LIFTING OPERATIONS CRITICAL RISK STANDARD

TNCL-OHSS-STD-0007

APPROVALS:

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1. INTRODUCTION

The purpose of this Lifting Operations Critical Risk Standard is to implement and verify the standard safe working practices to protect all individuals from the hazards of lifting activities.

This standard applies to all employees, contractors, and subcontractors who perform or are involved with lifting operations. Each person shall ensure that their employees follow this procedure.

This standard specifies in detail:

- The mandatory requirements and recommendations for the safe utilization of all lifting equipment.
- The experience, qualification, and training requirements for lifting equipment personnel, maintenance, inspection, testing, critical lift operation, organizational setup, and quality systems for the safe use of lifting equipment.

This standard shall be:

- Considered as mandatory requirements applying to all departments and contractor-owned and operated lifting equipment.
- Applied to use, purchase, operate, maintain, and hire lifting equipment.
- Implemented by buyers, vendors, users, contractors, subcontractors, and all operational departments, including projects, with clear identification of their responsibilities to prevent the use of any outdated and/or uncertified lifting equipment.

However, the current Tembo Nickel facility has no crainage capacities. This standard applies to all hired lifting operations for both Tembo Nickel and contractors, and all lifting operations to be performed in Tembo Nickel facilities have to comply with this standard.

2. DEFINITION AND ACRONYMS

2.1 Definition of Terms

Term	Definition
Colour Coding	TNCL operates a system whereby all lifting equipment is colour-coded with a designated colour. The validity of the colour code is one month, and colour-coded according to the schedule.
Competent Person	A person approved by TNCL for the particular activity being described.
Contractor	An organization or entity providing products and/or services to TNCL.
Crane Footprint	The area contained within 360 degrees of the lifting operation, covering the size of the load and 1.1 x maximum crane boom length.
Dynamic Factor	The load factor by which the capacity of a crane is determined for offshore and onshore applications.
Emergency Repair	For this standard, an emergency repair of lifting equipment shall only be considered an emergency in situations where the danger to personnel, assets, or the environment would be greater if the repair is not carried out. Under no circumstances will an emergency repair be carried out without prior notification and approval of the TNCL-OHSS Manager, whose responsibility is to evaluate the situation based on the facts.
Inspection	Any physical activity, related to ensuring that an item of lifting equipment, in its entirety and at a given location or environment, meets the specified design and operating standards and is safe to operate or utilize for a specified period. This includes but is not limited to activities such as measuring, testing, recording, checking, analyzing, loading, and charting one or more characteristics of the equipment.
Lifting Appliance	Lifting appliances are the mobile or stationary equipment used to lift loads. These are usually powered by mechanical, electrical, hydraulic, or pneumatic mechanisms. Ex: crane, winch, forklift, man lifts, etc.

Term	Definition
Lifting Appliances (Lifting Machines)	Any manual or powered lifting machine, that can raise, lower, or suspend loads, and includes the supporting structure and all plant, equipment and gear used in connection with such a machine, but excludes continuous mechanical handling devices (i.e. conveyors). ○ Cranes (mobile, tower, pedestal, etc.), ○ Wall/pillar cranes, derricks, swing jibs, ○ Runway Beams, Monorails, Gin Poles and Gin Wheels, ○ Manual and Powered Hoists and Winches, ○ Chain blocks, Tirfors, pull lifts, trolleys, ○ Powered Working Platforms, ○ Elevators and Lifts, ○ Forklifts, boom trucks, side booms and excavators, ○ Lifting jacks (pneumatic or hydraulic).
Lifting Equipment	A generic term used to cover both lifting gear and lifting machines. Lifting equipment shall mean any work equipment for lifting or lowering loads and includes its attachments used for anchoring, fixing, or supporting it. It includes any lifting accessories that attach the load to the lifting machine in addition to the equipment that carries out the actual lifting function.
Lifting Gear (Lifting Accessories or Loose Gear)	Any item used to connect a load to the lifting appliance but which is not in itself a part of the load or the appliance, such as: • Chains and Wire • Chain Slings, Wire Rope Slings, and Webbing Slings, • Rings, Links, Hooks, Shackles, Eye Bolts, Swivels, • Blocks, Snatch Blocks, • Beam Clamps and Plate Clamps, • Lifting Beams / Spreader Beams, • Man-baskets.
Lifting Tackles	These are the aids required to suspend the load by the lifting appliance. Ex: slings, hooks, eyebolts, baskets, etc.

Term	Definition
Load	This means any material, personnel, or any combination of these that are lifted, lowered, or suspended by the lifting equipment. The weight of the lifting accessories, including the hook block, shall be considered as part of the load being lifted.
Minimum Breaking (or Failure) Load (MBL)	The minimum-breaking load is the calculated load at which a sample of the item will break or fail.
Mode Factor	A factor applied by the user that takes into account the geometry of a sling assembly to obtain the maximum load that may be lifted for a particular mode of use or a configuration of use.
Proof Load Test (PLT)	Deliberate application of a predetermined load over SWL to assess the ability of the equipment to withstand operational requirements. This applied proof load shall never exceed the elastic limit of the item being tested. The amount of proof load to be applied will vary depending on the type of equipment, its SWL, and the applicable standard.
Repair	A measure whereby the original state of an appliance will be restored by rebuilding or exchanging parts or units. If essential parts with safety functions are to be rebuilt or exchanged, this is considered to be a major repair. This is the case, particularly in respect of the exchange of the following: • Brakes. • Safety gear or catching devices. • Over-speed governors. • Load carrying parts (e.g. anchorages, open or closed smelters sockets, primary structures, etc.) • Driving mechanisms and controls.

Term	Definition
Safe Working Load (SWL)	The maximum load, as certified, that an item of lifting equipment may raise, lower, or suspend under particular service conditions. It is the SWL that is marked on the item and that appears on any examination report or test records. Standard document, established by consensus and approved, that provides, for common and repeated use, rules, conditions or requirements, recommended practices, procedures, guidelines, specifications, philosophies, and datasheets, aimed at the achievement of the optimum degree of order in a given context.
Standard	Approved document with detailed sequential steps describing HOW a specific task is performed.
The factor of Safety (FOS), Coefficient of Utilization or Working Coefficient	It is a factor that is applied to the MBL to determine the WLL. It varies with the product to take account of the susceptibility to damage and considers the type of stresses the item will meet in normal use.
Third-Party Certification	Any activity related to lifting equipment where it is necessary to obtain a certificate, signed by a qualified, independent body possessing the necessary competence, professionalism, and expertise recognized by governments and international institutions worldwide in both legislative or non-legislative environments, having professional liability and indemnity or insurance issued for certification.
Working Load Limit (WLL)	The maximum load (as certified based on the design and mechanical properties of the item) that an item of lifting equipment is designed to sustain, i.e. to raise, lower, or suspend incorporating an appropriate FOS.

2.2 Acronyms and Meaning

Acronyms	Meaning
(A)SLI	(Automatic) Safe Load Indicator
CAR	Corrective Action Requests
EOT	Electric Overhead Travelling
FOS	Factor of Safety
GW	Gross Weight
HSE	Health, Safety and Environment
LEEA	Lifting Equipment Engineer Association
LOLER	Lifting Operations and Lifting Equipment Regulations
MBL	Minimum Braking (or failure) Load
MPI	Magnetic Particle Inspection
NDT – Non	Destructive Testing
OEM	Original Equipment Manufacturer
PCSA	Power Crane and Shovel Association
PLT	Proof Load Test
QMS	Quality Management System
STD	Standard
SWL	Safe Working Load
TPCA	Third Party Certification Authority
WLL	Working Load Limit

3. RESPONSIBILITIES

- It is the responsibility of the concerned heads of departments and the contractor to ensure that this standard and the relevant documents detailed below are available. Furthermore, it is the responsibility of the respective operations management to ensure that the lifting equipment personnel are aware of the requirements of this standard and any amendments that may be issued from time to time.
- This standard is aimed at achieving a high level of quality and safety awareness in all lifting operations performed within the jurisdiction of TNCL and contractors.
- It is the mandatory requirement of this standard that no item of lifting equipment shall be utilized to raise, lower, suspend, or transport a load unless a valid certificate verifying suitability for its intended use has been issued by an approved TPCA every year.
- Any item of lifting equipment, not holding a valid certificate from any approved TPCA shall not be utilized in any TNCL operational area. An original or approved copy of a valid certificate shall be available at the site where lifting equipment is in use.
- Any certificate issued by private companies or TPCAs that are not approved shall not be accepted unless it is endorsed and supported by a valid certificate issued by an approved TPCA.

All Line Managers must ensure that all employees, including contractors, comply with this Procedure.

4. GENERAL REQUIREMENTS

4.1 Rigging Supervisor

Physical and Educational Qualifications:

- Have a minimum of 10 years of rigging experience in the mining industry, with at least three years of supervisory experience.
- Physically fit with regard to eyesight, hearing, reflexes, and ability to handle lifting gear and equipment.
- Have had adequate training and experience and be competent to act as an appointed person or focal point nominated by management to be in overall control of the lifting operations.
- Be capable of reading, speaking, writing, and understanding the English language.
- Have strong administrative and supervisory skills to schedule, monitor, and control the lifting equipment personnel and lifting operations.

Training and Certification Requirements:

- Must hold a valid certification in rigging and rigging supervision issued by an approved TPCA.
- All certified and authorized TNCL/contractor rigging supervisors shall hold a laminated identification card with a photograph issued by an approved TPCA.

