EXPRO
هيئة كفاءة الإنفاق والمشروعات الحكومية
Expenditure Efficiency & Projects Authority

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Crane and Lifting Operation Procedure

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IMPORTANT NOTICE

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1.0 PURPOSE

This Procedure establishes the minimum requirements to develop and implement the necessary plans and procedures to ensure the safe and efficient execution of lifting operations.

2.0 SCOPE

The scope of this procedure applies to all Maintenance and operations works performed in Facilities under the Expro Organization throughout the Kingdom of Saudi Arabia.
To include, but not limited to:

- Ensure compliance with Operations specific requirements, and statutory legislation.
- Specify the guidelines for contractors to develop and implement a safe lifting procedure; including required training for personnel involved in the execution of these operations.
- Assist in the elimination of workplace injuries
- Provide a guideline to ensure consistency in the operation and maintenance of cranes, lifting and transportation equipment and rigging gear.
- Ensure the appropriate lifting equipment selection for the lifting procedure being planned.
- Establish the minimum requirements relating to the safe operations of crane variants.

3.0 DEFINITIONS

Definitions	Description
Anti-two Block	A system installed to crane winches that warns and/or prevents two-blocking. Two-blocking is defined as, *"the condition in which the lower load block (or hook assembly) comes in contact with the upper load block (or boom point sheave assembly), seriously interfering with the safe operation of the crane."*
CPR	Competent Person Rigger
Crane	For the purposes of this procedure, the term “Crane” is considered to be any lifting device having capacity over 3 tons.
Crane Chart/ Rated Capacity	A tabular sheet collating all the essential parameters of the lifting operation; it is the primary record that contains, but is not limited to, details of the configuration of the crane(s), capacity deductions to be taken, load weight and center of gravity (C.G.) details, rigging to be used, operating radii, crane capacities, etc.
CRE	Certified Rigging Engineer
Hauling	The process of loading, transferring, relocating and/or moving of equipment, components, vessels, or other materials from one point to another.
Hoist	An appliance intended for raising and lowering a load or people, vertically and without slewing which includes a mast climbing work platform, personnel and materials hoist, scaffolding hoist and serial hoist but does not include a lift or building maintenance equipment
HSE	Health, Safety and Environment
JHA	Job Hazard Analysis
Lift Plan	A collection of documents containing the information necessary to convey the full intent of the planner of the specific operation to others and defining the steps necessary to execute it safely and efficiently. Documents include, but are not limited to, details of the configuration of the crane(s) capacity deductions, load weight and center of gravity details, rigging to be used, operating radius and crane capacities.
Lifting	The process of changing the elevation and/or location of a payload using a lifting device. Lifting operations include not only the actual process of lifting but all necessary pre-lift preparations and post-lift demobilization
Lifting Equipment	Any manual or powered machine used to lift a load; such devices include, but are not limited to, the following: crane, hoists, winch, chain hoist, hydraulic or mechanical jack, levers, pulley system, beam trolley etc.
Lifting Gear/Rigging Gear	Lifting Gear / Rigging Gear is approved equipment used to provide connection between lifting equipment and a load, and includes: chains, slings, shackles, hooks, spreader beams, lifting frames, etc.

Definitions	Description
LMI	Load Moment Indicator
Mobile Crane	A crane capable of moving over a supporting surface without the need for fixed runways and/or rails and relying only on gravity for stability.
OSHA	Occupational Health and Safety Administration
Payload Weight	The weight of the item to be handled, including the weight of attachments, saddles, temporary supports, insulation, content, etc. as applicable
PIC	Person in Charge
Plant	Any machine that is self-propelled and controlled by an operator
PPE	Personal Protective Equipment
RE	Rigging Engineer
Rigging	Work involving the use of mechanical load shifting equipment and associated gear to move, place and/or secure a load including plant, equipment or members of a building or structure and to ensure the stability of those members and for the setting up and dismantling of cranes and hoists
SWL	Safe Working Load (Max load capacity due to configuration)
VOC	Verification of Competency
Weight	Weight is the gravitational force of an object mass, or the heaviness of the object.
WLL	Working Load Limit (Max load designed by manufacturer)
Workbox	A personnel-carrying device, designed to be suspended from a crane, which provides a working area for persons elevated by and working from the box. Also referred to as a Workbasket, Manbox or Manbasket

4.0 REFERENCES

- SASO-ISO-9928-1 Cranes – Crane operating manual Part 1
- SASO-ISO-9928-2 Cranes – Crane operating manual – Part 2
- SASO-ISO-15513 Cranes - Competency requirements for crane drivers (operators), slingers, signalers and assessors
- SASO-ISO-12480-3 Cranes – Safe use – Part 3: Tower cranes
- SASO-GSO-15442 Cranes - Safety requirements for loader cranes
- EOM-KSS-PR-000033, Job Hazard Analysis & Pre-Start Briefing Procedure

5.0 RESPONSIBILITIES

5.1 Facility Manager or Responsible Contractor

- Ensure the resources and arrangements are available for the implementation and management of this procedure.
- Ensure that this procedure is implemented as written.

5.2 HSE Responsible

- Developing and executing health and safety plans in the workplace according to legal guidelines.
- Preparing and enforcing policies to establish a culture of health and safety.
- Evaluating practices, procedures and facilities to assess risk and adherence to Saudi law.

