inform of all required actions when thunder is heard, lightning is seen or other signs of approaching thunderstorms are perceived;

(b) Indicate how information is to be disseminated amongst personnel on the Site;

(c) Identify locations and requirements for safe shelters;

(d) Indicate response times necessary for all personnel to reach safe shelters; and

(e) Specify methods to determine when to stop and resume affected work activities.

(7) The Contractor shall display signs with information on lightning safety.

(8) The Contractor shall provide adequate training to all personnel on lightning safety with the safety induction training required by JSSS 1.20 [*Safety Induction Training*].

(9) Unless otherwise determined to be safe by the HSO, the Contractor shall prohibit any hazardous exposed work and external work at heights during thunder storms including

for example:

(a) Work on or from Scaffolding;

(b) Work with, on or in the vicinity of cranes or hoists or similar Contractor's Equipment;

(c) Work on tops of walls, exposed, elevated slabs or roofs;

(d) Erection or removal of steel structures;

(e) Erection of steel reinforcement and other metal components.

(f) Outdoor work of power utility; and

(g) Work of plumbing and pipe fitting.

2.7.6 Safety Measures for Earthquake and Tsunami

To the extent that time is available and forewarning is given, the Contractor shall evacuate workers to the designated meeting place in the event of earthquakes or tsunamis when the relevant authority issues a warning for the occurrence or prediction of earthquakes or tsunamis.

2.7.7 Inspection

Following the occurrence of any adverse weather or after any earthquake and before re-commencing any work, the Contractor shall:

(1) Perform a visual inspection.

(2) Check all measured values of any instruments to ensure the safety of Temporary Works.

(3) When abnormality is found in instruments, recalibrate or replace them.

(4) If any damage or fault is found in the TW, immediately carry out repair, replacement and/or reinforcement works, as necessary.

(5) Keep the Engineer informed of inspection and monitoring results.

## 2.8 FIRE PREVENTION

2.8.1 Measures and Facilities

Unless otherwise specified in the Particular Safety Specification, the Contractor shall take measures and provide facilities for fire prevention and fire-fighting and shall ensure that such measures are readily available and at all times at the Site and at any offices and accommodation for Contractor's and Employer's Personnel.

(1) Fire Response Plan:

The Contractor shall:

(a) Prepare a Fire Response Plan detailing the proposed fire prevention and fire-fighting measures and facilities and include this as a part of the Safety Plan;

(b) Designate a person (or persons) responsible for fire prevention, fire-fighting and also for evacuation in the event of a fire;

(c) Prepare a firefighting training plan as a part of the Fire Response Plan; and

(d) Carry out all training and keep records of such training in accordance with JSSS 1.19.6 [*Records of Education and Training*].

(2) Fire Response Measures and Facilities:

The Contractor shall:

(a) Provide fire hoses, hose-reels, fire hydrants and similar equipment, and temporary water supply where considered necessary by the HSO;

(b) Provide fire extinguishers and fire blankets according to the area and purpose of use, such as for ordinary fires, oil fires, electric fires and the like;

Fire extinguishers shall be regularly inspected, refilled, serviced and certified as such by a qualified and independent safety company approved by the Engineer;

(c) Prohibit smoking anywhere on the Site other than designated smoking areas, and implement effective fire prevention measures by placing buckets filled with water or sand in smoking and other dangerous areas; and

(d) Train Contractors Personnel and ensure that a team or teams is available to respond in the event of a fire and in advance or in place of attendance by any public firefighting service.

2.8.2 Evacuation

In the event of a fire, the Contractor shall facilitate evacuation by:

(1) Creating an evacuation route map if necessary and post this in easy-to-see places.

(2) Display the evacuation routes as necessary at all work places.

(3) Install multiple evacuation routes and staircases for buildings with 2 or more floors and a capacity of 30 people or more.

(4) Establish a communication method to inform the Contractor's Personnel, Employer's Personnel and any other persons that are on the Site so that they are aware of danger and that they must evacuate due to a fire.

2.8.3 Management of Flammable and Combustible Materials

By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any items in this Section or relevant to the subject of this Section and which are not fully covered by JSSS and unless otherwise approved by the Engineer, the Contractor shall take necessary measures for fire prevention complying with OSHA 1926.152 [*Flammable liquids*] and OSHA 1926.153 [*Liquefied petroleum gas (LPG)*] or other relevant OSHA standards for the use and storage of

flammable and combustible materials and gases, including gasoline, kerosene, light oil, heavy oil, creosote oil, gear oil, cylinder oil, and other lubricating oils and organic solvents such as acetone, toluene, LPG and other gases including oxygen, acetylene etc. (hereinafter collectively referred to as "flammable and combustible materials" in this Clause).

In addition, the Contractor shall:

(1) Appoint a person who is appropriately qualified, skilled and experienced in handling flammable and combustible materials, to be responsible for the storage and handling flammable and combustible materials and notify the name of such person to the Engineer.

(2) Store flammable and combustible materials in a purpose-built building or compound, fit for the intended purpose, well ventilated and secure, and protecting the stored materials from direct sunlight and extreme heat.

(3) Take measures to prohibit entry to unauthorised personnel and display signage prohibiting the use of flame.

(4) Determine handling methods of flammable and combustible materials, which shall be notified to the Engineer, and ensure Contractor's Personnel are fully aware of the methods.

(5) Provide fire prevention and firefighting facilities appropriate to the stored flammable and combustible materials.

2.8.4 Measures for Electric and Gas Welding and Cutting

The Contractor shall refer to and comply with JSSS 6.8 [*Electric and Gas Welding and Cutting*] for the fire prevention requirements for electric and gas welding and cutting works.

## 2.9 PPE AND FIRST AID

2.9.1 PPE

(1) General

(a) Further to the requirements of JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*] the Contractor shall provide all necessary and required PPE free of charge, to all Contractor's Personnel, ensure that this is used properly, kept in good condition and replaced in the case of being worn-out, lost or damaged;

(b) PPE shall comply with the requirements of this Section;

(c) The Contractor shall ensure as a minimum and mandatory requirement, that all Contractor's Personnel are provided with the following PPE and the Contractor shall make sure that all Contractor's Personnel wear or use such PPE as appropriate whenever they are on the Site:

(i) Head Protection; and

(ii) Protective Footwear.

(d) The following additional PPE shall be provided whenever required by the working environment:

(i) Eye and Face Protection;

(ii) Ear Protection;

(iii) Respiratory Protection;

(iv) PPE for PFRS and PFAS (Safety Harnesses, Safety Belts and the like);

(v) Gloves; and

(vi) Body Protection.

(e) The particular requirements for PPE are not repeated in each Section of JSSS but appropriate PPE must always be provided by the Contractor; and

(f) PPE described in JSSS 2.9.1 (4) to (11) are examples only and not exhaustive, and the Contractor shall provide further PPE at his cost to the Contractor's Personnel when and where any work requires specific PPE.

(2) Additional Inspection, Testing and Maintenance

Further to the requirements of JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*] and unless otherwise required by the manufacturer or approved by the Engineer:

(a) Frequently used PPE shall be inspected, tested and maintained at least once a month; and

(b) Occasionally used PPE shall be inspected before every use and tested and maintained at least once every three (3) months.

The HSO shall also conduct regular checks to ascertain any requirements for the following:

(a) Inventory and reorder supplies;

(b) Expedite any outstanding manufacturer's response on repair or maintenance issues; and

(c) Schedule of training and retraining.

(3) PPE Signage

(a) The Contractor shall display signage at specific places at the Site where the wearing of PPE is mandatory;

(b) Such signage shall include for example:

"Head Protection Must be Worn"
"Eye* Protection Must be Worn"
(* face, ear or other)

(4) Head Protection

Head protection shall protect workers' heads and necks against injury from falling or flying objects, risk of head bumping, hair getting tangled in machinery, chemical drips or splash, climate or temperature, reduce the impact from tripping or falling and protect workers against electric shocks.

Head protection shall ensure a level of performance that is equal to or greater than the following standards:

**Table 2.9.1: Applicable Standards for Head Protection**

| | Standard | Title of Standard |
|---|---|---|
| 1 | JIS T8131 | Industrial Safety Helmets |
| 2 | ANSI Z89.1 | Industrial Head Protection |
| 3 | BS EN 397 | Industrial Safety Helmets |

(5) Protective Footwear

Protective footwear shall protect against foot injury due to crushing by superimposed loads, impact injuries from dropped or Falling Objects, foot injuries from treading on sharp penetrating objects, injuries from electric shock and also shall increase adhesion preventing workers' from slipping and falling.

Protective Footwear shall have a variety of sole patterns and materials to help prevent slips in different conditions, including oil or chemical-resistant soles. It can also be anti-static, electrically insulating or thermally insulating, appropriate footwear that shall be selected for the risks identified.

Protective footwear shall ensure a level of performance that is equal to or greater than the following standards:

**Table 2.9.2: Applicable Standards for Protective Footwear**

| | Standard | Title of Standard |
|---|---|---|
| 1 | JIS T8101 | Protective footwear |
| 2 | ASTM F2413 | Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear |
| 3 | BS EN ISO 20346<br><br>BS EN ISO 20349 | Personal protective equipment – Protective footwear<br><br>Personal protective equipment. Footwear protecting against risks in foundries and welding |

(6) Eye and Face Protection

Eye and face protection shall protect workers' eyes and face from harmful materials (for example dust, chemicals, liquid splash, flying objects, molten metal, gas and steam, extreme light, flashes and hazardous rays, dirt and debris, etc.).

Eye and face protection can include safety spectacles, goggles, face masks, face shields, visors and the like. Selected protection shall have the right combination of /impact/dust/splash/molten metal eye and face protection for the task and shall be selected for the risks identified.

Eye and face protection shall ensure a level of performance that is equal to or greater than the following standards:

**Table 2.9.3: Applicable Standards for Eye and Face Protection**

| | Standard | Title of Standard |
|---|---|---|
| 1 | JIS T 8141<br>JIS T 8142 | Personal eye protectors for optical radiations<br>Personal face protectors for welding |
| 2 | ANSI Z87.1 | American National Standard for Occupational and Educational Personal Eye and Face Protection Devices |
| 3 | BS EN 166<br>BS EN ISO 4007 | Personal eye protection. Specifications<br>Personal protective equipment. Eye and face protection. Vocabulary |

(7) Ear Protection

Ear protection shall protect workers' hearing against injury from continuous, loud or Intense Noise by providing soundproofing.

The Contractor shall ensure that workers are still able to receive and immediately react to oral instructions and danger warnings when wearing ear protection.

Ear protection shall ensure a level of performance that is equal to or greater than the following standards:

**Table 2.9.4: Applicable Standards for Ear Protection**

| | Standard | Title of Standard |
|---|---|---|
| 1 | JIS T 8161 | Ear protectors |
| 2 | ANSI/ASA S12.6 | Methods for Measuring the Real-Ear Attenuation of Hearing Protectors |
| 3 | BS EN ISO 4869-1<br><br>BS EN ISO 4869-2 | Acoustics. Hearing protectors. Subjective method for the measurement of sound attenuation<br><br>Acoustics. Hearing protectors. Estimation of effective A-weighted sound pressure levels when hearing protectors are worn |

| | | |
|---|---|---|
| | BS EN ISO 4869-3 | Acoustics. Hearing protectors. Measurement of insertion loss of ear-muff type protectors using an acoustic test fixture |
| | BS EN ISO 4869-4 | Acoustics. Hearing protectors. Measurement of effective sound pressure levels for level-dependent sound-restoration ear muffs |

(8) Respiratory Protection Equipment (RPE)

RPE shall protect workers' airways, lungs and related bodily systems against damage and injury from Harmful Substances or from oxygen-deficient atmospheres when other controls are either not possible or insufficient on their own.

RPE shall be selected with due consideration of:

(a) the Hazardous Substance(s) and the concentration in the air (exposure);

(b) the form of the substance in the air (e.g. gas, particle, vapour);

(c) the type of work being carried out; and

(d) the specific wearer requirements, such as other PPE or a need for spectacles.

RPE shall be:

(a) Correct for the Hazardous Substance such that it reduces exposure to the level required to protect the wearer's health; and

(b) Correct for the wearer, task and environment, such that the wearer can work freely and without additional risks due to the RPE.

As for details, refer to HSE publication HSG53.

RPE shall fit properly and filters shall be of the correct type as each filter is effective for only a limited range of substances. Filters have only a limited life and shall be changed regularly to maintain performance.

When replacing parts such as filters, use only manufacturers original parts, ensure that the correct type is selected and fit in accordance with the manufacturer's instructions.

Where there is a shortage of oxygen or any danger of losing consciousness due to exposure to high levels of harmful fumes, the Contractor shall only use breathing apparatus, never a filtering cartridge.

RPE shall ensure a level of performance that is equal to or greater than the following standards:

**Table 2.9.5: Applicable Standards for RPE**

| | **Standard** | **Title of Standard** |
|---|---|---|
| 1 | JIS T 8151<br>JIS T 8157 | Particulate respirator<br>Powered air purifying respirator |
| 2 | BS EN 149: 2001+A1: 2009<br><br>BS EN 14593-1: 2018 | Respiratory protective devices. Filtering half masks to protect against particles.<br><br>Respiratory protective devices. Compressed air line breathing devices with demand valve. Devices with a full-face mask. |

| | | |
|---|---|---|
| 3 | ANSI Z88.2-2015 | Practices for Respiratory Protection |

(9) Safety Harnesses and Safety Belts

PPE for PFRS shall prevent the risk of workers falling from a height or sliding down slopes.

PPE for PFAS shall arrest a worker in a fall from a height or sliding down slopes.

For further requirements on PPE for PFRS and PFAS, refer to JSSS 2.5.13 [*PPE*].

PPE for PFRS and PFAS shall ensure a level of performance that is equal to or greater than the following standards:

**Table 2.9.6: Applicable Standards for PPE for PFRS and PFAS**

| | **Standard** | **Title of Standard** |
|---|---|---|
| 1 | JIS T8165 | Personal fall-arrest systems |
| 2 | ANSI Z359.0 to Z359.16 | ANSI/ASSE Z359 Fall Protection and Arrest Standards Package |
| 3 | BS EN 361<br><br>BS EN 358 | Personal protective equipment against falls from a height. Full body harnesses<br>Personal protective equipment for work positioning and prevention of falls from a height. Belts and lanyards for work positioning or restraint |

(10) Gloves

Gloves shall protect workers' hands from electric shocks, sparks during welding and fusing work, molten metal, heated metal, etc., and shall reduce the vibrations transmitted to workers' hands by tools, machines, etc.

Gloves shall ensure a level of performance that is equal to or greater than the following standards:

**Table 2.9.7: Applicable Standards for Gloves**

| | **Standard** | **Title of Standard** |
|---|---|---|
| 1 | JIS T 8113<br>JIS T 8114 | Protective Leather Gloves for Welders<br>Vibration isolation gloves |
| 2 | ASTM D120<br>ANSI S2.73 | Standard Specification for Rubber Insulating Gloves<br>Mechanical vibration and shock – Hand-arm vibration |
| 3 | BS EN 60903<br>BS EN 12477 | Live working. Gloves of insulating material<br>Protective gloves for welders |

(11) Body Protection

If the HSO considers necessary, Contractor's Personnel shall be supplied with and shall wear suitable body protection appropriate for the working environment.

Risks such as from chemical or metal splash, spray from pressure leaks or spray guns, contaminated dust, impact or penetration, entanglement of own clothing, hot and extremely cold work; and the like shall be considered and avoided through the provision where necessary of special protective clothing. This may include for example flame-retardant, anti-static, chain mail, chemically impermeable, and high-visibility clothing and the like.

Body Protection shall be selected and provided for the risks to be identified.

Body Protection shall be kept reasonably clean and shall be replaced when worn out or damaged.

2.9.2 First Aid

(1) General

The Contractor shall ensure that trained personnel and adequate first aid equipment and supplies shall be readily available at the Site. First aid kits shall be stored at selected locations on the Site where they are most likely to be needed; they must be accessible with the minimum of delay.

(2) Training

A representative number of Contractor's Personnel selected by the HSO shall be trained in first aid (including CPR) to a minimum standard of that recommended by the International Federation of Red Cross and Red Crescent Societies standard course or equivalent.

(3) First Aid Kits

(a) By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any items in this Clause or relevant to the subject of this Clause and which are not fully covered by JSSS, the Contractor shall take necessary measures for first aid complying with OSHA 1910 Subpart K [*Medical and First Aid*];

(b) First Aid kits shall comply with ANSI Z308.1 and unless otherwise specified in the Particular Safety Specification, Class A first aid kits shall be provided at the working area(s) on Site and one (1) Class B safety kit shall be provide at the sick bay;

(c) All persons working at the site need to be aware of their purpose and location. Adequate signage shall be provided at the Site to show the location of the first aid kit(s);

(d) Each first aid kit shall contain the specified items and quantities listed in ANSI Z308 as follows:

(i) Adhesive Bandage;

(ii) Adhesive Tape;

(iii) Antibiotic Application;

(iv) Antiseptic;

(v) Breathing Barrier;

(vi) Burn Dressing (gel soaked);

(vii) Burn Treatment;

(viii) Cold Pack;

(ix) Eye Covering, with means of attachment;

(x) Eye/Skin Wash;

(xi) First Aid Guide;

(xii) Hand Sanitiser;

(xiii) Medical Exam Gloves;

(xiv) Roller Bandage;

(xv) Scissors;

(xvi) Splint;

(xvii) Sterile pad;

(xviii) Tourniquet;

(xix) Trauma pad; and

(xx) Triangular Bandage.

(e) Each first aid kit shall contain any additional items and quantities that may be necessary according to the requirements and location of the Works;

(f) The Contractor shall ensure that the following additional items are provided with each first aid kit:

(i) A list of emergency phone numbers;

(ii) Flashlight and extra batteries; and

(iii) Bottled drinking water.

(g) To prevent disease transmission when giving first aid, first aid kits shall contain PPE such as disposable gloves, CPR breathing barriers, eye protection and like supplies;

(h) First aid kits shall be inspected at least once a month;

The HSO shall also conduct regular checks to ascertain any requirements for the following:

(i) Inventory and reorder supplies;

(ii) Schedule of training and retraining.

(4) Automated External Defibrillator – AED.

(a) Unless otherwise specified in the Particular Safety Specification, and amongst any other first aid equipment to be provided by the Contractor, the Contractor shall provide at least one (1) AED at the Site;

(b) The AED shall be stored at a selected location on the Site where it is most likely to be needed and it must be accessible with the minimum of delay;

(c) All personnel at the site shall be kept informed of the purpose and location and the Contractor shall train a sufficient number of personnel in its use;

(d) Adequate signage shall be provided at the Site to show the location of the AED together with instructions for its use;

(e) The AED shall be regularly inspected in accordance with the manufacturer's instructions and as follows:

(i) Visually inspect looking for dirt, damage, or contamination;

(ii) Inspect electrodes ensuring that they are unexpired and in their original, sealed packages, two sets shall be provided;

(iii) Test primary battery;

(iv) Make sure a backup battery is stored with the AED and test backup battery; and

(v) Keep the AED charged and check it is maintaining a charge.

The HSO shall also conduct regular checks to ascertain any requirements for the following:

(i) Inventory and reorder supplies;

(ii) Follow up with the manufacturer on maintenance issues; and

(iii) Schedule training and retraining.

(f) The AED shall ensure a level of performance that is equal to or greater than the following standards:

**Table 2.9.7: Applicable Standards for AED**

| | Standard | Title of Standard |
|---|---|---|
| 1 | BS EN 60601-2-4:2011+A1:2019 | Medical electrical equipment: Particular requirements for the safety of cardiac defibrillators |

# CHAPTER 3: EXISTING UNDERGROUND, CONCEALED AND OVERHEAD SERVICES

## 3.1 UNDERGROUND AND CONCEALED SERVICES

### 3.1.1 General

(1) This Section applies where there are existing underground or concealed pipes, cables, wires, ducts and the like within the Site (hereinafter collectively referred to as "Underground or Concealed Services"), which may require locating, preserving, avoiding and protecting, diverting, removing, relocating or replacing by the Contractor. The Employer shall provide, at the request of the Contractor, such reasonable assistance as to allow the Contractor to carry out such work.

(2) If Underground or Concealed Services are the property of a relevant authority and unless otherwise specified in the Particular Safety Specification, the Contractor shall, in accordance with the agreement between the Employer and the owner of Underground or Concealed Services regarding the actual scope of work to be carried out, comply with the official regulations and procedures of the authority.

(3) In the case of Underground or Concealed Services which are the property of a third party, the Contractor shall take the procedure of obtaining permission for the work mentioned in (4) below.

(4) In accordance with the agreement between the Employer and the owner of Underground or Concealed Services regarding the actual scope of work to be carried out, permission for its execution and details of the procedures and requirements (including responsibility for insurance and safety procedures), the Contractor (with reasonable assistance of the Employer) may consult with the owner of Underground or Concealed Services to obtain permission to execute the work following the preparations described in JSSS 3.1.2 [*Preparation and Work Planning*] as well as the requirements of the Contract and the instruction of the Engineer.

(5) In the case of Underground or Concealed Services which are the property of the Employer, the permission mentioned in (4) above shall be deemed to have been provided by the Employer subject to the preparations described in JSSS 3.1.2 [*Preparation and Work Planning*].

### 3.1.2 Preparation and Work Planning

(1) Unless otherwise specified in the Particular Safety Specification, the Contractor shall make the following preparations prior to commencing any work for locating, protecting, diverting, removing, replacing or the like of any Underground or Concealed Services:

(a) Prepare a Method Statement describing the measures for carrying out the required work and ensuring the safety of all persons engaged thereon;

(b) Prepare an emergency call list and communication procedure;

(c) Obtain particular information from the Employer or relevant authority on the procedures for emergency disconnection/de-energisation of the Underground or Concealed Services in case of an accident;

(d) Provide and use cable avoidance tools or cable locators, trace the position and routes on ground surfaces, walls and floors of all Underground or Concealed Services, mark routes with paint and/or wooden pegs or barriers and clear signage and ensure that no unauthorised work take place within the area;

(e) Conduct careful exploratory hand excavation to locate the exact position, depth and route of the Underground or Concealed Services and proceed to expose and protect same or prepare for the required work; and

(f) The Method Statement shall be revised based on the information obtained from the above locating and exploratory work.

(2) In case Underground or Concealed Services of which existence are predicted at the Site, but not shown in the Contract, the Contractor shall inform the Engineer of the existence for the Engineer's instruction to the Contractor.

(3) Machine excavation shall not be allowed when there is any risk that Underground or Concealed Services may exist in the location or vicinity of the excavation.

(4) The Contractor shall take all measures necessary to ensure the protection and safety of road traffic, pedestrians, Contractor's Personnel and any other persons affected by or potentially affected by the Works as required by the Contract and also by JSSS including JSSS 2.2 [*Risk Control around the Site*].

3.1.3 Requirements and Precautions

Unless otherwise specified in the Particular Safety Specification, the Contractor shall:

(1) Protect and secure all Underground or Concealed Services throughout the execution of the Works and avoid all damage to such services and adjacent areas, particularly when backfilling, compacting and reinstating surfaces.

(2) Take care not to damage the Underground or Concealed Services when using power tools for example asphalt cutting machine to break through paved surfaces above Underground or Concealed Services.

(3) Take care to safely expose, support and protect any drains, other services (new or existing) which follow or cross the route of Underground or Concealed Services.

(4) Reinstate surface paving with material and methods specified, without leaving any difference in level with surrounding pavement and replace all surface markings and signage.

(5) Adequately test all Underground or Concealed Services after completing any diversion, replacement or alteration work, to ensure the safety and integrity and to avoid any future risk of injury, leakage or pollution.

