



EXECUTIVE SUMMARY
FOR
WIDENING TO 2-LANE, RE-ALIGNMENT AND GEOMETRIC IMPROVEMENT
OF CHAMPHAI-ZOKHAWTHAR ROAD (00.000 KM to 27.247 KM) WITHIN
MIZORAM STATE ROADS PROJECT II

E1. Background

The Government of India has requested World Bank financing for the improvement and rehabilitation of State Highways and Major District Roads in the State of Mizoram that enhance connectivity to Bangladesh and Myanmar. The proposed roads project includes a 336 km north-south alignment starting at the NH44A junction between Aizawl and Tripura State passing through Thenhlum, Phairuankai, Chawngte, and connecting to the Multi-modal Kaladan Road at the southern end. Other road links in the project include the 112 km east-west Lunglei-Lungsen-Tlabung-Kawrpuchhuah road which links to nearby Chittagong Port (through Rangamati) in Bangladesh and the east-west 28km Champhai-Zowthowkar road and 42 km Chumkhum- chongte road.

The improvement works will consist mainly of widening and some new construction to two-lane Asian Highway standard, pavement construction, strengthening, improving, constructing of bridges, cross drainage structures and longitudinal drainage and provision of adequate slope protection works. Road stretches crossing semi-urban areas and villages may also require provision for covered drains, sidewalks and parking where required. In some cases, new alignments (by-passes) and/or realignments for the existing villages and towns may also be required.

The Project Implementation Unit (PIU) within the Public Works Department (PWD) of the Government of Mizoram will be the implementing agency for the project .The PIU is located in the capital of Mizoram State, Aizwal.



Proposed Project Roads under MSRP II – Regional Transport Connectivity Project			
Group/Project 1		District(s)	Length
	Lunglei - Tlabung - Kawrpuichhuah	Lunglei	87.9 km, (E-W road to Bangladesh border)
	Champhai – Zokhawthar	Champhai	27.5 km, (E-W road to Myanmar border)
	Chhumkhum-Chawngte	Lunglei	41.7 km, (part of original N-S road alignment)
Group/Project 2		District(s)	Length
	Junction NH44A (Origination) – Chungtlang – Darlung – Buarpui	Mamit & Lunglei	83 km
	Buarpui – Thenlum – Zawlpui	Lunglei	95 km
	Chawngte including bridge to BungtlangSouth up to Multimodal Road junction	Lawngtlai	76 km
	Zawlpui – Phairuangkai	Lunglei	30 km

E 2. EXISTING SCENARIO OF CHAMPHAI – ZOKHAWTHAR ROAD

The existing Champhai – Zokhawthar road was originally constructed as other district road (ODR) Standard road during the early part of eighties. It was constructed by the State Public Works Department (PWD). The road was constructed to provide connectivity between district headquarters and International boarder of Indo Myanmar for international trading but also for Eastern part of Mizoram. The total length of the project road is 27.247 km. (including 2.53 km of spur road). The road was upgraded to the status of State highway (SH) and International trading route between India and Myanmar in the year 2005. Existing road take off from Km 150.0 of Seiling Champhai Road passes through the villages and Terminate at km 26.60 on River Tiau Indo Myanmar Boarder and this road passes through five villages, i.e. Khankawn ,Zotlang, Ruatlang , Mualkawi, Melbuk& Zokhawthar.

E. 3. Need of the project



It is of single lane road with formation width 5.2 m without conforming any standard / specification. As a result, the heavily loaded trucks and large sized vehicles find it difficult to pass through these stretches safely. Since this road is the main route provides connection between district town Champhai to Indo Myanmar Boarder at River Tiau and it will serve one of the major International trade routes between India and Myanmar for economically and culturally.

Although this road has been categorized as State road (SH) by PWD, Government of Mizoram but substantial improvement of the road other than normal renewal works have been carried out since the road was declared an International trade route. Most of the retaining wall / wing wall had been collapsed and the road formation width also breaches at many stretches. The existing road has steep gradient and sharp curves / zigs at various stretches.