Responsibilities:

- Organization and control of the lifting operation.
- Assessment of the lifting operation to provide such planning, selection of cranes, lifting gear and equipment, instruction, and supervision as is necessary for the task to be undertaken safely.
- Ensure that accurate weights, radii, heights, etc., are established.
- Ensure that the ground is made suitable for taking up the loads to be imposed.
- Ensure that suitable access is provided to the site and any area required for the erection and dismantling of the crane.
- All hazards such as services (gas, water, electricity, etc.) above or below ground are identified, and suitable precautions are taken.
- Ensure that adequate inspection and maintenance of the equipment has been carried out.
- Ensure that there is an effective procedure for reporting defects and incidents and taking any necessary corrective action.
- Ensure that both the rigger and the crane operator are familiar with the method of signalling to be used.

4.2 Crane Supervisor

Physical and Educational Qualifications:

- Be educated to a minimum secondary level,
- A minimum of five years of experience,
- Be capable of reading, speaking, writing, and understanding the English language sufficiently for the safe operation of the crane,
- Be physically and medically fit, especially in eyesight, hearing, and reflexes.

Training and Certification Requirements:

- All mobile cranes shall be driven or operated by a person holding a valid Tanzanian driving license class F.
- All cranes shall be operated by a person holding a valid certificate of competence issued by an approved TPCA.

- All certified and authorized crane operators shall hold a laminated identification card with a photograph issued by an approved TPCA
- All certified and authorized crane operators shall only use the equipment for which they have received training and use it in the manner in which they have been trained.
- Minimum training, three days for fresh hands and two days for the refreshers.
- TNCL may demand the removal of the Operator where incompetence or negligence is proven at any time during an operation.

Responsibilities:

- Correct operation of the crane as per the manufacturer's instructions. The crane operator shall ensure that the crane is roadworthy, functioning correctly, and properly maintained every time that the crane is operated.
- Setting the crane level before lifting and checking that it remains level throughout the operation.
- Establishing which signalling system is to be used and following instructions from only one signaller at a time.
- Stopping operations if given any instructions that would take the crane outside its permitted duties.
- Stopping operations if the signaller is not within his direct sight.
- Stopping operations if visibility is not clear.
- Informing the supervisor of any problems that arise, which would affect the lifting operation.
- Recording the daily checks, maintenance, and comments relating to the crane's operation in the log book for the crane.
- The crane operator shall know the weight of the load before the start of the lift. No load is to be lifted where the weight is unknown.
- Shall not leave the crane unattended while a load is suspended from the hook.
- Where lifting operations involve the use of lifting equipment in proximity to overhead power lines, it is the responsibility of the crane operator to ensure that it is safe to do so. The crane operator shall ensure that the equipment is operated in such a manner that no item of lifting equipment is within 20 meters of the proximity of any live overhead power line.
- Put the operation on hold if riggers are not present or are exposed to any potential hazard.
- It is forbidden to use mobile phones inside the crane cabin.

4.3 Crane Operator

- Only trained, competent, and properly authorized Operators are permitted to operate.
- Crane Operators must be physically fit and have good hearing and eyesight. They shall undergo periodic medical checks once in a year.
- The crane operator should have a minimum of five years of experience in the operation of a crane and must be deployed after selection and getting a crane operator permit.
- Before taking charge of the crane, the operator must fill out the daily shift checklist and communicate immediately if any abnormality is observed.
- A crane operator shall be alert at all times.
- They shall familiarize themselves fully with all crane safety operating instructions, the crane mechanism, and its proper care as per the manufacturer's manual.
- They shall not operate a crane when, in their opinion, it is unsafe.
- They shall at all times ensure that the crane is properly lubricated in accordance with instructions issued.
- They shall not leave their control position while a load is suspended from the crane.
- Where and when the crane fails to correctly respond to controls, the crane operator shall immediately stop the operation and immediately inform the TNCL competent person.
- They shall immediately report to their supervisor any unusual operating feature, noise, or undue wear that may be noted, and the crane shall not be used until such conditions are examined and rectified.
- In case of power failure, the crane operator shall move all controllers to the OFF Position, report the matter to the TNCL competent person, and wait for further instructions.
- They shall not bypass limit switches.
- The crane operators shall not tamper with circuit breakers, limit switches, or other safety devices.
- The crane operator should have knowledge of slinging and give correct instructions on the load.
- They should use only slings, which are free from defects, inspected and tested in a stipulated manner.

- Before leaving the crane, the crane operator should ensure the crane is in the designated location, there is no suspended load from the hook, and the hook is cleared of all obstructions. The power should be switched off.
- Crane's monthly inspection checklist must be followed.
- Before starting work, the ground staff should acquaint the crane operator with the sequence of work.
- While making any crane movement, only one man (rigger) is to give the signal.
- Before giving the signal for lifting or travelling of the load, the reliability and correctness of the fastenings shall be checked.
- The correct size of sling and a good quality sling should be used while lifting loads.
- The signal should be given from the place visible to the crane operator standing near the lifted load.
- The Crane Operator should give an audio signal (bell/ horn) while moving the load.
- Avoid working/walking below/around the suspended loads.
- Never make oblique pulls and never throw hook blocks of cranes out of its reach by swinging
- The Crane Operator should never give sudden reversal power to stop the crane. Stop smoothly.
- Never hit the lifted load on any structure or building
- It is forbidden to sleep inside the crane.
- While parking, the main switch should be switched off and all controls should be kept in neutral.
- Nobody should attempt to either use the lifted load as an intermediate platform or stand on the load.
- It is forbidden to use mobile phones inside the crane cabin.

4.4 Rigger

Physical and educational qualifications:

All Riggers shall be:

- Educated to a minimum secondary school level.
- A minimum of three years' experience.
- Capable of reading, speaking, writing, and understanding the English or Swahili languages, sufficient for the fulfilment of their function in a safe manner.

- Physically fit with regard to eyesight, hearing, reflexes, and ability to handle lifting gear and equipment.

Training and Certification requirements:

- All riggers utilized in the TNCL operational area shall hold a valid certificate of competence.
- Certificates of competency issued without evidence of appropriate training shall be liable to rejection by TNCL. The validity of the certificates shall not in any case exceed three years.
- All riggers involved in lifting operations shall have a valid riggers certificate of competence.
- TNCL may demand the removal of a rigger where incompetence or negligence is proven at any time during an operation.
- The duration of the training course shall be a minimum of three days of training for fresh candidates and two days of training for refreshers.

Responsibilities:

It is the rigger's responsibility to ensure that the lifting tackles are functioning correctly and are safe to use, and properly maintained, and all maintenance activities are registered and documented. This does not in any way alleviate the responsibility of the management or owners of the lifting tackle, in ensuring that the lifting tackle meets the requirements of this procedure and the appropriate standards.

All riggers shall:

- Ensure that the crane operator is familiar with the method of signalling to be used.
- Ensure that no load is to be lifted where the weight is not stated or unknown,
- Check that the lifting equipment being used is in good condition, certified for use, correctly colour-coded, and of sufficient capacity to carry out the lift.
- Ensure taglines are always attached to loads that are likely to swing.
- Be aware of any obstructions within the crane radius and working area,
- Check that the area around the load to be lifted is clear and that the load is not attached to the floor, transportation cradle, or adjacent equipment.
- Ensure that the crane hook is positioned in the above center of each load before sending any signal to the crane operator,
- Ensure that no personnel are standing between two loads, especially if one load will be lifted and repositioned,
- Ensure that the escape route is identified,

- Check that no personnel are below the load whilst lifting is in progress,
- Ensure all hands are free of lifting tackle and stand clear before the load strain is taken.
- Indicate to the crane operator where the load has to be moved to or placed, and, where possible, he shall follow each load to its destination.
- Warn other personnel in the area of the movement of the load,
- Observe and note other activities within the crane's operating area to avoid the development of any unforeseen hazards,
- When lifting a load, stop hoisting when the load reaches 10 cm above the ground to check the security and balance of the load and check the proper function of the crane's hoist brakes.
- Stop the lifting operation if anything out of the ordinary occurs and check that it is safe to continue the operation.
- Solely direct the lifting and loading activities and operations.

4.5 Forklift Operator

Physical and educational qualifications:

- Be capable of reading, speaking, writing, and understanding the English or Swahili language sufficiently for the fulfilment of their function safely.
- Physically fit with regard to eyesight, hearing, reflexes, and ability to handle lifting gear and equipment.

Training and certification requirements:

- All forklift operators shall have a valid Tanzanian driving license, class F.
- All forklift operators shall hold a valid certificate of competence issued by an approved authority.
- All certified and authorized forklift operators shall hold a valid permit.
- All certified and authorized forklift operators shall only use equipment for which they have received training and use it in the manner in which they have been trained.
- The duration of the training course shall be a minimum of three days for fresh candidates and two days for refresher,
- The validity of the certificates shall not exceed three years.

Responsibilities:

- Forklift operators shall be responsible for ensuring that the forklift is functioning correctly and properly maintained every time the forklift is operated.

- Stop the lifting operation if anything out of the ordinary occurs and check that it is safe to continue the operation.
- When lifting a load, raise 10 cm, stop the load just clear of the ground, check the security and balance of the load, and check the function of the lifting brakes.
- Observe and note other activities within the load operating area to avoid the development of any unforeseen hazards.
- Warn other personnel in the area of the movement of the load.
- Check that the area around the load to be lifted is clear and that the load is not attached to the transportation cradle or adjacent equipment.
- Be familiar with the lifting capabilities of the forklift.
- Check that the forklift being used is in good condition and certified for use.
- Ensure that no load is to be lifted where the weight is not stated or unknown.
- Ensure that all equipment controls function correctly.
- Ensure that the load does not block the vision for forklift operation. If unavoidable, safety is to be provided during the period of load lifts and transfers.
- Ensure that the light around the forklift and rotating siren are functioning correctly.