(6) Implement strict safety and fire prevention measures throughout the work including prohibiting the use of equipment that can create any damage or fire hazard (such as welding, cutting and electrical equipment) in the vicinity of any Underground or Concealed Services conveying flammable, combustible or explosive liquids or gases.

(7) Be aware of and avoid electric shock when excavating for or near any cables, wires or cable ducts, ensure the safety of all Contractor's Personnel and ensure the provision and use of PPE.

(8) Be aware of and avoid subsidence or collapse of excavations due to Contractor's Equipment, vehicles, other equipment or other activities being too close to any excavation.

(9) Provide adequate temporary barriers, signage, markings and lighting to all areas where work on or adjacent to Underground or Concealed Services is taking place.

(10) Assign a full time Spotter in accordance with the requirements of JSSS 2.4 [*Spotters*] when work in progress poses any risk to the Underground or Concealed Services, Contractor's Personnel or the Works.

(11) Provide electrical cable marker tiles over all buried wires, cables and cable ducts to warn and protect against the risk of future mechanical damage to same.

(12) Provide permanent markers or signage at the surface to warn of the presence, route and any danger of any Underground or Concealed Services.

(13) Prepare as-built drawings of Underground or Concealed Services after completion of the associated work showing accurate positions, depth, sizes, routes and details and submit to the Engineer.

3.1.4 Instruction for Contractor's Personnel

Prior to the start of work to or in the vicinity of Underground or Concealed Services, the Contractor shall instruct relevant Contractor's Personnel of the following:

(1) Location of live cables and equipment.

(2) Risk of electric shock from live cables or equipment.

(3) Separation distances from live cables and equipment.

(4) Work procedure.

(5) Preventive measures against electric shock.

(6) PPE to be used.

(7) Electric shock treatment in accordance with JSSS 3.1.5 [*Electric Shock Treatment*].

(8) Response in the event of an accident in accordance with JSSS 1.24 [*Accident Response Plan*] and JSSS 1.25 [*Measures at the Time Accidents Occur*].

(9) Appropriate procedures in the case of accidents arising from contact with or damage to any other services.

3.1.5 Electrical Shock Treatment

The following measures shall be taken in the event of an electric shock accident.

(1) Prohibit workers from touching the chassis or body of any Contractor's Equipment or materials that have become electrified by any live circuit and keep all Contractor's Personnel well away from such equipment, materials and the working area.

(2) When the unit of Contractor's Equipment which is in contact with or in close proximity to a live circuit does not get an electrical shock, the operator shall immediately move the equipment to an adjacent safe location.

(3) When it is not possible to move the Contractor's Equipment away, the operator shall remain in the cabin until the affected live circuits are de-energised.

(4) Prevent secondary electric shock accident by permitting only those who have received training in electrical rescue to rescue the casualties of an electric shock accident.

(5) Immediately perform primary lifesaving measures such as CPR, if necessary use an Automated External Defibrillator (AED) and call for emergency medical support.

(6) Report to the Engineer in accordance with JSSS 1.25 [*Measures at the Time Accidents Occur*] and where applicable to the representative of the relevant authority.

## 3.2 OVERHEAD SERVICES

3.2.1 General

(1) This Section applies where there are exposed or overhead power or communication cables, wires, ducts, pipes and the like within the Site (hereinafter collectively referred to as "Overhead Services"), and which may require preserving, protecting, diverting, removing, relocating or replacing by the Contractor. The Employer shall provide, at the request of the Contractor, such reasonable assistance as to allow the Contractor to carry out such work.

(2) If Overhead Services are the property of a relevant authority and unless otherwise specified in the Particular Safety Specification, the Contractor shall, in accordance with the agreement between the Employer and the owner of Overhead Services regarding the actual scope of work to be carried out, comply with the official regulations and procedures of the relevant authority.

(3) In the case of the Overhead Services which are the property of a third party, the Contractor shall take the procedure for the works mentioned in (4) below.

(4) In accordance with the agreement between the Employer and the owner of Overhead Services regarding the actual scope of work to be carried out, permission for its execution and details of the procedures and requirements (including responsibility for insurance and safety procedures), the Contractor (with reasonable assistance of the Employer and Engineer) may consult with the owner of Overhead Services to obtain a permission of the owner of Overhead Services to execute the works following the preparations described in JSSS 3.2.2 [*Preparation and Work Planning*] as well as the requirements of the Contract and the instructions of the Engineer.

(5) In the case of Overhead Services which are the property of the Employer, the permission mentioned in (4) above shall be deemed to have been provided by the Employer subject to the preparations described in JSSS 3.2.2 [*Preparation and Work Planning*].

3.2.2 Preparation and Work Planning

(1) Unless otherwise specified in the Particular Safety Specification, the Contractor shall make the following preparations prior to commencing any work for protecting, diverting, removing, replacing or the like of any Overhead Services:

(a) Prepare a detailed Method Statement describing the measures for carrying out the required work and ensuring the safety of all persons engaged thereon;

(b) Prepare an emergency call list and communication procedure; and

(c) Obtain particular information from the Employer or relevant authority on the procedures for emergency de-energisation of the Overhead Services in case of an accident.

3.2.3 Requirements and Precautions

Unless otherwise specified in the Particular Safety Specification, the Contractor shall:

(1) Protect and secure all Overhead Services throughout the execution of the Works.

(2) Adequately test all Overhead Services after completing any diversion, replacement or alteration work, to ensure the safety and integrity and to avoid any future risk of injury, leakage or pollution.

(3) Be aware of and avoid electric shock when working near any cables or wires, ensure the safety of all Contractor's Personnel and ensure the provision and use of PPE.

(4) Be aware of and avoid subsidence or collapse of support structures of Overhead Services due to excavations being too close.

(5) Provide adequate temporary barriers, signage, markings and lighting to all areas where work on or adjacent to Overhead Services is taking place.

(6) Provide insulating protective pipe or casings to the Overhead Services.

(7) Create safe zones free from danger arising from the use Contractor's Equipment by demarcating the route and turning ranges and providing adequate signage and barriers.

(8) Prevent Contractor's Equipment, wire ropes or chains from entering the safe zones and limit the moving range of crane jibs and other high equipment.

(9) Assign a full time Spotter in accordance with the requirements of JSSS 2.4 [*Spotters*] when work in progress poses any risk of close proximity or contact with Overhead Services, Contractor's Personnel or the Works.

(10) Maintain a safe separation distance between any charged electrical circuit and Contractor's Personnel, Contractor's Equipment, Scaffolding and any other Temporary Works, wire rope, tools and materials. The separation distance shall be the maximum relevant value shown Table 3.2.1 [*Safe Separation Distances*] any values that may be prescribed by the Laws of the Country or any values that may be prescribed by the regulations of the relevant authority:

**Table 3.2.1: Safe Separation Distances**

| | Circuit Voltage | Separation Distance |
|---|---|---|
| 1 | Extra-high Voltage<br>(7000V and above) | 2m (20cm to be added for every 10,000V increase and fraction from 60,000V) |
| 2 | High Voltage<br>(600V up to 7000V) | 1.2m |
| 3 | Low Voltage<br>(Less than 600V) | 1m |

3.2.4 Instruction for Contractor's Personnel

Prior to the start of work to or in the vicinity of Overhead Services, the Contractor shall instruct relevant Contractor's Personnel of the same items as listed in JSSS 3.1.4 [*Instruction for Contractor's Personnel*]

3.2.5 Electrical Shock Treatment

The Contractor shall take the measures prescribed in JSSS 3.1.5 [*Electrical Shock Treatment*].

# CHAPTER 4: CONTRACTOR'S EQUIPMENT

## 4.1 GENERAL REQUIREMENTS

### 4.1.1 Scope

(1) This Chapter specifies the safety requirements for Contractor's Equipment which shall include mobile equipment, static equipment, small equipment, tools and electric power equipment as further described in the following Clauses.

(2) The Contractor shall ensure the safety of all Contractor's Personnel, Employer's Personnel and any other persons that are on the Site, adjacent to the Site and other places where they may be affected by Contractor's Equipment in operation, standby or storage or when such equipment is being maintained or transported.

(3) For additional requirements for hoisting, rigging and cranes, refer to JSSS Chapter 5 [*Hoisting and Rigging*].

(4) Any reference to "operator" in this Chapter and elsewhere in JSSS shall be deemed to include "driver" also.

(5) Mobile equipment including wheeled or tracked, self-propelled construction machinery such as:

(a) Surface excavation and spoil movement equipment for bulk excavation, grading and levelling, such as bulldozers, graders and tractor excavators;

(b) Excavators such as backhoes, face shovels, power shovels;

(c) Loaders such as payloaders and face shovels;

(d) Dump trucks for removal or importation of spoil;

(e) Specialist foundation equipment such as pile driving and boring equipment;

(f) Compaction and surface treatment equipment such as smooth or sheepsfoot rollers, pneumatic and vibration rollers, asphalt finishers;

(g) Mobile cranes;

(h) Piling equipment;

(i) Concreting equipment such as ready-mixed concrete trucks and pump trucks;

(j) Demolition equipment such as breakers, concrete crushers and demolition grippers;

(k) Transportation Equipment, such as cars and buses for Contractor's Personnel and trucks and trailers for transporting Goods to, around and from the Site; and

(l) Workboat for Diving Works.

(6) Static equipment includes powered stationary equipment such as:

(a) Stone crushing plants and screening equipment;

(b) Concrete and asphalt concrete batching plants;

(c) Tower cranes, derrick cranes;

(d) Elevators;

(e) Material conveyors;

(f) Air compressors;

(g) Engine Generators, submersible pumps and engine pumps; and

(h) Reinforcement, cutting and bending machines.

(7) Small equipment and tools such as:

(a) Hand steered vibrating rollers;

(b) Plate compactors and vibratory rammers;

(c) Portable conveyors;

(d) Pipe bending machines;

(e) Drills, hammers, breakers, compactors and compressors;

(f) Wood processing equipment;

(g) Independent concrete mixers;

(h) Air extract or blowing equipment for improving the working area environment;

(i) Jack hammers, drills;

(j) Chain saws;

(k) Hand operated equipment such as jacks, winches, lever hoists; and

(l) Hand tools such as wrenches, chisels, hand saw, picks, hammers.

4.1.2 Compliance Standards

(1) By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], the Contractor shall comply with the requirements of this Chapter, read jointly with and including the Provision and Use of Work Equipment Regulations 1998 (PUWER), HSE Guidance in UK.

(2) In accordance with these regulations, together with JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*] the Contractor shall ensure that all Contractor's Equipment provided for use upon the Works is:

(a) Suitable and fit for the purpose for which it is intended;

(b) Safe for use, maintained in a safe condition and inspected to ensure it is correctly installed and used and does not subsequently deteriorate;

(c) Used only by people who have received adequate information, instruction and training;

(d) Accompanied by suitable health and safety measures, such as protective devices and controls. These shall include emergency stop devices, adequate means of isolation from sources of energy, clearly visible markings and warning devices; and

(e) Used for the designed and intended purpose.

4.1.3 Manufacturer's Documentation

The Contractor shall obtain a copy of the following official Manufacturer's documentation for all units of Contractor's Equipment:

(1) Safety instructions and recommendations.

(2) Operation, maintenance and repair manual.

The Contractor shall inform all relevant Contractor's Personnel of the content of the same, provide further safety training as necessary and ensure full compliance by all relevant Contractor's Personnel with such instructions and recommendations to assist in enforcing the safe use of Contractor's Equipment.

4.1.4 Instruction for Contractor's Personnel

Further to the requirements of JSSS 1.7 [*Contractor's Safety Plans*], JSSS 1.9 [*Contractor's*

*Method Statements*] and JSSS 1.15 [*Contractor's Safety Management Activities*], the Contractor shall include details of the following in the Method Statement and Safety Plan for works involving the use of Contractor's Equipment and shall fully inform all relevant Contractor's Personnel associated therewith of all requirements before the commencement of any such operations, such as:

(1) Scope of work, locations and areas, work methods, dimensions, levels and quantities to be achieved.

(2) Types, capacities and numbers of units.

(3) Workplaces, area limits and operational routes, restricted areas, locations of caution signs and fences.

(4) Preservation of safe access, walkways and footpaths around the working areas and transportation areas.

(5) Identities and roles of and location(s) for Spotters and the communication and signalling requirements, including equipment to be used.

(6) Working conditions and required mitigation measures for workers and any other persons against vibration, noise, dust and the like.

(7) Safety measures in the working area, any nearby areas for storage of Dangerous Goods or Hazardous Substances, Hazardous Areas, Operational Areas or areas where Dangerous Work is taking place.

(8) Potential danger to any persons who may be affected by the use of Contractor's Equipment and the required measures to avoid any accident or injury.

(9) Any potential hazards in the use of Contractor's Equipment including those which may create a risk of falling or overturning.

(10) Restrictions to the movement and operation of Contractor's Equipment such as existing structures, foundations, surfaces, underground or overhead services and Dangerous Goods storage.

(11) Measures to be taken in case of breakdown, defect or fault in Contractor's Equipment including location of areas for inspection and maintenance.

(12) Name of the authorised operator for each unit of Contractor's Equipment when authorised operator is necessary to be assigned.

(13) Name and contact of the HSO to inform when there are any requirements for inspection, maintenance and repair of Contractor's Equipment.

4.1.5 Safety Training

(1) The Contractor shall provide the relevant Contractor's Personnel with health and safety training in accordance with JSSS 1.19 [*Safety Training Generally*] taking account of the characteristics of the particular types of Contractor's Equipment and including:

(a) Functions, performance, operation methods, inspection items, inspection method of safety and emergency alarm devices;

(b) Operation procedure, signal and communication method at starting time of the operation, and daily inspection;

(c) Lockout and tagout procedures for shutting down operation, turning off the power, locking the starter and necessary measures for the time of cleaning and inspection of the Contractor's Equipment;

(d) Stop of the operation of the Contractor's Equipment when an abnormality occurs and report to the person in charge;

(e) Prohibition of removal or isolation of safety devices; and

(f) Risks during operation of the Contractor's Equipment.

(2) Particular safety training for transportation equipment operators shall be for the purpose of preventing of traffic accidents on and off the Site and shall include:

(a) Driving rules in general;

(b) Compliance with speed limits, signs, alcohol use, drugs and all other requirements the Laws of the Country;

(c) Driving methods to avoid contact and collision with other persons, cycles, motorcycles and other vehicles;

(d) Driving methods to properly overtake other vehicles and to be undertaken by others;

(e) Driving methods when encountering holes, bumps or obstacles on the road;

(f) Required inspection and maintenance before starting operation; and

(g) Proper use of vehicles including behaviour and control of passengers, prevention of overcrowding, overloading and unauthorised passengers.

4.1.6 Requirements for Operators

Further to the requirements of JSSS 1.18 [*Proper Placement of Contractor's Personnel*], the Contractor shall ensure that operators are appropriately qualified, skilled and experienced in operation of the Contractor's Equipment to which they are assigned and duly certified as such by the HSO.

(1) Operators shall safely and competently operate the Contractor's Equipment.

(2) Operators shall be fully aware of the following:

(a) Work procedures, hazards and operation methods;

(b) The need to stop the operation when any defect or abnormality is detected;

(c) The identity of and location(s) for Spotters and the communication and signalling requirements including equipment to be used; and

(d) The procedures in case of emergency.

(3) Operators shall:

(a) Keep all safety devices including emergency-alarm and stop-devices activated;

(b) Keep their assigned unit clean and carry out regular inspections prescribed by the Contractor before start of operation;

(c) Inform the Contractor's maintenance personnel of any apparent defect or maintenance requirements; and

(d) Not use such Contractor's Equipment until any required repair or maintenance is performed.

4.1.7 Signalling

(1) Signalling between operators and any associated workers shall only be carried out by designated personnel.

(2) Spotters shall be located in a safe place and where they can clearly see and be seen by the operator.

(3) When it is not possible for Spotters to give direct visible and audible signals to the operator, other systems including hand-held radios or videophone must be provided and

used.

## 4.2 INSPECTION, MAINTENANCE AND REPAIR

### 4.2.1 General

(1) Further to the requirements of JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*] the HSO shall ensure that all Contractor's Equipment is inspected, fully maintained and operational when it is mobilised to the Site. Thereafter all Contractor's Equipment shall be inspected, maintained and repaired before the commencement of the first and of all subsequent days of operation.

(2) Inspections shall include all items necessary to ensure the safe performance of the Contractor's Equipment including the following examples and any further requirements due to the characteristics, capability and condition of the Contractor's Equipment and in compliance with the manufacturer's official operation, maintenance and repair manual.

(3) When mobilising Contractor's Equipment to the Site and before commencement of operation, the Contractor shall:

(a) Inspect all units of Contractor's Equipment to ensure that:

(i) all components are installed and functioning; and

(ii) adequate covers and safety guards (to prevent contact with moving parts) are provided and securely fixed.

(b) Ensure as a minimum that the daily and periodical check items have already been inspected and recorded;

(c) Ensure that all inspection and maintenance records are available for inspection by the Engineer if and when required in compliance with JSSS; and

(d) If any inspection and maintenance records are incomplete or not available, the Contractor shall carry out inspections and maintenance to ensure that a full and acceptable record is available for all units of Contractor's Equipment.

In relation with the above, it should be noted that Contractor's Equipment shall be in a working and safe condition and fully compliant with JSSS when it is mobilised to the Site. The Engineer may refuse to accept delivery to the Site any Contractor's Equipment which does not meet the requirements stipulated in JSSS.

(4) The Contractor shall undertake the following daily inspection items, (or at intervals required by the manufacturer's official operation, maintenance and repair manual), carry out any necessary maintenance and repair, and when necessary obtain re-certification of the HSO before any further operation of the Contractor's Equipment is permitted:

(a) Operating condition of engine, gearbox(s), drive shafts, pulleys and main components, emergency stop and safety devices, any defects or abnormalities in covers, doors and enclosures;

(b) Abnormal sounds, vibrations or smell;

(c) Leaks, levels and condition of lubricants, coolant, hydraulic fluid levels, and the like;

(d) Lights and indicators;

(e) Brakes, clutches, steering and operating devices and working devices;

(f) Cables, slings, ropes and chains;

(g) Protective covers are adequately provided over all rotating or moving parts;

(h) Attachments and tools such as buckets, grabs and the like;

(i) Cleanliness of each unit or item of Contractor's Equipment;

(j) Cleanliness of each working area and removal of obstructions;

(k) Availability of emergency kits such as warning flares and triangles, fire extinguisher, first aid kit and the like, as required by the Laws of the Country with the testing and expiration date clearly indicated; and

(l) Any additional inspection items stipulated in the manufacturer's official operation, maintenance and repair manual.

(5) The Contractor shall undertake the following periodical inspection items, (at intervals required by the manufacturer's official operation, maintenance and repair manual), carry out any necessary maintenance and repair, and when necessary obtain re-certification of the HSO before any further operation of the Contractor's Equipment is permitted:

(a) Engine compression pressure, valve clearance and other relevant parts of prime energy unit;

(b) Gearbox, clutch, transmission, propeller shaft, differential and other parts of power transmission devices;

(c) Drive wheels, idling wheels, vertical trunk rollers, belts, tires, wheel bearings and other parts of traveling devices;

(d) Springs, shock absorbers and other parts of suspension devices;

(e) Left and right rotation angle of steering wheel, knuckle, rod, arm and other parts of control devices;

(f) Brake capacity, brake drum, brake shoe and other parts of braking systems;

(g) Blades, booms, link mechanisms, buckets, wire ropes and other parts of work equipment;

(h) Hydraulic pump, hydraulic motor, cylinder, safety valve and other parts of hydraulic equipment;

(i) Voltage, amperage and relevant performance and components of electrical systems;

(j) Body, operating devices, head guards, back stoppers, access doors, protective covers, ladders and steps, locking devices, warning alarm devices, direction indicators, tyre air pressures and lightning devices; and

(k) Any additional inspection items stipulated in the manufacturer's official operation, maintenance and repair manual.

(6) Operation of any unit of Contractor's Equipment shall not be allowed to commence until the HSO has certified that it is safe to do so.

(7) The Contractor shall prepare standard checklists for all inspections and the HSO shall ensure that these are complied with, completed and signed and kept as a record in accordance with JSSS 1.32 [*Health and Safety Records*].

4.2.2 Defects and Repair during Operation

(1) If an operator notices any defect or abnormality in the Contractor's Equipment during operation (such as abnormal noise, temperature, smell, etc.) the operator shall stop the operation immediately.

(2) Necessary repair shall be provided by qualified mechanics, electricians or engineers.

(3) The HSO shall ensure that no further operation shall resume unless the above has been complied with and the Contractor's Equipment has been re-inspected by him and certified in accordance with JSSS 1.35 [*Contractor's Equipment, Temporary Works,*

*Safety Equipment and PPE*].

## 4.3 SAFETY REQUIREMENTS

### 4.3.1 General Safety Measures

In addition to other safety and health requirements of JSSS, the Contractor shall:

(1) Ensure that there is sufficient lighting to perform all work safely and provide artificial lighting where necessary.

(2) Ensure that Contractor's Equipment is equipped with suitable protective safety devices such as covers, screens, guards, contact prevention devices, auto-stop devices, enclosures, barriers and the like as necessary to prevent injury to personnel from equipment or parts of equipment, where:

(a) There may be any risk of persons being hit by, caught or injured or entangled in any ropes, cables, sheaves, moving or rotating parts; and

(b) There may be any risk of persons being hit by flying debris, offcuts, or the like produced by the equipment.

(3) Ensure that Contractor's Equipment is equipped with suitable ladders and steps for access to the operating cab and also to all other levels and components to permit inspection, assembly, maintenance and repair of the equipment. When any Contractor's Personnel need to work at a height of 2m or more, the Contractor shall take suitable measures in accordance with JSSS 2.5 [*Fall Prevention*], including the provision and use by such Contractor's Personnel of guide ropes and PFAS.

(4) Prohibit personnel other than operators, workers and other authorised personnel from entering the place where Contractor's Equipment is in use for the Works.

(5) Ensure that each unit of Contractor's Equipment is provided with appropriate numbers and types of fire extinguishing equipment (where such equipment is necessary) and ensure that all operators and other Contractor's Personnel are trained in the use of such equipment and in fire safety procedures.

(6) Ensure that each working area where Contractor's Equipment is in use, is provided with appropriate numbers and types of first aid equipment and such other facilities that are necessary to ensure safety and treat accidents and ensure that all operators and other Contractor's Personnel are trained in the use of such equipment and first aid procedures.

(7) Post a label clearly showing the name of the operator on each unit of Contractor's Equipment together with the name and contact number of the HSO or a person in charge who shall be contacted in the event of breakdown or fault.

(8) Ensure that only the authorised operating, inspection and maintenance personnel access the mechanical, electrical and other components and systems of the Contractor's Equipment and prohibit all other persons from such access.

(9) Ensure that any inspection and maintenance covers, safety guards to prevent contact with moving parts and the like are not disabled, tampered with or removed except for repair, maintenance or any other justifiable reason.

(10) Ensure that installation, assembly, testing commissioning, operation and dismantling of all Contractor's Equipment is carried out under the direction of an Operation Leader, appropriately qualified, skilled and experienced in such activities for the particular type and capacity of equipment and in accordance with the manufacturer's operation, maintenance and repair manual.

### 4.3.2 Safety Measures during Cleaning, Inspection and Maintenance

The Contractor shall take the following measures for safety of Contractor's Personnel during

cleaning, inspection and maintenance. Until such measures are taken, the Contractor shall prohibit any cleaning, inspection or maintenance personnel or other workers from entering the areas:

(1) Put Contractor's Equipment, wherever possible on a level surface. Where such is not possible, ensure that wheels are securely chocked to prevent any movement of equipment.

