



Craning and Rigging Standard

Document Number: MSS0012A	Standard – Administrative	Applies To: Maintenance Support Services - Cranes
Revision Date: 2016/09/28 Revision: 1 Review Cycle: 3	Document Owner (Title): Manager, Cranes	

Summary of Changes

Rev No.	Section Changed	Revision Made
1		Changed Business Units. Transferred to New Template.

Scope

This standard applies to all mobile cranes, truck mounted cranes and boom trucks with a capacity 2000 kg or more, which work for Suncor, or any of Suncor's contractors or subcontractors. This standard applies to lifting devices, including cranes and hoists, with a rated load capacity of 2000 kg or more. (Overhead cranes and hoist shall be covered under separate standards).

Purpose

To ensure that craning and rigging activities involve a systematic identification of associated loss exposures and remedial actions are established to control the risk to people, equipment, materials, process and the environment.

To define the guidelines for proper and safe performance of craning and rigging activities consistent with legislation, codes, best practices, procedures and work practices best suiting Suncor Energy Inc., Oil Sands directed lease operations.

Compliance

Suncor Base Plant

Roles and Responsibilities

The following individuals and groups have the following roles and responsibilities:

Document Owner

- Ensures this document is reviewed according to the required revision cycle.
- Ensures the document is updated to accommodate changes to Suncor, provincial, and federal regulation.
- Ensures the document is updated to mitigate risks found as the result of an incident.

Document Approver

- Ensures this standard is necessary and that it aligns with management and company direction.

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Approved By: Christina Ellerbeck, Director, Maintenance Support Services

References

- CAN/CSA-Z150.98
- ASME B 30.20-2006 “Below the Hook Lifting Devices”
- [LMP0018A](#) – Refusal To Work On Grounds Of Imminent Danger
- [MSS0003A](#) – Use of Portable Frequency Communication Devices
- [RGM10001](#) – Oil Sands and In Situ Contractor Safety Regional General Manual
- [LMS0042A](#) – Safety Requirements for Suncor Rentals Standard

Standard**1. The Lift Planning Process Requirements**

Responsibility	Item	Description
The Director, Materials Management, Planning and Control	1.1	Ensures the Crane Contractor will meet the process set out in Oil Sands and In Situ Contractor Safety Regional General Manual RGM10001 .
The Director, Materials Management, Planning and Control	1.2	Ensures the Crane Supply Company will meet the specifications and conditions set out in Safety Requirements for Suncor Rentals or Contractor Supplied Equipment, - LMS0042A . (Reference: Occupational Health and Safety Act / Code). Note: Only crane companies that have been pre-qualified by Suncor Energy Inc., Oil Sands are permitted to perform work on the Suncor site. This includes all work directly contracted or indirectly through contractor/sub-contractor agreements.
Senior Management of the Business Units	1.3	Ensures the crane end user is aware of the relationship between the load, the rigging and crane risks as it relates to the specific job site and the individual craning and rigging responsibilities.
Senior Management of the Business Units	1.4	Ensures stability of ground area is communicated to the crane end user. (Reference: Occupational Health and Safety Act / Code).
Senior Management of the Business Units	1.5	Ensures the crane end user is aware of their responsibility for using only certified crane equipment and qualified personnel capable of completing the job in a safe and efficient manner, in accordance with all Suncor standards, procedures, work practices, rules and applicable legislation. (See Appendix I-A to I-G).
Senior Management of the Business Units	1.6	Ensures the crane operator, site supervisor/lift coordinator, lift engineer/rigging specialist, rigger and signal person will meet their role criteria, as defined in the Construction Owners Association of Alberta (COAA) Best Practice.

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Responsibility	Item	Description
Senior Management of the Business Units	1.7	Ensures only certified personnel baskets will be allowed to perform work in a suspended hoisting operation at Suncor Energy Inc., Oil Sands. (See Appendix II-B - Acceptable Basket Applications).
Senior Management of the Business Units	1.8	Ensures all spreader bars and other lifting devices are built and certified according to the ASME Standard B30.20-2006, "Below the Hook Lifting Devices.

2. Lift Classification

Note: A competent professional with involvement or input by Business Area owner must establish the classification of a lift. Although the classification is often expressed as a percentage of the capacity of the crane, it can also apply to lifts made in a hazardous location, where crane configuration is non-standard, or when Plant Assets or load is deemed critical, expensive or irreplaceable.

Responsibility	Item	Description
Senior Management of the Business Units	2.1	<p>Ensures a lift evaluation and classification process for every lift or series of similar lifts, of each machine, at each location will be established. Third party lift studies are subject to review by qualified Suncor engineering personnel or independent third party engineers contracted by Suncor Energy Inc., Oil Sands.</p> <ul style="list-style-type: none"> • Critical Lifts- COAA Category Red will require a documented detailed, in depth hazard assessment accompanied by a sanctioned engineering lift study and, where applicable, authorization from the business area management. • Serious Lifts- COAA Category Yellow will normally require authorization from the business area management, a less rigorous hazard review (e.g.: the checklist approach), and may require an engineering lift study confirming degree of lift. • Standard Lifts- COAA Category Green will require the standard appraisal of potential loss exposures associated with normal work i.e. (FLRA, START, JSA, and JHA).
	2.2	<p>Ensures a critical lift team, under the direction the Lift Coordinator will be established to evaluate critical lift hoisting operations, with continuing assistance from a crane expert, and a Province of Alberta Certified Professional Engineer, who has been properly trained in lift studies. (Reference: Specifications and Certifications OH&S Code - Part 3, Section 12, Cranes, Hoists and Lifting OH&S Code – Part 6 and Rigging OH&S Code – Part 21).</p> <p>Note: The Lift Coordinator will report to Site or Area Maintenance Supervisor.</p>

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Responsibility	Item	Description
	2.3	Critical Lift Classification- COAA Category Red Any lift that meets any of the conditions listed below will be classified as a Critical Lift. The personnel involved in the lift will then apply the appropriate controls to ensure the safe and effective execution of the lift (see following sections for recommended controls). Critical lifts may not be engineered greater than 95% of manufactures specifications of any lifting device.
	2.4	Electrical: <ul style="list-style-type: none"> Refer to Appendix V - Operating Near Electrical Power Lines and Appendix VI – Electrical Distribution Department Standards, when any load is to be lifted within the approach limits electrical power line while taking deflection and induction potential of any lift into consideration.
	2.5	Buildings / Structures / Processes: <ul style="list-style-type: none"> Any lift in a confined space or restricted area where the load or any part of a structure will come within 24 inches (600 mm) of the crane boom and has the potential of getting closer. Any lift that may present a real or significant risk to existing structures / operational processes. Any lift where the load has a weight greater than 50 tons being lifted in an area where there are buildings, structures or processes. Any lift over one of a kind process equipment that may present a real or significant hazard or risk to safe continuous operation of that process equipment. Any lift deemed by Area Management or the lift coordinator, or the lift engineer to be categorized as a critical lift.
	2.6	Single Crane Lifts: <ul style="list-style-type: none"> Any load that will represent more than 85% of the manufacturer's rating chart at the working radius for a crane.
	2.7	Tandem Lifts (Multi-Crane Lifts): <ul style="list-style-type: none"> Any tailing crane operation where the weight of the load is greater than 25 tons or any lift involving two or more cranes lifting the <u>same</u> load simultaneously, where the load on any one crane may exceed more than 75% of that crane's lifting capacity as measured on the lifting chart.

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Responsibility	Item	Description
	2.8	<p>Any special lifting considerations shall be subject to approval by qualified Suncor or independent third party engineering personal. These will include but not limited to:</p> <ul style="list-style-type: none"> • Any load where special lifting or rigging equipment such as: gin-poles, derricks, independent hoists and tuggers, jack and roll operations, lift and lock, strand jacking, or non-standard crane configurations are used. • Any crane lift where the actual weight of the load is unknown and has the potential to exceed crane load limits as defined in this standard. • Any crane lift where the crane is setup over any underground installations requiring additional protections such as over manholes, catch basins, sewers, sinkholes, new excavations, underground gas lines, firewater lines or other known surface or sub-surface interferences. • Cold weather lifts - see Appendix VII or as per specific crane manufacturer's recommendations. • Any crane lift where the combination of weather conditions and air pollution may increase the chance of induction from surrounding high voltage lines.
	2.9	<p>Serious Lift Classification- COAA Category Yellow:</p> <ul style="list-style-type: none"> • When the lift, as defined by the above criteria, is not CRITICAL. • Any lift deemed by Area Management, the lift coordinator or the lift engineer to be categorized as a serious lift due to lift over or in close proximity to equipment deemed critical to production or areas containing process streams that would present a serious health and safety risk in the event of a lift related contact. • Any lift between 75% and 85% of the manufacturer's crane capacity rating chart. • Any non critical tailing crane operation. • A "pick and carry" operation other than routine material handling with rough terrain cranes and crawlers. • A suspended personnel-carrying basket is utilized (as per OH&S Code - Part 23, section 350(2) and Part 9, Section 141(5) referred to as suspended man baskets and CSA – Z150 - 98). (See Appendix II-B - Acceptable Basket Applications). • Any crane lifts where the load or any part of the crane could come within the approach limits of power lines or transformers. See appendix V- Operating near Electrical Power Lines and Appendix VI – Electrical Distribution Department Standards.
	2.10	<p>Standard Lift Classification- COAA Category Green</p> <ul style="list-style-type: none"> • All lifts that are not classified as CRITICAL or SERIOUS as defined above will be classified as STANDARD.

