



HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA) -DEVELOPMENT OF RISK CONTROL MEASURES

S.No.	ACTIVITY	HAZARD	CONSEQUENCE	PROBABILITY	SEVERITY	RISK LEVEL	RISK RATING	CONTROL MEASURES
ACTIVITY - 1: BRICK WORKS								
1	Storage of Bricks.	1. Height above 1.5 2. Improper Storage	1. Fall of Bricks 2. Personal Injury	4	3	MODERATE	3	1.Restrict Height of Storage to 1.5 M. 2. Adopt cross bar system of storage.
2	Transportation of bricks to the site.	1. Unsecured bricks 2. Rough and uneven Road.	1. Breakage of Bricks. 2. Personal Injury	3	2	LOW	2	1. Ensure Bricks carried are properly secured. 2. Defensive Driving.
3	Unloading Bricks.	1. Fall of a bricks. 2. Wrong Lifting Method	1. Personal Injury. 2. Back pain.	4	3	MODERATE	3	1. Safe handling. 2. Education of correct posture.
4	Shifting Bricks to the building site by Dumper.	1. Use of defective dumper 2. Mis-Operation	1. Damage to Dumper 2. Tilting of dumper	3	4	MODERATE	3	1. Use serviced dumper. 2. Deploy trained Operator. 3. Operate Slowly and carefully on rough road. 4. Provide trained Banksmen.
5	Shifting Bricks, Cement mortar, concrete etc., manually, (borrow).	1. Defective Wheel barrow 2. Loosing balancedue to uneven/ loose surface 3. Absent mindedness. 4. Hurry.	1. Overturning of wheelbarrow 2. Personnel Injury.	3	2	LOW	2	1. Use good serviceable wheel barrow. 2. Use Planks wherever necessary. 3. Be cautious. 4. Concentrate on job. 5. Know your surroundings.
6	Preparation of cement mortar and placing of bricks with cement.	1. Improper handling of cement bags. 1. Evolution of cement dust at work place. 2. Splashing of cement	1. Back pain. 2. Skin allergy. 1. Dust allergy for workmen 2. Eye/skin Injury.	4	3	MODERATE	3	1. Flow ergonomics. 2. Use of adequate PPE.
7	Shifting of cement mortar by	1. Defective Dumper. 2. Mis-Operation	1. Damage to Dumper 2. Tilting of dumper.	4	3	MODERATE	3	1. Use serviced dumper. 2. Deploy experienced operator.
ACTIVITY - 2: CONCRETE CHIPPING								
1	Chipping.	1. Bad condition of tools. 2. Foreign particles	1. Personal Injury. 2. Eye injury. 3. Tripping hazard.	2	3	LOW	2	1. Do not use defective tools. Select the right tools for right 2. Use adequate PPE. 3. Maintain good housekeeping. 4. Remove debris immediately.
ACTIVITY - 3: CONCRETING								
1	Concreting	1. Air pollution by cement. 2. Handling of ingredients. 3. Protruding reinforced rods. 4. Earthing of electrical mixers, vibrators etc.. Not done. 5. Falling of materials from height. 6. Continuous pouring of by same gang. 7. Revolving of concrete mixer/vibrators.	1. May affect Respiratory system. 2. Hands may get injured. 3. feet may get injured. 4. Can cause electrocution/asphyxiation. 5. Persons may get injured. 6. causes tiredness of workers and may lead to 7. Parts of body or clothes may get entrappd.	3	3	MODERATE	3	1. Wear respirators or cover mouth and nose with wet cloth. 2. Use gloves and other PPE. 3. Use Safety Shoes. 4. Provide platform with wooden planking above reinforcement for movement of workers. 5. Ensure earthing of equipments and proper functioning of electrical circuit before commencement of work. 6. Use hard hats. 7. Remove surplus materiil Immediately from work place. 8. Ensure lighting arrangement during night hours. 9. Insist on shift pattern 10. Provide adequate rest to workers between subsequen 11. Allow only mixer with hooper. 12. Provide safety cages around moving motors. 13. Ensure proper mechanical locking of vibrator.
2	Super - Structure	1. Air pollution by cement. 2. Handling of Ingredients. 3. Protruding reinforced rods. 4. Earthing of electrical mixers, vibrators etc.. Not done. 5. Falling of materials from height. 6. Continuous pouring of by same gang. 7. Revolving of concrete mixer/vibrators. 8. Deflection in props or shuttering materials	1. Shuttering / props may fall and collapseand prove fatal.	4	3	MODERATE	3	1. Use PPEs like gloves, shoes, helmets, etc.. 2. Avoid usage of make -shift tools.
3	Access to workplace	1. Passage to workplace	1. Improperly tied and designed props/planks may collapse	3	3	MODERATE	3	1. Ensure the stability and strength of passage before commencement of work. 2. Do not overload or stand under the passage.
ACTIVITY - 6: MANUAL EXCAVATION								
2	Pit Excavation upto 3m	1. Falling Into pit. 2. earth collapse. 3. Contact with buried electric 4. Gas/Oil Pipelines.	1. Personal Injury. 2. Suffocation/Breathlessness. 3. Buried. 4. Electrocution. 5. Explosion.	3	4	MODERATE	3	1. Provide guardrails/barricade with warning signal. 2. Provide atleast two entries/exits. 3. Provide escape ladder. 4. Provide suitable size of shoring and strutting if required. 5. Keep soil heaps away from edge equivalent to 1.5m or depth of pit whichever is more. 6. Do not allow vehicles to operate too close to excavated areas. Maintain atleast 2m distance from edge of cut. 7. Maintain sufficient angle of repose. Provide slope not less than 1:1 and suitable bench of 0.5m width at every 1.5m depth of excavation in all soil except hard rock. 8. Battering/Benching the sides. 9. Obtain permission from component authorities prior to excavation, if required. 10. Locate the position of buried utility by referring to plant 11. Start digging manually to locate the exact position of buried utility and thereafter use mechanical means.
ACTIVITY - 4: PLASTERING								
1	Plastering/Grouting	1. Inhalation of cement dust. 2. Absorption of cement. 3. Ingestion.	1. Bronchial disease 2. Irritation. 3. Prolonged exposure causes dermatitis. 4. Gastro-Intestinal	4	3	LOW	2	1. Wear respiratory protection. 2. Wear safety goggles and coverall. 3. Wash hands before taking food. 4. Take shower after reaching camp.
ACTIVITY - 5: SHUTTERING AND SHORING								
1	Shuttering/Handel ing of wooden planks and	1. Protruding nails. 2. Unsafe/Improper handling. 3. Improper housekeeping.	1. Personal Injury. 2. Tripping/slipping hazard.	3	4	MODERATE	3	1. Avoid Protrusion/projection of sharp edges. 2. Secure the load properly. 3. See that there is no strain on back.
2	Cutting wood to required size.	1. Misuse of cutting device. 2. Fall of tools and wood from height.	1. Hand Injury. 2. Improper cutting resulting in material loss. 3. Personnel Injury.	3	3	LOW	2	1. Deploy trained carpenter.
3	Preparation of shuttering on ground.	1. Flying nails while hammering. 2. Use of loose hammer.	1. Eye Injury. 2. Flying of hammer head resulting in personnel Injury.	3	4	MODERATE	3	1. Wear safety goggles. 2. Ensure that hammer handle is properly wedged and hammer is in good condition. 3. Keep persons away from hammering area.
4	Erection of shuttering.	1. Fall of shuttering.	1. Physical Injury and back pain.	2	4	MODERATE	3	1. Erection should be done standing over firm supports.