4.6 Lifting Appliances

- All lifting appliances shall be designed, engineered, constructed, installed, tested, operated, and maintained in accordance with the specified standards.
- No lifting appliances shall be used unless an approved TPCA has issued a certificate, verifying its design suitability for its intended use in a specified environment.
- All lifting appliances shall be assigned unique identification numbers and marked with certified SWL. In addition, all items shall be colour-coded in accordance with the TNCL colour coding scheme, which is applicable at the time of utilisation. The contractor shall ensure that the equipment bears the current colour coding according to the period specified in the TNCL colour coding schedule.
- A comprehensive register of lifting equipment detailing minimum information shall be developed for monitoring periodic inspection requirements.
- The maintenance supervisor will be the focal point when equipment arrives on site. They may nominate other personnel for this job.

- No lifting appliance shall undergo alterations to components or parts that affect its structural integrity or load-bearing capacity without the written approval of an approved TPCA or from the original equipment manufacturer.
- When a lifting appliance has undergone repairs that affect the load-bearing parts or replacement of parts or components that affect the structural integrity, the lifting appliance shall be re-inspected and certified by an approved TPCA.
- Safety devices that affect the integrity of a lifting appliance shall not be altered without the written approval of an approved TPCA or the original equipment manufacturer.
- Where a lifting appliance has suffered major damage or an incident, the appliance shall not be repaired without a written repair procedure from the original equipment manufacturer and shall be retested after the repairs by an approved TPCA to verify the equipment's structural integrity.
- Any lifting appliance that has been newly installed or relocated shall undergo approval by TPCA, and commissioning tests shall be performed before being used.
- A complete manufacturer's maintenance and operating manual for lifting appliances shall be available for reference to the operator and maintenance personnel at the site. The lifting appliance shall be operated and maintained in accordance with the procedures set out in its relevant handbook and manuals.
- Maintenance activities carried out on the appliance shall be recorded in the work order, and the record shall be kept.

4.7 Requirements for Cranes

All cranes shall have the following:

- A hoisting limit device that, when actuated, stops the hoisting motion and applies the brake on the hoisting winch automatically.
- A luffing limit device that, when actuated, stops the luffing motion, and applies the brake on the luffing winch automatically and that is so arranged as to prevent bypassing of this device in the normal operation of the crane.
- Operating levers and switches that are clearly identified and marked. All markings shall be in English or internationally agreed symbols.
- Engine stop systems that operate in a manner such that the engine comes to rest with minimum delay.
- Check valves shall be fitted to all hydraulic cylinders to prevent cylinder movement in the event of hose failure.

- A facility for emergency lowering of loads.
- Temperature sensing devices, audio or visual type, or equivalent safeguards to give adequate protection to the prime mover and associated equipment.
- An emergency stop with manual reset capability within the crane operator's reach.
- Motion control levers that return to neutral with a minimum delay upon release – this does not apply to engine throttle levers.
- Adequate fire extinguishers of approved size and type.
- All pneumatic, hydraulic, and electrical connections are clearly tagged/marked, corresponding to the markings on the crane circuit drawings.
- An emergency escape route for personnel.
- Safety latches that automatically close are fitted to all integral crane hooks.
- A suitable operating cab that adequately protects the crane operator and controls the elements (weather), is adequately cooled (if possible), ventilated and provides a clear and unrestricted view of all operations associated with the crane.
- The SWL of the hook block is prominently marked and highlighted on the hook.
- Where the design of the crane is intended for SWL loads of greater than five tonnes, a calibrated automatic SWL Indicator shall be fitted, and a legible metric crane capacity chart prominently displayed.
- Outriggers and hooks are clearly marked with a red and white chevron pattern.
- Crane hooks (for mobile cranes) are secured to ensure no swinging occurs in transit.
- Maintenance and repair records for each crane are to be maintained.
- Audible and visual alarms are to be installed in all cranes, which shall sound continuously when the crane slewing is set on.
- No crane shall be utilized for any operation other than that for which it was designed.
- Audible and visual alarms fitted on crawler cranes while travelling forward or reversing.

4.8 Forklifts

All forklifts, including electrically/battery-operated, shall comply with the requirements of the specified standards and the manufacturer's operation and maintenance manuals, and additionally:

- Forklifts shall be fitted with Tanzanian traffic-registered number plates.

- Forklifts shall not be driven on public roads.
- Fork arms shall not be distorted or perforated.
- Forklifts shall not be used to lift a load greater than the maximum designed SWL.
- Forklifts shall be fitted with audible warning devices such as a horn and reverse horn to warn other personnel in the vicinity.
- Forklifts shall be provided with suitable lights at the front and rear.
- Battery-powered forklifts shall only be used where there is a risk of a flammable
- If an attachment fitted may alter the characteristics of the forklift, an approved TPCA, in consultation with the supplier or manufacturer, shall carry out the necessary de-rating.
- The attachments shall be securely fastened, and care is taken to ensure that the attachments or securing device do not foul any part of the mast structure during raising or lowering of the attachment.
- All forklifts shall be thoroughly inspected by an approved TPCA at a maximum interval of one year.
- The SWL shall be prominently displayed on all forklifts.
- No forklift shall be used beyond its statutory test period.
- The use of forklifts for the transport of personnel is strictly forbidden.
- All forklifts shall be annually tested to 100% SWL.
- All forklifts shall be fitted with adequate and certified portable fire extinguishers.

4.9 Special restrictions

- No person shall be transported by a crane except in an approved workbasket or personnel transfer net. The operator shall not leave the controls while the personnel or load is suspended.
- When a crane is being operated, hand signal communication between the rigger and the crane operator shall be conducted in accordance with the standard hand signal requirements, except that voice communication, by radio between those persons, is permitted as an alternative.
- No crane shall be used beyond its statutory test period.
- Cranes shall not be used to transport loads.
- No crane is allowed to lift any weights above the SWL marked up as per the load chart.
- No crane is allowed to pull or tow/drag weights.

- No crane is allowed to enter any hazardous zone without permission and verification of zone requirements.
- Cranes shall not be utilized when the wind speed is more than 40 km/h or where, due to the nature of the load, it becomes unmanageable due to wind acting on the load.
- Cranes shall not be utilized to carry out any lifting operations after sunset.
- Ground conditions shall be assessed before deploying the crane outriggers. Crane pads shall be used to help disperse weight evenly under each of the crane's outriggers.
- Cranes not in regular use shall be subjected to special checks as per the manufacturer's instructions/applicable standards, before being used.

5. PROCEDURE

5.1 Safe Practice in Using Mobile Cranes

- The training department shall ensure that riggers and crane operators are qualified, certified, and competent for the task. The Crane Operator shall have a valid equipment operations license and TPCA certificate.
- Drop area shall be barricaded using tapes or other means in areas where operation or maintenance activities are in progress.
- Outriggers shall be fully extended.
- The designated rigger shall give signals for crane operations. They shall wear a fluorescent jacket and a red helmet for easy visibility.
- The load chart shall be available in the crane operator's cabin.
- The next due date for inspection shall be painted/tagged on the crane.
- Guide rope (tag lines) shall be used to control swinging.
- Communication equipment (Radios) shall be used when the rigger cannot give clear signals to the operator due to obstructions, height, or distance and when the crane operator can't see the load.
- Critical lifting operations must be planned with extreme care, and written procedures shall be prepared.
- No one shall stand under the suspended load.
- Load shall not be left suspended and unattended. The Crane operator or the rigger shall not leave the area without a substitute.

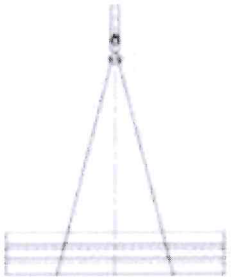
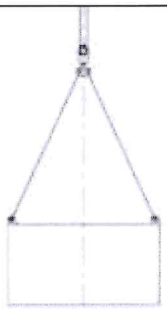
- Multiple crane lifting operations must be planned with extreme care, and written procedures shall be prepared for each lifting. Wire ropes shall remain vertical. Each crane shall be assumed to have 25% less than the rated SWL (Safe Working Load).
- Strictly no person is allowed to ride on the body of the crane.

5.2 Classification of Lift Types

There are generally two types of lift: routine and Non-Routine. Categorising the type of lift before planning the lift and documenting it in a lifting plan is critical because it allows for the proper assessment of the amount of risk present in the lifting operation and the level of control required in mitigating the risks involved.

5.2.1 Routine Lifts

Routine lifting operations may be executed under a basic lift plan. These plans must clearly define the limitations on the loads, lifting methods, and areas of operation. A Risk Assessment will be required in each case and authorized before commencement. A non-routine may also be completed using similar documents, but will require greater detail. Before any lifting operation commences, a review of the lift plan must be conducted.

