STANDARD

SARNIA REFINERY

CRANE AND RIGGING

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SCOPE AND PURPOSE:

This standard applies to all crane and rigging equipment used by Suncor and any of its contractors or subcontractors. It prescribes the requirements for identifying and controlling the risks associated with crane and rigging activities.

CONTENTS

1.0 LIFT PLANNING REQUIREMENTS FOR MOBILE CRANES

1.1 Lift Classification

All mobile crane lifts will be classified as critical, serious or standard in order to determine the degree of lift plan required. Each lift classification is based on a list of criteria as prescribed below. Mobile Crane Lift Classification and Risk Control Tables are provided in **Appendix A (A-1, A-2, A-3) and Appendix B** respectively.

1.2 Critical Lift Classification

Critical Lifts will require a documented hazard assessment accompanied by a stamped engineering lift study.

A critical lift team will be established to evaluate critical lift hoisting operations, with continuing assistance from a crane expert, and a Licensed Professional Engineer, Province of Ontario, who has been properly trained in lift studies.

Lifts meeting any of the conditions listed below will be classified as a Critical Lift.

- Load is > 50 tons or the lifting device is operating above 80% of its rated capacity.
- Lift height above 300 ft.
- Two lifting devices are required for the lift (includes tailing crane) and the lift is > 50% of the rated capacity for either crane at some point during the lift.
- The load is > 5,000 lbs. and the lifting device is operating above 50% of its rated capacity and lifting over or near live equipment.
- Lifting device will travel with a load while the lifting device is operating > 50% of its rated capacity (on rubber or tracks), **and** lifting over live equipment.
- Required for all personnel lifts. See Personnel Lifting Check Sheet **(Appendix F)**.
- Any lift where the lifting device is setup over any underground installations needing **special treatment** or where the integrity of the ground (soil/cement/stone) is questionable requiring significant soil investigation and site remediation work to protect underground services/systems.
- A portion of the lifting device, load or rigging is within 3m of high voltage lines or conductors > 750 volts.
- Cold Weather Lifts:
    - At temperatures colder than –15°C all possible precautions should be taken to avoid impact or shock loading on cranes and rigging. At these temperatures operations involving hydraulic cranes shall be conducted with due regard to potential failure of hydraulic components.
    - In cold weather operation between –15ºC and –30ºC, cranes shall be de-rated as per manufacturer specifications or by 25% if not specified.

1.3 Serious Lift Classification

Lifts meeting any of the conditions listed below will be classified as a Serious Lift.

- The load is between 30-50 tons, not lifting over or near live equipment and operating 80% or below of its rated capacity.
- Lift height between 200 and 300 ft.
- Two lifting devices are required for the lift (includes tailing crane) and the lift is 50% or less than the rated capacity at any point during the lift.
- The load is < 5,000 lbs. and the lifting device is operating between 50% and 80% of its rated capacity, and lifting over or near live equipment.
- The Load is > 5,000 lbs. and the lifting device is operating 50% or below of its rated capacity and lifting over or near live equipment.
- Lifting device will travel with a load while the Lifting Device is operating 50% or less of its rated capacity (on rubber or tracks), and lifting over live equipment.
- Lift/Load has unusual characteristics that increase the risk of performing the lift; i.e. rigging is very complex, load geometry makes wind loading a concern, extremely tight tolerances between load and adjacent equipment, etc.
- A portion of the lifting device, load or rigging is within 6m but not closer than 3m from high voltage lines or conductors > 750 volts.
- Lifting device operator cannot see the load, and multiple safety watches are required to monitor load/ball location during the lift (e.g. lifting into Reactors or other very confined spaces).
- Lifts over equipment in the Alkylation unit containing concentrated and trace Hydrofluoric (HF) acid. See appendix D-5 for clarification

1.4 Standard Lift Classification

Lifts meeting any of the conditions listed below will be classified as a Standard Lift.

- The load is < 30 tons, **and** not lifting over or near live equipment **and** the lifting device is operating 80% or below of its rated capacity.
- Lift height is < 200 feet.
- Single Crane Lift.
- The load is < 5000 lbs. and the lifting device is operating 50% or below of its rated capacity and lifting over or near live equipment.
- Lifting device will travel with a load if the lifting device is operating 80% or below of its rated capacity (on rubber or tracks), and not lifting over live equipment.
- No portion of the lifting device, load or rigging is within 6m of high voltage lines or conductors > 750 volts.

1.5 Critical Lift Plans

Lift Plans classified as “Critical” require the following risk controls:

- Crane operator License
- TASC
- JSA
- Copies of test certificates for slings and shackles
- Engineered Lift Study stamped by a Professional Engineer
- Critical Lift Authorization Form **(Appendix C-1)**
- Critical Lift Checklist **(Appendix C-2)**
- Safety Pause

1.6 Serious Lift Plans

Lift Plans classified as “Serious” require the following risk controls:

- Crane operator license
- TASC
- JSA
- Copies of test certificates for slings and shackles
- Serious Lift Calculation and Authorization Form – **(Appendix D-1)**
- Serous Lift Checklist **(Appendix D-2)**
- Serious Lift Detailed Rigging Plan **(Appendix D-3)**
- Serious Lift Detailed Rigging Plan – Sketch **(Appendix D-4)**
- Safety Pause

1.7 Standard Lift Plans

Lift Plans classified as “Standard” require the following risk controls:

- Crane operator License
- TASC
- JSA – may be prepared for a series of standard lifts provided the risks and controls remain the same.
- Standard Lift Checklist – including capacity calculation for single crane lifts **(Appendix E)** – may be used for a series of standard lifts provided the risk and controls remain the same.
- Safety Pause – may be conducted for a series of standard lifts provided the risks and controls remain the same.