5	Erection of shuttering on height.	1. Fall of person or sutter. 2. Fall of loose materials.	1. Personal Injury. 2. Damage to the shutter. 3. Loss of materials.	3	4	MODERAT E	3	1. Use approved scaffolding. 2. Do not keep loose material on platform. 3. Deploy experienced workers.
6	De-shuttering & De-shoring	1. Fall of shuttering. 2. Protruding nails. 3. Loose nails on floor.	1. Injury to persons.	2	3	LOW	2	1. Deploy experienced workers. 2. Keep and alert third party persons to be away from the de-shuttering area. 3. Remove nails and stack shuttering materials properly. 4. Keep all removed nails in one container. 5. Maintain good housekeeping.
ACTIVITY - 6: REINFORCEMENT								
1	Reinforcement	1. Curtailment and binding of 2. Carrying of rods for short distancelat height. 3. Checking of clear distance/cover with hands. 4. Hitting projected rods and standing on cantilever rods.	1. Persons may get injured. 2. Workers may get injured on their hands and soulders. 3. Rods may cut or injure the fingers. 4. Persons may get injured and fall down. 5. May prove fatal. 6. Protruded rods may hit the persons.	3	3	MODERAT E	3	1. Use PPE like gloves, shoes, helmets, etc.. 2. Avoid usage of make -shift tools. 3. Provide suitable pads on shoulders and use safety gloves. 4. Tie up rods in easily liftable bundles. 5. ensure proper staging. 6. Use measuring devices like tape, measuring rods, etc.. 7. Use safety shoes and avoid standing unnecessarily on cantilever rods. 8. avoid wearing of loose cloths. 9. Provide safety nets.
2	Transportation of Rebar	1. Fall of material from height. 2.Hit by protruding bar.	1. Personal injury. 2. May prove fatal. 3. damage to Material/Property	4	3	MODERAT E	3	1. Use red flags/flights at the end. 2. Do not protrude the rods infront of or by the side of the drivers cabine. 3. Do not extend the rods 1/3rd of deck length or 1.5m whichever is less.
ACTIVITY - 7: SCAFFOLDING, FORMWORK AND LADDERS								
1	SCAFFOLEING, FORMWORK AND LADDERS	1.Persons can fall down. 2. Failure of scaffolding material. 3. material can fall down.	1. Person may sustain severe injuries and prove fatal. 2. Persons working at lower level get injured.	4	3	MODERAT E	3	1. provide guard rails for working at height. 2. Face ladder while climbing and use both hands. 3. Ladder shall extend about 1m above landing for easy access and tying up purpose. 4. Do notplace the ladder against amovable objects and maintain base at 1/4 ratio of the working length of the ladder. 5. Suspended scaffold shall not be less than 500mm wide and tied securely with ropes. 6. No loose planks shall be allowed. 7. Use PPE, like helmets, safety shoes etc.. 8. Inspect visually all scaffolding materials for stability and anchor with permanent structures. 9. Design scaffolding for max. load carrying capacity. 10. Scaffolding planks shall not be less than 250mm full thickness lumber or equivalent. These shall be cleated or 11. Do not overload the scaffolds. 12. Do not join short ladder to make alonge one. Vertical ladders shall not exceed 6m. 13. Remove excess material and scrap immediately. 14. Carry the tools only in a tool-kit bag. 15. Provide safety nets.
ACTIVITY - 8: PARKING OF VEHICLES IN PARKING AREA.								
1	vehicle parking in designated area.	1. Improper parking. 2. Uneven surface. 3. Defective hand brake. 4. Absence of wheel chock. 5. Non/Partial application of hand brake.	1. Rolling of vehicle resulting in fatality / injury. 2. Damage to vehicle / properties / live facilities nearby.	1	4	MODERAT E	3	1. Follow parking procedure 2. Level ground for parking. 3. Proper hand brake. 4. Wheel chockes in position. 5. Gear engagement.
ACTIVITY - 9: OPERATION OF COMPACTOR..								
1	1. Starting by pulling up with string. 2. Running compactor.	1. Inadvertent contact with vibrator. 2. Rotating parts. 3. Fall.	1. Accidents. 2. Damage.	2	4	MODERAT E	3	1. Pull the string gently avoiding ontact or hit against compector or near by personal. 2. Guarding. 3. Hold firm and move slowly.
ACTIVITY - 10: OPERATION OF VIBRATOR.								
1	Starting by pulling up with string	1. Inadverant contact with vibrator. 2. Rotating parts. 3.Klick back of hose. 4. Cement splash. 5. Fall of vibrator into 6. Fire hazard.	1. Injury. 2. Contact with body. 3. damage. 4. Burn Hazard.	2	4	MODERAT E	3	1. Pull the string gently avoiding ontact or hit against vibrator or near by personal. 2. Guarding. 3. Hold the hose firm while vibration is in use. 4. Keep in safe place. 5. Keep away from naked flames. 6. Keep DCP fire extinglisher ready.
ACTIVITY - 11: HANDLING AND LIFTING EQUIPMENTS (GENERAL).								
1	Handling and lifting equipments.	1. failure of load lifting and moving equipment. 2. Overloading of lifting equipments. 3. Overloading electrical wires.	1. can cause accident and prove fatal. 2. Can cause electrocution and fire.	3	4	HIGH	4	1. Avoid standing under the lifted load and within the operating radius of cranes. 2. Check periodically oil, brakes, gears, horns and tyry pressure. 3. Check size and condition of all chain pully blocks, slings, U-clamps, D-shackles, wire ropes etc.. 4. Allow crane to move only on hard, firm and levelle ground. 5. Allow lifting sling as short as possible and check gunny packlings at the friction points. 6. Do not allow crane to lift it boom while moving. 7. Install Safe Load Indicator. 8. Ensure load test certification by competent authority. 9. Safe lifting capacity of winches written on them shall be 10. The max. safe working load shall be marked on all the lifting equipment. 11. Check the weight of columns and other heavy items painted on them and accordingly decide about the crane capacity, boom and angle of erection. 12. allow only trained operators and riggers during crane 13. Do not allow the boom or other parts of crane to come within 3m reach of overhead HT cables. 14. Hook and load being lifted shall preferably remain in full visibility of Riggers and Operators.