5.3 Certified Competent Person Rigger (CPR)

- Plan, direct and control lifting operations.
- Select suitable certified equipment and rigging hardware.
- Complete the Pre-Lift Safety Checklist **(see Attachment 1 - EOM-KSS-TP-000009 - Rigging Work Operations Checklist)** and conduct rigging in accordance with this procedure and applicable regulations, and job site-specific requirements.
- Identify existing and predictable unsafe/hazards in the surroundings or working conditions and take prompt corrective measures to eliminate the unsafe/hazardous condition

- Ensure that rigging hardware and materials are inspected before use, configured correctly, and properly attached to the lifting equipment
- Ensure the availability of information, procedures, and equipment necessary to move loads without injury to personnel and without damage either to the site or the equipment.

5.4 Crane Operators

- Meet all requirements for the type and class of crane being operated and maintain valid qualification documents.
- Perform and document a thorough inspection before use, including subsequent use after a repair, adjustment or lubrication Determine if the equipment is safe to perform its function and addressing any concerns with the equipment that need to be resolved (and/or repaired, as necessary) with their supervisor prior to performing a lift.
- Perform a final check to ensure all applicable lift criteria are met and determine if crane is safe to perform upon satisfactory completion of the pre-lift checklist **(see Attachment 1 - EOM-KSS-TP-000009 - Rigging Work Operations Checklist)**.
- Secure the crane equipment upon successful completion of the lift and prepare for demobilization and, when necessary, transport.
- Comply with all applicable standards, and regulations including customer restrictions and job site-specific requirements.
- Operate assigned crane equipment within the specifications provided by the manufacturer's operator manuals, load charts, and operation notes.
- Utilize crane information and monitoring systems (on-board computers) when they are installed on the crane.
- Operate the crane equipment without tampering or disabling systems as this is prohibited.
- Ensure crane load certification is in order prior to any lift.

5.5 Person in Charge (PIC)

For every lifting / hauling operation, contractor shall designate the PIC to have overall control on behalf of the Facility conducting the operation to ensure implementation of a safe system of work. The PIC must be available on-site during operations they control. The PIC must have adequate training and experience to carry out these duties competently; a person qualified as a Certified Competent Person Rigger (CPR) would meet the criteria to function as the PIC for "low risk" operations. For medium, heavy, or critical operations the PIC shall be an employee who meets the minimum qualifications for a RE as defined in Section 5.5 of this procedure. The PIC may have other duties but shall not be the Crane Operator for that operation.

The PIC is responsible for:

- Plan and control lifting operations.
- Select suitable lifting equipment and rigging hardware where not specified by a written plan.
- Verify the condition and certification of equipment before use and ensure that adequate inspection and maintenance of the equipment has been performed.
- Ensure that rigging is configured correctly and properly attached to the lifting equipment.
- Identify defects and incidents and ensure that necessary corrective action is taken.
- Coordinate, direct and control lifting and/or hauling operations.
- Actively participate in the preparation of Job Hazard Analysis (JHA) for lifting and transportation activities.
- Ensure assigned personnel are properly trained for their task and aware of their responsibilities; and are complying with all applicable standards, regulations, client requirements and safe practices.
- Stop the operation whenever an unsafe condition is identified or suspected, or if the operation is inconsistent with the plan.

5.6 Certified Rigger Engineer (CRE)

- Review and approve all lifting and abnormal transportation operations which are categorized as “critical risk.”
- Plan for the safe execution of complex rigging operations.
- Identify and perform lifting device feasibility studies to determine the optimum set-up of lift equipment.
- Maximize lifts within capacity of crane equipment readily available in the market to meet the needs of equipment/material placement.
- Evaluate lifting and specialized transport requirements and establish most appropriate solutions.
- Participate in the development of the equipment schedule regarding rigging operations.
- Prepare or vet Job Hazard Analysis and procedures for lifting operations as required.
- Review work interfacing with lifting and activities such as road/culvert protection/reinforcement, soil preparation works and lifting attachment design.
- Provide guidance and assistance in rigging matters to those requiring support.
- Provide technical guidance and support by developing safe work methods and plans for rigging operations and heavy haul operations.
- Prepare rigging and heavy haul plans and calculations, specify rigging materials, lifting and transport equipment.
- Prepare Lift Data sheets for medium, and critical lifts.
- Liaise with Facility management regarding the preparation and Facility management approval of plans for heavy and critical lifts, and heavy hauls.
- Perform the duties of the “Person in Charge (PIC)” for medium and critical lifts, ensuring compliance with the developed safe system of work.
- Monitor general rigging operations, especially medium and critical risk lifts and transports, to ensure that all are performed in accordance with the approved rigging plans and procedures.

The CRE-shall have following minimum qualifications:

- A minimum of two (2) years of rigging engineering related experience.
- Knowledge of Saudi codes and regulations regarding lifting and rigging operations.
- Knowledge of crane types & ability to interpret crane load charts.
- Knowledge of rigging hardware and its safe usage.
- Possess drawing skills to prepare rigging drawings.
- Possess understanding of soil type and soil bearing capacity.
- This position maybe contracted in for specific Medium and high risk lifting operations.

