Global EHS - Lifting and Rigging Standard

CONTROL INFORMATION

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Contents

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1 Purpose

This document specifies the requirements for safe crane operations and associated rigging requirements for works activities that utilize crane at Micron sites globally.

2 Scope

Items	Details
Site(s) Impacted	All Micron Sites
Target Audience	Micron team members and contractors involved in lifting activities, and Micron team members who manage and coordinate crane operations and contractors performing crane work at Micron.
Applicability	This document applies only to all truck/ lorry mounted cranes, mobile cranes, hydraulic cranes, rough terrain cranes, and tower cranes used on Micron sites and operated by a general contractor or crane contracting company. This document does not include cranes used in indoor and cleanroom (for example gantry, material handling hoists, wall cranes) environments operated by Micron team members or contractors.

3 Roles and Responsibilities

Roles	Responsibilities
Global EHS	• Maintain and ensure Global EHS Cranes and Rigging Standard is up to date • Audit the compliance of the standard through periodic audit and site review
Site EHS	• Administration of the standard, necessary oversight • Assist procurement in qualifying crane company • Assist Facilities and Project in verifying document • Enforcement and audit for compliance • Feedback for improvement • Review the requirements and subsequent changes of this standard and identify actions to ensure the requirements are effectively implemented • Evaluate continuous compliance to the updated requirements of this standard at least once every 3 years or more frequently (when risk of noncompliance is present) and implement actions to correct deficiency(ies) identified during the compliance evaluation process
Site Procurement	• Authorization for crane activity through tender requirement and purchase order. Inform crane contractor of Micron Cranes & Rigging requirements as part of PO issuance • Use the requirements stipulated in this standard to qualify service providers
Micron Host, Micron Facilities Manager, or Micron Construction Project Manager	• Ensure Contractor or Vendor companies comply with this standard • Work with EHS representative to ensure that contractor and vendor are appropriately briefed and trained on Micron site EHS requirements before lifting work begins • Request crane through Facilities Purchasing, or, • In a construction project, include crane as part of the project • Both should share Safety responsibility for crane activity for their specific project • Verify documentation e.g. maintenance record, inspection logs and competency training for lifting crew, machinery permit, etc. before authorizing lifting operation.

Roles	Responsibilities
General Contractor Project Construction Manager	• Ensure Contractor or Vendor companies comply with this standard • Works with Contractor EHS representative to ensure that contractor and vendor are appropriately briefed and trained on Micron site EHS requirements before crane work begins • Verify documentation e.g. maintenance record, inspection logs and competency training for lifting crew, machinery permit, etc. before authorizing lifting operation • Appoint a Lift Director for lifting activities. There must be a Lift Director assigned by the respective contractor for each lifting activity. However, a Lift Director may manage multiple lifting activities for the contractor providing he is not overwhelmed • In general, a Lift Director can only supervise not more than 3 lifting activities and must be able to oversee all of them • Carry out crane pre-mobilization inspection to determine crane and lifting gear worthiness
Lift Director/ Lifting Supervisor	• In certain countries, local regulatory requirement stipulates the need to appoint a Lifting Supervisor, which is mandatory. In such instance, the Lift Director is to be construed as the Lifting Supervisor. A Lift Director/Lifting Supervisor should possess a certificate of competency related to lifting and rigging • Plans, coordinates, and supervises all lifting activities • Ensure the load is properly rigged, that all personnel are properly trained and credentialed to perform their role • Ensure a lift plan is completed and lifting operations are performed according to the lift plan. Lifting activity that cannot be performed as per the lift plan must be stopped and can only proceed after the deviation has been resolved • The Lift Director shall not be any one of the following three personnel Operator, Rigger, or Signalman • Ensure that each lifting activity is assigned competent and adequately experienced lifting crew; 1 x Crane Operator, 1 x Rigger and 1 x Signalman • Determine mode of communication between the lifting crew • Ensure the lifting zone and load travel path is adequately barricaded with adequate and appropriate warning signs to prevent unauthorized access • Communicate conditions for aborting lift e.g. bad weather, increased wind velocity, etc. • Determine safe work condition and communicate the same to the lifting crew e.g., fall protection when ascending and descending lorry to rig un- rig the load, safe approach distance, etc.
Qualified Crane Operator	• Set-up the crane in the correct and safe manner as per manufacturers' specifications e.g., extend all out-riggers fully and ensure is adequately supported or rested on firm ground without impacting underground services, if any • Ensure safety devices fitted on the crane is functional and are not bypassed under any circumstances • Abort lifting operations and inform lifting supervisor if safety devices are not functional or if safe operational limits are exceeded • Perform daily crane inspection at the start of the work shift or when taking over crane operation from the outgoing crane operator • The crane operator shall operate the crane as instructed by the Lifting Director • Abort the lift it is deemed to be unsafe and notify the Lifting Director
Qualified Rigger	• Ensure correct rigging appliance are selected according to the lift plan provided by the Lift Director • Determine the weight and center of gravity for the load to be lifted

Roles	Responsibilities
	• Rig the load as per lift plan • Once the load is rigged, request the operator to lift the load approximately 300mm off the ground to determine if the load is stable and the load is stable before allowing the load to be moved • Keep clear of the load at all times • Inspect lifting appliance for damages and certification validity on a daily basis as well as prior to the lift • Tag and isolate damaged lifting appliances to prevent accidental use and inform Lifting Director. Where required ensure tag- lines are installed. Control the load with the use of tag- line to ensure load is adequately secured and will not slip out/fall
Qualified Signalman	• Maintains communication between with the crane operator, rigger and lifting director during lifting activities to ensure safe lifting, movement and landing • Ensure the communication device provided, if any, is functional before the lift • Report faulty communication device to Lifting Director • Use whistle or other means to warn team members of approaching load, when required • Ensure personnel are not trespassing the load travel path when the load is being shifted from one location to another

4 Terms and Definitions

Terms	Definitions
Annual Crane Inspection	An inspection performed, documented, and verified by the local Authority Having Jurisdiction (AHJ) over crane operations for the purpose of issuing permit to operate.
AHJ	**Authority Having Jurisdiction**
Crane Contractor/ Supplier	Company engaged by Micron or Micron Contractor to provide crane.
Crane Inspection	Pre-mobilization check is to be done by the General Contractor or Crane Suppliers. Where applicable such checks are to be witnessed by Micron representatives or a pe-mobilization checklist endorsed by the General Contractor or Crane Suppliers is to be made available to Micron representative for verification.
Crane Inspection Checklist	A checklist used to perform crane inspection, which is verified by competent Micron or a General Contractor representative working for Micron.
Critical Lift	A Critical Lift is any lift that requires careful planning and execution, without which there is a potential for a serious injury or event. Please refer to Section 6.7.3 of this standard. A Critical Lift requires additional planning documentation, such as a Critical Lift Study.
Daily/ Pre-Shift Inspection	An inspection performed by the crane operator before lifting activities are to take place.
General Contractor	The contractor having overall control of a construction project at Micron.
Lifting Checklist	A checklist used to verify lifting readiness where the inspection for readiness is carried out prior to the planned lifting activity.
Lift Plan	A plan for any Lifting & Rigging activities in a manner that maintains control and establish safety precautions for the lift procedure.
Micron Host	Micron team member who is the custodian of the lifting activity and responsible for engaging crane supplier and coordinating crane mobilization.