ACTIVITY - 5: CONCRETE MIXER OPERATION

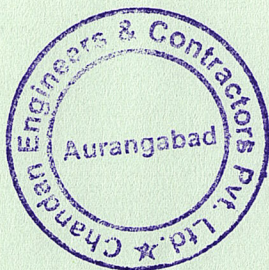
1	Deployment of Concrete pump	1. Poor mechanical condition	1. Failure of equipment 2.	3	4	MODERATE	3	1. Use good serviced equipment. 2. Deploy only licenced operators. 3. Engage Banksman.
2	Batching Plant. Truck Mixer.	1. Poor mechanical condition	1. Failure of equipment 2.	4	3	MODERATE	3	1. Use good serviceable equipment. 2. Deploy only licenced operators. 3. Engage Banksman.
3	Deployment of concrete mixture	1. Improper placement of mixture machine on uneven 2. Mis-Operation 3. Loose contact with electric connection 4. Rotating parts of machine 5. Unblocked wheels of concete mixture 6. Improper coordination	1. Tilting of mixture. 2. Damage to concrete mixture. 3. Electrical shocks. 4. Fire hazard. 5. Personnel injury. 6. Unwanted movement of concreted of truk 7. Mis- operation and injury	4	3	MODERATE	3	1. Ensure concrete mixture is placed on even surface with proper pegs. 2. Check for proper electrical connetions and insullation. 3. Keep adequate fire extinguishers. 4. Proper guards at all rotating parts of mechnery. 5. Position the mixer machine to disperse smoke easily into atmoaphere. 6. Clean the mixer machine after the concreting is over.

ACTIVITY - 6: MANUAL EXCAVATION

MODERA

2	Pit Excavation upto 3m	1. Falling into pit. 2. earth collapse. 3. Contact with buried electric 4. Gas/Oil Pipelines.	1. Personal injury. 2. Suffocation/Brea thlessnes. 3. Buried. 4. Electrocuton. 5. Explosion.	3	4	MODERATE	3	1. Provide guardrails/barricade with warning signal. 2. Provide atleast two entries/exits. 3. Provide escape ladder. 4. Provide suitable size of shoring and strutting if required. 5. Keep soil heeps away from edge equivalent to 1.5m or depth of pit whichever is more. 6. Do not allow vehicles to operate too close to excavated areas. Maintain atleast 2m distance from edge of cut. 7. Maintain sufficient angle of repose. Provide slope not less than 1:1 and suitable bench of 0.5m width at every 1.5m depth of excvaton in all soil except hard rock. 8. Battering/Benching the sides. 9. Obtain permission from component authorities prior to excavation, if required. 10. Locate the position of buried
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ACTIVITY - 7: MECHANICAL EXCAVATION



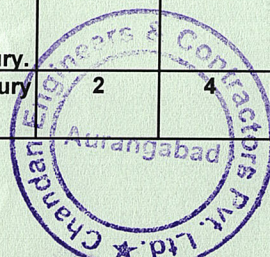
1	Excavation using machinery	<ol style="list-style-type: none"> Defective machinery. Mis-Operation Inadvertent operation Working near the edge of excavation Working near utilities Working near overhead lines Fall of heavy objects Stone, boulder, soil etc.. Into excavated pit. Fall of person into pits. Dust. Congested work site, too many persons working in the Noise during rock breaking, heavy equipment operation. 	<ol style="list-style-type: none"> Damage to the machinery. Damage to underground electrical, telecom cables and Fall of machinery into pit. Pipe lines rupture/explosion injury. Shock/fatality. fatal injury. Lung complaints. Eye injuries. Hit injuries. Hearing impairment. Injury due to hit or collision. Hit and damage to overhead structure. 	3	5	HIGH	4	<ol style="list-style-type: none"> Adhere to Permit to work system if applicable. Check machine thoroughly before starting the job. Use good and serviced machines. Look for route markers. Make trail pits and expose underground cables, if any. Look for warning tapes, cable covering mats concrete saddles and padding. Use cable detectors. Adhere strictly to manual excavation in case underground cables are present. Follow safety procedure. operate machinery keeping safe distance to avoid excavation area landslide. Deploy trained banksman. Keep away from the edge of excavation. Provide barrier away from the edge of excavation. provide sign boards and blinking lights. Edge of excavation shall be 0.5m away from high pressure Keep 1.5m away from overhead LT lines. Use only approved equipment and competent operators. No entry into pit during excavation. Keep removed earth at least 1m away from the pit. Provide shuttering/shoring. Remove the excavated earth immediately. Do not keep heavy objects on the
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ACTIVITY - 8: PLASTERING