(2) Provide safety blocks or supports under cargo bed of vehicles to prevent them descending unexpectedly.

(3) Lower attachments (buckets and blades etc.) to the ground during any inspection and maintenance. Where unavoidable ensure that attachments are securely supported to prevent any fall or downward movement.

(4) Stop and isolate the functions completely, establish and implement lockout and tagout procedures to prevent accidents during inspection and maintenance. The lockout and tagout system shall fully isolate the starting system.

(5) Post warning signs to prohibit start-up or use of any Contractor's Equipment.

(6) Assign a Spotter.

(7) Ensure that only authorised personnel have access to the cleaning, inspection and maintenance area.

4.3.3 Safety Measures during Operation

(1) Unless otherwise specifically permitted by the HSO, all work involving the use of Contractor's Equipment shall be designated as Dangerous Work and the Contractor shall enclose the working area with temporary fences or barriers, prevent entry of any unauthorised personnel and take all such further measures that are required by JSSS 2.3 [*Prohibition of Entry*].

(2) The Contractor shall also ensure that:

(a) All operators are able to clearly see and communicate effectively with Spotters and other relevant persons;

(b) No Contractor's Equipment is operating beyond the capacity or operational limits officially prescribed by the equipment manufacturer;

(c) The surfaces upon which the Contractor's Equipment is working, and any adjacent surfaces and areas over which access is required, are sound, safe and suitable to support the equipment and the Contractor shall provide any temporary foundations, hardstanding or other surfaces, sleepers or steel plates as are necessary to ensure safety and stability of the equipment at all times;

(d) Spotters are always be provided to enable precise movement and positioning of Contractor's Equipment, particularly when reversing, loading and unloading, in dangerous areas or when the operator's view is not clear and at intersections with public roads;

(e) Where there is any risk of turnover, slippage, collapse or fall, Contractor's Equipment is equipped with seatbelts or safety harnesses and that such seatbelts and harnesses are used;

(f) Where there is any risk of turnover, slippage, collapse or fall, Contractor's Equipment is equipped with a "Roll-Over Protective Structure" (ROPS);

(g) Where there is any risk of injury to operators due to Falling Objects Contractor's Equipment is equipped with a "Falling Object Protective Structure" (FOPS);

(h) Operators are aware that they shall pay careful and constant attention to the position of any workers near to the operating area and particularly when mobile

equipment is reversing;

(i) Operators of excavating equipment are aware that excavator buckets shall never pass over the operator's seat of any other Contractor's Equipment;

(j) Workers shall not enter under a bucket which is loading material and shall keep away from dump trucks when loading or unloading materials; and

(k) No person shall ride on trucks, trailers or cargo bed other than cabin of vehicles unless permitted by the Laws of the Country.

4.3.4 Safety Measures When Mobile Equipment Is Not In Use

(1) When mobile equipment is not in use, the Contractor shall ensure that operators:

(a) Park on surfaces which are level, sound, safe and suitable to support the equipment;

(b) Securely chock all wheels to prevent any movement;

(c) Lower attachments (buckets and blades etc.) to the ground;

(d) Stop and isolate the functions completely, fully engage brakes and lock the brake pedal; and

(e) Lock the equipment and store the starter key in the designated place.

(2) The Contractor shall prohibit all persons other than authorised personnel from entering the area where Contractor's Equipment is parked.

4.3.5 Safety Measures during Connecting and Removing of Attachments

The Contractor shall take the following measures when connecting and removing attachments (buckets, blades etc.) to Contractor's Equipment:

(1) Prevent any accident due to movement or fall of attachments by taking safety measures for example, connecting and removing attachments after locating them on stable and sound frames or on the ground.

(2) Prevent accidental movement or operation causing persons to be trapped attachments by taking safety measures for example, parking of the Contractor's Equipment such that it cannot move (as mentioned in JSSS 4.3.4 (1) (a), (b) and (d)) and stop the engine.

4.3.6 Safety Measures during Loading and Transporting of Contractor's Equipment

The Contractor shall:

(1) Select and use trailers with associated ramps, other loading equipment and restraints which are suitable for the particular type, size and weight of the Contractor's Equipment and fit for the purpose for which they are intended.

(2) Select location and areas for loading and unloading which have sufficient space and surfaces which are level, sound, safe and suitable to support all of the equipment.

(3) Securely chock all wheels of trailers to prevent any movement.

(4) Stop and isolate the functions of trailers and load and fully engage brakes.

(5) Ensure trailers are equipped with tie down devices to allow secure fixing of load.

(6) Ensure that the weight and height of the loaded Contractor's Equipment do not exceed actually required or legal limits.

(7) Ensure that all lights, brakes, steering and safety devices are working properly.

(8) Ensure that suitable, clear and legally compliant signage is attached to the trailer visibly indicating the maximum safe loading capacity, height of load, width, speed limits and any other restrictions or required information.

(9) Ensure that trailers are loaded evenly.

(10) Ensure that Contractor's Equipment loaded onto trailers is braked, wedged, securely locked in position and tied to the trailer with adequately sized chains, slings and other fixings and tensioned to prevent any movement during transit.

(11) Place any attachments on trailers and securely tie down.

(12) Inspect the tie-down tensioning, before and at intervals during transportation of Contractor's Equipment to ensure that there is no slackening.

(13) Inspect chains, slings and other fixings for securing transported Contractor's Equipment and if any abnormality is found, replace immediately.

4.3.7 Safety Measures during Loading and Transporting of Goods

The Contractor shall:

(1) When transporting heavy or long Goods on public roads, select roads on which the transportation does not pose danger to other traffic, third parties, structures adjacent to the transportation route, obtain all necessary permission from the relevant authorities including police and road authority before commencement of transportation and comply with all requirements.

(2) When transporting heavy or long material Goods within the Site, select suitable routes where the transportation does not pose danger to existing permanent or temporary buildings or structures or other works and obtain the consent of the HSO before commencement of the transportation and comply with all requirements.

(3) Ensure that Goods are loaded evenly.

(4) Secure all loads with adequate and tensioned slings and cover with protective sheets, to avoid any fall or collapse of the conveyed articles and prevent any risk to workers and third parties.

(5) Inspect slings for securing transported materials and if any abnormality is found, replace immediately.

4.3.8 Temporary Roads in the Site

The Contractor shall:

(1) Take measures to ensure that that Temporary Roads in the Site are of suitable construction, of sufficient width, free from potholes, uneven settlement and collapse.

(2) Provide signs indicating height and weight restrictions, bends, speed limits, intersections, dangerous places and the like (e.g. road shoulders, cliff edges and the like).

(3) Separate roads for vehicles and walkways for workers and provide passing area for vehicles at places where the road is narrow.

(4) In large construction sites, provide exclusive transport roads which are one-way if possible and provide passing areas on narrow roads.

(5) Provide sufficient lighting facilities at necessary places along roads when work operating in night.

4.3.9 Additional Requirements for Static Equipment

(1) The Contractor shall design and construct suitable foundations and support structures for static equipment with paved surfaces, screens, fencing and associated facilities for storage of material and product and for offices, access and the like all of which shall be suitable and fit for the purpose for which they are intended. Unless otherwise stated in the Contract, all such foundations, support structures, paved surfaces, fencing, screens and associated facilities shall be demolished and removed and disposed of safely and in

an environmentally acceptable manner by the Contractor on or before completion and taking-over of the Works. All areas shall be backfilled, restored to a safe and suitable condition, cleaned and landscaped.

(2) Unless otherwise stated in the Contract, all remaining aggregate, rock, cement, bitumen and the like used by or processed with the static equipment shall be removed and disposed of safely and in an environmentally acceptable manner by the Contractor on completion of use of the static equipment. All areas shall be backfilled, restored to a safe and suitable condition, cleaned and landscaped.

4.3.10 Additional Requirements for Personnel and Goods Elevators and Material Conveyors

(1) General

(a) The requirements for conveyors stipulated in this Clause apply to material conveyors;

(b) The Contractor shall undertake the daily and periodical inspection in addition to the items stipulated in JSSS 4.2 [*Inspection, Maintenance and Repair*], (or at intervals required by the manufacturer's official operation, maintenance and repair manual), carry out any necessary maintenance and repair and when necessary obtain re-certification of the HSO before any further operation of the Contractor's Equipment is permitted; and

(c) The Contractor shall post the maximum load capacity and any restrictions on the use.

(2) Personnel and Goods Elevators

(a) Additional daily inspection items shall include checking for defects or operational faults with the following:

(i) Elevator enclosures, doors, guide-rails and runners;

(ii) Emergency stop and alarm systems;

(iii) Power, lighting and control systems;

(iv) Interphone systems;

(v) Brakes, clutches; and

(vi) Sheaves and pulleys.

(b) Additional periodical inspection items shall include checking for defects or operational faults with the following:

(i) Daily inspection items;

(ii) Wire ropes;

(iii) Winch and its foundation; and

(iv) Supporting structures, guy ropes, fixings and anchors.

(3) Material Conveyors

(a) Additional safety measures:

(i) Conveyor systems shall be equipped with an audible warning signal to be sounded immediately before starting up the conveyor;

(ii) Means for stopping the motor or engine shall be provided at the motor or engine location;

(iii) Emergency stop switches shall be provided and be arranged so that the conveyor cannot be started again until the actuating stop switch has been

reset to running or "on" position;

(iv) Where a conveyor passes over working areas, roads and walkways, suitable guards shall be provided to prevent fall of the materials being conveyed; and

(v) Riding of workers on the moving belts shall be prohibited.

(b) Additional daily inspection items shall include checking for defects or operational faults with the following:

(i) Overrun and reverse run prevention devices;

(ii) Emergency stop switches; and

(iii) Guards.

(c) Additional periodical inspection items, shall include for checking for defects or operational faults with daily inspection items.

4.3.11 Additional Requirements for Small Equipment and Tools

(1) Accessories and attachments shall be the standard types obtained from or recommended by the manufacturer of the equipment to which they are connected.

(2) Any repairs shall be carried out by competent persons approved by the HSO.

(3) All small equipment and tools shall be tested by the HSO as safe for use after any repair or replacement of parts, before such equipment is put back into use.

4.3.12 Additional Requirements for Electric Powered Equipment

(1) Electric powered equipment specified in this Clause shall include portable electric powered mobile equipment or tools and shall form a part of the small equipment and tools listed in JSSS 4.1.1 (7).

(2) The Contractor shall undertake the following additional daily inspection items, (or at intervals required by the manufacturer's official operation, maintenance and repair manual), carry out any necessary maintenance and repair and when necessary obtain re-certification of the HSO before any further operation of the Contractor's Equipment is permitted:

(a) Defects or operational faults with grounding such as disconnection of grounding wire and insecure fixing of grounding electrodes;

(b) Damage to insulation and protective coverings of all wires and cables including flexible cables; and

(c) Damage to plugs, sockets, transformers and all wiring fittings and appliances.

(3) The Contractor shall comply with the following additional safety requirements:

(a) Use waterproof switches and socket outlets with covers, securely fixed and located in accessible and dry places;

(b) Label and paint electrical power and switch boxes with warning signs and coloured hazard markings;

(c) Use rubber cabtyre cables for all electrical power equipment;

(d) Provide grounding to all electrical power supply systems with GFCI or RCD in accordance with JSSS 6.7.3 [*General Safety Requirements*];

(e) Avoid hanging electric cables and wires directly on nails, reinforcement or Scaffolding and the like to prevent damage to the insulation and protective covering;

(f) Turn off the power before repairing, moving or maintaining electric power

equipment;

(g) Replace fuses with correct type and rating, prohibit replacing fuses with a higher rating or with iron or copper wire;

(h) Ensure that fuses are replaced by an authorised person;

(i) Prevent any use of electric power equipment from use in the rain, or when the user is wet, standing in water or is not wearing rubber soled insulated footwear or when the electric power equipment is wet;

(j) When any operational fault is identified immediately turn off the power, unplug and stop using the equipment and advise (or hand to) the HSO;

(k) Ensure that workers using electric power equipment wear appropriate PPE suitable for the electric power equipment in use such as working clothes, protective helmets, safety shoes, eye and face protection, ear protection; and

(l) When electric shock accident occurs, unplug and stop using the equipment and advise (or hand to) the HSO and take measures in accordance with JSSS 1.25 [*Measures at the Time Accidents Occur*].

4.3.13 Additional Safety Measures during Adverse Weather

Further to the requirements of JSSS 2.7 [*Adverse Weather Requirements*], the Contractor shall ensure that Contractor's Equipment is parked in a stable and secure state by taking all necessary measures including:

(1) Dropping the jib, boom, arm and attachments to ground level and securing where necessary with adequate anchors and chains.

(2) If heavy rain and flooding can be anticipated, moving Contractor's Equipment to higher ground or to places where the risk of instability is limited.

(3) Removing snow or ice.

## 4.4 ROPES, SLINGS AND CHAINS

4.4.1 General

(1) The Contractor shall ensure that untested, uncertified, broken, damaged, deformed or defective ropes, chains or slings shall not be used.

(2) The safety factor for wire ropes, slings and chains shall be as recommended by the manufacturer of each type.

(3) Requirements for ropes, slings and chains shall be as specified in JSSS 5.4 [*Rigging Equipment*].

## 4.5 ALTERNATIVE USE OF CONTRACTOR'S EQUIPMENT

4.5.1 General

The Contractor shall not use Contractor's Equipment for any other purpose than the purpose for which it is designed and other than the purpose recommended by the manufacturer.

Use of Contractor's Equipment for any other purpose than the originally intended purpose are allowed only if it is not prohibited by either of the Laws the Country and the manufacturer's official operation, maintenance and repair manual and subject to HSO's approval after reviewing all the safety aspects.

In particular, when equipment for excavation is to be used for lifting, the HSO shall, in addition to other requirements provided in JSSS, confirm:

(1) Rigging Equipment (such as hook) is attached on an appropriate part of the excavation equipment (e.g. arm or bucket).

(2) Arms, bucket, Rigging Equipment have enough strength to lift the load.

(3) The lifting devices such as hook and shackles are firmly attached to arm or bucket of the equipment.

(4) The lifting capacity for alternative use is confirmed by loading tests at the Site.

(5) Ensure that operators have accurately determined the total weight of the load, taking account of the weight of any attachments, the reach and angle and configuration of the equipment and have informed the HSO of this and obtained his permission before commencing the operation.

## 4.6 HIRED/LEASED CONTRACTOR'S EQUIPMENT

### 4.6.1 General

(1) Contractor's Equipment from hire or lease companies shall comply with all of the requirements of JSSS as if it were the Contractor's own property, in particular the Contractor shall ensure compliance with the requirements of JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*].

(2) The Contractor shall ensure that the hire/lease companies have performed all necessary inspection, maintenance and repair works before the Contractor's Equipment is mobilised to the Site and that the following is provided with the equipment to the Contractor upon mobilisation and is available for the inspection of the Engineer:

(a) Inspection and maintenance records;

(b) Operation, repair and maintenance manuals; and

(c) Spare and replacement parts, tools, maintenance equipment, lubricants, filters, hydraulic fluids and the like.

(3) The Contractor shall double-check to ensure that the inspection and maintenance has been carried out and if the Contractor has any doubt over the adequacy of such inspection or maintenance or if complete records are not made available, the Contractor shall not allow this Contractor's Equipment to be used upon the Works. The Contractor shall inspect and carry out full maintenance and repair on such equipment in compliance with the requirements of this Chapter before it is certified for use by the HSO and used upon the Works.

(4) Operators from hire/lease companies are by definition Contractor's Personnel and they shall be treated as if they are employed by the Contractor, in terms of compliance with JSSS.

(5) Operators shall be tested and certified by the HSO, shall receive safety training and shall perform all inspection, maintenance and other requirements fully in compliance with JSSS, in the same way as the Contractor's own employees.

## 4.7 TEMPORARY FUELLING FACILITIES

### 4.7.1 General

(1) When the Contractor uses temporary fuel storage and dispensing facilities at the Site for the use of Contractor's Equipment, the Contractor shall design and construct them so that they are substantial and secure and capable of storing and dispensing fuel in a safe and environmentally acceptable manner all to the approval of the Engineer.

(2) The facility shall include storage tanks, suitable foundations, support or containment structures, protective bund walls as necessary, paved surfaces, screens, fencing and associated facilities for storage of separate fuels and lubricants and for offices, access and the like all of which shall be suitable and fit for the purpose for which they are intended.

(3) Unless otherwise specified in the Contract, all such tanks, foundations, support and containment structures, paved surfaces, fencing, screens and associated facilities shall be demolished, removed and disposed of in a safe and environmentally acceptable manner by the Contractor on or before completion and taking-over of the Works. All areas shall be backfilled, restored to a safe and suitable condition, cleaned and landscaped.

(4) The Contractor must ensure that the temporary fuel storage and dispensing facility is operated and occupied at all time only by authorised personnel and that all unauthorised personnel are prohibited from entering such areas at all times. The Contractor shall be particularly careful and provide measures to prevent any unauthorised access, tampering, damage and theft at any time.

(5) All storage tanks shall be bunded either as jacketed tanks or by providing bunded enclosures, such that in the event of a catastrophic failure, the tank contents will be safely contained and shall not be allowed to run freely or enter the surface or ground water systems.

(6) The Contractor is reminded of the requirements of JSSS 2.8 [*Fire Prevention*] and will be required to provide a comprehensive and a high standard of fire protection in fuel storage areas.

# CHAPTER 5: HOISTING AND RIGGING

## 5.1 GENERAL REQUIREMENTS

### 5.1.1 Scope

(1) This Chapter specifies the safety requirements for Hoisting and Rigging Works which shall include:

(a) Hoisting Operations;

(b) Hoisting Equipment; and

(c) Rigging Equipment,

and hereinafter collectively referred to as "Hoisting and Rigging".

(2) General requirements for Contractor's Equipment for Hoisting and Rigging (including cranes) are included in JSSS Chapter 4 [*Contractor's Equipment*].

Additional particular requirements are contained in this Chapter.

### 5.1.2 Compliance Standards

By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any items in this Chapter or relevant to the subject of this Chapter and which are not fully covered by JSSS, the Contractor shall comply with the following standards:

(1) OSHA 1926.251 [*Rigging equipment for material handling*];

(2) OSHA Subpart R [*Steel Erection*];

(Note: Whilst this standard is related to Steel Erection, JSSS requires that this standard be applied to Hoisting Operations and associated rigging requirements in construction works generally)

(3) OSHA 1926.1413 [*Wire rope – inspection*]; and

(4) OSHA 1926.1414 [*Wire rope - selection and installation criteria*].

## 5.2 HOISTING OPERATIONS

### 5.2.1 Instruction for Contractor's Personnel

Further to the requirements of JSSS 1.7 [*Contractor's Safety Plans*], JSSS 1.9 [*Contractor's Method Statements*] and JSSS 1.15 [*Contractor's Safety Management Activities*], the Contractor shall include details of the following in the Method Statement and Safety Plan for Hoisting Operations and shall fully inform all Contractor's Personnel associated with such Hoisting Operations of these requirements before the commencement of any such operations, including:

(1) Scope, Area and Risk of the Hoisting Operation

(a) The scope of the required Hoisting Operation, the Rated Capacity, nature of Goods to be hoisted, location, required methods and safety arrangements;

(b) The Hoisting Operation boundary;

(c) Requirements on the ground conditions for installation, appropriate installation method taking account of all Hoisting Operation requirements, site and working conditions, location of obstacles, etc.;

(d) The working environment of the nearby areas to which particular attention should be paid (e.g. storage of Dangerous Goods or Hazardous Substances, Hazardous Areas, Operational Areas, or Overhead Services);

(e) The preservation of safe access for Contractor's Equipment and persons to, within and around the Hoisting Operations working area; and

(f) The potential danger of Hoisting Operations to any persons that are on the Site, and who may be affected by such operations.

(2) Hoisting Operation and Rigging Requirements

(a) The type(s) of Hoisting Equipment to be used and the Rated Capacity;

(b) The type(s) of Rigging Equipment to be used and the Rated Capacity;

(c) Hazards associated with the Hoisting Operation;

(d) Role and responsibility of the operator and each Rigger;

(e) Weight of Goods being hoisted;

(f) The shapes and characteristics of Goods being hoisted;

(g) The presence of any obstructions or Overhead Services and consequent restrictions on the movement and operation of Hoisting Equipment;

(h) Connecting and disconnecting techniques;

(i) The communication and signalling requirements (equipment to be used and standard signals); and

(j) The procedures in case of emergency.

(3) Identification of Personnel

(a) The identity of operators, Riggers and any other workers associated with the Hoisting Operation;

(b) The name of the authorised operator for each unit of Hoisting Equipment; and

(c) The identity of and location(s) for Spotters.

5.2.2 Operators and Riggers Generally

(1) The Contractor shall place signs on each unit of Hoisting Equipment showing the name of each authorised operator and clearly prohibiting all unauthorised persons from using, handling, operating or sitting at the controls of that equipment unit.

(2) Further to the requirements of JSSS 1.18 [*Proper Placement of Contractor's Personnel*], the Contractor shall ensure that operators and Riggers are appropriately qualified, skilled and experienced in operation of the Hoisting Equipment to which they are assigned and duly certified as such by the HSO.

(3) Operators and Riggers shall be fully aware of the following:

(a) Work procedures, possible risks and operation methods;

(b) The need to stop all work when any defect or abnormality is detected;

(c) Not to remove, interfere with or override any safety devices;

(d) The identity of and location(s) for Spotters and the communication and signalling requirements including equipment to be used and signals; and

(e) The procedures in case of emergency.

(4) In addition, operators shall:

(a) Safely and competently operate the Hoisting Equipment;

(b) Keep all safety devices including emergency alarm and stop devices activated;

(c) Keep their assigned unit clean and carry out regular inspections prescribed by the Contractor before start of operation;

(d) Inform the Contractor's maintenance personnel of any apparent defect or

maintenance requirements; and

(e) Not use such Hoisting Equipment until any required repair or maintenance is performed.

(5) The Contractor shall assign only Riggers for Hoisting Operations and shall prohibit other workers from any involvement.

(6) The names of all assigned Riggers shall be posted prominently in the working area of the Hoisting Operation.

5.2.3 Safety Training

The Contractor shall provide health and safety training in accordance with JSSS 1.19 [*Safety Training Generally*]. taking account of the characteristics of the Hoisting Operations, Hoisting Equipment and Rigging Equipment.

5.2.4 Inspection

(1) When the Hoisting Equipment is mobilised to the Site, the Contractor shall inspect the equipment complying with JSSS 4.2 [*Inspection, Maintenance and Repair*], to ensure that the equipment is free from defect and suitable for the planned Hoisting Operation.

(2) Further to the requirements of JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*] and JSSS 4.2 [*Inspection, Maintenance and Repair*], the HSO shall ensure that all Hoisting Equipment and all Rigging Equipment is inspected and maintained when it is at the location of operation before the commencement of the first and of all subsequent Hoisting Operations.

Inspections shall include all items necessary to ensure the safe performance of the Hoisting Operations including the following examples and any further requirements due to the characteristics of the Hoisting Operation and the capability and condition of the Hoisting Equipment and Rigging Equipment including condition and performance of:

(a) Anti-two blocking devices (over-winding prevention devices) and over-load prevention devices;

(b) Other safety devices including brakes, clutches and controllers;

(c) Rails for trolley and runway;

(d) Hooks, sheaves, blocks, pulleys and the like;

(e) Cables, ropes and the like; and

(f) Rigging Equipment.