Terms	Definitions
Monthly Inspection	Crane inspection carried out by a competent mechanic appointed by the crane supplier. A copy of the monthly inspection record is to be maintained on file and produced for verification when requested.
PTW	**Permit to Work** A formal authorization system, either paper or electronic based, used in an organization to manage high-risk work activities to ensure safe execution of work onsite e.g., Lifting Permit, Hot Work Permit, Confined Space Permit, Work-at-Height Permit, etc.

5 References

Internal References	Link
Nil	Nil

External References	Link
1926 Subpart CC - Cranes & Derricks in Construction	LINK
Codes of Practice on Safe Lifting Operations in the Workplaces, Singapore	LINK

6 Standard

6.1 General Requirements

6.1.1 Hazard Identification and Risk Management

During project planning phases, hazard identification and risk management must be carried out to identify all potential hazards and risks associated with the overall lifting operations. This includes identifying all plant and equipment, including lifting gear, required for the proposed work and assessing these for any potential adverse risks.

Prior to personnel undertaking any work, or utilizing any plant or equipment for lifting, a JHA and Work Method Statement must be performed to identify any specific hazards the plant or equipment may present to that job or task. The JHA and Work Method Statement should identify the need for:

- Pre-inspections,
- PPE,
- Supervision, and
- Training and/ or licensing for lifting crew.

6.1.2 Permit to Work

Sites that have instituted a permit-to-work system for Lifting and Rigging activities are required to integrate the requirements stipulated in this standard into their existing permit to work system. In addition, other requirements stipulated in this standard are to be adopted and implemented to ensure safe lifting and rigging.

6.1.3 Crane Supplier

- The crane contractor or supplier engaged by Micron or Micron Contractor are required to supply crane, lifting appliance and rigging gear in accordance to the specifications outlined in the purchase order or contract document.
- The crane supplied must have valid operating permit issued by Authority Having Jurisdiction, must be in safe working condition, reasonably clean and accompanied by competent lifting crew unless specified otherwise by Micron or Micron Contractor.
- The crane supplier shall also be responsible for periodic maintenance and inspection.
- Crane pre-mobilization check, which includes lifting appliance and rigging gear, is to be done by the General Contractor or Crane Suppliers. Where applicable such checks are to be witnessed by Micron representatives or a pe-mobilization checklist endorsed by the General Contractor or Crane Suppliers is to be made available to Micron representative for verification

6.1.4 Crane Selection

- Cranes assigned for lifting load below 250 tons SWL shall not exceed 15 years old whereas for loads above 250 tons SWL, shall not exceed 5 years old from the manufacturing date state on the crane certificate.
- Use of crane’s more than the age stated above for lifting loads below and above 250 tons must be approved by Micron Project Director or Micron Contractor’s Project Director.
- Criteria for approval shall be:
  - Valid crane inspection certificate from local AHJ should not be more than 3 months from the date of issue.
  - Date of last load test should be within 3 months.
  - Micron Project Director or Micron Contractor’s Project Director shall instruct re-test/ inspection by a qualified crane examiner or reject the crane if it fails to meet the above criteria.

- Cranes that are driven on public roads shall be road worthy and comply with legal requirement stipulated by the local authority. Proof of road worthiness in the form of certificate/inspection report shall be submitted by crane supplier for verification.
- Cranes that are not road worthy e.g., crawler cranes, etc., are to be transported via appropriate low-bed trailers to the site.
- Cranes that are between 10 to 15 years old, the following additional requirement shall apply:
  - 6 monthly inspection on vehicle motor engine to confirm its road worthiness. (
  - 6 monthly inspection on mechanical/structure to confirm its functionality. The same requirement for annual inspection shall apply.
  - Micron reserve the right to impose additional condition or reject the crane from use on Micron site.
  - Validation Process: Written/electronic documentation of inspection by the AHJ in the past 12 months.

6.1.5 Lifting Gear

- All lifting gear certification and records of test results, examinations, modifications and repairs must be maintained and available for review at the workplace.
- As a minimum the following information will be recorded in a Register of Lifting Gear prior to use:
  - Type of lifting gear,
  - Safe working load,
  - Individual identification number,
  - Date of the last inspection,
  - Date of the next inspection

6.1.6 Lifting Cage

Lifting Cage (workbox) must only be used when there is no other practical alternative means to access plant or equipment, or when the time frame involved in accessing the plant or equipment such as the erection of scaffolding, would seriously compromise safety or the environment

- Must be inspected, approved with current compliance tag/label
- Under no circumstances will a lifting cage designed for lifting personnel be used for lifting materials. It must only be used for lifting personnel and hand tools. Proper and clear label is required.
- Lifting cage designed for lifting loose materials shall also be clearly marked.
- In general, all lifting cages must be inspected and approved with current Tag/Label.
- Use of a crane-lifted cage for personnel is regarded as a critical lift.
- All local legal requirement with regards to use of the lifting cage must be strictly complied with.

6.1.7 Excavator

- If use of a crane is not reasonably practicable for a certain task, and an excavator is to be used to perform lifting, the following minimum requirements for lifts where excavators are used as cranes:
  - Quick- hitches must have independent latching devices
  - Not to be used for precision lifting (i.e., where operating at creep speed is required and supporting the load without drift while connections are being made etc.)
  - Is within the rated capacity of the plant (SWL is displayed on the boom)
  - Only designed and certified lifting point are used to attach the load
  - Controlled lowering devices are installed in case of hydraulic failure
  - Operator Protection Devices (ROPS/FOPS) are fitted.
  - Only allow for stationary lifting. Lift and travel are strictly not allowed.

- If this section was found to be conflicting with local legislations, local regulation shall take precedence

6.1.8 Personnel Selection

- In addition to the Lift Director/Lifting Supervisor, the Lifting Crew shall comprise of a Crane Operator, a Rigger and a Signalman.
- The crane operator is prohibited from taking-up other roles except to operate the crane during the lifting operations.
- Micron considers the lifting activity as a high-risk activity and requires the lifting crew to meet the following minimum experience level in addition to their competency;
  - Lift Director/Supervisor - at least 3 years of experience,
  - Crane Operator - at least 3 years of experience,
  - Rigger - at least 1 year of experience, and
  - Signalman - at least 1 year of experience
  - Alternatively, ANSI/ASSP A10.42-2000 (R2017) Construction And Demolition Operations – Safety Requirements For Rigging Qualifications And Responsibilities; can be used as reference for approval.
- The crane operators required to undergo regular health screening and certified healthy by an occupational doctor taking into consideration their task. Frequency shall comply with local legislations on health screening, or annually if not been specified.

