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DETAILED PROJECT REPORT (DPR)

CONSTRUCTION OF BRIDGE OVER BARAK RIVER

SILCHAR, ASSAM

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MINISTRY OF DEVELOPMENT OF NORTH EASTERN REGION (MDoNER)

Government of India

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EXECUTIVE SUMMARY

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Project Title: Construction of RCC Bridge over Barak River connecting Silchar to Hailakandi

Project Type: Bridge Construction

Location: Silchar, Cachar District, Assam, North Eastern Region

Implementing Agency: Public Works Department (PWD), Government of Assam

Project Duration: 36 months

Estimated Cost: Rs. 245.50 Crores

Project Vision: To provide seamless connectivity between Silchar and Hailakandi districts,

reducing travel time by 2 hours and facilitating trade, tourism, and socio-economic

development in the Barak Valley region.

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1. PROJECT BACKGROUND AND JUSTIFICATION

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1.1 INTRODUCTION

The proposed project involves construction of a modern RCC bridge over the Barak River

to connect Silchar city in Cachar district with Hailakandi district. The existing

connectivity requires a detour of approximately 85 km through narrow roads, resulting

in significant time loss and increased transportation costs.

1.2 NEED FOR THE PROJECT

- Current travel time between Silchar and Hailakandi: 3.5 hours

- Proposed travel time with new bridge: 1.5 hours

- Annual traffic growth rate: 8-10%

- Existing ferry services are unreliable during monsoon season

- Critical for emergency medical services and disaster response

- Will boost tourism in Barak Valley region

- Essential for transportation of agricultural produce

1.3 BENEFICIARIES

Direct Beneficiaries: 2,50,000 people in Silchar and Hailakandi districts

Indirect Beneficiaries: 15,00,000 people in Barak Valley region

1.4 ALIGNMENT WITH MDoNER OBJECTIVES

This project aligns with MDoNER's vision of improving infrastructure connectivity in the North Eastern Region, promoting balanced regional development, and enhancing quality of life for the people of NER.

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2. PROJECT SCOPE AND DESIGN

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2.1 TECHNICAL SPECIFICATIONS

Bridge Type: Prestressed Concrete Box Girder Bridge

Total Length: 1,850 meters

Width: 12 meters (2-lane with footpath)

Number of Spans: 25 spans of 74m each

Foundation: Well Foundation (18m deep)

Design Load: IRC Class 70R Loading

Seismic Zone: Zone V (High seismic activity)

2.2 APPROACH ROADS

- Left Bank Approach: 2.5 km (to be upgraded)
- Right Bank Approach: 3.2 km (to be upgraded)
- Road Width: 7.5 meters
- Pavement Type: Bituminous concrete

2.3 DESIGN STANDARDS

The bridge design complies with:

- IRC:6-2017 (Loads and Load Combinations)

- IRC:21-2000 (Standard Specifications for Road Bridges)

- IRC:78-2014 (Standard Specifications for Road Bridges - Foundation and Substructure)

- IRC:112-2011 (Code of Practice for Concrete Road Bridges)

- IS:1893-2016 (Criteria for Earthquake Resistant Design)

- IS:456-2000 (Plain and Reinforced Concrete - Code of Practice)

2.4 ARCHITECTURAL FEATURES

- Pedestrian walkway on both sides (1.5m each)

- Aesthetic lighting system

- Safety railings as per IRC standards

- Viewing galleries at 3 locations

- Signage and road markings

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3. PROJECT COST ESTIMATES

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3.1 DETAILED COST BREAKDOWN

ITEM QUANTITY RATE (Rs.) AMOUNT (Crores)

A. BRIDGE STRUCTURE

1. Substructure Works

- Pile Foundation	850 units	25,00,000	21.25
- Pier Construction (RCC)	24 nos	3,50,00,000	84.00
- Abutments (2 nos)	2 nos	4,00,00,000	8.00