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3. The Lift Plan

Note: Senior Management of the business units shall ensure basic elements will be addressed in each of the three classifications of lift plans

Item	Description
3.1	<p>The following will be considered, depending on the Lift Plan classification:</p> <ul style="list-style-type: none"> • Copies of Lift Plans and all relevant authorizations will be posted with the Safe Work Permit. • Lift and Hazard Assessment Processes. • Lift Planning Processes – knowing the load, verifying the load weight, confirming the supporting surface stability, the machine deck level, any crane travel, daily environmental conditions, types of rigging required, dealing with unnecessary personnel, conducting a dry run. • Consideration of induction potential of near-by overhead power lines and procedure for proper grounding. • Classifications of Lifts – terminology, standards, controls (Standard, Serious, and Critical). • Criteria for Engineered Lifts versus Non-Engineered Lifts. • Crane lift capability, percentage of capacity and selection matched to load. • Operator skills and competencies selection matched to lift requirements. • Supervision of lifts (responsibilities for ensuring compliance to lift requirements and plans). • Permits. • Meetings of all types – planning meetings, pre-lift meetings, hazard assessment meetings, etc. • Communications – pre-lift check list, during the lift, post-lift, signaling, etc. • Emergency planning and procedures – no lift criteria, lift veto, abort pre-planning, lift abort, crane failure quarantine area, procedures, crane shutdown conditions (securing the machine in high winds). • Incident response. • Lift Procedures – standardized checklist review process, depth dependant on lift criteria and classification. • Post Lift reviews will be completed.

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Responsibility	Step	Action	Initial/Date
	3.2	Critical Lift Plans	
		<ul style="list-style-type: none"> • ALL Critical Lifts must include Engineered Lift Plan documentation to be determined by the engineer responsible and should include, scale drawings showing configurations and clearances. The Engineered Lift Plan MUST be signed and approved by a qualified lift engineer and lift coordinator who will determine the measures and control necessary to ensure the safe completion of the lift. The lift plan shall be subject to review by a qualified Suncor or independent third party engineer. • In CRITICAL LIFT situations, area Manager or Site Supervisor and the contractor will jointly approve a written Engineered Lift Plan that must become part of the Contract documents. • A CRITICAL LIFT AUTHORIZATION FORM, (see Appendix III) will be utilized for hoisting operations within the Critical classifications. 	
	3.3	Serious Lift Plans	
		<ul style="list-style-type: none"> • Typically Lift Plans classified as "Serious" will be controlled by completing the SERIOUS LIFT CALCULATION AND APPROVAL FORM, (Appendix IV) and will be utilized for hoisting operations within the Serious Lift classification. The information recorded will include weight, working radius, crane type, and percentage of chart, rigging components, their capacities and the signatures of those involved in the Serious Lift classification review. • Any lift requiring personnel hoisting must address the requirements identified in the Personnel Lifting section, Appendix II of this standard and include the completion of the Personnel Lifting Check Sheet, (Appendix II-A) will be utilized for hoisting of personnel. 	
	3.4	Standard Lift Plans:	
		<ul style="list-style-type: none"> • Documentation of a Standard Lift Plan is typically done through completion of a JSA or JHA and FLRA, or START. Hazard assessment documentation shall be attached to the Safe Work Permit. 	

4. Incident Reporting

Note: In general, ALL crane incidents are to be reported and investigated to determine the root cause of the incident. The following lists, which are not all inclusive of incidents **that must be reported**, are:

Item	Description
4.1	Personal injuries.
4.2	Operating a crane outside of its manufactured specifications.
4.3	Shock/impact loading or induced voltage.

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Responsibility	Step	Action	Initial/Date
	4.4	Boom contact.	
	4.5	Any repairs or modifications made to a crane that have not been approved by a professional engineer or in some instances the manufacturer.	
	4.6	Observed changes or modifications that cannot be substantiated with proper documentation.	
	4.7	Mechanical and structural equipment damage.	
	4.8	Rigging damage.	
	4.9	Load shifting or dropping.	
	4.10	Engineered lifts that do not work as planned.	
	4.11	Critical lifts performed without completion of the "Critical Lift Calculation and Approval Form" (Appendix III).	
	4.12	Serious lifts performed without completion of the "Serious Lift Calculation and Approval Form" (Appendix IV).	
	4.13	Personnel hoisting performed without completion of the "Personnel Lifting Check Sheet" (Appendix II A).	
	4.14	Near misses.	
	4.15	Environmental incidents.	
	4.16	Equipment upset (crane tipping over).	
	4.17	Operation without outriggers - except when using the on rubber chart.	
	4.18	Known operation outside of load charts.	
	4.19	Encroachment on power lines.	
	4.20	Radio infringements – any interrupted radio communication during the lift.	
	4.21	Lifting Overhead of unprotected personnel.	

End of Standard

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Appendix I – A**FACILITY/SITE OWNER****Definition:**

1. Person in legal possession of the work site or the person with an ownership interest in the work-site, who requests that the work be done. *Reference OH&S Act 1(i.01).*
2. The facility/site owner is specifically responsible for, but not limited to:
 - a. Clearly define requirements, expectations, and specifications in contract documents.
 - b. Confirm crane owner and end users have been qualified to work on the site.
 - c. Require and confirm that third parties providing cranes and/or operators are in compliance with applicable laws and regulations, including facility owner's standards.
 - d. The assignment of a designated lift coordinator for all critical lifts and serious lifts.
 - e. Require and confirm that key personnel (lift engineer, crane operator, rigger, lift coordinator and site supervisor) know and understand their roles and responsibilities including facility owner's standards and carry them out. Verification of experience and qualifications of personnel participating shall be performed on critical lifts.
 - f. Ensure that a documented risk assessment is performed and identified hazards are mitigated or controlled prior to the lift.
 - g. Consult with crane owner/end user to determine if any site preparation is required.
 - h. Determine the level of supervision to be supplied by the crane owner/end user.
 - i. Confirm all lifts have been planned and appropriately assessed, including emergency action plans.
 - j. Confirm all permits and authorizations for crane activities are issued as required

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Appendix I – B**CRANE OWNER /SUPPLIER****Definition:**

1. The company who owns the physical asset.
2. The crane owner/supplier is specifically responsible for, but not limited to:
 - a. Providing equipment capable of completing the job in a safe and efficient manner, in accordance with all applicable legislation.
 - b. Ensuring that all personnel involved in maintaining, repairing, transporting, assembling and operating the equipment are suitably trained, experienced and competent to handle their specific jobs in a safe and efficient manner and in compliance with Alberta Occupational Health and Safety Regulations and Code.
 - c. Ensuring that a thorough crane maintenance and inspection program is established and maintained according to manufacturer's recommendations and specifications.
 - d. Maintaining for examination the most recent inspection and/or certification record for each crane. Certification to include both mechanical and hoisting components of carrier and crane as per CAN/CSA-Z150.98
 - e. Certification to include both mechanical and hoisting components of carrier and crane as per CAN/CSA-Z150.98 Safety Code on Mobile Cranes and in compliance with Alberta Occupational Health and Safety standards and applicable ANSI /ASME Standards.
 - f. Providing representation to participate in the appropriate hazard assessment prior to conducting the lift.
 - g. Ensure that all spreader bars and other lifting devices are built and certified in accordance with the standards laid out in ASME B 30.20-2006, "Below the Hook Lifting Devices".

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Appendix I – C

CRANE END USER

Definition:

Has “Operational Control” of the crane. This can also be defined as the organization paying for the crane service (operator and crane).

The crane end user may be the owner of the machine, the renter of the machine, or the person or group under whose direction the crane is working. This could be a contractor or the owner of the site where the work is being performed.