6.1.9 Crane and Lifting Gears Inspection

- **Prior to Commencement of Each Work Shift**
  - The Crane Operator should carry out a visual inspection and functional test using a Cranes Inspection Checklist before the commencement of each work shift, including inspecting and testing the following:
    - All relevant items indicated in the operations manual.
    - Operating and emergency controls.
    - Brakes.
    - Safety switches and interlocks, including limiting and indicating devices.
    - Visual inspection of the structure.
    - Wire ropes - to ensure they are on the drum and correctly reeved on the sheave.
  - The results of the inspection must be entered into a logbook and kept with the crane. The Crane Operator must also complete a Crane Inspection Log Sheet.
  - Where the inspection highlights deficiencies or non-compliance, these must be rectified prior to the commencement of any work.
  - The Rigger is to carry out inspections of lifting gear and rigging equipment to ensure that it is installed correctly and in good condition. Details of these inspections must be recorded on the Lifting Gear Inspection Checklist and the Rigging Equipment Register updated accordingly.
  - Where lifting gear is provided with a long-term Hire or Subcontractors crane, and used on a Micron workplace, the lifting gear must be inspected, tagged and comply with the requirements of this procedure.
  - Where short-term hire cranes use their own lifting gear, the hire company must provide proof of inspection of the lifting gear, or have the lifting gear inspected by a competent person prior to use or use on site Micron lifting equipment.
  - Lifting gear without a (current) color coded tag, which indicates that it is subjected to periodic maintenance and inspection, affixed to it shall not be used and shall be removed from the project. It should not be left stored on the crane whilst it is on site.

- **Removing Lifting Gear from Service**
  - Where maintenance or repairs are required, the crane must be tagged 'Out of Service' where the operator believes this may affect the safe operation of the crane.
  - Any lifting gear known or suspected of having been overloaded must have an 'Out of Service' tag placed on the gear and withdrawn from service. Arrangement shall be made to send such damaged parts out of the project site if it belongs to the crane supplier. If such overloaded lifting gear belongs to Micron, Micron responsible person should arrange to destroy such lifting gear to prevent unauthorized re-use.
  - Lifting gear which require repair should have 'Out of Service' tags must remain in place until repairs are completed and should only be removed by authorized personnel such as the competent mechanic or AHJ.
- **Planned Maintenance and Inspections**
  - All lifting gear, including fall prevention equipment, must be inspected by a competent person on a regular basis. These inspections shall be scheduled on- site inspection planner.
  - Please refer to Global EHS - Work At Heights Standard for inspection on fall prevention equipment. Pre- use inspection shall be incorporated in the pre-lift checklist.
  - A written inspection checklist must be used for inspection purposes to ensure consistent inspection criteria is used. In addition, all lifting gear, including fall prevention equipment, must also be inspected and tagged quarterly. The tagging will be either color coded tags or discs.
  - Each site must develop a maintenance schedule for all items of lifting gear. This schedule must be separate to the inspection plans.
  - It is recommended that such maintenance inspection shall be carried out at least on quarterly basis. Below table is an example but each site is encouraged to plan own schedule to exceed this minimum expectation.

Jan, Feb, Mar RED	Apr, May, Jun GREEN	Jul, Aug, Sep BLUE	Oct, Nov, Dec YELLOW

Figure 1 Example of Color-Coded Tag

- **Annual Inspection and Service Records**
  - An annual inspection by a competent person is required as part of legislative requirements for operation of a crane and should include all items specified by the crane manufacturer for annual inspection, as well as all items included in the routine inspection and maintenance programs.
  - Annual inspections include:
    - The effective functioning and calibration of all limiting and indicating devices;
    - Detailed visual inspection and tolerance checking of all structural and wear components;
    - Checking of tolerances for wear limit;
    - Detailed check for corrosion; and
    - Detailed examination of critical areas for evidence of cracking.
  - A written report must be provided upon completion of the inspection and a copy is to be kept in the crane cabin.
  - A crane service record, such as a maintenance logbook, of the significant events concerning the safety and operation of the crane should be kept and readily available.
  - The records should be easily understood, and preferably written in plain English.

- Entries in the maintenance logbook are to clearly describe the work undertaken and parts replaced; note the name of the person carrying out the work and be signed (and dated) by the person carrying out the work.
- Wire Rope on Cranes: Wire ropes in use on the crane must be inspected by a qualified person yearly. The inspection must be complete and thorough, covering the surface of the entire length of the wire ropes, with particular attention given to the following: Those sections normally hidden during shift and monthly inspections; Wire rope reverse bends; Wire rope passing over sheaves; If the wire rope inspection is not feasible due to site conditions such inspections must be conducted as soon as feasible, but not longer than an additional 6 months. This inspection must be documented and retained.
- Validation Process: Written/electronic documentation of inspection by the AHJ in the past 12 months.
- Annual Lifting Appliance and Lifting Gears Inspection
  - All lifting appliances and gears are to be inspected by a competent person as per local legislations.
  - If this is not specified in local legislations. Then owner of the lifting appliances and gears will be required to arrange for such inspection by a competent person at interval of not more than 12 months.
  - Load test should be carried out as per requirement stated in local legislations.
  - Validation Process: Written/electronic documentation of inspection, testing, by the AHJ in the past 12 months.

6.1.10 Rigging Supply

The Crane Contractor company will supply rigging, unless otherwise specified in the contract.

6.1.11 Rigging Inspection Requirements

Riggers trained and qualified in accordance with local regulations and the crane operator will visually inspect all rigging before each lift to ensure it is in satisfactory working condition and is appropriate for the cargo and lift. Micron team members assistance is not a substitute for the contractor crane operator or rigger to inspect the rigging. Before commencing the lift, the contractor crane operator must approve all rigging operations.

6.1.12 Boom Location/ Need for Evacuation

Where the swing of the boom extends over an occupied building or other occupied areas, the affected areas must be evacuated, and blocked from reentry by Micron personnel who are managing and coordinating the lifting operation.

At the discretion of the Safety department, and after discussion with trained Micron team members, an exception may be granted where the weight and size of the load are determined to be so light, and of such a size that it would not cause damage to the roof (if the load is displaced). In addition, potential hazards from the crane itself will be considered.

It is the responsibility of the Micron Facilities team or Micron Construction Project Manager or designee to notify Micron Employees of the event and associated hazards and appropriate safety measures implemented for the crane lift task.

The Micron Facilities team or the Micron Construction Project Manager or designee is responsible for clearing Micron team members who occupy areas within Micron Buildings or other work areas where the sweep of the crane boom may be directly overhead when required for significant crane lifts.

6.2 Training

No person will perform any crane work or use or operate any industrial lifting equipment unless they have the required certificates of competency. Lifting Director/Supervisor must ensure that all lifting activities are undertaken only by those workers who are trained, licensed and competent to do so.

6.2.1 Training Requirements

- **Lifting Director or Supervisor**
  - The Lifting Director or Supervisor shall hold a current Certificate of Competency and have sound knowledge of the following:
    - Legislative requirements for safe lifting operation,
    - Duties of personnel involved in lifting operation,
    - Safe work procedure and planning for safe lifting,
    - Coordinating and supervising lifting operations involving mobile cranes, tower cranes and other lifting machines based on lifting plan
    - Correct rigging methods, and
    - Responding to lifting emergencies
  - In the event of recognized competency training is not available, minimum requirement for Lift Director/Lifting Supervisor shall be a Qualified Rigger with not less than 5 years working experience.