6.0 JOB HAZARD ANALYSIS

Ensure that all identified hazards and associated controls are addressed in the JHA (See EOM-KSS-PR-000033, Job Hazard Analysis & Pre-Start Briefing Procedure)**.** Maintenance and Operations work SHALL NOT be commenced until the above has been completed and signed by the relevant Supervisor in charge.

7.0 GENERAL REQUIREMENTS

7.1 Crane Operators

Facility shall provide evidence of valid certification from an approved and internationally recognized source, ensuring that all crane operators meet minimum job qualifications including specific physical requirements.

Operators must demonstrate the knowledge and practical skills required to safely and proficiently operate the crane(s) and lift equipment to which they are assigned. Persons operating mobile cranes are required to hold the appropriate class of license for the specified crane. Additionally, the following shall apply:

- All personnel involved in crane operations must ensure that personnel are kept clear of loads about to be lifted and that no person is ever located under a suspended load.
- Crane owners and crane operators shall comply with the manufacturer’s specifications and operational restrictions, the crane must be maintained and serviced as per the operator’s manual instructions and certification available where required.
- Crane rotating or other moving parts such as belts; pulleys drums etc. must be guarded where practically possible.

- No person will use or operate any crane unless they have the required certificates of competency and have valid authority to operate issued in accordance with requirements. In general crane operators, will:
    - Be over 21 years of age and certified by 3rd party safety agencies as competent to operate the class of crane in use.
    - Physically fit and physically capable of operating the crane safely.
    - Understand the duties of the Rigger with full understanding of the communication channels and signals used.
    - Adequately trained on the crane they are assigned to operate.
    - Able to judge distances, height and clearances, and not be color-blind
    - Aware of the means of escape and safe use of fire extinguishers
    - Competent to operate the crane by examination and hold a current certificate from an approved accreditation body.

7.2 Riggers

Riggers must be trained and certified competent for the task; in general, they will:

- Be trained, certificated by 3rd party safety agencies and experienced.
- Can readily determine the approximate weight, center of gravity and characteristics of a load.
- Inspect and determine whether a wire rope sling or other piece of lifting equipment is damaged or not fit for purpose.
- Be familiar with the different and correct slinging techniques.
- Know the correct hand signals.
- Be authorized to perform the work.

7.3 Mobile Phone Restrictions

During crane operations, the use of cell phones (or any other type of mobile phone by anyone considered part of the operation (e.g., operator, riggers, etc.) shall not be permitted. Due to the potential for distraction, using the “hands-free” mode is not permitted while operating the crane.

7.4 Testing and Examination

- All Cranes brought to the site will be accompanied by a valid insurance and 3rd party testing certificate.
- In addition to certification. Cranes brought to the site will be load-tested and thoroughly examined before use.
- Crane operators shall check their cranes daily for oil, hydraulic oil, leaks, water etc. (Documented in daily check log)
- Cranes having their configuration changed, dismantled and re-erected will also be tested.
- The crane manufacturer’s manual will be adhered to for on-going maintenance.
- The Operator’s Manual and Load Charts will be inside the crane at all times.
- Crane maintenance records must be available for examination.

NOTE: No part of any crane equipment, which is subject to stresses during its operation, shall be altered, welded or changed in any way without the written approval from the equipment manufacturer.

7.4.1 Minimum Requirements for Maintenance and Inspection

Crane owners shall maintain equipment specific maintenance and inspection files for each piece of lifting and transportation equipment. These files shall include initial inspections, daily inspections, load tests, periodic monthly inspections as a minimum requirement. Maintenance records and any other documentation are to be made available upon request.

Crane owners (or their representatives) / crane operators shall perform a daily inspection of the cranes and transport equipment and record the results on applicable Inspection forms.

Crane owners (or their representatives) / crane operators shall perform periodic (recorded) crane & transport equipment inspections in accordance with applicable manufacturer's specifications and all legislation and standards, irrespective of jurisdictional requirements. In no case shall the period of inspection exceed one year from the last recorded inspection.

7.4.2 Pre-lift Checks

The following questions form the basis for a standard Lifting Operations Checklist **(see Attachment 1 - EOM-KSS-TP-000009 - Rigging Work Operations Checklist)** and shall be used before commencing any lifts:

- Have the personnel responsible been adequately trained?
- Has the weight, Centre of gravity and nature of the article been determined?
- Where is the article to be lifted from?
- Where is the article to be moved to?
- Has the length of slings etc. and the clearance between the load and crane jib been properly considered?
- What is the maximum load that can be lifted by the crane?
- What is the maximum radius that the crane can operate when lifting the load?
- What is the maximum load (including slings/spreader beams etc.) that the crane will be lifting?
- Is there enough space to erect and operate the crane and maintain a safe distance between the counterweight and any fencing, building or other obstructions to lifting operations?
- Are any pedestrian routes in the operating radius?
- Are there any slew limitations on the machine, when under load?
- Has the route and lift location been checked for positioning the crane about any overhead obstructions?
- Are there any overhead power lines or other elevated obstructions that the crane is likely to contact?
- Has the crane site been determined and is it in the best location?

7.4.2.1 Inspections

Lifting gear is any piece of equipment below the hook used to attach the load and includes:

- Chains.
- Slings (wire rope slings, synthetic webbing slings, etc.).
- Shackles.
- Hooks.
- Chain sling adjusters.
- Spreader beams.
- Lifting frames.