The crane end user (includes all management and supervisory personnel employed by the end user) is responsible for the identification and assignment of specific responsibilities to the operating crews, as well as a safety program that educates all personnel.

Participate in the appropriate hazard assessment prior to conducting the lift.

The crane end user must be aware of the load, rigging and crane requirements of every job, and ensure equipment and personnel provided are capable of completing the job in a safe and efficient manner, in accordance with all applicable legislation.

The crane end user is specifically responsible for, but is not limited to:

- a. Ensure that the crane operator's refusal to make a lift for safety reasons is without fear of reprisal.(LMP0018-A Refusal To Work On Grounds Of Imminent Danger)
- b. Assign appropriately sized crane equipment to do the job.
- c. Ensuring the operator is qualified, well trained, experienced, competent, and capable of performing the required work to operate the particular crane and attachments assigned to a specific job.
- d. Request and verify crane operator work experience and competency by reviewing the crane operator's logbook or Apprenticeship Blue Book, if available.
- e. Ensuring the operator fully understands the load chart and is capable of determining the crane's net capacity for all permissible load configurations by requiring completion of Serious Lift Calculation Forms.
- f. Ensuring that the client and site supervisors are aware of their responsibilities, in particular what work must be done to prepare the site for the crane operation.
- g. Ensure crane operators are kept thoroughly oriented to all pertinent operating conditions and hazards including the crane and rigging configurations.
- h. Provide support system to the operator for consultation regarding safety issues prior to and during the lift.
- i. Inform crane operator of known hazards or requirements, e.g., high voltage power lines, induction potential or underground cavities.
- j. Ensuring that a suitable, safe crane and equipment (rigging, shackles, spreader bar etc.) is utilized for the job.
- k. Ensuring that all personnel involved in providing the service are trained, experienced and competent to handle their specific jobs in a safe and efficient manner.
- l. Ensuring that safety features of the equipment are not bypassed, tampered with, disabled or otherwise defeated
- m. Assigning definite individual responsibilities to the crew(s) and the authority necessary to exercise the responsibilities.

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- n. Ensure that a secure means of communication is established. If radio communications is used, there must be dedicated channels with no possibility of interference. See LMS0066A – Use of Portable Frequency Communication Devices.
- o. Ensuring that the crane and associated equipment are in a safe, operable condition supported by applicable certification in accordance with the manufacturer's requirements, legislation and applicable ANSI / ASME Standards. This includes that a thorough crane and rigging maintenance and inspection program is established and maintained with log books kept up to date.
- p. Ensure crane owner/supplier has met the equipment certifications as detailed above as well as those outlined in LMS0042A.
- q. Ensure that associated lift equipment (Spreaders bars, Containers, Slings etc.) are designed and certified for particular purpose and bears marking to indicate its maximum load rating as per OH&S Code and in compliance with ASME B 30.20-2006, "Below the Hook Lifting Devices".
- r. Ensure that a periodic inspection and testing of rigging components are completed and recorded as per appropriate Standards, Codes, Specifications and Procedures.

Ensure storage and use of rigging components are as per manufacturer's specifications.

Appendix I – D**CRANE OPERATOR****Definition:**

1. The crane operator is responsible for the safety of the crane operation. If there is reasonable cause to believe the lift might be dangerous or unsafe, the operator must refuse to lift until the concern(s) have been reported to the supervisor, any hazards rectified and safety conditions assured.
2. The crane operator is specifically responsible for, but not limited to:
 - a. Knowing the machine functional capability, limitations and its particular operating characteristics.
 - b. Creation of lift plans for Serious and Personnel Lifts in concert with the Lift Coordinator.
 - c. Participate in the appropriate hazard assessment prior to conducting the lift.
 - d. Being totally familiar with the information contained in the crane's operating manual and to understand the crane's limitations, including any attachments.
 - e. Proper set up of the crane as per the manufacturer's specifications, "Best Practice" and site rules.
 - f. Being totally familiar with the crane's load chart. The operator must understand the correct meaning of all notes and warnings and be able to calculate or determine the cranes actual net capacity for every configuration of the machine.
 - g. Inspecting and maintaining the crane regularly as prescribed by the owner and manufacturer. Confirm operating aids and safety devices are operational, i.e. load movement indicator, etc.
 - h. In the event that a crane must be left unattended within an operating process area where mechanical failure of any type might permit any component of the crane to come into contact with area process equipment, the crane end user must obtain written authorization from the area's Operations Manager or their designate. As per Appendix VIII
 - i. Informing the owner of any problem needed maintenance or necessary repairs to the machine. This should be done in writing, preferably in the machine's log book or inspection report.
 - j. Recording in the log or report the details of all inspections, maintenance and work done on the crane while in the field. In the case of the mechanic servicing or repairing, it is his/her responsibility to make entries in the Crane Logbook.
 - k. Being aware of any site conditions that could affect the crane operation such as, underground pipe-ways, culverts and particularly around power lines and weather. The operator must refuse to operate if the crane, hoist rope or load will come closer to a power line than the absolute limit of approach specified by Alberta OH&S code.
 - l. Checking the site is adequately prepared for the crane (e.g. hazards identified, base level and compaction tests). Confirming the ground beneath the crane can support the loads imposed by the crane and any attachments. Ground assessment should include an evaluation, which takes into account the load point that could occur over any outrigger or track that can accommodate the bearing ability of the maximum weight expectation as well as induction potential from high voltage lines in proximity.
 - m. Access roads are adequately prepared.
 - n. Reviewing the planned operation and requirements with the site supervision/ lift coordinator
 - o. Finding out the load and rigging weight and determining where the load is to be placed. Although the operator is not responsible for determining the weight of the load, if the operator lifts it without

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- checking the weight with site supervision, then the operator becomes totally responsible for the lift and any consequences that come from it.
- p. Determining the number of parts of hoist line required.
 - q. Checking the load chart to ensure the crane has sufficient load capacity for every lift.
 - r. When not provided with a critical or serious lift plan, selecting (from the crane capacity charts and manufacturer's notes and warnings) the best boom, jib and crane configuration to meet lift requirements (suit the load, site and lift conditions) and determine the net lifting capacity of this configuration.
 - s. Assembling, setting up and rigging the crane (including attachments) properly in accordance with manufacturer's specifications.
 - t. Following the manufacturer's operating instructions in accordance with the load chart.
 - u. Considering all factors that might reduce crane capacity and adjusting the load weight to suit.
 - v. Knowing load rigging procedures and ensuring that they are applied - when the load is visible to the operator.
 - w. Maintaining a secure communication process with signal persons.
 - x. Assess weather conditions at time of lift to confirm lift can safely proceed.
 - y. Complete a "Serious Lift Calculation and Approval Form" for each serious lift (refer to Appendix IV for a sample form).
 - z. Moving the crane around the work-site either with or without a suspended load.
 - aa. Vehicle entry authorizations for restricted work areas are to be obtained from the respective permit centre prior to work commencing.
 - bb. Shutting down and securing the machine properly when it is unattended – this will include the heater in a restricted hot work area where there is potential ignition hazard.
 - cc. Ensuring loads are not lifted over workers unless the workers have been warned of the dangers in accordance with OH&S Code.

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Appendix I – E**SITE SUPERVISOR/LIFT COORDINATOR****Definition:**

1. Person in charge of the lift is the person **representing the crane end user** at the lift site that has the ultimate responsibility for the safe and effective execution of the lift.
2. Site supervisor/lift coordinator is acting on behalf of the **crane end user** and has overall responsibility for the lift and therefore must plan all phases of the operation. This includes complete cooperation with the operator who has the final say regarding the lift occurring.
3. The site supervisor/lift coordinator:
 - a. Is part of the Lift Assessment Team that determines the classification of lift.
 - b. Ensures appropriate lift plan for the classification of lift.
 - c. Participates in the development of lift plans for all Serious and Critical Lifts.
 - d. Participate in the appropriate hazard assessment prior to conducting the lift.
 - e. Ensures appropriate personnel review lift plans.
4. Site supervisor/lift coordinator is specifically responsible for site preparation - "Providing a well prepared working area for the crane before it arrives, so the job can be done safely". Site preparation may include, but is not limited to the following:
 - a. Cranes are currently certified with all known deficiencies corrected.
 - b. Confirming the ground beneath the crane can support the loads imposed by the crane and any attachments. Ground assessment should include an evaluation, which takes into account the load point that could occur over any outrigger or track that can accommodate the bearing ability of the maximum weight expectation.
 - c. Access roads are adequately prepared.
 - d. Adequate space is provided to safely assemble, erect, and/or extend the boom and operate the crane, as well as materials such as timber mats, cribbing and blocks.
 - e. Blocking will be used to support the boom while it is being assembled and dismantled.
 - f. Operating locations are graded, level and compacted.
 - g. Suitable pads are used under outriggers, as required.
 - h. Operating locations are chosen so that the minimum clearances from power lines are maintained. If not, the power lines must be shut down, relocated or specifically insulated by the utility. (contact Suncor Electrical Distribution Department)
 - i. Appropriate grounding or bonding is provided to mitigate the induction potential from high voltage power lines in the proximity of the lift.
 - j. Operating locations are far enough away from shoring, excavations, trenches, buried utilities, foundations, etc., to eliminate risk of collapse.
 - k. Appropriate banner guard or barricades are positioned to prevent entry into restricted areas around the crane including the swing area, thus limiting access to authorized personnel.