- **Crane Operators**
  - The operation of prescribed plant requires the operator to be the holder of a nationally accredited Certificate of Competency for that particular type of plant. Micron require that prior to the operation of any crane, the operator must provide a current Certificate of Competency specific to the type of crane being used.
  - The primary role of the crane operator is to perform the function of the crane operation in a safe manner. If the crane operator has reason to believe that a lift may be dangerous or unsafe, the operator must refuse to proceed until the concern has been reported, relevant risks have been managed, and safe conditions have been confirmed.
  - Crane operators must be competent to operate the crane and must be able to demonstrate knowledge of:
    - the particular model of crane to be operated, its characteristics, functions and limitations
    - information in the crane's operating manual
    - the crane's load chart, including all notes and warnings, and how to calculate or determine the crane's actual net capacity in every possible configuration
    - proper inspection and maintenance procedures to be followed in accordance with the guidelines of the manufacturer and owner
    - any workplace conditions that may affect crane operation, including the presence of overhead electric lines, nearby structures, cranes and concrete placement booms, and slinging techniques.
  - Operators of mobile cranes are also required to hold the appropriate class of driver license (Heavy vehicle) before driving the crane on a road.

- **Rigger**
  - It is a requirement that any person who undertakes rigging activities, including the setting up of winches, chain blocks, come-a-longs etc. or slings any load, is the holder of a current Certificate of Competency for rigging.

- **Signalmen**
  - It is a requirement that any person who undertakes signaling activities, is the holder of a current Certificate of Competency for signaling.

6.3 Control Measures for Lifting Operations

6.3.1 Determine Type of Lift

Each lift (or series of lifts) must be assessed to determine whether the lift constitutes a 'standard' or 'critical' lift on a case-by-case basis.

6.3.2 Operators Manual

The crane operator's manual is to be supplied with each crane. The manual must be kept on the crane at all times. The Crane Operator must read the Operators Manual prior to the initial operation of any crane and consult the Operators Manual when carrying out tasks such as boom make up, boom manual extension set-up and erection of fly's etc.

6.3.3 Crane Logbook

Every crane must be provided with a Logbook. It is the operator's responsibility to complete entries into the Logbook daily and submit the daily pre- start sheet each week to the Lifting Director/ Supervisor.

6.3.4 Load Charts

- Load charts, also called rated capacity charts, identify what a crane is able to lift safely. The load charts must include the information specified in must be metric units.
- Where the crane has one main load chart, this should be fixed in the operator's cabin in a clearly visible location.
- Where the crane has numerous load charts (e.g., for different boom and fly jib configurations), the charts should be kept in a book, folder or envelope in the operator's cabin.
- The lifting capacity of a crane is limited by:
  - Structural strength when the working radius is small, and
  - Stability when the working radius is greater.
- If a crane is overloaded in the structural area of the load chart, a structural or mechanical component of the crane may fail. However, if the crane is overloaded in the stability area of the load chart, the crane may overturn.
- The lifting capacities specified on a load chart must never be exceeded, except during testing of the crane by a competent person under controlled conditions.

6.3.5 Communication

- A reliable method of signaling between the Lifting Director/ Supervisor, Crane Operator, Rigger and Signalmen is essential for safe crane operation. Failure to implement a reliable method of communication may lead to unsafe crane operations and contribute to injury to persons. The methods of communication that may be employed include:
  - Hand signals (requires clear line of sight between Dogger and Crane Operator); and
  - 2-way radios (where vision is impaired by structure).

- An effective means of communication is particularly important where:
  - the crane operator cannot see the load
  - the crane operator cannot see the load's landing area
  - the crane operator cannot see the path of travel of the load or the crane
  - the crane operator is not in a position to make an accurate judgement of distance, and
  - it is possible for the crane to come into contact with overhead power lines.
- Under above situation, crane operator shall always re-confirm instruction given by rigger/signalman each action so as to avoid miss-communication.

6.3.6 Exclusion Zones

- Prior to the commencement of any significant lift, the Project or Construction Manager must notify (where applicable) all relevant persons who may be affected by the lift, closing of roads, access ways, work areas etc. (i.e., client, other contractors, etc.).
- Exclusion zones must be established to ensure non-essential personnel are kept clear of the lift area. Exclusion zones will be established and recognizable by way of solid barricading, flagging and sign posting, or control personnel.
- The exclusion zone must be identified, installed and maintained prior to and throughout the lift. Once the lift is positioned and is undergoing consolidation, and deemed safe, the exclusion zone will be re-established to the immediate area of the lift and all other affected work areas re-opened.
- Where the exclusion zone includes a public footpath or roadway closure, approval will be required from the relevant local authorities. Any operations requiring barricades and signs to be erected should meet local road traffic authority, local government authorities and relevant building or local laws.

6.3.7 Overhead Power Lines

- Cranes should not be operated where any part of the crane or the crane's load could come within 10m of an overhead electric line. Local legislations shall be checked to ensure compliance.
- Comply with local legislations if it stipulated higher requirement
- A Safety Observer, a person other than the lifting crew, (or Spotter) shall be used when operating cranes or mobile plant in the vicinity of overhead electric lines.
- The Safety Observer is responsible for alerting workers, crane operators when approach distances may be about to be breached. The worker designated the responsibility of Safety Observer should have successfully completed specific training, so they are competent to observe the work and able to implement control measures in an emergency.
- In the event of space constrain, the following should be considered:
  - Carry a thorough JHA to determine additional control measures. For example, more tag- lines to control the load from swinging, or re-pack materials into smaller packaging, etc.
  - Implement additional control measures thoroughly.
  - Consult local power bureau to find out the possibility of de-energize the overhead power line.

6.3.8 Weather Conditions

- Strong winds and adverse weather conditions impose additional loads on a crane and affect the crane's stability. Crane manufacturers will generally only specify a maximum permissible wind speed for crane operation.
- Where wind speeds exceed the maximum figure stated by the crane manufacturer, crane operations should cease.
- In order to ensure the stability of a mobile crane in windy conditions, the following factors should be addressed:

- The maximum wind speed that the crane may be operated in is generally, 10m/s or 36km/h irrespective of the size of the load unless otherwise specified by the manufacturer.
- If there is a higher or more stringent standard is available from local legislations or professional organization requirements, higher standard should take precedence.
- The wind will have a greater effect on the crane stability and the potential application of a side load on the crane's boom where the crane is working at close to its rated capacity.
- A competent person should provide written advice on safe lifting conditions (WMS/JHA) where the lift is a non-standard lift, involving a suspended load or large surface area.
- Anemometers should be attached to cranes or where these are not fitted, handheld wind speed meters should be provided. The provision of anemometers on cranes is mandatory for tower cranes where the maximum rated capacity of the crane is 100 tons or greater. Wind meters should be used at all times where practical.

6.4 Subcontractor and Hire Cranes

All subcontractor and hire cranes used at a Micron's worksites are subjected to the requirements of this procedure. The Project or Construction Manager must ensure that:

- Subcontractors and hire companies that use cranes in any of the Micron's sites are conversant with the requirements of this procedure and comply with all requirements whilst at the workplace.
- Companies supplying cranes for site work are informed that cranes will be inspected and must comply with all criteria of the inspection check list prior to being allowed to commence work.
- Where subcontractors are engaged to undertake work, the requirements of this procedure must be included in Subcontract Agreements and Purchase Requisitions.
- Contractors must ensure all cranes under their direct or indirect control are registered and certified according to state law or other prescribed requirements, and that all crane drivers and operators hold a current valid certificate and/or license to operate that particular crane.

6.5 Crane Set - Up

Cranes must be set up in a level and stable condition. Where crawler cranes are used, consideration must be given to ground bearing pressures, and the use of heavy- duty mats under the tracks. When setting up a crane consideration must also be given to the following:

- Type and compaction of the soil
- Underground services
- Clearance from buildings and structures
- Overhead electrical wires
- Personnel access routes to workplaces

Factors that will affect the ability of the ground to provide adequate support include the following:

- The presence of water, including when it is mixed with the soil as mud, and where it is present under the surface.
- The type of ground (e.g., clay, sand, rock or a mixture of these).
- Backfilled ground that was previously an excavation or trench.
- Presents of underground utilities- vaults, tunnels, and trenches which might require additional protection.
- Cavities or penetrations in the ground that have been covered but still exist.

- Continued operation of the crane in one location.

Where cranes are set up on outriggers, it is mandatory that timber pads or steel plate sections are placed under the outrigger foot pads to increase the foot pad surface area and decrease the point ground bearing pressure. In the event of timber pads, proper manufactured pads shall be used instead of random timber planks. The pictures below show some examples of proper timber pads.




Different ground types will have different ground bearing capacities. Generally, harder ground, such as rock, is capable of withstanding higher ground pressures than softer ground, such as dry sand. Where the ground consists of a combination of ground types, the poorer ground type should be used for determining the maximum ground pressure that can be applied to the ground when the crane is set up on outriggers.

The following table identifies the maximum permissible ground pressure according to the ground type. This may vary for different sites, in such cases the Project Manager or Construction Manager is required to determine a suitable the Permissible Ground Pressure for the ground type.

Table 1 Maximum Permissible Ground Pressure for Different Ground Types

Ground Type	Maximum Permissible Ground Pressure, Pmax (Tons per m2)
Hard rock	200
Shale rock and sandstone	80
Compacted gravel (with up to 20% sand)	40
Asphalt	20
Compacted sand	20
Stiff clay (dry)	20
Soft clay (dry)	10
Loose sand	10
Wet clay	Less than 10

In the event that a crane is to be set up close to excavations or trenches, there may be an increased risk of the sides of the excavation or trench wall collapsing, causing the crane to overturn. This risk increases with softer ground, and the presence of groundwater. Additionally, the risk of collapse is greater for vertical cuts in the excavation wall in comparison to walls that have been battered back at an angle.

The presence of 'slippery back', where there is a naturally occurring slip plain such as a fracture in the ground, can also increase the risk of excavation or trench collapse.

The following principles should be applied when setting up mobile cranes near excavations:

- Where the ground is compact and non-friable (i.e., not crumbling), the distance of any part of the crane support timbers from the excavation should be at least equal to the depth of the excavation (1:1 rule) e.g., for a three meters deep trench in compact ground, the outrigger timbers or pads should be a horizontal distance of at least three meters away from the closest edge of the trench wall.
- Where the ground is loose or backfilled (i.e., crumbling), the distance of any part of the crane support timbers from the excavation should be at least twice the depth of the excavation (2:1 rule) e.g., for a

3m deep trench in backfilled ground, the outrigger timbers or pads should be a horizontal distance of at least six meters away from the closest face of the trench wall.

- When there is a space constrain to meet above requirement, the following should be considered:
  - Condition of the soil.
  - Strength and type of shoring.
  - Above two points may require certification by a professional engineer.
  - Carry out a thorough JHA to identify additional control measures.

These and any other items shall be identified, and the proposed control measures detailed, in the WMS & JHA for the activity.

6.6 Crane Safety Systems

6.6.1 Access to Crane

Mobile cranes must be fitted with safe means of access that allow the crane operator to safely access the crane cabin and other frequently accessed areas of the crane.

Safe access includes the provision of:

- Ladders
- Footholds
- Steps
- Grab rails.

Access provisions provided by the crane manufacturer should not be removed or modified unless a qualified person (e.g., an ergonomist) specifies otherwise.

Where there is a risk of slips, trips and falls, the walking surfaces should be coated with an anti-slip product. Fall protection and fall arrest devices should be provided and utilized whenever there is a potential for falls during erecting and dismantling cranes, and when accessing booms and jibs. Micron Work at Height Standard shall apply (2 meters and 6 feet for US only).

6.6.2 Limiting and Indicating Devices

Limiting and indicating devices must be fitted to mobile cranes as required by manufacturer and local regulatory requirements: Cranes, hoists and winches – Mobile cranes, unless otherwise required by State and Territory legislation. The purpose of limiting devices is to stop a specific crane motion before the crane moves out of its limits into an unsafe situation.

Indicating devices are used to visually or audibly warn the crane operator that the crane may be approaching its set limits or an unsafe situation. These devices may be used individually, or together, for specific crane motions.

6.6.3 Capacity Limiters

A rated capacity limiter prevents overloading of the crane by stopping all relevant crane functions when an overload is detected.

Rated capacity means the maximum load that may be attached and handled by the crane, and may not include the weight of the hook block, falls of rope, slings and rigging hardware. The load to be raised must include the weight of all lifting appliances that are not permanently attached to the crane.

Rated capacity limiters must be provided on all mobile cranes manufactured since 2002 with a maximum safe working load of more than three tons.

6.6.4 Motion Limiters

Motion limiting devices are used to prevent physical damage to the crane or part of the crane due to movement of the crane or part of the crane past its designed range of motion.

Motion limiting devices must be fitted to a mobile crane to prevent motion out of its service limits. These devices cause braking, including deceleration where appropriate and stopping, when the following extreme permissible positions have been reached:

- the highest position of the hook (this is generally known as 'anti-two block')
- the extreme permissible operating positions of the jib (luff limiter), and
- the end positions of horizontally telescoping or movable jibs.

6.6.5 Working Radius

Working radius indicator displays the radius of the suspended load generally measured from the center of the slew ring. A radius indicator should be fitted on all mobile cranes that were originally designed with this feature.

6.6.6 Load Indicator

Load indicators should be fitted to all mobile cranes with a maximum rated capacity of more than three tons. Load indicators measure and display the mass of the load being lifted. This indicator assists the crane operator to stay within the load chart and safe working limit of the crane. The load indicator should be capable of displaying the mass of the suspended load at all times.

6.6.7 Safeguarding Overhead Power Lines Contact

There are a number of devices available that either assist in preventing contact with overhead power lines or reduce the degree of risk in the event of contact. These include tiger tails, hook-on flags and limiting or warning devices.

The use of tiger tails on power lines acts as a visual aid to highlight the location of the overhead power line. Only low voltage lines (under 1000 volts) can be continuously covered with tiger tails. Tiger tails do not insulate wires.

Limiting or warning devices may be used to prevent the crane boom or load from entering the exclusion zone, or to warn the crane operator before the boom enters the exclusion zone. If a limiting device is used, the system must be designed to 'fail-safe', or should generally meet a reliability level of Category 4 as defined under AS/NZS 4024:1503, ISO 13849-1:2006 and IEC/AS 62061:2005.

Regardless of whether safety devices are being used, the exclusion zone must not be encroached.

6.7 Safe Lifting Practice

6.7.1 Pre Lift Plan

Lifting should not take place unless the load charts are in the crane cabin. The load charts must be available to verify that the crane is not being overloaded.

In the event of adverse weather conditions, including heavy rains, crane operators are to conduct a risk assessment prior to proceeding with works.

Whenever lightening is visible or occurs within 5kms of any crane operations, all liftings are to cease until the threat has passed. Project Managers are to liaise with local authorities on approaching storm conditions before commencing any works.

Sites are recommended to install on-site lightning detection system, or purchase hand- held portable device for lightning detection.

Crane operators should recognize that dependent on the boom length, the wind speed may be greater at the height of the load compared to the wind speed at the height of the crane's cabin.

- Wind speed may be much greater above the ground level than next to the operator's cabin. The effect of wind gusts will have a different effect on the crane than a constant wind.
- If the operator believes it is unsafe to lift the load, written certification should be obtained from the crane manufacturer or an engineer prior to lifting taking place.

All lifting and hoisting operations shall be planned and documented with a written lift plan. The lift plan shall include the following at a minimum:

- Weight of the load
- Weight of the rigging
- Total weight of the gross load
- Calculation of percentage of crane capacity used during the lift
- Crane chart documenting the capacity of the crane in the configuration the crane will be used in
- Crane maximum radius for the lift in the configuration it will be used in
- List of lifting gears and supporting equipment to be used.
- Location the load will be lifted at, and the distance to the location the load will be set at.
- Work area has sufficient space for crane to extend all out-riggers fully, turning and swing without obstruction.
- Site layout plan

6.7.2 Lifting Activity

The Lifting Director/Supervisor must:

- Check no unauthorized persons are present on the crane
- Inspect the area, including the ground condition
- Monitor the ground condition during repetitive crane lifts in one location
- Check each motion to be performed is safe and without risk, and
- Complete the daily inspection checklist, including filling out the crane logbook.

The Crane Operator should have full control of the crane during all lifting activities and **MUST NOT**:

- Supervise and/or direct a trainee rigger or signalmen; or
- Leave the crane operator controls unless in an emergency or after the following actions have been taken:
  - Removed all loads and lifting slings from the hook or dedicated lifting device
  - Raised the crane hook to a position where it is clear of other operations,
  - Disabled all powered crane motions.

A rigger should be in control of the load from the time it is slung until it is securely placed in its final position and slings are removed. If a load is being controlled by more than one rigger, the different riggers must know what part of the lifting operation they are responsible for.

Before signaling the crane operator to raise a load, the rigger should ensure:

- Each lifting attachment, sling and shackle has a safe working load, or working load limit greater than or equal to that of the load. These attachments must be suitable for safely handling the load.
- The hoisting apparatus is correctly applied to the load and the crane hook.
- No part of the load is loose.

- The load is properly balanced.
- The load is not snagged.
- The load, when it is lifted, will not contact any object, dragged or constitute a hazard to any person
- All lifting equipment is fitted with the current quarterly colored test tag.

6.7.3 Critical Lift

A Critical Lift Plan is required for any of the following conditions. All critical lifts must be reviewed with the Micron EHS department and Project manager before the General contractor and crane contractor can perform the lift, and the critical lift plan must be submitted not less than 7 days in advance of the activity taking place. Any of the following are considered a Critical Lift:

- A lift that is greater than 70% of the rated capacity of the crane
- Hoisting personnel
- A lift over or near power lines
- A lift over a section of an occupied building.
- Hoisting hazardous materials
- Lifts made with more than one crane
- Lifts in which the center of gravity could change
- Lifts the operator believes should be considered critical
- Lifts made without the use of outriggers using rubber-tired load charts
- Lifts using more than one hoist line on one crane. This will only be allowed provided it is complying with requirement stipulated in 6.7.8
- Lifts involving non-routine or technically difficult rigging arrangements

Critical Lift Plans shall be prepared by a qualified person when any of these issues are present. A JHA/RA shall be developed along with the Critical Lift Plan. The critical lift plan shall be developed in tandem with the Lift Director, Crane Operator, Qualified Rigger and Signalman. Micron Project Manager will have the discretion to request such Critical Lift Plan to be reviewed and endorsed by a Professional Engineer engaged by the Contractor.

Once the plan has been completed it shall be reviewed by all personnel involved in the lift prior to the lift itself.

6.7.4 Communication Method

A dedicated radio frequency should be selected for the duration of the crane operations to prevent interference to or from other radio equipment being used in the vicinity of the crane.

Where radio communication is not or cannot be used, other forms of communication, such as hand signals and bell, buzzer and whistle signals should be used. These must be documented in the WMS.

The safe use of radio communication usually involves:

- The lifting crew performing an operating safety check to ensure the radios are performing satisfactorily, and a fully charged battery and spares are available.
- Ensuring the lifting crew is familiar with the specific procedures for using radio communications
- Adopting a constant talk method between radio users so that all involved people are aware of the progress of the lifting operations at all times, and
- Ensuring the crane operator normally takes radio instructions from one person only.
- Work must stop immediately if there is a loss of radio communication.
- Mobile phones must not be used for directing mobile crane operations.

6.7.5 Crane Movement

The following requirements are mandatory when moving cranes around sites:

- Chains must be removed or secured to prevent excessive movement or displacement
- Hook blocks must be (preferably) secured to the crane body by chains or wire rope to prevent excessive movement and potential damage to boom lacings.

Where it is impractical to secure the hook blocks, the hook blocks will be lowered to a position that the movement of the crane will not allow the hook block to contact the boom. In some tractor cranes the block may be held fast against the boom head.

6.7.6 Free Fall Load

Under no circumstances can any load be lowered by the disengagement of the winch clutches and controlled by brake pressure (free fall). All loads must be lowered by means of a power lowering or positively engaged drive down system.

For specified operation such as drop hammer for piling, the machine shall be strictly operated as per manufacturers manual.

6.7.7 Overhead Lifting

Where a crane lifts a load that may travel over the top of other workers that are not protected by suitable overhead protection, it is the responsibility of the Rigger directing the crane lift to notify workers in the load path of the impending lift.

It is the responsibility of the workers to remove themselves from the load path until such time as the load has passed overhead or is landed or secured into position.

Where cranes are working in the vicinity of access routes or work areas (for example, site office, container store), and there is a potential for a load to pass over these areas, it shall be the duty of Lift Director/Lifting Supervisor to coordinate with relevant parties and evaluate such work areas for the Lift to be executed safely.

6.7.8 Using Two Hook for Lift

Cranes must not lift on two hooks at the same time unless:

- A risk assessment has been undertaken.
- There is written confirmation from the crane manufacturer that the lifting method is within the design criteria of the crane and does not compromise the safety or integrity of the crane.
- Specified load chart for using two hooks is available in the operating manual.

6.7.9 Christmas Treeing (Christmas Tree Lifting Method)

- Christmas Treeing, or generally known as Christmas Tree lifting method will not be allowed
- This will be strictly prohibited as nobody should be working under load suspended by crane.

6.8 Rigging

6.8.1 Fall Prevention and Protection

Where rigging/slinging activities are to be carried out where there is potential to a fall from a height, fall prevention, protection, and or restraint, equipment must be utilized.