All lifting gear must be:

- Designed in accordance with jurisdictional rules, regulations, and recognized international standards.
- Inspected by the certified competent person/rigger before being put to use.
- Stored in a safe manner when not in use, away from chemicals and adverse weather conditions.
- Inspected periodically, inspection records and certification should be maintained, Facilities and entities must develop a color coding system for the periodic inspection process.

7.5 Ground Conditions

When planning lifts, the following shall apply:

- Consideration must be given to the ground conditions.
- Outrigger and track loading should be established before positioning the crane; the competent person shall also consider the added weight when lifting operations take place.

When positioning a crane in live operational areas and on concrete ground, the safe load limits should be identified against the specification of the concrete, foundations etc. of the area involved. For other areas, the density and compaction qualities should be assessed.

7.6 Mobile Crane Outriggers

- Outriggers must be used as specified by the manufacturer of the crane.
- Sound timber packing, steel plates and/or crane load mats shall be provided under crane outrigger pads to distribute the load.
- When multiple layers of packing are used, they should be stacked at right angles. Each layer should be packed tightly together.
- Outriggers must be properly set and locked where locking devices are provided.
- The crane operator must ensure that the pad of each outrigger is positioned correctly before lifting a load.
- Outriggers must be extended on both sides when performing lifting operations.
- Outriggers must be fully extended; any other outrigger configuration will require the preparation/approval of a lift plan.
- Check the condition of the jacks and packing regularly during crane operation.

7.7 Automatic Safe Load Indicators

- **Automatic safe load indicators:** Must be tested and thoroughly examined after erection and/or installation of the crane before use.
- **Anti-Two blocks:** Will be fitted to prevent the head and sheaves blocks coming into contact with one another.

7.8 Load Radius Indicator

Every crane brought to the site shall be fitted with an appropriate load radius indicator.

7.9 Fly Jib

Fly jibs on telescopic cranes shall only be erected or dismantled by a competent person, normally the crane operator and the equipment superintendent or designee.

7.10 Safety and Operational Aids

- All mobile and locomotive cranes with a capacity over three tons are required to have fitted, as a minimum, a working LMI (Load Moment Indicator).
- Safety and operational aids originally fitted by a manufacturer shall be fitted and in full working order. They should not be removed except to upgrade.
- Operations shall not begin unless the required safety devices are in proper working order. If a device stops working properly during operations, the operator shall safely stop operations and operations shall not resume until the device is again working properly. Alternative measures are not permitted to be used.
- Operations shall not begin unless all operational aids are in proper working order, except where the specified temporary alternative measures are implemented and crane manufacturer approved. More protective alternative measures specified by the crane manufacturer, if any, shall be followed.
- If a listed “operational aid” stops working properly during operations, the operator shall safely stop operations until the temporary alternative measures are implemented, or the device is working properly. If a replacement part is no longer available, the use of a crane manufacturer approved substitute device that performs the same type of function is permitted.
- The crane operator shall be familiar with the equipment and its proper operation. If adjustments or repairs are necessary, the operator shall promptly inform the person designated by the employer to receive such information and, where there are successive shifts, to the next operator and record it on a pre-use checklist **(see Attachment 1 - EOM-KSS-TP-000009 - Rigging Work Operations Checklist)**.
- Safety devices and operational aids shall not be used as a substitute for the execution of professional judgment by the operator.

7.11 Crane Operation

- The weight of the load shall be determined from a reliable source (such as the manufacturer provided information), by a reliable calculation method (such as calculating a steel beam from measured dimensions and a known weight per meter), or by other equally reliable means.
- Compliance with crane rated capacity is mandatory. The equipment shall not be operated in excess of its rated capacity.
- The crane operator shall not be required to operate the equipment in a manner that would violate the above.
- The operator shall consider the effect of wind speed on equipment stability and rated capacity.
- The operator shall test the brakes each time a load that is 90 percent or more of the maximum line pull by lifting the load 100mm, and applying the brakes. In duty cycle and repetitive lifts where each lift is 90 percent or more of the maximum line pull, this requirement applies to the first lift but not to successive lifts.
- Neither the load nor the boom shall be lowered below the point where less than three full wraps of rope remain on their respective drums. If hoisting limits are available, they shall be set to reflect this.
- The crane operator shall obey a stop (or emergency stop) signal, regardless of who gives it.
- Booms are not very strong laterally, thus side loads such as those resulting from inertia of the load during movement must be avoided. Crane manufacturers publish guidance on the maximum swing (slew) at which a crane may be operated in a specific configuration. This guidance is not to be exceeded without approval from the crane manufacturer.
- When a local storm warning has been issued, the competent person shall refer to the location and adjust requirements.

Whenever there is a concern as to safety, the crane operator shall have the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

8.0 PLANNING

Facilities should ensure that executing parties develop a rigging plan which defines the general strategy to be adopted to execute load handling activities. As a minimum, the plan should include:

- A list of all critical lifts and critical transportation activities.
- A summary of anticipated contractor or subcontractor participation.
- A list of planned heavy haul equipment and cranes (large and small).
- A list of applicable codes and standards to comply with.
- A summary of anticipated personnel training requirements.
- To plan for safe lifting and handling operations, certain information regarding the item and its safe handling is required from the Vendor (crane supplier or contractor). This information shall be identified and shall be included as a deliverable in the purchase order or subcontract.
- Facilities must ensure that a formal lift plan is prepared for all lifting operations, the required details on the lifting plan varies based on the classification of the lift, higher risk operations should have more stringent requirements. The below table is an example of Lift Operations Risk Categorization (see Table 1).