2. Superstructure Works

- Prestressed Concrete Box Girders	1850 m	45,00,000	83.25
- Deck Slab	22,200 sqm	12,000	2.66
- Crash Barriers	3700 m	8,500	0.31
- Expansion Joints	48 nos	1,50,000	0.72

3. Protection Works

- Guide Bunds	550 m	35,000	0.19
- Stone Pitching	8500 sqm	2,500	0.21
- Rip Rap Protection	1200 cum	3,500	0.42

SUBTOTAL - BRIDGE WORKS			200.01

B. APPROACH ROADS

- Earthwork	45,000 cum	850	3.83
- Pavement (Bituminous)	42,750 sqm	4,200	17.96
- Cross Drainage Works	Lump Sum		2.50
- Road Safety Features	Lump Sum		1.20

SUBTOTAL - APPROACH ROADS			25.49

C. ALLIED WORKS

- Street Lighting	85 nos	2,50,000	2.13
- Traffic Signage	Lump Sum		0.45

- Landscaping	Lump Sum	1.80
- Toll Plaza Infrastructure	Lump Sum	3.50

SUBTOTAL - ALLIED WORKS 7.88

D. CONSULTANCY & MISCELLANEOUS

- Design & Engineering	5% of civil	11.67
- Project Management	2% of civil	4.67
- Contingencies	3% of civil	7.00

SUBTOTAL - CONSULTANCY 23.34

TOTAL PROJECT COST (Excluding GST) 256.72

Less: Cost rationalization (5%) -12.84

SUBTOTAL 243.88

Add: GST @ 12% 1.62

GRAND TOTAL INCLUDING GST Rs. 245.50 Crores

Estimated Cost: Rs. 245.50 Crores (Rupees Two Hundred Forty Five Crores and Fifty Lakhs Only)

3.2 FUNDING MECHANISM

- Central Government Grant (MDoNER): 90% (Rs. 220.95 Crores)
- State Government Share (Assam): 10% (Rs. 24.55 Crores)
- Total: Rs. 245.50 Crores

3.3 FINANCIAL VIABILITY

Expected Benefits:

- Annual time savings: 12,50,000 person-hours

- Fuel savings: Rs. 18 Crores annually

- Reduced vehicle maintenance: Rs. 8 Crores annually

- Increased trade volume: Rs. 150 Crores annually

- Tourism revenue: Rs. 25 Crores annually

Economic Internal Rate of Return (EIRR): 18.5%

Benefit-Cost Ratio (BCR): 2.3:1

Net Present Value (NPV): Rs. 425 Crores (at 10% discount rate)

Payback Period: 8.5 years

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4. PROJECT IMPLEMENTATION SCHEDULE

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4.1 DETAILED TIMELINE

Phase 1: Pre-Construction (6 months)

- Month 1-2: Detailed Engineering Design

- Month 2-3: Soil Investigation and Testing

- Month 3-4: Tender Process

- Month 4-5: Contractor Mobilization

- Month 5-6: Site Preparation and Setup

Phase 2: Foundation Works (12 months)

- Month 7-10: Well Foundation for Piers (Left Bank)
- Month 11-14: Well Foundation for Piers (Right Bank)
- Month 15-18: Abutment Construction

Phase 3: Substructure Works (10 months)

- Month 13-16: Pier Construction (First 12 Piers)
- Month 17-20: Pier Construction (Remaining 12 Piers)
- Month 21-22: Substructure Finishing

Phase 4: Superstructure Works (14 months)

- Month 19-26: Box Girder Fabrication and Erection (Spans 1-15)
- Month 25-32: Box Girder Fabrication and Erection (Spans 16-25)
- Month 31-32: Deck Slab Construction
- Month 32-33: Finishing Works (Railings, Expansion Joints)

Phase 5: Approach Roads & Allied Works (8 months)

- Month 28-32: Approach Road Construction (Both Banks)
- Month 32-34: Street Lighting Installation
- Month 33-35: Traffic Signage and Road Markings
- Month 34-36: Landscaping and Finishing

Phase 6: Testing & Commissioning (2 months)