All personnel who are required to use fall protection equipment will be trained by a competent person in its correct selection, use and maintenance before commencing work.

6.8.2 Making Safe

Prior to the end of a shift or where there is a potential for inclement weather, riggers must ensure that all structures, vessels, plant equipment etc. are adequately braced stayed or secured to prevent damage, displacement distortion or undue stresses being placed on these parts.

6.8.3 Safe Access & Egress

Where riggers are required to work in elevated areas, approved access and egress must be provided, and used at all times by the rigger. The climbing of columns, lowering on ropes or swinging on slings or chain falls is prohibited.

Prohibited actions also include:

- Climbing columns
- Lowering on ropes
- Swinging on slings or chain falls
- Stepping onto suspended loads
- Walking under a suspended load

Persons found to be engaged in these or other unacceptable and unsafe practices will be subject to the disciplinary process up to and including termination.

6.8.4 Warning Signs and Barricades

Where riggers are working overhead, installing or moving plant or equipment, erecting structures, carrying out lifting operations; or where there is a potential for other personnel to sustain injury from these or other activities being undertaken by the rigger, then barricades and signage must be installed and maintained.

6.8.5 Dropped Objects

Equipment such as hand tools, bolts, bracing gear etc. must not be stacked, stored or left on a structure unless adequately secured to prevent displacement or falling to lower levels due to inclement weather, plant or equipment vibration or contact with the structure. In compliance with sound housekeeping and hazard prevention practices good housekeeping at all times is paramount with bolts and small items to be stored in containers.

Where due to working or environmental conditions there is a possibly for hand tools, gear etc. to be dropped, wrist lanyards, ropes or other means will be used as a restraint.

6.8.6 Tag Lines/Shepherd's Hook

A 16mm diameter tag lines will be used on all loads lifted to safely control and position the load and to ensure that the Rigger is not in the 'Line of Fire' if the lifting equipment fails, or the load moves, or is displaced.

Care shall be taken by the rigger as well as the operator to prevent the tag line from being entangled on to structures e.g., scaffold, rebar, etc.

Depending on the size, weight, and shape of the load, direction of swing and route of travel, more than one tag lines could be required in order to have effective control of the load. Lifting Supervisor shall consider this and work with Rigger on site.

An ergonomically designed shepherds hook must be provided to riggers to ensure the tag lines can be safely retrieved by the riggers in any circumstance where the rigger would need to work beneath the load to retrieve the tagline or to prevent the rigger without having to place themselves in the 'Line of Fire'.

6.8.7 Sheet Piling

When cranes are used for sheet pile driving, it is mandatory that, an additional tagline shall be provided to secure the sheet pile to the vibro or press-driving rig to prevent the sheet pile from accidentally falling off.

6.9 Lifting Gear

6.9.1 Hire or Purchase

When purchasing lifting gear, the purchase requisition must contain full details of the type of lifting gear required, its intended use, and any adverse conditions where the lifting gear may be used (i.e., in the vicinity of extreme heat).

When hiring lifting gear, the Project or Construction Manager must ensure that, prior to use, current test certification and other appropriate documentation have been provided by the hire company, irrespective of the period of hire. Any test certificates must be verified by the Lifting Director/Supervisor prior to the lifting gear being used.

All hired lifting gears must also be marked with the SWL and provided with an individual identification number.

6.9.2 Repair or Modification

No modifications or repairs to lifting gear will be undertaken without appropriate design, testing and certification, including proof loading by AHJ approved service provider.

All records of the engineering approvals, specifications and proof loads test certificates be kept in accordance with the relevant Quality Management Plan.

6.9.3 Lifting Gear Failure

All incidents of failure of any lifting gear must be reported immediately to the Project or Construction Manager and will be treated as a significant incident which requires a detailed 8D report.

6.10 Notification and Coordination

6.10.1 Notification of Micron EHS Department/Crane Arrival

When it concerns crane operation within Micron occupied operating facility in which Micron owns the direct management of crane operations, the Facilities Manager, Micron Project Manager or designee must notify the Micron EHS Department one day beforehand that a crane will be arriving on site and will require support. The EHS Department will be on the distribution list for all crane operation notifications and will periodically monitor events as necessary to ensure compliance with this procedure.

6.10.2 Notification of General Contractor EHS Department/Crane Arrival

As for construction activities that are managed by a General Contractor, the General Contractor must notify the GC EHS personnel at the time a crane arrives onsite and require support.

6.10.3 Reporting Mechanical and Security Issues

The Facilities Manager, Construction Project Manager or designee will coordinate with site EHS and Security for any mechanical and security related issues to be considered prior to the crane operations beginning.

6.10.4 Emergency Procedure

In the event of a mishap where team members or property may be at risk, contact Site ERT/EHS and the Facilities Manager or Micron Construction Project Manager.

If a crane was required to evacuate an injured person from elevated area, the Lift Director shall work with the rigger to ensure that lift was being execute safely without any potential second injury inflicted to the injured.

At remote locations, away from the main facility, the appropriate emergency agency must be notified as indicated in the site emergency procedures.

6.10.5 Shutdown

After completion of crane operations, the contractor will ensure the crane is returned to a transportable condition and properly secured for movement from the Micron site.

7 Appendices

Below are samples of some checklists and forms.

Each site is encouraged to use these documents to develop own format which is most suitable for each operation.

- Pre- Lift Checklist
- Register of Lifting Gear
- Register of Rigging Equipment
- Lifting Gear and Rigging Equipment Inspection Checklist
- Mobile Crane Inspection Checklist

Appendix 1 Pre - Lift Checklist

Pre-Lift Checklist		
S/No	**Check Items**	***circle where appropriate**
1	Annual Crane Certification present? (Verification: Crane contractor has crane certification present within 1 year of lifting operations)	Yes / No
2	Crane operator has a current & valid Operator's License? (Verification: Operator presents crane Operator's License)	Yes / No
3	Operators completed daily crane inspections, and documented monthly crane inspections? (Verification: Witness operator perform visual inspection. Monthly inspection log available onsite to review)	Yes / No
4	Crane company supply a preventative maintenance log for the crane? (Verification: Log is present and documenting that crane has been serviced. To be verified within an hour)	Yes / No
5	Lift Director identified for all lifting activities? (Verification: Who is the Lift Director and his/her credentials)	Yes / No
6	Operators/Construction Field Manager aware of wind restrictions for crane? (Verification: Personnel knows the maximum wind speed which the crane can operate at)	Yes / No
7	Operators/Construction Field Manager aware of ground conditions where outriggers/tracks are set up? (Verification: lift location compaction & grading has been taken into account on the pick plan)	Yes / No
8	Operators and qualified riggers inspected rigging before each lift? (Verification: Observe inspections of rigging taking place before lift)	Yes / No
9	Pick Plan in place for each lift? (Verification: Pick plan is available)	Yes / No
10	Critical Lift Plan completed when needed? (Verification: Compare lift criteria to critical lift criteria to demonstrate if lift is a critical pick)	Yes / No
11	Operator/Construction Field Manager aware of overhead power lines and other overhead hazards? (Verification: Visually confirm line location at the location of the pick)	Yes / No
12	Load chart with configurations and rated capacities of crane accessible to the crew? (Verification: visually verify in the cab of the crane)	Yes / No