	
Example: Routine Lifts - Bundle of rebars / I-Beam	Example: Routine Lifts – Receptacle

A Routine Lift is a lift which conforms to the following factors:

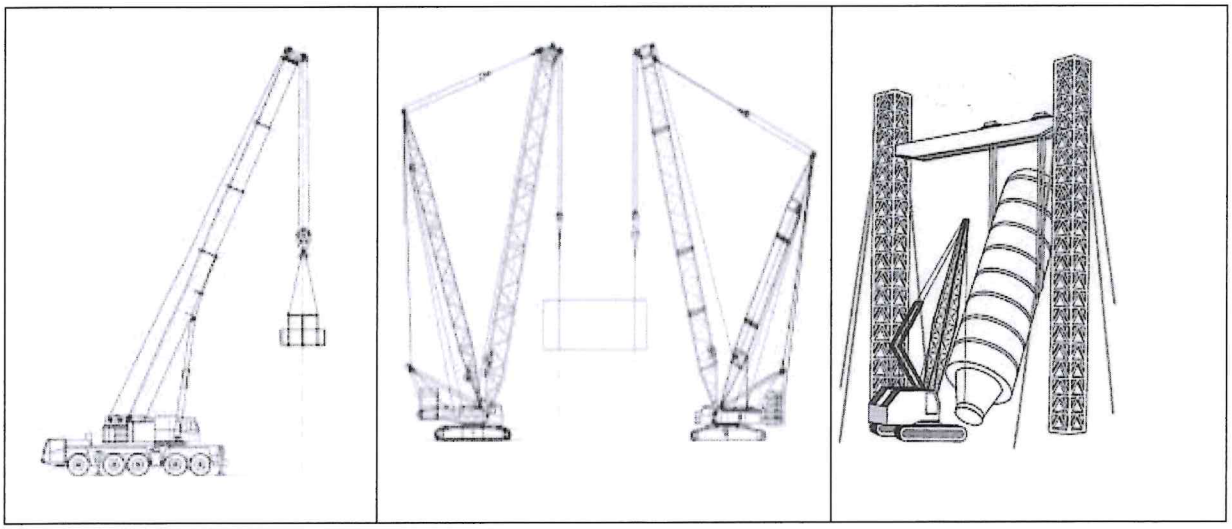
- Within the normal operating parameters of the crane.
- Lifting over non-sensitive areas.
- Suitable environmental conditions.
- The load has a known and evaluated weight, shape, and centre of gravity.
- Standard rigging arrangements.
- Routine repetitive lifting operations using the same equipment.
- The load has a pre-determined weight, shape, and centre of gravity.
- Single function or series of functions repeated manually or automatically.

- Order of function repeated.
- Same equipment.
- Same competent Crane Operators.
- Load under 75% of the rated load of the load chart.
- Equipment specifically installed by a competent operator/ installer.
- Load has a known and evaluated weight.
- Centre of gravity below the lifting hook.
- Use of a certified lifting point.
- Ample headroom.
- Not within sensitive, difficult, or restricted areas.
- Single lifting machine.
- Unlikely to be affected by changing environmental conditions.
- Suitable lay-down area available.

Note: Routine lifting operations require the above factors to be considered, but this list is not exhaustive. The risk of each lift should be separately considered before classifying the lifting operation as a routine one.

5.3 Non-Routine Lifts

Non-routine lifting operations will require a more detailed Lifting Plan containing all of the elements as described within this procedure. The plan will have to be approved by an Engineer before commencement of any Lifting Operation, and any deviation requirement identified from the plan must also get the approval of the Engineer prior to commencement of the lifting operation.



Example: Non-Routine Lifts - Heavy Lift	Example: Non-Routine Lift Tandem Lift	Example: Non-Routine Lift - Complex Lift

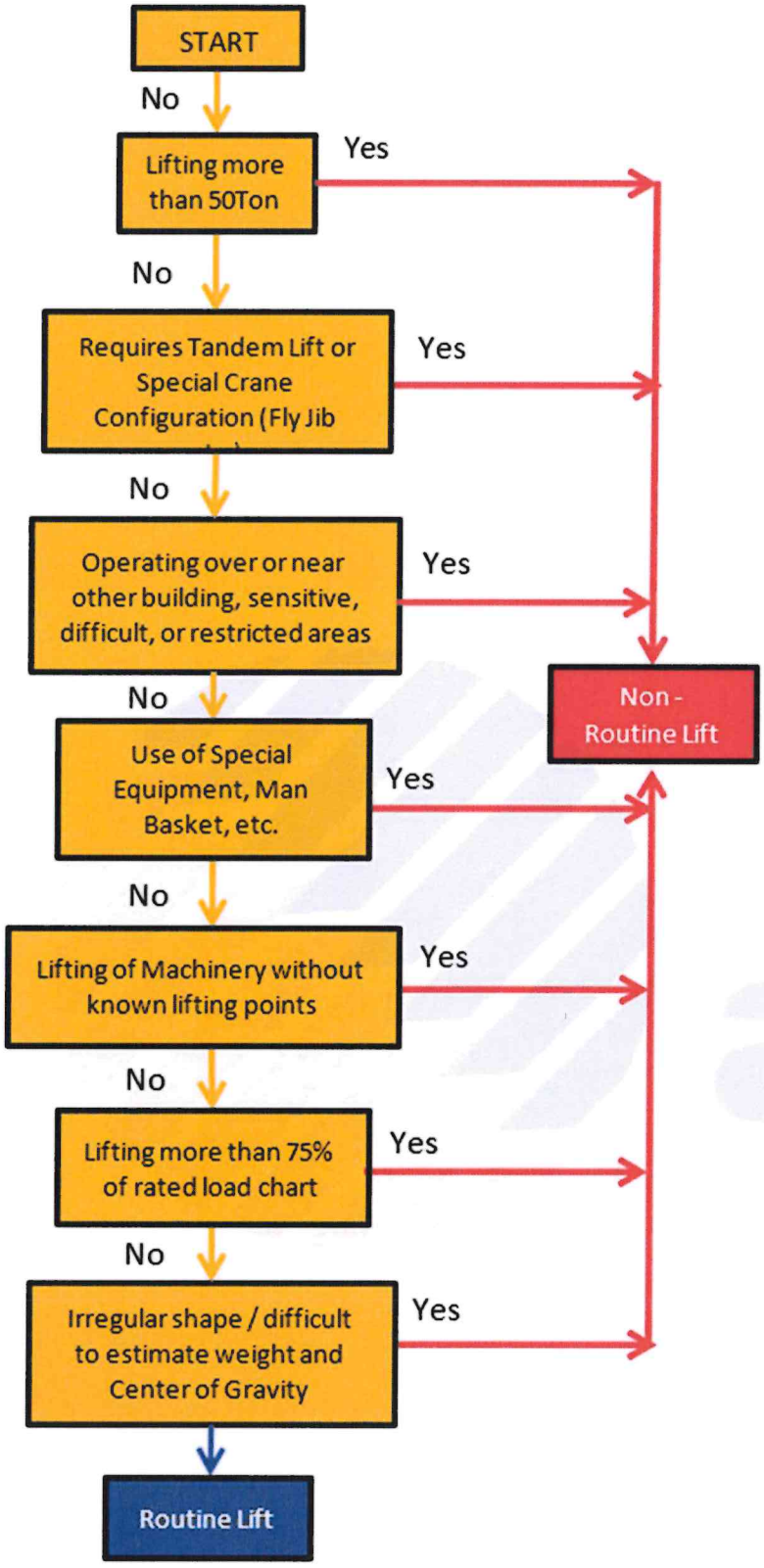
A Non-Routine Lift is a lift that should conform to the following factors:

- Use of two or more Lifting Appliances, including tallying pipe using a winch and crane (tandem lift).
- With sensitive, difficult, or restricted areas, lifts from one area to another.
- Continuation of a lifting operation with different people. Lifting of machinery without lifting points.
- Environmental conditions are likely to affect equipment performance.
- Load with unknown/difficult-to-estimate weight and/or centre of gravity. Non-standard rigging arrangements.
- Load lowered into or lifted from a confined space.
- Weight of load more than 75% rated load of the load chart.

Note: Non-routine lifting operations require the above factors to be considered, but this list is not exhaustive.

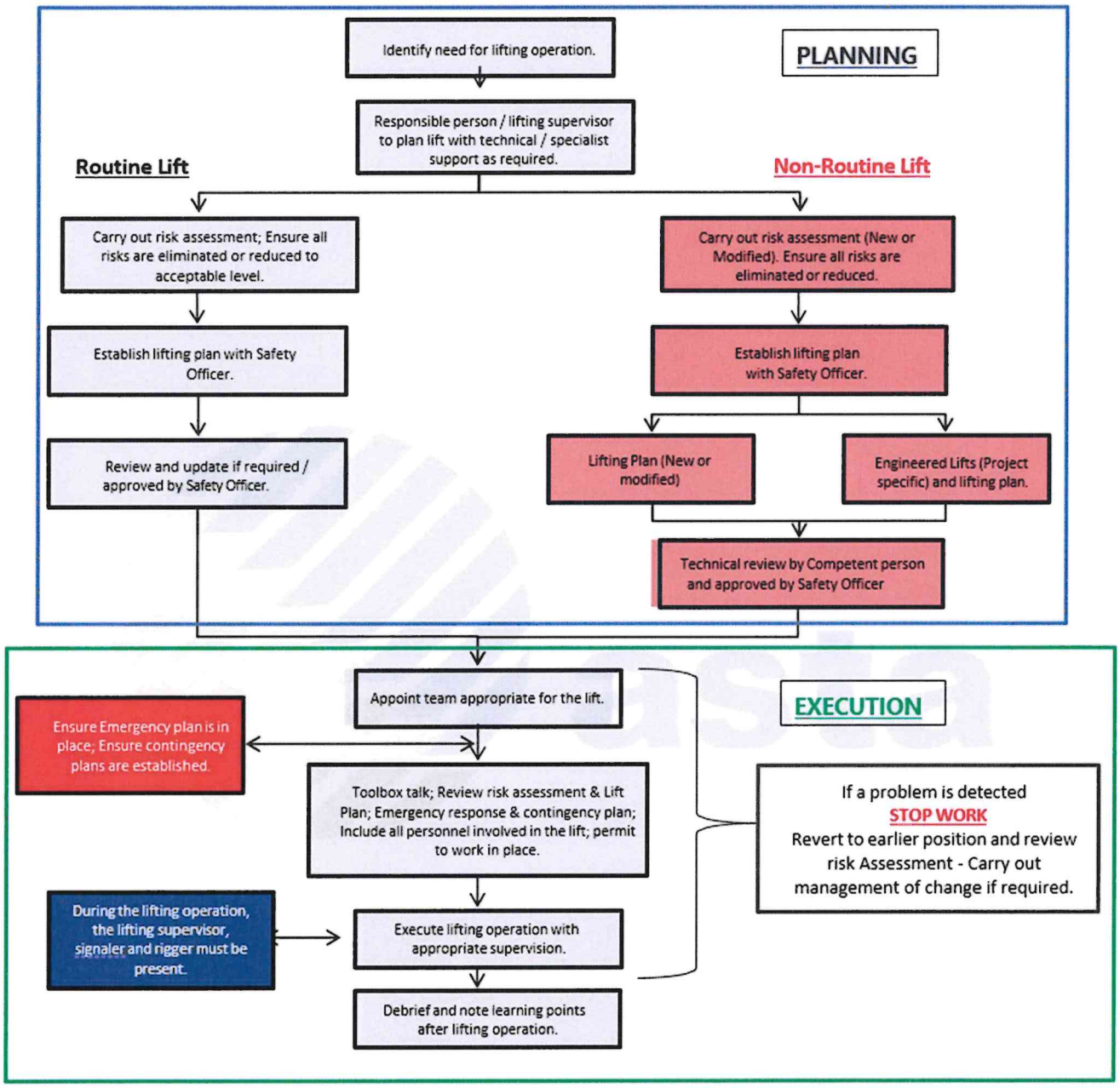
5.4 Flow Chart for Identification of Routine or Non-Routine Lifting Activities

Figure 1: Flow Chart for Identification of Routine or Non-Routine Lifting Activities



5.5 Planning and Execution of Routine and Non-Routine Lifts

Figure 2: Planning and Execution of Routine and Non-Routine Lifts



5.6 Details of Lifting Plan

Sufficient information must be provided to give a clear, but brief, description that will identify the lift(s) to be undertaken. A separate risk assessment form will need to be completed every time the crane is moved to a new position unless the risk assessment has taken into account the hazards associated with all positions.

5.6.1 Details of Load(s) to be Lifted

It is extremely important that as many details as possible are gathered about the load/loads to be lifted. Details of each load to be lifted must be entered on the risk assessment form. The Rigging Supervisor must carefully consider all the loads to be lifted and ensure that sufficient information is provided and recorded to enable other persons to see how the lifts are to be performed safely.

5.6.2 Load Crucial Information

No load shall be lifted without the following crucial information:

- The load weight.
- The overall dimensions (length, width, and depth).
- Indication of the position of the centre of gravity.
- The lifting/slinging points.
- The pickup radius.
- The final location radius.
- The height to which the load has to be lifted.
- The overall weight (load + all lifting accessories).

5.6.3 Load(s) Weight(s) Including Lifting Gears

The most important thing that you need to know is the weight of the load. This information should be given at the earliest point in the planning stage, as it is from this information that your crane selection will be made and all the planning around it. The weight of the load must be accurate.

It is also important that the load dimensions are recorded, as this will also help in the planning of the lift, particularly in establishing boom clearance and calculating required clearances when in restricted and confined areas. It also allows the calculation to be completed on the wind sail area, giving a maximum wind speed that the crane can operate in.

The weight of the load must include every piece of lifting gear involved in the lift from the hook block downwards, ropes, beams, shackles, frames, slings, etc.

A crane is not designed to be, nor is it a weighing machine; weights must be known by other means. However, every load lifted should, in the first instance, be lifted slowly from the ground. Should it start to exceed the given weight, it must be placed back on the ground, and the Responsible Person / Competent Person must then take whatever actions are required to re-plan the lifting operation.

5.6.4 Centre of Gravity (CG) of the Load

To ensure that every lifting operation is under control and free of unplanned movement, the CG must be known. In simple lifting terms with balanced loads, the CG is generally in the middle; this point will always be directly below the centre line of the crane hook block when slung.

5.6.5 Crane Selection

Using the previously gathered information in conjunction with crane manufacturers' load charts will allow the selection of a crane that is suitable with sufficient capacity to safely execute the lifting operation.

Details of the preferred crane(s) to be used must be recorded within the Method Statement and must include:

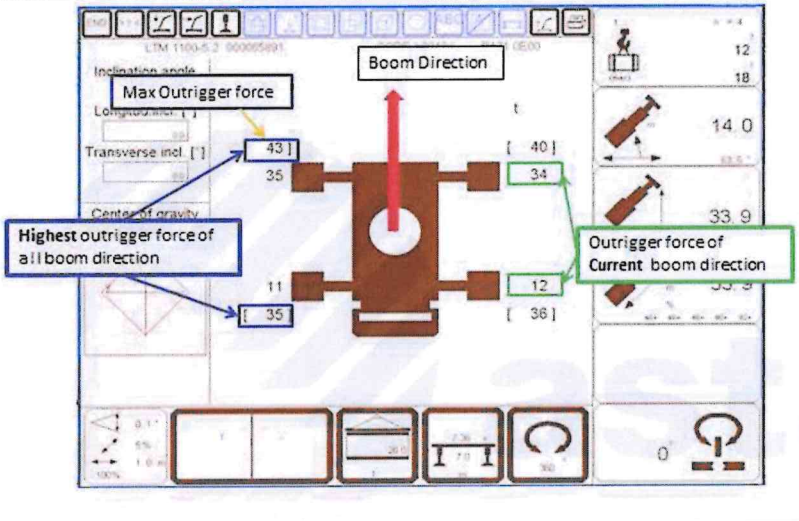
- The make and model.
- Capacity.
- Jib length (plus fly/luffer jib with offset where required);
- Outrigger spread;
- Outrigger load;
- Maximum ground bearing capacity
- Counterweight/super-lift counterweight required;
- Weight of the crane.

After crane selection has been made, it is important that it is known how much spare capacity is left within the crane load chart; this should be recorded within the plan. This is also at times referred to as the “Safety Margin”. It should be remembered that the safety margin must not be less than 80% of the rated load chart. It may well be necessary to select a larger capacity crane.

5.6.6 Load Bearing Capacity

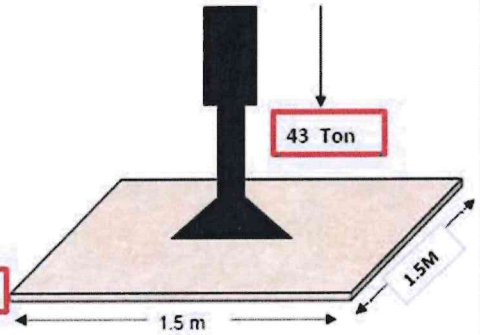
This must be the permissible load-bearing capability of the ground at every position where the crane is to be stood. The Crane Operator will need to determine the area of the outrigger supports/crawler tracks/wheels, etc., required to ensure that the maximum given ground pressure is not exceeded. Details of the required supports must be recorded in the Lifting Plan.

Where the crane is supported by its outriggers during a lifting operation, the maximum outrigger load for the specific configuration, whilst lifting the load, will also need to be entered within the Lifting Plan. These loadings can be obtained from the manufacturer’s outrigger load tables.



Example of Identifying highest outrigger force with Load

Crane Model	=	AC-100(100TON)
Counter Weight	=	25 TON
Length of Main Boom	=	33.7 M
Working Radius	=	14 m
Corresponding Safe Working Load	=	18 TON
Total Lifting Load With Gears	=	12.7 ton
Max Outrigger Pressure	=	43 Ton
Effective Area	=	1.5M x 1.5 M
	=	2.25Sq M
Weight of Outrigger Plates	=	1 TON
Total Weight	=	43TON + 1TON
Total Pressure Load	=	44 TON
Required Ground Bearing Capacity	=	44 ton / 2.25 sqm
	=	19.56 Ton / sqm
Max Allowable soil bearing	=	70 Ton / Sqm



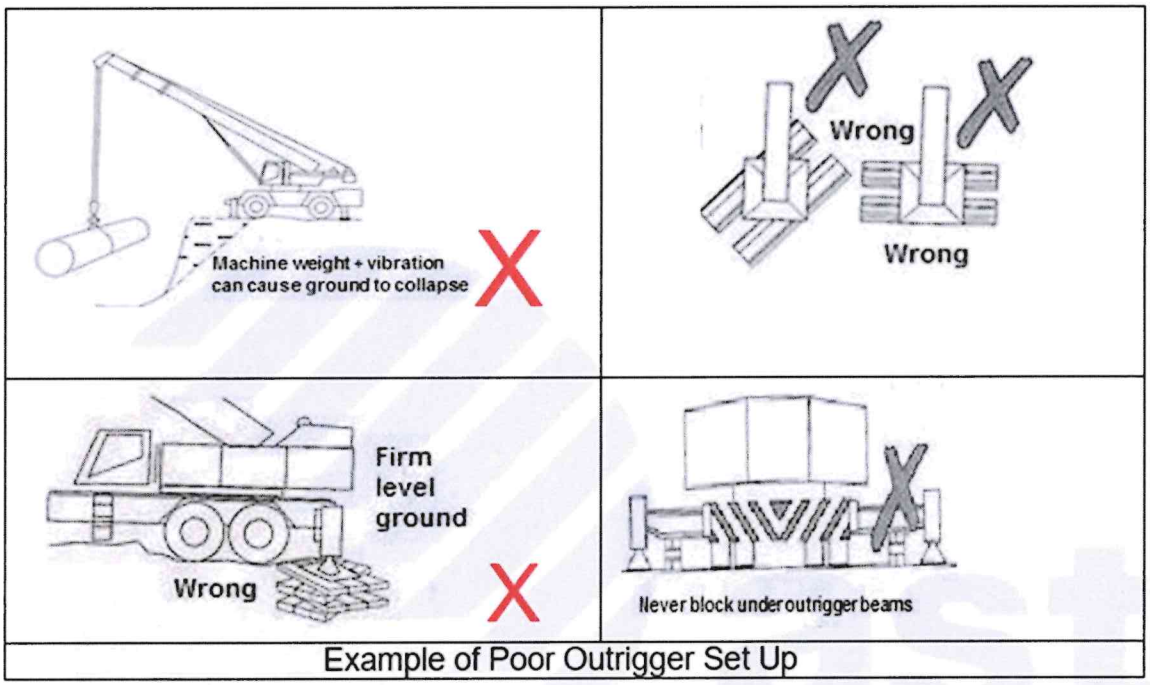
Example of Calculation for Ground Bearing Capacity

5.6.7 Ground & Outriggers

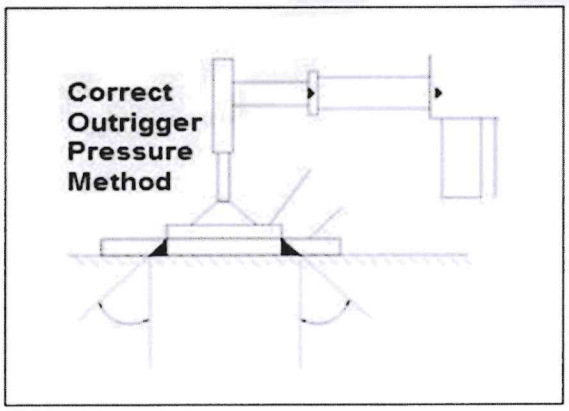
When lifting on outriggers, the outrigger beams and jacks must be extended in accordance with the manufacturer's instructions for the crane. The Crane Operator must ensure that there

is sufficient space at the crane sitting location for this to be achieved. The crane-rated capacity indicator must be set in accordance with the manufacturer's operating instructions.

It is important to realise that ground that has been backfilled without any means of compaction will present a danger and must not be used to support a crane. Sufficient load-spreading materials, of adequate size and strength, must be used under each outrigger. Ensure that the crane lifting area has been checked for voids and underground services.



Example of Poor Outrigger Set Up



5.6.8 Access & Lifting Location

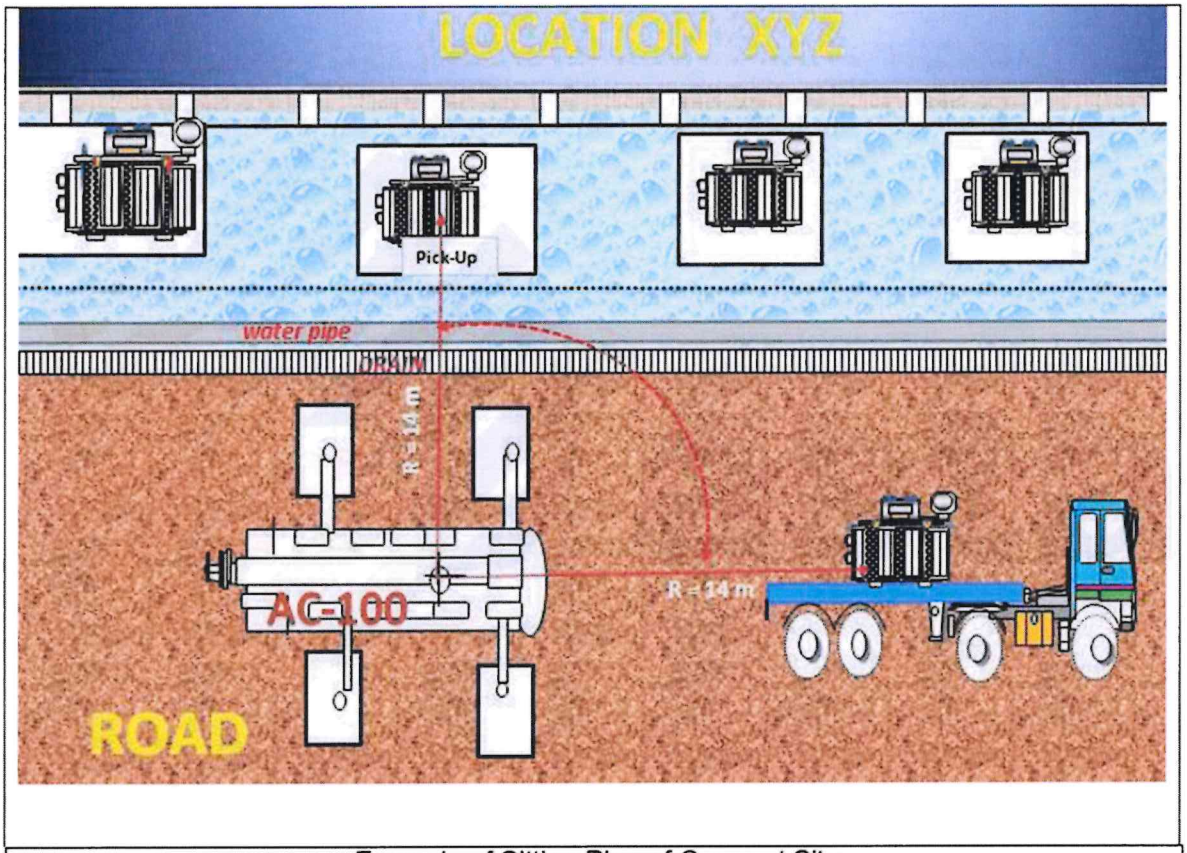
The Crane Operator during their survey should take particular note and record the site ground surface conditions on at least 2 occasions, the first relates to access for the crane and transport vehicles (boom/ballast/counterweight carriers) to the site location, and the second relates to the actual location where the crane will be located when lifting the load/s. It is

important to discuss with the rest of the team the route to be used, as it is their responsibility to ensure that the ground can support the loads that will be applied. The Crane Operator must be satisfied with the space provided and the access route to be used, as well as the nature of the surface (e.g. blacktop, hard-core, concrete). For clarity, the route can be shown on the site plan.

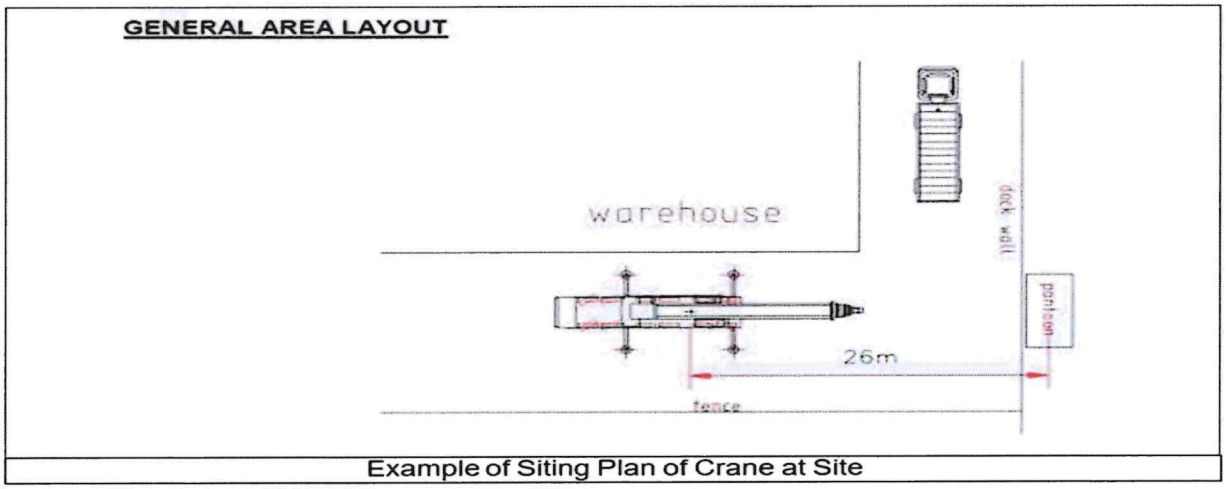
5.6.9 Crane Sitting & Lifting Study

All crane/lifting operations must have some form of document, from the simple lifting operations where all analysis and information may be recorded on a Lifting plan in conjunction with a Permit to Work, all the way up to the very complex lifting operation, which will require a very detailed and comprehensive Lifting Study.