Lifting Operations Risk Categorization		**Risk Category**		
Criteria		**Low**	**Medium**	**Critical**
Payload Weight	0 t to less than 10 t	*		
	10 t to less than 40 t		*	
	40t and above			*
Chart Capacity	lifts at less than 75% of chart	*		
	75% to less than 90%		*	
	90% and above			*
	if 360° chart not used or short outrigger duties planned		*	
Hoist Line Pull	lifts using less than 75% of available hoist line pull	*		
	75% to less than 90%		*	

	90% and above			*
Tandem Lifts	any 2-crane tandem lift (as a min)		*	
	either crane over 75% of chart			*
	where either crane travels carrying load		*	
	possibility of load transfer taking either crane over 75%			*
	significant possibility of boom or jib side loading			*
	any lift using more than 2 cranes			*
	"flipping" a load over 180° using 2 cranes			*
"Special" Lift Devices	cranes where Super lift tray is required for the lift		*	
	"tugger" lifts		*	
	gin poles / stiffleg & guy derricks			*
	hydraulic gantries			*
	strand jacks or climbing jacks			*
	"alternative" custom or specialized rigs			*
Specialized Rigging	complex rigging arrangements (including 'xmas-treeing")		*	
	custom below-the-hook hardware		*	
Specialized Crane Use	Use of a land-based crane on a barge		*	
	lifts using short outrigger spreads or narrow track center's		*	
	lifts not using 360° charts		*	
	"topping" and "tailing" with a single crane using two hoist drums			*
Specialized Rigging	complex rigging arrangements (including 'xmas-treeing")		*	
	custom below-the-hook hardware		*	
Specialized Crane Use	Use of a land-based crane on a barge		*	
	lifts using short outrigger spreads or narrow track center's		*	
	lifts not using 360° charts		*	
	"topping" and "tailing" with a single crane using two hoist drums			*
Electrical Hazards	lifting over any power line (regardless of clearance)			*
	lifts breaching Safe Limit of Approach			*
	lifts over Motor Control Center's or Switch Gear Buildings			*
	lifts requiring the assistance of a utility company			*
Buildings /Structures Live Plant	lifting over occupied buildings or operating facilities			*
	where live pipe ricks or essential plant are in the fall zone			*
	when set up over critical underground services			*
"Design-Criteria"	any item on the *Engineering Support Required Item List*	**See Note 2**		*

* Mandatory requirement. Higher risk category may be applied on highlighted terms

Note 1: No person shall be allowed, either in whole or in part, under any portion of any suspended load. Personnel assigned to rigging (i.e., attaching and/or detaching rigging hardware to an intended load) are permitted under the lifting/rigging hardware only, and to the extent required to attach or detach the hardware from the intended load prior to or after it has been lifted.

Note 2: Large flimsy loads with little integral strength,; forming larger/heavier lifts by assembly of components where such preassembly was not originally envisaged by the designer; lifts inducing out-of-place lifting loads or stress reversals as a result of lifting from points other than the permanent supports, when engineering assists with design of special handling frames, lift beams and custom structural rigging tackle; where review of permanent structures to withstand temporary loads is required or where temporary structure additions to permanent structures are needed.

Note 3: A lift is categorized per the highest risk category it meets in the table above.

Note 4: any lift may be classified to a higher risk category due to the sensitivity, risk, or cost of the payload being lifted.

Note 5: Any lift whose failure would pose exceptional risk to persons, property, schedule and/or finances, and/or whose methodology is sufficiently unusual as to be outside the skill sets required of the responsible Certified Rigging Engineer is to be defined as being "Super-Critical" and additionally requires review and approval by a "Chief Rigging Engineer."

Note 6: "t" is a metric ton (Mt) or TE of 1000 KG

Table 1: Lifting Operations Risk Categorization

8.1 Lift Requirements by Risk Category

8.1.1 Low Risk Lifts

Planned and executed prior to lifting, the characteristics of every “low” risk lift should be entered into a “low-risk” Crane Lift Summary Sheet to be maintained by the responsible supervisor **(see Attachment 2 - EOM-KSS-TP-000010 - “Low Risk” Crane Lift Summary Template).**

PIC to be a CPR that the Supervisor determines is qualified to be in charge of “low-risk” lifts by virtue of experience and technical knowledge.

8.1.2 Medium Risks

Lift plan requirements are a Lift Data Sheet supplemented by crane chart extracts and other information as required to adequately explain the intent (e.g., rigging hook-up sketches). Contractors may use their own formats for Lift Data Sheets upon approval from the PRE.

8.1.3 Critical Risk Lifts

A full lift plan, including lift plan drawings and procedures (including special instructions for complex lifts), crane charts extracts and similar supporting data with completed Lift Data sheets is required.