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5. Site supervisor/lift coordinator – **Supervisory duties relating to** all crane work
- a. Hold pre-lift meetings to discuss all hazards in detail to minimize risks and ensure everyone is aware and ready for the work to be performed.
 - b. Verify that the crane operator is properly certified and competent to safely perform the lift and use the equipment designated.
 - c. Inform the crane operator of any hazardous site conditions, e.g., water lines, sewers, overhead power-lines, induction potential, etc.
 - d. Ensure that the correct load weight, center of gravity and maximum radius required for the lift have been accurately determined.
 - e. Communicate the combined load weight (rigging and load) to the crane operator. Site supervisor/lift coordinator should know the maximum radius, load weight and lift height of each “pick” before ordering the crane.
 - f. Lift coordinators must be competent in interpretation or performance of load chart calculations.
 - g. Ensure the lift procedure and plan are followed explicitly and that any required changes to the plan are reviewed with the lift engineer/rigging specialist prior to implementing the change. If the lift cannot be carried out as per the Engineered Plan, then the lift must be stopped until a formal review has been conducted and all parties understand the revised plan.
 - h. If changes are made to the lift plan/procedure or lift study, they must be documented and approved. Prior to commencement of any Critical Lift it must be determined which individual, on site, will have the authority to make changes to the lift plan/procedure or lift study in consultation with the Lift Engineer.
 - i. Physically verify the lift radius.
 - j. Ensure traffic control and the securing of potential failure area measures are approved, taken and communicated, if required.
 - k. Work with the site owner to develop an emergency action plan (where applicable) and communicate it to all personnel involved with the lift.
 - l. Ensuring that the rigging crew is experienced and competent. They must be capable of establishing weights; judging distances, heights and clearances; selecting tackle and lifting gear suitable for the loads; and rigging the load safely and securely.
 - m. Supervising the rigging crew.
 - n. Ensuring that the load is properly rigged for lifting. Determine that the load is secure and balanced before lifting more than a few centimetres above the support.
 - o. Ensuring that the signal persons are competent, knowledgeable and capable of directing/communicating with the crane operator to ensure the safety and efficiency of the operation.
 - p. Designating signal persons, identifying them to the operator, and ensuring they are capable of communicating effectively. Radio communications may be necessary if a direct line of sight is not possible.
 - q. Ensuring the safety of the rigging crew and all other personnel with the potential of being affected by the rigging operation.
 - r. Ensuring that all required safety precautions are taken when the lift is in the vicinity of power lines (i.e.: appropriate grounding to mitigate induction potential).
 - s. Ensuring that all personnel involved directly or indirectly by the operation know and understand their roles, responsibilities and applicable restrictions.
 - t. Assess weather conditions at time of lift to confirm lift can proceed safely, e.g. wind, precipitation, cold weather, lightning, etc.

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Appendix I – F

LIFT ENGINEER/RIGGING SPECIALIST

Definition:

1. A person who is a Professional Engineer (as defined by the Occupational Health and Safety Code) and/or deemed by the employer to be appropriately trained in the preparation and development of lifting studies.
2. The requirement for using the expertise of a lift engineer/rigging specialist will be determined by the site owner and crane end users based on the specifics of the lift to be done.
3. The lift engineer/rigging specialist is specifically responsible for, but not limited to:

3.1 Primary duty

- The primary duty of the lift engineer/rigging specialist with respect to lift studies is, as with all engineering functions, to ensure the protection of life, limb and property, of both the companies and personnel involved and the public, through the sound application of knowledge, training and experience.
- The lift engineer/rigging specialist will provide technical support and resources for the planned lift and ensure that all applicable codes, standards and regulations are complied with.

3.2 General Duties

3.2.1 Investigate and understand the nature of the lift, in regards to:

- a. What is to be lifted, size, weight, center of gravity, special conditions, etc.
- b. What the initial and final position, orientation, elevation, etc., of the load to be lifted.
- c. Any special weather/climate conditions or concerns.
- d. Special ground, or area conditions, or concerns. Soil compaction, matting requirements to ensure stable ground conditions for the crane.
- e. Pre-determined equipment requirements and availability.

3.2.2 Design the Lift (plan how to make the lift)

- a. Identify the optimum location for the cranes for capacity and clearance from obstacles.
- b. Identify crane(s) travel or swing.
- c. Size the crane(s) to suit the requirements, both primary and secondary as may be required. Crane capacity must be calculated through each phase of the lift.
- d. Calculate the point loading on all cranes involved in the lift, i.e. tracks and outriggers.
- e. Size, design and/or detail the rigging hardware to suit the lift.
- f. Prepare drawings, plans and specifications as required.
- g. Consider the potential for induced voltage.
- h. Calculate the sail effect of the load and boom on lifts where wind may be a consideration, and determine the maximum wind velocity and wind direction allowable.

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- i. Verify all “Below the Hook Lifting Devices” are built and certified according to the standards laid out in ASME B 30.20-2006.

3.2.3 **Communicate the Lift**

- a. Issue drawings, plans and specifications to the people who will make the lift.
- b. Review, discuss and revise as required with the people who will make the lift.

3.2.4 **Planning**

- a. Review drawings and/or site information to verify access and clearances; identify obstructions; and eliminate interference with respect to the lift.
- b. Verify lift lug information, both head and tail if required.
- c. Verify crane charts, boom length, and accessories required.

3.2.5 **Design**

- a. Plan how the crane(s) will physically make the lift.
- b. Specify the rigging, sling diameter, length and quantity.
- c. Select shackle size, clearance and quantity.
- d. Select and detail any new items required.
- e. Prepare sketches/drawings.

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Appendix I – G

RIGGER

Definition:

1. A competent worker designated as the rigger. Note: The degree of competency and responsibilities for the rigger must meet and be consistent with the complexity of the lift to be performed.
2. The rigger is specifically responsible for, but not limited to:
 - a. Rig loads and equipment to the manufacturer's recommendations.
 - b. Interpret the sling and hardware charts and lift plans.
 - c. Identify appropriate rigging components for the load to be lifted.
 - d. Visually inspect rigging components on a regular basis and prior to each lift to ensure compliance with appropriate ANSI /ASME Standards, Codes, Specifications and Procedures.
 - e. Know and understand the general operating parameters of cranes.
 - f. Participate in the appropriate hazard assessment prior to conducting the lift.
 - g. Be capable of identifying different rigging components and to be knowledgeable in their proper application.
 - o Capable of performing inspections of applicable rigging components to ensure they are in an adequate condition to perform the lifting tasks.
 - o Able to produce documentation showing hours of training accomplished in understanding and applying principles and components.
 - o Knowledgeable of the different sling configurations available and know which to use on different load applications.
 - o Knowledgeable of the weight of the load to be lifted.
 - o Knowledgeable and capable of using the hand signal chart for hoisting and moving loads.
 - o Giving all signals in a slow, smooth and decisive manner.
 - o Aware of overhead hazards and obstructions. Be aware that the swing path must be kept clear of vehicular and pedestrian traffic.
 - o Aware that the load should never be brought over the top of people.
 - o Communicate with the crane operator throughout all stages of the rigging process

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Appendix II – Personnel Lifting

1. Personnel Lifting for Suspended Basket

1.1 General

The person specifically responsible for the overall work function to be performed shall determine that there is no practical alternative way to perform the needed work or gain access to the area, and shall authorize its usage.

