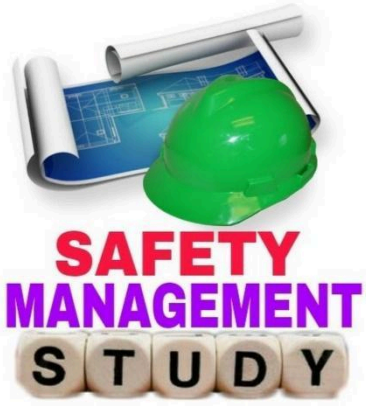
SAFETY MANAGEMENT STUDY

CIVIL WORK JOB SAFETY ANALYSIS



Rev:	Date	Revision Details	Prepared By	Issued By	Checked By	Approved By

S.NO.	ACTIVITY	HAZARD	CONSEQUENCE	CONTROL MEASURES
ACTIVITY - 1: BRICK WORKS				
1	Storage of bricks	1. Height above 1.5 M 2. Improper Storage	1. Fall of bricks 2. Personal Injury	1. Restrict height of storage to 1.5M 2. Adopt cross tier system of storage.
2	Transportation of bricks to the site	1. Unsecured bricks 2. Rough and uneven Road.	1. Breakage of bricks 2. Personnel injury.	1. Ensure bricks carried are properly secured 2. Defensive driving.
3	Unloading bricks	1. Fall of bricks 2. W rong lifting method.	1. Personnel injury 2. Back pain.	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.	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, (wheel borrow)	1. Defective wheelbarrow 2. Loosing balance due to uneven / loose surface 3. Absent mindedness 4. Hurry.	1. Overturning of wheelbarrow 2. Personnel injury.	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. Back pain 2. Skin allergy	1. Follow ergonomics 2. Use of adequate PPE
		1.Evolution of cement dust at work place 2.Splashing of cement mixture.	1. Dust allergy to the workmen 2. Eye/Skin injury.	1. Use of adequate PPE
7	Shifting of cement mortar by dumper	1. Defective dumper 2. Mis-operation.	1. Damage to dumper 2. Tilting of dumper	1. Use serviced dumper 2. Deploy experienced operator.
ACTIVITY - 2: CONCRETE CHIPPING				
1	Chipping	1. Bad condition of tools 2. Foreign particles	1. Personnel injury 2. Eye injury 3. Tripping hazard	1. Do not use defective tools. Select the right tool for the job. 2. Use adequate PPE. 3. Maintain good house keeping. 4. Remove debris immediately.
ACTIVITY - 3: CONCRETE FOUNDATION BREAKAGE USING JACKHAMMER.				
1	Dismantling concrete (foundation)	1. Fall of Jack hammer. 2. Vibration.	1. Injury. 2. Prolonged exposure causes occupational disease called white finger	1. Hold firm. 2. Secure chisel firm to jack. 3. Rotation of work force to avoid prolonged exposure.

ACTIVITY - 4: CONCRETING.				
1	Concreting	1. Air pollution by cement. 2. Handling of ingradients. 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 accident. 7. Parts of body or clothes may get entrapped.	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 material immediately from work place. 8. Ensure lighting arrangement during night hours. 9. Insist on shift pattern . 10. Provide adequate rest to workers between subsequent pours. 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 ingradients. 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 material	1. Shuttering /props may collapse and prove fatal.	1. Use PPE like goves, shoes, helmets,etc. 2. Avoid usage of make-shift tools.
3	Access to workplace	1. Passage to work place	1. Improperly tied and designed props/planks may collapse.	1. Ensure the stability and strength of passage before commencement of the work. 2. Do not overload or stand under the passage.
ACTIVITY - 5: CONCRETE MIXTURE OPERATION				
1	Deployment of concerte pump	1. Poor mechanical condition of the equation. 2. Unauthorized operation	1. Failure of equipment. 2. Accident /personal injury	1. Use good serviced equipment . 2. Deploy only licenced operators. 3. Engage banksman.
2	Batching plant. Truck Mixer. Cement bulk carrier.	1.Poor mechanical condition of the equipment. 2. Unauthorised Operation	1. Failure of equipment. 2. Accident /personal injury	1. Use good serviceable equipment. 2. Deploy only licenced operators. 3. Engage Banksman.
3	Deployment of concerte mixture.	1. Improper placement of mixer machine on uneven surface . 2. Mis-operation. 3. Loose contact with electric connections. 4. Rotating parts of machine. 5. Unblocked wheels of concrete mixer. 6. Improper coordination among crew members. 7. Smoke from the exhaust.	1. Tilting of mixture. 2. Damage to concrete mixer. 3. Electrical shock. 4.Fire hazard . 5. Personnel injury. 6. Unwanted movement of concrete truck. 7. Mis- operation and injury to crew. 8. Breathing problems.	1. Ensure concrete mixer is placed on even surface with proper pegs. 2. Check for proper electrical connections and insulation. 3. Keep adequate fire extinguishers. 4. Proper guards at all rotating parts of machinery. 5. Position the mixer machine to disperse smoke easily into atmosphere. 6. Clean the mixer machine after the concreting is over.

ACTIVITY - 6: MANUAL EXCAVATION

1	Piling Work	1. Failure of pile- driving equipment . 2. Noise pollution. 3. Extruding rods/ casing . 4. Working in the vicinity of 'Live- Electricity '	1. Can hurt people . 2. Can cause deafness and psychological imbalance. 3. Can hurt people. 4. Can cause electrocution /Asphyxiation	1. Inspect Piling rigs and pulley bricks before the beginning of each shift. 2. Use personal protective equipment like ear plugs, muffs, etc. 3. Barricade the area and install sign boards. 4. Keep sufficient distance from Live Electricity as per IS code. 5. Shut off the supply, if possible.
2	Pit Excavation upto 3m	1. Falling into pit. 2. Earth collapse. 3. Contact with buried electric cables. 4. Gas / Oil Pipelines	1. Personal injury. 2. Suffocation / Breathlessness. 3. Buried. 4. Electrocution. 5. Explosion	1. Provide guide rails/ 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. Don't 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 soils except hard rock. 8. Battering/Benching the sides. 9. Obtain permission from competent authorities , prior to excavation , if required. 10. Locate the position of buried utililty by referring to plant drawings. 11. Start digging manually to locate the exact position of buried utility and thereafter use mechanical means.
3	Pit excavation beyond 3m.	1. Falling into pit. 2. Earth collapse. 3. Contact with buried electric cables. 4. Gas / Oil Pipelines 3. Flooding due to excessive rain/ underground water. 4. Digging in the vicinity of the existing building / structure . 5. Movement of vehicles / equipments close to the edge of cut.	1. Personal injury. 2. Suffocation / Breathlessness. 3. Buried. 4. Electrocution. 5. Explosion 6. Can cause drowning situation . 7. Building / structure may collapse . 8. Loss of health and wealth. 9. May cause cave-in or slides. 10. Persons may get buried.	1. Prevent ingress of water 2. Provide ring buoys. 3. Identify and provide suitable dewatering pump or well point system. 4. Obtain prior approval of excavation method from local authorities, if required. 5. Use under-pining method . 6. Barricade the excavated area with proper lighting arrangements.. 7. Maintain atleast 2m distance from edge of cut and use stop bricks to prevent over-run . 8. Strengthen shoring and strutting.
4	Rock excavation by blasting	1. Improper handling of explosives. 2. Uncontrolled explosion. 3. Scattering of stone pieces in atmosphere. 4. Entrapping of animals / persons . 5. Misfire	1. May prove fatal. 2.. May cause severe injuries or prove fatal. 3. Can hurt people . 4. May cause severe injuries 5. May explode suddenly.	1. Ensure proper storage, handling and carrying of explosives by trained personnel. 2. Comply with the applicable explosive acts and rules. 3. Allow only authorized persons to perform blasting operations. 4. Smoking and open flame are to be strictly prohibited. 5. Use PPEs like gloves, goggles, face mask, etc. 5. Barricade the area with red flags and blow siren before blasting . 6. Do not return to site for atleast 20min. or unless announced safe by designated person.
5	Narrow deep excavations for pipelines, etc.	1. Frequent cave-in or slides. 2. Flooding due to Hydrostatic testing	1. May cause cave-in or slides.. 2. Persons may get buried. 3. May cause severe injuries or prove fatal. 4. May arise drowning situation	1. Battering / benching of sides . 2. Provide escape ladders. 3. Bail out accumulated water. 4. Maintain adequate ventilation .

ACTIVITY - 7: MECHANICAL EXCAVATION

1	Excavation using machinery	1. Defective machinery 2. Mis-operation 3. Inadvertent operation 4. Working near the edge of excavation 5. Working near utilities. 6. Working near overhead lines. 7. Fall of heavy objects Stone, boulder, soil etc. into excavated pit. 8. Fall of persons into the pits. 9. Dust. 10. Congested work site, too many persons working in the pits or trenches. 11.Noise during rock breaking, heavy equipment operation.	1. Damage to the machinery 2. Damage to underground electrical, telecom cables and water services. 3. Fall of machinery into the pit. 4. Pipe lines rupture/explosion injury. 5. Shock/Fatality 6. Fatal injury 7. Lung complaints 8. Eye injuries. 9. Hit injuries. 10. Hearing impairment. 11. Injury due to hit or collision. 12. Hit and damage to overhead structure.	1. Adhere to Permit to Work System if applicable. 2. Check machine thoroughly before starting the job. 3. Use good and serviced machines. 4. Look for route markers. 5. Make trial pits and expose underground cables, if any. 6. Look for warning tapes, cable covering mats concrete saddles and padding. 7. Use cable detectors. 8. Adhere strictly to manual excavation in case underground cables are present. 9. Follow safety procedure. 10. Operate machinery, keeping safe distance to avoid excavation area landside. 11. Deploy trained banks man. 12. Keep away from the edge of the excavation. 13. Provide barrier away from the edge of excavation. 14. Provide sign boards and blinking lights. 15. Edge of excavation shall be 0.5 m away from highpressure lines. 16. Keep 1.5 m away from overhead LT lines. 17. Use only approved equipment and competent operators. 18. No entry into the pit during excavation. 19. Keep removed earth at least 1m away from the pit. 20. Provide shuttering/shoring.
				21. Remove the excavated earth immediately. 22. Do not keep heavy objects on the edge of the pit. 23. Provide barricading with warning signals (warning light at night) 24. Provide proper ladder to get into the pits. 25. Provide walkway for lengthy trenches. 26. Use dust mask and goggles. 27. Allow only minimum number of persons to work at the same time. 28. Train for safe manual working procedures. 29. Provide adequate emergency access always. 30. Use earplugs or earmuffs. 31. Provide trained banksman. 32. Keep distance of minimum 5m between two equipment while in use. 33. Use only approved equipment and employ competent operators. 34.Keep safe overhead distance. 35. Observe special permits wherever required. 36. Strictly adhere to banksmen's signals and directions.
2	Incomplete excavation.	1. Un-noticed hazard area. 2. Improper barricading. 3. Bad weather.	1. Fall of persons/animals into the pit. 2. 3. Fall of machinery into pit. 4. Landslide due to weather effect	1. Impart proper instruction to all workmen. 2. Proper demarcation around the pit. 3. Keep sign board "Danger". 4. Barricade pits / trenches.

ACTIVITY - 8: ROCK BREAKING				
1	Rock excavation using pneumatic equipment, rock breaker, excavators.	1. Jolts to operator. 2. Obstruction to vision between operator and banksman. 3. Flying Projectiles. 4. Noise. 5. Dust. 6. Excavated Trench	1. Ill health. 2. Damage, injury to facilities and people 3. Injury/Damage to asset. 4. Hearing impairment. 5. Plumonary disorders. 6. Fall of material, equipment, persons and animals	1. Employ trained operator with license. 2. Avoid applying excessive force to hammer to avert jolting. 3. Banksman to stand in direct view with operator. 4. Extreme care to prevent projectiles flying from hammer point. 5. Do not operate the hammer if window cabin or shield is not in place. 6. Use ear muff / plug. 7. Use dust mask / Balaclava. 8. Barricade the area with warning sign. 9. Ensure overnight safety. 10. Provide ladder for deep pits.
2	Removal of Hydraulic Hammer	1. Hydraulic pressure jet	1. Loss of Hydraulic oil. 2. Environmental impact	1. Disconnect Hydraulic hose only after closing pressure and return line stop valves.
3	Laying hammer down	1. Fall.	1. Physical injury & back pain.	1. Position the hammer horizontal on wooden block and remove pins by gentle tapping.
4	W orking near overhead lines and pressure lines	1. Fall of hammer on nearby facilities. 2. Overhead lines. 3. Hitting, stricking, reversing incidents.	1. Damage to Hammer chisel. 2. Physical injury. 3. Damage to assets. 4. Shock. 5. Fatal injury	1. Employ trained and licensed operator. 2. Careful operation. 3. Edge of excavation shall be 0.5m away from heigh-pressure pipelines. 4. Keep 1.5 m away from overlhead LT lines. 5. Strict adherence to conditions stipulated by excavation work permit. 6. Keep adequate signboards and barricade the area. 7. Keep work force 5m away from Rock Breaker. 8. Strict adherence to Banks man's instructions.
S. No.	**ACTIVITY**	**HAZARD**	**CONSEQUENCE**	**CONTROL MEASURES**
ACTIVITY - 9: 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 disorders.	1. Wear respiratory protection. 2. Wear safety goggles and coverall. 3. Wash hands before taking food 4.Take shower after reaching camp.