(3) Periodical inspection shall be made complying with JSSS 4.2 [*Inspection, Maintenance and Repair*] and include the following items:

(a) Condition of over-winding prevention devices, anti-two blocking devices (over-winding prevention devices), other safety devices, brakes, and clutches;

(b) Condition of wire ropes and hanging chains;

(c) Condition of the Hoisting Equipment;

(d) Condition of placement of winches; and

(e) Condition of electric wire, switchboard and controller.

(4) No Hoisting Equipment or Rigging Equipment shall be put into operation unless it has been inspected in accordance with the requirements of JSSS 4.2 [*Inspection, Maintenance and Repair*] and it is certified as safe to be used.

(5) The Contractor shall prepare standard checklists for the above regular and periodical inspections. The results of these inspections shall be recorded and kept in accordance

with JSSS 1.32 [*Health and Safety Records*].

5.2.5 General Safety Measures

The Contractor shall:

(1) Select Hoisting Equipment which has a Rated Capacity and function compatible with the work conditions and requirements, including loads, surface conditions, access, working area, radius and angle of boom, etc.

(2) Clearly display the Rated Capacity of the Hoisting Equipment so that all operators and Riggers are fully aware at all times.

(3) Select Rigging Equipment with a Rated Capacity suitable for the Hoisting Operation.

(4) Select Rigging Equipment compatible with the purpose, work conditions and requirements.

(5) Ensure that operators and Riggers confirm that the load on the Rigging Equipment is less than the Rated Capacity.

(6) Activate all safety devices of Hoisting Equipment throughout the entire operation time(s) of any Hoisting Operations.

(7) Prohibition of entry

(a) Designate all Hoisting Operations as “Dangerous Work”, enclose the entire working area which is subject to any risk by providing temporary fences or barriers, prevent entry of any unauthorised personnel and take all such further measures that are required by JSSS 2.3 [*Prohibition of Entry*]; and

(b) The Contractor shall take measures to keep any unauthorised personnel away from any area where there is any risk of injury arising from the Hoisting Operation, due to fall of hoisted Goods, tangling, snagging, rebound of broken ropes or cables, broken sheaves, droppage and the like.

(8) Signalling

(a) Signalling between operators, Riggers and any associated workers regarding the Hoisting and Rigging Operations, shall only be carried out by Riggers, (hereinafter referred to as signallers);

(b) Signallers shall be located in a safe place outside the immediate area where the Rigging and Hoisting Operations are taking place, but in a location where they can clearly see suspended loads and can also see the operator and also be seen by such personnel;

(c) When it is not possible for signallers to give direct visible signals to the operator, hand-held radios or other communication tool as approved by HSO must be provided and used; and

(d) In addition, Spotters shall be placed and used only to keep any unauthorised personnel away from the working area.

(9) During Hoisting Operations:

(a) Check if the hoisting points, hooks and the like are positioned above the centre of gravity of the load to be hoisted;

(b) At commencement of all Hoisting Operations, stop the hoist at 30cm from hoisting level, to check stability and ensure that all is in order before proceeding;

(c) Ensure that there are no persons and objects within the turning area when the Hoisting Equipment turns;

(d) After hoisting loads up to the safe height, adjust the boom gently;

(e) Always pay attention to any movement of the boom and the condition of suspended loads; and

(f) When unloading or detaching loads, stop once before landing and check the condition of the landing place and the load and then continue to lower gently.

(10) Ensure that operators shall never leave their seat or leave the controls while Hoisting Operations are in progress.

(11) Defects with Hoisting Equipment during operation

(a) Ensure that if operators notice any defect or abnormality in the Hoisting Equipment during Hoisting Operations (such as abnormal noise, temperature, smell, etc.) the operator shall stop the Hoisting Operation immediately;

(b) Identify the cause of the defect or abnormality and make necessary repairs by using authorised and qualified specialist mechanics, electricians or representative technical engineers authorised by the Hoisting Equipment manufacturer; and

(c) Ensure that the repaired Hoisting Equipment shall not be put in operation unless certified by the HSO.

(12) Condition of Ropes, Slings and Chains

Ensure that untested, uncertified, broken, damaged, deformed or defective ropes, chains or slings shall not be used.

(13) Adverse Weather

Take the following measures in addition to JSSS 2.7 [*Adverse Weather Requirements*]:

(a) Hoisting Equipment is left in a safe condition when not in use and particularly if adverse climatic conditions can be anticipated;

(b) All anchors, outriggers and supports are secure and adequate to fix and support the Hoisting Equipment in position during any adverse climatic conditions;

(c) Booms and jibs shall be secured to prevent any instability or collapse; and

(d) Before resuming any Hoisting Operation after any adverse weather, inspect Hoisting Equipment using the daily and periodic checklists specified in JSSS 5.2.4 [*Inspection*].

(14) Use of Hoisting Equipment for Contractor's Personnel

As a general rule, Hoisting Equipment shall not be used for transporting or hoisting Contractor's Personnel.

In exceptional circumstances and if so approved by the HSO, use of Hoisting Equipment may be allowed when the following all measures are taken:

(a) Dedicated gondola for transporting or hoisting shall be provided;

(b) Prevention measures shall be taken to avoid turning and falling of gondola;

(c) The assumed load (i.e. 1.3 times of total weight of gondola and workers on board plus 500kgf (approx. 4.9kN) shall not exceed the Rated Capacity of the Hoisting Equipment;

(d) Wires and ropes of Hoisting Equipment shall have a safety factor of at least 10 against the assumed load;

(e) Lowering the gondola shall be by powered system which prevents any free drop; and

(f) Use of PFAS of any Contractor's Personnel in the gondola shall be ensured.

## 5.3 HOISTING EQUIPMENT - CRANES

### 5.3.1 Planning, Installation and Removal

Unless otherwise approved by the HSO, the Contractor shall employ an appropriately qualified, skilled and experienced crane specialist(s) that shall select the required type and capacity of crane, plan the Hoisting Operation including mobilising, assembly, erection, use, dismantling and removal of cranes. The Contractor's specialist shall:

(1) Investigate the location and position for installation, plan the appropriate installation method taking account of all Hoisting Operation requirements, site and working conditions, location of obstacles, etc.

(2) Investigate the working area and ensure the safety of the crane and any crane rails.

(3) Design and construct crane foundation, assemble and install the crane with proper structural design and in compliance with the manufacturer's written instructions.

(4) Conduct completion inspection, load test and stability test of the crane.

(5) Dismantle and remove and transport cranes in a planned and systematic manner in compliance with the manufacturer's written instructions.

### 5.3.2 Additional Requirements for Mobile cranes

(1) Position mobile cranes where there are no obstacles within the operation range.

(2) Where obstacles exist, plan the appropriate operation to avoid the obstacles and ensure that operators and signallers comply with this plan.

(3) Ensure that ground has sufficient and even bearing capacity to prevent the crane from subsiding and overturning. Where necessary or where there is any risk of damaging surface paving or underground services, provide temporary steel plates of suitable size, thickness and to support the crane and avoid any risk of overturning during operation.

(4) Provide steel plate load-spreader pads to support outriggers and prevent them from subsiding.

(5) Fully extend outriggers or extension type crawlers to the maximum position.

(6) When the outriggers or crawlers cannot be extended to the maximum position, adjust the Rated Capacity of the mobile cranes to suit lower capacity commensurate to the actual extension length of outriggers or crawlers.

(7) Ensure that the actual Rated Capacity of the mobile crane is clearly shown and also advised to operators and Riggers.

(8) Activate the over-load prevention device of mobile cranes and accurately input the operational conditions of booms and outriggers.

(9) Cease the Hoisting Operation from time to time and check upon the condition of the outriggers or crawlers, implement adequate remedial measures if there is any subsidence and prohibit continuation of the Hoisting Operation until the crane has been re-inspected and certified as safe by the HSO.

(10) After the Hoisting Operation:

- (a) When the mobile crane is not driven, fix the hooks of crane at the safe position;
- (b) When the mobile crane is driven, take the following measures before driving:
  - (i) Attach fixing pin on each part;
  - (ii) Apply the brake of the turning device and winch drum; and
  - (iii) Turn off all switches related with operation of cranes.

## 5.4 RIGGING EQUIPMENT

5.4.1 Hoisting and Rigging Equipment

(1) All items of Rigging Equipment shall be labelled to show all pertinent information, such as the name of the manufacturer, date of manufacture, Rated Capacity, date of the latest periodical inspection, and its expiration date, etc.

(2) The Contractor shall obtain Rigging Equipment from reputable manufacturers approved by the HSO and shall not make or repair his own Rigging Equipment at the Site.

(3) Rigging Equipment shall only be used:

(a) When certified as safe for use by the HSO in accordance with JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*];

(b) Within the Rated Capacity; and

(c) In compliance with the manufacturer's written instructions.

(4) Rigging Equipment shall be removed from service, tagged as such and destroyed or removed from the Site, where required by the standards noted in JSSS 5.1.2 [*Compliance Standards*] including (but not limited to) the following conditions:

(a) Wire ropes

(i) Where one-tenth or more of the element wires are broken or cut in any one (1) strand;

(ii) Where the reduction ratio of diameter due to use, exceeds 7% of the original nominal diameter at the date of manufacture;

(iii) With kink or deformation; and

(iv) With excessive wear, corrosion or defect.

(b) Chains

(i) Where elongation due to use exceeds 5% of the original nominal length at the date of manufacture;

(ii) Where the diameter of links has reduced by more than 10 % since the date of manufacture; and

(iii) With excessive wear, cracks, corrosion or defect.

(c) Hooks, shackles

(i) Signs of deformation; and

(ii) With excessive wear, cracks, corrosion or defect.

(d) Synthetic fibre ropes or slings

(i) Broken or cut strands; and

(ii) With excessive wear or defect.

5.4.2 Further Safety Requirements

The Contractor shall fully comply with the requirements of the standards noted in JSSS 5.1.2 [*Compliance Standards*] including taking the following measures to prevent the risk of injury:

(1) Attach colour-coded self-adhesive vinyl tape and labels for slings visibly indicating the month of inspection and whether suitable for use.

(2) Inspect all Rigging Equipment before start of work.

(3) Select and use suitable Rigging Equipment depending on the weight and shape of Goods.

(4) Apply appropriate set up, provide fittings and accessories including clips and friction pads during Hoisting Works to ensure that the hoisted load (including bundled loads) are secure and will not move or slip, for example, cable-laid slings referred to BS EN 13414-3 [*Steel wire rope slings – Safety], Part 3 [ Grommets and cable-laid slings*].

(5) Hoist loads at or above the centre of gravity.

(6) Attach guide ropes to the hoisted loads to assist with positioning.

(7) Securely store and protect Rigging Equipment to maintain in good condition and to prevent damage from rain, dust or contamination.

# CHAPTER 6: TEMPORARY WORKS

## 6.1 GENERAL REQUIREMENTS

This Section 6.1 applies to all Temporary Works included in JSSS Chapter 6.

### 6.1.1 Design and Provision

Unless otherwise specified in the Particular Safety Specification, the Contractor shall take all necessary measures for the study, design, management, provision, safe use and safe removal of all Temporary Works as necessary to safely and systematically execute the Permanent Works and in accordance with JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*], JSSS 1.37 [*Design and Management of Temporary Works*] and the specified standards.

The Contractor shall comply with the requirements specified in the Contract for Temporary Works and:

(1) Provide Temporary Works which are fit for the purpose for which they are intended and fully in accordance with the JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*].

(2) Manage the design, use and removal of Temporary Works fully in accordance with JSSS 1.37 [*Design and Management of Temporary Works*].

(3) Maintain and repair all Temporary Works when in use to ensure the continued optimal and safe performance.

(4) Monitor all Temporary Works when in use and any affected Permanent Works, existing buildings, structures, ground or surfaces that may be affected by the Temporary Works through regular inspection and (where necessary and specified) with relevant instrumentation to ensure that the Temporary Works are performing safely, to the designed limits and intended purpose.

(5) Ensure that:

(a) Modification of Temporary Works is not allowed unless it is authorised by the HSO;

(b) Unauthorised use of Temporary Works by any persons is not allowed;

(c) The HSO shall inspect all Temporary Works upon completion of erection and certify and label them as safe for use before any use is allowed;

(d) The HSO shall regularly inspect Temporary Works and certify and label them appropriately to ensure the continuous safe use or, in the event that faults are discovered, certify them as "Not Safe for Use" and prevent access to the Temporary Works until repaired and re-inspected;

(e) The HSO shall inspect Temporary Works upon the completion of the required Permanent Works and before Temporary Works are dismantled, demolished and removed accompanied by the Contractor's Temporary Works staff specified in JSSS 1.37 [*Design and Management of Temporary Works*] as appropriate, and certify that the Permanent Works are completed and the Temporary Works can be safely removed; and

(f) The HSO shall inspect after removal of the Temporary Works to ensure that removal has been completed properly and that no part of the Temporary Works remains, that any rectification of the Permanent Works is completed and all is left in safe order and condition.

(6) Safety Plan for Temporary Works

The Contractor shall include details of all Temporary Works in the Safety Plan to be submitted in accordance with JSSS 1.7 [*Contractor's Safety Plans*].

6.1.2 Method Statements

Refer to JSSS 1.9 [*Contractor's Method Statements*].

6.1.3 Monitoring

(1) The Contractor shall monitor the Temporary Works to demonstrate that they are performing safely, to the designed limits and for the intended purpose.

(2) For more details, refer to JSSS 2.1.7 [*Monitoring and Records*].

(3) Contract Compliance

Notwithstanding the requirements of JSSS 2.1.7 [*Monitoring and Records*], the Contractor is reminded of his overall responsibility under the Contract for the Temporary Works.

The Contractor shall satisfy himself that the monitoring criteria and requirements specified in JSSS 2.1.7 [*Monitoring and Records*], or in other respective Chapters of JSSS and/or in the Particular Safety Specification, are sufficient to comply with his obligations under the Contract and he shall take any additional measures necessary to ensure the adequacy, stability and safety of Temporary Works.

6.1.4 Compliance Standards

(1) By reference to JSSS 1.37 [*Design and Management of Temporary Works*] and unless otherwise specified in the Particular Safety Specification, the Contractor shall comply with Sections 1 and 2 of BS5975 [*Code of Practice for Temporary Works Procedures and the Permissible Stress Design of Falsework*] as management standard with respect to design, erection, use and dismantling of Temporary Works.

(2) In relation to Temporary Works, the Contractor shall, subject to JSSS 1.4.5 [*Specified Standards*] also comply with:

(a) Section 3: Falsework of BS5975 [*Code of Practice for Temporary Works Procedures and the Permissible Stress Design of Falsework*]; and

(b) Such standards that are referred to in particular parts of JSSS.

## 6.2 EARTHWORK SUPPORT

### 6.2.1 General

(1) Refer to JSSS Annex 1.1: [*Definitions and Abbreviations*] for the definition of Earthwork Support.

(2) The Contractor shall maintain the structural integrity of the Works and Other Properties that could be affected by the Excavation Works and shall provide and maintain whatever Earthwork Support is necessary to comply with this requirement and ensure the safety of all persons that are in, under or adjacent to any excavation and to avoid any damage.

(3) Earthwork Support shall include for example:

(a) Timberwork including sheeting, planking, strutting and support systems;

(b) Steel sheet piling including shoring, strutting and support systems;

(c) Specialised support systems such as diaphragm walling, steel pipe piling, contiguous piling, soldier piling and lagging, and the like;

(d) Ground improvement, slope stabilisation, injection, ground freezing and the like; and

(e) Ground Anchors.

(4) In the case of (a) and/or (b) following, the Earthwork Support may not be required if, in the opinion of the HSO, conditions of the excavation are sufficiently safe, stable and free from danger of movement or collapse, and if the HSO gives permission that no-Earthwork Support is required:

(a) Excavation in rock; and/or

(b) Excavation less than 1.5m deep.

(5) For sloping or benched sides to excavations (in lieu of Earthwork Support), refer to JSSS 7.2.1 (3).

### 6.2.2 Planning and Design

The Contractor shall design all Earthwork Support so that it is fit for the purpose for which it is intended and take account of ground conditions and surrounding conditions including:

(1) The effects of ground water including liquefaction, boiling or piping, heave, displacement and the like.

(2) The effect of vibration from site operations including piling or ground improvement.

(3) The effect of adjacent road or rail traffic.

(4) The requirements for safe access and working space necessary to execute the Works.

### 6.2.3 Monitoring

Refer to JSSS 2.1.7 [*Monitoring and Records*] for general requirement of monitoring and records.

The Contractor shall prepare a Monitoring Plan covering visual and instrument monitoring based on Table 6.2.1 [*Example of Visual and Auditory Monitoring Items*] and Table 6.2.2 [*Example of Instrument Monitoring Items*]

The contents of the tables are reference only and the Contractor shall prepare a detailed Monitoring Plan and submit to the Engineer as a part of the Safety Plan or the Method Statement.

**Table 6.2.1: Example of Visual and Auditory Monitoring Items**

| | Locations | Monitoring Items |
|---|---|---|
| 1 | Earthwork Support: Faces, sheeting and piling | Meander/horizontal displacement and vertical displacement along top.<br>Crack, deflection and swelling.<br>Water leakage, mud inflow.<br>Opening of joints or gaps in Earthwork Support. |
| 2 | Earthwork Support: Piles, walings and struts | Deflection, deformation and abnormal sound of struts and walings and other members.<br>Settlement, floatation and twist of piles.<br>Vertical or horizontal displacement of walings, struts and other members.<br>Opening of joints or breakage of cross members, or breakage and loosening of bolts. |
| 3 | Base of Excavation | Water spring and ground water flow.<br>Sand boiling.<br>Heaving of the base.<br>Liquefaction. |
| 4 | Neighbouring or adjacent Ground, paving and roads | Cracks, collapse, subsidence of pavement or ground surfaces.<br>Opening of joints in paving and kerbs. |
| 5 | Neighbouring or adjacent Buildings or Structures | Cracks, subsidence, deformation and tilting of structures. |
| 6 | Underground Utilities | Displacement or leakage of or damage to underground utilities. |

**Table 6.2.2: Example of Instrument Monitoring Items**

| | Locations | Monitoring Items |
|---|---|---|
| 1 | Earthwork Support: Faces, sheeting and piling | Displacement, stress of Earthwork Support.<br>Earth pressure and water pressure acting on Earthwork Support. |
| 2 | Earthwork Support: Piles, walings and struts | Axial force of struts, other supports and ground anchors. |
| 3 | Base of Excavation | Displacement of base of excavation.<br>Water pressure of ground water, rate of water inflow. |

| | | |
|---|---|---|
| 4 | Neighbouring or adjacent ground, paving and roads | Displacement of neighbouring or adjacent ground.<br>Ground water level. |
| 5 | Neighbouring or adjacent buildings or structures | Displacement; cracks, weakening, subsidence, deformation and tilting of structures. |
| 6 | Underground Utilities | Displacement or leakage of or damage to underground utilities. |

6.2.4 General Safety and Construction Requirements

(1) Materials and equipment to be used for Earthwork Support shall be appropriate for the width and depth of the excavation and free from damage or defects that might impair their proper function.

(2) Workers shall not be allowed to enter any excavation until Earthwork Support is installed prior to the work commencing.

(3) Earthwork Support shall proceed progressively so that no excavated faces are left without support or at risk of weakening or collapse at any time.

(4) Excavation to a level greater than 60cm below the planned bottom level of support when the support itself is not yet installed shall not be allowed.

(5) If temporary removal of individual members of Earthwork Support is necessary, safety measures shall be taken to ensure the safety of workers, such as installing additional temporary struts to support the additional loads imposed on parts of the system.

(6) When removing Earthwork Support, the Contractor shall prohibit anyone other than the workers engaged in the removal work to enter the working area and vicinity.

(7) Backfilling and compaction of any excavation shall be performed in parallel with the removal of Earthwork Support.

6.2.5 Safety Measures for Shoring

(1) “Shoring” shall include walings, struts and like support.

(2) Shoring shall be securely installed and fixed to Earthwork Support to prevent detachment and any movement or failure.

(3) All members acting in compression (excluding diagonal struts) shall be butt-jointed, and timber shoring shall be jointed with two or more doubling plates.

(4) Connecting parts of shoring or diagonal shoring or intersections, shall be reinforced with backing plates and bolts (timber) and welding with reinforcing plates (steel).

(5) For earth retaining work with intermediate piles, fix struts on intermediate piles rigidly.

(6) When shoring is fixed to or relies on an existing structure or building, the Contractor shall ascertain that the structure or building is able to withstand the applied load.

(7) Gaps between earth retaining wall (steel sheet piles, H-shape steel piles and the like) and walings shall be filled with mortar, concrete, steel plates and suitable wedges.

(8) Connections between struts and walings shall be reinforced with ready-made stiffeners, stiffener plates, concrete/mortar filling, stiffener jacks, etc.

6.2.6 Safety Measures for Ground Anchor Works

(1) Anyone other than designated personnel shall not operate the boring machine.

(2) No one (except those essential to the post-tensioning operations) shall be permitted to be behind the tensioning jack during tensioning to prevent any injury through breaking of the anchor tendon during tensioning.

(3) The Contractor shall check any damage in the grout hoses and joints before commencing any grout injection.

6.2.7 Adjacent Goods, Excavated Spoil and the like

(1) When placing any Goods, excavated spoil and the like on the ground surface at the top and adjacent to any excavation, the Contractor shall take measures to prevent it from falling.

(2) The Contractor shall not place any Goods, excavated spoil, backfill material and the like where the weight exceeds the load considered in the design of the Earthwork Support.

## 6.3 COFFERDAMS

### 6.3.1 General

(1) Refer to JSSS Annex 1.1: [*Definitions and Abbreviations*] for the definition of Cofferdam.

(2) Cofferdams are generally constructed as earth dykes, caissons, steel sheet piling, double steel sheet piles, steel pipe piles and the like.

### 6.3.2 Planning and Design

The Contractor shall design Cofferdams so that they are fit for the purpose for which they are intended and take account of ground conditions and surrounding conditions including:

(1) The effect of vibration from site operations including piling or ground improvement.

(2) Access and working space necessary to execute the Works.

(3) River discharge, water levels, tide levels, wave height, free board, seismic load, external force and any other relevant water conditions.

(4) Waterborne traffic.

(5) Avoidance of any damage by piling operations and the protection of the structural integrity of existing river or canals banks, dykes and the like.

(6) Reduction of river cross sectional area, increased flow rates and protection of the structural integrity of existing river or canal banks, dykes and the like.

(7) Effects of tides, wave action, flooding and the like, the consequent need for additional shoring and avoidance of loosening of shoring and joints.

(8) Provision of at least two safe evacuation routes from the working areas by means of ladders, stairs, etc. to evacuate in the case of any danger of collapse of or inundation in the Cofferdam.

(9) Provision of life-saving equipment including buoyancy jackets, lifebuoy, ropes and (where necessary) standby boats.

(10) Measures for avoiding water pollution from construction and dismantling of Cofferdams.

(11) Measures for safe dismantling and removal.

### 6.3.3 Monitoring

Refer to JSSS 2.1.7 [*Monitoring and Records*] for general requirement of monitoring and records.

The Contractor shall prepare a Monitoring Plan covering visual and instrument monitoring based on Table 6.3.1 [*Example of Visual and Auditory Monitoring Items*] and Table 6.3.2 [*Example of Instrument Monitoring Items*].

The contents of the tables are reference only and the Contractor shall prepare a detailed Monitoring Plan and submit to the Engineer as a part of the Safety Plan or the Method Statement.