1.2 Platform Requirements

The platform that the worker is on shall:

- a. Be capable of supporting, without failure, its own weight and at least five times the rated load of the platform;
- b. Have a minimum carrying capacity of 136 kg (300 lb.);
- c. Be designed and approved by a professional engineer, and in accordance with good engineering practice;
- d. Have design drawings that set out the size and specifications of all components of the platform, including the type and grade of materials used for it, the rated load of the platform, and instruction for the proper maintenance and inspection of the platform in compliance with CSA Z-150-98;
- e. Be equipped with a second means of suspension or support, where the second means of support is secured above the hook. The secondary support shall, at all times, be connected to the traveling block, and neither impede the operation of the hoist line and traveling block nor compromise the structural integrity of the traveling block or the hoist line (see Appendix II-B);
- f. Be constructed and maintained in accordance with the design drawings;
- g. Have all weldments conforming to CSA Standard W59 or ANSI/AWS D14.3. Similar standards or procedures are acceptable, providing the welding process meets or exceeds the criteria of CSA Standard W59 or ANSI/AWS D14.3;
- h. Not have synthetic slings and slings utilizing wire rope clips used as part of the main suspension system;
- i. Be modified or repaired in accordance with the manufacturer's specifications or as directed by a professional engineer;
- j. Be designed, constructed, and maintained so that the failure of one means of support or suspension will not cause the collapse of all or part of the platform;
- k. Have the primary and secondary suspension designed with a factor of safety of 10 to 1;
- l. Have bridles and associated rigging for attachment to the hoist line that are identified and used only for the purpose of lifting or lowering workers;
- m. Be equipped with sufficient numbers of fixed supports for lanyards. Fixed supports for lanyards shall be clearly identified. Each support shall be free of sharp edges that might cut or chafe the connection, and each shall have the ability to resist the arrest forces in case of a fall;
- n. Have all eyes in wire-rope slings fabricated with a Flemish eye, with mechanical splice;
- o. Have all wire rope, shackles, rings, master links, and other rigging hardware capable of supporting, without failure, at least ten times* the maximum intended load applied or transmitted to that component;

*The 10:1 safety factor applies to the components used, not to the efficiency of the completed assembly where end-fitting efficiencies, geometry, etc., may reduce the overall factor of safety.
- p. Have guardrail protection, consisting of a top rail, intermediate rail, toe board, and lower barrier. The top rail shall be no less than 990 mm (39 in) or more than 1140 mm (45 in) in height with

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respect to the platform floor. The intermediate rail shall be positioned at an equal distance between the toe board and the top rail. The toe board shall be around the periphery of the platform and shall be a minimum of 90 mm (3.5 in) in height. The lower barrier shall span the distance between the toe board and intermediate rail and be of solid construction or expanded metal;

- q. have continuous hand or grab rail inside the perimeter of the suspended platform;
- r. have flooring with a slip-resistant surface, with provision to allow free drainage of liquids;
- s. have means of securing loose items with the platform; and
- t. If built with an access gate, be equipped with an acting device to restrain the gate from accidental opening. When provided, access gates shall swing into the platform.
- u. Shall be recertified by a professional engineer annually and records maintained and available by equipment owner.

1.3 Crane Requirements

A crane used as a personnel-lifting device shall:

- a. be down-rated to half of its rated capacity when used to lift personnel;
- b. be equipped with an anti-two-blocking device;
- c. have, on its hoist line, hooks equipped with positive-locking catches at the point where the platform is suspended, or have other means of preventing the platform from accidentally detaching from the hook;
- d. have hoist lines capable of supporting at least ten times the maximum load or force to which it is likely to be subjected;
- e. have a boom that is equipped with fail-safe systems and devices (a pawl on the drum in a lattice boom crane or a check valve on hydraulic cylinders) to prevent the boom from free-falling or unintentional lowering or retracting;
- f. when used for hoisting workers, and if equipped with a secondary hoist line, have the line and its rigging removed or set in such a way that it will not tangle or endanger workers on the platform and prevent the safe operation of the crane; and
- g. Use only winches with power down capabilities for suspending personnel platforms.

1.4 Fall Protection Requirements

Workers on the platform shall at all times wear full body harness, in conjunction with a lanyard fitted with a shock absorber and connected to an independent anchor point(s). All aspects of fall protection must meet the requirements of [RGS0024A](#).

1.5 Trial Lift

A trial lift shall be done to verify the integrity of rigging and the personnel platform, and to ensure that all systems, controls, crane set-up, lift routes, and safety devices are activated and functioning properly at each location at which the personnel platform is to be lifted and positioned. The trial lift shall ensure that no interference exists, and that all configurations necessary to reach those work locations will allow the operator to remain under the 50% limit of the crane's rated load capacity. The trial lift(s) shall be done with maximum rated load, with the load evenly distributed in the platform. The trial lift shall be performed in the following sequence:

- Suspended by the secondary support, lift the personnel platform 1 m off the ground to verify the integrity of the work platform and the secondary support;

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- Suspended by the primary support, lift the personnel platform 1 m off the ground to verify the integrity of the primary support; and
- Suspended by the primary support, lift the personnel platform to all work locations to verify the lift routes and that these work locations can be reached by the crane using a maximum of 50% of the crane's capacity. If the lift area is congested, the personnel platform may be lifted an equal or greater radius in the same quadrant of crane capacity to verify ground support and stability of the crane.

Note: Trial and load test need not be repeated for continuous use, providing crane positioning has not changed and personal platform has not been disconnected. Personal platforms for use in emergency evacuation situations must be pre planned and separately assessed.

1.6 Personnel Basket Directly Attached to the Boom (Pinned Baskets)

1.6.1 Platform Requirements

- **General**

The platform that the worker is on shall:

- Be capable of supporting, without failure, its own weight and at least five times the rated load of the platform; with a minimum carrying capacity of 136 kg (300 lb.);
- Be designed and approved by a professional engineer;
- Have a design safety factor of not more than 50% of yield strength for ductile materials, or 20% of ultimate strength for brittle materials that do not have clearly defined yield strength for static loading. Where the platform is subjected to dynamic loading, this loading shall be included;
- Have design drawings that set out the size and specifications of all components of the platform, including the type and grade of materials used for it, the rated load of the platform, and instructions for the proper maintenance of the platform;
- Be designed to prevent overturning;
- Be constructed and maintained in accordance with the design drawings;
- Have all weldments conforming to CSA Standard W59 or ANSI/AWS D14.3. Similar standards or procedures are acceptable, providing the welding process meets or exceeds the criteria of CSA Standard W59 or ANSI/AWS D14.3;
- Have its weight and rated load conspicuously posted on a plate or by other means of permanent marking;
- Be modified or repaired in accordance with the manufacturer's specifications or as directed by a professional engineer;
- Be equipped with means of self-leveling the platform and guarded against overturning; have the basket be not less than 990 mm (39 in) nor more than 1140 mm (45 in) in height with respect to the platform floor;
- Have a barrier that spans the full distance between the floor to rail and is of solid construction or expanded metal; and
- Be equipped with slip-resistant flooring, with provisions to allow free drainage of liquids.
- Shall be recertified by a professional engineer annually and records maintained and available by equipment owner.

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1.6.2 Platform requirements when equipped with Motion Control

The motion control on the personnel basket shall:

- Be clearly identified as to its function;
- Be clearly marked to indicate the direction of movement and, if possible, be oriented and move in the same direction as the platform will move when the control is actuated;
- Be inside the platform and readily accessible to the platform operator; be protected from inadvertent actuation;
- Return to its neutral position and stop all motion when released;
- Include an emergency stop control that does not require continuous actuation for a stop condition; and
- Have a motion control at ground level that can override the platform control.
- Is function tested as per manufactures specifications prior to use.

1.6.3 Crane Requirements

A crane used as a personnel-lifting device shall:

- Be down-rated to half of its rated capacity;
- Be equipped to protect the platform from accidental overturning;
- Have a boom that is equipped with fail-safe systems and devices to prevent the boom from free-falling or unintentional lowering or retracting, such as a pawl on the drum in a lattice boom crane or a check valve on hydraulic cylinders; and
- When hoisting workers, have the hoist line removed from the boom sheave or set in such a way that it will not endanger the workers in the platform or interfere with the operation of the crane.

1.6.4 Fall Protection Requirements

Workers on the platform shall at all times wear full body harness, in conjunction with a lanyard fitted with a shock absorber and connected to an independent anchor point(s). All aspects of fall protection must meet the requirements of [RGS0024A](#).

1.6.5 Operation and Set-up

The following requirements shall be met:

- The crane shall have its structural elements visually inspected and documented by a competent person before each use.
- The crane shall be leveled as specified by the manufacturer and located on firm footing. Cranes equipped with outriggers shall have them fully deployed in accordance with the manufacturer's specifications.
- The crane shall not be used to hoist material while the platform is being used to support workers, unless approved by the authority having jurisdiction (Area Manager) for the specific application.
- The crane shall not travel while workers are on the platform.
- The crane operator shall adhere to all requirements stated in Appendix 1-D. The operator shall remain at the crane controls at all times when a person occupies a personnel basket.
- Positioning of the personnel platform shall be performed by the crane operator. Motion control in the personnel platform shall only be used for final positioning of the personnel platform.