2.0 CRANING AND RIGGING RESPONSIBILITIES

2.1 Project Manager (Capital) / Execution Supervisor (Maintenance and Turnaround)

- Ensures the appropriate lift plan is used for the classification of lift.
- Require and confirm that third parties providing cranes and/or operators are in compliance with this standard.
- Require and confirm that key personnel (Crane Owner, Crane Operator, Supervisor / Lift Coordinator, Lift Engineer / Rigging Specialist and Rigger) know and understand their roles and responsibilities as prescribed in this standard.
- Consult with Crane Owner and Lift Supervisor / Lift Coordinator to determine if any site preparation is required.
- Confirm all lifts have been planned and appropriately assessed, including emergency action plans.
- Confirm all permits for crane activities are issued as appropriate.
- Designate a Lift Coordinator for all critical and serious lifts.
- Ensure the Supervisor / Lift Coordinator is aware of the relationship between the load, rigging and crane risks as it relates to the specific job site and the individual craning and rigging responsibilities.
- Ensure stability of ground area is communicated to the Supervisor / Lift Coordinator. (Reference: Occupational Health and Safety Act, Section 156 (b).
- Ensure only certified personnel baskets are used to perform work in a suspended hoisting operation. See **Personnel Lifting Check Sheet (Appendix F)**.

2.2 Planner (Maintenance)

- Ensures the appropriate lift plan is used for the classification of lift.
- Consult with Crane Owner and Lift Supervisor / Lift Coordinator to determine if any site preparation is required.
- Confirm all lifts have been planned and appropriately assessed.

2.3 Supervisor / Lift Coordinator

The Supervisor/Lift Coordinator has the ultimate responsibility for the safe and effective execution of the lift.

The Supervisor / Lift Coordinator responsibilities include:

- Serving as a member of the Lift Assessment Team that determines what classification of lift applies.
- Ensuring the appropriate lift plan is used for the classification of lift.
- Participating in the development of lift plans.

- Ensuring appropriate personnel review lift plans.
- Providing a well prepared working area for the crane before it arrives, so the job can be done safely. Site preparation includes:
    - 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.
    - Ensuring access roads are adequately prepared.
    - Ensuring 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.
    - Using blocking to support the boom while it is being assembled and dismantled.
    - Providing blocking and or mats under outriggers as required.
    - Ensuring 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.
    - Ensuring operating locations are far enough away from shoring, excavations, trenches, buried utilities, foundations, etc., to eliminate risk of collapse.
    - Positioning the appropriate barricades to prevent entry into restricted areas around the crane including the swing and tail swing areas.
    - Submitting traffic plans in advance to Suncor for all road closures, restricted access, road side work, etc.
- Holding 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.
- Verifying that the crane operator is properly certified and competent to safely perform the lift and use the equipment designated.
- Informing the crane operator of any hazardous site conditions, e.g., water lines, sewers, overhead power-lines, etc.
- Ensuring that the correct load weight, center of gravity and maximum radius required for the lift have been accurately determined.
- Communicating the combined load weight (rigging and load) to the crane operator. The Supervisor / Lift coordinator should know the maximum radius, load weight and lift height of each “pick” before ordering the crane.
- Ensuring 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 in accordance with the Engineered Plan, then the lift must be stopped until a formal review has been conducted and all parties understand the revised plan. If changes are made to the lift plan / procedure or lift study, they must be documented and approved.

- Physically verifying the lift radius.
- Ensuring the traffic control plan is communicated.
- Ensuring any potential failure area measures, if required, are approved, implemented and communicated.
- Working with the site owner to develop an emergency action plan and communicating it to all personnel involved with the lift.
- 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.
- Supervising the rigging crew.
- Ensuring that the load is properly rigged for lifting and determining that the load is secure and balanced before lifting more than a few centimeters above the support.
- Checking the crane charts to ensure the machines are rigged in the optimum configuration.
- 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.
- 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. An orange florescent vest is required for the signaler.
- Ensuring the safety of the rigging crew and all other personnel with the potential of being affected by the rigging operation.
- Ensuring that all required safety precautions are taken when the lift is in the vicinity of power lines.
- Ensuring that all personnel involved directly or indirectly by the operation know and understand their roles, responsibilities and applicable restrictions.
- Assessing weather conditions at the time of the lift to confirm the lift can proceed safely, e.g. wind, precipitation, cold weather, lightning, etc.

2.4 Crane Owner / Supplier

The Crane Owner is the company that owns the physical asset. They are responsible for:

- Providing equipment capable of completing the job in a safe and efficient manner, in accordance with all applicable legislation.

- Ensuring that all personnel involved in maintaining, repairing, transporting, assembling and operating the equipment are well trained, experienced and competent to handle their specific jobs in a safe and efficient manner.
- Ensuring that hook block (s) have its load rating and weight legibly cast or stamped on it in a conspicuous location. Reference OH&S Act 174.
- Ensuring that a thorough crane maintenance and inspection program is established and maintained according to manufacturer's recommendations and specifications. This involves developing crane reports or records that facilitate the reporting of all work needed and completed on the crane.
- Ensuring an outrigger or stabilizing device used on crane or similar hoisting device shall be extended to meet load chart requirements and shall rest on blocking able to support the crane or similar hoisting device and its maximum load without failure or settlement which affects its stability. Reference OH&S Act 156(a&b).
- Ensuring that traveling with a load will be in accordance with the manufacturer's recommendations and a Job Safety Analysis review.
- Ensuring cranes have an anti-two block device to warn the operator of two block situations.
- Certification to include both mechanical and hoisting components of carrier and crane as per N/CSA-Z150.98 Safety Code on Mobile Cranes.
- The owner of the crane shall keep a permanent record of all inspections, tests, repairs, modifications and maintenance of the crane. This record shall be kept with the crane for the preceding twelve months or for the length of the project, whichever is greater.