1	Plastering/Grooving	<ol style="list-style-type: none"> Inhalation of cement dust. Absorption of cement. Ingestion. 	<ol style="list-style-type: none"> Bronchial disease Irritation. Prolonged exposure causes dermatitis. 	4	3	LOW	2	<ol style="list-style-type: none"> Wear respiratory protection. Wear safety goggles and coverall. Wash hands before taking food. Take shower after reaching camp.
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ACTIVITY - 9: SHUTTERING AND SHORING

1	Shuttering/Handling of wooden planks	<ol style="list-style-type: none"> Protruding nails. Unsafe/Improper 	<ol style="list-style-type: none"> Personal injury. Tripping/slipping 	3	4	MODERATE	3	<ol style="list-style-type: none"> Avoid Protrusion/projection of sharp edges. Secure the load properly. See that there is no strain on back
2	Cutting wood to required size.	<ol style="list-style-type: none"> Misuse of cutting device. Fall of tools and wood from 	<ol style="list-style-type: none"> Hand injury. Improper cutting resulting in material loss. 	3	3	LOW	2	<ol style="list-style-type: none"> Deploy trained carpenter.
3	Preparation of shuttering on ground.	<ol style="list-style-type: none"> Flying nails while hammering. Use of loose hammer. 	<ol style="list-style-type: none"> Eye injury. Flying of hammer head resulting in personnel injury. 	3	4	MODERATE	3	<ol style="list-style-type: none"> Wear safety goggles. Ensure that hammer handle is properly wedged and hammer is in good condition. Keep persons away from
4	Erection of shuttering.	<ol style="list-style-type: none"> Fall of shuttering. 	<ol style="list-style-type: none"> Physical injury and back 	2	4	MODERATE	3	<ol style="list-style-type: none"> Erection should be done standing over firm supports.



5	Erection of shuttering on height.	1. Fall of person or sutter. 2. Fall of loose materials.	1. Personal injury. 2. Damage to the shutter.	3	4	MODERATE	3	1. Use approved scaffolding. 2. Do not keep loose material on platform. 3. Deploy experienced workers.
6	De-shuttering & De-shoring	1. Fall of shuttering. 2. Protruding nails. 3. Loose nails on floor.	1. Injury to persons.	2	3	LOW	2	1. Deploy experienced workers. 2. Keep and alert third party persons to be away from the de- shuttering area. 3. Remove nails and stack shuttering materials properly. 4. Keep all removed nails in one

ACTIVITY - 10: WORK ON REBAR

1	Manual bar bending	1. Defective tools. 2. wrong application of tools. 3. Wrong	1. Personal injury. 2. Damage to tools. 3. Back pain.	2	3	LOW	2	1. Do not use sub-standard tools. 2. Ensure use of right tools for right job. 3. Do not push tools while bending. 4. Hold firmly 5. Adhere to connect and safe
2	Bar bending on bending machine	1. Defective Machinery. 2. Difference in level between tble and machine. 3. Improper guard. 4. Inexperienced	1. Personal injury. 2. Damage to the machine. 3. Damage to the table. 4. Misoperation.	3	3	LOW	2	1. Do not use defective tools. 2. Secure machine and table on level ground. 3. Keep area clean around machine. 4. Provide switch or emergency stoppage. 5. ensure guards are provided on all rotating parts. 6. hold the bars firmly.
3	Manual cutting	1. Toppling of chisel. 2. Slippage of bar under tension	1. Personal injury. 2. Flying bar.	3	4	MODERATE	3	1. Safe handling of tools. 2. Keep hand away from cutting chisel. 3. Hold bar firmly. 4. Ensure safety while operating
4	Binding bar with	1. Haphazard placement of	1. Personal injury.	3	3	LOW	2	1. Keep wires initially bend downward.
5	Cutting bar by machine.	1. Defective machine. 2. Improper guard. 3. Loose electrical connection. 4. Defective	1. Personal injury. 2. Damage to the machinery. 3. Personnel injury. 4. Fire hazard. 5. Personnel	4	3	LOW	2	1. Do not use deective tools. 2. Use serviced machine. 3. Provide stand on both sides of the machine for moving 4. Provide switch or emergency stoppage of machine. 5. Ensure proper electrical connections.
6	Cutting wire by tools.	1. Defective tools.	1. Personal injury.	3	3	MODERATE	3	1. Use proper binding. 2. Take extra care while walking
7	Manual placement of bar.	1. Loose binding of reinforcment. 2. Improper co-ordination. 3. Inexperienced persons.	1. Slippage of binding steel reinforcement. 2. Personal injury.	3	3	LOW	2	1. Ensure proper binding. 2. Give proper instructions. 3. Deploy trained and experienced persons. 4. Ensure proper co-ordination among the crew. 5. Avoid sharp edges.

ACTIVITY - 11: REINFORCEMENT



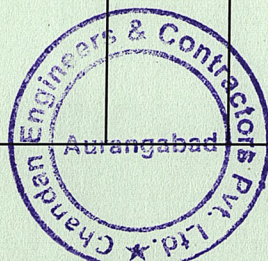
1	Reinforcement	1. Curtailment and binding of rods for short distance/at height. 2. Carrying of rods for short distance/at height. 3. Checking of clear distance/cover with hands. 4. Hitting projected rods and standing on cantiliver rods.	1. Persons may get injured. 2. Workers may get injured on their hands and soulders. 3. Rods may cut or injure the fingers. 4. Persons may get injured and fall down. 5. May prove fatal. 6. Protruded rods may hit the	3	3	MODERAT E	3	1. Use PPE like gloves, shoes, helmets, etc.. 2. Avoid usage of make -shift tools. 3. Provide suitable pads on shoulders and use safety gloves. 4. Tie up rods in easily liftable bundles. 5. ensure proper staging. 6. Use measuring devices like tape, measuring rods,etc.. 7. Use safety shoes and avoid standing unnecessarily on cantilever rods. 8. avoid wearing of loose cloths. 9. Provide safety nets.
2	Transportation of Rebar	1. Fall of material from height. 2.Hit by protruding bar.	1. Personal injury. 2. May prove fatal. 3. damage to	4	3	MODERAT E	3	1. Use red flags/lights at the end. 2. Do not protrude the rods infront of or by the side of the dricers cabine. 3. Do not extend the rods 1/3rd of deck length or 1.5m

ACTIVITY - 12: SCAFFOLDING, FORMWORK AND LADDERS

1	SCAFFOLEING , FORMWORK AND LADDERS	1. Persons can fall down. 2. Failure of scaffolding material. 3. material can fall down.	1. Person may sustain severe injuries and prove fatal. 2. Persons working at lower level get injured.	4	3	MODERAT E	3	1. provide guard rails for working at height. 2. Face ladder while climbing and use both hands. 3. Ladder shall extend about 1m above landing for easy access and tying up purpose. 4. Do notplace the ladder against amovable objects and maintain base at 1/4 ratio of the working length of the ladder. 7. Use PPE, like helmets, safety shoes etc.. 8. Inspect visually all scaffolding materials for stability and anchor with permanent structures. 9. Design scaffolding for max. load carrying capacity. 10. Scaffolding planks shall not be less than 250mm full thickness lumber or equivalent. These shall be cleated or 11. Do not overload the scaffolds. 12. Do not join short ladder to make
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ACTIVITY - 13: GRINDING

1	Grinding and grinding wheel replacing	1. Grinding without goggle. 2. Absence of tool rest on bench grinder. 3. More gap between the wheel and tool rest of bench 4. Improper/wrong size grinder wheel. 5. Excess pressure on wheel. 6. Breakage of	1. Injury to eyes by flying 2. Accident and injury.	3	4	MODERAT E	3	1. Use proper PPE. 2. Mount the tool rest on both side. 3. Replace the wheel. 4. Gap more than 3mm is unsafe. 5. Use grinding wheel of correct size. 6. Training and instruction. 7. Provide the extinguisher. 8. Use the blanket to cover nearby vents, drains, open ends of 9. Application of mud plug prior to pipe after cold cutting. 10. Proper tightening of wheel. 11. Use of corrcet size spacer washers.
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ACTIVITY - 14: USING ENGINE GENERATOR SET

1	Using engine generator set for ARC-welding.	1. Improper earthing. 2. Improper insulation. 3. Faulty appliances/control system. 4. poor exhaust. 5. Poor ventilation	1. Electrical shock/burn 2. Fire explosion. 3. Asphyxiation. 4. Poisoning.	2	5	HIGH	4	1. Proper earthing. 2. Adequate insulation.(check). 3. Proper preventive maintenance. 4. Ventilation. 5. Periodical gas testing and monitoring at all areas. 6. Prevent leakages. Check before use.
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ACTIVITY - 15: HANDLING OF PORTABLE ELECTRICAL TOOLS

1	Working with portable electrical tools.	1. Damaged cable. 2. Defective tool. 3. loose components (wheel, switch) 4. Excess pressure on tool. 5. Improper	1. Electric shock. 2. Spark/shock. 3.Hit injury. 4. Accident and injury. 5. Bodily injury. 6. Shock/eye and bodily injuries.	3	4	MODERATE	3	1. Daily check up before start. 2. Replace defective tools. 3. Proper maintenance. 4. Training on proper use and care. 5. Inspection and corrective action to follow correct handling procedures. 6. Use adequate PPE (Face shield/goggles, gloves).
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ACTIVITY - 16: HANDLING PORTABLE HAND TOOLS

1	Working with portable hand tools.	1. Defective/damaged tools and tools without protective 2. Improper handling. 3. Improper	1. Accident and bodily injuries. 2. Property damages.	4	3	MODERATE	3	1. Replacing defective/damaged tools. 2. use tools only with protective handles. 3. Training and instruction to use right tool for the right job. 4. Keep tools only in toolboxes. 5. Training and instruction to use right tools for the right job
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ACTIVITY - 17: ARC WELDING

1	Arc welding	1. Radiation harmful to naked eyes. 2. Splinters/slag. 3. Toxic flames. 4. Dislocation / fall of job piece due to faulty clamping. 5. Loose connections/Loss of insulation. 6. Flammable gases. 7. Poor ventilation.	1. Welder's cataract. 2. Burn injury. 3. Lung ailments. 4. Dermatitis. 5. Hit injury / crush injury. 6. Electric shock. 7. Fire/Explosion. 8. Asphyxiation	2	5	HIGH	4	1. Use welding shield/goggles. 2. Fire proof apron/gloves/screen. 3. Ventilation (local or exhaust) if possible. 4. Full-sleeved coverall and gloves. 5. proper clamping system/material handling techniques. 6. Use shock proof boots and hand gloves. 7. provide earthing to the plant. 8. Periodical gas testing. 9. Keep fire extinguisher standby. 10. Adequate ventilation. 11. training and instructions.
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ACTIVITY - 18: WORKING IN CONFINED SPACE

1	Working in confined spaces (tank, vessel, static equipment, excavation beyond 3metc..)	1. Suffocation/drowning. 2. Presence of foul smell and toxic substances. 3. Ignition/flame can cause fire.	1. Unconsciousness, death. 2. Inhalation can pose threat to life. 3. person may sustain burn injuries or explosion may occur.	1	5	HIGH	4	1. use respiratory devices, if required. 2. Avoid overcrowding inside a confined space. 3. provide exhaust fans for ventilation. 4. Do not wear loose clothes, neck ties, etc.. 5. Fulfill conditions of the permit. 6. Check for presence of hydrocarbons and oxygen level. 7. Obtain work permit before entering a confined space. 8. Ensure that the connected piping of the equipment which is to be opened is pressure free, fluid has been drained, vents are open and piping is positively isolated by a blind flange. 9. Check for hydrocarbon and Aromatic compounds before entering a confined space.
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ACTIVITY - 19: MATERIAL HANDLING (MANUAL)

