

HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)

TABLE OF CONTENTS

1. INTRODUCTION	3
2. DEFINITIONS AND ACRONYMS	3
3. HIRA ORGANISATION STRUCTURE.....	4
4. RESPONSIBILITIES OF HIRA TEAM.....	4
5. FREQUENCY.....	5
6. METHODOLOGY.....	5
7. EFFECTIVENESS.....	8
8. MASTER HIRA FOR CRITICAL ACTIVITIES	9
1) Excavation	10
2) Blasting Activity	17
3) Bar Bending & Cutting.....	21
4) Scaffolding	23
5) Formwork	26
6) Shuttering	28
7) Batching Plant Operation	31
8) Concreting	34
9) Movement Of Equipment & Machineries	36
10) Portable Electric Power Tools And Electrical Equipment.....	38
11) Lifting Of Material.....	39
12) Working At Height	41
13) Welding, Gas Cutting & Grinding.....	42
14) Grit Blasting / Abrasive Blasting	45
15) Road Work-Widening Project (Flexible Pavement / Bc Pavement)	46
16) Roof Works	49
17) Confined Space.....	50
18) Radiography	52
19) Tower Erection And Stringing.....	53
20) Working Near IR Track	61
21) Under Ground Tunnel Work.....	63
22) Working Over Or Adjacent To Water	68

1. INTRODUCTION

The objective of this Hazard Identification Risk Assessment (HIRA) is to identifying and assessing the hazard associated during the construction of project and there by controlling the risk by implementing mitigation measures before start of the work to avoid incident. HIRA helps to become proactive rather than just reactive.

2. DEFINITIONS AND ACRONYMS

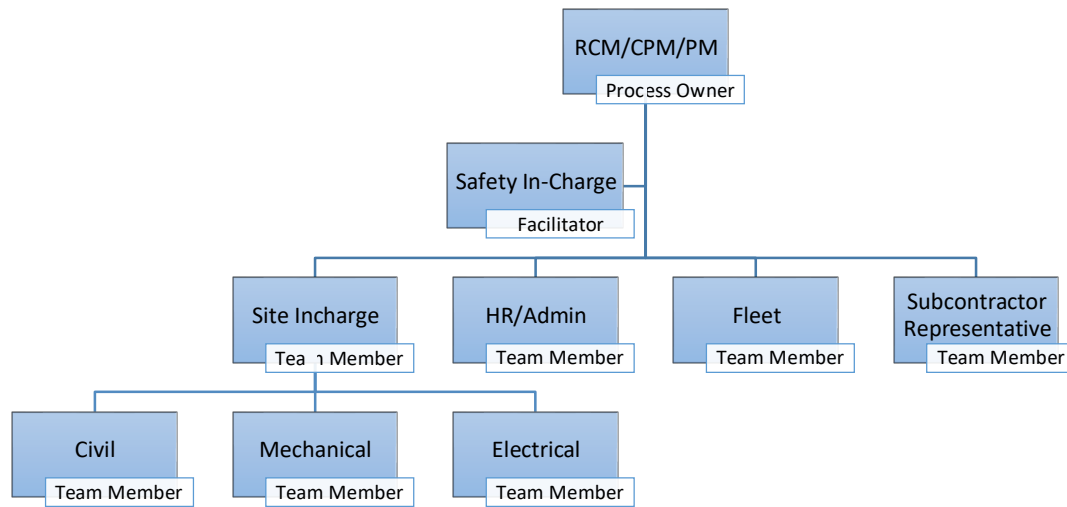
The following terms used in this report have the meaning defined below:

ALARP	: As Low As Reasonably Practicable. This is the level, where the time, effort, difficulty and cost of further reduction measures becomes disproportionate to the additional risk reduction from the incremental effects.
CONSEQUENCE	: The unmitigated impact of the hazard in terms of People, Environment, Asset and Reputation.
HAZARD	: The potential to cause harm, including ill health and injury, damage to property, products or the environment; production losses or increased liabilities.
HIERARCHY OF CONTROLS	: An order of preference in application of risk mitigations. The order is: Eliminate, Substitute, Isolate, Engineer, Administration and PPE.
PROBABILITY	: The possibility of the event happening.
MAJOR RISK	: A risk that has the potential to result in a Major Accident classified as high risk to people, assets, the environment and/or company reputation as defined in TPL SHE Risk Matrix.

The acronyms used in this document have the meaning defined below:

Acronym	Definition
E&I	: Electrical and Instrumentation
HIRA	: Hazard Identification Risk Assessment
SHE	: Safety, Health and Environment
HRA	: Health Risk Assessment
RAM	: Risk Assessment Matrix
OCP	: Operational Control Procedure
TPL	: Tata Projects Limited

3. HIRA ORGANISATION STRUCTURE



4. RESPONSIBILITIES OF HIRA TEAM

S.No	Person	Responsibility
1	RCM/CPM/PM	<ul style="list-style-type: none"> RCM is process owner. To form a HIRA Cross functional team along with Site In-charge/Engineer (Civil, Electrical, Mechanical), Safety In-charge, Fleet, HR/Admin and subcontractor representative. Any material to be required as per the Precautionary measures and proposed control measures need to arrange To review the updated HIRA and approve it.
2	Site In-charge	<ul style="list-style-type: none"> To prepare Method statement of each activity. To participate in preparing HIRA. To incorporate all the Hazard & appropriated precautionary measures as per the site environment, to bring down the risk level to acceptable risk and communicate down the level. Before issuing PTW ensure all precautionary measures are in place. Ensure HIRA talk by site supervisor before starting the activity.
3	Safety In-charge	<ul style="list-style-type: none"> Work as Facilitator to prepare HIRA based on the method statement. Ensure all concern person are available for preparing HIRA. To incorporate all the Hazard & appropriated precautionary measures in HIRA format along with responsibility. Communicate updated HIRA to all concern for implementation and ensure all precautionary measures are in place. The same shall be communicated to SBG SHE Head and Corporate SHE Team. To ensure safety supervisor shall monitor for any deviation. If any deviation, escalate to Site In-charge, RCM/CPM/PM and SBG SHE Head.
4	Sub-contractor Representative	<ul style="list-style-type: none"> Follow the precautionary measure as per the HIRA

5. FREQUENCY

- Site Team need to prepare Dynamic HIRA along with proposed control measure on the basis of Master HIRA.
- HIRA need to be prepared before start of each activity.
- HIRA need to be updated after occurrence of any incident, management of change, change of work methodology and change of any regulation. If there is no change then it should be reviewed half-yearly.

6. METHODOLOGY

The HIRA review is the structured multidisciplinary hazard identification, risk assessment and methodology that provides detail review of hazard, risk and control of the construction activities. The review is facilitated by the relevant construction personnel in the brainstorming session

This review covers the following steps in a systematic approach as follows in *Figure 6.1*.

Figure 6.1 Overview of HIRA Methodology

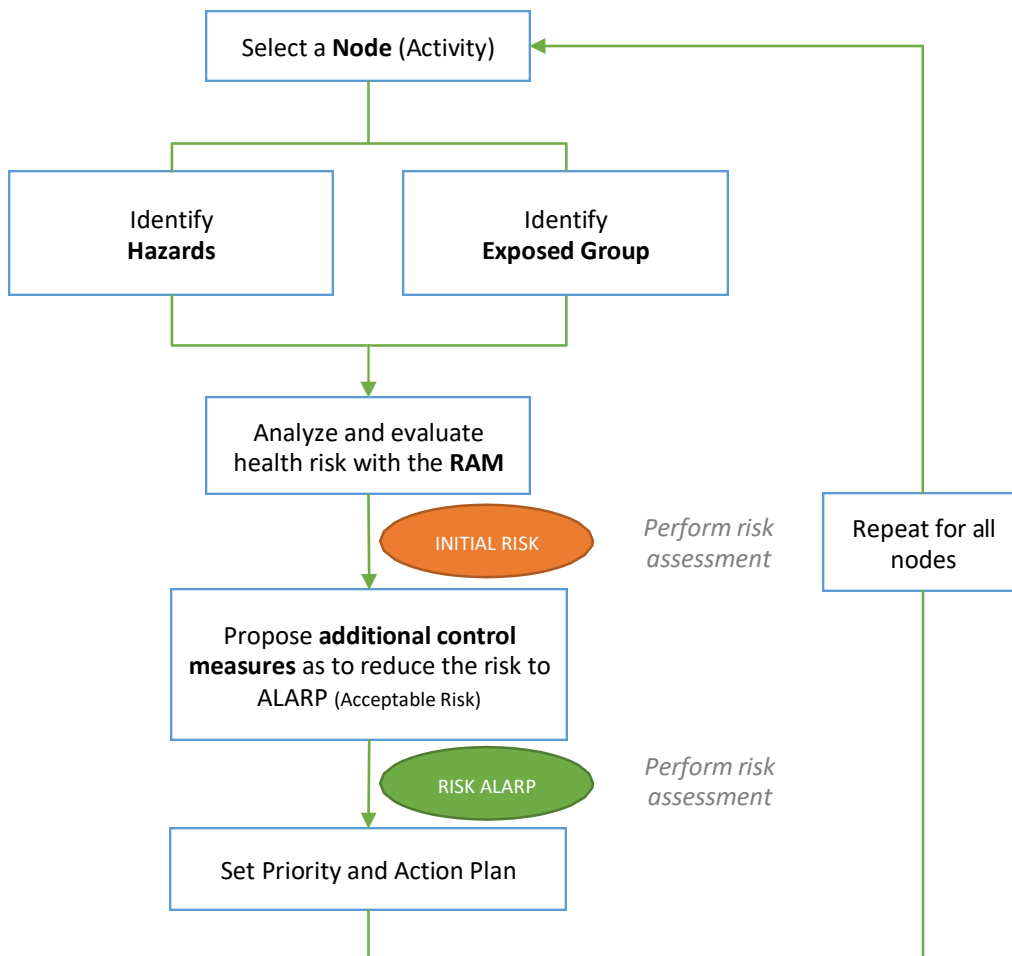
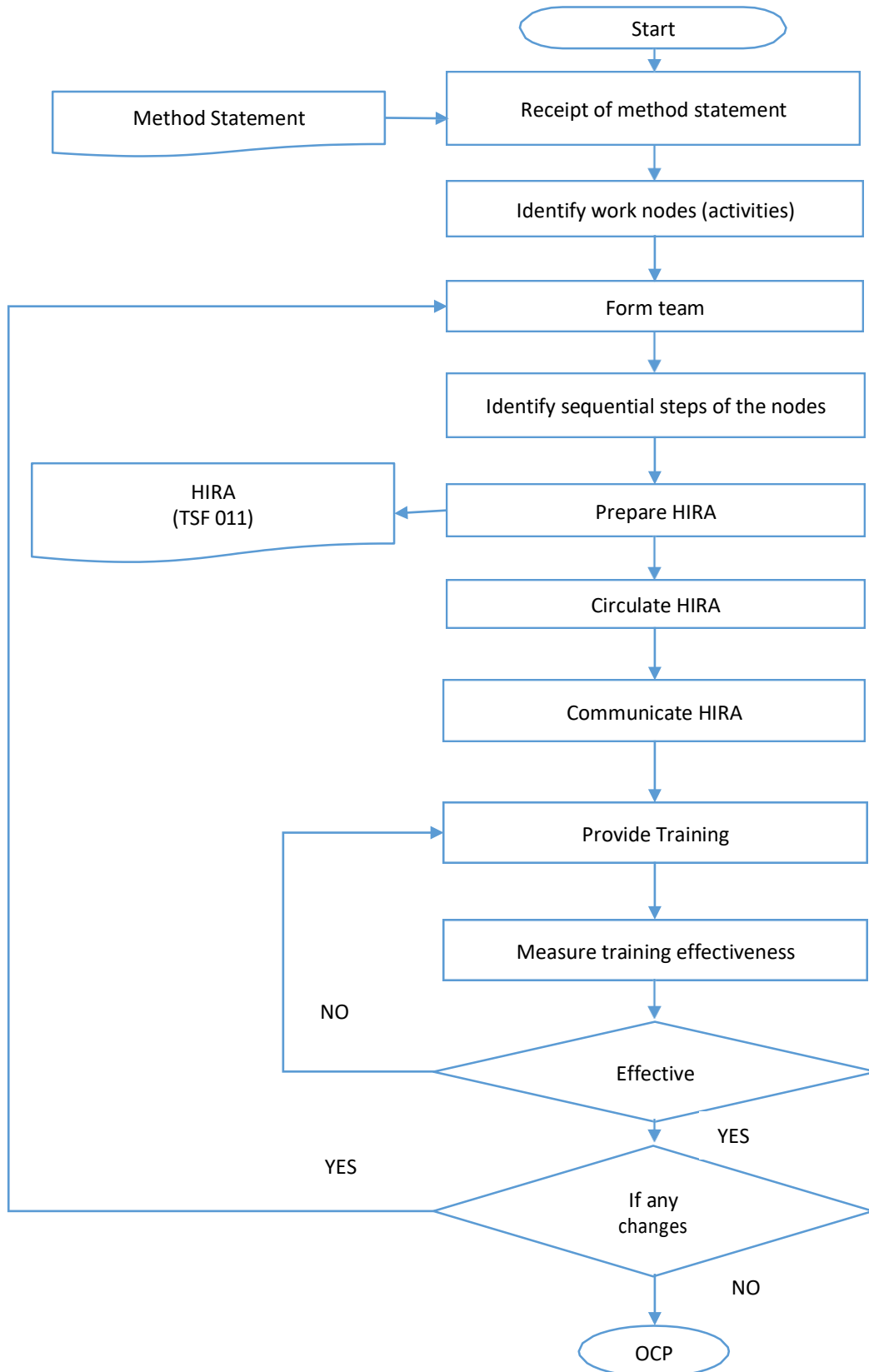


Figure 6.2 HIRA Flowchart



Steps of HIRA review is summarised as follows:

- Classify work/assessment units or work activities during construction phase (based on Work Method Statement).
- Identify the hazards associated with work activities.
- List out the Consequence of the hazard involved in the activity.
- Assess and score the risk (i.e. probability X severity) using the Risk Matrix as per TPL Risk Assessment Matrix (RAM) (refer to Section 6.3).
- List out present controls (preventive and recovery).
- Assess the risk based on present controls.
- Reassess the medium and high risk to bring it down to acceptable risk.
- Verify compliance to regional Regulation, Project Specifications, and applicable international codes and standards.

TPL SHE RISK ASSESSMENT MATRIX

For each of the identified hazard, the level of risk is assessed based on the TPL SHE Risk Assessment Matrix (see Figure 6.3) during HIRA review. Risk ranking is firstly performed based on the unmitigated risk for each hazard, and then the level of risk is re- evaluated after taking into consideration of the existing prevention/mitigation measures and controls.

Figure 6.3 TPL SHE Risk Assessment Matrix (RAM)

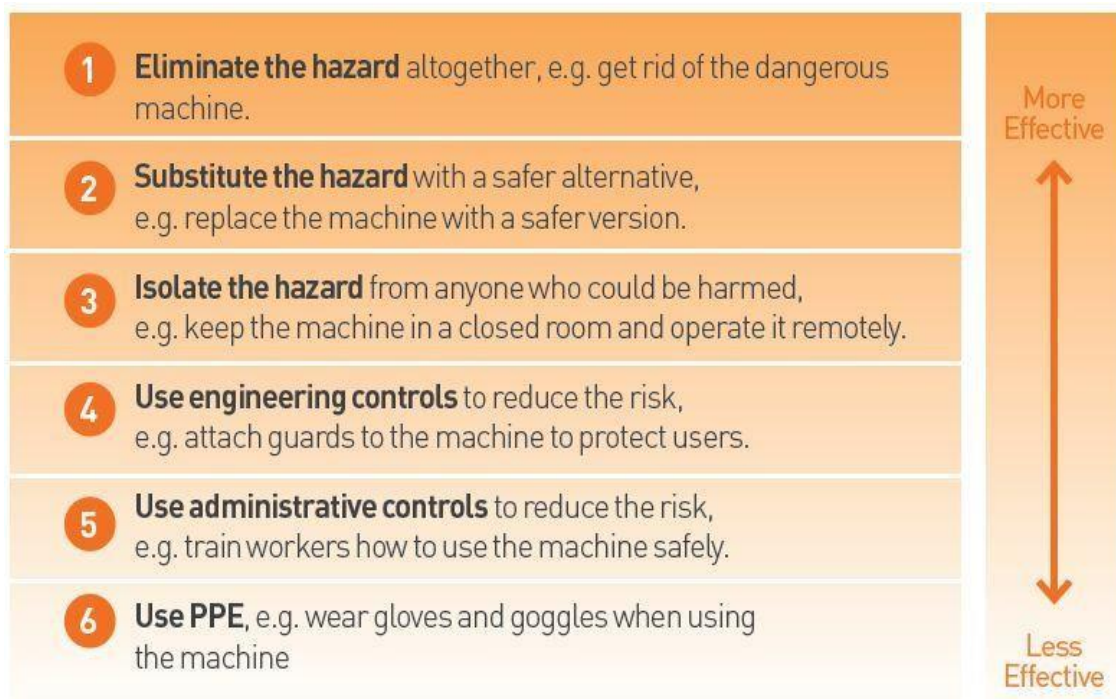
RISK MATRIX						
PROBABILITY →	Very Likely - 5	5	10	15	20	25
	Likely - 4	4	8	12	16	20
	Possible - 3	3	6	9	12	15
	Unlikely - 2	2	4	6	8	10
	VeryUnlikely-1	1	2	3	4	5
		1	2	3	4	5
		<i>Negligible</i>	<i>Slight</i>	<i>Moderate</i>	<i>High</i>	<i>Very High</i>
		SEVERITY →				
	Risk	Risk Level	Action			
	1 to 6	Low Risk	May be acceptable but review task to see if risk can be reduced further			
	8 to 12	Medium Risk	Task should only be undertaken with appropriate management authorization after consultation with specialist personnel and			
	15 to 25	High Risk	Task must not proceed. It should be redefined or further control measures put in place to reduce risk. The controls should be			

If the risk is in the Green region on the TPL SHE RAM, this is broadly acceptable and no further action is required. If the risk is in the Yellow region on the TPL SHE RAM, this is in the tolerable regions and needs to be demonstrated to be As Low As Reasonably Achievable (ALARP) by recommending further action. If the Risk is still in the Red region, this is not acceptable and action definitely needs to be taken. HIRA Review team shall discuss the proposed actions, where applicable, to address the hazard that is ascribed with a medium to high-risk rating.

CONTROL MEASURES

Controls are required to be separated into preventive and recovery. Controls are required to be categorized using the hierarchy of controls (eliminate, substitute, isolate, engineering, administrative, and PPE) (see Figure 6.4). This allows review of controls to ensure the principle of inherently safer construction is being applied.

Figure 6.4 Control Measures



7. EFFECTIVENESS

- Present Risk reduced to Acceptable Risk
- Reduction of incident
- Reduction in repetitive observation
- Improvement in Behavioural Safety

8. HIRA FOR CRITICAL ACTIVITIES

Master HIRA prepared for all identified critical activities as listed below

- 1) Excavation
- 2) Blasting Activity
- 3) Bar Bending & Cutting
- 4) Scaffolding
- 5) Formwork
- 6) Shuttering
- 7) Batching Plant Operation
- 8) Concreting
- 9) Movement of Equipment & Machineries
- 10) Portable Electric Power Tools and Electrical Equipment
- 11) Lifting of Material
- 12) Working at Height
- 13) Welding, Gas Cutting & Grinding
- 14) Sand Blasting / Abrasive Blasting
- 15) Road Work-Widening Project (Flexible Pavement / BC Pavement)
- 16) Roof Works
- 17) Confined Space
- 18) Radiography
- 19) Tower Erection and Stringing
- 20) Working Near IR Track
- 21) Under Ground Tunnel Work
- 22) Working Over or Adjacent to Water

1. EXCAVATION

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
1.1	Removal / cleaning of Surface encumbrances i.e. Electrical lines, trees, heap of soil, existing buildings, existing roads and other existing structures	R	1. Work near to the moving Vehicles / equipment. 2. Manual cutting & material handling 3. Fall from height 4. Electrocutation while using power tools 5. Presence of underground / overhead services / utilities; 6. Use of sharp hand tools.	1. Fatality / severe injury due to hit by the moving vehicles / equipment. 2. Fall from height and may result into multiple injuries / fatality. 3. Cut injuries while doing manual material handling.i.e. Shifting / pulling / pushing. 4. Electrical burn/fatality	1. Barricading the work area. 2. Engaging the competent operators. 3. Taking approval from relevant authorities and ensure PTW. 4. Imparting the HIRA talks before start of work. 5. Avoiding the manual material handling as much as possible and introducing mechanical material handling for the removal of surface encumbrances.	Y	2	4	8	1. Engage competent / experienced personnel for handling /operating hand tools / power tools during tree cutting.	1	4	4	A
1.2	Surface levelling (general cutting / filling)	R	1. Work near to the moving Vehicles / equipment. 2. Topple of vehicle due to uneven ground surface. 3. Presence of overhead / underground utilities.	1. Fatal / severe injury due to hit by the moving vehicles / equipment.	1. Barricading the vehicle movement area and define pedestrian movement area separately. 2. Ensuring that vehicle movement area is levelled and well compacted. 3. Prior information to the concern departments of utility services and ensure de-energize / isolation of source.	N	2	4	8	1. Administrative control measures are to be developed for vehicle fitness and engagement of competent operators.	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not- Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
1.3	Blasting operation for hard rock cutting	NR	1. Fly rock 2. Vibration	1. Injury due to flying rock, 2. Neel finger 3. Hand-Arm Vibration Syndrome (HAVS)	1. Imparting HIRA talks on blasting operation before start of work. 2. Sufficient number of rubber mats / sand bags are placing on the charging holes for minimizing the flying rock. 3. Delays are providing in-between every two holes 4. WARNING SIGNAL - a one-minute series of long audible signals 5 minutes prior to blast signal; BLAST SIGNAL- a series of short audible signals 1 minute prior to the shot. ALL CLEAR SIGNAL- a prolonged audible signal following the inspection of blast area. Warning signs and flags shall be posted at all access points. 5. Vibration effect is planning by a competent person with full consideration for all forces and conditions involved 6. Appropriate owners/ occupants and the public is notified of the nature of blasting operations 7. Using appropriate ear muffs. 8. Creating awareness / informing the villagers / public about blasting operation. 9. Providing warning signs / barricades as per the requirement. Alerting the public with flaggers.	Y	2	4	8	Follow OCP-30: "Hard Rock Blasting" for ensuring its close compliance / execution.	1	4	4	A
1.4	Surveying	R	Presence of poisonous reptiles/inspects	Loss of consciousness / heart attack / fatal	1. Ensuring proper supervisor & using safety stick (wooden) 2. Ensuring use of appropriate PPE's (high ankle safety shoes) & avoiding loose clothing 3. Ensure proper housekeeping/ use of protective tools 4. Create awareness among the workforce and staff/ monitoring.	N	2	4	8	1. Use of pesticide / bleaching powder / carbolic acid 2. Ensure availability of emergency vehicle and contact details/ tie up with local hospitals	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
1.5	Surveying	R	Improper Access / working on uneven ground surface;	Slip / trip/ fall may result injury to the personnel.	1. Ensuring general levelling of surface for vehicle movement 2. Deployment of flagman 3. Ensuring barricades to the work location at valley / steep access / ramps are existing.	N	2	3	6				A	
1.6	Surveying	R	Working near to the moving vehicles / construction vehicles	Hit by the vehicles.	1. Ensuring competent driver. 2. Displaying sign boards / caution boards. 3. Providing training / awareness & close monitoring 4. Using high visibility clothing.	N	2	4	8	1. Provide rigid barricades for defining the vehicle movement & pedestrian walkways separately.	1	4	4	A
1.7	Surveying	R	Presence of live electrical cables near survey work.	Cardiac arrest / burns due to electric shock.	1. Using Insulated tools and keeping minimum distance of 3 meters. 2. Using rubber gloves. 3. Tie-up with local hospitals. 4. Providing HIRA talks to the workforce before start of work.	N	2	4	8	1. Use wooden / fibre levelling staffs wherever electrical lines are existing. 2. Ensure emergency vehicle availability till the completion of job.	1	4	4	A
1.8	Surveying	R	Working in extreme climatic conditions	1. Sun stroke due to de-hydration. 2. Injuries / fell in sick due to adverse weather.	1. Ensure availability of drinking water 2. Provide temporary rest sheds 3. Avoiding the work during extreme climatic conditions e.g. Excessive cold/hot.	N	2	3	6				A	
1.9	Surveying	R	Manual handling of survey instruments while shifting manually.	Hit by the survey instruments while shifting manually and may receive injury.	1. Ensuring supervision for safe execution of work. 2. Creating awareness on manual material handling by imparting training before start of work. 3. Using appropriate PPE in the form of safety shoes & hand gloves.	N	2	3	6				A	

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
1.10	Cutting / digging the soil mechanically (Pit Excavation up to 3.0 M)	R	1. Earth Collapse 2. Presence of buried electric cables 3. Presence of overhead electrical cables 4. Movement / working of equipment in steep access / egress / valley conditions.	1. Toppling of equipment due to earth collapse and personnel may receive severe injury / fatal.	1. Screening of workforce before induction training 2. Medical examination as per Legal Requirement 3. Safety Induction; Issue of ID Card 4. Imparting daily HIRA talk 5. Use of PPE (Both Mandatory and work related) 6. Behavioural Safety Training 7. If any unsafe act found then - council them & if done knowingly. 8. Motivate them by suitably rewarding them. 9. Do not allow any unauthorized to person to enter the pit 10. Awareness towards safety by displaying safety postures & slogan. 11. Relocating/ removing the overhead electrical lines. 12. Deploying competent operators for equipment use / operation.	Y	3	5	15	Maintain the slope as per the types of soil. Follow OCP-03 "Excavation". Avoid collapse of soil provide shoring/shuttering/sheet piling.	1	5	5	A
1.11	Pit Excavation beyond 3.0m (*During excavation / cutting*)	R	*Same as above plus* 1. Flooding due to excessive rain / underground water 2. Digging in the vicinity of existing Building / Structure 3. Movement of vehicles / equipment's close to the edge of cut.	Injury / fatal due to: 1. Drowning 2. Building / Structure collapse due to cave-in or slides. 3. Electrocution	1. Preventing ingress of water by providing temporary bunds / diverting the catchment water. 2. Obtaining prior approval of excavation method from local authorities; if required / needed. 3. Relocating / removing the surcharge loads such as buildings / structures from the edge of excavation before mechanical digging / cutting operation. 4. Impart training on Excavation to all operators. 5. Separate entry & exit path for man and machinery must be maintained	N	2	4	8	Follow OCP-03 "Excavation".	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
1.12	Working inside deep excavation (*After cutting/excavation*)	R	1. Formation of tension cracks on the edge of excavation 2. Formation of cave-in on the sides of excavation 3. Water seepage 4. Rain-cut 5. Presence of steep access / egress/ ramp 6. Manual shifting of materials / portable equipment 7. Presence of unprotected vertical trench/ excavation walls 8. Vehicle movement near to the excavation 9. Presence of toxic gases 10. Presence of surcharge loads such as stacking of excavated soil on the edge of excavation	Injury / fatal due to: 1. Soil collapse 2. slip/ trip while Manual material handling 3. Fall of person 4. Fall of material 5. Fall of equipment	1. Performing regular inspections as per checklist for tension cracks/cave-ins/dewatering / rain-cut. 2. Continuous de-watering system in case of seepage of water 3. Provide safe access/ egress by providing gentle ramps / standard ladders / modular stairways. 4. Providing Sloping / benching / shoring / sheet piling to restrict the soil collapse as per the type of soil. 5. Avoiding vehicle movement near to the excavation. 6. Providing rigid barricades, signage's & illumination to avoid fall of person inside excavation. 7. Regular HIRA talks are being imparted to workforce on daily basis. 8. Checking the oxygen levels & other toxic gases with gas detector.	Y	3	4	12	Follow OCP-03 "Excavation" & assign duties, responsibilities & authorities to the concern execution team.	Y	1	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
1.13	Heavy Vehicle movement	R	Speed, Hit, slip, trip & fall.	Collision Overturn Topple Fire	Following DOs & DON'Ts as listed below: 1. Don't leave the keys in the cabin. 2. Don't allow any other person / cleaner to drive the vehicle. 3. Don't use Mobile phone while driving the vehicle. 4. Parking of vehicles near the excavated area is strictly prohibited and also not in the access path 5. Minimum of 3 meters' distance to be maintained from the excavation with parking light and display signage. 6. Avoid unnecessary parking. 7. Bank man or helper to deploy. 8. First aid box and fire extinguisher must be kept inside the cabin. 9. Maintenance to be carried out by an experience mechanic. 10. Other than construction vehicles should not take into the work locations.	Y	3	4	12	1. Ensure site layout plan is implemented 2. Ensure daily checklist compliance	1	4	4	A
1.14	Removal of Soil	R	Entanglement, & slip or trip	Hit by bucket	1. The radius where the Bucket is operated should be barricaded. 2. Signal man should be made available to guide the operator 3. Ensuring restriction of unauthorized personnel to enter in the excavation area. 4. Ensuring all the personnel must wear reflective jacket. 5. Ensuring by that JCB / excavator operator must aware of the surrounding area. 6. Operator should not use mobile phone or hear music by inserting the head phone in the ear. 7. While swinging / reversing - indication horn should be ON.	Y	3	3	9	1. Ensure dynamic HIRA precautionary measures are in place 2. Ensure daily checklist compliance	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not- Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
1.15	Loading / Unloading of soil	R	Workmen close to the moving equipment / machinery.	Physical injury/fatal due to hit by machinery.	<ol style="list-style-type: none"> Engaging trained personnel Engaging a signal person wherever loading / unloading in progress. No personnel should come in the approach / radius of the JCB bucket while loading sand in the truck. Ensure that no personnel should stand in the vicinity of loading activity. Signal man should communicate once the loading has been completed in the truck & he should simultaneously inform the truck driver & JCB operator. Ensure that there must be a clear understanding / communication between operator & signalmen. Not overload the trucks since there is possibility of skidding while travelling on the ramp. Ensuring no personnel movement on ramps whereas trucks are plying on the ramp. Providing signal men, caution boards & barricading. 	Y	3	3	9	<ol style="list-style-type: none"> Ensure dynamic HIRA precautionary measures are in place Ensure daily checklist compliance 	2	3	6	A
1.16	Backfilling, Grading & Dumping	R	Including plying of vehicles on the uneven ground surface/ loose soil.	Injury to personnel / fatal due to toppling of vehicle / equipment / stuck in loose soil.	<ol style="list-style-type: none"> Vehicle movement area must be demarcated. Soil strengthening of vehicle movement area / road being done. Impart HIRA Talk. 	Y	3	4	12	Follow : OCP-03 Excavation	1	4	4	A

2. BLASTING ACTIVITY

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
2.1	Transportation of Explosive material	NR	Fire & Explosion	Multiple injuries/ burns/ fatality	Transportation of explosive materials shall be in accordance with Indian Explosive Rules 2008-Rule (3&4).	Y	3	4	12	1. Ensure daily checklist compliance 2. Ensure dynamic HIRA precautionary measures are in place	1	4	4	A
2.2	Transportation of Explosive material	NR	Fire & Explosion	Multiple injuries/ burns/ Fatality	<p>*W.O/ P.O shall be issued to a Licensed vendor / supplier only*.</p> <p>Following control measures are ensuring from the vendor's / sub-contractor's end.</p> <ol style="list-style-type: none"> 1. Vehicles shall not be overloaded. 2. Shall be shifted by explosive van only. 3. Shall engage authorized operator and proper trained helper. 4. Explosive material shall not expose to sparking metal while transportation. 5. Vehicle shall equipped with one or more extinguishers. 6. Vehicle shall not take into garage /repair while containing explosives. 7. Explosives and detonators shall not load / shift together 8. Vehicle shall display with all placards/lettering / numbering as mentioned in Indian Explosive Rules. 	Y	2	4	8	1. Ensure daily checklist compliance 2. Ensure dynamic HIRA precautionary measures are in place	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
2.3	Storage & handling of explosive	NR	Fire & Explosion	Multiple injuries / burns / Fatality	1. There shall be no smoking/open lights/ fire of any kind within 50 ft. (15.2 m) where explosives are being handled. 2. Storage of explosives and detonators shall be done in a separate magazine. 3. No sparking material shall be used while handling 4. Explosives and detonators shall be taken to blasting area with original containers.	Y	3	4	12	1. Ensure daily checklist compliance 2. Ensure dynamic HIRA precautionary measures are in place	1	4	4	A
2.4	Drilling in rocks	NR	Dust	Effects on Lungs	1. Red flag shall be displayed near the blasting area for the awareness of common people 2. Use of proper nose musk.	N	3	3	9	1. Ensure daily checklist compliance 2. Ensure dynamic HIRA precautionary measures are in place				A
2.5	Drilling in rocks	NR	Noise	Temporary/permanent hearing loss	Use of Earplug / Ear muff	N	3	3	9	1. Ensure safety checklist is compliance. 2. Ensure dynamic HIRA precautionary measures are in place				A
2.6	Drilling in rocks	NR	Fire & Explosion	Multiple injuries / burns / Fatality	1. Drilling and number of holes shall be determined and designed by a licensed blaster; 2. Drill holes shall be sufficiently large enough to freely allow for the insertion of the explosives; 3. Drilling and loading operations shall not be carried on in the same area;	N	2	4	8	1. Ensure safety checklist is compliance. 2. Ensure dynamic HIRA precautionary measures are in place	1	4	4	A
2.7	Drilling in rocks	NR	Flying particles of rocks	Get injury due to hit by the flying particles / rocks	1. Ensure job related PPE's 2.Restrict the entry of unauthorized personnel.	N	2	3	6	1. Ensure safety checklist is compliance. 2. Ensure dynamic HIRA precautionary measures are in place	1	3	3	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
2.8	Loading and charging	NR	Fire & Explosion	Multiple injuries / burns / Fatality	1.Loading or loaded area shall be kept free of any equipment /operations /unauthorized personnel 2.No holes shall be loaded except those to be fired in the next round of blasting 3. Remaining explosive materials and detonators shall be immediately returned to an authorized magazine 4. No explosive shall be loaded or used underground in the presence of combustible gases or combustible dusts 5.All the detonators which are inserting in the explosives shall have a cap 6. Tamping shall be done with wood rods without exposed metal parts 7. Damaged detonating cards shall not be used and shall be free of loops/ sharp kinks 8. Time delay EDs (electronic detonators) shall be used for the charging.	N	3	4	12	1. Ensure safety checklist is compliance. 2. Ensure dynamic HIRA precautionary measures are in place	1	4	4	A
2.9	Blasting activity	NR	Fly rock	1. Major injury/fatality	1. Ensuring daily positive interaction to the staff & public 2. Adequate no's of rubber mat, steel plate and sand bags are to be placed on the charging holes for minimizing the flying rock 3.Delays are to be provided in-between of every two holes 4.WARNING SIGNAL - a one-minute series of long audible signals 5 minutes prior to blast signal; 5.BLAST SIGNAL- a series of short audible signals 1 minute prior to the shot. 6. ALL CLEAR SIGNAL- a prolonged audible signal following the inspection of blast area.	Y	4	4	16	1. Ensure safety checklist is compliance. 2. Ensure dynamic HIRA precautionary measures are in place	2	4	8	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
2.10	Blasting activity	NR	Vibration	Collapse of structure	1. Vibration effect shall be planned by a competent person with full consideration for all forces and conditions involved 2.Appropriate owners/ occupants and the public shall be notified of the nature of blasting operations 3.Monitoring / recording & interpreting of vibrations shall be done by a qualified personnel 4.Use appropriate ear muffs.	Y	2	3	6	1. Ensure dynamic HIRA precautionary measures are in place 2. Ensure safety checklist is compliance.	1	3	3	A
2.11	Post Blasting	NR	Misfire	Injury/fatality due to explosion	1. Sensitive monitoring is to be done before starting the activity; Area must be vacant before starting activity. 2. Post blasting operation must be performed under the supervision of a competent person.	N	2	4	8	1. Ensure dynamic HIRA precautionary measures are in place 2. Ensure safety checklist is compliance.	1	4	4	A

3. BAR BENDING & CUTTING

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
3.1	Stacking of material	R	1. Over stacking of material/ unstable manner 2. Poor material handling without assessment 3. Mechanical material handling	Injury / fatal due to: 1. Collapse of material on to workmen 2. Shift / collapse of stacked material. 3. Hit by the loading/ unloading equipment.	1. Stack the reinforcement rod on the base of the concrete sleeper / concrete blocks & not on the ground directly. 2. Material should not be stacked more than 3 layers of bundle. 3. All the bars should be tied - minimum at 3 places & especially at the end so that they are not open. 4. Reinforcement should be laid in such a manner that it does not block the passage. 5. Soft barricading should be provided around the area 6. Gap should be provided for easy lifting / inspection of the material. 7. All the personnel should wear appropriate PPE.	Y	3	3	12	To follow OCP-04: Handling of Reinforcement work	2	3	6	A
3.2	Loading of material	R	1. Mechanical / Manual handling without assessment	Injury due to: 1. Hit by the swinging part of crane 2. Hit by the swinging material	1. Only trained rigger / operators are to be performed the loading / unloading operation. 2. Carefully select the type of equipment to carry out loading / unloading activity. 3. Note the weight of the reinforcement bundle before lifting. 4. Use of Chain sling / wire sling to lift the load. 5. The sling should be calibrated & inspected before use. 6. While placing the sling carefully lift first at the end & then tie the sling then lift at the other end. 7. If for some reason the load is to be lifted through centre then repeat above steps & then insert the sling in the middle.	Y	3	3	12	1. To follow OCP-04: Handling of Reinforcement work 2. Ensure dynamic HIRA precautionary measures are in place	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
					8. Never place the sling directly on the packaged tie up of reinforcement rod. 9. Check the stability & firmness of the ground where the crane / TRX is to be placed. 10. Operator should first inspect the place of lifting, material to be lifted & path from where the material to be shifted to be placed on the trailer. 11. First lift the load less than 4 to 6 inches from the ground level & check the CG & its stability, wait for few minutes. 12. Then again lift the load @ 1 Feet above ground 13. Tie a Tag Line on both the end, the tag line should be minimum 3 meters & the personnel holding the tag line should									

4. SCAFFOLDING

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
4.1	Mobilization, Handling (loading / unloading) & stacking of scaffold material.	R	1. Fall of material due to handling while unloading from truck. 2. Improper Stacking	1. Injury due to hit by the swinging material 2. Injury due to collapse / shift of stacked material.	1. Do not lift the materials with bundle ties and to be unloaded with suitable lifting equipment's. 2. Quality of scaffolding material shall be checked by the competent person as per the requirement. 3. Scaffolding materials should be stacked in stable manner and less than shoulder height. It must be barricaded. 4. Tag line must be used while loading & unloading of scaffold materials. 5. Experienced rigger must be engaged at the time of loading & unloading. 6. Sleepers must be placed underneath the scaffold materials. 7. Side support must be provided at stacking of materials.	Y	3	2	6	1. Mobilization of scaffold material inside shall be done only after clearance from SHE department. 2. Follow OCP-2:scaffolds (Erection / dismantling)	2	2	4	A
4.2	Erection of scaffolding	R	1. Fall from height 2. Collapse of scaffold 3. Fall of material	Personnel injury due to: 1. Fall from height 2. Collapse of scaffold 3. Fall of material	1. Scaffolding should be erected as per the drawing/scheme. 2. Before installation of scaffolding soil condition must be checked and verified. 3. Ground soil must be compacted. 4. Scaffolding shall be installed and modified under the competent supervision with competent scaffolders only as per scaffolding procedure. 5. After installation scaffolding tag system is being followed. 6. Scaffolding shall not be used without authorization of scaffolding inspector/supervisor.	Y	3	3	9	To follow OCP-2:scaffolds (Erection / dismantling)	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
4.3	Working on scaffolding at height	R	*above hazards plus*: 1. Missing of scaffold members such as railings / bracings / ledgers / base plate / sole plate. 2. Insufficient width of scaffold work platforms 3. Unsupported / unsecured scaffold with permanent structure.	Injury / fatal due to: 1. Fall of person from height 2. Collapse of scaffold 3. Fall of material	1. Scaffolders must undergo for medical test and vertigo test. 2. PTW system must be followed. 3. Activity shall be carried out by competent scaffolders. 4. Shall be used full body harness with scaffolding hook and double lanyard harness and other basic PPEs. 5. All tools shall be carried in a tool bag or with adequate arrangement means hand tools must be tied with tag line. 6. Surrounding must be barricaded. 7. Weather condition and speed of wind shall be taken in consideration before working at height on scaffold. 8. HIRA Talk is compulsory before start of activity. 9. Maintain tag system for scaffold while working on the scaffold.	Y	3	3	9	1. To follow OCP-2: scaffolds (Erection / dismantling) 2. Ensure dynamic HIRA precautionary measures are in place	2	3	6	A
4.4	Working on mobile scaffold	R	1. Working at height 2. Pulling / pushing of mobile scaffold 3. Failure of caster wheels & unlocked wheels. 4. Failure of out rigger supports. 5. Missing of mobile scaffold parts.	1. Injury due to fall from height 2. Injury due to collapse of scaffold while passing / pulling	1. Adequate access ladders shall be fixed, suitable work platform shall be provided with toe boards. 2. Caster wheels shall be armed with breaks. 3. Scaffolding tags inspection shall be followed. 4. Mobile scaffold shall not be moved while workers on it. 5. Sufficient out riggers supports shall be provided. 6. Loose materials shall not be kept at the edges left on the scaffolding platform.	Y	3	3	9	1. To follow OCP-2: scaffolds (Erection / dismantling) 2. Ensure dynamic HIRA precautionary measures are in place	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
4.5	Scaffold dismantling	R	Erection scaffolding hazard including: 1. Unstable scaffold 2. Handling / dismantling by incompetent personnel 3. Presence of workmen nearby the dismantling work 4. Unavailability of anchoring arrangement for personnel working at height on scaffold.	Injury due to collapse of scaffold / fall of person / fall of material on workmen nearby scaffold.	1. Scaffolding dismantling shall be carried out under supervision of competent scaffolder. 2. Scaffold tag system shall be strictly followed. 3. Dismantling activity must be done sequentially (From top to bottom). 4. Dismantling scaffold material shall not be thrown from height. 5. If possible life line must be provided at the time of dismantling. 6. PTW system must be followed up. 7. Materials must be stacked properly. 8. Dismantling of scaffold shall be done only after arrangement of barricades & signage.	Y	3	3	9	1. To follow OCP-2: scaffolds (Erection / dismantling) 2. Ensure dynamic HIRA precautionary measures are in place	2	3	6	A

5. FORMWORK

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
5.1	Manual material handling of formwork components	R	1. Handling of material without assessment 2. Repeated movements for lifting of heavy component	Back Pain; Cut / struck injuries due to fall of material;	1. Formwork shall be supervised by a competent person 2. Workers should follow proper manual handling methods. 3. Assess the load by considering the parameters like load, environment, and physical condition of workmen.	Y	3	3	9	1. All worker should go through manual material handling training. 2. Ensure dynamic HIRA precautionary measures are in place	2	3	6	A
5.2	Manual material handling of formwork components	R	Fall of materials while working at height.	Physical Injury	1. Small loose items shall be lifted and handled in the suitable containers and cages to prevent falling objects. 2. Proper stacking methods and housekeeping shall be followed at work platform. 3. Fall prevention requirements like toe boards and catch nets shall be fixed.	N	2	3	6					A
5.3	Mechanical material handling i.e. with crane	R	Handling with crane for lifting / shifting and fixing purpose.	Physical Injury	1. Lifting plan shall be followed 2. Certified riggers shall be deployed for the lifting by the crane. 3. Certified and experienced crane operators are deployed for lifting operation by crane. 4. Suitable and Certified lifting tools and tackles shall be used during the work.	Y	3	3	9	Follow OCP-10: Mechanical Material Handling	2	3	6	A
5.4	Mechanical material handling i.e. with crane	R	Toppling of crane due to uneven ground surface / handling with more than it's rated capacity/ Breakage of sling	Physical Injury	1. Slings and lifting gears shall be inspected by the riggers regularly before use and damaged items are removed from the service. 2. All lifting tools and tackles shall be certified by third party and also periodically inspected at store. 3. Ensure the stability of the ground for positioning the crane.	Y	3	3	9	Follow OCP-10: Mechanical Material Handling	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
5.5	Mechanical material handling i.e. with crane	R	Swing of load	Physical Injury/fatality	1. Lifting shall not be carried out by cranes during high wind speed. 2. Guy rope shall be fixed to control the load and controlled by the riggers. 3. Adequate supervision	Y	3	3	9	Follow OCP-10: Mechanical Material Handling	2	3	6	A
5.6	Formwork fixing	R	Slip, trip and fall	Physical Injury	1. Adequate ties to be given and sufficient supports to be provided as per design. 2. Catch nets shall be provided to control the falling objects.	Y	3	3	9	Ensure dynamic HIRA precautionary measures are in place	2	3	6	A
5.7	Formwork removal	R	Collapse of Formwork	Physical Injury/fatal	1. De shuttering of formwork shall be carried out under the supervision of competent supervisor. 2. Concrete slurry, plumb stones, tie rods, tie pins, shall be removed before lifting the form work. 3. Catch nets shall be provided to control the falling objects. 4. Life line to be provided while working at height.	Y	3	3	9	Refer OCP-26: Demolition of Building / Structure	2	3	6	A
5.8	Work at height	R	Fall of person, fall of materials.	Physical Injury	1. Proper work platform shall be provided. 2. Ladders shall be provided for access and egress. 3. Proper inspection shall be carried out by scaffolding inspector. 4. Full body harness is a must.	Y	3	4	12	To follow OCP-7: Work at Heights	1	4	4	A

6. SHUTTERING

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
6.1	Shifting of shuttering plate or ply boards to work site manually	R	Slip / Trip & Fall	Physical Injury	<ol style="list-style-type: none"> 1. Keep the surrounding area clean 2. Access path should be clear & free from debris 3. Place the shuttering material layer by layer & not scattered 4. Carefully load them manually 5. Do not overload - so that they slip from the top 6. While lowering take help of another person for removing. 7. Do not wear loose cloth 	Y	2	4	8	Ensure dynamic HIRA precautionary measures are in place	1	4	4	A
6.2	Shifting of shuttering plate or ply boards to work site mechanically	R	Fall of material, Hit by object	Physical Injury	<ol style="list-style-type: none"> 1. Only trained rigger / operator to perform the loading / unloading operation. 2. Carefully select the type of equipment to carry out loading / unloading activity. 3. Note the weight of the reinforcement bundle before lifting. 4. Use of chain sling / wire sling to lift the load. 5. The sling should be calibrated & inspected before use. 6. If for some reason the load is to be lifted through centre then repeat above steps & then insert the sling in the middle. 7. Check the stability & firmness of the ground where the crane / TRX is to be placed. 8. Operator should first inspect the place of lifting, material to be lifted & path from where the material to be shifted to be placed on the trailer. 	Y	2	4	8	Follow OCP-10:Mechanical Material Handling	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
					9. First lift the load less than 4 to 6 inches from the ground level & check the CG & its stability, wait for few minutes. 10. Then again lift the load @ 1 Feet above ground 11. Tie a Tag Line on both the end, the tag line should be minimum 3 meters & the personnel holding the tag line should be away from its swinging radius. 12. The tag line holder should not walk behind / in front the hydra wheel.									
6.3	Stacking of shuttering materials	R	Trips, Fall & Hit during/ Improper stacking of fabricated rebar.	Injury	1. Stack shuttering materials according to its size. 2. Provide packing and stop poles for preventing for uncertain slip/fall down of stacked materials. 3. Do not stack the material where there is water logging, slope or flammable material. 4. Stacked board should be placed in such a manner that it is easy for removing.	Y	2	3	6					A
6.4	Placement of shuttering boards	R	Man/Material may fall during fixing of shuttering boards	Injury, Personnel getting crushed beneath the shuttering structure	1. Ensure skilled & Trained manpower are deployed at site 2. Check their competency level. 3. Check the tools used for erecting 4. Ensure with the Engineer Method Statement is available & the procedure is explained to the workforce 5. Ensure that protruded nails do not get intact with the fingers or body or clothes. 6. While working at height ensure proper platform / scaffolding are used 7. Use PPE Like Hard hat, safety shoes, gloves & Safety harness.	Y	2	3	6					A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
6.5	Placement of shuttering boards	R	Lack of experience	Injury due to poor manual handling / fall from height.	1. Deploy experienced and competent workmen Impart training on regular basis	Y	2	3	6	Evaluate personnel capability & Follow TPL 3 day mandatory induction procedure	1	3	3	A
6.6	Erection & Dismantling of scaffolding / working platform for shuttering work	R	Fall of personnel from height Collapse of Scaffolding	Injury due to fall from height	1. Proper scaffolding is to be used as per TSL standards. 2. Only trained personnel & authorize personnel to do the scaffolding 3. Scaffolding shall be properly fixed and braced. 4. Implementation of scaffolding tag system	Y	3	4	12	To follow OCP-7: Work at Heights	1	4	4	A
6.7	Provision of access path	R	Slip / Trip & Fall	Physical Injury	1. Use of Safety belt and with suitable lifeline arrangement for anchoring safety belt. 2. Provide elevated working platform for all activities at heights more than 2.0 m. 3. Platform to be of sufficient area for Optimum movements of the workers 4. Fully covered working platform with guardrails and safe access to be provide. 5. Beneath area should be barricaded to avoid unauthorized entry. 6. Use ladder / stairs as per TSL standard 7. Provide ladder on firm footing at appropriate inclination and fasten on top 8. Fall arresting arrangement to be used for vertical moment 9. Full body harness to be used by all workmen who all are working at 2mt & above Only height training passes workmen to be allowed for height job	Y	3	3	9	To follow OCP-7: Work at Heights	2	3	6	A

7. BATCHING PLANT OPERATION

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
7.1	<p>Manual / Mechanical Loading or unloading of :</p> <p>a) Raw material at material stack yards of Batching plant.</p> <p>b) Mechanical Loading / feeding of cement in silo unit.</p> <p>c) Manual handling of cement bags at cement store</p>	R	<p>1. Vehicle Movement.</p> <p>2. Stack plies of raw material.</p> <p>3. Men movement on or near to stack piling area & Men movement near to the equipment.</p> <p>4. Auto functioning of material. Grabber to feed the material on feeder unit.</p> <p>5. Men movement or manual material handling near to the conveyor/ rotating parts.</p>	<p>1. Hit by the moving vehicles/ equipment may result fatality / severe injuries.</p> <p>2. Fall from height / hit by the grabber while working on piling area which may result fatality or severe injuries.</p> <p>3. Injuries due to toppling of vehicles while moving on uneven ground surfaces / heaps.</p> <p>4. Injuries due to collision of vehicles while working at congested / unsafe areas of Batching plant.</p>	<p>1. Men and vehicle movement area must be separated and barricades shall be provided.</p> <p>2. Deploy competent and trained operators.</p> <p>3. Avoid manual material handling and involve mechanical lading / unloading.</p> <p>4. Stop the movement of vehicles why manual handling in progress.</p> <p>5. Stack pile separators / retaining structures are designed based on considering all load to withstand the stack piles.</p> <p>6. Daily HIRA Talk talks are to be imparted to bring the awareness amongst all workforce at batching plant.</p> <p>7. Signage and caution boards shall be displayed at vehicle movement area. Engage flagmen's to guide the movement of vehicles.</p> <p>8. Pull card / guarding / covers shall be provided to all rotating parts such as conveyor belts /covers on feeding hoppers.</p> <p>9. All personnel shall be adhered with appropriate PPE.</p> <p>10. Heavy /unwanted vehicle movement shall be restricted in and around batching plant. No parking shall be allowed near the vehicle movement area.</p>	N	4	4	16	<p>1. Ensure dynamic HIRA precautionary measures are in place</p> <p>2. To ensure safety checklist compliance</p>	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
			6. Emission of cement particles while feeding the cement. 7. Failure /collapse of stack pile separators / retaining walls / structure due to excessive stack of raw material.	5. Fatality / multiple injuries due to entrapment of body parts in the moving conveyor/rotating parts of batching plant.	11. Use and maintain filters bags at cement hopper to avoid the emission of cement particles. 12. Concern to establish and operate to be obtained from regulatory authorities.				8					
7.2	Batch preparation and loading of mortar on to millers.	R	1. Movement of feeding bins 2. Movement of vehicles. 3. Noise 4. Electrical operation. 5. Personnel working at / movement to height .i.e. access to the control panel room.	1. Entrapment of body parts 2. Hit by the moving vehicles 3. Loss of hearing 4. Electric shock 5. Collision /toppling of vehicles. 6. Fall from height.	1. Avoid personnel / manual intervention while batch preparation in progress. 2. Men / vehicle movement shall be separated. 3. Use Ear muffs while it's in operation. 4. Use RCCBs/ ELCBs and standard industrial plugs. 5. Vehicle movement area must be PCC laid to avoid the stocking of vehicles in the mud. 6. All gangways / access must be constructed with standard material and railings shall be provided to avoid the fall of personnel while working at height.	N	2	4	8	1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist compliance	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
7.3	Maintenance operation of Batching plant.	NR	1. Electrical operation / work during maintenance. 2. Unauthorized operation during plant is in maintenance. 3. Working at height.	1. Electrical Shock 2. Entrapment of body parts / fatality due to unauthorized operation. 3. Fall from height.	1. Use ELCBs / RCCBs and regular inspection of all electrical devices / cables by an electrical. 2. Adopt LOTO system when maintenance in progress. 3. All the electrical equipment shall be grounded properly. 4. Use appropriate PPE while work in progress. Railing system shall be in place. 5. Restrict the movement and presence of unauthorized personnel while maintenance in progress.	N	2	4	8	1. To ensure availability of licenced electrician 2. To ensure safety checklist compliance	1	4	4	A

8. CONCRETING

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
8.1	Concreting	R	Air Pollution by cement	May affect Respiratory System	Wear respirators or cover mouth and nose with wet cloth.	Y	3	3	9	1. To follow OCP-05: Handling of Cement & Concrete 2. To ensure fulfil of pre task checklist.	2	2	4	A
8.2	Concreting	R	Handling of ingredients	Hands injury	Use gloves and appropriate PPE.	N	2	4	8	1. To follow OCP-05: Handling of Cement & Concrete 2. To ensure fulfil of pre task checklist.	1	3	3	A
8.3	Concreting	R	Protruding reinforcement rods.	Feet may get injured	Use Safety shoes; Provide platform above reinforcement for movement of workers.	N	2	4	4	1. To follow OCP-05: Handling of Cement & Concrete 2. To ensure fulfil of pre task checklist.	1	3	3	A
8.4	Concreting	R	Earthing of electrical mixers, vibrators, etc. not done.	Can cause electrocution / asphyxiation	Ensure earthing of equipment's and proper functioning of electrical circuit before commencement of work.	N	3	2	9	1. To follow OCP-05: Handling of Cement & Concrete 2. To ensure fulfil of pre task checklist.	2	2	4	A
8.5	Concreting	R	Falling of materials from height.	Persons may get injured	Use hard hats; Remove surplus material immediately from work place.	N	3	4	12	1. To follow OCP-05: Handling of Cement & Concrete 2. To ensure fulfil of pre task checklist.	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
8.6	Concreting	R	Continuous pouring by same gang	Cause tiredness of workers and may lead to accident.	Insist on shift pattern; Ensure lighting arrangements during night hours.	N	2	3	6	1. To follow OCP-05: Handling of Cement & Concrete 2. To ensure fulfil of pre task checklist.	1	3	3	A
8.7	Concreting	R	Revolving of concrete mixer / vibrators	Parts of body of clothes may get entrapped	Allow only mixers with hopper. Provide safety cages around moving motors; Ensure proper mechanical locking of vibrator.	N	2	4	8	1. To follow OCP-05: Handling of Cement & Concrete 2. To ensure fulfil of pre task checklist.	2	2	4	A

9. MOVEMENT OF EQUIPMENT & MACHINERIES

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
9.1	Unauthorized operator operating Plant Equipment's Heavy Vehicles the plant	NR	Incompetent Operator	Injury or Multiple sever injury	<ol style="list-style-type: none"> Authorized operator with valid driving license only allowed to operate the plant equipment's/ Heavy vehicles allowed after the medical induction. To ensure screening of operator. Operator should have minimum 05 Yrs. Experience with Construction Equipment Operating driving License. To organize periodical training. Operator should maintain daily checklist of equipment. To check Alcoholic by tester of operator and health condition. 	N	2	4	8	<ol style="list-style-type: none"> To follow OCP-10: Mechanical equipment's handling Vehicle should be less than 10 years old. 	2	2	4	A
9.2	Unloading of Soil	NR	Toppling of heavy vehicle during unloading of Soil.	Injury or Multiple sever injury	After ensuring the Pin and proper opening of back door the bucket should be lifted for unloading the materials.	Y	3	3	6	<ol style="list-style-type: none"> To follow OCP-10: Mechanical equipment's handling To implement safety checklist before commencing of work. 	3	2	6	A
9.3	Tipper movement without repositioning of back bucket	NR	Hit with overhead cables/structures / may lead to toppling of vehicle during Tipper movement without repositioning of back bucket.	Injury or Multiple sever injury	<ol style="list-style-type: none"> Trained operator only allowed to move the vehicle inside the plant. Install goal post where ever OHE crossing are there. 	Y	2	4	8	<ol style="list-style-type: none"> To follow OCP-10: Mechanical equipment's handling To implement safety checklist before commencing of work. 	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
9.4	Material handling	NR	Material slip and fall	Injury or Multiple sever injury	All hook will be provided with hook latch.	N	2	4	8	To follow OCP-10: Mechanical equipment's handling	3	2	6	A
9.5	Failing to pull the parking brake.	NR	Hit of person due to failing the parking brake.	Injury or Multiple sever injury	Ensure parking break prior to getting down from vehicle.	N	2	4	8	To follow OCP-10: Mechanical equipment's handling	2	3	6	A
9.6	Shifting of bar bending and cutting machine with hydra crane	NR	Failure of lifting appliance by poor rigging methods.	Severe injury	Use proper rigging method for lifting the materials, Use experienced riggers for lifting.	N	2	4	8	To follow OCP-10: Mechanical equipment's handling	2	2	4	A
9.7	Use of mobile crane for material lifting and marching	NR	Chances of personal fall under wheel, chances of toppling.	Severe injury	Provide wheel guard for mobile crane avoid personal fall under the mobile crane wheel, over dimension or over load materials should not be lifted.	N	3	3	9	To follow OCP-10: Mechanical equipment's handling	2	3	6	A

10. PORTABLE ELECTRIC POWER TOOLS AND ELECTRICAL EQUIPMENT

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
10.1	Use portable electric power tools and electrical equipment	R	Short circuit due to electricity	Electric shock & burn injury	1. All tools shall be fitted with adequate fuse protect 2. Close supervision is required. 3. To ensure the PTW system compliance. 4. To implement safety checklist before commencing of work. 5. Monthly tagging system to be followed.	N	3	4	12	To follow OCP-09: Electrical Work	2	3	6	A
10.2	Use portable electric power tools and electrical equipment	R	Use of incorrect power tools	Electric shock & burn injury	1. All tools shall be class 2 double insulated Or have reinforced insulation throughout 2. Connection of electrical tools to be routed through ELCB	Y	3	4	12	To follow OCP-09: Electrical Work Ensure the use of standard make tools	2	3	6	A
10.3	Use portable electric power tools and electrical equipment	R	Inexperienced personnel using tools	Electric shock & burn injury	1. Only trained and experienced person are allowed	Y	3	4	12	To follow OCP-09: Electrical Work	2	3	6	A
10.4	Use portable electric power tools and electrical equipment	R	Laceration & Abrasion due to use of faulty tools	Electric shock & burn injury	1. Tools shall be inspected on monthly basis. 2. Disc/wheel/tool kit are changed after disconnected 3. Face shield/goggle shall be worn while working 4. All equipment will be routed through 30 mA ELCB	Y	3	3	9	To follow OCP-09: Electrical Work	2	2	4	A

11. LIFTING OF MATERIAL

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
11.1	Material Handling	R	Slip, trip and Falling of material	Injury due to unsafe load handling.	1.Trained Riggers crew shall be engaged and the workforce shall be trained for safe handling. 2. Tag line shall be used to control the swinging load. OCP 10 control measures shall also been followed.	N	3	4	12	To follow OCP-11: Lifting appliances & lifting gears	2	3	6	A
11.2	Material Handling	R	Failure of lifting gear, improper rigging.	Fall of material from height, Damages to material, man power etc.	1. Periodic testing & inspection. 2. Pre use testing of lifting equipment's, lifting tools like Shackles, ropes, slings, pulley, etc. 3. Periodic maintenance of lifting equipment's & tools. Special training to the Riggers. 4. Do not allow overloading of the lifting equipment's. 5. Barricading the area with signage to avoid unwanted visitors to the area. Follow the OCP-10.	N	2	4	8	To follow OCP-11: Lifting appliances & lifting gears	1	4	4	A
11.3	Placement of Cranes	R	Due to uneven ground imbalance or toppling of mobile cranes	Injury	1. A trained work crew shall be deployed, 2. Crane working area shall be cordoned with indicative tapes, 3. Third party certified crane shall be used, 4. Outriggers shall be fully extended and prior to use of crane 5. A general inspection shall be carried out by TPL Team with checklist. 6. Lifting shall be avoided where overhead electrical lines are crossing. 7. Compaction of the ground to be ensured.	Y	2	4	8	To follow OCP-11: Lifting appliances & lifting gears	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
11.4	Placement and Removal of Slings & D-Shackles	R	Hit by object due with rapid speed of lowering hoist/hook.	Injuries with head & hand/shoulder	1. A trained gang shall be deployed, 2. Adequate height of platform or ladder shall be used for placement and removal of slings and D-shackles, 3. Third party certified tools shall be used, 4. Prior to use physical inspections shall be carried out by mechanical department.	N	3	2	6				A	

12. WORKING AT HEIGHT

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
12.1	Height work	R	Following of unsafe work methods.	Injury or Fatal	1. PTW should take prior to erection work. 2. Ensure close supervision 3. Dynamic HIRA/ pre-task HIRA prepare before commencing of work by a CFT team. 4. To ensure fulfil of pre task checklist.	N	3	5	15	1. To follow OCP-07: Work at Heights 2. To ensure fulfil of pre task checklist.	2	3	6	A
12.2	Height work	R	Fall from height	Injury or Fatal	1. Height pass shall be implemented, 2. Work shall be carried out under direct supervision of TPL	N	3	5	15	1. To follow OCP-07: Work at Heights 2. To ensure fulfil of pre task checklist.	2	3	6	A
12.3	Height work	R	Hitting the object.	Injury or Fatal	1. No obstruction should be made in the passage at height,	N	2	5	10	1. To follow OCP-07: Work at Heights 2. To ensure fulfil of pre task checklist.	1	3	3	A
12.4	Height work	R	Falling objects from height	Injury or Fatal	1. No person shall work under the suspension load, 2. All height works shall be carried out in presence of supervisor and Safety Nets shall be fastened where ever it is required. 3. No loose materials shall be placed at edge. 4. Proper housekeeping to be ensured. 5. Multi-layer protection system to be in place.	N	3	5	15	1. To follow OCP-07: Work at Heights 2. To ensure fulfil of pre task checklist.	2	3	6	A

13. WELDING, GAS CUTTING & GRINDING

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
13.1	Welding	R	Working on hot surfaces/ flames/ molten metals.	Burns / arc flash	<ol style="list-style-type: none"> Adopting administrative control measures like work permits, method statements, work procedures, imparting training, deployment of qualified welders. Taking fire protection measures such as placing adequate fire extinguishers, water buckets, sand buckets and fire blankets. Barricading the area with signage, appointing well trained fire watch & keeping the area wet before starting the work if required. Housekeeping and removal of combustible materials before starting the work. Execution of welding at fabrication yards as much as possible. Avoiding fabrication at workplaces. Using PPEs like leather gloves, safety shoes and aprons. Ensure PTW system. 	N	3	3	9	1. To follow OCP-13: Welding (Electric Arc)	2	3	6	A
13.2	Welding	R	Use of electricity.	Cardiac arrest due to electric shock	<ol style="list-style-type: none"> Provision of double earth conductors & RCCBs to avoid electric shock. Pre-inspection of machines, cables by a qualified electrician. 	N	2	4	8	1. To follow OCP-09:Electrical Work	1	4	4	A
13.3	Welding	R	Emission of fumes & gases	Respiratory / lung illness / acute & chronic effects on human body	<ol style="list-style-type: none"> Providing appropriate PPE. Giving proper training using the proper eye protection methods like welding shield, Barricading the area as much as possible. Providing UV filter safety glass for all workers. Providing proper signage. 	N	2	3	6					A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
13.4	Gas Cutting	R	Handling & storage of gas cylinders	Explosion of gas cylinders may lead to fatal / severe injuries. Fall of cylinders on workmen may lead to injuries.	<ol style="list-style-type: none"> Using gas cylinder trolleys. Shifting gas cylinders with mechanical aids as per OCP-12. Storage of DA/Oxygen cylinders separately in upright position. Using appropriate PPE while handling the gas cylinders. Ensuring demarcation and signage as per the standard. Securing the gas cylinders to avoid fall of cylinders. 	N	2	4	8	1. To follow OCP-12:Gas cutting	2	3	6	A
13.5	Gas Cutting	R	Flash back / fire	Explosion of gas cylinders may lead to fatal / severe injuries.	<ol style="list-style-type: none"> Using standard NRVs on the cylinder side. Flash back arresters are providing on the cutting torch. Ensuring the deployment of skilled personnel for gas cutting. Adequate fire extinguishers are ensuring before start of work. Providing barricades and maintain good housekeeping. Soap test to be done on both end connection of the hose. 	N	2	4	8	1. To follow OCP-12:Gas cutting	1	3	3	A
13.6	Grinding	R	Use of electrical driven machines.	Cardiac arrest due to electric shock	<ol style="list-style-type: none"> Provision of double earth conductors & RCCBs to avoid electric shock. Pre-inspection of machines, cables by a qualified electrician. 	N	2	4	8	1. To follow OCP-09-Electrical safety	1	4	4	A
13.7	Grinding	R	Operation of tool / machine by an incompetent personnel	Cut injuries due to Incorrect run / operation	<ol style="list-style-type: none"> Deploying competent /skill personnel on job. 	N	2	4	8	Screening of skilled personnel during 3 day mandatory induction training program.	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
13.8	Grinding	R	Rotating equipment with breakable flying wheels, Flying of Melton metals,	Injury due to flying particles & cut off wheels. Fire hazard due to the hot metal particles	1. Selection, usage and maintenance of flying wheels as per the OCP-Grinding 2. Checking the quality, RPM capacity of grinding wheel before issuing from store. 3. Performing ring tests for the grinding wheels and ensuring its standard.	N	2	4	8	1. To follow OCP-14: Grinding	1	4	4	A

14. GRIT BLASTING / ABRASIVE BLASTING

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
14.1	Performing the grit blasting	NR	Exposure to silica/led & flying objects.	Lung dieses / silicosis and cancer. Asphyxiation due to lack of air supply. Body Injury.	1. Grit blasting suite shall be worn by the operator / dust mask and earplugs are the mandatory PPEs to perform the job. 2. Area must be isolated / barricaded to restrict the entry of unauthorized personnel. 3. Minimum person shall be deployed and movement of vehicle shall be prohibited where grit blasting carried out.	N	2	4	8	To implement safety checklist before commencing of work. Use of dead man switch.	1	4	4	A

15. ROAD WORK-WIDENING PROJECT (FLEXIBLE PAVEMENT / BC PAVEMENT)

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
15.1	Removal / cleaning of Surface encumbrances i.e. electrical lines, trees, heap, existing buildings, existing roads and other existing structures		*Refer "Excavation" HIRA since the sub-activity is similar in nature*											
15.2	Surface levelling (general cutting / filling)		*Refer "Excavation" HIRA since the sub-activity is similar in nature*											
15.3	Loading / Unloading of soil	R	1.Vehicle / equipment movement inside / near working location	Injury due to hit by the machinery	1. Trained personnel only to be deployed for loading & unloading activity 2. Signal man to be present at the loading / unloading site 3. No personnel should come in the approach / radius of the JCB Bucket while loading sand in the truck. 4. No personnel should be standing in the truck when the loading activity is in process.	N	3	4	12	Ensure dynamic HIRA precautionary measures are in place	1	4	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
					5. Signal man should communicate once the loading has been completed in the truck & he should simultaneously inform the truck driver & JCB operator. 6. Only after the instruction he should start the truck. 7. Do not overload the truck, as there would be every possibility of skidding while travelling on the ramp. 8. When loaded truck is travelling then no other truck / machine / personnel should be approaching through the ramp.									
15.4	Laying & compaction of GSB layer	R	1.Vehicle / equipment movement inside / near working location 2.Emission of dust 3.Work near to the live carriage way (widening project)	Injury / fatal (public / workmen) due to: Hit by the moving equipment / public vehicles. Ill health due to work in dust area.	1. Provide nose mask to workmen while working near to dust emission areas. 2. All personnel must wear high visibility clothing 3. Engage competent operators and flagmen to control the traffic. Ensure fitness for vehicle and display the inspection tags.	N	3	4	12	1. Follow IRC Specifications-55 for signage's, making diversion, providing buffer zone for widening projects.	1	4	4	A
15.5	Laying of DBM / BC & compaction of Layer	R	1. Handling and work near to the hot bitumen 2. work near to the equipment such as paver, vibro rollers, PTR, etc.	*above incidents plus* Burns / de-hydration	*Above control measures plus* Use appropriate clothing and hand gloves Ensure availability of drinking water all the time near to the work location.	Y	3	3	9	1. Avoid manual handling as much as possible and introduce mechanical handling.	1	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
15.6	Spray of Tar	R	1.Handling the chemical & Hot condition of tar / bitumen / tar	Dehydration throat irritation/ lung diseases	1. Correct PPE in accordance with PPE procedure including sun hat, long sleeved shirt & sunscreen 2. Provide cool water on site and drink regularly. 3. All personnel on site to wear approved high visibility clothing. For night works and Vic Roads works approved reflective vests must be worn.	Y	2	3	6	1. Ensure dynamic HIRA precautionary measures are in place 2. Deploy traffic controller	1	3	3	A
15.7	Other miscellaneous activities for road widening project as below: 1. Kerb laying 2.Drainage construction 3.Road marking 4.Median preparation 5.Culvert / minor bridge / major bridge construction	R	1. Work near to the live traffic 2. Working near to the excavation/ trench areas 3. Working at height.	Physical injury/fatal	1. Provide buffer zones and speed limit control system by providing flagmen / caution boards. 2. Deploy trained & experienced operators 3. Impart HIRA talks	Y	2	5	10	1. Follow IRC specifications-55 for signage's, making diversion, providing buffer zone for widening projects.	1	5	5	A

16. ROOF WORKS

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
16.1	Roof works	NR	Fall of person	Injury due to fall from height	1. Work to be carried out under the supervision of TPL. 2. Work permit system to be implemented. 3. Valid Height pass personnel shall be engaged. 4. Usage of retractable fall arrestors. 5. Multilayer of protection system to be used. 6. Securely roof sheets shall be stored to avoid flying in wind season. Site safety norms shall be followed.	N	3	4	12	1. To follow OCP-7: Work at Heights, 2. OCP-29: Selection and usage of Lifeline	2	3	6	A
16.2	Roof works	NR	Fall of material	Injury due to hit by material	1. All lifting zone should be closed with indicative barricading and one person should stand near the area to restrict unauthorized entry in the lifting zone. 2. Use tool bag kit.	N	2	3	6					A
16.3	Roof works	NR	Fall of purlin / brazing and other structure which is lifted manually.	Chances of fall above person and may lead to severe injury even may fatal.	1. All manual lifting items should be tied with double PP rope and after providing/securing with bolt or weld only rope should be unwanted.	N	3	4	12	1. To follow OCP-7: Work at Heights, 2. OCP-29: Selection and usage of Lifeline	1	3	3	A
16.4	Roof works	NR	Roof sheets may fly due to heavy wind	Injury due contact with flying material	1. All roof sheets to be secured rigidly, 2. While lifting the sheet good condition ropewith proper clamp arrangement to be made.	N	3	3	12	1. To follow OCP-7: Work at Heights, 2. OCP-29: Selection and usage of Lifeline,	2	3	6	A

17. CONFINED SPACE

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
17.1	Working in Confined Space	R	Fall hazard, Inability to escape due to Improper Access/Egress	Injury, suffocation & fatal	Proper access to be provide using ladder/tripod stand. Ensure emergency access and rescue plan before entry	Y	3	2	6				A	
17.2	Working in Confined Space	R	Fire, Explosion due to Hydrocarbons gas	Injury and Fatal	Frequent gas testing. No ignition source	Y	3	3	9	1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work.	3	2	6	A
17.3	Working in Confined Space	R	Poisoning due to Toxic gases	Injury and Fatal	Frequent gas testing.	Y	3	3	9	1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work.	3	2	6	A
17.4	Working in Confined Space	R	Asphyxiation due to Oxygen deficiency	Injury and Fatal	Frequent gas testing. Circulation of air	Y	3	3	9	1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work.	3	2	6	A
17.5	Working in Confined Space	R	Slip/Trip, Fall due to Insufficient lighting	Injury and Fatal	Fluorescent bulb to be provided for adequate lighting	N	3	2	6				A	

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
17.6	Working in Confined Space	R	Lack of communication	Injury and Fatal	Maintain uninterrupted contact with the workers by the standby man.	N	3	2	6				A	
17.7	Working in Confined Space	R	Tools striking due to congested work.	Injury and Fatal	Keep only minimum no of persons for work to avoid congestion	N	2	2	4				A	
17.8	Working in Confined Space	R	Closure of access due to miscalculation and trapping of persons in confined space.	Injury and Fatal	Supervisor & Standby man to ensure record of all persons working in confined space.	Y	3	3	9	1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work.	3	2	6	A
17.9	Working in Confined Space	R	Heat stress due to working in hot climate or doing hot work	Dehydration, Fatal	Provide access to shade at intervals. Provide adequate cold water. Ensure adequate ventilation.	Y	3	3	9	1. Close supervision is required. 2. To ensure safety checklist before commencing of work.	3	2	6	A

18. RADIOGRAPHY

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
18.1	Handling and storage of source.	R	Exposure to radiation	May react with skin and can cause cancer / skin irritation.	<ol style="list-style-type: none"> 1. Ensure safety regulations as per BARC before commencement of job. 2. Source pit shall be made at least 1 M. Depth. 3. Pit room shall be lock & key arrangement. 4. Signage to be displayed to restrict the entry of unauthorized personnel. 5. Handling of source shall be done by a licensed radiographer from BARC. 	Y	3	4	12	<ol style="list-style-type: none"> 1. To follow OCP-25 Radiography. 2. Ensure close supervision 3. Measure exposure intensity level of radiation by using of survey meter 4. Operator should be use Pocket dosimeters 	1	4	4	A
18.2	Exposing the film to radiation	R	Exposure to radiation	May react with skin and can cause cancer / skin irritation.	<ol style="list-style-type: none"> 1. Effect area must be barricaded/ cordoned off, radiation warning and signage system shall be displayed. 2. Avoid radiography in daytime. 3. Wear appropriate badges issued by BARC. 4. Radiation effect shall be measured with survey meter before starting the radiography. 5. Use the exact source of radiation and avoid powerful sources which are not required/ needed. 6. Working crew shall be informed about the radiography timing. 7. Personal dosimeter shall be used by the individuals to measure the exposure during the performance. 8. Camera, isotope, survey meter and personal dosimeter shall be calibrated periodically. 9. Ensure PTW system is in place. 	Y	3	4	12	<ol style="list-style-type: none"> 1. To follow OCP-25 Radiography. 2. Ensure close supervision 3. Measure exposure intensity level of radiation by using of survey meter 4. Operator should be use Pocket dosimeters 	1	4	4	A

19. TOWER ERECTION AND STRINGING

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
19.1	Mobilization of Manpower	R	1. Lack of knowledge. 2. Insufficient knowledge on using safety appliances. 3. Ill health person deploying for job. 4. Worker working in intoxicated state. 5. Manpower shifting by tractor.	Personal injury or fatal accident.	1. Safety induction training is being given by safety department. 2. Daily HIRA Talk is conducting at site. 3. Not allowing any worker in intoxicated state to site. 4. Tractor is not allowing for shifting manpower.	Y	3	3	9	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. To ensure safety checklist before commencing of work.	2	3	6	A
19.2	Loading & Unloading of materials	R	1. Failure of lifting gear 2. Toppling of vehicles 3. Uneven surface of ground 4. Incompetency/lack of knowledge of rigger. 5. Miscommunication between operator and signalman	1. Personal injury or fatal accident 2. Property damage	1. Ensuring valid test certificate for lifting tools & tackles. 2. Competent operator is deployed. 3. Well trained rigger are deployed. 4. Using proper PPEs. 5. Using tag line while lifting.	N	3	4	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. To ensure safety checklist before commencing of work.	2	4	8	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
19.3	Material Handling (Mechanical).	R	1. Failure of lifting gear 2. Incompetency/lack of knowledge of rigger. 4. Fall of load due to failure of lifting gears or faulty attachments. 5. Hit by hanging load.	1. Personal injury or fatal accident 2. Property damage	1. Ensuring test certificate for all lifting gear/ tools tackles are available and valid. 2. Checking the competency of person & equipment 3. Visual inspection of TNP is conducting twice in a month. 4. Trainings Riggers once in a week. 5. Using tag line while lifting.	N	3	4	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. Close supervision is required. 4. To ensure safety checklist before commencing of work.	2	4	8	A
19.4	Material Handling (Manual).	R	1. Non-use of PPE's 2. Inadequate manpower. 3) Lack of concentration in group. 4. Wrong body posture. 5. Lifting error. 6. Injury due sharp edges/ corners/ projected parts/ protruding nail.	1. Personal injury or fatal accident 2. Property damage 3. Back pain, sprain etc.	1. Using proper PPEs, 2. Providing adequate Manpower for the lifting of loads 3. Avoided handling of heavy loads by workmen. 4. Close supervision is ensured.	N	2	3	6	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. Close supervision is required. 4. To ensure safety checklist before commencing of work.	2	2	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
19.5	Stores	R	1.Fall of equipment 2.Vehicle topple 3.Collapse of stacking materials. 4.Roll over of cable drums 5. Fire Hazard. 6. Cut or fracture injury due to projecting part of materials.	1.Personal injury. 2.Burn injury. 3.Fatal accident. 4.Material damage.	1.Ensuring test certificate for all lifting gears are available and valid. 2. Deploying the competent operator. 3.Isolating ignition source. 4. Ensured the provision of required fire extinguishers. 5. Material was stacked properly. 6. Stoppers provided to avoid rolling over of cable drums. 7. Using proper PPEs. 8.All the walkways, entry and exits are kept clear. 9.Providing stack guard to protect collapse the materials. 10.Barricading the stacked materials and scrap area.	N	3	4	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. Close supervision is required. 4. To ensure safety checklist before commencing of work.	2	4	8	A
19.6	Loading and unloading of Pole & Transformer	R	1. Slip of poles while shifting. 2. Non usage of PPE's. 3. Improper use of lifting gears.	1. Personal Injuries 2.Damage of property.	1.Ensuring the usage of PPE's. 2.Competent person are deployed. 3.Trainings conducting in regular intervals. 4.Using only third party tested tools-tackles.	N	3	3	9	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. Close supervision is required. 4. To ensure safety checklist before commencing of work.	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
19.7	Excavation (Manual)	R	1. Damage of underground utilities 2. Leg injury during use of hand tools. 3. Collapse of soil 4. Toppling of vehicle 5. Toppling of person & animal.	1. Personal injury 2. Fracture	1. Ensuring from local authority that there has no any underground utilities. 2. Step/Slope cutting is ensured. 3. Access/Egress ladder is provided as per standards. 4. Barricading is being provided 5. Vehicle movement near the excavation is restricted. 6. Immediately erecting the pole after excavation. 7. Using the hand tools with wooden handle. 8. Using proper PPEs during manual excavation.	N	3	2	6				A	
19.8	Erection of Pole (Manually)	R	1. Improper lifting and positioning of poles. 2. Improper support of pole. 3. Damage lifting rope 4. Fall of person from height. 5. Injury due to electrical shock (during erection near existing line) 6. Villagers (unauthorized persons) enter in to the erection area.	1. Serious injury due to fall of poles 2. Trapping of hand / leg 3. Electrocutation 4. Fatal accident	1. Providing proper lifting tackles. 2. Checking rope before use. 3. Providing double post support during pole erection. 4. Using safety harness. 5. Taking shut down during erection near existing line. 6. Implementation of PTW/LC. 7. Not allowing any un authorized person near the erection area. 8. Barricading the erection area. 9. Tractor is not used for lifting the pole. 10. Not allowing any person under the erected pole.	N	3	4	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. Close supervision is required. 4. To ensure safety checklist before commencing of work.	2	4	8	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
19.9	Erection of Pole (Tractor Mounted Boom)	R	1.Excess swing of pole during shifting. 2.Toppling of Tractor. 3.Slip/cut of chain. 4.Excess dust emission during digging of pit. 5.Chance of contacting boom to electric wire. 6.Chance of stuck loose clothes in rotating parts.	1.Serious injury due to hit by pole. 2.Serious injury or lead to fatal from toppling of tractor. 3.Health issues. 4.Electrocution	1.Ensuring that operator has valid driving license. 2.Tractor should stand/work on evenly surface. 3.Using tag line during pole shifting. 4.Regular check-up of chain is being done. 5.Using dust masks. 6.Lowering down the boom during marching time / taking shut down when work near live conductor. 7.Gaurds/shield provided for all the rotating parts. 8.Deploying flagman while working nearby road.	N	3	4	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. OCP-07 Work at Heights 4. Close supervision is required. 5. To ensure safety checklist before commencing of work.	2	4	8	A
19.10	Working at heights	R	1. Fall of person or material. 2. Collapse of pole or access ladder. 3. Improper use of full body harness. 4. Electric shock 5.Acrophobia leads to fall from heights 6.Unauthorised entry of persons at height work area. 7. Heavy wind & rain.	1.Personal injury 2.Amputation 3.Fatal accident	1. Using proper PPE's 2.Rescue training has been given to the workforce. 3. All height worker are having medically fitness certificate. 4. Ensuring fall protection devices are properly used by all the workforce working at height. 5. Providing safe approach for ascending & descending at pole. 6. Using tools bag at height. 7. Avoided working under height work area. 8. Barricaded the height work area. 9. Stopping the height work at the time of heavy wind, rain, lightening & poor illumination.	Y	3	4	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. OCP-07 Work at Heights 4. Close supervision is required. 6. To ensure safety checklist before commencing of work.	2	4	8	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
19.11	Laying out Electrical Cables	R	1. Cable drum fall /tilting /rolling over 2. Wrong position of jack 3. Inadequate jack / spindle/defective jack 4. Struck of fingers in-between cable and rollers. 5. Vehicle topple.	1. Personal injury 2. Fatality, severe injury due to fall of cable drum or jack. 3. Finger injury.	1. Competent person has been deployed. 2. Proper handling of the cable drum & jack has been ensured. 3. Use hand gloves. 4. Level of ground to be even. 5. Sufficient manpower deployed during cable laying on ground.	N	4	3	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. Close supervision is required. 4. To ensure safety checklist before commencing of work.	2	3	6	A
19.12	Stringing	R	1. Electric shock due to existing line. 2. Fall of person from height. 3. Failure of T&P. 4. Fall of material from height. 5. Fall of the pole due to tight sagging. 6. Unauthorised entry. 7. Rainy weather, heavy wind & lightening.	1. Electrocution 2. Fatal accident 3. Serious injury 4. Cut injury and fracture	1. Implementation of PTW/LOTO 2. Ensure shut down of existing line while working near to the existing line. 3. Ensure the usage of safety harness. 4. Ensure the usage of appropriate PPE. 5. Ensure the walkways, entry and exits kept clear. 6. Back stay should be tighten before the start of stringing. 7. Stringing work should not be allowed during rainy weather, heavy wind, lightening & poor illumination. 8. All T&P should be check before starting the job. 9. Material should be lifted through rope pulley.	Y	4	4	16	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. OCP-07 Work at Heights 4. Close supervision is required. 5. To ensure safety checklist before commencing of work.	2	4	8	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
19.13	Shut down work	NR	1.Injury due to electrical shock. 2.Burns due to short circuit. 3. Injury due to flash-over. 4. Electrocutation due to Induction current/ back current. 5. Fall of person from height. 6.Lack of knowledge. 7.Poor supervision. 8.Rainy weather & lightening.	1.Electrocutation 2.Burn injury 3.Fatal accident 4.Amputation	1. Implementation of work permit/line clearance system. Follow OCP 32 2. Use discharge rod to discharge the Induction current/back current. 3. Use induction tester to ensure the shutdown at site before connecting the discharge rod. 4. Appropriate PPEs should be provide(rubber hand gloves). 5. Safety harness to be used while working at height. 6. Competency of person & equipment 7.Good supervision. 8. Implementation of LOTO system. 9. Authorised person to be deployed at feeder area for observing the taking of shutdown. 10. Trainings to be conducted. 11. Shut down work should not be allowed during rainy weather, lightening & poor illumination.	Y	4	4	16	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. OCP-07 Work at Heights 4. Close supervision is required. 5. To ensure safety checklist before commencing of work.	2	4	8	A
19.14	Transformer erection	R	1. Improper lifting and positioning of Transformer. 2. Improper & damage lifting tools & tackles. 3. Fall of person from height. 4. Fall of Transformer from height.	1. Personal injury 2. Fatality, severe injury due to fall of transformer from height. 3. Finger injury due to trapping between transformer and soil. 4. Cut injury & Fracture. 5. Fatality, severe injury due to fall of person from height.	1. Use chain pulley block for transformer erection 2. Check all tools -tackles prior to use. 3. Use only third party tested tools-tackles. 4. Use safety harness while working at height. 5. Use tag line to control the swing of the load.	N	3	4	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. OCP-07 Work at Heights 4. Close supervision is required. 5. To ensure safety checklist before commencing of work.	2	4	8	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
			5. Injury due to fall of transformer on person. 6. Poor supervision. 7. Swing of Transformer.											
19.15	BPL kit fixing & Termination	R	1. Fall from the LT pole. 2. Electrical shock. 3. Fall from the roof	1. Cut injury & Fracture. 2. Electrocutation.	1. Safety harness must be used at pole. 2. A.B. Switch should be cut & locked at DTR structure. 3. Deploy one authorized person at DTR structure for observation continuously. 4. Use appropriate PPEs.	N	3	3	9	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. OCP-07 Work at Heights 4. Close supervision is required. 5. To ensure safety checklist before commencing of work.	2	3	6	A
19.16	Charging of Transformer	NR	1. Injury due to electrical shock 2. Burns due to short circuit 3. Injury due to flash-over 4. Electrocutation due to Induction current/ back current 5. Fall of person from height. 6. Fire in Transformer	1. Electrocutation 2. Burn injury 3. Fracture 4. Fatal accident	1. Implementation of work permit/line clearance system. Follow OCP 32 2. Use discharge rod to discharge the Induction current/back current. 3. Use induction tester to ensure the shutdown at site before connect the discharge rod. 4. Proper PPEs must be provide (rubber hand gloves). 5. Safety harness must be used while working at height. 6. Ensure availability of DCP type fire extinguisher near charging DTR.	N	3	4	12	To follow: 1. OCP-22 Tower Erection 2. OCP-23 Stringing 3. OCP-07 Work at Heights 4. Close supervision is required. 5. To ensure safety checklist before commencing of work.	2	4	8	A

20. WORKING NEAR IR TRACK

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
20.1	Execution of work within 3.5 M from the existing IR Track	R	1. Contact with moving train 2. Equipment / Men coming close to IR Track / Infringement of unauthorized vehicles into the train movement zone.	Injury and multiple fatalities.	1. Should be executed under block protection and with permit to work from concerned railway. 2. Tie up with local hospitals. 3. Provide supervision / Look out man. 4. Ensure Daily HIRA Talk talk/HIRA Talk Talks 5.Ensure Emergency vehicle availability 6.Provide a flagman. 7. Intimate to local authorities. 8. Ensure proper hard barricades as per IR Standards. For ex. DFCCIL projects, barricades shall be as per drawing. 9. No night work is allowed.	Y	4	5	20	1. Ensure the engagement of competent and trained operators. 2. Boundary illumination 3. Battery operated yellow - red stickers. 4. CCTV surveillance round the clock.	1	5	5	A
20.2	Execution of work within 3.5 M from the existing IR Track	R	Working near to the underground utilities	Injury	1. Provide barricades and IR specifications. 2. HIRA Talk shall be delivered. 3. Obtain PTW from IR team while working near to the railway electrical lines. 4. Relocate / underground while working near to the other LT/HT lines.	Y	3	3	9	1. Ensure dynamic HIRA precautionary measures are in place 2. Use utility detector to identify the existing utility system.	1	3	3	A
20.3	Execution of work within 3.5 M from the existing IR Track	R	Working near to OHE Line	Electrical shock / burns	1. Provide barricades and IR specifications. 2. HIRA Talk shall be delivered. 3. Obtain PTW from IR team while working near to the railway electrical lines. 4. Relocate / underground while working near to the other LT/HT lines.	Y	4	5	20	Ensure dynamic HIRA precautionary measures are in place	1	5	5	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
20.4	Execution of work between 3.5 m to 6 m from centre line of existing Indian Railway track.	R	Equipment / Men coming close to IR Track / Infringement of unauthorized vehicles into the train movement zone.	Injury or Fatal	1. Tie up with local hospitals. 2. Provide supervision / Look out man. 3. Ensure Daily HIRA Talk talk/HIRA Talk Talks 4.Ensure Emergency vehicle availability 5.Provdie a flagman. 6. Intimate to local authorities. 7. Barricading at 3.5 m are being provided for an example: per NCR approved drawings.	Y	3	5	15	Ensure dynamic HIRA precautionary measures are in place	1	5	5	A
20.5	Execution of work between 3.5 m to 6 m from centre line of existing Indian Railway track.	R	Slip, trip and fall while working near to the underground utilities.	Injury	1. Check for any underground utilities with CAT and refer other drawings from municipal / local bodies to identify any utility services. 2. A Clear demarcation shall be given to the underground utilities. 3. HIRA Talk talks shall be delivered before start of work. 4. Use cable detector to identify the existing utility system.	N	3	3	9	Ensure dynamic HIRA precautionary measures are in place	1	3	3	A
20.6	Working beyond 6m from centre of UP Line track of IR.	R	Slip, trip and fall and electrocution	Injury or Fatal	1. Ensure the engagement of competent and trained operators. 2. Conduct HIRA Talk talks before start of job. 3.Vehicle movement area shall be defined and away from men movement. 4 Ensure the vehicle / equipment fitness condition based on checklists.	N	2	4	8	Ensure dynamic HIRA precautionary measures are in place	1	4	4	A

21. UNDER GROUND TUNNEL WORK

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
21.1	Tunnel Survey	R	Improper Access / working on uneven ground surface;	Slip / trip/ fall may result injury to the personnel.	1. All engaged personnel must use the designated pathway. 2. Avoid slippery work areas.	Y	2	4	8	1. To follow OCP-08 Work in Confined Space 2.Ensure dynamic HIRA precautionary measures are in place	2	2	4	A
21.2	Lifting of Tunnel Boring Machine (TBM) Parts	*Refer "Lifting of Material" HIRA since the sub-activity is similar in nature*												
21.3	TBM Maintenance	R	Working in narrow space	Personal Injury	1. Working space must be clear (Don't obstruct passageway or access for entrance and exit area). 2. Required illumination to be ensured. 3. The maintenance of the EPB TBM's will be carried out in accordance with the Operations and Maintenance Manual.	Y	2	3	6					
21.4	Lifting & Lowering of segment into the shaft	R	Improper set up / stabilization	Risk of tipping over Failed lift due to failure of lifting gear /accessories	1. Crane shall be placed on firm ground of required bearing capacity as specified by competent person. 2. Sufficient lighting arrangement to be ensured in lifting area.	N	3	4	12	1. To follow OCP-011 Lifting Appliances and Lifting Gears 2.Ensure dynamic HIRA precautionary measures are in place	2	2	4	A
21.5	Working in the shaft/tunnel	R	Lack of oxygen/ Improper Lighting	Severe injuries/death	1. Adequate lighting arrangement as per the task requirements (110 lux) 2. Regularly check shaft wall integrity and report any deficiencies, evacuate area if deemed unsafe. 3. Ensure only certificated of conformance and maintenance records for PPE/safety equipment at procurement stage. 4. 24 hours' gas monitoring to be done. 5. Acceptable entry conditions are: Oxygen (O2) - greater than 19.5% Lower Flammable Limit LFL - less than 10% Carbon Monoxide (CO) - less than 35ppm Hydrogen Sulphide (H2S) - less than 10ppm	N	3	3	9	1. To follow OCP-08 Work in Confined Space 2.Ensure dynamic HIRA precautionary measures are in place	2	2	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
21.6	Working in the shaft/tunnel	R	Inadequate Ventilation	Severe injuries/death	1. Static plant items at surface located away from jet fan to ensure forced air is not contaminated by exhaust fumes. 2. Ensure proper ventilation all the time inside the shaft.	N	3	3	9	1. To follow OCP-08 Work in Confined Space 2.Ensure dynamic HIRA precautionary measures are in place	2	2	4	A
21.7	Rail Line & HT Cable Extension	R	Slip, trip and fall	Personnel injury	1. Rail line must be kept in designated place, don't through everywhere at shaft location. 2. Proper illumination to be provided and ensure specially in night shift. 3. Provide separate pathway for the rail & HT cable extension. 4. Grease and oil spillage to be control in the access way.	N	3	3	9	1.Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work	2	2	4	A
21.8	Shifting of materials inside the tunnel by Locomotive	R	Hit by locomotive rolling stock & Derail of locomotive	Severe injuries/death	1. Manchester gate to be installed at the tunnel entrance. 2. All safety devices & signal system must be installed in loco (Rear View camera, revolving light, stretchers, dead man switch, etc.). 3. Adequate fencing/grill provided to avoid any rail line crossing from back up gantry area 4. Adequate Rail line stoppers to be fixed 5. Banksmen to be deployed for loco moment. 6. Loco movement signal system to be implemented and awareness to be provided to all workers 8. Daily track inspection by loco operators & supervisor.	N	3	3	9	1. To follow OCP-011 Lifting Appliances and Lifting Gears & OCP-08 Work in Confined Space 2.Ensure dynamic HIRA precautionary measures are in place	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
21.9	Handling of segments	R	Crushing injury/ Fractured/ Toppling of segments	Severe injuries/death	1. Proper support to be fixed for the stability of the segment at the shaft bottom. loading/unloading operations 2. Proper coordination between Loco operator and rigger to be ensured. 3. Adequate illumination to be provided.	N	3	4	12	1. To follow OCP-011 Lifting Appliances and Lifting Gears & OCP-08 Work in Confined Space 2. Ensure dynamic HIRA precautionary measures are in place	2	3	6	A
21.10	Mining	R	Collapse of soil surface/flooding	Severe injuries/death	1. Voids shall be identified and filled backfill and compacted or pumped with concrete. 2. Alternatively, tunnels shall be re-routed. 3. A 'Geotechnical' survey shall be carried out prior to commencement of works.	Y	3	3	9	1. To follow OCP-08 Work in Confined Space 2. Ensure dynamic HIRA precautionary measures are in place	2	3	6	A
21.11	Muck Disposal	R	Fall of muck bucket	Fatal to major injuries, or property damage	1. Muck bucket to be tested by competent person with maximum load capacity. 2. SWL must be displayed at the muck bucket and spreader beam. 3. Communication system to be effective from bottom shaft to surface level.	Y	3	3	9	1. To follow OCP-08 Work in Confined Space 2. Ensure dynamic HIRA precautionary measures are in place	2	2	4	A
21.12	Backfill Grouting	R	Splash of grout material to Eye/Skin	Personal injury	1. Ensure Inspection of the grouting pump and accessories before start of work. 2. Ensure usage of Rubber hand gloves & safety Goggles. 3. Eye wash lotion and clean water availability to be ensured.	Y	2	3	6					

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
21.13	Working with conveyor belt	R	Entanglement may be happening between the running parts, In-running nip point where body parts may be trap in, Falling of muck materials.	Personal injury in form crushing, shearing, tearing or loss of body part. Skin irritation due to muck handling	<ol style="list-style-type: none"> 1. Proper guard must be provided to all moving parts. 2. Emergency stop buttons should be installed. 3. Warning sirens must be installed to make sure that belt is going to move. 4. Loose clothing must be avoided. 5. Restricted to unauthorized person working near the conveyor belt. 	Y	3	4	12	<ol style="list-style-type: none"> 1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work 	2	3	6	A
21.14	Paste Mixing	NR	Skin contact with repairing material, spillage of repairing material & Chemical hazard from bonding agent	Skin injury like itching, skin allergy, slipping of any person etc. & Chemical Burn/ Skin Allergy	<ol style="list-style-type: none"> 1. Area must be cordon off near the repairing work. 2. MSDS must be displayed at work location with local language and engaged workers must be aware about it. 3. All engaged workers must aware about the risk associated with the crack repairing materials. 4. Paste shall be prepared as per instruction or direction of methodology. 5. Bonding agent should be stored in cool & separate. 	N	3	3	9	<ol style="list-style-type: none"> 1. To follow OCP-20 Handling and Storage of Chemicals 2. Ensure dynamic HIRA precautionary measures are in place 	2	2	4	A
21.15	Injection of grouting	NR	Skin contact & eye injury	Eye injury and skin disease	<ol style="list-style-type: none"> 1. MSDS must be displayed at work location with local language and engaged workers must be aware about it. 2. All engaged workers must aware about the risk associated with the crack repairing materials. 3. Ensure usage of Rubber hand gloves & safety goggles. 	N	3	3	9	<ol style="list-style-type: none"> 1. To follow OCP-20 Handling and Storage of Chemicals 2. Ensure dynamic HIRA precautionary measures are in place 	2	2	4	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
21.16	Temporary Ring & Scaffold Erection and Dismantling	R	Falls from scaffolds/collapse of scaffolds/ Drop or fall of tools, machines	Fatal/serious injury due to fall or falling objects	<ol style="list-style-type: none"> 1. Follow Schematic drawing. 2. Scaffold shall be provided with a safe means of access and or a safe working platform. 3. Follow scaffold tagging system. 4. Do not overload the scaffolding with materials and keep the platforms clean of debris. 5. Periodic Checking of Chain pulley blocks to be ensured. 6. Formwork inspection program shall be developed to check the installation/dismantling are carried out as per the scheme drawing and sequence of operations. 	Y	3	3	9	<ol style="list-style-type: none"> 1. To follow OCP-02 Scaffolds 2. Ensure dynamic HIRA precautionary measures are in place 	2	3	6	A
21.17	Core cutting & disposal for the core cutting blocks	R	Electric shock/ Fall materials/ man/ Fall core cutting blocks.	Serious injury, Fatal due to electrocution	<ol style="list-style-type: none"> 1. Electrical equipment, cables and accessories shall be periodically checked for insulation, resistance, continuity to ensure fit for use. 2. All connection must be routed through RCCB/ELCB with 30mA sensitivity. 3. Electrical panels shall located/routed away from water logging area. 4. Use proper tested chain pulley blocks during lifting and shifting for the core cutting blocks. 5. Electrical panels shall be inspection on monthly basis and Green Card system shall be followed. 	Y	3	3	9	<ol style="list-style-type: none"> 1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work 	2	2	4	A
21.18	Wire mesh fixing	R	Pollution /Dust / injured for eyes	Personal injury/long term health issues respiratory issues	<ol style="list-style-type: none"> 1. Water to be sprayed before and during the operation to control the dust generation. 2. Use approved dust filter mask. 3. Proper illumination to be provided in the wire mesh fixing location 4. Adequate ventilation fans/ducts to be provided. 	Y	2	4	8	<ol style="list-style-type: none"> 1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work 	2	2	4	A

22. WORKING OVER OR ADJACENT TO WATER

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
22.1	Working over or adjacent to water (depth above 4 feet)	NR	Falls of person into water	Drowning	<ol style="list-style-type: none"> Edge protection will be provided where practicable. Safety lines and harnesses will be worn where edge protection cannot be provided. Where there is fast flowing water, make provision of grab lines downstream. Gangways and areas near water will be kept clear of obstructions. Suitable lighting (54 lux) will be provided at edges adjacent to water. A rescue boat or other means of prompt rescue will be available when necessary. Life jacket shall be provided to all those working over the water. Activities at edges shall not be performed on rough wind times / dark hours. Caution board must be displayed with proper information. Emergency Rescue team should be designated 	Y	3	4	12	<ol style="list-style-type: none"> Ensure dynamic HIRA precautionary measures are in place To ensure safety checklist before commencing of work 	2	3	6	A
22.2	Working over or adjacent to water (depth above 4 feet)	NR	Sinking of floating vessel/barge	Risk of drowning, serious injuries and fatal due to stuck between objects in the water	<ol style="list-style-type: none"> Check the condition of vessels against corrosion, ensure sufficient anticorrosion measure taken. Mark the Safe Working Load on every barge taking the dead weight of vessel and fill water into account. Also mark the appropriate allowable dip with respect to SWL. A rescue boat or other means of prompt rescue shall be available when necessary. Life jacket shall be provided to all those working over the water 	Y	3	4	12	<ol style="list-style-type: none"> Ensure dynamic HIRA precautionary measures are in place To ensure safety checklist before commencing of work 	2	3	6	A

Sr. No.	Sub-Activity	Routine (R)/ Non Routine (NR)	Potential Hazard	Consequence	Present Control	Legal Concern(Y/N)	Base Risk			Proposed Control	Residual Risk			Remarks (Acceptable: A/ Not-Acceptable: NA)
							1 to 5	1 to 5	1 to 25		1 to 5	1 to 5	1 to 25	
							Probability	Severity	Risk		Probability	Severity	Risk	
22.3	Working over or adjacent to water (depth above 4 feet)	NR	Flash flood	Drowning and washing away	1. Regular update to be taken from meteorological / local department to reach flood alerts. 2. Erect warning signage's. 3. Establish Emergency Siren system for quick evacuation. 4. Conduct frequency drills.	Y	3	4	12	1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work	2	2	4	A
22.4	Working over or adjacent to water (depth above 4 feet)	NR	Oil spillage into water body	Water pollution	1. Never keep the drums/barrels/containers in open condition, always ensure lid on. 2. Employee suitable re-fuelling methods to avoid oil spillages. 3. Promptly remove the empty containers away from workplace. 4. Use spill trays, maintain equipment oil leak free	Y	3	3	9	1. Ensure dynamic HIRA precautionary measures are in place 2. To ensure safety checklist before commencing of work	2	2	4	A