The sitting plan can be in the form of a hand-drawn sketch for simple operations, with a detailed engineered drawing for the more difficult and complex operations. In each case, the idea of having a sitting plan is to ensure that the crane or lifting machine is positioned in the correct location to safely complete the intended operation. Margins as low as 1m can be the difference between success and failure. It is recommended that water-based spray paint be used to mark out where the crane will be sited for all complex lifting situations. Examples are given below:



Example of Sitting Plan of Crane at Site

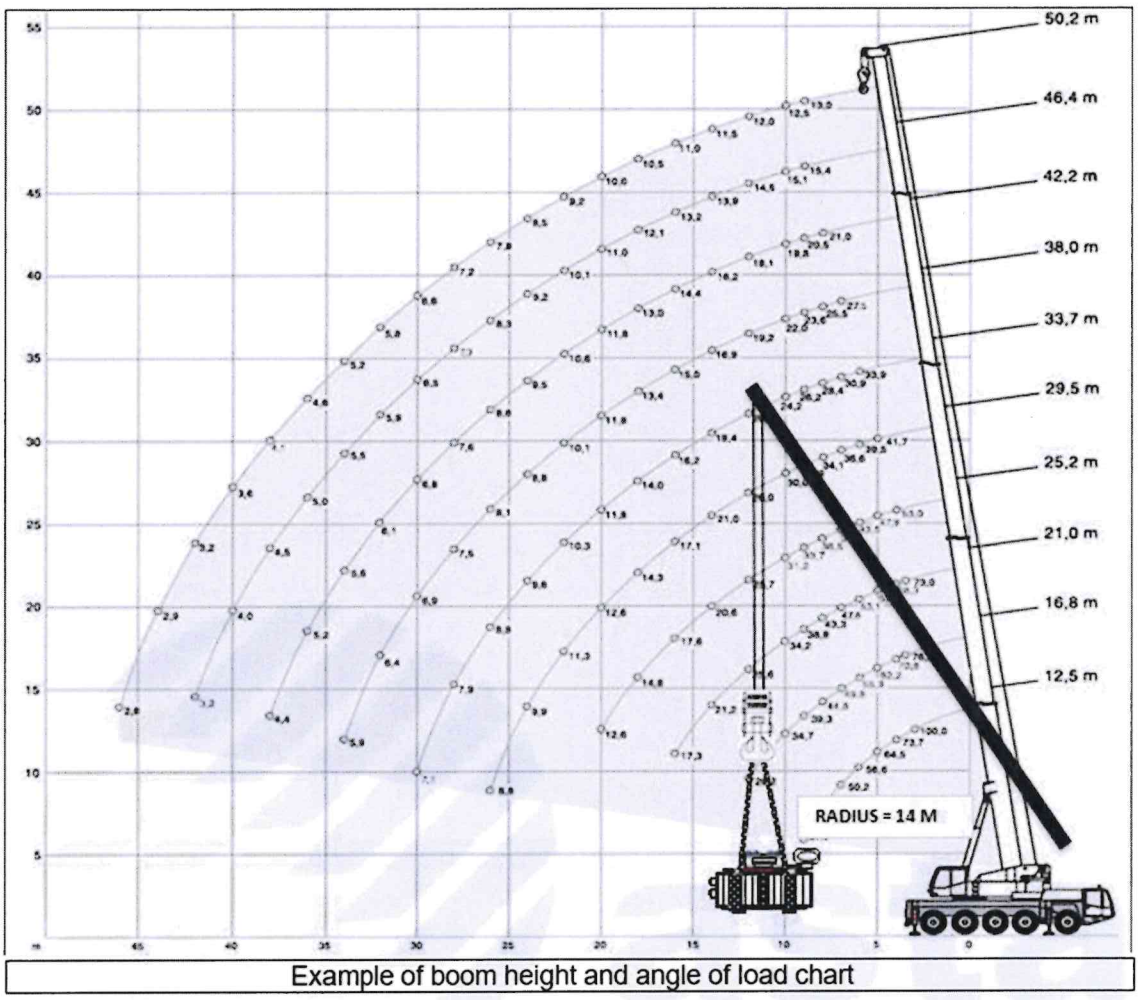


Example of Siting Plan of Crane at Site

5.6.10 Boom Clearance, Height & Angle

It is always necessary to know that there is sufficient boom clearance during any lifting operation, particularly when working in restricted and confined areas. This should be determined during the planning stage and recorded within the lifting plan. Equally, the tail swing should be determined.

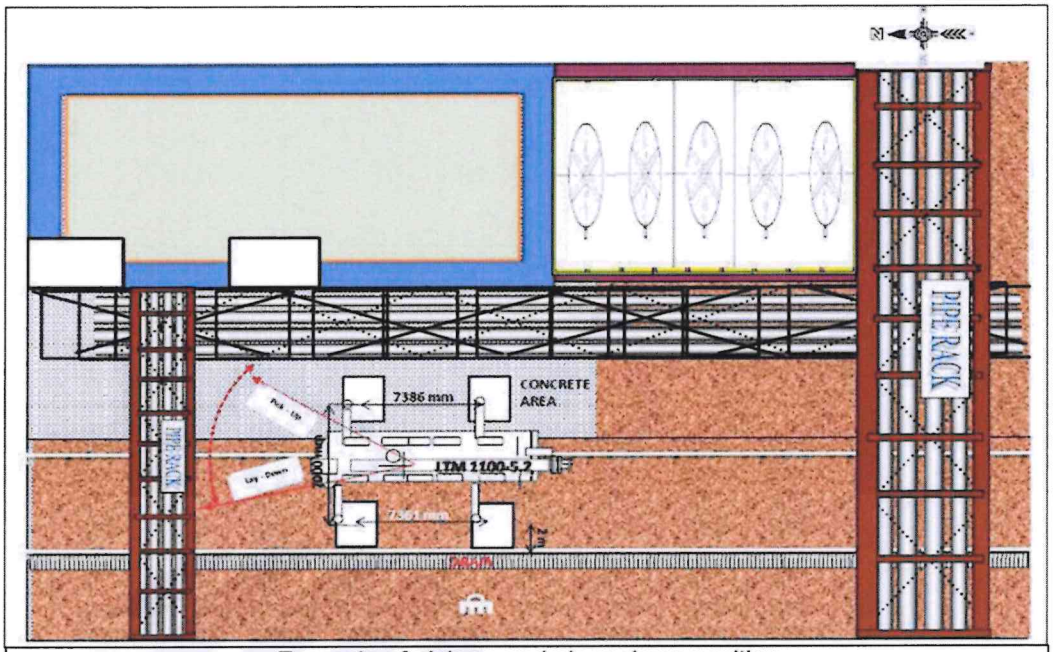
Boom angle and height are pieces of important information that must be recorded within the Lifting Plan. Not only do they help in the correct selection of a suitable crane, but they also allow the calculation of clearances of buildings and other possible obstructions.



Example of boom height and angle of load chart

5.6.11 Pick Up & Place Down Radius

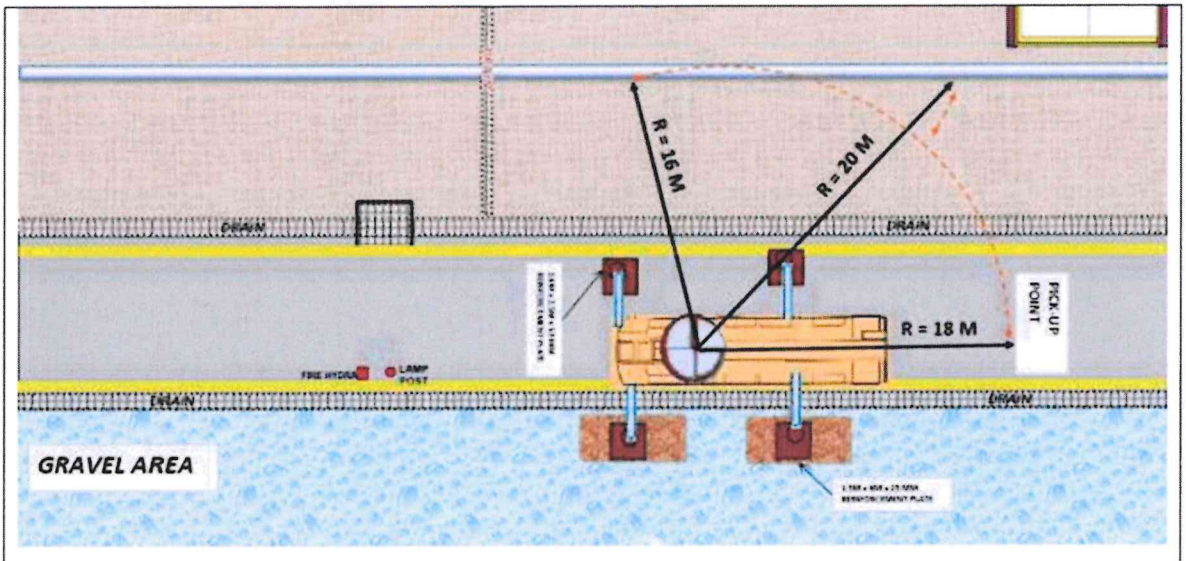
Radius, like all other pieces of information, is extremely important and fundamental to safe lifting practices. When measuring radius, which again is part of the requirements in the selection of a suitable crane type, ensure that both the "Pick Up and Lay Down" measurements are taken and recorded within the plan.



Example of pick up and place down position

5.6.12 Unit Measurements Used in Drawing

It is important to mark the drawing with the correct information where detailed drawings are being used, such as the unit of weight and dimension being used. Drawings must be of the same unit of measurement. All drawings must be signed by the originator and approved by an Engineer. Always ensure that drawings are the latest and final versions. An example is shown below:



Example of drawing with dimension and standard unit of measurement

5.7 Communication

Failures in communications are often the root causes of lifting incidents and can also be the most difficult to detect.