1.6.6 Inspection

Cranes used for personnel lifting shall follow Suncor Standards and CSA-Z150-98-CAN/CSA Safety code on mobile cranes requirements.

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1.6.7 Repairs and Modifications

Pinned baskets shall be inspected and load tested with 100% rated load following structural repairs and modifications.

1.6.8 Responsibilities

The supervisor/employer in charge of the operation shall:

- Ensure that an adequate means of communication between the worker on the platform and the crane operator is established, maintained, and used;
- Ensure that sufficient lighting for the job is provided;
- Conduct a pre-lift meeting to ensure that every worker involved with the hoisting operation receives adequate instructions about the requirements, restrictions, and hazards associated with the hoisting operation; and
- Develop adequate means of evacuation or rescue procedures and communicate these in writing to all workers involved with the hoisting operation. Completion of Personnel Lifting Check sheet (see Appendix II-A).

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Approved By: Christina Ellerbeck, Director, Maintenance Support Services

Appendix II – A – Personnel Lifting Check Sheet – Form OS-0106 Rev 2/04 must be ordered from the Print Room by phoning 743-6420 or Daily Tools/Forms on Intranet.

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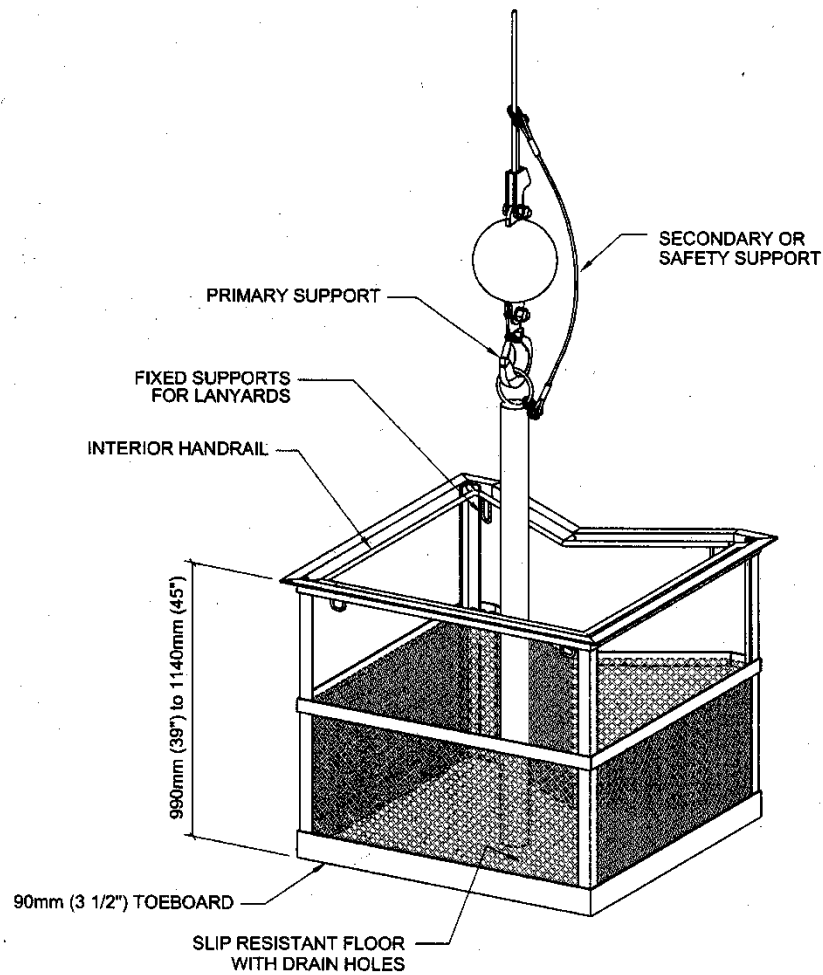
Personnel Lifting Check Sheet

PERSONNEL PLATFORM CHECK LIST	PERMIT NUMBER	
Department:	Date:	Time:
Crane Number:	Number of persons hoisted:	
Basket weight:	Basket Number:	
Work Description:		
PRE-LIFT CHECK	YES	N/A
◆ Hoist cable condition		
◆ Ball and safety latch		
◆ Fuel level		
◆ Man basket Structural condition		
◆ Proper man basket hookup		
◆ Wooden outrigger pads		
◆ Can all locations be reached (within 50% of cranes rated load capacity)		
◆ Tag line (if not used, explain why)		
◆ Crane set up as per work practice		
◆ Load test with 100% basket capacity		
JOB SUPERVISOR		
◆ Check personnel safety equipment		
◆ Safety harness for each employee		
◆ Employees competent giving hand signals		
◆ Check weather conditions; (wind, lightening)		
◆ Tag line person designated		
◆ Work area flagged and tagged		
◆ Job discussed with employees and crane operator		
COMMENTS: _____		

Job Supervisor Signature: _____		
Crane Operator Signature: _____		

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Appendix II-B - Acceptable Basket Applications

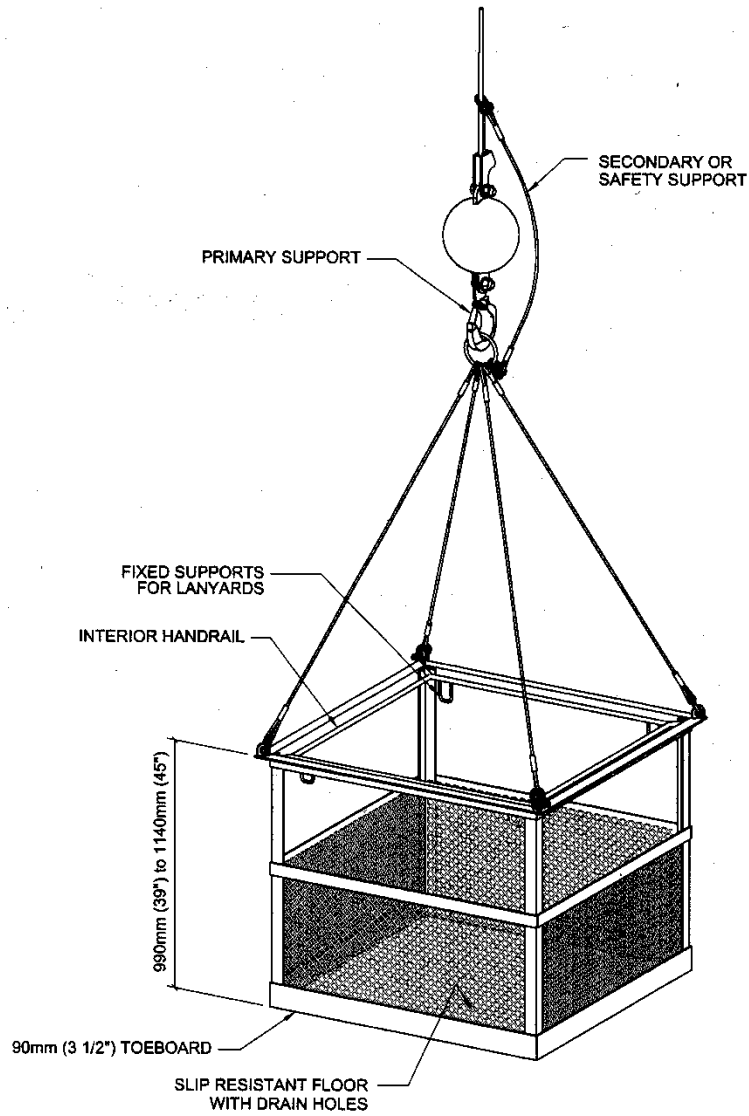


LEDUC STYLE BASKET

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Approved By: Christina Ellerbeck, Director, Maintenance Support Services

Appendix II B – (Continued)



CONVENTIONAL STYLE BASKET

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Appendix III – CRITICAL LIFT AUTHORIZATION FORM – Page 1 of 2 OSG-0012.1 Rev 7/04. Forms must be ordered from the Print Room by phoning 6420 or see Daily Tools/Forms on Intranet

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Critical Lift Authorization Form