Hence is very essential to improve & up-grade existing Champhai –Zokhawtha Road conforming to 2-lane standard.

E. 4. Expected benefit from the project

- The road will provide better connectivity between district headquarters and International boarder of Indo Myanmar for international trading but also for Eastern part of Mizoram
- Improve quality of life of the people living along the road in the region
- Improve quality of life of the people in the region

E. 5. Engineering Design and Surveys

E.5.1 Alignment improvement

The existing alignment passes through some heavily built-up areas and steep terrains which are unstable and landslide prone so it was felt absolutely necessary to re-align the existing initial stretch of the Champhai – Zokhawthar



- i. **First realignment** is between km 0/00 – 3/00 by shifting the existing take-off point at km 150/00 to a proposed new take-off point at km 146/00 (i.e. Located at out skirt of Champhai town) on Seiling – Champhai road. (refer map 2.4),
- ii. **Second realignment** is within Mualkawi village (Km7+680 to 9+290 km)
- iii. **Third realignment** Melbuk village (Km 7+640 to Km 9+200)
- iv. **Fourth realignment** at (Km 17+050 to Km 24+300) is to by pass the habitant and heavily built-up areas of the villages Melbuk & Zokhawthar.

E.5.2 Improvement of Cross Section

Existing carriageway width is 5 m to 5.2 m with hillside earthen drain. Road width of 12m and Carriage width of 7m has been proposed for improvement.

E.5.4 Horizontal Alignment improvement

The project corridor passes through steep and mountainous terrain. The design speed adopted is 30km/hour (IRC SP: 48). Along the proposed alignment, there will be no hair-pin bend. However minimum design speed has been considered on technical grounds.

E.5.5 Vertical Alignment/Gradient improvement

Gradient, being the most important parameter, has been the guiding factor. Ruling gradient (less than 5.0%) has been achieved, the maximum gradient being 5.4%.

E.5.6 Drainage



Longitudinal side drains (lined) have been proposed on the side of hill cutting all throughout the length except for cross drainage and bridges. Besides longitudinal drains, it is proposed to provide chutes at different location as per site conditions.

Cross-drainage structures in the form of 97 pipe and 37 box culverts have been proposed in the improved road.

E.5.7 Slope Protection works

Adequate Protective structures are proposed for retaining of cut/fill slopes to ensure stability of the road formation at locations where required. In the proposed improvement 1520m of retaining wall, 825m of breast wall, 920m of gabion wall and 900m of toe wall have been proposed as slope protection measures. In addition to these bioengineering measures will be provided for protection of embankments, disposal sites and hill side and valley side slopes.

E.5.8 Seismic Effects

As the project area is in zone –V of the seismic zone classification i.e. high earth quack prone area, hence design of structures has been done considering the provisions of IS 13920

E.5.9 Source of rock and sand

Construction materials for GSB, WMM, DBM ,BC, Cross drainage & Masonry R/Wall etc. works, will be available at Patea (Champhai), Pa Zualtea (Zotlang), Zarzoliana, Tuichang, C.Malsawma Khawzawl quarry and Tiau River . Sand from Tiau river at end of proposed alignment and Tuipui River which is 13 Km from takeoff point have been proposed for road construction.

E.5.10 Excavated spoil

It has been estimated that due to construction of the road about 2.7 million M3 of spoil will generate, out of which soil will be 1.53 million M3, soft rock will be 1.15 million M3 and hard rock will be 0.09 million M3. Out of the excavated earth 2.7



million M3, 0.5 million M3 will be disposed at the proposed 11(eleven) dumping sites and at the site where embankment is required.

E.5.11 Disposal of spoil

It has been stated that 2.7 million M3 of spoil will generate due to up gradation of the existing soil, which about 0.11 million M3 per km. Disposal of such a huge quantity of earth spoil is a difficult task. Provision will be made in the contract that contractor will dump the spoil in the designated disposal sites and also will take proper engineering and bioengineering measure to manage the site and conserve the spoil.