**Table 6.3.1: Example of Visual and Auditory Monitoring Items**

| | **Locations** | **Monitoring Items** |
|---|---|---|
| 1 | Cofferdam Generally | Water seepage.<br>Ability and capacity of pumping arrangements to maintain safe working conditions.<br>Meander/horizontal displacement and vertical displacement |

| | | |
|---|---|---|
| | | along top.<br>Crack, deflection and swelling.<br>Opening of joints. |
| 2 | Piles, walings, struts, shoring and other members | Deflection, deformation and abnormal sound of piles, walings, struts, shoring and other members.<br>Opening of joints or breakage of piles, cross members, or breakage and loosening of bolts. |
| 3 | Base of Excavation | Water spring and ground water flow.<br>Sand boiling.<br>Heaving of the base. |
| 4 | Neighbouring Properties or Structures on or outside the Site | Cracks, subsidence, deformation and tilting of structures. |

**Table 6.3.2: Example of Instrument Monitoring Items**

| | **Locations** | **Monitoring Items** |
|---|---|---|
| 1 | Cofferdam Generally | Displacement, stress of Cofferdam.<br>Earth pressure and water pressure acting on Cofferdam |
| 2 | Shoring and struts | Axial force of strut, other supports and ground anchors. |
| 3 | Base of Excavation | Displacement of base of excavation.<br>Water pressure of spring of water, water inflow. |
| 4 | Neighbouring Properties or Structures on or outside the Site | Displacement: cracks, weakening, subsidence, deformation and tilting of structures. |
| 5 | Underground Utilities | Displacement, damage or leakage of underground utilities. |

6.3.4 General Safety and Construction Requirements

(1) For shoring works, refer to JSSS 6.2.5[*Safety Measures for Shoring*].

(2) The Contractor shall provide training to all Contractor's Personnel who are to work on the construction, maintenance and removal of the Cofferdam or within the Cofferdam, so that they are aware of all risks and countermeasures including water leakage, adverse weather, severe waves or adverse water conditions, so that they can work safely and when necessary, evacuate the working areas efficiently and safely.

(3) The Contractor shall display visible and clear warning notices of all hazards and advisory notices giving directions and information, including emergency contacts, safe escape routes, directions to and locations of life-saving equipment, assembly areas, evacuation boats and the like.

(4) The Contractor shall implement measures to prevent collisions with waterborne traffic, including warning signs and lights during the night or in heavy rain mist or fog.

(5) The Contractor shall establish a system to confirm the safety of the Cofferdams, appoint a person-in-charge who shall be present at all times and shall be responsible for issuing an evacuation order if and when necessary.

(6) The Contractor shall evacuate Contractor's Personnel whenever there is any danger due to water leakage through Cofferdams or from the ground within the working area.

(7) Whenever any defect is identified in the Cofferdam, the Contractor shall implement repair and improvement measures to ensure the safety of Contractor's Personnel and prevent any personnel from re-entering the Cofferdam until it has been inspected by the HSO and certified by him to be safe for use.

6.3.5 Excessive and Sudden Rise in Water Level.

(1) The Contractor shall analyse any risk due to sudden rise of water level and excessive water level above the design basis for the highest water level and prepare for this as applicable in the Safety Plan.

(2) This shall include procedures for monitoring water levels as described below.

(a) Monitoring water levels with instruments and recording equipment at the Site and obtaining forecasting information of water levels;

(b) Communications among persons in charge of monitoring of water levels, persons responsible for the works in the Cofferdams, the HSO and workers in the Cofferdam;

(c) Instructions to Contractor's Personnel for evacuation;

(d) Stop work in accordance with JSSS 1.13 [*HSO – Scope of Duties and Authority*]; and

(e) Resume work when water level has subsided and after inspection and certification by the HSO that it is safe to do so.

6.3.6 Monitoring Other Conditions

In addition to the requirements of JSSS 2.1.7 [*Monitoring and Records*], the Contractor shall monitor and keep records of all climatic, river, lake or marine conditions in the direct vicinity of any Cofferdam including for example, the water level at various times throughout the day, tidal data, speed and direction of waterflow, wave height, wind speed and direction.

The Contractor shall provide all instruments and facilities to obtain the data and submit reports to the Engineer on a daily basis and compile on weekly basis.

## 6.4 WALKWAYS

### 6.4.1 General

(1) This Section includes safety measures relating to the safe movement of persons to and around the Site with respect to walkways.

(2) Refer to JSSS 2.5.7 *[Preventing Falls from Walkways]* for interpretation of the word "walkways".

(3) As a general rule, steps or staircases shall be provided for the vertical movement of all persons. Steep ramps shall be avoided and non-slip measures shall be adopted on all ramps. Ladders and stepladders may be used only if the HSO considers the risk of their use to be low.

(4) For temporary steps and staircases the requirements of JSSS 6.5 [*Scaffolding*] shall apply.

(5) For Fall Prevention from walkways, ladders and stepladders the requirements of JSSS 2.5 [*Fall Prevention*] shall apply.

(6) Details of the following shall be included in the Safety Plan required by JSSS 1.7 [*Contractor's Safety Plans*] and JSSS 6.1.1 (6) [*Safety Plan for Temporary Works*]:

(a) Locations and available periods of walkways to be provided;

(b) Drawings of walkway structures, indicating structure type, materials and main dimensions for bridge type walkways where the height and length is 10m or more;

(c) Types of temporary walls, barriers or other separation between walkways and working areas, roads or footpaths on or around the Site; and

(d) Locations of emergency exits and evacuation routes.

(7) The Contractor shall:

(a) Provide designated walkways to, in and around the various workplaces at the Site to ensure the safe and secure movement of all persons at all times;

(b) Provide and maintain clear signage so that all users are aware of the locations and routes;

(c) Provide and maintain adequate lighting;

(d) Ensure that walkways have sufficient dimensions and load-bearing capability for the intended purpose;

(e) Ensure that there are no obstacles in walkways and that surfaces are level and safe, maintain all in a clean and orderly condition to avoid any falls, slips and injury;

(f) Ensure that walkways do not exceed a gradient of 30 degrees. Steeper gradients shall be provided with steps or staircases or ladders where appropriate; and

(g) Ensure that ramps, steps and staircases have slip resistant surfaces and that they are provided with handrails and toe boards in accordance with JSSS 2.5.5 [*Handrails*] and JSSS 2.5.6 [*Toeboards*].

### 6.4.2 Emergency Exits and Safe Evacuation Routes

The Contractor shall provide clear and illuminated signage so that all persons are made aware of the locations of emergency exits and safe evacuation routes and maintain all such locations and routes in a clean, safe and readily available condition.

### 6.4.3 Vertical Access

The Contractor shall provide steps, stairs and ramps as means of providing safe access or egress from excavations or different working levels.

Steps, stairs and ramps shall be constructed as follows:

(1) With Scaffolding in accordance with JSSS 6.5 [*Scaffolding]*, provided with handrails and non-slip treads.

(2) With purpose made timber or metal ramps comprising plywood boarding and structural timber framing.

6.4.4 Ladders and Stepladders

For the purposes of interpretation and unless otherwise stated in JSSS the word "ladders" shall be deemed to mean portable ladders, namely those that can be easily moved or carried even if temporarily restrained and that are not an integral part of a building, structure or equipment.

The Contractor shall comply with the following requirements regarding the use of ladders and stepladders:

(1) Ladders shall:

(a) Be of sound structure, clean and not contaminated by any slippery material;

(b) Be without visible signs of defect, damage, corrosion, and shall otherwise in safe condition;

(c) Be at least 30cm wide;

(d) Have steps with an interval of 25cm to 35cm and evenly spaced; and

(e) Have slip-proof steps or have other measures to prevent slipping.

(2) Stepladders shall

(a) Be of sound structure, clean and not contaminated by any slippery material;

(b) Be without visible signs of defect, damage, corrosion, and shall otherwise in safe condition;

(c) Have an angle between the front rail and the floor not exceeding 75 degrees and for folding stepladders they shall be equipped with a lock (such as a spreader with lock) to secure the angle made by the front rail and the floor;

(d) Steps shall be non-slip and of sufficient size to ensure safe operation; and

(e) Rails shall have non-slip feet or shoes.

(3) Use of ladders and stepladders

The Contractor shall ensure with respect to use of both ladders and stepladders that:

(a) Users shall read and follow all labels/markings on ladders or stepladders, be aware of and never exceed the maximum load rating of the ladder or stepladder and of the weight it is supporting, including the weight of any tools or equipment;

(b) Users shall avoid electrical hazards, always look for overhead power lines before handling ladders or stepladders. Avoid using metal ladders or stepladders near power lines or exposed energised electrical equipment;

(c) Ladders or stepladders shall be inspected prior to use. If a ladder or stepladder is damaged, it shall be removed from service and suitably tagged until repaired or discarded;

(d) Ladders or stepladders shall only be placed on a stable, firm and sufficiently strong base giving level and safe support and so that the rungs or steps remain horizontal, as well as any loading placed on it; and

(e) The top rung of a ladder or top step of a stepladder shall not be used as a rung/step unless designed for that purpose.

(4) Additional Requirements for Use of ladders

The Contractor shall ensure with respect to use of ladders:

(a) Ladders shall maintain an angle between foot and floor of L (horizontal length): H (height) = 1: 4 (75.5 degrees);

(b) Ladders shall have the top projecting at least 1m over the landing floor;

(c) Ladders shall not be placed on boxes, or other unstable bases to obtain additional height and connected ladders to give greater height or reach shall not be allowed;

(d) Suspended ladders shall be anchored in a secure manner so that they cannot be displaced or swing;

(e) Ladders shall be secured before any use and prevented from slipping during use by:

(i) Securing the side rails at or near the top and the bottom; and

(ii) Providing an effective anti-slip shoe or foot.

(f) No extendable ladder shall be used where its sections cannot be locked and which could therefore move while in use; and

(g) Where a ladder or a series of ladders rise for a vertical height of 9m or more above the base level, safe landing areas or rest platforms shall be provided at suitable intervals wherever possible.

(5) Additional Requirements for Use of Stepladders

The Contractor shall ensure with respect to use of stepladders:

(a) Stepladders shall not be used for work at heights of 2m or more. The Contractor shall adopt other measures for work in excess of 2m such as or providing Scaffolding in accordance with JSSS 6.5 [*Scaffolding*];

(b) Stepladders shall not be used as a single ladder or in a partially closed position;

(c) Treads of stepladders shall have the correct sized area and slip resistant finish for safe working;

(d) Restraint Clasps shall be securely locked before any use;

(e) Stepladders shall not be placed on unstable or uneven surfaces;

(f) Stepladders shall not be positioned in front of doors;

(g) For use of Stepladders as a support for trestle Scaffolds refer to JSSS 6.5 [*Scaffolding*]; and

(h) The user can maintain a safe handhold when carrying a load unless this is otherwise justified by the height of the task, nature of work and the like.

6.4.5 Inspection

In accordance with JSSS 1.13 [*HSO - Scope of Duties and Authority*] the HSO shall regularly inspect all walkways, ladders and stepladders, ensure that same are safe and fit for the intended purpose and visibly certify each as safe for use or otherwise.

## 6.5 SCAFFOLDING

### 6.5.1 General

(1) This Section contains requirements for various types of Scaffolding including supported scaffolds (for example tube and coupler scaffolds and fabricated frame scaffolds), mobile scaffolds, suspended scaffolds, trestle scaffolds and mobile elevating work platforms.

(2) Not all types of Scaffolding are separately described in this Section and the requirements of this Section are therefore of general application. Requirements for any one (1) type of Scaffolding shall also apply generally to all types and configurations unless otherwise stated or apparent from the wording and context.

(3) All Scaffolding shall be designed, erected, tested, inspected, used, dismantled and removed by Contractor's Personnel that have been trained and certified for such operations in accordance with JSSS 1.18 [*Proper Placement of Contractor's Personnel*].

(4) All Scaffolding, shall be carried out in compliance with the manufacturer's written instructions or the design of the Contractor.

(5) The design, management, provision, safe use and safe removal of Scaffolding shall comply with the requirements of JSSS 6.1.1 [*Design and Provision*].

(6) Unless specified elsewhere in JSSS or in any of the compliance standards, all Scaffolding and Scaffold components shall be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

(7) Scaffolds and Scaffold components shall not be loaded in excess of their maximum intended loads or rated capacities, whichever is less.

(8) Scaffolding shall not be used for any purpose other than the intended original purpose and for example shall never be used for hoisting loads. The Contractor shall provide other specific types of Contractor's Equipment (such as material hoists) for that purpose.

(9) Scaffolding shall be removed immediately upon completion of the work for which it is provided.

### 6.5.2 Compliance Standards

(1) By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], any items in this Section or relevant to the subject of this Section and which are not fully covered by JSSS, the Contractor shall comply with any one (1) of the following standards:

(a) OSHA 1926 Subpart L [*Scaffolds*];

(b) ANSI/ASSP A10.8 – 2019 Scaffolding Safety Requirements equipment - Part 1: Scaffolds [*Performance requirements and general design*]; and

(c) BS EN12811-1:2003 Temporary works equipment - Part 1: Scaffolds [*Performance requirements and general design*]

### 6.5.3 Notices to be Displayed

(1) Following inspections by HSO, suitable signage shall be applied to Scaffolds clearly indicating for example:

(a) "Scaffold Complete and Safe For Use";

(b) "Scaffold Not Complete - Do Not Use"; and

(c) "Scaffold Not Safe For Use".

(2) When any Scaffold is to be used for loading of Goods, the Contractor shall display a notice indicating the maximum load capacity of each Scaffold.

(3) Scaffolds shall also be tagged with the names of the erector and the person responsible for inspection and maintenance of the Scaffold.

(4) All notices shall be clearly visible and in easy-to-see locations.

6.5.4 Assembly, Erection, Alteration and Dismantling

The Contractor shall ensure, when assembling or erecting, altering or dismantling all types of Scaffolding, that:

(1) Scaffolding shall be assembled or erected, altered and dismantled only by competent personnel and the work shall always be carried out under the direction of a competent Superintendent.

(2) Working areas where Scaffolding is being assembled or erected, altered and dismantled shall be enclosed with temporary fences or barriers. The Contractor shall also prevent entry of any non-authorised personnel and take all such further measures that are required by JSSS 2.3 [*Prohibition of Entry*].

(3) During erection of Scaffolding 2m high and above, boarded areas shall be provided for safe temporary storage of Scaffolding tubes, couplings, fittings or components and other materials and equipment.

(4) All workers engaged in the assembly or erection, alteration and dismantling of any Scaffolding shall be provided with PFAS and such workers use this.

(5) Scaffold boards shall each be securely fixed at a sufficient number of points to provide constant support with no movement or dislocation and no gaps that may create a dropping hazard.

(6) When moving Scaffold boards, they are securely supported in at least three (3) locations, and the length of any projection from supports shall be at least 10cm and not exceeding one-eighteenth of the length of the Scaffold boards.

(7) When stacking the timber sole plate or runners, they are stacked in the longitudinal direction, over supports and with 20cm overlaps.

6.5.5 Inspection and Maintenance

Further to the requirements of JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*] the Contractor shall comply with the following:

(1) Every Scaffold from which a person could fall 2m or more shall be thoroughly examined by the HSO (or his delegated assistant):

(a) Before it is brought into use;

(b) After any substantial alteration or extension;

(c) At least once in every 7 days; and

(d) Whenever it has been exposed to adverse climatic conditions, earthquake or other factors which may have affected its safety.

(2) A written record of the examination and regular inspections with details of any repair measures shall be prepared and kept by the HSO.

(3) The examinations and regular inspections shall include:

(a) Check that the Scaffold is provided and used in accordance with the Method Statement, Safety Plan and its design;

(b) Condition of Working Platforms and of any damage to fixings;

(c) Condition and any loosening at the fastening, connecting and mounting, portions of standards, ledgers, brackets, and the like;

(d) Condition and any damage and corrosion of couplings, fittings, clamps and accessories;

(e) Condition and any damage and corrosion of fall prevention facilities and that they are intact and secure;

(f) Condition of mountings and presence of toe boards;

(g) Condition of bases, screw jacks, castors, brakes, sole plates and the like and ensure there is no movement or settlement;

(h) Condition of mountings and presence of diagonal bracings, stays, anchors, ties and other bracing, support or reinforcement materials; and

(i) Condition of mountings and presence of posts, standards, ledgers and transoms.

(4) The Contractor shall carry out all necessary remedial and repair work necessary to rectify any deterioration, defect or damage and shall, if necessary, stop the use of the Scaffolding until such work has been properly completed, re-inspected and re-certified as safe for use by the HSO.

6.5.6 Scaffold Platforms

Scaffold platforms shall comply with the following:

(1) Each platform on all working levels of Scaffolding shall be fully planked or decked between the front uprights and the handrail supports as follows:

(a) Platforms shall be of adequate size and strength and with true dimension and no twist or bending, no splits, holes or damage;

(b) Each platform unit shall be installed so that the space between adjacent units and the space between the platform and the uprights is no more than 2.5cm wide, except where the Contractor can demonstrate that a wider space is necessary;

(c) Where the Contractor makes the demonstration provided for in paragraph (b) above, the platform shall be planked or decked as fully as possible and the remaining open space between the platform and the uprights shall not exceed 24 cm.; and

(d) The requirement to provide full planking or decking does not apply to platforms used solely as walkways or solely by the workers performing Scaffold erection or dismantling. In these situations, only the planking that the Contractor establishes is necessary to provide safe working conditions is required.

(2) Except as may be provided separately for individual types of Scaffold, Scaffold platforms and walkways shall be at least 45cm wide.

Where it is not practicable to provide 45cm width, the Contractor shall secure a width as wide as feasible for the work, and the workers on those platforms and walkways shall be protected from fall hazards by the use of handrails and/or personal fall arrest systems.

(3) Except as provided separately for individual types of Scaffold, the front edge of all platforms shall not be more than 36cm from the face of the work, unless handrails are erected along the front edge and/or personal fall arrest systems are used to protect the workers from falling.

(4) Further requirements to those specified above, shall comply with OSHA 1926.451 [*General requirements*], *(b)* [*Scaffold platform construction*].

6.5.7 Supported Scaffolds

(1) General

(a) Scaffolds with a height to base width (including outrigger supports, if used) ratio

of more than four to one (4:1) shall be restrained from tipping by guying, tying, bracing, or equivalent means;

(b) Poles, legs, posts, frames, and uprights shall bear on base plates and mud sills or other adequate firm foundation;

(c) Footings shall be level, sound, rigid, and capable of supporting the loaded Scaffolding without settling or displacement;

(d) Poles, legs, posts, frames, and uprights shall be plumb and braced to prevent swaying and displacement;

(e) When moving platforms to the next level, the existing platform shall be left undisturbed until the new bearers or end frames have been set in place and braced prior to receiving the new platforms; and

(f) Further requirements to those specified above, shall comply with OSHA 1926.451 [*General requirements*]*, (c)* [*Criteria for supported scaffolds*].

(2) Tube and Coupler Scaffolds

(a) Transverse bracing forming an "X" across the width of the Scaffold shall be installed at the Scaffold ends and at least at every third set of posts horizontally (measured from only one end) and every fourth runner vertically;

(b) On straight run Scaffolds, longitudinal bracing across the inner and outer rows of posts shall be installed diagonally in both directions, and shall extend from the base of the end posts upward to the top of the Scaffold at approximately a 45-degree angle;

(c) Where conditions preclude the attachment of bracing to posts, bracing shall be attached to the runners as close to the post as possible;

(d) Bearers shall be installed transversely between posts, and when coupled to the posts, shall have the inboard coupler bear directly on the runner coupler. When the bearers are coupled to the runners, the couplers shall be as close to the posts as possible;

(e) Runners shall be installed along the length of the Scaffold, located on both the inside and outside posts at level;

(f) Couplers shall be of a structural metal, such as drop-forged steel, malleable iron, or structural grade aluminium, the use of grey cast iron is prohibited; and

(g) Further requirements to those specified above, shall comply with OSHA 1926.452 [*Additional requirements applicable to specific types of scaffolds*]*, (b)* [*Tube and coupler scaffolds*].

(3) Fabricated Frame Scaffolds

(a) Frames and panels shall be braced by cross, horizontal, or diagonal braces, or combination thereof, which secure vertical members together laterally. The cross braces shall be of such length as will automatically square and align vertical members so that the erected Scaffold is always plumb, level, and square. All brace connections shall be secured;

(b) Frames and panels shall be joined together vertically by coupling or stacking pins or equivalent means;

(c) Where uplift can occur, which would displace Scaffold end frames or panels, the frames or panels shall be locked together vertically by pins or equivalent means;

(d) Brackets used to support cantilevered loads shall:

(i) Be seated with side-brackets parallel to the frames and end-brackets at 90

degrees to the frames;

(ii) Not be bent or twisted from these positions; and

(iii) Be used only to support personnel, unless the Scaffold has been designed for other loads.

(e) Further requirements to those specified above, shall comply with OSHA 1926.452 [*Additional requirements applicable to specific types of scaffolds*]*, (c)* [*Fabricated frame scaffolds*].

6.5.8 Suspended Scaffolds

(1) General

(a) Suspended Scaffolds comprise Working Platforms suspended from upper levels for example with ropes, cables or chains and all necessary support framing, with or without Hoisting Equipment.

(b) Further requirements to those specified above for suspended Scaffolds, shall comply with:

(i) OSHA 1926.451 [*General requirements*]; and

(ii) OSHA 1926.452 [*Additional requirements applicable to specific types of scaffolds*].

(2) The following safety measures shall apply to interior hung Scaffolds which are suspended from roof structures, ceiling beams or other structural members:

(a) Capacity

(i) Each Scaffold and Scaffold component except as provided in (ii) below shall be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it; and

(ii) Each suspension rope, including connecting hardware, used on non-adjustable suspension Scaffolds shall be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope.

(b) Construction

(i) Overhead supporting members (roof structure, ceiling beams, or other structural members) shall be inspected and checked for strength before the Scaffold is erected; and

(ii) Suspension ropes and cables shall be connected to the overhead supporting members by shackles, clips, thimbles, or other means that meet equivalent criteria (e.g., strength, durability).

(c) Inspection

(i) Scaffolds shall be inspected before every work shift, and if any abnormality is found, the work shall be stopped; repairs made and the Scaffold re-inspected in accordance with JSSS 6.5.5 (4); and

(ii) Wire ropes, chains, hooks and shackles used in the Scaffolds shall be inspected before every work shift in accordance with JSSS 5.4.1 [*Hoisting and Rigging Equipment*] If any abnormality is found, they shall be replaced.

(d) Prohibited activity

The use of any ladders or stepladders on suspended Scaffolds shall be prohibited.

6.5.9 Mobile Scaffolds

(1) Mobile Scaffolds shall be braced by cross, horizontal, or diagonal braces, or combination thereof, to prevent distortion or collapse of the Scaffold and to secure vertical members together laterally so as to automatically square and align the vertical members. Scaffolds shall be plumb, level, and squared. All brace connections shall be secured.

(2) Scaffold casters and wheels shall be locked with positive wheel and/or wheel and swivel locks, or equivalent means, to prevent movement of the Scaffold while the Scaffold is used in a stationary manner.

(3) Manual force used to move the Scaffold shall be applied as close to the base as practicable, but not more than 1.5m above the supporting surface.

(4) Power systems used to propel mobile Scaffolds shall be designed for such use. Forklifts, trucks, similar motor vehicles or add-on motors shall not be used to propel Scaffolds unless the Scaffold is designed for such propulsion systems.

(5) Platforms shall not extend outward beyond the base supports of the Scaffold unless outrigger frames or equivalent devices are used to ensure stability.

(6) Where levelling of the Scaffold is necessary, screw jacks or equivalent means shall be used.

(7) Caster stems and wheel stems shall be pinned or otherwise secured in Scaffold legs or adjustment screws.

