Risk Assessment Report

for Ukhrul-Talui-Tadubi Road(NH-102A) in Manipur

Introduction:-

The Hill Road construction process has numerous uncertainties and risks, which increase with the size and the complexity of a project. Risk has been defined in different ways. Risk is an unforeseen event that occurs during the process of construction projects. Study shows that construction industry is subjected to more risk and uncertainties than any other industries. The reason for that is mainly due to complex nature of construction business activities, process, environment and organization. Risks that occur in highway projects will lead to inability to achieve desired project objectives. Delays, cost overruns and reduction of availability of resources are negative effect of risk inherent to highway projects.

Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat (also called hazard). *Quantitative risk assessment* requires calculations of two components of risk: the magnitude of the potential loss, and the probability that the loss will occur. **Acceptable risk** is a risk that is understood and tolerated usually because the cost or difficulty of implementing an effective countermeasure for the associated vulnerability exceeds the expectation of loss.

Different type of Risk in Hill Road Construction:

Major Types of Risk Assessment are describe below

1. Environmental Risk Assessment.

Natural hazards of this area like Ukhrul & Senapati District, earthquake, land submergence and landslides are the real threat to the community and infrastructure of north east India. The visual inspections of the project site were made during the field visits.

The environment of Manipur is fragile and much variable in aspect of vulnerability thus every place seems to be erratic and specific in nature of risk. Risk assessment is very essential for the North East India to assess the capabilities and immediately respond to the natural disasters like Landslides, earthquakes etc. Vulnerability and risk assessment depends much more on logic and high integrity of different technologies for different consequences of the environment and nature. This will be much useful to establish community-based disaster preparedness and prevention.

a. Earthquake: The project area is located in seismic zone V which is very high damage risk zone. Relevant IS codes shall be adopted while designing the civil structures to sustain the earthquake of highest magnitude in Seismic zone V.

b. Landslides: Land Slide zone is observed on the existing road stretch from Design Chainage Km. 19+200 to Km.21+544. Gabion Structure is provided at the toe of the hill side so that these serve as breast walls as well as in the middle of running slopes where they serve as check walls. In such application gabion walls help to retard the flow of water and reduce the surface erosion of the slope to a certain extent. To prevent erosion on Hill Slope 3mm GI Wire netting opening size 5cm to 8cm and width 1m to 1.22m pegged down

with staples 30cm to 60 cm apart on the prepared ground surface. The top and bottom ends of the nettings are fixed in slots of 30cm deep fully stretched.

The lithology of the project area combined with high rainfall makes the hill slopes unstable. Destabilization of slopes due to hill cutting may cause extensive erosion resulting to siltation in water bodies and impact on properties. To avoid/minimize the impact of landslide on the road and vice versa, following mitigations have been included in the design.

(i) Retaining walls for stabilization of uphill
(ii) Breast walls down slopes and
(iii) Parapet walls/guide posts/railings/edge stones

Following 'Bio-engineering' measures are also recommended for slope stabilization. In addition to controlling soil erosion, this will generate employment to local people, manifold saving against masonry structures, quick timeframe, increase productivity of hill slopes and reduce carbon emissions. These measures are

(iv) Bamboo terracing, bamboo crib walls, and bamboo knitting a slope
(v) Contour trenching
(vi) Series of check dams on hill slopes etc.

Different Key IRC guidelines will be apply that have a direct/indirect bearing on the environmental risk assessment as well as environmental risk management during Road construction period.

Table: Applicable Indian Road Congress(IRC) Codes

S.No	Code Title/Theme	Code
1	Guidelines on requirement of environmental clearance for road projects	IRC:SP:93-2011
2	Guidelines on Landscaping and tree plantation	IRC:SP:21-2009
3	Guidelines for EIA of Highway projects	IRC:104-1988
4	Guidelines for Borrow area identification, use and its rehabilitation	IRC:10-1961
5	Guidelines for Pedestrian Facilities	IRC:103-1988
6	Ribbon developments on highways and its prevention	IRC:SP:1996
7	Manual on Landscaping of road	IRC:SP:21-1979
8	Report on recommendations of IRC Regional workshops on highway safety	IRC:SP: 27-1984
9	Road safety for Children (5-12years old)	IRC:SP: 32-1988
10	Guidelines on road drainage	IRC:SP:42-1994
11	Highway safety code	IRC:SP:44-1994
12	Guidelines for safety in construction zones	IRC:SP:55-2001
13	Hill road manual	IRC:SP-48-1998
14	Recommended practice For treatment of embankment slopes and erosion control	IRC:56–1974

2. Risk Assessment Road Safety & Hazard Identification For Construction Equipment & Construction Worker:

In order for an organization to take well-targeted actions that prevent motor vehicle incidents (MVI) and safeguard employees, it must first understand how employees can get hurt while driving for work. Identifying the hazards they encounter, understanding the factors that contribute to crashes and evaluating the associated risks are key steps in an effective road safety program.

Different Potential Risk Parameter for workers in road construction Period:

1. Scaffolding
2. Fall protection
3. Excavations
4. Blasting

1.Scaffolding

Hazard: When scaffolds during different structure construction i.e bridge, culvert etc. on Road, are not erected or used properly, fall hazards can occur. Protecting these workers from scaffold-related accidents would prevent.

Solution for overcome from this Potential Risk:

- Scaffold must be sound, rigid and sufficient to carry its own weight plus four times the maximum intended load without settling or displacement. It must be erected on solid footing.
- Unstable objects, such as barrels, boxes, loose bricks or concrete blocks must not be used to support scaffolds or planks.
- Scaffold must not be erected, moved, dismantled or altered except under the supervision of a competent person.
- Scaffold must be equipped with guardrails, midrails and toeboards.
- Scaffold accessories such as braces, brackets, trusses, screw legs or ladders that are damaged or weakened from any cause must be immediately repaired or replaced.
- Scaffold platforms must be tightly planked with scaffold plank grade material or equivalent.
- A "competent person" must inspect the scaffolding and, at designated intervals, reinspect it.
- Synthetic and natural rope used in suspension scaffolding must be protected from heat-producing sources.
- Employees must be instructed about the hazards of using diagonal braces as fall protection.
- Scaffold can be accessed by using ladders and stairwells.
- Scaffolds must be at least 10 feet from electric power lines at all times.

2.Fall Protection

Hazard: A number of factors are often involved in falls, including unstable working surfaces, misuse or failure to use fall protection equipment and human error. Studies have shown that using guardrails, fall arrest systems, safety nets, covers and restraint systems can prevent many deaths and injuries from falls.

Solution for overcome from this Potential Risk:

- Consider using aerial lifts or elevated platforms to provide safer elevated working surfaces;
- Erect guardrail systems with toeboards and warning lines or install control line systems to protect workers near the edges Road.
- Use safety net systems or personal fall arrest systems (body harnesses).

3.Excavations Work

The standards apply to all open excavations made in the Earth's surface, including trenches. Following the requirements of the standards will prevent or greatly reduce the risk of cave-ins and other excavation-related incidents. Excavation will be done during construction period in different Borrow Pit locations

Solution for overcome from this Potential Risk:

- Within 2.0 meters of excavation edge, permit only excavation equipment. Don't allow any other equipment near excavation edge since the weight of the machines can fall trench walls.
- Cranes should maintain a safe distance equal to depth of excavation from the edge of the excavation
- Deposit excavated soil along with other materials at least 0.61 meters from the edge. Place soft barricades for pedestrians at least 1.0 meter from the edge. Scaffold posts, loose materials along with any loads shall be at a distance of 1.5 times excavation depth away from the edge. Provide hard barricades for vehicles at least 2.0 meter from the edge.
- Only authorized persons should enter the excavation
- Keep flagman with a red flag in busy and risky locations to guide vehicular traffic
- Keep signalman to guide equipment operation safely
- Use blinking warning lights where the pedestrian or vehicular traffic is expected.
- Provide additional bracing and shoring in the vicinity of the source of vibration such as Pile driving rigs to prevent slides, slips or cave-in where excavations.
- Provide one ladder per 15 meters of length. Extend the ladder for one meter above the top of cut
- Prohibit persons in the path of an excavator turning bucket
- Prohibit lone workers without supervisor
- Wherever presence of insects, leeches and snakes is possible, make arrangements for repellents, fumigation and first aid as needed.
- Carry earth work inspection daily

4.Blasting

To ensure safe blasting procedures, it is very critical to understand the terminology used in the specifications. As a general rule of thumb:

The "blast site" is the area where explosive material is handled during loading, including an area extending safe distance in all directions. The "blast area" is the entire zone that may be affected in any way by the blast.

Solution for overcome from this Potential Risk

- A safe area around the shot area should be determined and cleared. Guards should be assigned to secure all possible entryways into the blast area.
- The Blaster-in-Charge should be in constant radio communication with all personnel during the clearing and guarding operation.
- At blast time, the Blaster-in-Charge should fire or instruct the designated shot-firer to fire the blast.
- After the post-blast fumes have dissipated to safe levels, the Blaster-in-Charge should inspect the shot area. During the examination the blaster should look for.
- All misfires should be safely removed, and other hazardous condition corrected or secured.
- When the area is clear of hazards to nearby traffic, the public, or the job site personnel, the Blaster-in-Charge should give the all-clear signal and relieve the guards from their posts.
- An approved lightning detector should be used to monitor approaching electric storms. All precautions should be taken in the event of a storm.

3. Risk Assessment & Personal Protective Equipment (PPE)

i. Eye and Face Protection

- Safety glasses or face shields are worn anytime work operations can cause foreign objects getting into the eye such as during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles).
- Eye and face protectors are selected based on anticipated hazards.
- Safety glasses or face shields are worn when exposed to any electrical hazards including work on energized electrical systems.

ii. Foot Protection

- Construction workers should wear work shoes or boots with slip-resistant and puncture-resistant soles.
- Safety-toed footwear is worn to prevent crushed toes when working around heavy equipment or falling objects.

iii. Hand Protection

- Gloves should fit snugly.
- Workers wear the right gloves for the job (for example, heavy-duty rubber gloves for concrete work, welding gloves for welding, insulated gloves and sleeves when exposed to electrical hazards).

iv. Head Protection

- Workers shall wear hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or of accidental head contact with electrical hazards.
- Hard hats are routinely inspected for dents, cracks or deterioration.
- Hard hats are replaced after a heavy blow or electrical shock.
- Hard hats are maintained in good condition.

Risk Management for construction work:

Different Key IRC guidelines will be apply that have a direct/indirect bearing on the accidental risk assessment as well as its management during Road construction period.

The employers will be share the details of their safety and health programs with workers & emphasize the critical role workers will be play in keeping the jobsite safe. Employers will be emphasize on specific practices that will help to reduce the risk of on-the-job injuries at excavation sites.