1	Material Handling (Manual)	1. Non-use of PPEs. 2. Inadequate manpower. 3. Lack of coordination	1. Accident/injury. 2. Back pain, sprain, etc.. 3. property damage. 4. Injury/property	3	4	MODERATE	3	1. Use adequate PPE. 2. Provide adequate manpower for lifting of heavy loads. 3. Training & instructions. 4. Use hand gloves/packing materials. 5. Remove protruding nails before handling. 6. use proper lifting devices for good grip.
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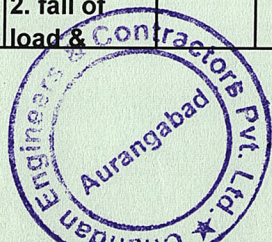
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1	Material Handling with forklift, hiab, crane etc..	1. Lack of knowledge/skills. 2. Defective equipment	1. Accident/injury/ 2. Material losses. 3. Tilting of jacks / boom. 4. Injury	2	4	MODERATE	3	1. Only competent and approved operator shall be deployed for equipment operations. 2. Equipment to be tested and certified by competent person before deployment. 3. No overloading allowed.
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ACTIVITY - 21: WORK AT HEIGHTS



1	Working at elevated places.	1. Person can fall down. 2. Material can fall down.	1. May sustain severe injuries or prove fatal. 2. May hit scrap/material stacked at ground or in 3. May hit the workers working at lower levels and prove fatal.	2	5	HIGH	4	1. Provide guardrails/barricade at the work place. 2. Use PPE like full body harness, life line, helmets, safety shoes, etc.. 3. Obtain the permit before starting the work at height above 4. Fall arrest and safety nets, etc.. Must be installed. 5. Provide adequate working space (min. 0.6m). 6. Tie/ weld working platform with fixed support. 7. Use roof top walk ladder while working on a slopping roofs. 8. Avoid movements on beam. 9. Keep the workplace neat and clean.
ACTIVITY - 22: WORKING UNDER CRANE / LIFTING EQUIPMENT.								
1	Working under crane / lifting equipment.	1. Working without PPE. 2. Failure of slings. 3.	1. Fatality / injury due to fall of loads. 2. Material damage.	2	5	HIGH	4	1. Use required PPEs. 2. Use only certified slings as per colour coding. 3. No person to stand under lift load. 4. Follow safe lifting procedures. 5. Only approved equipment to be used.
ACTIVITY - 23: LOADING / UNLOADING ON TRUCK / TRAILER								
1	Loading and unloading of materials on trucks / trailers.	1. Loaded material due to fall. 2. Defective equipment. 3.	1. Accident / injury. 2. Damage to materials. 3. Damage to equipment.	1	5	HIGH	4	1. Follow lifting procedure. 2. Use correct equipment & lifting tackles. 3. supervision by competent persons. 4. Provide trained banksmen/rigger. 5. Do not jump out from vehicle till clearance is obtained. 6. Proper supervision.
2	Loading near live facilities	1. Live facilities / OH lines etc	1. Fire 2. Electric shock. 3. Injury. 4. property	2	5	HIGH	4	1. Keep safe distance from live facilities.
ACTIVITY - 24: MATERIAL HANDLING WITH CRANE								
3	Extending Outriggers	1. Outriggers not extended	1. Tilting of 2. Retracting	2	4	MODERATE	3	1. Extend outrigger fully. 2. Lock the outrigger beam.
4	Passage under OH lines with raised	1. High tension electric 2.	1. Electric shock. 2. fall of load &	1	5	HIGH	4	1. No movement with raised boom. 2. Provide banksmen. 3. Do not travel with lifted load.



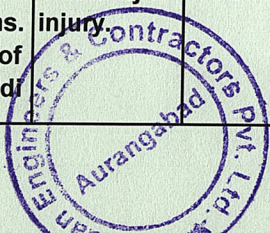
5	Loading operation	1. Side loading / dragging of load. 2. Overload 3. Swinging the load. 4. Abrupt operation of control	1. Tilting of crane due to uneven load. 2. Damage to crane and loss of materials. 3. Instability & tilting of 4. Jerking, fall of load, hitting person. 5. fall of crane.	2	5	HIGH	4	1. Lifting only vertically. 2. no dragging of load. 3. no overload. 4. No swinging of load. 5. Operate the levers slowly and smoothly. 6. Do not keep the load in the elevated position. 7. Do not allow any person to be under the load. 8. No movement with raised boom. 9. Provide banksman. 10. Do not travel with lifted
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ACTIVITY - 25: HANDLING OF GAS CYLINDERS

1	Transporting gas cylinders : * Oxygen * Acetylene * Argon * Nitrogen * LPG	1. Cylinder kept horizontal. 2. Cylinder kept untied/unlocked in welding truck/mobile welding unit. 3. Valve	1. Fire and explosion by leakage and property damage. 2. Gas leakage due to valve damage. 3. Human injury by fall of cylinder. 4. Damage to	2	5	HIGH	4	1. Keep charged cylinder only. 2. Keep vertically and tie with chain to a fixed structure. 3. Keep in specially fabricated cage to prevent fall. 4. Keep valve cap in position during transportation. 5. Different types of gas cylinders not to be loaded in the same vehicle at a time. 6. Only authorised vehicle and specially trained driver shall be engaged in gas cylinder transportation. 7. Do not use leaking cylinder. 8. Keep cylinder tied up/ chained & locked
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ACTIVITY - 26: ERECTION, DISMANTLING AND WORKING ON SCAFFOLDING

1	Scaffolding erection.	1. Improper manual handling 2. Fall of scaffolding	1. Personal injuries. 2. Material Damage. 3. Collapse of scaffolding and fall of	2	5	HIGH	4	1. Train on proper manual lifting procedures. 2. Use only tested and certified equipment & lifting tackles. 3. Erection only by experienced persons under supervision of a competent person.
2	Working on scaffolding	1. Defective scaffolding. 2. Improper use	1. injury due to fall.	1	5	HIGH	4	1. Daily inspection & certification by competent person. 2. Training & supervision. 3. Provide access/ladders or stairs_ as per specification. 4. adequate size as per job requirement
3	Dismantling scaffolding	1. fall of persons. 2. Fall of scaffolding	1. fatality / injury	1	5	HIGH	4	1. follow dismantling procedures. 2. Do not allow persons to be under the scaffolding structure



