

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

| S.No.  | ACTIVITY   | HAZARD  | CONSEQUENCE   | PROBABILITY FACTOR | SEVERITY | RISK LEVEL      | RISK RATING | CONTROL MEASURES   |
|--|--|---|---|--------------------|----------|-----------------|-------------|--|
| <b>ACTIVITY - 1: BRICK WORKS</b>                                   |  |   |   |                    |          |                 |             |  |
| 1  | Storage of Bricks.   | 1. Height above 1.5<br>2. Improper Storage  | 1. Fall of Bricks<br>2. Personal Injury   | 4                  | 3        | MODERATE        | 3           | 1.Restrict Height of Storage to 1.5 M.<br>2. Adopt cross bar system of storage.  |
| 2  | Transportation of bricks to the site.                              | 1. Unsecured bricks<br>2. Rough and uneven Road.  | 1. Breakage of Bricks,<br>2. Personal Injury  | 3                  | 2        | LOW             | 2           | 1. Ensure Bricks carried are properly secured.<br>2. Defensive Driving.  |
| 3  | Unloading Bricks.  | 1. Fall of a bricks.<br>2. Wrong Lifting Method   | 1. Personal Injury.<br>2. Back pain.  | 4                  | 3        | MODERATE        | 3           | 1. Safe handling.<br>2. Education of correct posture.  |
| 4  | Shifting Bricks to the building site by Dumper.                    | 1. Use of defective dumper<br>2. Mis-Operation  | 1. Damage to Dumper<br>2. Tilting of dumper   | 3                  | 4        | MODERATE        | 3           | 1. Use serviced dumper.<br>2. Deploy trained Operator.<br>3. Operate Slowly and carefully on rough road.<br>4. Provide trained Banksmen.                   |
| 5  | Shifting Bricks, Cement mortar, concrete etc., manually, (barrow). | 1. Defective Wheel barrow<br>2. Loosing balanced due to uneven/ loose surface<br>3. Absent mindedness.<br>4. Hurry. | 1. Overturning of wheelbarrow<br>2. Personnel injury.                                   | 3                  | 2        | Low             | 2           | 1. Use good serviceable wheel barrow.<br>2. Use Planks wherever necessary.<br>3. Be cautious.<br>4. Concentrate on job.<br>5. Know your surroundings.      |
| 6  | Preparation of cement mortar and placing of bricks with cement.    | 1. Improper handling of cement bags.<br>1. Evolution of cement dust at work place.<br>2. Splashing of cement        | 1. Back pain.<br>2. Skin allergy.<br>1. Dust allergy for workmen<br>2. Eye/skin injury. | 4<br>3             | 3<br>3   | MODERATE<br>LOW | 3<br>2      | 1. Follow ergonomics.<br>2. Use of adequate PPE.<br>1. Use of adequate PPE.  |
| 7  | Shifting of cement mortar by                                       | 1. Defective Dumper.<br>2. Mis-Operation  | 1. Damage to Dumper<br>2. Tilting of dumper.  | 4                  | 3        | MODERATE        | 3           | 1. Use serviced dumper.<br>2. Deploy experienced operator.   |
| <b>ACTIVITY - 2: CONCRETE CHIPPING</b>                             |  |   |   |                    |          |                 |             |  |
| 1  | Chipping.  | 1. Bad condition of tools.<br>2. Foreign particles  | 1. Personal Injury.<br>2. Eye injury.<br>3. Tripping hazard.                            | 2                  | 3        | LOW             | 2           | 1. Do not use defective tools. Select the right tools for right<br>2. Use adequate PPE.<br>3. Maintain good housekeeping.<br>4. Remove debris immediately. |
| <b>ACTIVITY - 3: CONCRETE FOUNDATION BREAKAGE USING JACKHAMMER</b> |  |   |   |                    |          |                 |             |  |
| 1  | Dismantling concrete (foundation).                                 | 1. Fall of jack hammer<br>2. Vibration.   | 1. Injury.<br>2. Prolonged exposure causes occupational disease called                  | 4                  | 3        | MODERATE        | 3           | 1. Hold firm.<br>2. Secure chisel firm to jack<br>3. Rotation of work force to avoid prolonged exposure.   |