Where a Critical Lift Plan drawing includes the required content of a Critical Lift Data sheet in similar format, the drawing effectively includes the Lift Data Sheet. If completion of a Lift Data Sheet would serve no other useful function, then it is an unnecessary duplication and policy shall allow the drawing to substitute. Critical Plans shall be prepared by a RE-or a qualified representative. Technical review of all rigging plans and “approval to proceed” will be performed by an approved, CRE

8.1.4 Super Critical Risk Lifts.

Any lifting operation whose failure would pose exceptional risk to persons, property, Reputation and/or whose methodology is sufficiently unusual as to be outside the skill sets required of the CRE is defined as being “Super-Critical”. Handled as a “critical” lift, but additionally requires review and approval by the Senior Rigging Manager.

9.0 SPECIAL OPERATING CONSIDERATIONS

Depending upon the scope of work, location of the operation, and other task-specific elements, the following additional requirements shall be considered:

9.1 Effects of Wind Speeds on Crane Operations.

- When wind velocities equal or above 32 km/h (20 mph), all lifting operations must be suspended.
- Wind forces are greater at height by as much as 35% or more. All lifts above ground level must account for wind forces (e.g., side loads, down drafts, etc.), as applied to the load and the boom.

The following table lists speed in the major units, relative to Beaufort Wind Scale Numbers (Table 2), the international accepted reference for wind force.

Beaufort Numbers	Description	Knots	M/Sec	KM/H	Miles/H
0	Calm	0-1	0-0.51	0-1.84	0-1.15

Beaufort Numbers	Description	Knots	M/Sec	KM/H	Miles/H
1	Light Air	1-3	0.51 - 1.53	1.84 - 5.52	1.15 - 3.45
2	Light Breeze	4 -6	2.04 - 3.07	7.36 - 11.04	4.6 - 6.9
3	Gentle Breeze	7 - 10	3.58 - 5.11	12.88 - 18.4	8.15 - 11.5
4	Moderate Breeze	11 -16	5.62 - 8.18	20.24 - 29.44	12.65 - 18.4
5	Fresh Breeze	17 - 21	8.69 - 10.73	31.38 - 38.64	19.55 -24.15
6	Strong Breeze	22 - 27	11.24 - 13.80	40.48 - 49.68	25.3 - 31.05
7	Near Gale	28 - 33	14.31 - 16.87	51.52 - 60.72	32.2 - 37.95
8	Gale	34 - 40	17.38 - 20.44	62.56 - 73.6	39.1 - 46
9	Strong Gale	41 - 47	20.96 - 24.02	75.44 - 86.48	47.15 -54.05
10	Storm	48 - 55	24.53 - 28.11	88.32 - 101.2	55.2 - 63.25
11	Violent Storm	56 - 63	28.62 - 32.20	103.04.-115.92	64.4 - 72.45
12	Hurricane	64+	32.71+	117.76+	73.6

Table 2: Beaufort Wind Scale

9.2 Overhead Power Lines

There is an area surrounding every power line that is referred to as the absolute limit of approach. It is strictly forbidden to move any crane boom or load line into this area unless the line has been de-energized or insulated. **NO EXCEPTIONS**

9.2.1 Encroachment Prevention Precautions

Any lifting operations that are within the below distances, power lines require an encroachment permit issued and approved by the Saudi Electric Co. In the event a safe boundary needs to be established, the following encroachment measures must be followed:

- Conduct a planning meeting with the crane operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution. When tag lines are used, they must be non-conductive and made of 16mm Dry Natural Fiber Rope.
- Erect and maintain an elevated warning line, barricade, or line of signs equipped with flags or similar high-visibility markings at the minimum clearance distance. If the operator cannot see the elevated warning line, a dedicated spotter must be used to signal the operator that the crane is passing the marked line.
- Additionally, you must use at least one of the following precautions: A proximity alarm, a dedicated spotter, warning device, range limiter, or insulating link.

The absolute limit of approach varies (Table 3).

Line Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25
Over 500 to 750	35
Over 750 to 1000	45
Over 1000	(As established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Table 3: Limited Approach Boundaries

NOTE: Once voltages have been identified, height restrictors (goal posts) must be erected at both sides of the overhead lines to indicate the safe working distance.

9.3 Loader Cranes (HIAB)

Loader cranes may only be used for loading and unloading of vehicles, any deviations must be pre-authorized by the Facility management and assessed by a competent person and under the following guidelines:

- The driver / operator holds a valid and in-date Saudi Government driving license, and is trained to operate the specific HIAB by examination, holding a current approved certificate / license from an approved and internationally recognized source.
- The safe working load (SWL) of the HIAB is clearly displayed
- The HIAB has a 3rd party inspection certificate.
- All other requirements for lifting operation equipment and mobile cranes are met.

HIABs used on public roads for lifting operations shall comply with Saudi Arabian Ministry of Transport Standards for Road Safety Features.
Refer to: SASO-GSO-15442 Cranes - Safety requirements for loader cranes for further information.

9.4 Working over Water

When personnel lifts are conducted over water, personnel flotation devices must be used. Personal fall protection devices with quick release features shall be used, attached when personnel are lifted over land and detached while personnel are over water.

A safety rescue boat with appropriate rescue personnel shall be present and available when personnel are lifted over water. Refer to EOM-KSS-PR-000013 Work Over or Near Water Procedure.