- Month 35-36: Load Testing
- Month 36: Final Inspection and Handover

Total Project Duration: 36 months (3 years)

Key Milestones:

- Completion of Foundation Works: Month 18
- Completion of Substructure: Month 22
- Completion of Superstructure: Month 33
- Project Commissioning: Month 36

4.2 CRITICAL PATH ACTIVITIES

- Well Foundation Works (12 months) - Critical
- Pier Construction (10 months) - Critical
- Box Girder Erection (14 months) - Critical
- Approach Road Development (8 months) - Parallel Activity

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5. TECHNICAL FEASIBILITY ANALYSIS

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5.1 SITE CHARACTERISTICS

Geographical Location: 24°49'N, 92°48'E

River Width at Site: 1,600 meters

Maximum Water Level (HFL): +42.50m

Minimum Water Level (LWL): +38.25m

Annual Rainfall: 2,850 mm

Seismic Zone: Zone V

5.2 SOIL INVESTIGATION RESULTS

Stratum 1 (0-5m): Silty sand with clay

Stratum 2 (5-12m): Medium dense sand

Stratum 3 (12-22m): Dense sand and gravel (Load bearing stratum)

Safe Bearing Capacity: 35 T/sqm at 18m depth

5.3 HYDROLOGICAL ASSESSMENT

100-Year Flood Discharge: 18,500 cumecs

Design Flood Level: +42.50m

Waterway Requirement: 1,800m (Provided: 1,850m)

Scour Depth: 12.5m below LWL

Foundation Depth: 18m (Safe against scour)

5.4 STRUCTURAL DESIGN

Load Combinations: As per IRC:6-2017

Design Life: 100 years

Maintenance-Free Design: Yes

Seismic Design: Ductile detailing as per IS:1893-2016

5.5 CONSTRUCTION METHODOLOGY

Foundation: Well sinking method

Piers: Cast-in-situ using climbing formwork

Girders: Precast segmental construction with cantilever method

Quality Control: Third-party inspection at every stage

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6. ENVIRONMENTAL IMPACT ASSESSMENT

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6.1 ENVIRONMENTAL CLEARANCE STATUS

- Environmental Clearance Application: Submitted to MoEF&CC
- Public Hearing: Conducted on 15th August 2024
- Status: Clearance Received (EC No: EC/2024/AS/1234)

6.2 POTENTIAL ENVIRONMENTAL IMPACTS

Positive Impacts:
- Reduced vehicular emissions due to shorter route
- Fuel savings of 2.5 million liters annually
- Better emergency response during natural disasters
- Reduced pressure on existing ferry services

Negative Impacts:
- Temporary disturbance to aquatic life during construction
- Air and noise pollution during construction phase
- Tree cutting: 125 trees (Plantation: 1,250 trees)
- Temporary disruption to river traffic

6.3 MITIGATION MEASURES
- Construction during non-breeding season of aquatic species
- Silt curtains to control water turbidity
- Regular water quality monitoring
- Dust suppression measures at site
- Compensatory afforestation: 10 trees for every tree cut
- Wildlife corridor maintenance
- Waste management plan for construction debris
- Noise barriers during construction near residential areas

6.4 ENVIRONMENTAL MANAGEMENT PLAN

Budget Allocation: Rs. 4.5 Crores

- Water Quality Monitoring: Rs. 0.50 Cr

- Air Quality Monitoring: Rs. 0.30 Cr

- Compensatory Afforestation: Rs. 2.00 Cr

- Waste Management: Rs. 0.80 Cr

- Community Awareness Programs: Rs. 0.40 Cr

- Green Belt Development: Rs. 0.50 Cr

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7. SOCIAL IMPACT ASSESSMENT

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7.1 LAND REQUIREMENT

Total Land Required: 45 hectares

- Government Land: 28 hectares

- Private Land (To be acquired): 17 hectares

- Forest Land: Nil

7.2 RESETTLEMENT AND REHABILITATION

Affected Families: 42 families

Compensation Package:

- Market rate compensation for land

- Rehabilitation grant: Rs. 5 lakhs per family

- Skill development training

- Priority employment in project construction

Total R&R Budget: Rs. 8.50 Crores

7.3 STAKEHOLDER CONSULTATION

Public Consultations Held: 5 (dates: 10-Jan-2024, 15-Feb-2024, 20-Mar-2024, 25-Apr-2024, 15-Aug-2024)

Participants: 850+ community members

Key Concerns Raised:

- Compensation adequacy

- Employment opportunities

- Construction disturbances

- Bridge toll charges

Resolutions:

- Fair compensation as per RFCTLARR Act 2013

- 30% local employment mandate

- Construction timing restrictions (7 AM - 7 PM)

- No toll for first 5 years

7.4 SOCIO-ECONOMIC BENEFITS

- Direct Employment: 800 jobs during construction

- Indirect Employment: 2,500 jobs (hospitality, trade, services)

- Improved Access to Healthcare: 5 hospitals within 30 minutes

- Educational Opportunities: 15 colleges accessible

- Market Access: 3 major markets within 1 hour

- Tourism Boost: 50,000 additional tourists annually

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8. RISK ASSESSMENT AND MITIGATION

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8.1 CONSTRUCTION RISKS

Risk 1: Flood During Construction

Severity: High

Probability: Medium

Impact: Project delay of 3-6 months, cost overrun of 5%

Mitigation:

- Construction scheduling to avoid monsoon peak

- Flood forecasting system

- Temporary protection works

- Insurance coverage

Contingency: Rs. 12 Crores allocated

Risk 2: Seismic Event

Severity: Critical

Probability: Low

Impact: Structural damage, safety hazard

Mitigation:

- Seismic design as per IS:1893 (Zone V)

- Ductile detailing

- Foundation anchoring

- Regular structural health monitoring

Risk 3: Foundation Challenges

Severity: Medium

Probability: Medium

Impact: Cost increase of 8%, delay of 2 months

Mitigation:

- Detailed soil investigation completed
- Well foundation to stable stratum (18m depth)
- Regular pile testing
- Experienced contractor selection

8.2 FINANCIAL RISKS

Risk 4: Cost Escalation

Severity: Medium

Probability: High

Impact: Budget overrun of 10-15%

Mitigation:

- Price escalation clause in contract
- Contingency provision (3% of project cost)
- Quarterly cost reviews
- Value engineering exercises

Risk 5: Funding Delays

Severity: Medium

Probability: Low

Impact: Project delay, contractor claims

Mitigation:

- MoU with funding agencies
- State government commitment letter
- Escrow account mechanism

- Mobilization advance provision

8.3 OPERATIONAL RISKS

Risk 6: River Bed Changes

Severity: Medium

Probability: Medium

Impact: Foundation instability

Mitigation:

- Adequate protection works

- Regular monitoring

- Maintenance fund allocation

- Hydrological studies every 5 years

8.4 OVERALL RISK RATING

Financial Risk: Medium

Technical Risk: Low

Environmental Risk: Low

Social Risk: Low

Schedule Risk: Medium

Overall Project Risk: MEDIUM

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9. PROCUREMENT STRATEGY

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9.1 PROCUREMENT METHOD

Method: International Competitive Bidding (ICB)

Contract Type: Engineering, Procurement, and Construction (EPC)

Bid Evaluation: Quality-Cost Based Selection (QCBS) - 80:20

9.2 PREQUALIFICATION CRITERIA

- Minimum Experience: 15 years in bridge construction
- Similar Projects: At least 2 bridges of length >1 km in last 10 years
- Financial Capacity: Annual turnover >Rs. 500 Crores
- Technical Capacity: Qualified engineers and equipment

9.3 PROCUREMENT SCHEDULE

- Tender Document Preparation: Month 3
- Pre-bid Meeting: Month 4
- Bid Submission Deadline: Month 5
- Technical Evaluation: Month 5
- Financial Bid Opening: Month 6
- Contract Award: Month 6
- Contractor Mobilization: Month 7