ACTIVITY - 27: STRUCTURAL WORKS

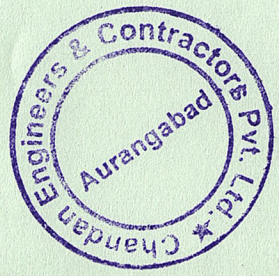
1	Structural Works	1. Personal negligence and danger of fall. 2. Lifting / slipping of material.	1. can cause injuries or casualty.	4	5	HIGH	4	1. Do not take rest inside rooms built for welding machines or electrical distribution system. 2. Avoid walking on beams at height. 3. Wear helmet with chin strip and full body harness while working at height. 4. Use hand gloves and goggles during grinding operations. 5. Cover or mark the sharp and projected edges. 6. Do not stand within the operation radius of crane
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ACTIVITY - 28: PIPELINE WORKS

1	Pipe laying	1. Erection/lowering failure. 2. Others.	1. can cause injury. 2. can cause injury.	4	5	HIGH	4	1. Do not stand under the lifted load. 2. Do not allow any persons to come within the radii of the side boom handling pipes. 3. Check the load carrying capacity of the lifting tools and 4. Use safe load indicator. 5. use appropriate PPEs. 6. Wear gum boots in mashy area. 7. Allow only one person to perform singalling operations
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ACTIVITY - 29: WORKING IN HOT ENVIRONMENT

1	1. Working in hot environment 2. Hot work such as welding, cutting, heating,	1. Heat stress due to dehydration due to excess	1. Heat ailments such as heat cramps and heat stroke.	2	4	MODERATE	3	1. Drink plenty of cold water. 2. Intermittent rest under shade. 3. Eating more vegetables and fruit items. 4. Provide shade for work in static proture (welding). 5. Appropriate PPEs to protect
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ACTIVITY - 30: WORKING IN DUSTY ENVIRONMENT								
1	Working in dust.	1. Dust (inhalation)	1. Lung disorders	5	1	MODERATE	3	1. Sprinkle water to suppress dust generation wherever
ACTIVITY - 31: WORKING DURING NATURAL CALAMITIES								
1	Working / Driving during natural calamities	1. Flood. 2. Fog. 3. Storm / high wind.	1. Drowning and washing away in flood water. 2. Injury / fatality due to hitting or vehicle accident. 3. Injury due to collapse of buildings.	1	5	HIGH	4	1. Do not go into flood. 2. No driving of vehicles in fast flowing water. 3. Ascertain the depth of water and the firmness of the road 4. Keep on elevated terrain till flood subsides. 5. Vehicle / equipment movements only in clear vision. 6. Drive slowly with head lights and wipers on. 7. Sufficient anchoring of office cabins.
AC				MODER				
1	Staying in residential camps.	1. Biological hazards (Malarial mosquitoes, contaminated water / food stuff)	1. Ill health.	2	4	MODERATE	3	1. Prompt disposal of wastes, concealment of drainage. 2. Use of insecticides. 3. Ventilation in living accommodation. 4. Keeping food waste in garbage bags/closed buckets and prompt disposal to the food waste to dump yard as per Waste Management Plan.
ACTIVITY - 33: SLIPS, TRIPS AND FALL AT WORK PLACE.								
1	Moving in the work area.	1. Timbering blocks, wooden planks, steel rod bits. 2. Pipe pieces. 3. Protruding 5. overhead projection	1. Bodily injury due to fall of persons, fall of heavy objects, tools etc.. 2. Hitting on overhead projections.	3	4	MODERATE	3	1. Remove all timber blocks, planks, pipe pieces etc.. Immediately after use to the designated place. 2. Do not keep objects/tools etc. at height without safe containment against fall. 3. Provide barricading with warning tags. 4. Provide plastic/soft material cap to projectile 5. Maintain good housekeeping by frequent
ACTIVITY - 34: FIRE PREVENTION AND PROTECTION.								

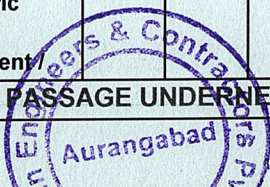


1	Fire prevention and protection	1. small fires can become big ones and may spread to the 2. Improper selection of fire extinguishers. 3. short circuiting of electrical system.	1. Cause burn injuries and may prove fatal. 2. Complete extinguishment of fire may not be possible. 3. Can cause electrocution.	3	4	HIGH	4	1. In case a fire breaks out, press fire alarm system and shout fire, fire. 2. Keep bucket full of sand and water/ fire extinguishers in all hazardous location. 3. Confine smoking to "smoking Zone" only. 4. Train people for using specific type of fire equipments under different classes of fire. 5. Maintain good housekeeping and first-aid boxes. 6. Do not obstruct access to fire extinguishers. 7. Do not use any sort of elevators for evacuation during fire. 8. Maintain lightening arrestors for elevated structures. 9. Stop all electrical motors. 10. move the vehicles from dangerous locations. 11. Remove the load hanging from the crane booms. 12. remain out of the danger areas. 13. Ensure usage of correct fire extinguisher meant for
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ACTIVITY - 35: LAYING ELECTRICAL CABLES

1	Laying out electrical cables	1. Unstable cable drum. 2. Wrong position of jack/spindle. 3. Inadequate jack/spindle. 4. Defective jack/spindle. 5. rotating parts. 6. Drum rollers. 7. Pulling in wrong posture	1. fatality/service injury due to fall of cable 3. Finger injury due to trapping between 4. Serious injury due to slip & fall of cable. 5. Loss of cable.	4	5	HIGH	4	1. Cable shall be handled by experienced persons. 2. Adopt proper procedure. 3. Use only tested and certified jack and spindle. 4. Keep fingers away from nip point. 5. Use hand gloves. 6. Tool box meeting. 7. Proper position. 8. trained person. 9. Use cable roller. 10. Planning. 11. Keep cable-laid trenches backfilled before leaving site.
2	Pole hole drilling.	1. Rotating parts. 2. Open	1. Injury due to rotating 2. Injury due to	3	4	MODERATE	3	1. Deploy approved rig. 2. take care of rotating parts. 3. Cover all drilled holes.
3	Erection of poles	1. Live lines nearby. 2. Improper lifting & 3. Loose soil. 4. Live lines nearby.	1. Electric shock. 2. Injury due to fall of poles. 3. trapping of hand / leg. 4. Electric shock. 5. Accident	3	4	MODERATE	3	1. Keep safe distance. 2. Close supervision. 3. Avoid lifting of poles during heavy wind. 4. Approved equipment & tackles. 5. Provide firm footing to equipment. 6. Keep away from OH line.