Job Work Order #:		Job Description:	
Location:			
Suncor Representative: (Please Print)			
Contractor Name:		Supervisor Responsible for Lift:	
Description of Item to be lifted:			
Major Hoisting Equipment to be used:			
1. _____		2. _____	
Equipment & Lift Relationship: Crane #1 Crane #2			
1. Operating Radius	_____	_____	Crane #1 Crane #2
2. Boom Length	_____	_____	
3. Allowable Load Weight:			4. Ratio of lift to allowable load:
a. Load	_____	_____	a. Capacity from the chart
b. rigging /spreader bars	_____	_____	b. % of capacity
c. block or ball	_____	_____	c. Ratio of lift to allowable load
d. effective jib	_____	_____	_____
e. stowed jib	_____	_____	5. Clearance between boom & lift:
f. other rigging jib	_____	_____	_____
g. load lines jib	_____	_____	6. Clearance to surrounding facilities
h. aux. boom head jib	_____	_____	_____
i. Total weight to be lifted jib	_____	_____	
Basis for Critical Lift:			
<input type="checkbox"/> Load will be lifted over operating equipment or electrical power lines		<input type="checkbox"/> Load exceeds 85% and is less than 95% of the manufacturer's rating chart at the Working radius.	
<input type="checkbox"/> Two or more pieces of lifting equipment will be required to work in unison		<input type="checkbox"/> Other: _____	
How was the weight of the critical lift obtained?			
A. Certified Scale Weight: No <input type="checkbox"/> Yes <input type="checkbox"/>		C. Has taken into account all modifications, including internals as well as an allowable for scale, sediment, sludge, insulation, liquid, etc. No <input type="checkbox"/> Yes <input type="checkbox"/>	
B. Calculated independently : Yes <input type="checkbox"/> No <input type="checkbox"/>		D. Should this weight be verified by independent source: No <input type="checkbox"/> Yes <input type="checkbox"/>	
Comments:			

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Approved By: Christina Ellerbeck, Director, Maintenance Support Services

LMS0039A - APPENDIX III - CRITICAL LIFT AUTHORIZATION FORM – Page 2 of 2 OSG-0012.1 Rev 7/04. Forms **must** be ordered from the Print Room by phoning 743-6420 or see Daily Tools/Forms on Intranet

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Critical Lift Authorization Form

Condition of Hoisting Equipment and Rigging:

- A. Has the crane been inspected prior to this lift? No Yes Date: _____
- B. Has all equipment and rigging been inspected and found in acceptable condition for this lift? No Yes Date: _____

Comments: _____

Stability of Ground Area:

- A. Are the soils deemed to be acceptable? No Yes If No, is compaction testing required? No Yes
- B. Will mats be required? No Yes Size: _____
- C. Any underground installations needing special treatment? _____

Operator(s):

- Will steps be taken to ensure competency prior to the lift? No Yes
- What is the operator's experience on this equipment and with this type of lift?

Comments: _____

Environmental Controls:

Will the weather conditions, (e.g. wind speed and direction, temperature, rain, lightning and air pollution etc.), be a factor as per original equipment manufacturer's (OEM) specifications, applicable legislation, industrial codes and practices, and Suncor standards, procedures, safe work practices or rules?

Has the crane capacity been reduced as per risk for cold weather? No Yes

Has the potential for induced voltage from surrounding high voltage power lines been taken into consideration?

No Yes

What are the most critical aspects of this lift?

Nothing in this submission and/or acceptance of this authorization is to be considered as relieving the contractor of any responsibility for a safe operation.

Approvals	Print Name	Signature	Date
Area Manager, Ops.			
Area Manager, Mtce.			
Contractor or Supervisor			
Lift Coordinator			
Lift Plan Engineer			
Review Engineer			

Date of Lift: _____ Time Lift Started: _____

Total Time: _____

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Approved By: Christina Ellerbeck, Director, Maintenance Support Services

LMS0039A - APPENDIX IV – SERIOUS LIFT CALCULATION AND APPROVAL FORM – Page 1 of 1 OSG-0084 Rev 2/04 - Forms **must** be ordered from the Print Room by phoning 743-6420 or see Daily Tools/Forms on Intranet.



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Serious Lift Calculation and Approval Form

Location:		Job Description:	
Operator: (Please Print)		Operator Signature:	
Supervisor Responsible for Lift:		Supervisor Signature:	
Contractor Name:		Unit Number:	
Crane Used:		Area Operations Mgr/Sup Signature:	
Reason for lift:			
	CRANE 1	CRANE 2	<div style="background-color: yellow; border: 1px solid black; padding: 5px;">Serious Lift Criteria</div> <ul style="list-style-type: none"> 75-85% of chart Use of a man basket Non critical tailing crane operations Pick & Carry Operating near high voltage lines Non-critical lift over hazardous processes/ equipment
GROSS CAPACITY (value on load chart)	lbs.	lbs.	
LOAD RADIUS (actual measured radius)	feet	feet	
NET LOAD (actual weight of load)	lbs.	lbs.	
DEDUCTIONS:			
Rigging Weight	lbs.	lbs.	
Spreader Bars etc.	lbs.	lbs.	
Load Block Weight	lbs.	lbs.	
Headache Ball Weight	lbs.	lbs.	
Effective Jib Weight	lbs.	lbs.	
_____ Parts of Line	lbs.	lbs.	
TOTAL DEDUCTIONS:	lbs.	lbs.	
GROSS LOAD (net load plus total deductions)	lbs.	lbs.	
PERCENTAGE OF GROSS CAPACITY (gross load divided by gross capacity x 100)	degree	degree	
BOOM ANGLE @ MAXIMUM RADIUS LOADED	degree	degree	
NET CAPACITY (Gross capacity minus total deductions)	lbs.	lbs.	
<u>LIFT PROCEDURES AND SPECIAL CONDITIONS OR COMMENTS</u>			
<p>NOTE: Completion of these Serious Lift Calculation and Approval Forms is mandatory and appropriate approval signatures must be in place before serious lifts are performed. Completion must conform to the conditions of the Suncor Crane Standard and Crane charts.</p>			

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Approved By: Christina Ellerbeck, Director, Maintenance Support Services

Appendix V – Operating Near Electrical Power Lines

All crane operations performed on the Suncor site, all voltage determinations and all determinations of Safe Limits of Approach will comply with the provisions of the Alberta Occupational Health and Safety Code.

Any crane operating within the crane's boom length of minimum safe distance (as specified in Schedule 4) of any electrical line shall have a competent signaller stationed at all times, within view of the operator, to warn the operator when any part of the machine or its load is approaching the minimum safe distance from the power line.

Schedule 4

Minimum Distance from Live Electric Power Lines

Operating Voltage Between Conductors of overhead Power Lines	Safe Limit of Approach Distance
0 to 750 volts (insulated or polyethylene covered ¹)	300 mm
0 to 750 volts (uninsulated or bare)	1.0 m (3.3 ft)
Above 750 volts (insulated ^{1, 2})	1.0 m (3.3 ft)
750 volts – 40 kilovolts	3.0 m (10.0 ft)
69 kilovolts, 72 kilovolts	3.5 m (11.5 ft)
138 kilovolts, 144 kilovolts	4.0 m (13.0 ft)
230 kilovolts, 260 kilovolts	5.0 m (16.5 ft)
500 kilovolts	7.0 m (23.0 ft)

Note: *When a crane is operated near a source such as a radio transmitter or energized high-voltage electrical equipment that may induce an electric charge, there may be a hazard to workers. As a precaution, the crane should be effectively grounded. Any induced electric charge on the load should be dissipated by applying grounding cables or other effective means before workers contact the load, and all flammable materials should be removed from the immediate work area.*

The safe limit of approach distances listed above do not apply to a load, equipment or building that is transported under energized overhead power lines if the total height, including equipment transporting, is less than 4.15 metres.

1. Except where the electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work, or where insulating barriers not a part of, or an attachment to, the crane have been erected to prevent physical contact with the lines, cranes shall operate so that no part of the crane or load enters into the minimum safe distance shown in Table 3.
2. When operating, no part of any crane or its load shall be permitted to approach closer to any power line than the distance specified in schedule 4, unless the electrical authority has been notified and the line de-energized or insulated.
3. In the event of induced voltage from surrounding high voltage power lines,
 - The crane or hoist must be effectively grounded or bonded to a solidly grounded structure;
 - Any induced electric charge on the load must be dissipated by applying grounding cables or by other effective means before workers contact the load.
4. It shall be the responsibility of the user controlling the crane to
 - provide an competent signal person;

¹ Conductors must be insulated or covered throughout their entire length to comply with the group.

² Conductors must be manufactured to rated and tested insulation levels.