10.0 SUSPENDED PERSONNEL PLATFORM

This section is a summary of the requirements for the use of suspended personnel platforms, the equipment requirements, and operating procedures for the safe hoisting of personnel in platforms suspended on load lines from cranes or derricks. Please refer to: EOM-KSS-PR-000015 Suspended Personnel Platform Procedure for further details.
All suspended personnel platform operations shall comply with the requirements specified by local Legislation and Codes and all suspended personnel platforms shall meet the design, inspection and testing requirements from the manufacturer.

For the purpose of this procedure, a suspended personnel platform also referred to synonymously as a man-basket, shall meet the following criteria:

- Prior to using any suspended personnel platform, work will have an acceptable Lift Procedure. The procedure shall include, but not be limited to, employee training, pre-lift meetings, trial lifts, and platform inspection.
- A visual inspection, checking for the condition of the basket and lifting bridal (signs of rust, corrosion, damage, and cable condition) will be performed prior to use.
- Personnel platforms (baskets) provided shall be designed, certified and approved for a SWL. They shall have permanent markings indicating SWL and current certification.
- The executing party shall thoroughly inspect the crane/derrick and ensure the following:
  - An operational anti two block device and locking devices on the hook;
  - Free fall capacity, if present, is locked out or disabled;
  - The area under the lift is isolated by barrier tape and signs;
  - A positive means of communication between the crane/derrick operator and employees in the suspended personnel platform is available.
  - Employees in the platform shall wear full body harness attached to a designated tested anchor points.

10.1 Suspended Personnel Platform Risk Assessment

Hoisting employees in a man-basket is prohibited except when the use of conventional means of reaching the work-site, such as personal hoist, ladder, stairway, mobile elevated work platform, or scaffold, would be more hazardous or would not be possible because of structural design or work-site conditions.

The originator of the Personnel Lift Plan must determine if an alternative means of reaching the worksite location is available.

The decision to use a personnel workbox over other conventional means must be reviewed and approved by the following individuals prior to first use of the workbox:

- Facility Manager.
- HSE Responsible.
- Crane Engineer.

The Hazard Identification and Control tools shall be used to evaluate and control risks associated with utilizing a workbox to perform maintenance work.

11.0 SAFETY SIGNS AND MARKINGS

All warning signs shall be posted in Arabic and English. Boom length, size and safe working load capacities at the appropriate radius and recommended operating conditions shall be identified on an instructions plaque which shall be permanently affixed to the cab of the crane in a location readily visible to the operator while seated at the control station.

A sign warning of the danger of overhead power lines shall be mounted in each crane. Operator instruction labels/plates mounted on the crane shall have an equivalent plate in the operator's first language.

All exclusion zones should be established by way of a physical barrier, nominated personnel to control the area or by signage and flagging. Exclusion zones shall be identified prior to the commencement of the lift and maintained throughout the lift. Once the heavy lift is positioned and is undergoing consolidation the exclusion zone will be the immediate area of the lift crane and all other work fronts previously affected can then re-open.

During lifting or lowering of the associated rigging gear all traffic, pedestrian and vehicular shall be diverted from the immediate area.
Refer to EOM-KSS-PR-000006 Barricades and signs procedure.

11.1 Road Closures

Road closure to accommodate lifting operations must be coordinated with the governing authorities and applicable third parties including emergency services must be advised in advance of the road closure.

12.0 TRAINING

License, training & Verification of Competency VOC process requirements shall adhere to the regulatory requirements, or applicable approved local standard, pertaining to crane operator competency/certification requirements.

Subcontractor should make available on an ongoing basis refresher courses to maintain the competencies originally achieved and verified. Evidence of refresher training records must be made available for Contractor review.

Documentation of training, copies of individual certifications, and documentation regarding verification of competency shall be kept onsite by the employer and made available to Contractor and Company upon request.

13.0 ATTACHMENTS

1. EOM-KSS-TP-000009 - Rigging Work Operations Checklist
2. EOM-KSS-TP-000010 - “Low Risk” Crane Lift Summary Template

Attachment 1 - EOM-KSS-TP-000009 - Rigging Work Operations Checklist

RIGGING WORK OPERATIONS

RIGGING HARDWARE/SPECIALTY RIGGING PRE-LIFT CHECKLIST — **Will rigging be used today? Yes/No**

RIGGING INSPECTION CHECK	Yes	N/A
☐ Rigging Hardware will be inspected before use?		
☐ Rigging Hardware Quarterly Inspected:		
First Quarter - Red		
Second Quarter - Green		
Third Quarter - Blue		
Fourth Quarter - Yellow		
Foreman/General Foreman VERIFIED!		

ROUNDSLING & SYNTHETIC SLINGS	Yes	N/A
☐ Does the slings have identification tag?		
☐ Is the rated for the load that is being picked?		
☐ Does the Rigger understand the **D/d Ratio**?		
☐ Inspect for tears, cuts, holes, excessive wear?		
☐ Is sling discolored? Ultraviolet/Sunlight damage?		
☐ Sling soiled and/or sour/musty smell?		
☐ Is sling protected from sharp objects or edges?		
☐ Will sling be constantly exposed to weather?		
If yes, explain why:		

WIRE ROPE SLINGS (All used today)	Yes	N/A
☐ Does the slings have identification tag?		
☐ Is diameter of item to lift > the diameter of rope?		
☐ Does the Rigger understand the **D/d Ratio**?		
☐ No more than 3 broken wires in 1 strand/1 lay?		
☐ No more than 6 random broken wires in 1 lay?		
☐ Checked for severe kinks, abrasion or scrapes?		
☐ Is Rope over stretched, deformed or corroded?		
☐ Instructed all users that there shall be no more than 2 eyes of sling in a single hook?		
Foreman/General Foreman VERIFIED!		