ACTIVITY - 10: SHUTTERING AND SHORING

1	Shuttering / Handling of wooden planks and supports.	1. Protruding nails. 2. Unsafe / Improper handling. 3. Improper house keeping	1. Personal injury. 2. Tripping/Slipping hazard.	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 & wood from height.	1. Hand injury . 2. Improper cutting resulting in material loss. 3. Personnel injury.	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	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 & back pain.	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.	1. Use approved scaffolding. 2. Do not keep away 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.	1. Deploy experience 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.
S. No.	**ACTIVITY**	**HAZARD**	**CONSEQUENCE**	**CONTROL MEASURES**
ACTIVITY - 11: WORK ON REBAR				
1	Manual bar bending.	1. Defective tools 2. W rong application of tools. 3. W rong posture.	1. Personnel injury. 2. Damage to tools. 3. Back pain.	1. Do not use sub-standard tools. 2. Ensure usage of right tools for right job. 3. Do not push tools while bending. 4. Hold firmly. 5. Adhere to correct and safe posture
2	Bar bending on bending machine	1. Defective machinery. 2. Difference in level between table and machine. 3. Improper guard. 4. Inexperienced operator.	1. Personal injury 2. Damage to the machine. 3. Damage to the table. 4. Misoperatorion.	1. Do not use defective tools. 2. Secure machine and table on level ground. 3. Keep area clear around machine. 4. Provide switch for emergency stoppage. 5. Ensure guards are provided on all rotating parts. 6. Hold the bars firmly. 7. Stack bars properly and away from machine.
3	Manual cutting	1. Toppling of chisel. 2. Slippage of bar under tension.	1. Personal injury. 2. Flying bar.	1. Safe handling of tools. 2. Keep hand away from cutting chisel. 3. Hold bar firmly. 4. Ensure safety while operating handle.
4	Binding bar with wire	1. Haphazard placement of steel bar.	1. Personal injury	1. Keep wires initially bend downward.
5	Cutting bar by machine	1. Defective machine. 2. Improper guard. 3. Loose electrical connections. 4. Defective blade.	1. Personnel injury. 2. Damage to the machinery. 3. Personnel injury. 4. Fire hazard. 5. Personnel injury	1. Do not use defective tools. 2. Use serviced machine. 3. Provide stand on both sides of the machine for moving steel. 4. Provide switch for emergency stoppage of machine. 5. Ensure proper electrical connections. 6. Do not use defective blade. 7. Keep hands away from cutting blade while in operation.
6	Cuting wire by tools.	1. Defective tools.	1. Personal injury. 2. Damage of tools.	1. Use proper binding. 2. Take exta care while walking around the work site
7	Manual placement of bar.	1. Loose binding of reinforcement . 2. Improper co-ordination. 3. Inexperienced persons.	1. Slippage of binding steel reinforcement. 2. Personal injury.	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 - 13 SCAFFOLDING , FORMWORK AND LADDERS				
1	Scaffolding , formwork and ladders	1. Person 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.	1. Provide guard rails for working at height . 2. Face ladder while climbing and use both hands. 3. Ladder shall exend about 1m above landing for easy access and tying up purpose. 4. Do not place the ladder against a movable objects and maintain base at 1/4 ratio of the working length of the ladder. 5. Suspended scaffolds 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 stablity and anchor with permanent structures. 9. Design scaffolding for max. load carrying capacity. 10. Scaffolding planks shall not be less than 250 mm full thickness lumber or equivalent. These shall be cleated or secured and must extend over the end supports by atleast 150 mm and not more than 300mm. 11. Don't overload the scaffolds. 12. Do not join short ladders to make a longer 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 - 14: HANDLING OF PORTABLE ELECTRICAL TOOLS				
1	W orking with portable electric tools	1. Damaged cable . 2. Defective tool. 3. Loose components (wheel, switch) 4. Excess pressure on tool. 5. Improper handling. 6. Non use of PPE.	1. Electic shock. 2. Spark /shock. 3. Hit injury. 4. Accident and injury. 5. Bodily injury. 6. Shock/eye and bodily injuries.	1. Daily check up before start. 2. Replace defective tools. 3. Proper maintenance. 4. Training on proper use & care. 5. Inspection and corrective action to follow correct handling procedures. 6. Use adequate PPE (Face shield/googles, gloves)
ACTIVITY - 15: HANDLING PORTABLE HAND TOOLS				
1	W orking with portable hand tools.	1.Defective / damaged tools and tools without protective handlles. 2. Improper handling. 3. Improper storage. 4. Misuse /abuse.	1. Accident and bodily injuries. 2. Property damages.	1. Replacing defective / damaged tools. 2. Use tools only with protective handles. 3. Training & instruction to use right tool for the right job. 4. Keep tools only in toolboxes. 5. Training & instriction to use right tools for the right job.

ACTIVITY - 16: GAS WELDING				
1	Gas welding / cutting / heating.	1. Welding radiates invisible ultraviolet and infrared rays. 2. Improper placement of oxygen and acetylene cylinders. 3. Leakage /cuts in hoses. 4. Opening - up of cylinder. 5. Welding of tanks, container or pipes storing flammable liquids.	1. Radiation can damage eyes and skin. 2. Explosion may occur. 3. May cause fire. 4. Cylinder may burst.	1. Use specified shielding devices and other PPE of correct specifications. 2. Avoid thoriated tungsten electrodes for GTAW . 3. Move out any leaking cylinder. 4. Keep trolley for transportation of cylinders and chain them . 5. Use flashback arrestors. 6. Purge regulators immediately and then turn off. 7. Never use grease or oil on oxygen line connections and copper fittings on acetylene lines. 8. Inspect regularly gas carrying hoses. 9. Always use red hose for acetylene and other fuel gases and blue for oxygen. 10. Always stand back from regulator while opening the cylinder. 11. Turn valve slowly to avoid bursting. 12. Cover the lug terminals to prevent short circuiting . 13. Empty & purge them before welding. 14. Never attach the ground cable to tanks, container or pipe storing flammable liquids. 15. Never use LPG for gas cutting.
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.	1.Use welding shield / goggles. 2. Fireproof 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. Presence of fire extinguisher 9. Adequate ventilation. 10. Training & instructions.

ACTIVITY - 18: WORKING IN CONFINED SPACE				
1	W orking in confined spaces (tank, vessel, static equipment, excavation beyond 3m etc)	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. Use respiratory devices, if required. 2. Avoid over crowding 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. Depute one person outside the confined space for continuous monitoring and for extending help in case of an emergency. 10. Keep the fire extinguishers at hand distance. 11. Remove surplus material and scrap immediately . 12. Do not smoke inside a confined space. 13. Do not allow gas cylinders inside a confined space. 14. Use low voltage (24V) for hand held lighting. 15. Use tools with air motors or electric tools with max. voltage of 24V. 16. Remove all equipments at the end of the day.
ACTIVITY - 19: MATERIAL HANDLING (MANUAL)				
1	Material handling (manual)	1. Non-use of PPE. 2. Inadequate manpower. 3. Lack of co-ordination in group effort. 4. W rong body posture. 5. Lifting error. 6. Sharp edges / corners / projecting parts / protruding nails. 7. Slippery materials. 8. Loose materials.	1. Accident/ injury. 2. Back pain,sprain,etc. 3. Property damage. 4. Injury /property damage. 5. Loss of property.	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. 7. Fasten the item properly or use suitable packing / container.
ACTIVITY - 20: MATERIAL HANDLING (MECHANICAL)				
1	Material handling with forklift , hiab, crane etc.	1. Lack of knowledge / skills. 2. Defective equipment. 3. Defective lifting jacks. 4. Overloading. 5. Untrained opertator.	1. Accident / injury. 2. Material losses. 3. Tilting of jacks / boom. 4. Injury due to accident and property damage.	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. 4. Follow procedures. 5. Training and assistance of banksmen / rigger.

ACTIVITY - 21: WORK AT HEIGHTS				
1	W orking at elevated places.	1. Person can fall down. 2. Material can fall down	1. May sustain sever injuries or prove fatal . 2. May hit the scrap/ material stacked at the ground or in between . 3. May hit the workers working at lower levels and prove fatal.	1. Provide guard rails/ 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 3m. 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 movement on beams. 9. Keep the work place neat and clean. 10. Remove the scrap immediately. 11. Do not throw or drop materials or equipment from height. i.e. do not bomb materials. 12. All tools to be carried in a tool- kit Bag or on working uniform. 13. Remove scrap from the planks. 14. Ensure wearing of helmet by the workers working at lower levels.
ACTIVITY - 22: WORKING UNDER CRANE / LIFTING EQUIPMENT.				
1	W orking under crane / lifting equipment	1. Working without PPE. 2. Failure of slings. 3. Improper handling. 4. Overloading. 5. Defective equipment. 6. Lack of awarness.	1. Fatality / injury due to fall of loads. 2. Material damage.	1. Use required PPE. 2. Use only certified slings as per colour coding. 3. No person to stand under lifted load. 4. Follow safe lifting procedures. 5. Only approved equipment to be used. 6. Ensure pronpr servicing. 7. Training to operator and provinding banks man / rigger for assistance.
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. Overloading	1. Accident / injury 2. Damage of materials. 3.Damage to equipment.	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 clearence is obtained. 6. Proper supervision. 7. Refer to load chart. 8. Use platform ladder for safe access. 9. Never deactivate or deenergise over riding devices on lifting equipment.
2	Loading near live facilities	1. Live facilities etc.	1. Fire 2. Electric shock. 3. Injury. 4. Property Damage	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.	1. Outrigger base plates to rest on firm ground or on timber bricks/ steel plates
2	Operating of PTO	1. Operating levers not in neutral position.	1. Inadvertent operation of crane on engagement of PTO	1. Make sure control levers are all in neutral position
3	Extending outriggers	1. Outriggers not extended fully 2. Outrigger not locked.	1. Tilting of the crane. 2. Retracting of outriggers & tilting of the crane	1. Extend outrigger fully. 2. Lock the outrigger beam.
5	Passage under OH lines with raised boom	1. High tension electric current . 2. Traveling with load.	1. Electric shock. 2. Fall of load & tilting of crane.	1. No movement with raised boom 2. Provide Banksman 3. Do not travel with lifted load.
4	Loading operation	1. Side loading / dragging of load. 2. Overload. 3. Swinging the load. 4. Abrupt operation of control levers. 5. Keeping the load in the elevated position. 6. Persons standing below the lifted load.	1. Tilting of the crane due to uneven load. 2. Damage to crane and loss of materials. 3. Instability & tilting of crane. 4. Jerking, fall of load, hitting person. 5. Fall of load due to mechanical failures. 6. Fall of load causing human injuries. 7. Electric shock. 8. Fall of load & tilting of crane.	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 load.
ACTIVITY - 24: HANDLING OF GAS CYLINDERS				
1	Transporting gas cylinders: * Oxygen * Acetylene. * Argon. * Nitrogen. * LPG.	1. Cylinders kept horizontal. 2. Cylinder kept untied /unlocked in welding truck /mobile welding unit. 3. Valve leakage.	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 cylinder/valve. 5. Leakage of gas.	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 authorized 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 independently on truck to prevent falling of one cylinder while loading/unloading the other.

ACTIVITY - 25: ERECTION, DISMANTLING AND WORKING ON SCAFFOLDING				
1	Scaffolding erection	1. Improper manual handling. 2. Fall of scaffolding materials. 3. Hitting. 4.Defective lifting equipment / improper use. 5.Faulty erection.	1. Personal injuries. 2. Material damage. 3. Collapse of scaffolding and fall of persons.	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. 4. Daily inspection and certification by competent person. 5. PTW in place.
2	W orking on scaffolding	1. Defective scaffolding. 2. Improper use. 3. Faulty access to platform. 4. Inadequate size of platform. 5. Overloading. 6. Faulty / unguarded access ladder/stairs	1. Injury due to fall.	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. 5. No overloading permitted. 5. Only minimum number of persons allowed to work at a time.
3	Dismantling scaffolding	1. Fall of persons. 2. Fall of scaffolding materials. 3. Fall of hand tools (hammer etc.)	1. Fatality / injury.	1. Follow dismantling procedures. 2. Do not allow persons to be under the scaffolding structure. 3. Use PPEs (helmet, gloves) 4. Keep tools in proper holder.
ACTIVITY - 26: WORKING IN HOT ENVIRONMENT				
1	1. Working in hot environment. 2. Hot work such as welding, cutting, heating, cooking, etc.	1. Heat stress due to failure of thermo-regulatory system of the body. 2. Dehydration due to excess loss of body fluids.	1. Heat ailments such as heat exhausting, heat cramps and heat stroke.	1. Drink plenty of cold water. 2. Intermittent rest under shades. 3. Eating more vegetables and fruit items. 4. Provide shade for work in static posture (welding). 5. Appropriate PPE to protect body against direct exposure to heat or hot sun.
ACTIVITY - 27: WORKING IN DUSTY ENVIRONMENT				
1	W orking in dust	1. Dust (Inhalation and striking the eye)	1. Lung disorders (silicosis) and eye injury.	1. Sprinkle water to supress dust generation wherever possible. 2. Use PPE (dust mask, goggles)
ACTIVITY - 28: STAY IN CAMPS				

1	Staying in residential camps	1. Biological hazards (Malarial mosquitoes, contaminated water / food stuff)	1. Ill health.	1. Prompt disposal of wastes, concealment of drainage. 2. Use of insecticides. 3. Ventilation in living accommodation. 4. Keeping food wastes in garbage bags/closed buckets and prompt disposal to the food waste to dump yard as per Waste Management Plan. 5. Dead slow driving in camp premises. 6. No night driving. 7. Extremely cautious against crossing of stray animals. 8. Do not cause harm to any livestock. 9. Obseve warning signals on roads against stray animals.
ACTIVITY - 29: SLIPS, TRIPS AND FALLS AT WORK PLACE.				
1	Moving in the work area.	1. Timbering bricks, wooden planks, steel rod bits. 2. Pipe pieces. 3. Protruding bolts on concrete foundations of pipe supports. 4. Paint tins, polythene papers, electric cable/wire insulations, steel wire insulations, steel wire cuttings, tools & tool boxes. 5. Overhead projection of pipes.	1. Bodily injury due to fall of persons , fall of heavy objects, tools etc. 2. Hitting on overhead projections.	1. Remove all timber bricks, planks, pipe pieces etc immediately after use to the designated place. 2. Do not keep objects / tools etc at heights without safe containment against fall. 3. Provide barricading with warning tags. 4. Provide plastic/soft material cap to projecting pipes and warning tags to caution the workers. 5. Maintain good house keeping by frequent appraisals, supervision, inspection, audit and follow up.q1
ACTIVITY - 30: FIRE PREVENTION AND PROTECTION				

1	Fire prevention and protection	1. Small fires can become big ones and may spread to the surroundings aresa. 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	8. Do not use any sort of elevators for evacuation during fire. 9. Maintain lightening arrestors for elevated structures. 10. Stop all electrical motors. 11. Move the vehicles from dangerous locations . 12. Remove the load hanging from the crane booms . 13. Remain out of the danger areas. 14. Ensure usage of correct fire extinguisher meant for the specified fire. 15. Do not attempt to extinguish oil and electric fires with water. Use foam extinguishers /CO2 /sand. 16.Maintain safe distance of flammable sub fr Bnuyh67n b stance from source of ignition . 17. Restrict the distribution of flammable materials to only min. necessary amount 18. Construct specifically designed fuel storage facilities. 19. Keep chemicals in cool and dry place away from heat. Ensure adequate ventilation. 20. Before welding operation , remove or shield the flammable materials properly. 21. Store flammable materials in stable racks, correctly labeled preferably with catchment trays. 22. Wipe off the spills immediately .

ACTIVITY - 31: LAYING ELECTRICAL CABLES

1	Laying out electrical cables (Cable drum handling)	1. Unstable Cable drum. 2. W rong position of jack. 3. Inadequate jack / spindle. 4. Defective jack / spindle. 5. Rotating parts. 6. Drum rollers. 7. Pulling in wrong posture. 8. Open trench. 9. Theft.	1. Fatality / service injury due to fall of cable drum or jack. 2. Injury by hitting / caught in. 3. Finger injury due to trapping between drum / rollers. 4. Serious injury due to slip & fall of cable. 5. Loss of cable.	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 points. 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.
ACTIVITY - 32: ELECTRICAL INSTALLATION AND USAGE				
1	Electrical installation works	1. Short circuiting. 2. Overloading of Electrical System	1. Can cause Electrocution or Fire. 2. Bursting of system can occur which leads to fire	1. Use rubberized hand gloves and other PPE. 2. Don't lay wires above ground or under carpets, mats or door ways. Lay cables overhead or buried. 3. Allow only licensed electricians to perform on electrical facilities. 4. Use only approved and insulated wires or cables. 5. Don't 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 / equipment 's from water and naked flames. 12. Check all connections before energizing. 13. Display voltage and current ratings prominently with 'Danger' signs. 14. Ensure approved cable size, voltage, grade and type. 15. Switch off the electrical utilities when not in use. 16. Do not allow unauthorized connections. 17. Ensure proper grid wise distribution of power. 18. Do not lay unarmoured cable directly on ground, wall, roof or trees. 19. Maintain atleast 3 m distance from HT cables . 20. All temporary cables should be laid atleast 750 mm below ground on 100 mm fine sand overlying by brick soling. 21. Provide cable route markers indicating the type and depth of cable at intervals not exceeding 30 m and at the diversions/ termination.

ACTIVITY - 46: DRIVING / OPERATING VEHICLES & EQUIPMENTS				
1	Driving /operating vehicles/ equipment	1. Lack of knowledge and skill. 2. Untrained drivers / operators. 3. Defective vehicles / equipments. 4. Over speed / overload.	1. Fatality / injury. 2. Loss of property / material. 3. Damage to equipment.	1. Only authorized persons to be deployed for driving / equipment operation. 2. Training / refresher training to drivers / operators. 3. Use of appropriate vehicles /equipments. 4. Inspection & supervision. 5. Provide banksmen as appropriate.
2	Driving on graded roads	1. Loose surface, erosion, pot holes.	1. Injury / fatalities due to accidents.	1. Provide speed limiters. 2. Use tyres with a minimum of 2 mm tread. 3. Drive with dipped headlights and high intensity lights on.
3	Speed driving	1. Crossing the speed limits (Rash driving)	1. Personnel injury	1. Obey speed limits and traffic rules strictly. 2. Always expect the unexpected and be a defensive driver. 3. Use seat belts/ helmets. 4. Blow horn at intersections and during overtaking operations. 5. Maintain the vehicle in good condition. 6. Do not overtake on curves , bridges and slopes.
4	Driving in adverse condition	1. Adverse weather condition. 2. Falling objects/ Mechanical failure	1. Personnel injury. 2. May prove fatal	1. Read the road ahead and drive to the left. 2. Keep the wind screen and lights clean . 3. Do not turn at speed. 4. Recognize the hazard, understand the defense and act correctly in time. 5. Ensure effective braking system, adequate visibility for the drivers, reverse horn. 6. Proper maintenance of the vehicle as per manufacturer's instructions.
5	Drunken Driving	1. Consuming alcohol before and during the driving operation	1. Accident 2. Personal injury	1. Alcohol and driving do not mix well. Either choose alcohol or driving. 2. If you have a choice between hitting a fixed object or an on-coming vehicle ,hit the fixed object. 3. Quit the steering at once and become a passenger. Otherwise take sufficient rest and then drive. 4. Do not force the driver to drive fast and round the clock. 5. Do not day dream while driving.
ACTIVITY - 47: 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 choke. 5. Non / Partial application of hand brake.	1. Rolling of vehicle resulting in fatality / injury. 2. Damage to vehicle / properties / live facilities nearby.	1. Follow parking procedure. 2. Level ground for parking. 3. Proper Hand brake. 4. Wheel chokes in position. 5. Gear engagement.
ACTIVITY - 50: 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.	1. Pull the string gently avoiding contact or hit against compactor or nearby personal. 2. Guarding. 3. Hold firm and move slowly.

ACTIVITY - 51: OPERATION OF CRANE				
1	Operation of Power Take Off (PTO)	1. Inadvertent movement of crane	1. Accidents. 2. Damage.	1. Make sure PTO levers are in neutral position
2	Positioning outrigger.	1.Outriggers can sink in soft ground. 2. Improper extinction of the outriggers. 3. Improper locking of outriggers.	1. Lifting of vehicle. 2. Tilting of vehicle. 3. Physical injury. 4. Equipment damage. 5. Material damage.	1. Crane must be set on firm ground. On soft ground place strong wooden bricks or steel plates on ground and set outriggers on them. 2. Extend the outrigger beam fully as far as possible during operation. 3. Be sure to lock the outrigger beams with lock pins.
3	Locking operation.	1. Side loading or dragging of loads will exert extra load on crane. 2. Excess load. 3. Abrupt load. 4. Careless	1. Cause serious damage to equipment . 2. Crane becomes unstable & causes accident. 3. Electrocution	1. Avoid side looking or dragging loads. 2. Strict adherence to SWL. 3. Ensure crane is installed with safety limits. 4. Move the levers in a slow manner. 5. Attention on operation. 6. Do not allow workers to stand within the working radius.
4	Inspection of winch rope.	1. Damaged or less turns of winch rope.	1. Cause serious accidents	1. Inspect rope for any damage or twist and replace in case of any damage.
6	Signals	1. Improper signs	1.Leads to confusion and accidents.	1. Competent banksman to be detailed for signals.