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- provide adequate advance notification to the electrical authority to allow for insulation or isolation and grounding of the line or lines;
- ensure that the electrical authorities are fully informed as to when the operations are to begin, when they are due to be completed, and when any location changes are planned;
- Ensure that whenever cranes must be repeatedly travel beneath power lines a route is plainly marked, and “rider poles” are erected on each side of the crossing approach to ensure that the crane structure is lowered to a safe position. The routes shall be located as close to the power line support tower or pole as possible in order to take advantage of the greater ground clearance;
- measure for induced voltage and sufficiently ground the crane;
- ensure that if a crane will be working in a relatively fixed location near electrical hazards, it is electrically grounded with a ground rod, permanent grounding bus, or ground mat;

Note: *Grounding instruments should be placed as close to the machine as possible. The ground lead should first be connected to the grounding instrument and then to the machine. All personnel must be instructed to stay clear of both the lead and rod at all times. When removing the ground, the lead should first be disconnected from the machine. If a ground mat is used, the equipment must be placed on the mat and bonded to it. The ground mat area should be enclosed with a fence to prevent personnel from stepping on and off the mat during operation of the machine. For grounding instruments requiring ground penetration refer to LMS0059A Ground Disturbance.*

- Report every incident involving contact with a live line to the electrical authority and safety inspector, so that inspections and repairs can be made to prevent damaged live lines from falling at a later date; and not use the crane until it has been completely inspected by a competent person for possible damage caused by electrical contact.

5. In the event that the crane or load makes contact with an energized circuit, the operator shall, if feasible:

- Remain inside the cab;
- Instruct all other personnel to keep away from the machine, rope, and load;
- Try, unaided, and without anyone approaching the machine, to back off the crane until it is well clear of the power line; and
- If the machine cannot be self-propelled away or disentangled from the line, remain inside the machine until the electrical authorities de-energize the circuit and confirm that conditions are safe.

Notes:

- ***If the operator decides to leave the machine, he or she shall not, under any circumstances, step down, allowing part of his or her body to be in contact with the ground while any other part is touching the machine.***
- ***Because there may be a hazardous voltage differential on the ground, the operator should jump with feet together, maintain balance, and shuffle slowly across the affected area.***

6. Caution shall be exercised when working near overhead lines having long spans, since they tend to swing laterally in response to the wind and present a contact hazard.

7. **Cage-type boom guards, insulating links, and proximity-warning devices have limitations, and their use does not alter the requirements of Clauses 1 to 6.**

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Appendix VI – Electrical Distribution Department Standards

UOP0011A - Crossing Under High Voltage Lines

UOP0012A - Working Within EDD Right of Way

UOS0049A - Addition or Removal of Conductors (All Sizes / All Voltages) on the EDD System

UOS0050A - Electrical Distribution Work Authorization

UOS0052A - Attachments to Power Poles

UOS0075A - Extraction 15KV Equipment Ownership and Responsibility

UOW0005A - Electrical Distribution Work Authorization Work Practice

UOR0004A - Application of EDD Locks

UOR0030A - Specific Rules for Electrical Line Person

Alberta Occupational Health and Safety Code, Part 17 – Overhead Power lines

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Approved By: Christina Ellerbeck, Director, Maintenance Support Services

Appendix VII – Cold Weather Lifting Guidelines

The following are recommendations on cold weather operating procedures representing industry best practices. Refer to Crane Manufacturers guidelines per specific equipment on cold weather lifting restrictions.

- At temperatures colder than -15°C all possible precautions shall be taken to avoid impact or shock loading on cranes and rigging.
- Operations involving hydraulic cranes should be conducted with due regard to potential failure of hydraulic components.
- In cold weather operation between -15°C and -30°C, cranes should be de-rated as per manufacturer specifications or by 25% if not specified.
- All rigging hardware and crane hooks for use at -25 °C and below must be free of all nicks, gouges or notches.
- Between -30°C and -40°C, cranes should be de-rated by 40% for all lifts and consideration given to stopping all lifting activities.
- Lifting at temperatures below -40°C is not recommended except in the case of an emergency, unless the cranes and rigging are specially engineered for cold weather operation. Efficiency and safety of personnel is a prime consideration in extreme cold and wind chill conditions.

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Appendix VIII – Unattended Cranes

- Cranes left unattended in non operating areas must be parked in a manner conforming to the manufacturer's recommendations and positioned in a manner that will prevent any contact with adjacent equipment and structure should the crane mechanically fail in any way.
- In the event that a crane must be left unattended within an operating process area where mechanical failure of any type might permit any component of the crane to come into contact with area process equipment, the crane end user must obtain written authorization from the area's Operations Manager or their designate.
- Prior to the granting of the authorization, the Area Operations Manager or their designate in conjunction with the Crane end user, shall conduct a hazard assessment to determine that the unattended crane will not pose an unacceptable risk to the health and safety of personnel that may be required to enter the immediate area or to adjacent processes should the crane experience unexpected mechanical failure.
- Should permission be granted by the authorized Operations personnel, the Crane End User will ensure that the crane be positioned in a manner that will prevent any contact with adjacent equipment and structure should the crane mechanically fail in any way.
- In the event that Operations deems that the unattended crane poses an unacceptable risk to area personnel or process equipment, the crane must be moved out of the operating process area.
- In the event that Operations authorization is not granted and it is not practical that the crane be removed from the area due to disassembly/assembly constrictions, the Crane End User shall make arrangements to ensure that the crane is continuously attended while it remains in the operating process area.

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Appendix IX – Rigging

Pull Tests:

- An employer must ensure that slings at a worksite are not subjected to pull tests beyond 100 percent of their rated load capacity other than the proof testing done at time of manufacture.
- Pull tests in excess of 1 to 1 may only be performed by the sling manufacturer or his designate in order to maintain responsibility and accountability.
- Pull tests for site safety requirements must not exceed 1 to 1.
- Slings do not require re-certification unless damaged and repaired.
- If repaired, the sling may then be pulled to 2 to 1 by the manufacturer or his designate for purposes of re-certification.
- All slings shall be appropriately tagged with the type of construction, safe working load, serial number and material of construction
- All Rigging, previously used in offshore applications, shall not be used on Suncor sites.

Winch Line End Connections:

- Any winch, tugger or running line shall not be operated unless a proper, engineered end connection device such as a socket and wedge, cable clamps, swaged, plug, spelter or resin socket is used. Under no circumstances may a winch, tugger or running line be operated with a knot tied in the end of the line for the purpose of attachment to the hook.

ASME Hoisting Safety Factors:

- | | |
|--|------------------------|
| • Hooks, slings, spreader bars, shackles and all other hardware below the hoist ropes, boom point or bridge of the crane - | <u>5 to 1</u> |
| • Hoist ropes (running lines on cranes) | <u>3.5 to 1</u> |
| • Hoist ropes (running lines on cranes) | <u>3.5 to 1</u> |
| • Hoist ropes (non-rotating) | <u>5 to 1</u> |
| • Personnel Hoisting | <u>0 to 1</u> |
| • Tugger lines and blocks (hoisting) | <u>5 to 1</u> |
| • Tugger lines and blocks (pulling) | <u>3 to 1</u> |
| • Pendant lines and guy lines | <u>3 to 1</u> |

Hook Standards:

The following standard must be followed to ensure loads on hooks will not exceed 20% of ultimate breaking strength.

- Hooks must be taken out of service if any indication of spreading or twisting of the hook is evident.
- No more than two slings shall be placed on a hook. More than two slings must be attached to a shackle and the shackle shall be placed on the hook.
- Slings must be placed at angles of 60° or greater unless the hook is marked with 45° angles.
- Hooks must receive a periodic visual inspection for cracks, nicks or gouges as per the requirements of ASME B30.10.
- Remove from service any hook with a crack, nick or gouge. Deformations may be dressed out with a file or grinder provided manufacturer specifications are followed.
- Hooks used on multi sling bridles should be equipped with locking, load rated safety latches of the type sometimes referred to as “Shur-Lok”.
- Hooks used with pulsating or frequent load cycles such as on a Vibro-hammer, shall be subject to periodic non-destructive inspection such as magnetic particle or dye penetrant.
- Hooks must not be repaired, altered or re-shaped by heating, welding or bending.
- Hooks must be equipped with a properly functioning safety device that will prevent slings from being dislodged.
- Hook manufacturer “Best Practice” requires not less than 80% of shackle pins to bear the loads imposed by lift lugs.
- Hooks must never be side loaded, back loaded or tip loaded.
- Safety latches must not be distorted or bent and must not be placed under any load whatsoever.

D/d Ratio

Employers must ensure that all rigging used employs the D/d Ratio required by the manufacturer to ensure safe usage and proper application. If workers do not employ special shackles and hooks with an increased D/d Ratio (of a type sometimes known as “Sling Saver”) are used, the rigger must either oversize shackles and hooks or de-rate slings 15%.

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The following individuals have approved and signed this document.

UserName: Christina Ellerbeck (cellerbeck)

Title: Dir Maintenance Support Services

Date: Tuesday, 22 November 2016, 02:04 PM Mountain Time

Meaning: Approver 1 Signed

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