(8) Following safety measures shall be applied before relocating the Scaffolds:

(a) Check the floor surface in advance to prevent the Scaffold from overturning due to any irregularities or obstructions;

(b) Move the Scaffold only after releasing brakes on all castors;

(c) Do not move the Scaffold when any workers or Goods are on the Scaffold;

(d) Ensure that there are no obstructions in the route including any overhead obstructions; and

(e) Do not allow any persons other than workers engaged in the relocation to enter the moving areas of the Scaffold or in the vicinity.

(9) Prohibited activity

Use of the Mobile Scaffolds shall be prohibited for the following:

(a) Use as a support for lifting dropping Goods, debris or waste materials or for dropping same;

(b) Use for the purpose of providing a barrier by covering with sheet material with the risk of collapse due to exposure to wind;

(c) Use for work of grit blasting or water jetting, where the reaction force can destabilise the Scaffold or workers on the Scaffold; and

(d) Use as floor to support mobile ladders, stepladders, trestles.

(10) Further requirements to those specified above shall comply with OSHA 1926.452 [*Additional requirements applicable to specific types of scaffolds*], *(w)* [*Mobile scaffolds*].

6.5.10 Trestle Scaffolds

(1) Trestle Scaffolds can comprise:

(a) Special proprietary type free-standing trestle platforms; or

(b) Scaffold boards or lightweight staging boards supported on stepladders or other tripod type ladders.

(2) For requirements on Stepladders refer to JSSS 6.4.4 [*Ladders and Stepladders*].

(3) The following safety measures shall apply:

(a) The distance between the centre lines of the supporting stepladders shall not exceed 1.8m, width of the Scaffold boards shall be at least 45 cm;

(b) Scaffold boards shall not be placed any higher than the second highest rung or step of the stepladder supporting the platform;

(c) If timber Scaffold boards are used, the overlap between boards shall be at least 20cm; and

(d) The length of projection of the platform from the end support shall be at least 10cm and not more than one-eighteenth of the length of the boards.

6.5.11 Mobile Elevating Work Platforms

This Clause specifies requirements for mobile elevating work platforms (also known as aerial lifts) including extendable boom platforms, articulating boom platforms, vertical towers and a combination of any such devices.

(1) The following safety measures shall apply for placing and operating mobile elevating work platforms:

(a) Only trained Contractor's Personnel, certified as such by the HSO shall be permitted to operate in accordance with JSSS 1.18 [*Proper Placement of Contractor's Personnel*];

(b) All operation shall be carried out in accordance with the manufacturer's written instructions;

(c) Mobile elevating work platforms shall never be used beyond the load limit recommended by the manufacturer, which shall also be clearly displayed on the equipment; and

(d) Safety devices shall not be switched off or isolated.

(2) Measures before operation of mobile elevating work platform:

(a) Designate operation as "Dangerous Work" and in accordance with JSSS 2.3 [*Prohibition of Entry*] demarcate working areas and take measures to prevent entry to unauthorised personnel;

(b) Place a Spotter, in accordance with JSSS 2.4 [*Spotters*] to guide the mobile elevating work platform and, in case of emergency to properly address the situation (e.g. to call help when the operator is incapacitated);

(c) Determine signals in accordance with JSSS 2.4.5 [*Signals*], and

(d) Determine in advance the appropriate working speed limit for the mobile elevating work platform according to the height of the Working Platform and the length of the boom, etc. and ensure that the operator never drives the equipment in excess of this limit.

(3) Measures at locating mobile elevating work platform:

(a) The parking brakes of vehicle shall be set;

(b) Wheel chocks shall be installed before using the mobile elevating work platforms on an incline, provided they can be safely installed;

(c) When outriggers are used, they shall be positioned on pads or a solid surface; and

(d) Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition.

(4) Measures at operation on mobile elevating work platform:

(a) Workers shall always stand firmly on the floor of the basket/Working Platform, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position;

(b) Workers shall use PPE including PFRS;

(c) Workers shall be prohibited from taking dangerous actions such as moving from the working basket/Working Platform to neighbouring structure, standing on and working from handrail;

(d) When the mobile elevating work platform has both platform (upper) and lower controls, the upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the worker in the lift, except in case of emergency;

(e) When leaving the operating position and when work is stopped the operator of the mobile elevating work platform shall:

(i) Put the Working Platform in the lowest position;

(ii) Stop the prime engine/motor; and

(iii) Apply the parking brake securely and ensure the equipment is securely parked.

(f) Stop work at a height of 2m or more in case of adverse weather in accordance with JSSS 2.7 [*Adverse Weather Requirements*].

(5) Measures of moving mobile elevating work platform

(a) Mobile elevating work platform shall not be moved when the boom is elevated in a working position with workers in the basket, except for equipment which is specifically designed for this type of operation; and

(b) Before moving the mobile elevating work platform for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position.

(6) Inspection and maintenance of mobile elevating work platform

(a) Carry out inspection in accordance with JSSS 4.2.1 [*General*]; and

(b) Carry out maintenance, repair and installation/removal of the Working Platform in accordance with JSSS 4.2 [*Inspection, Maintenance and Repair*] and JSSS 4.3 [*Safety Requirements*].

(7) Prohibition of use for other purposes

Mobile elevating work platforms shall not be used for any purpose other than the intended original purpose and for example shall never be used for hoisting loads.

## 6.6 ELEVATED ACCESS STRUCTURES

### 6.6.1 General

This Section includes safety measures relating to Elevated Access Structures which act as temporary access, parking, working and/or storage areas which also accommodate Contractor's Equipment, Goods and temporary facilities as necessary to permit the construction operations to be performed from these structures on the underlying or adjacent working area(s) within the Site.

### 6.6.2 Design and Management

(1) The design, management, provision, safe use and safe removal of Elevated Access Structures shall comply with the requirements of JSSS 6.1.1 [*Design and Provision*].

(2) For related JSSS requirements, refer to the following and other related parts of JSSS including:

(a) JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*]; and

(b) JSSS 1.37 [*Design and Management of Temporary Works*].

(3) Erection and Removal of Elevated Access Structures

The Contractor shall:

(a) Enclose the working area where possible with temporary fences or barriers, prevent entry of any unauthorised personnel or prevent vessels from entering in the case of offshore or river, lake or marine works and take all such further measures that are required by JSSS 2.3 [*Prohibition of Entry];*

(b) Use of Measures to prevent Workers, Vehicles, Contractor's Equipment and Goods from falling;

The Contractor shall design and provide suitable measures to prevent workers falling including for example handrails specified in JSSS 2.5.5 [*Handrails*] to the perimeter of Elevated Access Structures.

The Contractor shall design and provide suitable measures to the perimeter of Elevated Access Structures prevent Vehicles, Contractor's Equipment and Goods falling including for example steel edge barriers and kerbs.

All edge barriers and kerbs shall be painted in black and yellow bands to show them as a hazard.

(c) Use of Measures to prevent collision with vessels;

For marine work or work in rivers or lakes, the Contractor shall provide all necessary warning signs, audible alarms, beacons and lighting and serve all notices to the relevant authorities as necessary to ensure that all shipping, boats and other vessels are aware of changes to navigation due to the presence of any Elevated Access Structures and that all risk of collision is avoided.

### 6.6.3 Further Safety Requirements

The Contractor shall take all necessary measures to ensure the safe provision, use and removal of Elevated Access Structures, including but not restricted to the following:

(1) Provide warning notices clearly showing the maximum Rated Capacity in clearly visible locations.

(2) Always respect the maximum Rated Capacity, taking account of all the persons/personnel, vehicles, Goods, etc. on the Elevated Access Structures.

(3) Provide any further signs containing user information or other mandatory usage

requirements such as speed limits and markings all as necessary to demarcate roadways and walkways, working, storage, parking and other areas.

(4) Designate all work to and on any Elevated Access Structures and during use, as Dangerous Work and take all further measures that are required by JSSS 2.3 [*Prohibition of Entry*].

(5) Provide walkways in accordance with JSSS 6.4 [*Walkways*]

(6) Provide adequate lighting to ensure the safety of Contractor's Equipment, equipment of other parties, vehicles and persons in transit or whilst working.

(7) (for offshore work) Provide rescue and lifesaving equipment to be used in the event that any persons fall into the water, including a rescue boat and life belts or the like.

(8) Provide PFAS or PFRS to workers where appropriate including those engaged in the construction and removal of the Elevated Access Structures.

(9) Prevent any accident or collision by ensuring that all Contractor's Personnel that may be working on Elevated Access Structures and any Employer's personnel and other persons that may be present on such structures are fully informed about the work that may be in progress from time to time, including transportation and delivery of Goods and of the measures and any precautions that must be complied with.

(10) Provide relevant training in accordance with JSSS 1.20 [*Safety Induction Training*] to ensure the safety of all persons before they commence work on the Elevated Access Structures.

6.6.4 Inspection and Maintenance

Further to the requirements of JSSS 1.35 [*Contractor's Equipment, Temporary Works, Safety Equipment and PPE*] the Contractor shall comply with the following:

(1) Every Elevated Access Structure shall be thoroughly examined by the HSO:

(a) Before it is brought into use;

(b) After any substantial alteration or extension;

(c) At least once in every 7 days; and

(d) Whenever it has been exposed to adverse climatic conditions, heavy seas, earthquake or other factors which may have affected its safety.

(2) A written record of the examination and regular inspections and details of any repair measures shall be prepared by the HSO.

(3) The examination and regular inspections shall include:

(a) Check if the Elevated Access Structure is provided and used in accordance with the Method Statement, Safety Plan and its design;

(b) Check items include:

(i) The structural condition of the Elevated Access Structure and of any deterioration, defect, damage or settlement;

(ii) Safety facilities including those for fall prevention are intact and fully operational; and

(iii) All other requirements of this Section are still being complied with.

(4) The Contractor shall carry out all necessary remedial and repair work necessary to rectify any deterioration, defect or damage and shall if necessary stop the use of the Elevated Access Structure until such work has been properly completed, re-inspected and re-certified as safe for use by the HSO.

## 6.7 TEMPORARY ELECTRICAL INSTALLATIONS

### 6.7.1 General

(1) This Section contains safety requirements for the provision, use, relocation, repair and removal of temporary electrical power and lighting installations at the Site.

(2) Although the work in this Section is temporary, it shall be particularly noted that temporary electrical installations shall be designed, installed, inspected, tested, altered and removed by Contractor's Personnel that are qualified electricians, trained and certified for such operations in accordance with JSSS 1.18 [*Proper Placement of Contractor's Personnel*] and that follow strict procedures prepared by the Contractor and specified in the Method Statement and Safety Plan.

(3) The Contractor shall take precautions against the risk of death or injury from electricity during construction work. In particular, when executing refurbishment work in existing buildings where greater risk exists, the Contractor shall locate and indicate the types, positions and routes of all underground and concealed services with clearly visibly markings on ground, floor, wall and ceiling surfaces, and take all actions necessary to ensure construction safety in compliance with JSSS 3.1.2 [*Preparation and Work Planning*].

(4) The temporary electrical installations and all equipment used shall be safe, regularly inspected and properly maintained.

(5) Temporary electrical installations shall be removed immediately upon completion of the work for which they are used.

### 6.7.2 Compliance Standards

By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any items in this Section or relevant to the subject of this Section and which are not fully covered by JSSS, the Contractor shall take necessary measures for Temporary Electrical Installations complying with OSHA 1926.405 [*Wiring methods, components and equipment for general use*].

### 6.7.3 General Safety Requirements

The Contractor shall avoid accidents to workers engaged on electrical works and also those workers who are not electricians but who are carrying out other works, by taking appropriate measures including the following:

(1) Understanding the system

(a) The Contractor shall ensure that Contractor's Personnel responsible for planning, managing or performing any part of the Works fully understand the danger in relation to electrical system on the Site or inside any existing building where any work is to be carried out, to ensure that the integrity of the electrical system is not compromised and all workers remain safe; and

(b) The Contractor shall ensure that relevant parts of existing electrical systems are isolated if the execution of any part of the Works may disturb or damage the existing electrical system and expose persons to electrical danger.

(2) Portable electrical equipment

(a) The Contractor shall ensure that tools, plugs and cables designed for domestic use are not used for construction works unless authorised by the HSO;

(b) The Contractor shall use cordless tools or other tools suitable for the Site conditions;

(c) Where cordless tools are not used, as a first preference the Contractor shall use cord and plug connected tools on a low voltage supply system with a maximum voltage to ground not exceeding 50V subject to the supply system at the Site;

(d) Where cordless tools or cord and plug connected tools with power supplies as described in (c) above are not available then, subject to authorisation by the HSO, the Contractor shall select cord and plug connected tools which are operated as stipulated below:

Under any of the following conditions, exposed non-current carrying metal parts of cord and plug connected tools shall be grounded:

(i) If in a hazardous (classified) location stipulated in OSHA 1926.407 [*Hazardous (classified) locations*];

(ii) If operated at over 150V to ground, except for guarded motors and metal frames of electrically heated appliances if the appliance frames are permanently and effectively insulated from ground;

(iii) If the equipment is one (1) of the types listed below:

- Hand held motor-operated tools;
- Cord and plug connected equipment used in damp or wet locations or by workers standing on the ground or on metal floors or working inside of metal tanks or boilers;
- Portable and mobile X-ray and associated equipment;
- Tools likely to be used in wet and/or conductive locations; and
- Portable hand lamps.

(3) GFCI (also referred to as RCD)

(a) Ensure that equipment, tools, leads, wires or cables are free of defect or damage, in particular when mains power supply is used;

(b) Use GFCI or RCD to detect any faults in the electrical system and rapidly switch off the supply; and

(c) GFCI or RCD shall be properly installed and enclosed; properly checked; treated with care; kept free of moisture and dirt; and protected against vibration and mechanical damage.

(4) Lighting systems

Protect cabling and bulbs against breakage. If a bulb breaks, the exposed filament may present a hazard. Have a system for checking bulbs regularly to maintain electrical safety and to keep the site well lit.

(5) Temporary electrical systems shall not be used in excess of intended loads or rated capacity whichever is less.

(6) Temporary electrical systems shall not be used for any purpose other than the intended original purpose.

(7) Regularly inspect power tools and take them out of service if they are damaged. Tools should be serviced by qualified electricians; makeshift repairs are prohibited.

6.7.4 Method Statement

The Method Statement for temporary electrical installations (required by the Contract and JSSS 1.9 [*Contractor's Method Statements*] shall refer to the Laws of the Country and the relevant authority which supplies power to the Contractor in relation with relevant temporary electrical installations and shall show:

(1) Required Standards and voltages of electric wires and cables.

(2) Protective work for electric wires and cables.

(3) Electric diagram.

6.7.5 Responsible Personnel

(1) The Contractor shall post the name and contact information for the person in charge of managing and operating the temporary electrical installation.

(2) All other persons shall be prohibited from operating repairing or interfering with the temporary electrical installation unless otherwise instructed or approved by the HSO or person in change.

6.7.6 Inspection, Maintenance and Repair

The Contractor shall inspect the temporary electric facilities and perform all requisite maintenance, replacement and repair to ensure the continued and safe operation including the following:

(1) Daily inspection

(a) Prepare a daily inspection checklist of the temporary electric installations including the condition of associated buildings, enclosures, fences and the like;

(b) Inspect daily; and

(c) Record the inspection results.

(2) Periodical inspection

(a) Prepare periodical (weekly and monthly) inspection checklist including measurement of insulation resistance values of temporary electric installations and the operating status of protective devices against overcurrent, grounding fault, etc.;

(b) Inspect periodically; and

(c) Record the inspection results.

(3) Maintenance and repair

(a) As a result of inspection, carry any maintenance, repair or replacement if and as necessary;

(b) Stop operation of the temporary electric installations or affected parts thereof and prevent any further operation until maintenance, repair or replacement is completed; and

(c) Reinspect, the temporary electric installations or parts thereof, and after the HSO has declared same as safe for use, operation can then re-commence.

6.7.7 Safety Measures

The Contractor shall take the following safety measures when installing, moving, removing, repairing temporary electric facilities.

(1) Cabling/Wiring

(a) Carry out cabling/wiring work so that safety distances between cabling/wiring and any other cabling/wiring, posts, gantries, other structures, buildings, enclosures Contractor's Equipment, vehicles and persons are maintained;

(b) If appropriate separation distances cannot be maintained, enclose cabling/wiring in insulated ducts, conduit or trunking;

(c) Locate cabling/wiring where it does not obstruct other works; and

(d) Always enclose cabling/wiring in insulated ducts, conduit or trunking in working areas or Operational Areas to avoid any risk of contact, damage or injury.

(2) Switchgear, Panels and Switches

(a) Enclose switchgear, panels and switches in waterproof and lockable metal enclosures to suit the environmental conditions, all of which shall be grounded; and

(b) Fuses and circuit breakers shall be suitable for their use and load capacity.

(3) Power Receiving Equipment and Transformers

(a) Power receiving equipment, transformers and the like, shall be located in securely fenced or enclosed and locked compounds, enclosures or buildings from which entry by unauthorised persons shall be prohibited;

(b) Any work in such areas shall be designated as Dangerous Work and the provisions of JSSS 2.1.5 [*Further Requirements for Dangerous Work*] shall be applied; and

(c) All such places shall be clearly indicated as dangerous no entry areas with clear and obvious signage.

(4) Grounding (earthing)

(a) All temporary electric installations shall be grounded for each part to prevent the risk of electric shock due to electrical leakage; and

(b) Grounding electrodes shall be highly conductive such as copper.

(5) Relocation and Repair Work

(a) Relocation and repair work to or any work in the vicinity of temporary electrical installations shall only be performed after the power supply has been turned off, isolation has been confirmed, confirmation that temporary protective casings have been installed over existing cables and no electricity is measured by electricity detection;

(b) When re-energising temporary electric installations during or after any relocation or repair work, the Contractor shall ascertain in advance that there will be no electric shock to any persons engaged in the relocation or repair work of temporary electrical installations or any work nearby; and

(c) When installation, relocation or repair work of temporary electric installations is completed, the facilities shall be operated only after testing and inspection of the installation by the HSO and after the HSO has declared same as safe for use.

## 6.8 ELECTRIC AND GAS WELDING AND CUTTING

### 6.8.1 General

(1) This Section contains safety requirements for electric and gas, welding and cutting.

(2) Electric and Gas welding and cutting work shall be designated as Dangerous Work and the provisions of JSSS 2.1.5 [*Further Requirements for Dangerous Work*] shall be applied.

(3) Electric and Gas welding and cutting work shall only be performed, inspected and tested by Contractor's Personnel that are qualified welders, trained and certified for such operations in accordance with JSSS 1.18 [*Proper Placement of Contractor's Personnel*] and that follow strict procedures prepared by the Contractor and specified in the Method Statement and Safety Plan.

### 6.8.2 Compliance Standards

By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any items in this Section or relevant to the subject of this Section and which are not fully covered by JSSS, the Contractor shall take necessary measures for Electric and Gas Welding and Cutting complying with the following standards:

(1) OSHA 1926.350 [*Gas welding and cutting*].

(2) OSHA 1926.351 [*Arc welding and cutting*].

### 6.8.3 Electric Welding and Cutting

The Contractor shall take the following measures for the electric welding and cutting:

(1) Check measures before operation:

(a) Automatic voltage reduction device for reducing no load voltage to prevent the shock hazard, is fitted and is functioning properly;

(b) Frame of welding machine is properly grounded;

(c) The ground resistance shall be sufficiently low for the proper function of GFCI or RCD;

(d) Grounding conductor is installed properly and working;

(e) There is no damage to welding cables;

(f) There is no damage to electrode holder, insulation of ground clamp or cable connections; and

(g) Carry out all such further checks that are required by the manufacturer's official maintenance and repair manual.

If any items are found to be missing or defective, the Contractor shall prohibit use until it has been repaired or replaced and the equipment has been inspected, tested and certified as safe for use by HSO, before it can be used.

(2) Measures to be adopted during operation:

(a) Prevent stray currents by securely fixing the ground cable with a ground clamp to a suitable ground, close to the work location;

(b) Use cables of the correct type and size and never use alternatives such as tools or reinforcing bars;

(c) When not working, remove electrode from holder and turn off the welding machine;

(d) Weld only in suitable environment and climatic conditions. Stop working outdoors during rainfall and take measures to prevent the welding machine, cables and accessories from getting wet;

(e) If any worker receives an electric shock, the Contractor shall stop the work immediately, identify the cause, prohibit use of the equipment until it has been repaired or replaced and the equipment has been inspected, tested and certified as safe for use by HSO, before it can be used;

(f) Ensure that workers wear appropriate PPE including personal face protectors for welding and protective gloves as specified in JSSS 2.9 [*PPE and First Aid*]; and

(g) Instruct all workers not to look directly at the electric arc with their naked eyes.

(3) Periodical inspection of welding machines and welding equipment:

(a) Electric welding and cutting equipment shall be inspected and tested periodically in accordance with JSSS 4.2 [*Inspection, Maintenance and Repair*] and JSSS 4.3 [*Safety Requirements*] and

(b) The voltage reduction device shall be regularly inspected and tested at least once every six (6) months.

6.8.4 Gas Welding and Cutting

The Contractor shall take the following measures for gas welding and cutting:

(1) Check measures before operation:

(a) Flashback arrestor to stop flame back-up into the equipment or gas supply line is installed;

(b) There is no damage to gas cylinders, regulators, flashback arrestor, hose bands, hoses, blow pipes, tip nozzles, and other accessories and equipment;

(c) Gas cylinders, regulators and caps and other relevant accessories and equipment have been inspected periodically and certified by HSO as safe for use; and

(d) Carry out all such further checks that are required by the manufacturer's official maintenance and repair manual.

If any items are found to be missing or defective, the Contractor shall prohibit use until it has been repaired or replaced and the equipment has been inspected, tested and certified as safe for use by HSO, before it can be used.

(2) Handling of gas welding and cutting equipment

(a) Gas hoses and gas weld sets, shall not be damaged or worn to prevent gas leakage;

(b) Gas weld sets shall be turned off when not in use and shall not be left lying around;

(c) Gas pressure regulators shall not be operated during cutting or welding operation;

(d) Connections between cylinders, gas hoses and gas weld sets shall be securely tightened with appropriate connectors;

(e) When tip nozzle overheats, flashback is likely to occur, therefore interrupt continuous working, from time to time and cool the nozzle by submerging in water whilst discharging oxygen at low pressure; and

(f) When finishing or interrupting work, completely close the container valves and vent gas in regulators.

(3) Handling of gas cylinders

Workers shall be trained to handle gas cylinders so that they are aware of the following requirements:

(a) Not to place gas cylinders:

(i) Where there is insufficient ventilation;

(ii) Near to fires, flames, heat sources, electrical sparks or grinding sparks; and

(iii) Near to Dangerous Goods or Hazardous Substances or near to Hazardous Areas.

(b) Handle gas cylinders with care and do not drop, throw or mishandle;

(c) Keep cylinders cool by shading and do not expose to direct sunlight;

(d) Keep cylinders standing during storage and use;

(e) Seal cylinders when transporting;

(f) Place compressed gas cylinders upright at all times except while cylinders are actually being hoisted or carried;

(g) Not to place gas cylinders in the vicinity of lightning conductors or grounding rods for electrical equipment;

(h) Mark all gas cylinders as either full or empty and separate them from each other in storage and during use; and

(i) When there is a risk of freezing, do not place gas cylinders in wet or humid places. When valves of cylinder or regulating valves freeze, thaw them out with hot water, do not flame or direct fire.

(4) Safety measures for gas welding and cutting work:

(a) Ensure that all internal and external working areas are fully ventilated;

(b) When checking for gas leakage from the gas welding or cutting equipment, use a liquid detergent or similar, never use flames or fire;

(c) Provide adequate fire extinguishing equipment near the working place, always maintained and certified, suitably labelled, available and positioned so that it can be used immediately when necessary;

(d) Remove oil and dust adhering to the valve of gas cylinders;

(e) Ignition and digestion shall be accomplished only with oxygen supply valve closed;

(f) Ensure that workers wear appropriate PPE including personal face protectors for welding and protective gloves as specified in JSSS 2.9 [*PPE and First Aid*]; and

(g) Instruct all workers not to look directly at the weld with their naked eyes.

(5) Periodical inspection of gas welding and cutting equipment.

Gas welding and cutting equipment shall be inspected and tested periodically in accordance with JSSS 4.2 [*Inspection, Maintenance and Repair*] and JSSS 4.3 [*Safety Requirements*].

6.8.5 Fire Prevention

The Contractor shall take all necessary measures to prevent fires caused by welding and cutting works, including:

(1) When welding or cutting work is carried out on/in containers previously filled with Dangerous Goods or Hazardous Material, the containers shall be thoroughly cleaned so that they are completely free from such Dangerous Goods or Hazardous Material before starting work.

(2) When welding or cutting work is carried out at a place where there is a risk of causing fire either to adjacent buildings or to Contractor's Equipment, Goods, debris, waste or other materials, then fire prevention measures shall be adopted. This may include moving all such Contractor's Equipment, Goods, debris, waste or other materials, from the

working area and taking other protective measures.

(3) Welding or cutting work shall not be conducted near Dangerous Goods or Hazardous Substances or in or near to Hazardous Areas.

(4) A sufficient number of fire extinguishers of appropriate types shall be provided, near the working place, always maintained and certified, suitably labelled, available and positioned so that they can be used immediately when necessary.

(5) Spotter(s) shall be provided at areas where welding or cutting work is taking place when there is risk of fire by the heat transmitted or sparks of welding or cutting, getting into walls, floors, ceilings and the like.

(6) When welding, cutting, or heating work is performed on walls, floors, and ceilings, since direct penetration of sparks or heat transfer may introduce a fire hazard to an adjacent area, the same precautions mentioned in this JSSS 6.8.5 [*Fire Prevention*] shall be taken on the opposite side as are taken on the side on which the welding work is being performed.

# CHAPTER 7: EXCAVATION WORKS

## 7.1 GENERAL REQUIREMENTS

### 7.1.1 Scope

(1) This Chapter specifies the safety requirements for excavation works which include:

(a) Open-cut and all other types of surface excavation;

(b) Pits, trenches, basements and all other types of structural excavation;

(c) Excavation using all methods such as manual excavation and machine excavation;

(d) Excavation by Blasting (hereinafter referred to as "Blasting Works");

(e) All associated embankment filling, backfilling and disposal; and

(f) Earthwork Support.

and which are hereinafter collectively referred to as "Excavation Works".

(2) General requirements for example for Contractor's Equipment, Temporary Works and other related works all which apply to the work in this Chapter, are included in other Chapters of JSSS.

Additional particular requirements are contained in this Chapter.

### 7.1.2 Monitoring

(1) The Contractor shall monitor the Excavation Works and surroundings, to demonstrate that the Excavation Works are performing safely, to the designed limits and for the intended purpose.

(2) For more details, refer to JSSS 2.1.7 [*Monitoring and Records*].

## 7.2 PARTICULAR SAFETY MEASURES

### 7.2.1 General

(1) The Contractor shall plan all Excavation Works so that they can be executed in a safe and methodical manner.

(2) Unless otherwise specified in the Particular Safety Specification, the Contractor shall be responsible for choosing manual or machine excavation, selecting types of Contractor's Equipment, types of Temporary Works, Earthwork Support, spoil removal, storage and handling, controlling ground and surface water, forming embankments and cuttings and the like.

(3) Sloping sides and benching to sides of excavations shall comply with OSHA 1926.652 [*Requirements for protective systems*], *(b)* [*Design of sloping and benching systems*], dependant on the dimensional constraints of the Site and the nature of the soil, hydraulic and geological conditions.

(4) The Contractor shall be responsible for preserving the structural integrity of all excavated sides and shall provide whatever Earthwork Support may be necessary to achieve this, in accordance with the requirements of JSSS 6.2 [*Earthwork Support*].

(5) The Contractor shall execute all Excavation Works and associated filling, backfilling and Earthwork Support without weakening any ground or causing any damage to Other Properties.

The Contractor shall also ensure the safety of all persons, whilst they are working in, under or adjacent to any excavation on or outside the Site.

The Contractor shall take all necessary measures to prevent the occurrence of any such weakening or damage to Other Properties and obtain the prior consent of the Engineer to

such measures before commencing relevant parts of the Excavation Works.

(6) If loose rock, boulders, trees and the like, are positioned above working areas and where there is any risk that these may pose a danger to workers, the HSO shall prohibit workers from entering the working areas and issue appropriate instructions including for example to:

(a) Provide protective overhead safety barriers or safety nets;

(b) Carefully remove loose rocks; and

(c) Provide (or improve existing) Earthwork Support to unstable areas.

7.2.2 Safety Measures before Commencing Excavation Works

(1) The HSO shall inspect the Excavation Works area and surrounding areas before starting work each day and after adverse climatic conditions or earthquake as described in JSSS 2.7 [*Adverse Weather Requirements*]. The inspection shall include the following areas and items:

(a) Potentially unsafe areas where there may be any risk of landslide;

(b) Loose rock or boulders which may be at risk of falling;

(c) Cracks in the Excavation Works area and the surrounding area;

(d) Changes in ground water level, surface or any spring water; and

(e) Deleterious effect due to freezing conditions.

(2) As a consequence of such inspections if the HSO identifies any outstanding risks, the HSO shall prohibit the continuation of any affected work, take necessary corrective measures and make any necessary amendment to the Safety Plan and instruct all Contractor's Personnel associated with such affected work of any revised safety measures before work is allowed to commence and continue in order to ensure their continued safety.

(3) Install facilities such as stairs and ramps as means of access or egress from the excavation site in accordance with JSSS 6.4.3 [*Vertical Access*].

(4) Provide support or protection for the underground services appropriately in accordance with JSSS Chapter 3 [*Existing Underground, Concealed and Overhead Services*], and take measures, according to the situation, such as indicating clearly the location and precautions of the underground service and providing protective fences for the services.

(5) Prevent workers and construction equipment/transport vehicles from falling at the excavation site, in accordance with JSSS 2.3 [*Prohibition of Entry*], install all necessary entry prevention facilities including fences, temporary enclosures, warning flags, "no entry" signs and the like and placing Spotters.

(6) Take the following measures when there is a risk of danger to third parties, workers, construction equipment, etc. by the fall of excavated soil/rock into the lower parts (bottom) of the excavation site:

(a) Identify dangerous locations, install entry prevention facilities such as fences, temporary enclosures, warning signs, etc. in accordance with JSSS 2.3 [*Prohibition of Entry*]; and

(b) Install protective fences that can catch falling rocks, etc.

(7) Preventive measures against falling rocks

(a) To protect workers from the dangers of falling of loose rocks and soils from the excavated surface, remove the loose rocks, etc. and take appropriate protective measures; and

(b) When there is a risk of falling of loose rocks/soils due to the excavation, take measures such as provision of earth retaining and protective net beforehand, and prohibiting workers from entering in the excavation site.

7.2.3 Safety Measures during Excavation Works

During the Excavation Works, the Contractor shall:

(1) Not place spoil, filling or Contractor's Equipment near the vertical edge of excavated surfaces.

(2) Stop the Excavation Works where a sign of ground collapse is identified during excavation, evacuate all Contractor's Personnel, implement all necessary safety measures, prohibit Contractor's Personnel from recommencing work until all safety measures have been taken.

(3) Backfill any temporary excavation area as soon as possible after the relevant work is completed.

(4) For places where open Excavation Works are performed, maintain the necessary illuminance to perform the work safely.

## 7.3 MANUAL EXCAVATION WORKS

7.3.1 General

During manual Excavation Works, the Contractor shall:

(1) Not undermine any excavation under and beyond the vertical cutting face.

(2) Not excavate under existing foundations.

(3) Maintain sufficient distance between workers.

(4) When breaking or removing loose rock, pay attention to the stability of the rock and the direction of its fall.

(5) When using a lever for removing rock, select equipment that has appropriate length and strength for the work.

## 7.4 MECHANICAL EXCAVATION WORKS

Refer to JSSS Chapter 4 [*Contractor's Equipment*].

## 7.5 TRENCHES, PITS AND OTHER TYPES OF STRUCTURAL EXCAVATION

7.5.1 General

The Contractor shall provide Earthwork Support in accordance with JSSS 6.2 [*Earthwork Support*] to prevent any danger to workers due to the collapse of excavated surfaces during the excavation of trenches, pits and other types of structural excavation.

7.5.2 Safety Measures

(1) Materials and equipment to be used for Earthwork Support shall be appropriate for the width and depth of the excavation and free from damage or defects that might impair their proper function.

(2) Workers shall not be allowed to enter any excavation until Earthwork Support is installed prior to the work commencing.

(3) Excavation to a level greater than 60cm below the planned bottom level of support when the Earthwork Support itself is not yet installed shall not be allowed.

(4) If temporary removal of individual members of the Earthwork Support is necessary, safety measures shall be taken to ensure the safety of workers, such as installing temporary members to hold the loads imposed on the system.

(5) When removing Earthwork Support, the Contractor shall not allow anyone other than the workers engaged in the removal work to enter the area and the vicinity.

(6) The Contractor shall perform backfilling of any excavation in parallel with the removal of the Earthwork Support.

## 7.6 BLASTING WORKS

### 7.6.1 Scope

(1) This Section specifies safety measures for Blasting Works generally for the removal of rock that cannot be undertaken using conventional excavation techniques.

(2) Blasting Works for tunnelling is not included in the scope of this Chapter.

### 7.6.2 General Requirements

(1) Blasting shall only be permitted to be performed by the Contractor:

(a) When it is safe to do so and when there is no reasonably identifiable risk of injury or damage being caused to persons or property within or outside the Site;

(b) Where it is not specifically prohibited by the Particular Safety Specification; and

(c) When the Contractor has received the Engineer's approval or instruction.

(2) Blasting when approved, shall only be permitted at times which have been predetermined and agreed with the Engineer and any relevant authority.

(3) The Blasting Works plan shall be described in the relevant Method Statement.

(4) This Section applies particularly where there may be any risk of injury or damage to persons and property from flying debris within or outside the Site.

### 7.6.3 Noise

Noise from blasting in the Site shall be controlled in accordance with JSSS 2.1.4 [*Noise*].

### 7.6.4 Compliance Standards

(1) By reference to JSSS 1.4 [*Compliance with JSSS and Other Regulations*], for any items in this Section or relevant to the subject of this Section and which are not fully covered by JSSS, the Contractor shall take necessary measures for Blasting Works complying with BS 5607 [*Code of Practice for the Safe Use of Explosives in the Construction Industry*].

(2) The Contractor shall obtain the necessary permits, licenses or approvals for Blasting Works and the handling and storage of Explosives associated therewith. The Employer, at the request of the Contractor, shall provide such reasonable assistance to allow the Contractor to obtain properly such permits, licenses or approvals.

### 7.6.5 Personnel

(1) Further to the requirements of JSSS 1.18 [*Proper Placement of Contractor's Personnel*], the Contractor shall assign the following personnel for Blasting Works:

(a) Explosives engineer; and

(b) Shotfirer(s).

(2) Responsibilities and requirement of personnel for Blasting Works.

(a) The Explosives engineer shall plan the Blasting Works, lead the Blasting Works at the Site and perform the safety management of the Blasting Works; and

(b) Shotfirer(s) shall perform safe handling, transportation and storage of Explosives, and perform Blasting Works and site safety management.

(3) Safety education and guidance

Further to the requirements of JSSS 1.18 [*Proper Placement of Contractor's Personnel*], the Contractor shall ensure that the Explosives engineer and shotfirer(s) have sufficient knowledge of and are able to comply with the following:

(a) Nature of hazards associated with Blasting;

(b) Unsafe conditions and conduct in performing Blasting Works;

(c) Procedures for Blasting Works;

(d) Evacuation and return procedures for any evacuated workers and personnel;

(e) Safety measures when misfiring of Explosives occurs; and

(f) Actions for Emergency Response.

7.6.6 Safety Plan

The Contractor shall prepare a Safety Plan for Blasting describing all required safety measures for Blasting Works in addition to the items prescribed in JSSS 1.7 [*Contractor's Safety Plans*] and including the following:

(1) Risk analysis and countermeasures.

(2) Safety measures for transportation, safekeeping, use and disposal of Explosives.

(3) Safety measures for Contractor's Personnel, Employer's Personnel and any other persons, the general public, neighbouring residents and building owners on or adjacent to the Site and who may be affected by the Blasting Works (hereinafter collectively referred to as "persons affected by the Blasting Works" in this Section).

(4) Determination of Blasting Exclusion Zone.

(5) Identification of affected areas, buildings, structures and property.

(6) Environmental and health compliance requirements including vibration, noise, fire, and the like.

(7) Environmental monitoring plan and methods to record the impact of Blasting on affected buildings, structures and property.

(8) Trial Blasting.

(9) Identification of the Explosives engineer and shotfirers to distinguish from other workers.

(10) Placement of Spotters.

(11) Method of notification of the start date and time of Blasting Works and the serving of notice immediately before commencement of Blasting Works to other persons affected by the Blasting Works.

(12) Evacuation method of all personnel from the Blasting Exclusion Zone before Blasting.

(13) Warning system at the time of Blasting.

(14) Procedures and methods for dealing with misfired Explosives (The plan for the treatment procedures for misfired Explosives shall be prepared by reference to BS 5607 [*Code of practice for the safe use of explosives in the construction industry*]: Clause 10.5 [*Misfires*]).

(15) List of legal and administrative records.

7.6.7 Risk Prevention

(1) Notice of Blasting

The Contractor shall notify all persons affected by the Blasting Works. of the planned

schedule and start dates and times for Blasting Works. Such information shall be updated as necessary, immediately before the Blasting Works commence.

(2) Risk Prevention Measures

The Contractor shall take all necessary measures to prevent any injury or damage to all persons affected by the Blasting Works, including the following:

(a) Prohibition of overcharging with Explosives more than that specified in the Method Statement prepared based upon the trial Blasting;

(b) Prevention of scattering of flying rock and other debris;

(c) Prevention of collapse of surrounding rocks or ground areas;

(d) Demarcate the Blasting Exclusion Zone for Blasting Works and take necessary measures to prohibit any unauthorised persons from entering the Blasting Exclusion Zone by a system of signs, signals and Spotters in accordance with BS 5607 [*Code of practice for the safe use of explosives in the construction industry*]: Clause 7.4.2 [*Blast warning procedures*] including the following:

(i) Provide audible warning sirens to warn of impending, current and completed Blasting operations; and

(ii) Place bulletin boards showing the Blasting time, siren code and other precautions at the boundary of the Blasting Exclusion Zone.

(e) Establish evacuation requirements, routes and assembly areas and inform all persons affected by the Blasting Works;

(f) Perform firing only after the Spotters have confirmed that all persons affected by the Blasting Works have been evacuated;

(g) Provide communication equipment between the shotfirer and the Spotter, maintain and test the equipment;

(h) Prohibit bringing into the Blasting areas any mobile phone that may affect adversely the electric detonator; and

(i) Unless otherwise specified in the Particular Safety Specification, perform Blasting Works only during the daytime.

7.6.8 Handling and Storage of Explosives

(1) Storage of Explosives

(a) The Explosive store to be constructed at the Site shall be a secure, substantial and fireproof building, environmentally controlled, locked, guarded and protected at all times and in accordance with the Laws of the Country;

(b) Appropriate numbers and types of personnel shall be assigned by the Contractor for safekeeping and security of the stored Explosives and any other materials;

(c) The Contractor shall maintain records of the types and quantities of all Explosives received and issued at the store, listing the date and time of receipt and issue and the names of all personnel concerned; and

(d) The Contractor shall submit the records to the Engineer when the Engineer requests.

For other storage requirements, the Contractor shall take necessary measures complying with BS 5607[*Code of practice for the safe use of explosives in the construction industry*]: Clause 9.3 [*Storage*].

(2) Transportation of Explosives

For transportation requirements, the Contractor shall take necessary measures complying with BS 5607 [*Code of practice for the safe use of explosives in the construction industry*]: Clause 9.4 [*Transport of Explosives on Site*].

(3) Quantity of Explosives at the Blasting site

(a) No Explosives shall be stored at the Blasting site;

(b) The quantity of Explosives to be transported from store to the Blasting site shall be limited to the estimated quantity of consumption for the Blasting; and

(c) Explosives not used on the day shall be returned to the Explosives store.

(4) Handling of Explosives

(a) Explosives shall be handled with extreme care ensuring that they are not hit, thrown or dropped;

(b) Containers for Explosives shall be solidly constructed from timber or non-conducting material and metals such as iron or foil must not be used on inner surfaces;

(c) Explosives and detonators shall be separately stored in lockable containers;

(d) The containers for Explosives shall protect against water ingress, impact damage; and

(e) Smoking, use of matches, lighters, flames, sparks and the like shall be prohibited in areas where Explosives are being transported, stored and handled, notice boards and warning signs shall be placed in suitable positions.

(5) Records of Blasting and Explosives

(a) The Shotfirer shall prepare daily work records showing the date and time of each Blasting operation, quantity of Explosives received, consumed, misfired and remaining, number of blast holes, charging method for the Blasting and treatment of misfired Explosives;

(b) The Explosives engineer shall check and countersign the Blasting Works records; and

(c) The Contractor shall submit the records to the Engineer when the Engineer requests.

(6) Notice to the Engineer

The Contractor shall notify the Engineer in writing as follows:

(a) Notification of delivery of Explosives to the store and from the store to the Site, shall each be given to the Engineer by no later than noon on the day preceding the scheduled date of the arrival of Explosives at the store and the delivery to the Site;

(b) Notification of intended Blasting Works shall be given to the Engineer by no later than noon on the day preceding the scheduled date of the Blasting operation; and

(c) Notification of the schedule for the following week's Blasting shall be given to the Engineer by no later than Friday morning of the preceding week.

### 7.6.9 Trial Blasting

The Contractor shall perform trial Blasting in accordance with the Safety Plan for Blasting provided in JSSS 7.6.6 [*Safety Plan*] for the following purposes, and modify the said Safety Plan according to the results of the trial Blasting:

(1) Confirm the characteristics of rock and topography at the Blasting site that will affect the Blasting operations.

(2) Confirm the suitability of the planned Blasting method, Explosives amount, and scattering prevention and other protection measures.

(3) Confirm the safety of all persons affected by the Blasting Works.

(4) Confirm that the Contractor's criteria are adequate for the purpose of JSSS 7.6.10 [*Monitoring*].

(5) The Contractor shall submit the trial Blasting reports with any consequent changes to the Safety Plan for Blasting to the Engineer before proceeding with the Blasting Works.

7.6.10 Monitoring

The Contractor shall comply with the requirements of JSSS 7.1.2 [*Monitoring*].

7.6.11 Particular Safety Measures

(1) Identification of Blasting workers

Provide clear visible identification mark, uniforms or marked safety helmets to distinguish the Explosives engineer and shotfirer(s) engaged in Blasting Works from other workers.

(2) Drilling Work

(a) No drilling shall be allowed in the hole formed for previous Blasting; and

(b) If any misfired Explosives are found during the drilling operation, the drilling shall be stopped and the misfired Explosives shall be treated in accordance with the procedures planned in JSSS 7.6.6 [*Safety Plan*] and JSSS 7.6.12 [*Measures after Blasting*], (2) [*Treatment of misfired Explosives*].

(3) Explosives Charging

(a) Drilling operations shall not be permitted during charging of Explosives;

(b) Before charging, thoroughly clean the holes and do not leave any dust or debris; and

(c) Shock and friction such as the following, which can cause accidental initiation of the charges, shall be avoided:

(i) The over-vigorous use of stemming rods to force Explosives into a shot hole;

(ii) The use of drill rods or other metal tools in a shot hole containing Explosives;

(iii) Vehicles running over Explosives and other hazards involving impact or concussion; and

For other safety measures for charging work, the Contractor shall comply with BS 5607[*Code of practice for the safe use of explosives in the construction industry]*: Clause 10 [*Safety when using Explosives*].

(4) Handling Detonators

(a) Measures for Blasting using electric detonators:

(i) Make sure electric detonator's leg wires shall be kept short-circuited until they are connected into the circuit for firing;

(ii) Check if shotfiring cables are not cut or damaged;

(iii) Make sure electric detonators shall be kept away from electric lighting supplies, power supplies and other electrical sources that may cause electric leakage;

(iv) Check if there are no missing or wrong wiring connections or mis-connection with previous blast wires;

(v) Make sure there are no stray electric currents;

(vi) Do not use electric detonators if there is any danger of electrical interference for example from radio-frequency radiation near radio communication facility or radar; and

(vii) Install a lightning detector near the Blasting area, stop Blasting Works when there is a risk of lightning strike, and evacuate workers to a safe place.

For other safety matters for Blasting with electric detonator, the Contractor shall comply with BS 5607[*Code of practice for the safe use of explosives in the construction industry*]: Clause 10.4.3 [*Electric detonators*].

(b) Measures for Blasting using non-electric detonators:

(i) Do not cut or damage the shock tube; and

(ii) Before firing, check the connections visually and make sure that there are no missing or previous wiring connections or wrong wiring connections.

(5) Measures in Ignition:

(a) The connection between the shotfiring apparatus and shotfiring cable shall be made just before ignition;

(b) Ignition shall be made at a safe place isolated and protected according to the degree of the blast; and

(c) The handle shall be removed from the shotfiring apparatus except when igniting.

7.6.12 Measures after Blasting

(1) Confirmation of safety of Blasting area after Blasting:

(a) No persons other than the shotfirer shall enter the Blasting site or its vicinity until the shotfirer has inspected the area and confirmed that it is safe to re-enter; and

(b) The shotfirer shall inspect the area and surrounding area of the Blasting site to check that there is no danger of falling or collapsing of ground and rocks or misfired Explosives.

(2) Treatment of misfired Explosives

If, after ignition, the loaded Explosives did not explode, or if it is difficult to confirm the explosion, the misfired Explosives shall be treated in accordance with the treatment of misfired Explosives in the Safety Plan for Blasting and BS 5607[*Code of practice for the safe use of explosives in the construction industry*], Clause 10.5 [*Misfires*] including the following:

(a) Procedure of treatment of misfired Explosives;

The following treatment procedure of misfired Explosives shall be taken:

(i) Immediate remedial action;

(ii) Delayed remedial action;

(iii) Further attempt at detonation; and

(iv) Inspection to confirm complete detonation.

The details of the above actions are stipulated in succeeding (b) to (d).

(b) Immediate remedial action;

The following initial actions shall be taken by the shotfirer:

(i) Prohibit anyone other than the shotfirer and other authorised personnel from entering the Blasting site;

(ii) Entry to the Blasting site shall only be permitted after the elapsed time from the occurrence of misfire as specified in the Safety Plan for Blasting;

(iii) Disconnect from the shotfiring apparatus any removable handle or key and the shotfiring cable, and short-circuit or ground the bare wires together;

(iv) When safe to do so, examine the cable and connections for any defects, and remedy any defect so found;

(v) Make a further attempt to fire the shot;

(vi) Report to the Explosives engineer for further instructions;

(vii) Do not collect any exposed Explosives before further action is taken;

(viii) Do not allow drilling or any other work to be carried out in the vicinity of the misfire until the misfire has been remedied, unless this is directly involved in the treatment of the misfire; and

(ix) Other actions specified in BS 5607[*Code of practice for the safe use of explosives in the construction industry*]: Clause 10.5.4.1 [*Initial actions*].