Appendix 2 Register of Lifting Gear

Register of Lifting Gears		
Project/Department:	**Date: _____ Year _____ Month**	**Remark:**
Project Number:	**Location:**	

Reg No.	Type[1]	Make / Model	Location	Length[2]	SWL[3]	Expiry Date	Name of Checker	Date Reg/Checked

Notes: 1) Types of Sling = Webbing / Wire Rope / Chain; 2) Length =Length of Sling 3) SWL. - Safe Working Load

Appendix 3 Register of Rigging Equipment

Register of Rigging Equipment		
Project/Department:	**Date:_____ Year _____Month**	**Remark:**
Project Number:	**Location:**	

Reg No.	Type	Manufacturer	Model No.	Expiry Date	Name of Checker	Date Reg/Checked

Appendix 4 Lifting Gear and Rigging Equipment Inspection Checklist

Location:	**Inspector:**	**Signature:**	**Date:**

Equip No.	**SWL marked clearly?**	**Cleaning required ?**	**Any damage ?**	**Any excessive wear?**	**Any kinks?**	**To be repaired by:**	**Repaired by:**	**Returned to service?**	**Description of damage/defect details**	**Repairs complete ?**	**Equip Decomm. ?**
	(YES/NO)	(YES/NO)	(YES/NO)	(YES/NO)	(YES/NO)	(WHO)	(WHEN)	(YES/NO)		(YES/NO)	(YES/NO)

Appendix 5 Mobile Crane Inspection Checklist

Mobile Crane Inspection Checklist	
JOB NUMBER:	**LOCATION:**
MAKE AND MODEL:	**KILOMETRES:**
DESCRIPTION:	**DATE:**
INSPECTED BY:	**SIGNATURE:**

No.	ITEM	TICK APPLICABLE BOX:			REMARKS:
		YES	NO	N/A	
1	Operators Manual present				
2	Current Machinery Certificate (completed in the previous 12 months)				
3	Maintenance Logbook				
4	Crane being serviced in accordance with scheduled service				
5	Plant risk assessment in vehicle				

No.	ITEM	TICK APPLICABLE BOX:					REMARKS:
		OK	ADJUST	REPAIR	REPLACE	N/A	
6	Boom Angle Indicator						
7	Boom Length Indicator						
8	Safe Load Indicator						
9	Load Charts						
10	Control Identification						
11	Safety Hooks						
12	Sheaves						
13	Hook Blocks						
14	Hydraulic System						
15	Hoist Brakes						
16	Main Boom						
17	Fly Jib						
18	Engine						
19	Lights and Reflectors						
20	Horn						

Mobile Crane Inspection Checklist							
No.	ITEM	TICK APPLICABLE BOX:					REMARKS:
		OK	ADJUST	REPAIR	REPLACE	N/A	
21	Foot Brake						
22	Park Brake						
23	Outrigger Condition						
24	Condition of Tyres						
25	Condition of Ancillary Gear						
26	Steering Rams and Pins						
27	Articulation Joint						
28	Suspension						
29	Spirit Levels						
30	Anti- Two Block						
31	Rear View Mirror						
32	Instruments						

Service / Repair Items Entered into Tracking System? (circle)	YES / NO

Overall Condition Of Vehicle Rating: (circle)	POOR FAIR GOOD
General comments:	

8 Document Control

Items	Details
ECN Facility	CORP EHS
ECN Area	EHS CONST
Approval	This document is approved by: GLOBAL_EHS_SEAL_LT
Notification	Notification of changes to this document is managed through Micron's Engineering Change Notification (ECN) process to the following: **EHS** • GLOBAL_EHS • GLOBAL_EHS_MANAGERS • GLOBAL_EHS_SEAL_LT • GLOBAL_EHS_TEAM_MEMBERS **Facilities** • GLOBAL_FAC_MANAGERS • GLOBAL_FAC_CONSTRUCTION
Review	This document will be reviewed at least biennially (once per two years) by Global EHS / PSM through the Periodic Document Review (PDR) process.

9 Revision History

Rev	Date	Description	Requestor
0	30 Apr 2019	**ECN Number:** 101022763 Initial document release	JLAWSON
1	16 Dec 2020	**ECN Number**: 101077926 Document title changed. Major revision with more detailed requirements on crane condition, qualification of lifting crews, inspection and maintenance of crane and lifting gears, in respond to a few lifting incidents recorded. Included safe lifting practices which encompasses roles and responsibilities of each member of the lifting team. Added samples of related checklists and forms.	HAICHUANCHUA

2	02 Feb 2023	**ECN Number:** 101135706
		Revision with more detailed information on crane supplier, lifting cage, personnel selection, lifting gears inspection, weather conditions, crane set-up, crane access, critical lift, tag lines/Shepherd's Hook and sheet piling, after gathering comments and feedback from various sites.
		
		Was
		• Terms and Definitions
		  ○ Crane Inspection
		• 6.1.3 Crane Supplier
		• 6.1.6 Lifting Cage
		• 6.1.8 Personnel Selection
		• 6.1.9 Crane and Lifting Gears Inspection
		• 6.3.8 Weather Conditions
		• 6.5 Crane Set-Up
		• 6.6.1 Access to Cranes
		• 6.7.3 Critical Lift
		• 6.8.6 Tag Lines, 6.8.7 Shepherd's Hook
		• Appendix 1 Pre - Lift Checklist
		
		Is
		• Terms and Definitions
		  ○ Crane Inspection - updated
		• 6.1.3 Crane Supplier - updated
		• 6.1.6 Lifting Cage - revised with additional info
		  ○ All local legal requirement with regards to use of the lifting cage must be strictly complied with.
		• 6.1.8 Personnel Selection - revised with additional info
		  ○ Alternatively, ANSI/ASSP A10.42-2000 (R2017) Construction And Demolition Operations - Safety Requirements For Rigging Qualifications And Responsibilities; can be used as reference for approval.
		• 6.1.9 Crane and Lifting Gears Inspection - updated
		• 6.3.8 Weather Conditions - revised with additional info
		  ○ If there is a higher or more stringent standard is available from local legislations or professional organization requirements, higher standard should take precedence.
			HAICHUANCHUA

		• 6.5 Crane Set Up - revised with additional info
		  ○ Presents of underground utilities- vaults, tunnels, and trenches which might require additional protection.
		  ○ In the event of timber pads, proper manufactured pads shall be used instead of random timber planks. The pictures below show some examples of proper timber pads.
		• 6.6.1 Access to Cranes - updated
		• 6.7.3 Critical Lift - revised with additional info
		  ○ Micron Project Manager will have the discretion to request such Critical Lift Plan to be reviewed and endorsed by a Professional Engineer engaged by the Contractor.
		• 6.8.6 Tag Lines/Shepherd's Hook - merged and updated
		• 6.8.7 Sheet Piling - added
		• Appendix 1 Pre - Lift Checklist - removed duplicated item
		
		Please refer to changes in MAGENTA.	

2	24 Jan 2025	**ECN Number:** Not workflowed Periodic Document Review (PDR) completed. No changes required.	HAICHUANCHUA

End of Document