E.5.12 Blasting of rock

Geological and geo- technical investigation indicate the fact that during widening of the road proposed road alignment will pass through hard rocky areas (Km 7+050 to Km 7+150, Km 7+300 to Km 7+600, Km 10+100 to Km 10+740, Km 11+430 to Km 11+50, Km 12+800 to Km 13+200, Km 15+450 to Km 16+200, Km 18+500 to Km 19+000, Km 20+550 to Km 21+2400, Km 22+900 to Km 23+400). To widen the road in this stretch need blasting.

E.5.13 Water for construction

It has been estimated that water requirement for construction of the road and for worker's camp will be 430KL/day. The contractor will arrange the water for construction mainly from available surface water sources.

E.5.14 Land slide along the road

Major land slide prone areas were not noticed during the field visit to the project stretch.



E.5.15 Project cost

The total cost of the project for civil work Rs 183.41 Crores which covers costs for formation work, Slope protection and cross drainage works, construction of bridges and pavement works.

E.6 ENVIRONMENTAL & SOCIAL BASELINE

E. 6.1 NATURAL ENVIRONMENTAL BASELINE

Climate

Climate of project area is pleasant. The temperature ranging from 8°C to 28°C with moderate Humidity varies from 70 to 85%. The average annual rainfall is about 2540 mm.

Relative humidity in the dry season is 50 –70% and in the monsoon period is about 90%. During southwest monsoon, February to April is comparatively dry when humidity is between 60 –70%. Average wind speed during site visit around 12.2km/hr and the Sunshine duration about <10 hours during August 2013.

Physiography and Geomorphology

The Champhai area is formed by medium structural hills along the ridges which runs from Chhawrtui to Pawlsang Village, and low structural hills in the western side of the ridge with many streams and rivulets. The streams are mostly ephemeral in nature.

Terrain

The alignment of the project road passes through mountainous and steep terrain exceeding 30 % ground slope across the alignment. The height of the road at various locations varies from 1350 m near take off point to 700.00 m River Tiua above mean sea level (MSL)



Ecological sensitivity areas

Project road is not passing through any reserve forest, wild life sanctuary and wet land. Only 230m of the alignment (Km 9+300 to 9+530) is passing through forest plantation area and about 0.28 ha of forest land need to be acquired for widening of the road.

Geology

The project area represent Barail Group of rocks which comprises a monotonous sequence of shale interbedded with siltstone and hard compact, thinly bedded, grey to khaki, fine grained sandstone. Locally, a few hard, dark grey compact, medium to fine grained quartzwacke bands are present.

The ridge area of the project is formed by Sandstone which are fine to very fine grained, not too bluish grey to light brown in colour, compact and hard, thinly bedded, rarely yellowish brown, medium grained and friable. The low structural hill is formed by Siltstone and Shale which are dark grey to grey in colour and are usually splintery (Source: Geological survey of India).

Ground water / Hydrogeology

Geologically, the area is underlain by sedimentary rocks of Tertiary age, which have been tightly folded in a series of anticlines and synclines. Ground water occurs under confined and unconfined conditions in sandstones, sandy shales etc.. Mizoram is an abode of springs. These springs are widely utilized by people for domestic needs. Recent study suggests that there is good scope of tapping ground water in the riverbeds with sumps connected to infiltration galleries.

Soil

The soils of the project area with a 25% - 50% slope with abandoned jhum, current jhum land and Horticulture plantation in small scales are clayey Typic



Hapludults, L.S. Umbric Dystrochrepts, FL Typic Hapludults and Typic Dystrochrepts. However in a less sloped areas, F.L Humic Hapludults and Clayey Typic Dystrochrepts are also found.

Seismic characteristics

In Mizoram, lie the southern most end of the Purbachal Himalayan range. Their folded structure is a synclinorium consisting of broad synclines and tight-faulted anticlines. Earthquakes in this region are generally shallow, though a few quakes of intermediate depth have occurred. The seismic hazard map of India was updated in 2000 by the Bureau of Indian Standards (BIS). States of Mizoram lie entirely in Zone V i.e. highest risk of earthquake.

Air Quality

Being an industrially backward state with no major polluting sources, the ambient air quality in Mizoram is generally pristine. The baseline air quality monitored along the roads indicates that the ambient air quality is within the acceptable limits of NAAQS (2009) along the corridor.

Ground Water Resources

In the low-lying areas, the ground water potential is categorized as good which are those jhum areas, abandoned jhum land and current jhum land. The ground water potential is moderate along the ridges which need to be focused upon to increase the sources of spring heads and fountains.

Ground water analysis indicate the chemical characteristics as - Fe 0.1 mg/l, Chloride 15 - 20.0 mg/l, PH 5.5 to 6 mg/l, Alkalinity 15-40 mg/l, Turbidity 0.1 to 1.0 NTU, Hardness 12- 16 mg/l.

Noise

The noise levels monitored along the upgradation corridor are found to be within the permissible standards prescribed by CPCB. Noise levels are found to be



slightly higher than the permissible level only in Champai and Zowkhtar (Aizawl) due to its commercial character

Biodiversity

There is no unique faunal community within the core and buffer zone of the project area, except most common ones like toad, frog, crow, sparrow and myna, Loris, etc.

E.6.2 SOCIO-ECONOMIC BASELINE

Champhai district is one of 8 districts of Mizoram state in India. The district is bounded on the north by Churachandpur district of Manipur state, on the west by Aizwal and Serchhip Districts, and on the south and east by Myanmar. The district occupies an area of 3185.83 km². Champai town is the administrative headquarters of the district. The district has 4 R.D. Blocks, Champhai, Khawbung, Khawzawl, and Ngopa. The district has 5 assembly constituencies. These are Champhai, Khawbung, Khawhai, Khawzawl, and Ngopa.

The main communities inhabiting Champhai District are the Paite, Pawi, Hmar, Lusei, etc. Major Languages are Mizo, English, Hindi.

About 183 semi-pucca structures will probably be affected. Approximately 48 ha of private/jhum land will be acquired for widening of this road, which is mostly agricultural land and Heritage resources

A fine blending of different shades of culture is noticeable in the festivals observed through out the district. Almost all the festivals are associated with the underlying principle of the anthropomorphizing of the divinity and the ascriptions of human conduct and affection to it. The Champhai is not only an ideal choice for mountains, valleys, Waterfalls and scenic beauties, but also for colourful fairs and festivals.



Cultural resources are in the form of some old churches and museum which represents archeological site of the area. No heritage site has been observed near the project corridor.

E.7. FINDINGS OF THE FOCUS GROUP DISCUSSIONS CONDUCTED

In Zotlang Village villagers know about the proposed project. Some of them informed that a team had come to take measurement of the road. The group knew that some residential structure and shops will be affected. They are willing to shift backwards if given permission to do so; otherwise it will be difficult for them to survive. The group informed that they do not face any inconvenience due to this road now, but it is always good to upgrade it keeping in view future traffic load and requirement.

In Mualkawi Village, villagers know about the proposed project. They are happy with the proposed diversion for the village. Some of them are losing their land but they are ready to give up their land for the development of the road and the state. They also expressed their concern for proper compensation for land and structure. Villagers expressed their views for maintenance of the existing road within the village.

In Zokhawthar Village, villagers know about the proposed project. They requested connectivity with the bypass road proposed for up-gradation of the road. Some of them are losing their land but they are ready to give up their land for the development of the road and the state. They demanded proper compensation for the land and structures. They also demanded the relocation of the affected school building in nearby place.

E 8. KEY IMPACTS AND THEIR MITIGATION



The sensitivity of Mizoram in terms of its pristine environment has been the focus of the environmental assessment during MSRP. Adequate safeguards have been built into the project design

Stability of Slopes

Since massive hill cutting is expected along the upgradation road, stability of slopes is a key issue in the project. In addition to the safety of the road-users and downhill populations, other concerns relate to the damage to the road formation, damage to the hillside flora and the disruption to traffic.

As a result of the geomorphological assessment, zoning has been worked out on the basis of the geological characteristics, and cut slopes were recommended for short stretches to cover the entire upgradation road. Vulnerable locations have been identified in terms of landslides and the landslide-prone locations along the upgradation road. At certain vulnerable locations, it has been suggested that hill cutting be avoided. And controlled blasting be used to limit the volume and extent of rock throw. At most locations, mitigation measures such as adoption of bio-engineering techniques for the stabilization of cut slopes have been identified.

Disposal of Construction Debris

Earthwork along almost the entire upgradation road, will be carried out by cutting on the hillside.

Disposal areas have been identified which avoid the ecologically sensitive areas and impacts on private and community properties. Toe walls have been designed for limiting the spread of the debris beyond the base on the valley side. Stretches that need to be avoided for disposal of wastes for biodiversity concerns have been identified and included in the contract document.

Loss of Biodiversity

The richness in terms of variety of flora and fauna species found in Mizoram makes it one of the major issues to be addressed. In addition to the presence of endangered species such as Cyathus (tree fern) along the roadside, some species of medicinal plants have been identified in the project area. The direct impacts include, the physical damage and clearing of vegetation close to the



existing carriageway and on the hillside where cutting will occur. The biodiversity assessment inferred that the bio-diversity in the area along the project road is good, but falls short of that of a dense primary forest. The ecological resources are important and rich, but not really unique. Therefore, the impacts of the project do not lead to extinction or similar critical ends. However, the project needs to protect/conservate the small patches of bio-diversity rich areas and individual endangered plants

Other management measures include pre-splitting instead of blasting along EidAs, prohibition of dumping of debris within 100 m on either side of such areas, monitoring of individual locations during the construction period.

Water for Construction - Storage and Harvesting

Water scarcity in Mizoram during the non-monsoon months is a result of the topography as well as the poor water retention capacity of the soil. Local people have constructed improvised water harvesting structures to alleviate the problem to a certain extent. The usage of these structures by the contractor for construction shall place additional pressure on the water available to the community. Therefore it has been specified that these locations shall not be used for construction.

Though the procurement of water is usually the Contractor's responsibility, 10 locations have been identified for water storage / harvesting structures. Based on the site investigations and space available for construction of storage structures, four typical designs have been worked out of water harvesting structures. These will be constructed prior to the commencement of road construction for effective utilisation. These will relieve the pressure on the local water supply sources, minimise transport of water over long distances and also provide for water storage in an area where there is a real need to conserve water despite abundant rainfall. These structures will be beneficial to the community after the construction.

Induced Development

The project, as is envisaged in the project objectives has the potential to trigger developmental activities in the region. This is an issue of concern in a biodiversity



rich state as Mizoram. The sensitive locations vulnerable in terms of biodiversity have been identified. It has been communicated and agreed upon by the village councils regarding the regulation development of land in those stretches

Resettlement issues

Land Requirements for the project

The project requires land for widening, strengthening, realignments and other development of the project highway stretches, siting of construction sites and labor camps etc. The project shall involve the acquisition of:

- Private properties, within the settlements, with a valid pass from the Village Council;
- Agricultural properties, with or without permission from the Government;
- Lands belonging to community organisations as NGOs;
- Lands belonging to the governmental agencies/departments, and;
- Forest land

Impact on Cultural properties

There are no major protected or archaeological monuments to be directly impacted due to the project. However, there are several structures as graves located within the formation width for the road. Apart from these, there are lands belonging to church and structures on these lands that will be acquired.

Other Social Issues

As part of the Resettlement and Indigenous Peoples Development Plan (R&IPDP) for the project, an assessment of the various social issues as the loss of access, road safety, disruption of livelihood, gender issues due to the project, and other issues related to HIV/AIDS have been addressed.

Traffic Safety and Management During Construction



To ensure the safety of road users and management of traffic during construction, adequate measures have been worked out, including the timing of the construction activities and alternative routes for diversion of traffic.

E. 9 Environmental Management Measures Proposed

A description of various management measures during the various stages of the project is provided in the following sections.