2.5 Crane Operator

The crane operator is responsible for the safety of the cranes 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, all hazards rectified and safety conditions assured.

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

- Knowing the machine functional capability, limitations and its particular operating characteristics.
- Being totally familiar with the information contained in the crane's operating manual and to understand the crane's limitations, including any attachments.
- Proper set up of the crane as per the manufacturer's specifications, "Best Practice" and site rules.

- 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.
- 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.
- Informing the owner of any problem, needed maintenance or necessary repairs to the machine. This must be done in writing, in the machine's log book or inspection report prior to the end of the operators shift. If the concern creates an immediate safety hazard, the crane shall be shut down until repairs can be completed.
- 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.
- Being aware of any site conditions that could affect the crane operation such as, underground pipe-ways, culverts and particularly around power lines. 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 law.
- Access roads are adequately prepared.
- Reviewing the planned operation and requirements with the site supervision.
- Finding out the load and rigging weight and determining where the load is to be placed.
- Determining the number of parts of hoist line required.
- Checking the load chart to ensure the crane has sufficient load capacity for every lift.
- Selecting (from the range diagram) 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.
- Assembling/disassembly, of the crane (including attachments, rigging and testing) properly in accordance with manufacturer's specifications.
- Following the manufacturer's operating instructions in accordance with the load chart.
- Considering all factors that might reduce crane capacity and adjusting the load weight to suit.
- Knowing basic load rigging procedures and ensuring that they are applied – when the load is visible to the operator.
- Maintaining a secure communication process with signal persons.
- Assess weather conditions at time of lift to confirm lift can safely proceed, if wind speed exceeds manufacturer's specifications, lift plan specifications, or sail area of lift is too great, the lift is to be stopped.
- Moving the crane safely around the work-site.

- Ensure appropriate vehicle entry authorizations for restricted work areas are to be obtained from the respective permit center prior to work commencing.
- Shutting down and securing the machine properly when it is unattended or in the event of an onsite emergency.

2.6 Lift Engineer / Rigging Specialist

The Lift Engineer / Rigging Specialist shall be a Professional Engineer and/or deemed by the employer to be appropriately trained in the preparation and development of lifting studies.

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.

The Lift Engineer / Rigging Specialist responsibilities include:

- Ensuring the protection of life, limb and property through the sound application of knowledge, training and experience.
- Providing technical support and resources for the planned lift.
- Investigating and understanding the nature of the lift, in regards to:
    - What is to be lifted i.e., size, weight, center of gravity, special conditions, etc.
    - The initial and final position, orientation, elevation, etc., of the load to be lifted.
    - Any special weather/climate conditions or concerns.
    - Special ground, area conditions, or concerns i.e., soil compaction, matting requirements to ensure stable ground conditions for the crane.
    - Pre-determined equipment requirements and availability.

- Designing the lift including:
    - Identifying the optimum location for the cranes for capacity and clearance from obstacles.
    - Planning how the crane(s) will physically make the lift.
    - Identifying crane(s) travel or swing.
    - Sizing 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.
    - Calculating the point loading on all cranes involved in the lift, i.e., tracks and outriggers.
    - Sizing, designing and/or detailing the rigging hardware to suit the lift.

- Specifying the rigging, sling diameter, length and quantity.
- Selecting shackle size, clearance and quantity.
- Selecting and detailing any new items required.
- Preparing drawings, plans and specifications as required.

- Planning the lift including:
  - Reviewing drawings and/or site information to verify access and clearances, identifying obstructions, and eliminating interferences with respect to the lift.
  - Verifying lift lug information, both head and tail if required.
  - Verifying crane charts, boom length, and accessories required.
- Communicating the lift including:
  - Issuing drawings, plans and specifications to the people who will make the lift.
  - Reviewing, discussing and revising as required with the people who will make the lift.

2.7 Rigger

A competent worker (qualified because of knowledge, training and experience) shall be designated as the Rigger.

The Rigger's responsibilities include:

- Rigging loads and equipment to the manufacturer's recommendations.
- Interpreting the sling charts and lift plans.
- Identifying appropriate rigging components for the load to be lifted.
- Visually inspecting rigging components on a regular basis and prior to each lift to ensure compliance with appropriate Standards, Codes, Specifications and Procedures.
- Knowing and understanding the general operating parameters of cranes.
- Being capable of identifying different rigging components and to be knowledgeable in their proper application.
- Being capable of performing inspections of applicable rigging components to ensure they are in an adequate condition to perform the lifting tasks.
- Being capable of reading Wire Rope/Synthetic Sling capacity charts.
- Being knowledgeable of the different sling configurations available and know which to use on different load applications.
- Being knowledgeable of the weight of the load to be lifted.
- Being knowledgeable and capable of using the hand signal chart for hoisting and moving loads.
- Giving all signals in a slow, smooth and decisive manner.

- Being aware of overhead hazards and obstructions.
- Being aware that the swing path must be kept clear of vehicular and pedestrian traffic.
- Being aware that the load should never be brought over the top of people.
- Communicating with the crane operator throughout all stages of the rigging process.
- Ensuring all required tag lines are installed and used.
- Ensuring all required barricades are in place prior to lifting the load.
- Ensuring the lift zone is cleared of all workers within the swing area prior to lifting the load.

3.0 INCIDENT REPORTING

ALL crane incidents shall be reported and investigated to determine the root cause. Incidents to be reported include:

- Personal injuries.
- Operating a crane outside of its manufactured specifications.
- Shock/Impact loading.
- Boom contact.
- Any repairs or modifications made to a crane that have not been approved by a professional engineer or in some instances the manufacturer.
- Observed changes or modifications that cannot be substantiated with proper documentation.
- Mechanical and structural equipment damage.
- Rigging damage.
- Load shifting or dropping.
- Engineered lifts that do not work as planned.
- Near misses.
- Environmental incidents.
- Equipment upset (crane tipping over).
- Operation without outriggers - except when using the on rubber chart.
- Known operation outside of load charts.
- Encroachment on power lines.
- Radio infringements.