ACTIVITY - 37: PASSAGE UNDERNEATH OVERHEAD LINES.



1	Transporting of equipment exceeding overhead	1. Excess height can contact with overhead	1. Fatal electric shock. 2. Damage to equipment.	2	5	HIGH	4	1. PTW. 2. Erect goal post. 3. Restrict passage. 4. Use inspected & approved lifting equipments & tackles
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ACTIVITY - 38: WORKING NEAR OVERHEAD LINES.

1	Working near overhead lines.	1. Live lines.	1. Electrocution (fatality/severe injury) 2. Damage to equipment and property.	2	5	HIGH	4	1. PTW in place. 2. Use guide rope for lifting load. 3. Avoid working if lightening threat is suspected. 4. Work area shall be clearly
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ACTIVITY - 39: ELECTRICAL INSTALLATION AND USAGE.

1	Electrical installation works.	1. Short circuiting. 2. Overloading of Electrical System.	1. Can cause electrocution /fire. 2. Bursting of system can occur which leads to fire.	4	5	HIGH	4	1. Use rubberized hand gloves and other PPE. 2. Do not lay wires above ground or under carpets, mats or door ways. Lay cables overhead or buried. 3. Allow only licensed electrician to perform on electrical 4. Use only approved and insulated wires or cables. 5. Do not place bare wire ends in a sockets. Use plugtops. 6. Ensure earthing of all machines and equipments. 7. Do not use damaged cords and avoid temporary connections 8. Use spark proof/ flame proof type field distribution boxes. 9. Do not allow open/bare connection. 10. Provide all connections through ELCB 11. Protect electrical cables / equipments from water and naked flame. 12. Check all connections
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ACTIVITY - 40: DRIVING / OPERATING VEHICLES & EQUIPMENTS

1	Driving / operating vehicles / equipment.	1. Lack of knowledge and skills. 2. Untrained drivers / operators. 3. Defective	1. Fatality/injury. 2. Loss of property / material. 3. damage to equipment.	2	5	HIGH	4	1. Only authorised persons to be deployed for driving / equipment operation. 2. Training / refresher training to drivers/operators. 3. Use of appropriate vehicles / equipments. 4. Inspection and
2	Driving on guarded	1. Loose surface, erosion,	1. Injury / fatalitie due to accidents.	1	5	HIGH	4	1. Provide speed limiters. 2. Use tyres with a minimum of 2mm tread.
3	Speed driving.	1. Crosing the speed limits (Rush driving)	1. Personnel injury.	3	4	HIGH	4	1. Obey speed limits and traffic rules strictly. 2. Allways expect the unexpected and be a defensive driver. 3. Use seat belts / helmets. 4. Blow horn at intersections



4	Driving in adverse condition	1. Adverse weather condition. 2. falling objects / Mechanical failure.	1. Personnel injury. 2. May prove fatal.	4	5	HIGH	4	1. Read the road ahead and drive to the left. 2. Keep the win screen and light clean. 3. Do not turn at speed. 4. Recognise the hazard, understand the defence and act correctly in time. 5. Ensure effective braking
5	Drunken driving	1. Consuming alcohol before and during the driving operation.	1. Accident. 2. Personal injury.	4	5	HIGH	4	1. Alcohol and driving do not mix well. Either choose alcohol 2. If you have a choice between hitting a fixed objects or an on-coming vehicle, hit the fixed object.

ACTIVITY - 41: PARKING OF VEHICLES IN PARKING AREA.

1	vehicle parking in designated area.	1. Improper parking. 2. Uneven surface. 3. Defective hand brake. 4. Absence	1. Rolling of vehicle resulting in fatality / injury. 2. Damage to vehicle / properties /	1	4	MODERATE	3	1. Follow parking procedure 2. Level ground for parking. 3. Proper hand brake. 4. Wheel chockes in position. 5. Gear engagement.
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ACTIVITY - 42: OPERATION OF COMPACTOR..

1	1. Starting by pulling 2. Running	1. Inadvertent contact 2. Rotating parts.	1. Accidents. 2. Damage.	2	4	MODERATE	3	1. Pull the string gently avoiding contact or hit against compactor or near by personal. 2. Guarding.
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ACTIVITY - 43: OPERATION OF VIBRATOR.

1	Starting by pulling up with string	1. Inadvertent contact with vibrator. 2. Rotating parts.	1. Injury. 2. Contact with body. 3. damage. 4. Burn Hazard.	2	4	MODERATE	3	1. Pull the string gently avoiding contact or hit against vibrator or near by personal. 2. Guarding. 3. Hold the hose firm while vibration is in use.
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ACTIVITY - 44: HANDLING AND LIFTING EQUIPMENTS (GENERAL).

1	Handling and lifting equipments.	1. failure of load lifting and moving equipment. 2. Overloading of lifting equipments 3. Overloading electrical wires.	1. can cause accident and prove fatal. 2. Can cause electrocution and fire.	3	4	HIGH	4	1. Avoid standing under the lifted load and within the operating radius of cranes. 2. Check periodically oil, brakes, gears, horns and tyre pressure. 3. Check size and condition of all chain pully blocks, slings, U- clamps, D- shackles, wire ropes etc.. 4. Allow crane to move only on hard, firm and level ground. 5. Allow lifting sling as short as possible and check gunny packings at the friction points. 6. Do not allow crane to lift it boom while moving. 7. Install Safe Load Indicator. 8. Ensure load test certification by competent authority.
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