WIRE ROPE CLIPS	Yes	N/A
☐ U-bolt clips did not "saddle a dead horse"?		
☐ Is the correct number of clips being used?		
☐ Have the clip bolts been torque with a torque wrench to the proper torque value?		
☐ Have the properly torque clip bolts been clearly marked (orange paint) and identified as verified?		
Foreman/General Foreman VERIFIED!		

"CHAINFALLS AND COME-A-LONGS"	Yes	N/A
☐ Is it clearly marked with manufacturer name, model, serial number, "Safe Working Load Limit"?		
☐ Verified it has an annual inspection?		
☐ Performed the daily "before use inspection?		
☐ Will the chainfall be used to "pull a load"?		
☐ Will the come-a-long be used to lift personnel?		
☐ No more than one person will operate the chainfall or come-a-long at any time?		
☐ Will the area beneath the chainfall/come-a-long be barricaded to prevent people from walking below a suspended load?		
☐ The chainfall or come-a-long will be attend at all times? Attended means access no farther than 26' horizontal!		
☐ The chainfall or come-a-long will be removed and stored properly at end of shift?		

If No, How long will it remain in service/place?

NOTE: IF THE CHAINFALL/COME-A-LONG IS LEFT IN PLACE UNATTENDED THEN A BARRICADE MUST BE ERECTED TO PREVENT PERSONNEL FROM ENTERING THE AREA BENEATH THE LOAD.

Foreman/General Foreman VERIFIED!

Specific to Round slings:	Yes	N/A
☐ Any tears, cuts, wear on outer jacket?		
☐ Any exposed central yarns?		
☐ Does sling have an "over load cord"? Exposed?		
☐ If sling has fiber optics test, does light shine?		
☐ Was the internal core inspected?		
Foreman/Supervisor VERIFIED!		

SHACKLES	Yes	N/A
☐ Clear raised letter markings/rated capacity on?		
☐ The right type of shackle being used for the job?		
☐ Shackle properly being pulled?		
☐ Inspect shackles for bent, gouges & deep cuts?		
Foreman/General Foreman VERIFIED!		

OTHER SPECIAL RIGGING (List)	Yes	N/A

CRANE LIFT PRE-LIFT CHECKLIST — **Will a crane be used today? Yes/No**

Pre-Lift Check	Yes	N/A
☐ Crane adequate for JOB?		
☐ No lift >90% chart capacity?		
☐ Payload weight < 20 ton?		
☐ Emergency response needed?		
☐ Medium Lift Plan?		
☐ Heavy/Critical Lift Plan?		
☐ Lift Plan signed/approvals?		
☐ Pre-Lift Checklist complete?		

Rigging Check	Yes	N/A
☐ Rigging hardware adequate?		
☐ Rigging properly assembled?		
☐ Softeners used where needed?		
☐ Rigging properly tagged?		
☐ Sling angles > 45°		
☐ Lift point inspect/adequate?		
☐ D/d Ratio adequate?		
☐ Tag lines length OK to control?		

Crane Set-up Check	Yes	N/A
☐ Equipment Daily Checklist?		
☐ Crane on adequate ground?		
☐ Crane set-up level?		
☐ Adequate parts of line?		
☐ Proper Matting set-up?		
☐ Obstructions/Clearance?		
☐ Weather Conditions Good?		
☐ Lift area barricaded?		

Personnel Check	Yes	N/A
☐ Person-in-Charge identified?		
☐ Signal Person(s)) identified?		
☐ Communication (hand/radio)?		
☐ Operator certified/qualified?		
☐ Non-essential persons out?		
☐ Rigger roles identified?		
☐ Other craft roles identified?		
☐ Rigging Engineer present?		

Attachment 2 - EOM-KSS-TP-000010 - “Low Risk” Crane Lift Summary Template

"LOW RISK" CRANE LIFT SUMMARY

CRANE LIFT CARD (planned lifts for the day)

Crane Operator Log-In the Qualified Riggers :	Qualified Rigger Name / Qualification Number:	Qualified Rigger Name / Qualification Number:

Payload Description/Crane Location	Weights			Radius	√	Crane Chart Capacity	Chart %	Rigging Inspected (Yes/No)	Approved
	Payload	Rigging	Deductions						

Operator to keep STARRT in the cab of the crane. Payload items add during the day must be added to the list above prior to picking up the payload.

I/WE ACCEPT RESPONSIBILITY FOR MY SAFE BEHAVIOR AND ENVIRONMENTAL ISSUES. I WILL PROMPTLY REPORT ALL INCIDENTS TO MY SUPERVISOR AND SAFETY REPRESENTATIVE.

RIGGING PERSONNEL PRINT/SIGN		RIGGING PERSONNEL PRINT/SIGN	

Signature: _____ Person-in-Charge

Signature: _____ Crane Operator(s)

Signature: _____ Supervisor/Superintendent

Did we leave the work area clean and organized, and all equipment turned off? **Yes** ☐ **N/A** ☐

For Safety/Mgmt. Use: