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

S.No.	ACTIVITY	HAZARD	CONSEQUENCE	PROBABILITY FACTOR	SEVIRITY	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.	4	3	MODERATE	3	1. Flow ergonomics. 2. Use of adequate PPE.
			1. Dust allergy for workmen 2. Eye/skin injury.	3	3	LOW	2	1. 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 debries immediately.
ACTIVITY - 3: CONCRETING								

1	Concreting	<ol style="list-style-type: none"> 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 oncrete mixer/vibrators. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 materil immediatly 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	<ol style="list-style-type: none"> 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 oncrete mixer/vibrators. 8. Deflection in props or shuttering materials 	<ol style="list-style-type: none"> 1. Shuttering / props may fall and collapseand prove fatal. 	4	3	MODERATE	3	<ol style="list-style-type: none"> 1. Use PPEs like gloves,shoes, helmets, etc.. 2. Avoid usage of make -shift tools. 	
3	Access to workplace	<ol style="list-style-type: none"> 1. Passage to workplace 	<ol style="list-style-type: none"> 1. Improperly tied and designed props/planks may collapse 	3	3	MODERATE	3	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Falling into pit. 2. earth collapse. 3. Contact with buried electric 4. Gas/Oil Pipelines. 	<ol style="list-style-type: none"> 1. Personal injury. 2. Suffocation/Breathlessnes. 3. Buried. 4. Electrocution. 5. Explosion. 	3	4	MODERATE	3	<ol style="list-style-type: none"> 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 excvation 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 refering to plant 11. Start digging manually to locate the exact position of buried utility and thereafter use mechanical means. 	
ACTIVITY - 4: PLASTERING									
1	Plastering/Groutin g	<ol style="list-style-type: none"> 1. Inhalation of cement dust. 2. Absorption of cement. 3. Ingestion. 	<ol style="list-style-type: none"> 1. Bronchial disease 2. Irritation. 3. Prolonged exposure causes dermatities. 4. Gastro-Instestinal 	4	3	LOW	2	<ol style="list-style-type: none"> 1. Wear rspiratory 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/Handling 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 shutter. 2. Fall of loose materials.	1. Personal injury. 2. Damage to the shutter. 3. Loss of materials.	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 container. 5. Maintain good housekeeping.
ACTIVITY - 6: REINFORCEMENT								
1	Reinforcement	1. Curtailment and binding of 2. Carrying of rods for short distance/at 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 shoulders. 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	MODERATE	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	MODERATE	3	1. Use red flags/lights at the end. 2. Do not protrude the rods in front of or by the side of the drivers cabin. 3. Do not extend the rods 1/3rd of deck length or 1.5m whichever is less.
ACTIVITY - 7: SCAFFOLDING, FORMWORK AND LADDERS								
1	SCAFFOLDING, 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	MODERATE	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 not place 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.

								<ul style="list-style-type: none"> 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 along 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.	<ul style="list-style-type: none"> 1. Improper parking. 2. Uneven surface. 3. Defective hand brake. 4. Absence of wheel chock. 5. Non/Partial application of hand brake. 	<ul style="list-style-type: none"> 1. Rolling of vehicle resulting in fatality / injury. 2. Damage to vehicle / properties / live facilities nearby. 	1	4	MODERAT E	3	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 1. Starting by pulling up with string. 2. Running compactor. 	<ul style="list-style-type: none"> 1. Inadvertdent contact with vibrator. 2. Rotating parts. 3. Fall. 	<ul style="list-style-type: none"> 1. Accidents. 2. Damage. 	2	4	MODERAT E	3	<ul style="list-style-type: none"> 1. Pull the string gentally 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	<ul style="list-style-type: none"> 1. Inadvertdent contact with vibrator. 2. Rotating parts. 3.Klick back of hose. 4. Cement splash. 5. Fall of vibrator into 6. Fire hazard. 	<ul style="list-style-type: none"> 1. Injury. 2. Contact with body. 3. damage. 4. Burn Hazard. 	2	4	MODERAT E	3	<ul style="list-style-type: none"> 1. Pull the string gentally 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 extinguisher ready.
ACTIVITY - 11: HANDLING AND LIFTING EQUIPMENTS (GENERAL).								

1	Handling and lifting equipments.	<ol style="list-style-type: none"> 1. failure of load lifting and moving equipment. 2. Overloading of lifting equipments. 3. Overloading electrical wires. 	<ol style="list-style-type: none"> 1. can cause accident and prove fatal. 2. Can cause electrocution and fire. 	3	4	HIGH	4	<ol style="list-style-type: none"> 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 levelle 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. 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.
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