4.0 PERSONNEL LIFTING

The person specifically responsible for the overall work function to be performed shall determine that there is no practical alternative method to perform the needed work or gain

access to the area, and shall authorize its usage. See **Personnel Lifting Check Sheet (Appendix F)**.

5.0 RIGGING DEVICES AND ANCHOR POINTS

5.1 Rigging Devices

All rigging devices (including overhead cranes) shall be:

- Inspected, tested and certified on an annual basis by a qualified hoisting and rigging inspector.
- Inspected before each use by a qualified worker (because of knowledge, training and experience) authorized by supervision to inspect rigging devices.
- Suitable for its intended use.
- Suitable and capable of supporting the object being rigged or hoisted.
- Arranged to prevent the object or any part of the object from slipping or falling.
- Capable of supporting at least five times the maximum load to which it may be subjected.
- Be arranged so that the workers are not beneath the suspended load.

5.2 Anchor Points

All anchor points used in rigging applications shall be:

- Capable of supporting at least five times the maximum load to which it may be subjected.
- Inspected before each use by a qualified worker (because of knowledge, training and experience) authorized by supervision to inspect anchor points.

6.0 BEAM TROLLEY & MONORAIL SYSTEMS

A competent worker must complete a Visual Pre-use of Inspection of the Beam Trolleys before each use to confirm:

- Capacity of beam is clearly marked and legible.
- Beam trolley is able to support the load of items being rigged.
- Visually confirm beam trolley has adequate trolley stoppers in place at both ends of the beam.
- Beam trolleys must be travel to each end of the beam to ensure that trolley stoppers are adequate and will prevent the trolley from going past the stoppers.
- Ensure there are no obstructions on the Beam to prevent the safe travel of the trolley.

7.0 EXCEPTIONS

Any deviation to this standard requires approval through the Suncor Management of Change process.

8.0 REFERENCES

Ontario Construction Regulations 213/91: Cranes, Hoisting and Rigging; Sections 150 – 156; Cables, Slings, Rigging; Sections 168 – 180

END OF STANDARD

REVISION LOG

Date (MM/DD/YYYY)	Revision	Section	Comments	Editor (Name)
06/16/2014	Original	All	New Document in Livelink. Replaces previous Crane and Rigging Standard on the Temp Drive.	D. Allen
-	-	-	Added Livelink number to headers. eSign page lost due to Edit. Approved by Peter Lynch.	J. Boilard
1/15/2019	1	Serious Lift criteria	Serious lift criteria changed: Serious lift Appendix added (New)	T. Richard
11/07/2019	2	Beam Trolley / Monorail System	Added in a section for safe use of beam trolley / monorail systems.	L. Nield

Appendix A-1 – Mobile Crane Lift Classification Criteria

Parameter	Critical	Serious	Standard
Weight	• Load is > 50 tons or the lifting device is operating above 80% of its rated capacity	• The load is between 30-50 tons, not lifting over or near live equipment and operating 80% or below of its rated capacity	• The load is < 30 tons, **and** not lifting over or near live equipment **and** the lifting device is operating 80% or below of its rated capacity
Height	• Lift height above 300 ft.	• Lift height between 200 and 300 ft.	• Lift height is < 200 feet
Multiple Crane	• Two lifting devices are required for the lift (includes tailing crane) and the lift is > 50% of the rated capacity for either crane at some point during the lift	• Two lifting devices are required for the lift (includes tailing crane) and the lift is 50% or less *than the rated* capacity at any point during the lift	• Single Crane Lift
Lifts over live equipment	• The load is > 5,000 lbs. and the lifting device is operating above 50% of its rated capacity and lifting over or near live equipment	• The load is < 5,000 lbs. **and** the lifting device is operating between 50% and 80% of its rated capacity, **and** lifting over or near live equipment • The Load is > 5,000 lbs. and the lifting device is operating 50% or below of its rated capacity and lifting over or near live equipment • Lifts over equipment in the Alkylation unit containing concentrated and trace Hydrofluoric (HF) acid	• The load is < 5000 lbs. **and** the lifting device is operating 50% or below of its rated capacity **and** lifting over or near live equipment

Appendix A-2 – Mobile Crane Lift Classification Criteria

Parameter	Critical	Serious	Standard
Traveling with load	• Lifting device will travel with a load while the lifting device is operating > 50% of its rated capacity (on rubber or tracks), **and** lifting over live equipment	• Lifting device will travel with a load while the Lifting Device is operating 50% or less of its rated capacity (on rubber or tracks), **and** lifting over live equipment	• Lifting device will travel with a load if the lifting device is operating 80% or below of its rated capacity (on rubber or tracks), **and not** lifting over live equipment
Personnel Lift	• Required for all personnel lifts		
Integrity of Ground / Subsurface interference	• Any lift where the lifting device is setup over any underground installations needing **special treatment** or where the integrity of the ground (soil/cement/stone) is questionable requiring significant soil investigation and site remediation work to protect underground services/systems		
Complicated Rigging		• Lift/Load has unusual characteristics that increase the risk of performing the lift; i.e. rigging is very complex, load geometry makes wind loading a concern, extremely tight tolerances between load and adjacent equipment, etc.	

Appendix A-3 – Mobile Crane Lift Classification Criteria

Parameter	Critical	Serious	Standard
Lifts near high voltage lines	• A portion of the lifting device, load or rigging has the potential of being within 3m of high voltage lines or conductors > 750 volts	• A portion of the lifting device, load or rigging is within 6m but not closer than 3m from high voltage lines or conductors > 750 volts	• No portion of the lifting device, load or rigging is within 6m of high voltage lines or conductors > 750 volts
Lift visibility		• Lifting device operator cannot see the load, and multiple safety watches are required to monitor load/ball location during the lift (e.g. lifting into Reactors or other very confined spaces)	
Cold Weather	• In cold weather operation between –15°C and –30°C, cranes shall be de-rated as per manufacturer specifications or by 25% if not specified.	• In cold weather operation between –15°C and –30°C, cranes shall be de-rated as per manufacturer specifications or by 25% if not specified.	• In cold weather operation between –15°C and –30°C, cranes shall be de-rated as per manufacturer specifications or by 25% if not specified.

Appendix B – Risk Controls – Mobile Crane Lifts

Critical	**Serious**	**Standard**
• Operator License	• Operator License	• Operator License
• TASC	• TASC	• TASC
• JSA	• JSA	• JSA (May be prepared for a series of lifts provided the risks and controls remain the same.)
• Copies of test certificates for slings and shackles	• Copies of test certificates for slings and shackles	
• Engineered Lift Study stamped by Professional Engineer		
• Critical Lift Authorization Form		
• Critical Lift Checklist		
• Safety Pause	• Safety Pause	• Safety Pause (May be conducted for a series of lifts provided the risks and controls remain the same.)
	• Serious Lift Calculation and Authorization Form	
	• Serious Lift Checklist	
	• Serious Lift Detailed Rigging Plan (Appendix D-2B) • Serious Lift Detailed Rigging Plan –Sketch (Appendix D-2C)	• Standard Lift Checklist (May be used for a series of lifts provided the risks and controls remain the same.)

Appendix C – Critical Lift Authorization Form

The Critical Lift Authorization Form shall be completed by the Crane Supervisor and approved where indicated:

Permit Number:

Job Description: _____

Location:

Contractor Name:

Description of Item to be lifted: _____

Major Hoisting Equipment to be used:

1. _____ 2. _____

Equipment & Lift Relationship:	**Crane #1**	**Crane #2**
1. Operating Radius		
2. Boom Length		
3. Allowable Load Weight:		
a. Load		
b. rigging /spreader bars		
c. block or ball		
d. effective jib		
e. stowed jib		
f. other rigging jib		
g. load lines jib		
h. aux. boom head jib		
i. Total weight to be lifted jib		

	Crane #1	**Crane #2**
4. Ratio of lift to allowable load:		
a. Capacity from the chart		
b. % of capacity		
c. Ratio of lift to allowable load		
5. Clearance between boom & lift:		
6. Clearance to surrounding facilities:		

How was the weight of the critical lift obtained?

A. Certified Scale Weight: Yes ☐ No ☐

B. Calculated independently : Yes ☐ No ☐

C. Has taken into account all modifications, including internals as well as an allowable for scale, sediment, sludge, insulation, liquid, etc. Yes ☐ No ☐

D. Should this weight be verified by independent source: Yes ☐ No ☐

Stability of Ground Area:

A. Are the soils deemed to be acceptable? Yes ☐ No ☐ If No, is compaction testing required? Yes ☐ No ☐

B. Will mats be required? Yes ☐ No ☐ Size: _____

C. Any underground installations needing special treatment? _____

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
Construction Coordinator (Capital) / Execution Supervisor (Maintenance / TA)			
Contractor Supervisor			
Supervisor / Lift Coordinator			
Operations Area Manager or designate			

Appendix C-1 – Critical Lift Checklist

This lift has been classified as a Critical Lift based on the Sarnia Crane and Rigging Standard, Mobile Crane Classificatio Criteria (Appendix A-1, A-2, A-3).

This checklist shall be completed prior to the Critical Lift by the Crane Operator and approved where indicated.

Operator (Name & License Number) _____ _____

PRE-LIFT CHECKLIST		YES	NO	NA
1.	The crane is the correct model.			
2.	Crane setup as the lift plan (radius, configuration, etc.)			
3.	Crane Operator is experienced with this crane.			
4.	The crane has been inspected? (Annual/Daily)			
5.	Job Safety Analysis has been reviewed			
6.	Rigging is connected as per plan.			
7.	Are all required approvals and permits completed?			
8.	Weather conditions and wind speed acceptable.			
9.	Has the stability of the ground been inspected			
10.	Mats or blocking place under outrigger pads.			
11.	Electrical equipment and power lines prepared correctly			
12.	Grounding of all equipment as necessary			
13.	Rigging inspected for defects/capacity.			
14.	Connecting/disconnecting plan been approved.			
15.	Have the safety precautions been reviewed?			
16.	Is survey equipment required?			
17.	The total lifted weight is as recorded on The Critical Lift Authorization Form?			
18.	Signal person(s) assigned.			
19.	Hoist area and load path cleared of non-essential personnel.			
20.	Has crane tail swing and load path been barricaded?			
21.	Rigging and tag lines installed.			
22.	Critical Lift Authorization Form complete?			
23.	Copies of test certificates for all slings.			
24.	All shackles magnetic-particle inspected prior to use.			
25.	All engineered lift studies stamped by a Professional Engineer.			

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
Construction Coordinator (Capital) / Execution Supervisor (Maintenance / TA)			
Contractor Supervisor			
Supervisor / Lift Coordinator			

Appendix D-2 – Serious Lift Calculation and Authorization Form

The Serious Lift Calculation and Authorization Form shall be completed by the Crane Supervisor and approved where indicated.

Job Description:		**Location:**	**Contractor Name:**	
GROSS CAPACITY (value on load chart)	lbs.	PERCENTAGE OF GROSS CAPACITY (gross load divided by gross capacity x 100)		
LOAD RADIUS (actual measured radius)	feet.	MAXIMUM WORKING RADIUS (on load chart)		feet.
NET LOAD (actual weight of load)	lbs.	BOOM ANGLE @ MAXIMUM RADIUS		degree.
DEDUCTIONS:		**NET CAPACITY** (Gross capacity minus total deductions)		lbs.
Rigging Weight	lbs.	PERMITTED AREA OF OPERATION:		
Spreader Bars etc.	lbs.	Over Side?	Yes ☐	No ☐
Load Block Weight	lbs.	Over Rear?	Yes ☐	No ☐
Headache Ball Weight	lbs.	Over Front?	Yes ☐	No ☐
Effective Jib Weight	lbs.	CRANE CONFIGURATION		
_____Parts of Line	lbs.	Main Boom		feet.
TOTAL DEDUCTIONS	lbs.	Jib Length		feet.
GROSS LOAD (net load plus total deductions)	lbs.	Luffing Jib		degree.

SPECIAL CONDITIONS	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

Operations Area Manager or designate	Shall collaborate with the Suncor area coordinator (maintenance/capital/turnaround) to confirm that alternate lifting schemes have been evaluated. If we can complete the lift safely not over live equipment specifically in the Alky unit containing concentrated or trace HF acid this method must be executed.

Approvals	**Print Name**	**Signature**	**Date**
Suncor Coordinator Maintenance/Capital/TA			
Contractor Supervisor			
Supervisor / Lift Coordinator			
Operations Area Manager or designate			

Appendix D-2A – Serious Lift Pre Lift Checklist

This lift has been classified as a Serious Lift based on the Sarnia Crane and Rigging Standard, Mobile Crane Classification Criteria (Appendix A-1, A-2, A-3).
This checklist is to be completed prior to the Serious Lift by the Suncor Coordinator Maintenance/Capital/TA and approved where indicated

Contractor:	Permit Number:	Crane Operator(s) Name:	License Number:

PRE-LIFT CHECKLIST

• The crane is the correct model	Yes ☐	• Detailed rigging plan has been completed?	Yes ☐		
• Crane setup as the lift plan (radius, configuration, etc.)	Yes ☐	• Connecting/disconnecting plan been approved	Yes ☐		
• The crane has been inspected? (Annual/Daily)	Yes ☐	• Have the safety precautions been reviewed?	Yes ☐		
• Job Safety Analysis has been reviewed	Yes ☐	• Is survey equipment required?	Yes ☐	No ☐	
• Rigging is connected as per plan	Yes ☐	• The total lifted weight is as recorded on Serious Lift Calc. Form?	Yes ☐		
• Are all required approvals and permits completed?	Yes ☐	• Signal person(s) assigned	Yes ☐		
• Weather conditions and wind speed acceptable	Yes ☐	• Hoist area and load path cleared of non-essential personnel	Yes ☐		
• Has the stability of the ground been inspected?	Yes ☐	• Has crane tail swing and load path been barricaded?	Yes ☐		
• Mats or blocking place under outrigger pads	Yes ☐	• Rigging and tag lines installed	Yes ☐		
• Electrical equipment and power lines prepared correctly	Yes ☐	If you cannot answer yes (when mandatory) to the requirements in the Pre-Lift Checklist prior to lifting, the job shall be stopped and re-evaluated.			
• Grounding of all equipment as necessary	Yes ☐				

If the lift were to fail - has the worst credible scenario been reviewed with the Operations area manager or designate?	Yes ☐
Are Operations prepared to initiate the emergency response plan based on worst credible scenario?	Yes ☐
Has the Console Operator and Shift Supervisor(s) been notified that the lift is being executed?	Yes ☐

Lift Failure: Worst credible scenario	Document worst credible scenario:

Approvals	Print Name	Signature	Date
Suncor Coordinator Maintenance/Capital/TA			
Contractor Supervisor			
Supervisor / Lift Coordinator			
Operations Area Manager or designate			

Appendix D-2B – Serious Lift Detailed Rigging Plan

To be completed by the Lift Engineer / Rigging Specialist

Plan the rigging: On a sketch show how the item will be rigged and the type of gear to be used.	
Show location of shackles, hoist rings, spreader beams, slings, etc.	Provide the weight of heavy equipment such as a lifter or spreader beam
Show attachment points (how rigging gear will be attached to load)	Show proper orientation of eyebolts
Show where padding of sharp edges are necessary	Indicate the center of gravity (horizontal and vertical)

Define Rigging Gear Requirements

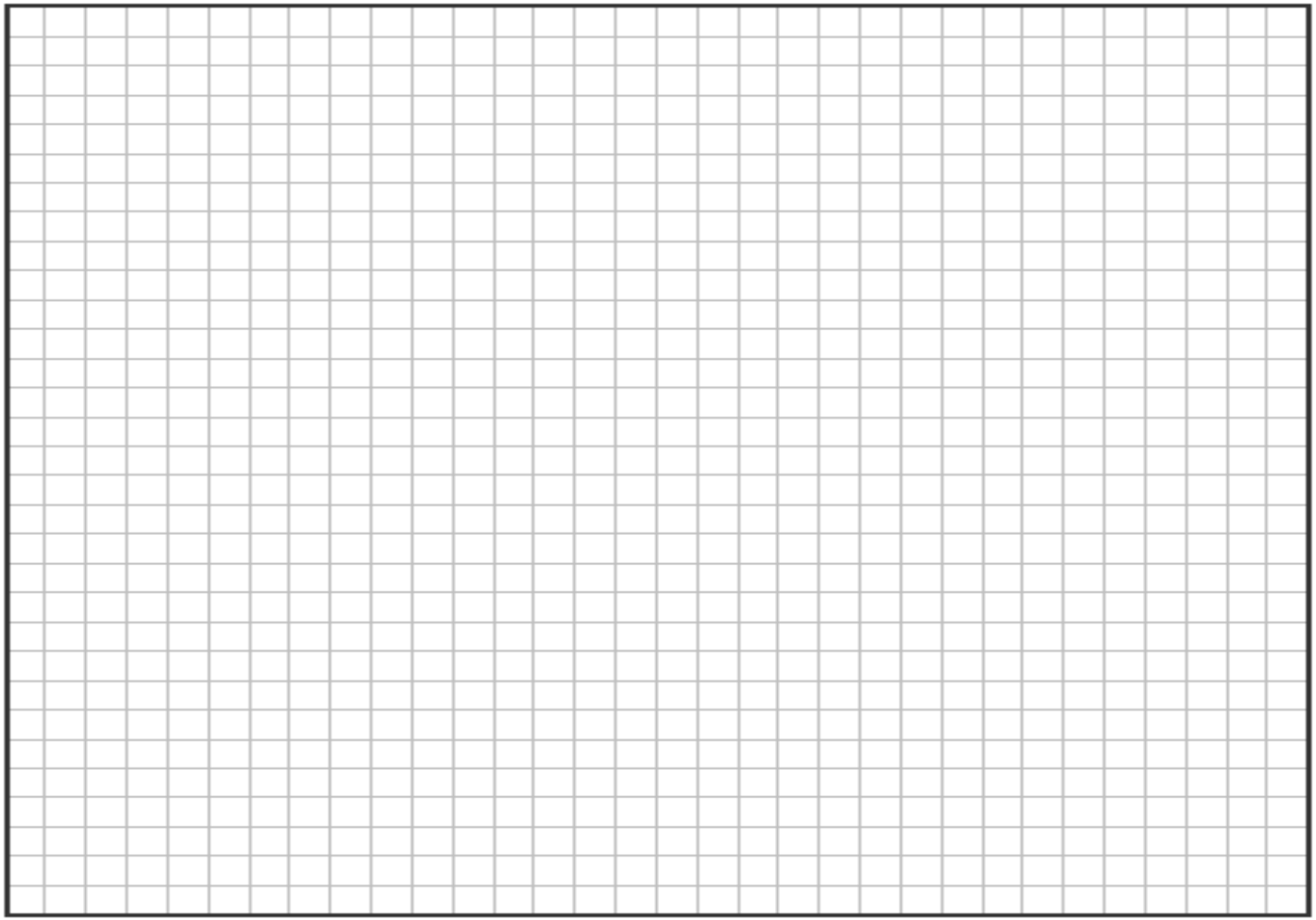
- List each piece of rigging gear shown on the rigging sketch or photo in the table (such as: load hook, shackles, slings, eye bolts).
- If a component weighs more than 10 pounds, include the weight in the weight column.
- Label the sketch or photo using the corresponding letter for the gear.
- Draw sling angles and the resulting load reduction factors for slings and eyebolts.
- Calculate the force on each piece of rigging gear. Show that angles are accounted for in determining forces.
- Determine the required rigging gear capacity and size. Indicate if this is an exact specification or a minimum.

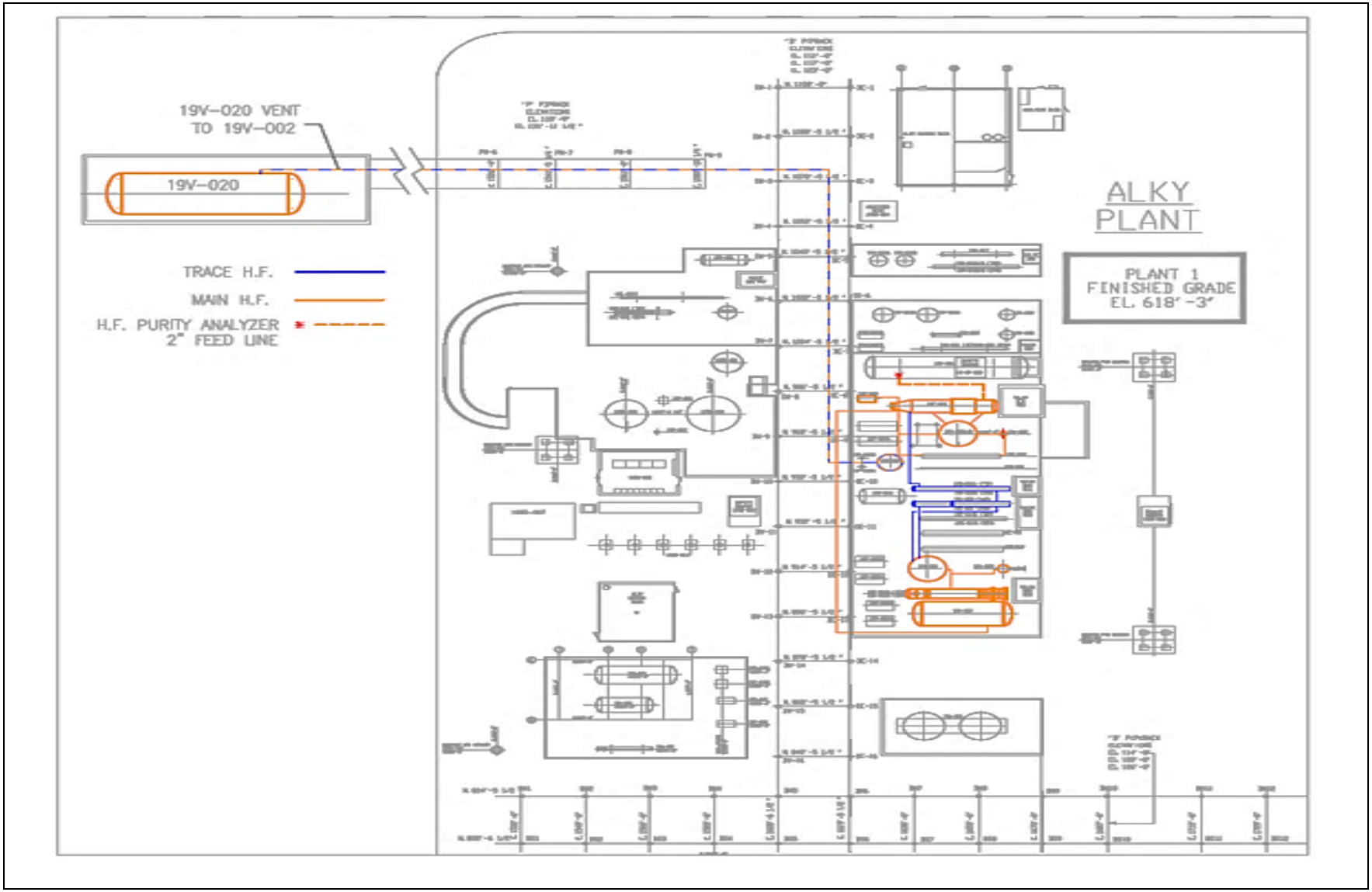
	Type	Weight	Force on rigging gear	Capacity / rating / working load limit	Size specification
A					
B					
C					
D					
E					
F					
G					
H					
I					
J					
K					
L					
M					
N					

NOTE: A photo of the equipment may be attached and marked up

Rigging Sketch or Photo of Rigged Item: To be completed by the Lift Engineer / Rigging Specialist

Include all information required to determine that the load is properly rigged and that appropriate rigging gear is selected. Include, as applicable, sling angles, eye bolt orientation, padding points, center of gravity, type of sling hitch, and any other pertinent information.




19V-020 VENT
TO 19V-002
19V-020
TRACE H.F.
MAIN H.F.
H.F. PURITY ANALYZER
2" FEED LINE
ALKY
PLANT
PLANT 1
FINISHED GRADE
EL. 618'-3"

Appendix E – Standard Lift Checklist

This lift has been classified as a Standard Lift based on the Sarnia Crane and Rigging Standard, Mobile Crane Classification Criteria (Appendix A-1, A-2, A-3).

This checklist shall be completed prior to the Standard Lift by the Crane Operator and approved by the Supervisor / Lift Coordinator.

CONTRACTOR: _____

Crane Model _____ Crane Capacity: _____ No. of parts of line _____

Boom Length _____ Radius: _____feet.

Weight of Load: _____lbs.

Weight of Block: _____lbs.

Weight of Ball: _____lbs. Capacity at Lift Radius: _____lbs.

Weight of Rigging: _____ lbs.

Weight of Jib: _____lbs. % of Capacity = Total Load X 100 = _____%

Misc: _____lbs. Rated Capacity lbs.

TOTAL WEIGHT: _____ lbs.

Operator Name & License Number _____ _____

PRE-LIFT CHECKLIST		YES	NO	NA
1.	The crane is the correct model.			
2.	Crane setup inspected (radius, configuration, etc.)			
3.	Crane Operator is experienced with this crane.			
4.	The crane has been inspected? (Annual/ Daily)			
5.	Job Safety Analysis has been reviewed			
6.	Rigging inspected for defects/capacity			
7.	All required approvals and permits completed?			
8.	Weather conditions and wind speed acceptable.			
9.	Has the stability of the ground been inspected?			
10.	Mats or blocking place under outrigger pads.			
11.	Electrical equipment and power lines identified as safe?			
12.	Grounding of all equipment as necessary			
13.	Connecting/disconnecting plan been approved.			
14.	Have the safety precautions been reviewed.			
15.	Is survey equipment required?			
16.	The total lifted weight has been verified.			
17.	Signal person(s) assigned.			
18.	Hoist area and load path cleared of non-essential personnel.			
19.	Has crane tail swing and load path been barricaded?			
20.	Tag lines installed.			

Approvals	**Print Name**	**Signature**	**Date**

Supervisor / Lift Coordinator

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.

Appendix F – Personnel Lifting Check Sheet

Personnel Lifting is considered a Critical Lift in accordance with the Sarnia Crane and Rigging Standard, Mobile Crane Classification Criteria (Appendix A-1, A-2, A-3)

The Personnel Lifting Check Sheet shall be completed by the Supervisor / Lift Coordinator. The Supervisor / Lift Coordinator and crane operator shall sign the checklist.

MAN BASKET CHECK LIST	PERMIT NUMBER
Contractor:	Date: Time:
Crane Identification:	Number of persons hoisted:
Basket weight:	MOL Number:
Work Description:	

All regulations MUST be followed from Section 153 of the OH&S Act and regulations

PRE-LIFT CHECK LIST	YES	NO
♦ Ensure conventional access cannot be used		
♦ Critical Lift documentations provided and reviewed		
♦ Crane has a revised load chart prepared by a professional engineer		
♦ Ministry of Labour has been notified		
♦ The design drawing of the platform are on site and have been reviewed		
♦ The platform has been inspected for any defects		
♦ Proper man basket hookup as per engineered drawings		
♦ Secondary suspension is adequately connected		
♦ JSA has been reviewed with all parties		
♦ Rescue plan has been developed and communicated to all employees involved		
♦ Check personnel safety equipment (fall arrest system)		
♦ Check weather conditions; (wind, lightening)		
♦ Work area flagged and tagged		
♦ competent person assigned to signal		
♦ adequate means of communication established		
♦ Tag line person designated		

COMMENTS:_____

_____

Supervisor / Lift Coordinator: _____

Crane Operator: _____

The following individuals have approved and signed this document.

UserName: Todd Murray (toddmurray)
Title: Manager EH&S Sarnia Refinery
Date: Thursday, 21 November 2019, 11:39 AM Mountain Time
Meaning:
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