After the initial actions, the following initial remedial actions shall be taken by the shotfirer:

(i) When safe to do so, examine the cable and connections for any defects, and remedy any defect so found; and

(ii) Make a further attempt to fire the shot.

(c) Delayed remedial action and further attempt at detonation:

(i) After the immediate remedial action, when necessary, the delayed remedial action and further attempt at detonation shall be taken.

(ii) The delayed remedial action and further attempt at detonation should be safe removal of the stemming to allow re-priming, or drilling and firing relieving holes placed so as to work away the rock surrounding the stemming and charge of the misfired shot holes.

(iii) The action and attempt shall be taken in accordance with the Safety Plan for Blasting, and BS 5607[*Code of practice for the safe use of explosives in the construction industry]*: Clauses 10.5.4.2 [*Written instructions*], 10.5.4.3 [*Attempts to re-fire*], 10.5.4.4 [*Drilling relieving holes*] and 10.5.5 [*Drilling relieving holes*].

(d) Inspection to confirm complete detonation;

After further attempt at detonation, inspection shall be made to confirm complete detonation. If any non or partial detonation is found, remedial measures shall be taken according to Figure-1 Procedure to remedy misfires in BS 5607[*Code of practice for the safe use of explosives in the construction industry*]: Clause 10.5.1 [*General*].

(e) Take appropriate steps to prevent theft of Explosives and detonators or their initiation by an unauthorised person; and

(f) The Contractor shall promptly notify the Engineer of any misfire event and the remedial actions.

# CHAPTER 8: FOUNDATION PILING WORKS

## 8.1 GENERAL REQUIREMENTS

### 8.1.1 Scope

(1) This Chapter specifies the safety requirements for piling works which include:

(a) Driven Piling;

(b) Cast-in-place Piling; and

(c) Hand-dug Piling

and which are hereinafter collectively referred to as "Foundation Piling Works".

(2) General requirements for Contractor's Equipment, Temporary Works and other related works all which apply to the work in this Chapter, are included in other Chapters of JSSS.

Additional particular requirements are contained in this Chapter.

## 8.2 PARTICULAR SAFETY MEASURES

### 8.2.1 General

(1) Foundation Piling Works and all operations connected therewith shall be designated as Dangerous Work and the Contractor shall enclose the working area with temporary fences or barriers, prevent entry of any unauthorised personnel and take all such further measures that are required by JSSS 2.3 [*Prohibition of Entry*].

(2) Unless otherwise specified in the Contract, the Contractor shall be responsible for selecting methods of working and types of Contractor's Equipment and Temporary Works suitable for the purpose in conformity with GC 4.10 [*Site Data*].

(3) In accordance with JSSS 6.2 [*Earthwork Support*] the Contractor shall be responsible for maintaining the structural integrity of the sides of all excavated or drilled pile excavations and shall provide whatever temporary or permanent Earthwork Support that may be necessary to achieve this.

(4) The Contractor shall execute all Piling Works without weakening any ground or causing any damage to Other Properties.

(5) The Contractor shall also ensure the safety of all persons, whilst they are working in, under or adjacent to any piling excavation on or outside the Site.

(6) The Contractor shall take all necessary measures to prevent the occurrence of any such weakening or damage to Other Properties and obtain the prior consent of the Engineer to such measures before commencing relevant parts of the Foundation Piling Works.

Such measures shall include the provision of permanent or temporary supports and reinforcing of foundations, structures, buildings, roads or paved areas or the like, either on or adjacent to the Site.

### 8.2.2 Safety Measures Before Commencement

The Contractor shall plan all Foundation Piling Works before commencement so that they are executed in a safe and methodical manner. The safety measures before commencement of the Works shall be as follows:

(1) The HSO shall inspect the Foundation Piling Works' working area and surrounding areas and ensure that all of the following is acceptable before allowing the Foundation Piling Works to commence:

(a) The ground is level and capable of supporting the loading of the Contractor's Equipment including any dynamic effect of the Foundation Piling Works and the load of any materials to be placed thereon;

(b) The area is clear of any obstructions; and

(c) The areas are properly drained and free from standing water.

If necessary, the Contractor shall improve the ground by stabilising, cleaning, draining, providing paving and/or placing steel decking and temporary piling and the like to provide a suitable, clean, dry and safe working area without causing any risk to the stability of Contractor's Equipment or materials.

8.2.3 Safety Measures for Transportation on Site - Appropriate Equipment and Vehicle

Piles and pile casings, liners, reinforcement cages and the like shall not be transported or relocated by use of pile driving or drilling machines. In all cases the Contractor shall use cranes accompanied or where necessary, trucks and flatbed trailers for the transportation or relocation.

8.2.4 Safety Measures for Driven Piling

The Contractor shall:

(1) Select correct rigging method and appropriate Rigging Equipment to suit the characteristics of the lifting or pile driving machine and the piles, so that piles are mishandled or dropped.

(2) Keep workers other than those directly engaged in the driving operations away from the direct working location when driving operations are taking place.

(3) Provide a lifeline to fix PFAS on the lead when the worker works on the lead of pile driving machine in addition to the fall prevention measures stipulated in JSSS 2.5 [*Fall Prevention*].

8.2.5 Safety Measures for Cast-in-place Piling

When any Cast-in-place Piling Works are adopted, the Contractor shall take appropriate safety measures taking account of features of different methods of work, in particular:

(1) Pile Excavation Works using All-Casing Piling Method:

(a) Keep workers other than those directly engaged in the piling operations away from the pile excavation machine while installing and removing the casing and operating the drop hammer grab. Before any worker is allowed to access the casing or equipment whilst the hammer grab is being operated, ensure that the hammer grab is secured in the casing; and

(b) When any worker needs to enter the casing, confirm that there is no danger in accordance with JSSS 2.1.5 [*Further Requirements for Dangerous Work*].

(2) Pile Excavation Works for Reverse Circulation Bored Piling Method:

(a) When adding or removing drill rods, ensure that a Spotter is present to signal the operator of the drilling machine so that the hands and fingers of workers do not get caught in the work;

(b) Maintain the water level and concentration level of slurry (bentonite solution) in the drilled hole as planned in the Method Statement and prepare for addition or discharge of slurry, consequent to any fluctuation; and

(c) When providing a mud creation pit or a mud discharge pit, take measures to prevent workers from falling into such pits by providing barriers and signage.

(3) Pile Excavation Works for Auger Piling Method:

(a) To prevent overturn of drilling or auger equipment, consider the weight of excavated material in the drilling bucket or on the auger during operation; and

(b) Keep workers other than those directly engaged in the drilling works, away from the drill or auger to prevent injury through splashing or falling of mud or earth or

through contact with drill or auger.

(4) Placement of Concrete

(a) Reinforcement cages shall be designed, manufactured and hoisted into place so that they do not deform;

(b) Provide secure rigging slings and welded metal fixings to ensure that reinforcement cages are secure and do not slip or drop off the Hoisting Equipment;

(c) Tremie pipes shall be treated in the same manner so that they are secure and do not slip or drop off the Hoisting Equipment;

(d) Provide secure Rigging Equipment and operate hoisting to ensure that reinforcement cages and tremie pipes do not slip or drop off from the Hoisting Equipment in accordance with the Method Statement and Safety Plan; and

(e) When handling reinforcement cages and tremie pipes, ensure that a Spotter is present to signal the operator of the machine so that the hands and fingers of workers do not get caught in the work.

8.2.6 Safety Measures for Hand-dug Piling

Unless otherwise specified in the Particular Safety Specification, the Contractor shall comply with the requirements of the following (1) to (3):

(1) Hand-dug Piling shall not be adopted by the Contractor in ground with unfavourable conditions such as:

(a) High ground water levels;

(b) Weak geological structure including the possible presence of voids or caverns;

(c) Possible existence of Hazardous Substances;

(d) Containing loose fill in depths exceeding 10m;

(e) In areas with history of deep-seated ground movement;

(f) Close proximity to water or sewage tunnels; and

(g) Close proximity to shallow foundations.

(2) Hand-dug Piling may for example be adopted by the Contractor in the following situations where there are no unfavourable conditions:

(a) Steeply-sloping sites with pile depths less than 25m in depth in soil;

(b) Sites with difficult access or insufficient working room where it may be impractical or unsafe to use mechanical plant; and

(c) Where noise, vibration or damage may be caused by driven or bored piling and which must be avoided.

(3) Hand-dug Piling shall:

(a) Be not less than 2m diameter;

(b) Be not more than 25m deep; and

(c) Have continuous shaft lining.

(4) Access/Exit Facilities

The Contractor shall:

(a) Provide safe and efficient access, egress and emergency exit facilities in the shaft for workers;

(b) Provide vertical ladders, securely anchored to framework or shaft lining and complete with a ladder safety system;

(c) Provide a landing rest platform every 5m, when the length of any ladder exceeds 10m;

(d) Ensure that the upper end of vertical ladders projects at least 1m above the ground and any landing rest platforms;

(e) Provide appropriate and adequate pumps to remove all water from the base of the shafts; and

(f) Take measures to prevent any accidents involving workers with the spoil removal containers and any other equipment particularly throughout the bucket hoisting and descending operations.

(5) Ladder Safety System

(a) A ladder safety system shall be provided to eliminate the risk of injury to any worker falling off the ladder; and

(b) The ladder safety system shall comprise a carrier, safety sleeve, lanyard, connectors, and body harness and all workers shall be trained in its use.

(6) Communication and Signalling Measures

(a) Signals for delivering materials and equipment or discharging excavated materials to and down or from the shaft shall be determined in advance and all workers shall be trained in their use;

(b) Signals and evacuation methods during emergencies shall also be determined in advance and all workers shall be trained in their use with regular evacuation training; and

(c) Where considered necessary by the HSO handheld radios shall be provided to the Operation Leader working at the base of the shaft and a Spotter at the ground level for all communications.

(7) Environmental Measures

(a) Ensure a continuous, adequate and safe air supply to workers located at the bottom of the shaft;

(b) Provide monitoring equipment, set up alarms and evacuate workers if air quality deteriorates and keep records in accordance with JSSS 2.1 [*Work Environment*]; and

(c) Provide adequate temporary lighting.

(8) Measures before Commencing the Works

Check the condition of the excavated ground surface in the shaft and whether there is any abnormality in the shaft lining.

(9) Measures during Execution of the Works

(a) When workers are in the shaft, assign a Spotter at ground level and located within direct view at the upper edge of the shaft;

(b) Minimise the depth of each stage of excavation;

(c) Avoid introducing new teams of workers or changing over teams until each stage of excavation is completed and temporary support or shaft lining has been installed;

(d) Provide immediate temporary support for the excavated faces prior to casting the

liner;

(e) Providing reinforcement to the concrete liner;

(f) Providing drainage to each stage of excavation with relief wells, sumps and pumping as appropriate;

(g) Stop the work and evacuate workers when abnormal water inflow occurs in the shaft and resume work only after taking countermeasures and confirming the safety of the Site and the effectiveness of the measures;

(h) Pay constant attention to any changes in soil types, properties, etc. and if any abnormality is identified at the excavated surface during work or in the shaft lining, immediately stop the work, evacuate workers and take appropriate remedial measures, resume the work only after confirming that there is no further risk; and

(i) Ensure nothing is dropped into the shaft that may injure workers.

8.2.7 Monitoring

The Contractor shall comply with the requirements JSSS 2.1.7 [*Monitoring and Records*].

# CHAPTER 9: CONCRETE WORKS

## 9.1 GENERAL REQUIREMENTS

### 9.1.1 Scope

(1) This Chapter specifies the safety requirements for concrete works which include:

(a) Cast-in-place (poured or pumped) concrete;

(b) Reinforcement (reinforcing bar and fabric reinforcement);

(c) Formwork (including associated Falsework);

and which are hereinafter collectively referred to as "Concrete Works".

(2) General safety requirements, covering for example Contractor's Equipment including stone crushing plants and screening equipment, concrete batching plants, Temporary Works and other related matters are described in other Chapters of JSSS.

Additional particular requirements are contained in this Chapter.

### 9.1.2 Safety Plan and Instructions to Workers

Prepare a Safety Plan describing the safety requirements for Concrete Works and inform all workers engaged in the Concrete Works of the content and requirements. The Safety Plan shall pay due care to the workers' health matters (e.g. back injury) in relation to handling of reinforcement, Formwork panels or other heavy items, and include necessary preventive measures (e.g. using appropriate Contractor's Equipment, assigning sufficient number of workers).

## 9.2 PARTICULAR SAFETY MEASURES

The following safety requirements are additional to the general requirements described in other Chapters.

### 9.2.1 Safety Measures at Planning Stage

(1) The Contractor shall plan all Concrete Works so that they are executed in a safe and methodical manner.

(2) The Contractor shall plan the method of placing cast-in-place concrete and carry out the design and construction of Formwork and Falsework to take account of uneven and excessive impact force and different or asymmetrical loads, thicknesses and pressures in certain areas during concrete placement to avoid deformation beyond allowable tolerances specified in the Contract, any damage or collapse of Formwork and Falsework and show all details in the Method Statement and Safety Plan.

(3) The Contractor shall provide PPE such as rubber gloves, face masks and goggles to the workers when spraying concrete form release agents to prevent chemical injury, and where there is a possibility that release agent may splash on the third parties, take measures such as establishing exclusion zone with temporary barriers and locate Spotters to prevent those persons from entering the area.

### 9.2.2 Safety Measures for Placement

The Contractor shall:

(1) Designate concrete placement works (including all pumping and hoisting of concrete) as Dangerous Work, enclose the immediate working area with temporary signs and fences or barriers, prevent entry of any unauthorised personnel and take all such further measures that are required by JSSS 2.3 [*Prohibition of Entry*].

(2) Inspect all reinforcement, Formwork and Falsework before and during concrete placement. If any abnormality is discovered, stop the placement works and evacuate the

workers immediately, carry out repairs and reinspect before resuming.

(3) Place the concrete in accordance with the Method Statement and avoid uneven and excessive impact force and different or asymmetrical thicknesses and pressures in certain areas during concrete placement. Additional materials shall be stored at the concrete placing site for use to reinforce Falsework in case of occurrence of their local deformation.

9.2.3 Safety Measures for Placement by Pumping

The Contractor shall take the following safety measures for delivery of cast-in-place concrete with the use of concrete pumps:

(1) Inspect the condition of concrete pump delivery pipes, end hoses and all connections, ensure that they are free from defects and blockage, check that all joints and connections are secure and free from leakage before and during concrete placement works.

(2) Ensure that all delivery pipes, end hoses and other system components are all correctly pressure rated and capable of withstanding the maximum pump pressure.

(3) Maintain a safe separation distance between the delivery pipe, end hose and boom and any existing Overhead Services as required by JSSS Chapter 3 [*Existing Underground, Concealed and Overhead Services*], Table 3.2.1: Safe Separation Distances.

(4) Maintain a safe separation distance from any obstructions (Contractor's Equipment, buildings, etc.) and avoid any risk of hitting or touching any obstructions with the pumping equipment, delivery pipes, end hoses or boom.

(5) Check the ground condition, ensure a firm, stable and horizontal working base at all times and position pumping equipment and ready-mixed concrete trucks at a safe distance from the edge of any excavations, drop or slope to protect against any slippage or fall of equipment and ready-mixed concrete trucks or collapse of ground.

(6) Fully extend outriggers and ensure stability of pumping equipment and ready-mixed concrete trucks at all times.

(7) Arrange proper communications and signals before starting the placement between workers, Spotters and operators of equipment and ready-mixed concrete trucks and ensure there is a Spotter at the point of placement.

(8) Never allow workers to stand between ready-mixed concrete trucks and pumps when ready-mixed concrete trucks are reversing.

(9) Ensure that workers are out of the path of the boom when moving the boom.

(10) If a blockage or clogging occurs inside the pipeline during the pour, stop pumping immediately and instruct workers to move to a safe position before attempting to remove the blockage or clogging. The pipeline shall be opened after releasing the pressure inside in accordance with the predetermined procedure.

(11) Ensure that hoppers and chutes are securely fixed and that workers are aware of the method of operation and safe use.

(12) Ensure that the delivery pipe and hose at the end of the concreting pump booms are securely connected so that they do not fall or become detached.

(13) Prohibit workers from working on the hopper screen of the concrete pump, remove obstructions and foreign materials in the hopper only after stopping the agitating blade and applying lockout/tagout procedures.

(14) Prohibit workers from entering in front of and below the outlet of concrete pump delivery pipes and end hoses to prevent workers being struck by pipes or flailing hoses.

9.2.4 Safety Measures for Ready-Mixed Concrete Trucks

The Contractor shall take the following measures for the ready-mixed concrete trucks in the

transportation and delivery of cast-in-place concrete.

(1) Ensure that drivers are aware of and take due account of the heavy load and high centre of gravity of loaded ready-mixed concrete trucks during delivery and discharge to maintain safety and prevent overturning.

(2) Ensure that workers do not come into contact with and/or become entangled with the rotating drum and other moving parts of ready-mixed concrete trucks and that they are prevented from looking into the drum.

9.2.5 Safety Measures for Use of Concrete Buckets

The Contractor shall take the following measures when using concrete buckets for hoisting and placement of cast-in-place concrete:

(1) Comply with JSSS 5.2.5 [*General Safety Measures*] for selection of proper Hoisting Equipment and Rigging Equipment, arrangement of proper communication tools, signals and placement of Spotters.

(2) Ensure that the movable gate is locked before hoisting and is only operated by a skilled worker when it is opened for discharge.

(3) Take measures to stabilise the bucket during hoisting and prevent any uncontrolled swinging. Prohibit workers from pushing and pulling bracket except for minor adjustment of location of the bucket for discharging concrete.

(4) Prevent any persons or workers from entering the places below bucket.

(5) Discharge the concrete slowly and in a controlled manner to prevent the bucket from rebounding after discharge.

9.2.6 Safety Measures for Use of Concrete Vibrators

The Contractor shall take the following measures when using concrete vibrators for compacting of cast-in-place concrete:

(1) Take all necessary measures to prevent electric shock, complying with JSSS 4.3.12 [*Additional Requirements for Electric Powered Equipment*].

(2) To prevent vibration injury to workers, provide anti-vibration gloves and ensure that they are properly used.

## 9.3 REINFORCEMENT

9.3.1 Safety Measures at Planning Stage

The Contractor shall:

(1) Prepare a Safety Plan, Method Statement and fixing and placing drawings of reinforcement describing the method of cutting, bending and fixing and showing the types and positioning of supports, ties and bracing necessary to support and rigidly secure the reinforcement and to prevent any movement or collapse.

(2) Inform all relevant workers of the content of the Safety Plan, Method Statement and assembly drawings.

9.3.2 Safety Measures at Cutting, Bending, Transporting, Fixing and Placing Stage

The Contractor shall take the following measures during cutting, bending, transporting, fixing and placing of reinforcement:

(1) Cutting and Bending:

(a) Designate the work as Dangerous Work, enclose the immediate working area with temporary signs and fences or barriers, prevent entry of any unauthorised personnel and take all such further measures that are required by JSSS 2.3

[*Prohibition of Entry*];

(b) Maintain the working area in a safe, organised, uncluttered and clean condition at all times, avoid excessive storage by retaining sufficient quantities of reinforcement for immediate use, locate equipment in known positions, prevent any fall or dropping of material, equipment and tools, remove offcuts to a separate area and ensure the area is safe and that the risk of workers falling or tripping is avoided; and

(c) Maintain stored reinforcement material in a safe and secure manner and prevent collapse or fall by providing adequate restraints.

(2) Transporting:

(a) Ensure that Scaffolding and any other temporary structures on which reinforcement is to be temporarily placed is capable of supporting the load, ensure that the load is distributed safely and that it does not cause any obstruction to the passage of other workers;

(b) Ensure that reinforcing bar is lifted and suspended horizontally to prevent any slippage during Hoisting Operations and also that it is bundled safely and securely tied to prevent any reinforcing bars from sliding out;

In principle, hoist the bundle of reinforcing bars, keeping them horizontal and maintaining the balance by using two rigging slings; and

(c) When transporting to the working location use flatbed trailers or truck, ensure that the trailer or truck is of sufficient length to avoid any overhang of reinforcing bars and provide appropriate warning signs and lighting on reinforcing bars if necessary in accordance with the local regulations to avoid collision with other vehicles, persons and workers.

(3) Fixing and Placing:

(a) Prepare proper temporary access to and support for fixing and placing reinforcement in position;

(b) Prevent any risk of fall and also any distortion or weakening of reinforcement by prohibiting workers from standing, walking or climbing on such reinforcement and where necessary provide safe temporary boarded walkways for workers use;

(c) Ensure that fixing and placing is in exact accordance with the fixing and placing drawings and that the correct types and positioning of supports, ties and bracing is maintained to properly support and rigidly secure the reinforcement and prevent undue movement or collapse;

(d) When there is any danger of reinforcement falling or collapsing during fixing and placing in wind and rain, stop the fixing and placing work. After conditions improve, inspect the reinforcement and take measures to correct any abnormality before continuing with fixing and placing;

(e) Prohibit working concurrently at levels where any other worker is working underneath in accordance with JSSS 2.6.7 [*Working Above or Below Other Persons*]; and

(f) Provide temporary protection caps to exposed ends of reinforcing bars to prevent injury to workers.

## 9.4 FORMWORK (INCLUDING FALSEWORK)

### 9.4.1 General

Any reference to “Formwork” in this Section shall also be deemed to include reference to the

associated Falsework for that Formwork.

9.4.2 Safety Measures at Planning Stage

The Contractor shall:

(1) Design the Formwork and manage its provision, use and removal in accordance with JSSS 1.37 [*Design and Management of Temporary Works*] and the further requirements of JSSS 6.1 [*General Requirements*].

(2) Prepare a Safety Plan, Method Statement and design drawings of Formwork describing the method of fabrication, assembly, erection and removal and showing details of all materials, components, types and positioning of supports, ties and bracing necessary to create a rigid and secure temporary support structure for the concrete, reinforcement and workers, and to prevent any movement or collapse.

(3) Inform all relevant workers of the content of the Safety Plan, Method Statement and design drawings.

9.4.3 Safety Measures at Fabrication and Assembly Stage

The Contractor shall take the following measures during fabricating, transporting and assembling of Formwork:

(1) Designate the work as Dangerous Work, enclose the immediate working area with temporary signs and fences or barriers, prevent entry of any unauthorised personnel and take all such further measures that are required by JSSS 2.3 [*Prohibition of Entry*].

(2) Maintain the working area and storage area in a safe, organised, uncluttered and clean condition at all times, avoid excessive storage by retaining sufficient quantities of material for immediate use, locate equipment in predetermined places, prevent any fall or dropping of material, equipment and tools, remove offcuts to a designated area.

(3) Ensure that the Formwork is free from cracks, defects and deformation.

(4) Ensure that Scaffolding and any other temporary structures on which Formwork is to be temporarily placed is capable of supporting the load, that the load is distributed evenly and within the allowable stress of Formwork.

(5) During any Hoisting Operations, ensure that all necessary measures are taken to prevent Formwork being affected by wind and that any risk of collision and consequent injury and damage is avoided.

9.4.4 Safety Measures during Dismantling and Removal Stage

(1) Ensure that Formwork is only dismantled when so instructed or approved in writing by the HSO.

(2) After dismantling, stack Formwork panels horizontally to avoid overturning due to strong wind or applied loadings; and

(3) Any protruding nails, wires, projecting members and splinters shall be removed or bent flat to avoid injury to workers and other persons.