ACTIVITY - 53: OPERATION OF VIBRATOR				
1	Starting by pulling up with string	1. Inadvertant contact with vibrator. 2. Rotating parts. Kick back of hose. 3. Cement splash. 4. Fall of vibrator into excavation concreting location. 5. Fire hazard	1. Injury. 2. Contact with body. 3. Damage. 4. Burn hazard.	1. Pull the string gently avoiding contact or hit against vibtator or nearby personnel. 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 - 60: HANDLING AND LIFTING EUIPMENTS (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	1. Avoid standing under the lifted load and within the operating radius of cranes. 2. Check periodically oil, brakes, gears, horns and tyre pressureS. 3. Check size and condition of all chain pulley bricks, slings, U-clamps, D- shackles, wire ropes etc. 4. Allow crane to move only on hard, firm and levelled ground . 5. Allow lifting slings as short as possible and check gunny packing's at the friction points. 6. Do not allow crane to lift its 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 followed. 10. The max. safe working load shall be marked on all the lifting equipments. 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 operation. 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.
2	Loading/Operating of hopper	1. Generation of dust.	1.Ill health. 2. Injury due to bursting of the flange coupling.	1. Provide proper PPE to workmen working arround. 2. Barricat the total area by providing curtain arround the booth opening. 3. Health check up to be done periodically to monitor the health. 4.Work to be done by the trained operator only.

ACTIVITY - 62: FABRICATION YARD OPERATIONS

1	Grinding and grinding wheel replacing.	1. Absence of tool rest on bench grinder. 2. More gap between the wheel and tool rest of bench grinder. 3. Improper/wrong size grinding wheel. 4. Excess pressure on wheel. 5. Breakage of wheel.	1. Eye / face injury 2. Hand injury	1. Use proper PPE. (Face shield) 2. Mount the tool rest on both sides. 3. Gap more than 3mm is unsafe. 4. Use grinding wheel of correct size. 5. Training & instruction. 6. Provide fire extinguisher. 7. Proper tightening of wheel. 8. Use of correct size spacer washers.
2	W orking with portable electric tools	1. Damaged cable . 2. Defective tool. 3. Loose components (wheel, switch) 4. Excess pressure on tool. 5. Improper handling. 6. Non use of PPE.	1. Electric shock. 2. Spark/shock. 3. Physical injury.	1. Daily check up before start. 2. Replace defective tools. 3. Proper maintenance. 4. Training on proper use & care. 5. Inspection and corrective action to follow correct handling procedures. 6. Use adequate PPE (Face shield/goggles, gloves)
3	Gas welding / cutting / heating.	1. Backfiring. 2. Splashing splinters. 3. Gas leakage. 4. W rong positioning of cylinders. 5. Presence of flammable gases.	1. Fatality / burn injury, fire / explosion. 2. Gas leakage due to fall of cylinder and damage of valves.	1. Work only after wearing PPE. 2. Fit flash back arrestor and NRV on both cylinder outlets. 3. Use face shield and fire proof gloves. 4. Daily check up before start of work. 5. Keep cylinders in trolleys or chain to some firm structure to prevent fall. 6. Gas testing before start of work. 7. Employ competent and trained welder. 8. Provide windshield.
4	Arc welding	1. Radiation harmful to naked eyes. 2. Splinters / slag. 3.Toxic flames. 4. Loose connections / Loss of insulation. 5. Flammable gases. 6. Poor ventilation	1. Welder's cataract. 2. Burn injury. 3. Lung ailments 4. Electric shock. 5. Fire / explosion. 6. Asphyxiation.	1.Use welding shield / goggles. 2. Fireproof 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 (DCP/CO_2) standby. 10. Adequate ventilation. 11. Training & instructions.
5	Material handling (manual)	1. Lack of co-ordination in group effort. 2. W rong body posture. 3. Lifting error. 4. Sharp edges/corners/projecting parts/protruding nails. 5. Slippery materials. 6. Loose materials.	1. Back pain,sprain,etc. 2. Body Injury	1. Training & instructions. 2. Use hand gloves/ packing materials. 3. Remove protruding nails before handling. 4. Use proper lifting devices for good grip. 5. Fasten the item properly or use suitable packing / container.
6	Material handling with forklift / crane etc.	1. Lack of knowledge / skills. 2. Defective equipment. 3. Defective lifting jacks. 4. Overloading.	1. Body injury. 2. Material losses. 3. Tilting of jacks / boom.	1. Only trained 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. 4. Follow procedures. 5. Training and assistance of banksmen / rigger.

ACTIVITY - 64: OFFICE WORK

2	Use of VDUs	1.Glaring from screen 2.Body stress due to bad ergonomic 3.Electrical shock due to loose electrical connection	1. Eye injury. 2. Bach ach. 3. Electricutation	1. Maintain safe distance & height from the screen at the time of working. 2. Install a screen guard to filter the unwanted rays. 3. Provision of furniture e.g. working table ,chair etc suitable for comfertable working.
3	Illumination at all working stations.	1. Inadequqte illumination.	1.Eye strain. 2. Headach.	1.Provide proper PPE to workmen working arround. 2. Barricating the total by providing curtain arround. 3. Adequate reflector to be provided at all light fitting as a antiglaring arrangement to improve the comfert. 4.Work to be done by the trained operator only.
4	Ventilation	1.Inadequate ventilation. 2.Electrical hazard. 3. Fire.	1. Physical strain. 2. Mental strain.	1. Maitain adequate level of ventilation with proper temprature. 2. Adherance to perioddical maintenance schedule. 3.Ensure to switch off the ventilation as & when it is not required.
4	Mental work load.	1.Mental depression	1.Mentally effected.	1.Allow person to take break to releive the mental stresses at differant interval of time. 2.Pre employment heath check to be conducted arround.