Good training and adherence to correct procedures are vital, but checking the actual situation at the worksite is of utmost importance. For example: -

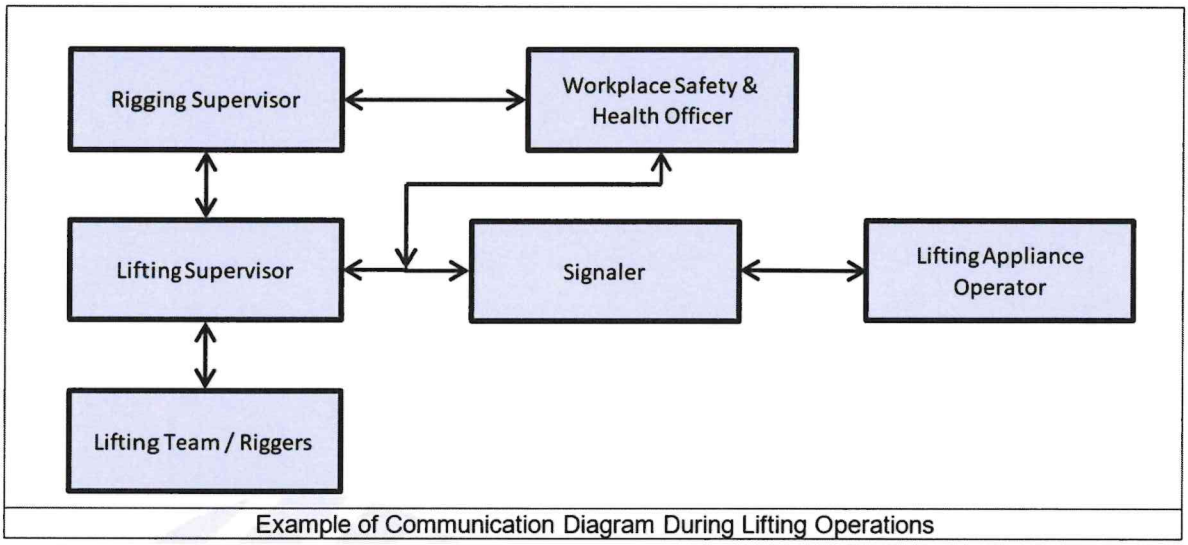
- Are the personnel concerned all from the same company?
- Do they all understand a common language?
- If not, is there an established system of signals in strict use that they all know and understand?
- Warning signage is displayed where the personnel can see it.
- What different methods of communication can be used?
- What communication is required between the worksite and the source of any technical assistance elsewhere?

Communication also extends to warning personnel of the lifting activity and keeping the lift area clear of personnel not involved in the lifting operation.

All members of the lifting team must be sure of their tasks and their team members' roles to communicate with one another fully and easily. Designated signallers shall be clearly and separately identifiable using reflective jackets or other conspicuous clothing or markings.

Good quality of communication is essential, especially when any part of the lift is not visible to any of the team members. If a signal is not clear to a member of the lift team operating any lifting equipment, then the operation shall cease to progress.

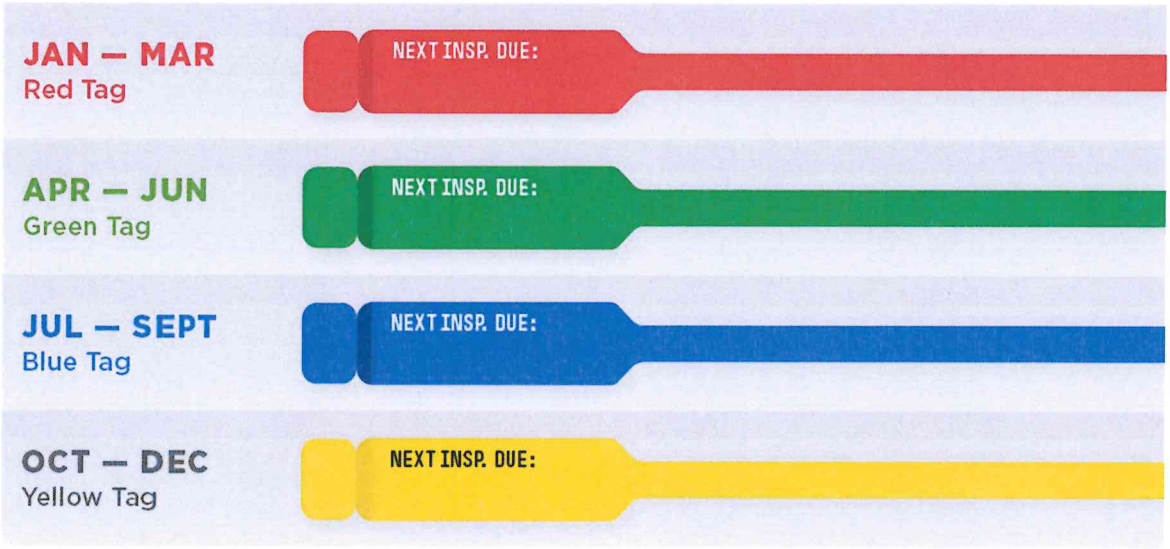
Never start any lifting operation until all concerned have been briefed in a Pre-Start Meeting, ensuring that they understand their role and responsibilities and that they have signed onto the Permit-to-Work or record of attendance at the Pre-Start Meeting.



Example of Communication Diagram During Lifting Operations

5.8 Inspection

- All lifting equipment shall be fully inspected and certified by an approved TPCA before being put into service and at all subsequent periodic inspections.
- For all lifting appliances, the first and all subsequent inspections shall include all functional tests, overload, and safety tests.
- Periodic inspection of lifting equipment shall also include the following:
  - A thorough inspection of all components.
  - All lifting connections, attachments, and structural components, as necessary.
- In the event of a major repair, the periodic inspection shall include a thorough inspection of all internal parts and components after dismantling and is to be complemented.
- The subsequent lifting tackle frequency of inspection shall be three (3) months in every case.
- All subsequent periodic inspections shall have a corresponding colour-coded tag.
- All lifting tackle shall be subjected to inspection by a competent rigger each time it is used. Where, in the opinion of the rigger, it is unsafe for use, that item will be immediately removed from the worksite.
- All lifting appliances shall be inspected and function tested by a competent crane operator for correct functioning (special attention shall be paid to safety systems) at intervals not exceeding seven (7) days. Where the lifting appliance is subject to infrequent use, it shall be inspected and function tested by a competent operator before each occasion.



5.9 Importance of Checklist

A checklist can mean the difference between failure and success. It may be only one element in the successful execution of a safe lift, but it is a key element. When all the work has been completed in preparation for the lifting operation, it is always recommended and wise to use a final checklist to ensure that all requirements are in place and in a safe condition. The important points given below could form part of your checklist:

•	Check the position of the crane(s)
•	Check outrigger positions and conditions of subsoil / supporting structure
•	Check the foundation and shim plates of the foundation, if applicable
•	Check the radius at the pick-up position of the load
•	Check the radius at the setting position of the load and the area between the pick-up and set position
•	Check the boom length of the crane and, if applicable, counterweight and super lift counterweights
•	Check clearances with surrounding structures in connection with a tail swing of the counterweight and superlight structure when slewing the crane
•	Check the reefing of the lift block and lift capacity
•	Check shackle pin sizes and lifting lug sizes
•	Check the orientation and position of the lifting and tail lugs
•	Check sling lengths and SWL
•	Check the location of the centre of gravity (CG) and verify it with the CG on drawings
•	Check the weight of the load if possible
•	Check the lifting trunnion size and dimensions

•	Check the condition of the access road to the foundation
•	Check the general condition of the crane and LMI
•	Check fuel, oil, and the condition of the engines
•	Instruct operators and rigging crew in detail about the planned operation
•	Mark the operation area to stop unauthorized personnel from entering the work area
•	Check medical aid on site in case of accidents
•	Plan your operations in detail and think ahead

Note: These 21 points should be expanded upon, depending on the type and complexity of the lift. While they will act as a reminder to the staff, remember that having a checklist may not safeguard your project. For that, experienced people are needed who attend to details, and staff will go through that list as automatically as any pilot before a flight.

6. SYSTEM EVALUATION

This procedure shall be reviewed at least two years by members of the Engineering department and presented to the Standards Committee for approval, or when organizational changes take place or are required as part of internal and external audits. The TNCL Document Controller will monitor compliance with the document control system on an ongoing basis.

7. DISTRIBUTION

List physical locations which require a controlled copy of this document.

Copy	Controlled Document Folder Location
Master	Controlled Documents Central Filing System

8. CONTRAVENTION

Any breach of this procedure shall be regarded as a refusal/failure to carry out a lawful instruction and will be dealt with as per the disciplinary procedure.

9. DOCUMENT CHANGE PROCESS

The process of document change starts when the document custodian identifies that there is a need to make changes within the document. The document custodian/ owner shall complete the document change request form, sign it off, and submit it to the Document Controller.

The Document controller shall issue the controlled word copy of the document to the respective document custodian/owner so that changes may be made. The document custodian/owner shall resubmit the updated document to the document controller so that the document can be controlled and updated within the Filing system ready for use by the end users.

9.1 Reason for Change

A	As a result of incidents	F	Change in training requirements
B	As a result of the audit findings	G	Results of risk assessments
C	New / changes in governance documents	H	Change due to spelling or grammatical error
D	Changes in legislation	I	New document format
E	Changes in technology	J	To integrate special instruction into the document control system

9.2 History of Change

Date of Change	Revision No	Revised Item (paragraph Number reference if required)	Reason Code	Name of Reviewer
01.06.2026	01	All Items	G	Manny Dos Ramos

10. RECORD CONTROL

Document Title:	Document ID:	Responsible for Maintenance:	Responsible for Filling:	Location of Storage:	Retention Period:	Method of Disposal:
Lifting Operations	TNCL-OHSS-STD-0007	Document Controller	Document Controller	OHSS Department	Hard Copy two Years	Hard copy shared file electronic

11. DECLARATION

I hereby declare that I have taken part in the discussion of this procedure, and I understand its contents and do commit that I shall ensure compliance hereto:

	Name and Surname	Company Number	Designation / Role	Signature	Date Signed
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