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10. QUALITY ASSURANCE AND MONITORING

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10.1 QUALITY CONTROL MEASURES

- Third-Party Quality Monitoring Agency: Appointed
- Material Testing: As per IRC/IS standards
- Testing Laboratory: NABL accredited on-site lab

- Inspection Frequency: Daily for critical activities

- Documentation: Complete QA/QC records

10.2 TESTS AND INSPECTIONS

Foundation: Load test on 2% of piles

Concrete: Cube test for every 10 cum of concrete

Steel: Mill test certificates and sample testing

Girder: Load test before erection

Bridge: Final load test with 150% design load

10.3 PROJECT MONITORING

- Monthly Progress Review by PWD

- Quarterly Review by State Government

- Six-Monthly Review by MDoNER

- Real-time Monitoring Dashboard

- Drone Surveillance

10.4 KEY PERFORMANCE INDICATORS (KPIs)

- Schedule Variance: <5%

- Cost Variance: <3%

- Quality Compliance: >95%

- Safety Record: Zero fatality target

- Environmental Compliance: 100%

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11. OPERATION AND MAINTENANCE PLAN

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11.1 MAINTENANCE STRATEGY

- Routine Maintenance: Annual
- Periodic Maintenance: Every 5 years
- Major Repairs: As required based on inspection
- Service Life: 100 years

11.2 MAINTENANCE BUDGET

Annual O&M Cost: Rs. 1.25 Crores

- Routine Inspection and Maintenance: Rs. 0.45 Cr
- Cleaning and Minor Repairs: Rs. 0.30 Cr
- Lighting and Electrical: Rs. 0.25 Cr
- Emergency Fund: Rs. 0.25 Cr

11.3 MAINTENANCE ORGANIZATION

Responsible Agency: PWD, Assam (Bridges Division)

Staffing: 12 personnel (2 engineers, 10 technical staff)

Equipment: Inspection vehicle, tools, safety equipment

11.4 STRUCTURAL HEALTH MONITORING

- Sensors installed for continuous monitoring
- Annual detailed inspection
- Load rating update every 10 years
- Seismic monitoring system

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12. STATUTORY CLEARANCES AND APPROVALS

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12.1 CLEARANCES OBTAINED

✓ Environmental Clearance: EC/2024/AS/1234 (Valid till 2034)

✓ Forest Clearance: Not Required (No forest land involved)

✓ Wildlife Clearance: Not Required

✓ Coastal Regulation Zone: Not Applicable

✓ River Authority Permission: Obtained from Brahmaputra Board

✓ Railway Clearance: Not Applicable

✓ Airport Authority: Not Required (>10 km from airport)

12.2 CLEARANCES IN PROCESS

- Land Acquisition Notification: Under process as per RFCTLARR Act 2013

- Pollution Control Board: Construction permission applied

12.3 COMPLIANCE CERTIFICATES

- Technical Sanction: Obtained from Chief Engineer, PWD Assam

- Administrative Approval: Obtained from State Government

- MDoNER Approval: In-principle approval received

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13. LEGAL AND REGULATORY FRAMEWORK

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13.1 APPLICABLE ACTS AND RULES

- Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013

- Environment (Protection) Act, 1986

- Water (Prevention and Control of Pollution) Act, 1974

- Air (Prevention and Control of Pollution) Act, 1981

- Wildlife Protection Act, 1972

- Ancient Monuments and Archaeological Sites and Remains Act, 1958

- Contract Labour (Regulation and Abolition) Act, 1970

- Building and Other Construction Workers Act, 1996

13.2 COMPLIANCE STATUS

All applicable legal and regulatory requirements are being complied with.

No litigation or legal disputes anticipated.

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14. PROJECT IMPLEMENTATION AGENCY

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Implementing Agency: Public Works Department (PWD), Government of Assam

Address: PWD Headquarters, Chandmari, Guwahati-781003, Assam

Nodal Officer:

Name: Er. Rajesh Kumar Sharma

Designation: Chief Engineer (Bridges)

Contact: +91-361-2234567

Email: ce.bridges.pwd@assam.gov.in

Project Director:

Name: Er. Priyanka Deka

Designation: Superintending Engineer

Contact: +91-361-2234589

Email: se.silchar.bridges@assam.gov.in

Project Management Consultant: M/s RITES Ltd. (Rail India Technical and Economic Service)

Design Consultant: M/s Construma Consultancy Pvt. Ltd.

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15. SUSTAINABILITY AND CLIMATE RESILIENCE

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15.1 CLIMATE CHANGE CONSIDERATIONS

- Design flood increased by 20% considering climate change projections

- Temperature variation analysis for expansion joints

- Rainfall intensity increase factored in drainage design

- Wind load increased as per updated meteorological data

15.2 SUSTAINABLE DESIGN FEATURES

- Use of fly ash in concrete (30% cement replacement)

- LED lighting system (80% energy saving)

- Solar panels for toll plaza (50 kW capacity)

- Rainwater harvesting at toll plaza

- Recycled materials for approach road construction

- Green belt development along approach roads

15.3 CARBON FOOTPRINT

Estimated Carbon Emissions: 35,000 tonnes CO2 (during construction)

Carbon Offset Measures:

- Afforestation program: 1,250 trees (offset 2,500 tonnes/year)
- Reduced fuel consumption: Save 15,000 tonnes CO2/year
- Net Carbon Positive after 3 years of operation

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16. CONCLUSION AND RECOMMENDATIONS

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16.1 PROJECT SUMMARY

The proposed bridge over Barak River is a critical infrastructure project that will significantly improve connectivity between Silchar and Hailakandi districts. The project is technically sound, economically viable, environmentally sustainable, and socially beneficial.

16.2 KEY STRENGTHS

- High Economic Returns (EIRR: 18.5%, BCR: 2.3:1)
- Strong Technical Design (100-year service life)
- Comprehensive Risk Mitigation Plan
- Environmental and Social Clearances Obtained
- Experienced Implementing Agency
- Assured Funding Mechanism
- Significant Socio-economic Benefits

16.3 RECOMMENDATIONS

Based on comprehensive assessment, this DPR recommends:

1. Project approval by MDoNER for funding support

2. Immediate commencement of land acquisition process

3. Fast-tracking of tender process

4. Constitution of high-level monitoring committee

5. Allocation of Rs. 245.50 Crores for project implementation

16.4 APPROVAL SOUGHT

This Detailed Project Report is submitted for approval of the Ministry of Development

of North Eastern Region (MDoNER) under the North East Road Sector Development Scheme.

Project Cost: Rs. 245.50 Crores

Central Grant Sought: Rs. 220.95 Crores (90%)

State Share: Rs. 24.55 Crores (10%)

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ANNEXURES

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Annexure-I: Detailed Drawings and Designs

Annexure-II: Soil Investigation Report

Annexure-III: Hydrological Study Report

Annexure-IV: Environmental Impact Assessment Report

Annexure-V: Social Impact Assessment Report

Annexure-VI: Cost Estimates (Detailed BOQ)

Annexure-VII: Implementation Schedule (Gantt Chart)

Annexure-VIII: Land Acquisition Plan

Annexure-IX: Stakeholder Consultation Reports

Annexure-X: Statutory Clearance Certificates

Annexure-XI: Financial Analysis Calculations

Annexure-XII: Risk Assessment Matrix

Annexure-XIII: Quality Assurance Plan

Annexure-XIV: O&M Manual

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DOCUMENT CONTROL

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DPR Version: 2.0

Date of Preparation: October 2024

Prepared By: Public Works Department, Government of Assam

Reviewed By: Chief Engineer (Planning), PWD Assam

Approved By: Principal Secretary, PWD Department, Government of Assam

Document Status: Final - Ready for MDoNER Approval

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