Pre-construction Stage

During the pre-construction stage, the management measures required will include the clearance of the ROW, plantation of trees, the measures for protecting/replacing community resources such as hand pumps and other utilities likely to be impacted. Their enhancement shall also be completed before construction actually starts so that the community can start using these while the construction activity begins.

Construction Stage

This will be most crucial and active stage for the Environmental Management Plan. In addition to the Monitoring of the construction activity itself to ensure that the environment is not impacted beyond permissible limits, the enhancement of cultural properties, mitigation and enhancement measures for water bodies will go simultaneously as the construction progresses. To facilitate implementation of the enhancement and mitigation measures suggested, working drawings of the same have been provided in the Appendices.

In addition, the need for the balanced evaluation and planning for risks associated with construction activities related to roads such as accidental spillage consequent damage to the surrounding environment in terms of loss of Flora and Fauna, agricultural crop or worse fertile land, continues to grow importance. Other possible locations where a Risk assessment will be useful include the locations of



Hot Mix plants (spillage of fuel, bitumen etc.) and labour-camp sites.

Operation Stage

The operation stage will essentially entail monitoring activity along the corridor. The monitoring for pollutants specified in the Monitoring Plan will serve the two purposes. In addition to checking the efficacy of the protection/mitigation/enhancement measures implemented, this will help verify or refuse the predictions made as a part of the impact assessment.

E.10 Environmental Monitoring Program

The purpose of the monitoring program is to ensure that the envisaged objectives of the project is achieved and results in desired benefits to the target population. To ensure the effective implementation of the EMP, it is essential that an effective monitoring program be designed and carried out. The broad objectives are

- To evaluate the performance of mitigation measures proposed in the EMP
- To evaluate the adequacy of Environmental Impact Assessment
- To suggest improvements in management plan, if required
- To enhance environmental quality
- To satisfy the legal and community obligations.

Performance Indicator

The physical, biological and social components identified as of particular significance in affecting the environment at critical locations have been suggested as Performance Indicators (PIs), and are listed below.

- Air quality
- Water quality
- Noise levels around sensitive locations.



- Plantation success / survival rate
- Soil contamination
- Vital statistics on health
- Accident frequency
- Selection of Indicators for monitoring

The environmental parameters that may be qualitatively and quantitatively measured and compared over a period of time, due to their importance and the availability of standardized procedures and expertise, have been selected as Performance Indicators (PIs).

- Air Quality
- Noise levels
- Water Quality
- Flora
- Soil Contamination

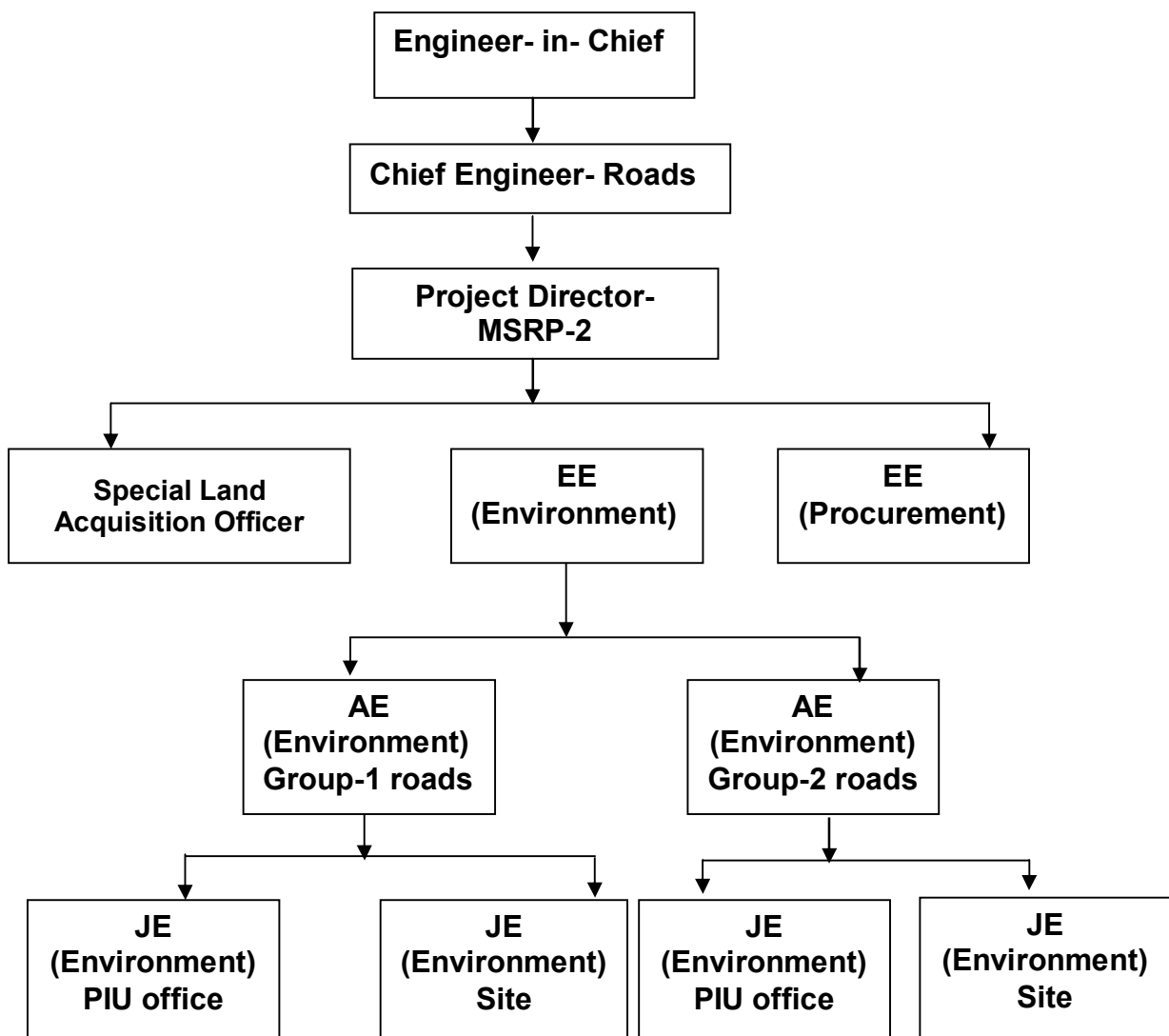
E. 11 INSTITUTIONAL ARRANGEMENTS IN PWD FOR IMPLEMENTATION OF MSRP-2

The MSRP-2 has been initiated and is being carried out by the Public Works Department. The PWD through the Engineer – in – Chief is responsible for the effective implementation of the project activities. To carry out the project prioritization, and to design for the various improvements that are proposed, the PWD has appointed consultants as the Project Co-ordinating Consultants (PCC) for the project. To effectively oversee the project preparation and to ensure the timely implementation of the project, a Project Director assisted by two Executive Engineers, looking into the Procurement, Environment and one SLAO for Social Aspects has been designated. Each of these executive engineers and SLAO are assisted by an Assistant engineer for carrying out their responsibilities. The Environmental Engineers and Procurement Engineers of the PIU are expected to



play a key role in implementation of the project including the overall control of construction activities and implementation of contracts.

During the implementation of the up-gradation component of MSRP-2, the PWD will be assisted by a Supervision Consultant (SC) procured through International Competitive Bidding. The SC will assume the role of the Engineer and ensure construction in an environmentally sound manner through their Environmental Specialist. The monitoring of construction activities by the PWD will be carried out in conjunction with the Mizoram Pollution Control Board Officials for the pollution component (Air, Water, Noise). For the implementation of R&R activities & local NGO will be procured.



Proposed Environment cell in PIU for MSRP 2

**E. 12. Environmental Budget**

The summary of approximate budget for the Environmental management costs for the MSRP-2 is 45,500,000 (INR) which are presented in the Table below

Environmental Budget – MSRP-2 (in INR)

Budget Head	Upgradation / Improvement
Mitigation/Enhancement	40,000,000
Monitoring	3,500,000
Training of MPWD	2,000,000
Total	45,500,000