

## **Terms of Reference**

### **( DPR Preparation of ROADS ) (West Meghalaya)**

#### **1. Introduction**

Meghalaya is a relatively small hilly state situated in the North-East region of the country. It is lagging in development as compared to rest of the country due to its poor transport infrastructure, difficult hilly terrain and climatic conditions, tenuous communication, poor market access, low agriculture productivity, and low level of industrialization. About 80 percent of the population is rural and mainly depends on agriculture which contributes only 17 percent to the state GDP. Meghalaya is famous for its natural scenic beauty and has big potential for development of tourism in addition to agriculture, forestry, handicraft, and minerals. Meghalaya is a matrilineal society and adequate livelihood opportunities for women are a key priority. As part of its development policies, Government of Meghalaya is implementing various programs for development of tourism, agriculture, handicrafts, rural livelihood, employment generation, and women empowerment. It is perceived that adequate transport infrastructure and efficient transport services (focus of the proposed project) are essential for successful implementation of these programs.

The existing road network of 13,000 km has been developed in bits and pieces rather than according to a well-designed plan: consequently, it is non-coherent and has many deficiencies like missing links, bridges, drainage and protection structures, and road safety engineering measures; and inadequate pavements and poor riding quality. Large part of the network has failed due to poor quality of initial construction, lack of maintenance, and extreme climate events (high rainfall). There are about 800 semi-permanent timber bridges in failed condition – posing a serious safety issue and need immediate replacement. Particularly, the road network towards Bangladesh Border is relatively underdeveloped and the population living in that part is deprived of even the basic facilities like access to health and education. About half of the 5,362 habitations lack all-weather road access, out of these 1,700 not covered under PMGSY<sup>1</sup> as their population (of individual habitation) is below 250. Due to hilly and difficult terrain conditions, road construction is not always possible in many areas. In such situations, alternate solutions such as ropeways, foot bridges and foot paths are to be considered.

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<sup>1</sup>

The absence of last mile connectivity and transport services impact the transport costs which are about 25 percent higher compared to other places in India reducing the competitiveness of agriculture and businesses.

Due to limited road space, traffic management and parking issues, Shillong and other urbanized locations experience long traffic congestions, especially during peak working hours. The reasons for the under-developed transport network are inadequate funds, their inefficient utilization, and low institutional capacities and knowledge base of the transport agencies.

**2. Objective of the Project:** To improve transport connectivity and efficiency and modernization of transport institutions in Meghalaya.

The project will focus *“to provide a well-connected efficient, good quality and safe transport network on long-term basis in a cost-effective manner maximizing economic and social outcomes”*. This will involve:

- (i) Integrating transport infrastructure with transport services to reduce overall transport costs thereby increasing the competitiveness of agricultural, industries, and businesses;
- (ii) Integrating climate resilience, green growth, asset management, and safety in the transport sector thus making the sector more resource efficient, reducing carbon footprint, minimizing GHG and contributing to health outcomes.

### **3. Project Scope**

The project will emphasize leveraging of annual sector investments using the two pronged approach (i) introducing an improved delivery framework for transport infrastructure using a rational criteria for investment decision; innovative, climate resilient, green, cost-effective designs; and improved contracting practices through direct funding of critical transport infrastructure gaps; and (ii) expand this improved delivery framework to the entire transport sector .

The project is structured around three components:

**Component-1: Improved transport connectivity:** The component will aim to improve transport connectivity on critical sections of an integrated transport network plans using climate resilient and green technologies, innovative designs, and improved delivering framework for transport infrastructure. This will include improvement/ rehabilitation of about 200 km of State Highways (SH) and Major District Roads (MDR); (ii) construction of stand-alone bridges and replacement of

existing semi-permanent timber bridges using innovative designs; (iii) improvement of existing rural roads (not covered under PMGSY); (iv) construction of foot bridges and tracks connecting small and scattered population in difficult terrains, and (v) pilot projects on construction of ropeways, foot bridges and tracks.

**Component-2: Transport Efficiency Improvement:** The component will aim to reduce congestion and transport costs, and improve urban mobility, road safety, and passenger and goods transport services.

**Component –3: Institutional Modernization:** The component is intended to introduce modern transport sector management and operation systems, thereby rendering the sector more responsive to evolving transportation needs and continuously improving and modernizing the ways of doing business for better efficiency and performance in transport agencies based on latest research, innovations, and best practices through development and implementation of TSMP

#### **4. Implementation Arrangement**

The Meghalaya Public Works Department (R&B), (PWD), Government of Meghalaya, Shillong is the implementing agency for the project. A dedicated Project Management Unit (PMU) has been established in MIDFC at Shillong, headed by a Project Director and supported by other staff responsible to implement the project with the support of various divisions (PIUs, Project Implementation Units) of Public works Department, Government of Meghalaya.

PWD now proposes to engage the services of two consultants for preparation of designs and Cost estimates (DPR Consultant), based on the geography of Meghalaya, one each for the Eastern & Western parts of the State. Consultants will be selected in accordance with the Consultant's Qualification based Selection (CQS) method set out in the Consultant Guidelines of the World Bank. The DPR Consultant is essentially to provide high quality Engineering services (through a small team of experts) to (PWD), Government of Meghalaya.

The Consultant will be selected in accordance with the procedures set out in the World Bank's Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers (Procurement Regulations) (current edition).

## **5. Objective of the DPR Consultancy Services**

5.1 To prepare cost effective engineering designs and cost estimates (detailed project reports) for up-gradation, rehabilitation , improvement of existing deficient road geometrics within the available right of way , rehabilitation / widening / reconstruction or new construction of culverts , bridges and other roads related structures like retaining walls / Breast walls , longitudinal / cross drains , road side facilities like Bus Stops , Village Haat / market platform , Toilet Blocks , villagers meeting platform , view point etc. and making good the deficiencies of road safety measures.

5.2 To introduce latest innovative and green & climate resilient technologies in the designs.

5.3 The objective of the services is to provide high quality professional and Engineering DPRs of the candidate roads under the project.

## **6. Scope of the Consultancy Services**

**Task-1: Preparation of plan and profile of the existing roads, covering all the existing features within a Right of Way (ROW) of 30 m width.**

The Consultant shall prepare plan and profile of the existing/ proposed new roads under the project with latest technology as per IRC specifications.

The Consultant shall design the roads as per the requirements prescribed in relevant IRC Specifications / guidelines for hills and try to best fitting within the available / existing Right of Way. The Consultant should consider that no land acquisition is going to take place under the project.

### **Task-2: Road and Bridge Inventory**

The Consultant will collect the inventory of road and bridge (culverts, minor bridges, major bridges and other structures) and protection structures as per IRC guidelines/ specifications. The same shall be collected on formats provided at **Annexure-1 & 2** of this TOR. Formats may be modified with the approval of PWD.

### **Task-3: Traffic Surveys**

The classified traffic volume count surveys shall be carried out for 7 days 24-hour at the selected survey stations. The traffic count will be conducted on 1(one) counting station per road, decided with the consent of the PWD.

The vehicle classification system as given in relevant IRC code may be followed.

All results shall be presented in tabular and graphical form. The Annual Average Daily Traffic (AADT) shall be worked out by applying seasonal factors.

**Task-4: Soil and Material testing**

CBR (4days soaked) of sub grade soil of the existing roads / proposed new road (at one location on each road) shall be worked out as per IRC specification.

The Consultant shall carry out geo-technical investigations and subsurface explorations for the proposed reconstruction / replacement or new bridges (except major bridges i.e. bridges of length equal or more than 60 m), culverts and any other structure and their approaches and conduct all relevant laboratory / field tests for design of structures and approaches. All the field investigations shall be done as per IRC Specifications & guidelines.

**Task-5: Pavement design**

On the basis of traffic density and CBR of the sub-grade soil , the Consultant shall design the pavement as per relevant IRC guidelines. The detailed design of the pavement shall be carried out for (i) strengthening of the existing pavement , (ii) design of the new pavement sections where required and (iii) design of shoulders .

**Task-6: Road side drainage plan**

The Consultant shall prepare the existing drainage plan of the existing roads, design and cost estimate for the rehabilitation and augmentation of the existing drainage as per actual site requirements.

The roadside drainage shall be examined and an efficient and adequate roadside drainage system for the project roads shall be designed in accordance with the IRC relevant guidelines. Proposals for drainage of urban stretches shall adequately address the specific needs of protection against erosion, quick disposal, and maintenance.

The design and drawings of the drainage system should show drain location, section, specifications, and outfall locations with details of outfall structures.

**Task-7: Road signs, Markings and Traffic safety devices**

The Consultants shall propose provision together with designs and specifications of road signs, pavement markings, crash barriers, railings , delineators, overhead signs, road boundary stones, km stones, 200m stones, etc The proposals shall be accompanied with design and drawings showing locations and specifications.

**Task-8: Environmental and Social Assessment Studies**

The consultant shall undertake the environmental and social impact assessment studies and reporting requirements for the roads included in the study in accordance with the guidelines laid down by the Government of India and the World Bank for projects proposed to be funded by World Bank loan assistance.

#### **Task-9: Evaluation of existing protection works and designs of new protection works required**

The Consultant shall evaluate the soundness of the existing protection works like retaining walls, breast walls, slope pitching etc. along with the remedial measures.

The Consultant shall work out the new protection works with proper justification and design of the same.

#### **Task-10: Engineering designs**

(i) The Consultant shall prepare cost-effective engineering design for construction/ up gradation/ rehabilitation of roads with green and climate resilient technologies. The work to include providing proposal along with cost estimate for improvement of the deficiencies in the existing geometry including deficiencies in the road safety measures provided on the road within available road width, as per IRC specifications.

(ii) The Consultant shall prepare cost-effective designs for rehabilitation/ reconstruction/ re-construction of the existing/ construction of new structures (culverts, minor bridges and other structures). Design of major bridges, if any, (bridges of length equal or more than 60 m) is not in the scope of this consultancy.

(iii) The Consultant shall prepare designs / arrangement and cost estimate of the local streams joining the road from the hill top including proper disposal of the discharge in the nearby cross drainage structures.

#### **Task-11: Road side amenities (Project facilities)**

The Consultant shall identify suitable places for providing roadside amenities like bus stops, passing places, parking places, huts for road maintenance staff, toilet blocks, village market platform, view point and any other amenity as per the direction of the PWD and prepare the designs along with cost estimates of the same.

#### **Task-12: Cost Estimate**

The Consultant shall prepare cost estimate of rehabilitation/ reconstruction of the existing roads and also of the new roads under the project.

The Consultant shall work out the analysis of rates based on the schedule of rates of PWD and the data book published by the IRC on behalf of the Ministry of Roads and Highways, Govt. of India.

### **Task-13: Preparation of Bill of Quantities Package wise along with Technical Specifications**

The Consultant shall prepare Bill of Quantities along with Technical Specifications for each package, as decided by PWD, separately.

### **7. Total Time for Assignment**

The total time period for completion of the study including submission of final Designs DPR, drawings and Bill of Quantities Package wise along with Technical Specifications covered under the scope of services is 6 months from the date of commencement of services notified by the Client / Employer.

The client shall ensure to give approval of alignment plans, GAD, designs, draft reports, proposals, etc submitted by the Consultant, in reasonable time so as not to delay the performance of the Consultant's services.

### **8. Consultancy Team**

(i) The Consultant shall form a multi-disciplinary team for undertaking this assignment. The consultant's Team shall be manned by adequate number of experts and technical staff with requisite qualification and experience for the assignment.

(ii) The tentative list of Key personnel to be fielded by the consultant as per the client's assessment is given in **Annexure-III**. The key personnel are required to be available for the period of assignment.

(iii) The Design Consultant should arrange for his office accommodation as required at Shillong, capital city of the State of Meghalaya including electricity & water and watch & ward facilities. Accordingly provision shall be made in the financial proposals.

(iv) The Design Consultant should provide for their own all the logistics, consumables, furniture's, furnishers, Computers, Laptops and equipment, software etc. required for proper completion of the work. Accordingly provision shall be made in the financial proposals.

(v) For transportation cost, the consultants shall make provision for the rental of vehicles including running and maintenance charges towards transportation in their

financial proposals. No provision for the purchase of vehicles shall be made by the consultants in the financial proposals. Accordingly provision shall be made in the financial proposals.

## **9. Reports and Documents to be submitted by the Consultant**

(i) All reports, documents and drawings are to be submitted separately for each of the road section.

(ii) Project preparation activities will involve the following stages:

**Stage 1: Inception Report**

**Stage 2: Preliminary Project Report (PPR)**

**Stage 3: Detailed Project Report (DPR)**

(iii) Consultant is required to complete fully all the different stages of study within the time frame indicated in the schedule of submission in Enclosure II for becoming eligible for payment. No time-over-run in respect of these submissions will normally be permitted.

(iv) The Consultant shall submit to the client the final reports and documents in bound volumes in the number of copies specified in Enclosure II, and also a soft copy of the final reports in CD.

(v) The reports and documents to be submitted by the consultant to the client are described in the following paragraphs.

### **Stage 1:**

#### **Inception Report**

The Inception Report shall cover:

Project appreciation and detailed methodology to meet the requirements of the TOR finalized in consultation with the PWD; including scheduling of various sub-activities to be carried out for completion of various stages of the work; stating out clearly their approach & methodology for project preparation including environmental and social impact studies after due inspection of the project roads and collection/ collation of necessary information;

Key plan and Linear Plan

Design standards



## Proposed Traffic Survey Stations

### Work program

## **STAGE 2:**

### **A. Strip Plans and Clearances**

- (i) The Consultants shall submit the following documents:
  - a) Plans showing the centre line of the proposed improvement/ widening of the road along with the existing and existing right-of-way limits;
  - b) Strip plans showing the location of existing utilities and services to be shifted.
  - c) Separate strip plans showing shifting / relocation of each utility services in consultation with the concerned local authorities;
  - d) The utility relocation plans should clearly show existing right-of-way and pertinent topographic details including buildings, major trees, fences and other installations such as water-mains, telephone, telegraph and electricity poles, and suggest relocation of the services along with their crossings the road at designated locations as required and prepare necessary details for submission to the Service Departments;
- (ii) The Report accompanying the strip plans should cover the essential aspects as given under:
  - a) Details of properties, such as buildings and structures falling within the existing right-of-way , if any
  - b) Kilometre-wise Utility Relocation Plan (URP) within the existing right-of-way, if any
  - c) Kilometre-wise account in regard to felling of trees of different type and girth within the existing right-of-way, if any.
- (iii) The strip plans shall clearly indicate the scheme for widening (left, right or symmetrical) duly taking into accounts the views and suggestions of PWD. The widening scheme shall be finalized in consultation with PWD.

### **B. Preliminary Project Report- PPR**

- (i) The Draft PPR shall be prepared separately for each construction package and shall contain the following five volumes:

Volume – I: Preliminary Design Report

- a) Executive summary
- b) Project description and socioeconomic profile of the project area
- c) Traffic surveys and analysis
- d) Summary of Environmental Management Plan
- e) Summary of Resettlement Action Plan
- f) Cost estimates
- g) Conclusions and recommendations

#### Volume – II: Design Report

- h) Road and bridge inventories
- i) Summary of survey and investigations data
- j) Proposed design standards and specifications
- k) Proposed road and pavement design, and preliminary designs of bridges and structures ( except that of major bridges )
- l) Safety audit report

#### Volume – III: Drawings

- m) Location map
- n) Layout plans
- o) Alignment Plans and widening scheme
- p) Typical cross sections showing pavement details, and other features like drains etc
- q) Drawings for culverts, bridges and other structures
- r) Road junction designs

(ii) The Final PPR duly modified in the light of comments of the PWD on the draft PPR shall be submitted within 15 days of the receipt of comments.

### **STAGE: 3**

#### **Detailed Project Report (DPR)**

The draft DPR shall be submitted for each road. The final DPR should contain following chapters:

#### **(i) Main Report:**

#### **(ii) Design Report:**

**(iii)Materials Report:**

**(iv) Environmental and Social Assessment Report-**

**(v)Technical Specifications:**

**(vi) Rate Analysis:**

**(vii)Cost Estimates:**

**(viii)Bill of Quantities:**

**(ix) Drawing Volume:**

### **Final Detailed Project Report, Documents and Drawings**

The Final construction package-wise DPR consisting of Volumes I to IX above incorporating all modifications and revisions as per the comments of the PWD on the draft DPR shall be submitted.

## **10 Payment Schedule**

10.1 The Consultant will be paid consultancy fee as a percentage of the contract value as per the schedule given below:

<b>S. No.</b>	<b>Description</b>	<b>Payment</b>
1	On submission of Inception Report	10%
2	On Submission of plan & profile of the existing facility along with inventory and condition survey of roads & bridges / structures in the format attached as Annexure -1 &2 of this TOR.	15%
3	On submission of traffic study report , soil testing reports and other engineering investigation reports	10%
4	On Submission of draft preliminary design project	15%
5	On Submission of Draft Detailed Project Report along with Technical specifications and cost estimate with detailed analysis of rates	20%

6	On approval of Final Detailed Project Report	20%
7	On submission of road wise Bill of Quantities package wise along with Technical Specifications	10%
	<b>Total</b>	100%

## 11. Data and Software

The consultant shall hand over to the client soft copies (including the raw design files) containing the following data, drawings and software along with the Final Report.

- (i) Engineering Investigations and Traffic Studies including road and bridge inventories and condition survey in MS EXCEL or any other editable format as required by the Client.
- (ii) Topographic Surveys and Drawings: All topographic data would be supplied in (x, y, z) format along with complete reference so that the data could be imported into any standard highway design software.
- (iii). Rate Analysis for various items in a format which allows updating of rates.

## 12. Deliverables:

**(i) Inception Report:** Within Fifteen days after the date of commencement of services.

**(ii) Plan & profile of the existing facility along with inventory and condition survey of roads & bridges / structures:**

Report of the first road within 30days after the date of commencement of services and thereafter four roads every week.

**(iii) Traffic study report, soil testing reports and other engineering investigation reports:** Report of the first road within 40days after the date of commencement of services and thereafter four roads every week.

**(iv) Draft preliminary design project:** Report of the first road within 45days after the date of commencement of services and thereafter four roads every week.

**(v) Draft Detailed Project Report along with Technical specifications and cost estimate with detailed analysis of rates:** Report of the first road within 90days after the date of commencement of services and thereafter four roads every week.

**(vi) Final Detailed Project Report:** Report of the first road within 120days after the date of commencement of services and thereafter four roads every week.

**(vii) Road wise Bill of Quantities package wise along with Technical Specifications:** Report of the first road within 150days after the date of commencement of services and thereafter four roads every week.

## Inventory and Condition Survey of formation and pavement

### ANNEXURE-1

(This information to be given for road length in open area and built up ( abadi ) area separately)

[illegible]

### Pavement and Topography Details

[illegible]

[illegible]

[illegible]



(Trapezoidal / L-type / U-type). Please provide the present condition also.

# Inventory and Condition Survey of Cross Drainage structures

## ANNEXURE-2

Road Name	
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### 1. Details of Existing Cross Drainage Works Needing Major Repairs / improvements

Chain age Km.	Type of Structure ( give details of foundation , substructure , super structure , bearings , wing walls / return wall , length of the structure , no. of spans & span arrangement and type of protection works )	General Condition of all components	Present prevailing Damage each component wise * General Condition**	Type of Repair & Priority ***	Tentative Cost of Repair Rs. in Lakhs
	<b>Foundation</b>				
	<b>Sub-structure</b>				
	<b>Super structure</b>				
	<b>Bearings</b>				
	<b>wing walls / return wall</b>				
	<b>length of the structure</b>				
	<b>no. of spans</b>				
	<b>span arrangement with length of each span</b>				
	<b>type of protection works</b>				



**Annexure-III/1****Manning Schedule**

(This is an indicative list of manpower schedule expected to be required. The consultants can suggest changes in the proposal)

Sl No	Key Personnel	Total Project assignment ( <b>six months</b> )
1	Senior Highway Engineer-cum-Team Leader	6 months
2	Highway design Engineer	6 months
3	Bridge Engineer	4 months
4	Geotechnical Engineer cum pavement specialist	4 months
5	Senior Survey Engineer	6 months
6	Social cum Environmental Specialist	6 months
7	Quantity Surveyor/Documentation Expert	4 months
8	Drainage Engineer cum Hydrologist	4 month

**Total = 40 person-months**

### Qualification and Experience Requirement of Key Personnel

#### Senior Highway Engineer-cum-Team Leader

<b>i)</b>	<b>Educational Qualification</b>	
	Essential	Graduate in Civil Engineering
<b>ii)</b>	<b>Essential Experience</b>	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway projects	Min. 10 years in Planning, project preparation and design of Highway projects, out of which at least 5 years in hills.
<b>iii)</b>	<b>Age Limit</b>	55 years on the date of submission of proposal ( work is in hills )

#### Highway Design Engineer

<b>i)</b>	<b>Educational Qualification</b>	
	Essential	Graduate in Civil Engineering
<b>ii)</b>	<b>Essential Experience</b>	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway Projects	Min. 10 years in Planning, project preparation and design of Highway projects including design of road geometry. Minimum 3 years experience in design of hill roads. Thorough knowledge of Hill Roads specifications.
<b>iii)</b>	<b>Age Limit</b>	55 years on the date of submission of proposal

### **Geotechnical Engineer cum pavement specialist**

<b>i)</b>	<b>Educational Qualification</b>	
	Essential	Graduate in Civil Engineering
<b>ii)</b>	<b>Experience</b>	
	a) Total Professional Experience	Min. 10 years
	b) Experience in Highway projects	Minimum 5 years experience in pavement design and maintenance
<b>iii)</b>	<b>Age Limit</b>	55 years on the date of submission of proposal

### **Bridge Engineer**

<b>i)</b>	<b>Educational Qualification</b>	
	a) Essential	Graduate in Civil Engineering
<b>ii)</b>	<b>Essential Experience</b>	
	a) Total Professional Experience	Minimum 15 years
	b) Experience in Bridge projects	Min. 10 years in design of bridges , at least 5 years in design of bridges in hills
<b>iii)</b>	<b>Age Limit</b>	55 years on the date of submission of proposal

### **Senior Survey Engineer**

<b>i)</b>	<b>Educational Qualification</b>	
	Essential	Graduate in Civil Engineering or Diploma in Civil Engineering or Diploma in Surveying
<b>ii)</b>	<b>Essential Experience</b>	
	a) Total Professional Experience	Min.10 years for Degree Holders and 15 years for Diploma Holders. At least 5/7 years experience in hills.
<b>iii)</b>	<b>Age Limit</b>	50 years on the date of submission of proposal

### Social cum Environmental Specialist

<b>i)</b>	<b>Educational Qualification</b>	
	a) Essential	Masters Degree in Social Sciences / Environmental Science / Engineering
<b>ii)</b>	<b>Essential Experience</b>	
	a) Total Professional Experience	<b>Min. 10 years</b>
	b) Experience in Highway Projects	Min. 5 years in environment impact assessment of infrastructure projects and worked as R&R Expert for at least one highway project preferably funded by WB/ADB
<b>iii)</b>	<b>Age Limit</b>	55 years on the date of submission of proposal

### Quantity Surveyor/Documentation Expert

<b>i)</b>	<b>Educational Qualification</b>	
	Essential	Graduate in Civil Engineering
<b>ii)</b>	<b>Essential Experience</b>	
	a) Total Professional Experience	Min. 15 years
	b) Experience in Highway Projects	Min. 5 years in Preparation of Bill of Quantities, Contract documents and documentation for roads / highway projects
<b>iii)</b>	<b>Age Limit</b>	60 years on the date of submission of proposal

### Drainage Engineer cum Hydrologist

<b>i)</b>	<b>Educational Qualification</b>	
	Essential	Graduate in Civil Engineering
<b>ii)</b>	<b>Essential Experience</b>	
	a) Total Professional Experience	Min. 15 years
<b>iii)</b>	<b>Age Limit</b>	60 years on the date of submission of proposal