ACTIVITY - 4: CONCRETING

|                       |  |   |   |   |          |   |
|-----------------------|--|---|---|---|----------|---|
| 1 Concreting          | <ol style="list-style-type: none"> <li>1. Air pollution by cement.</li> <li>2. Handling of Ingredients.</li> <li>3. Protruding reinforced rods.</li> <li>4. Earthing of electrical mixers, vibrators etc.. Not done.</li> <li>5. Falling of materials from height.</li> <li>6. Continuous pouring of by same gang.</li> <li>7. Revolving of concrete mixer/vibrators.</li> </ol>   | <ol style="list-style-type: none"> <li>1. May affect Respiratory system.</li> <li>2. Hands may get injured.</li> <li>3. feet may get injured.</li> <li>4. Can cause electrocution/asphylation.</li> <li>5. Persons may get injured.</li> <li>6. causes tiredness of workers and may lead to</li> <li>7. Parts of body or clothes may get entrappd.</li> </ol> | 3 | 3 | MODERATE | 3 <ol style="list-style-type: none"> <li>1. Wear respirators or cover mouth and nose with wet cloth.</li> <li>2. Use gloves and other PPE.</li> <li>3. Use Safety Shoes.</li> <li>4. Provide platform with wooden planking above reinforcement for movement of workers.</li> <li>5. Ensure earthing of equipments and proper functioning of electrical circuit before commencement of work.</li> <li>6. Use hard hats.</li> <li>7. Remove surplus materiil immediately from work place.</li> <li>8. Ensure lighting arrangement during night hours.</li> <li>9. Insist on shift pattern</li> <li>10. provide adequate rest to workers between subsequent</li> <li>11. Allow only mixer with hooper.</li> <li>12. Provide safety cages around moving motors.</li> <li>13. Ensure proper mechanical locking of vibrator.</li> </ol> |
| 2 Super - Structure   | <ol style="list-style-type: none"> <li>1. Air pollution by cement.</li> <li>2. Handling of Ingredients.</li> <li>3. Protruding reinforced rods.</li> <li>4. Earthing of electrical mixers, vibrators etc.. Not done.</li> <li>5. Falling of materials from height.</li> <li>6. Continuous pouring of by same gang.</li> <li>7. Revolving of concrete mixer/vibrators.</li> <li>8. Deflection in props or shuttering materials</li> </ol> | <ol style="list-style-type: none"> <li>1. Shuttering / props may fall and collapseand prove fatal.</li> </ol>   | 4 | 3 | MODERATE | 3 <ol style="list-style-type: none"> <li>1. Use PPEs like gloves, shoes, helmets, etc.</li> <li>2. Avoid usage of make -shift tools.</li> </ol>   |
| 3 Access to workplace | <ol style="list-style-type: none"> <li>1. Passage to workplace</li> </ol>  | <ol style="list-style-type: none"> <li>1. Improperly tied and designed props/planks may collapse</li> </ol>   | 3 | 3 | MODERATE | 3 <ol style="list-style-type: none"> <li>1. Ensure the stability and strength of passage before commencement of work.</li> <li>2. Do not overload or stand under the passage.</li> </ol>  |



ACTIVITY - 5: CONCRETE MIXER OPERATION

|   |   |  |   |   |               |   |   |
|---|---|--|---|---|---------------|---|---|
| 1. Deployment of Concrete pump              | 1. Poor mechanical condition<br>2. Unauthorized operation   | 1. Failure of equipment<br>2. Accident/Personal injury   | 5 | 4 | MODERATE<br>E | 5 | 1. Use good serviced equipment.<br>2. Deploy only licensed operators.<br>3. Engage Barkman.   |
| 2. Batching Plant, Truck Mixer, Cement bulk | 1. Poor mechanical condition<br>2. Unauthorized operation   | 1. Failure of equipment<br>2. Accident/Personal injury   | 4 | 3 | MODERATE<br>E | 3 | 1. Use good serviceable equipment.<br>2. Deploy only licensed operators.<br>3. Engage Barkman.  |
| 3. Deployment of concrete mixture           | 1. Improper placement of mixture machine on steers<br>2. Mis-Operation<br>3. Loose contact with electric connection<br>4. Rotating parts of machine<br>5. Unlocked wheels of concrete mixture<br>6. Improper coordination among crew members.<br>7. Smoke from the exhaust. | 1. Tilting of mixture.<br>2. Damage to concrete mixture.<br>3. Electrical shocks.<br>4. Fire hazard.<br>5. Personnel injury.<br>6. Unwanted movement of concrete of truck.<br>7. Mis-operation and injury to crew.<br>8. Breathing Problems. | 4 | 3 | MODERATE<br>E | 3 | 1. Ensure concrete mixture is placed on even surface with proper pegs.<br>2. Check for proper electrical connections and insulation.<br>3. Keep adequate fire extinguishers.<br>4. Proper guards at all rotating parts of machinery.<br>5. Position the mixer machine to disperse smoke easily into atmosphere.<br>6. Clean the mixer machine after the concreting is over. |

ACTIVITY - 5: MANUAL EXCAVATION

|                           |   |  |   |   |               |   |   |
|---------------------------|---|--|---|---|---------------|---|---|
| 1. Piling Work            | 1. Failure of pile-driving equipment.<br>2. noise Pollution.<br>3. Extruding reinforcing.<br>4. Working in the vicinity of Live Electricity | 1. Can hurt people.<br>2. Can cause deafness and psychological imbalance<br>3. Can hurt people.<br>4. Can cause electrocution/inspiration. | 2 | 3 | LOW           | 2 | 1. Inspect Piling rigs and pulley blocks before the beginning of each shift.<br>2. Use PPE: like ear plugs, muffs, etc..<br>3. Barricade the area and install sign boards.<br>4. Keep sufficient distance from Live Electricity as per IS code.<br>5. Shut off the supply, if possible.   |
| 2. Pit Excavation upto 3m | 1. Falling into pit.<br>2. earth collapse.<br>3. Contact with buried electric<br>4. Gas/Oil Pipelines.                                      | 1. Personal injury.<br>2. Suffocation/Breathlessness.<br>3. Buried.<br>4. Electrocution.<br>5. Explosion.                                  | 3 | 4 | MODERATE<br>E | 3 | 1. Provide guardrails/barricade with warning signal.<br>2. Provide atleast two entries/exits.<br>3. Provide escape ladder.<br>4. Provide suitable size of shoring and strutting if required.<br>5. Keep soil keeps away from edge equivalent to 1.5m or depth of pit whichever is more.<br>6. Do not allow vehicles to operate too close to excavated areas. Maintain atleast 2m distance from edge of cut. |



|   |  |  |  |   |   |          |  |   |
|---|--|--|--|---|---|----------|--|---|
|   |  |  |  |   |   |          | <ul style="list-style-type: none"> <li>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.</li> <li>8. Battering/Benching the sides.</li> <li>9. Obtain permission from component authorities prior to excavation, if required.</li> <li>10. Locate the position of buried utility by referring to plant</li> <li>11. Start digging manually to locate the exact position of buried utility and thereafter use mechanical means.</li> </ul> |   |
| 3 | Pit Excavation beyond 3m                     | <ul style="list-style-type: none"> <li>1. Falling into pit.</li> <li>2. earth collapse.</li> <li>3. Contact with buried electric cables.</li> <li>4. Gas/Oil Pipelines.</li> <li>5. Flooding due to excessive</li> <li>5. Digging in the vicinity of the existing building/structure.</li> <li>6. Movement of vehicles/equipments close to the edge of cut.</li> </ul> | <ul style="list-style-type: none"> <li>1. Personal Injury.</li> <li>2. Suffocation/Breathlessness.</li> <li>3. Buried.</li> <li>4. Electrocutation.</li> <li>5. Explosion.</li> <li>6. Can cause drowning situation.</li> <li>7. Building/structure may collapse.</li> <li>8. Loss of health an wealth.</li> <li>9. May cause cave-in or</li> <li>10. Persons may get buried.</li> </ul> | 3 | 4 | HIGH     | 4  | <ul style="list-style-type: none"> <li>1. Prevent ingress of water.</li> <li>2. Provide ring buoys.</li> <li>3. Identify and provide suitable dewatering pump or well point system.</li> <li>4. Obtain prior approval of excavation method from local authorities, if required.</li> <li>5. Use under-pining method.</li> <li>6. Barricade the excavated area with proper lighting arrangements.</li> <li>7. Maintain atleast 2m distance from edge of cut and use stop blocks to prevent over-run.</li> <li>8. Strengthen shoring and strutting.</li> </ul>                          |
| 4 | Rock excavation by blasting                  | <ul style="list-style-type: none"> <li>1. Improper handling of explosives.</li> <li>2. Uncontrolled explosion.</li> <li>3. Scattering of stone pieces in atmosphere.</li> <li>4. Entrapping of animals/pesons.</li> <li>5. Misfire.</li> </ul>   | <ul style="list-style-type: none"> <li>1. May prove fatal.</li> <li>2. May cause severe injuries or prove fatal.</li> <li>3. Can hurt people.</li> <li>4. May cause severe injuries.</li> <li>5. May explode suddenly.</li> </ul>  | 4 | 4 | HIGH     | 4  | <ul style="list-style-type: none"> <li>1. Ensure proper storage, handling and carrying of explosives by trained personnel.</li> <li>2. Comply with the applicable explosive acts and rules.</li> <li>3. Allow only authorised persons to perform blasting operations.</li> <li>4. Smoking and open flame are to be strictly prohibited.</li> <li>5. Uses PPEs like gloves, goggles face mask etc..</li> <li>6. Barricade the area with red flags and blow siren before</li> <li>7. Do not return to site for atleast 20min. or unless announced safe by designated person.</li> </ul> |
| 5 | Narrow deep excavations for pipelines, etc.. | <ul style="list-style-type: none"> <li>1. Frequent cave-in or slides.</li> <li>2. Flooding due to Hydrostatic testing.</li> </ul>  | <ul style="list-style-type: none"> <li>1. May cause cave-in or</li> <li>2. Persons may get buried.</li> <li>3. May cause severe injuries or prove fatal.</li> <li>4. May arise drownin</li> </ul>  | 4 | 3 | MODERATE | 3  | <ul style="list-style-type: none"> <li>1. Battering/benching of sides.</li> <li>2. Provide escape ladders.</li> <li>3. Ball out accumulated water.</li> <li>4. Maintain adequate ventilation.</li> </ul>  |



**ACTIVITY - 23: LOADING / UNLOADING ON TRUCK / TRAILER**

|   |   |   |   |   |      |   |  |
|---|---|---|---|---|------|---|--|
| 1. Loading and unloading of materials on trucks / trailers. | 1. Loaded material due to fall.<br>2. Defective equipment.<br>3. Overloading. | 1. Accident / injury.<br>2. Damage to materials.<br>3. Damage to equipment. | 1 | 5 | HIGH | 4 | 1. Follow lifting procedure.<br>2. Use correct equipment & lifting tackles.<br>3. supervision by competent persons.<br>4. Provide trained banksmen/rigger.<br>5. Do not jump out from vehicle till clearance is obtained.<br>6. Proper supervision.<br>7. Refer to load chart.<br>8. Use platform ladder for safe access.<br>9. Never deactivate or deenergise over riding devices on lifting equipment. |
| 2. Loading near live facilities                             | 1. Live facilities / OH lines etc.  | 1. Fire<br>2. Electric shock.<br>3. Injury.<br>4. property damage.          | 2 | 5 | HIGH | 4 | 1. Keep safe distance from live facilities.  |

**ACTIVITY - 24: MATERIAL HANDLING WITH CRANE**

|  |   |  |   |   |          |   |   |
|--|---|--|---|---|----------|---|---|
| 1. Crane positioning                       | 1. outriggers on soft ground / loose soil.  | 1. Tilting of crane & consequent damage & loss.  | 3 | 4 | MODERATE | 3 | 1. Outrigger base plates to rest on firm ground or on timber blocks / steel plates.   |
| 2. Operating of PTO                        | 1. Operating levers not in neutral position.  | 1. Inadvertent operation of crane on engagement of PTO.  | 2 | 4 | MODERATE | 3 | 1. Make sure control levers are all in neutral position.  |
| 3. Extending Outriggers                    | 1. Outriggers not extended<br>2. Outrigger not locked.  | 1. Tilting of the crane.<br>2. Retracting of outriggers & tilting of the crane.  | 2 | 4 | MODERATE | 3 | 1. Extend outrigger fully.<br>2. Lock the outrigger beam.   |
| 4. Passage under OH lines with raised boom | 1. High tension electric<br>2. Travelling with load.  | 1. Electric shock.<br>2. fall of load & tilting of crane.  | 1 | 5 | HIGH     | 4 | 1. No movement with raised boom.<br>2. Provide banksman.<br>3. Do not travel with lifted load.  |
| 5. Loading operation                       | 1. Side loading / dragging of load.<br>2. Overload.<br>3. Swinging the load.<br>4. Abrupt operation of control levers.<br>5. Keeping the load in the elevated position.<br>6. Persons standing below the lifted load. | 1. Tilting of crane due to uneven load.<br>2. Damage to crane and loss of materials.<br>3. Instability & tilting of<br>4. Jerking, fall of load, hitting person.<br>5. fall of load due to mechanical failures.<br>6. fall of load causing human injuries.<br>7. electric shock.<br>8. fall of load & tilting of | 2 | 5 | HIGH     | 4 | 1. Lifting only vertically.<br>2. no dragging of load.<br>3. no overload.<br>4. No swinging of load.<br>5. Operate the levers slowly and smoothly.<br>6. Do not keep the load in the elevated position.<br>7. Do not allow any person to be under the load.<br>8. No movement with raised boom. |

