



GOVERNMENT OF INDIA  
MINISTRY OF ROAD TRANSPORT & HIGHWAYS

Transport Bhawan,  
1, Parliament Street,  
New Delhi - 110001

NH-12014/02/2009/Ar.P/Ar. Package/SARDP -NE/P-9

New Delhi, 2<sup>nd</sup> December 2009

To,

The Commissioner, PWD  
Government of Arunachal Pradesh,  
Itanagar-791111

**Sub: 2 laning of Hoj – Potin section of Trans Arunachal Highway from km 30.190 to 49.250 (corresponding to existing 31.020 to km 52.560 (net length = 19.060 km) in Arunachal Pradesh under Arunachal Pradesh Package of SARDP-NE**

Sir,

Reference is invited to your letter No. SPWD/MOST/SARDP-NE/09-10/3101-3104 dated 20.10.2009 forwarding therewith DPR and cost estimate amounting to Rs. 94.14 crore for the proposal mentioned above.

2. The DPR and the cost estimate of the work mentioned above has been examined in the Ministry and retained for Rs. 94.14 crore based on the comments contained in the enclosed technical note.

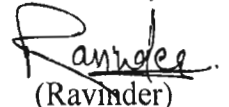
3. 'In principle' approval to the modified proposal / estimate amounting to Rs. 94.14 crore is hereby accorded. The Bidding document for the work may be prepared in accordance with the bidding document and procedure approved by the Ministry, for SARDP-NE works in Assam, vide letter No. NH-12013/ 69/ 2006/ AS/ NH-10 dated 26<sup>th</sup> July, 2006 and dated 12<sup>th</sup> October, 2006 (Copy enclosed).

4. The invitation of bids shall be widely publicized as per Ministry's guidelines for works costing more than Rs 5 crore each, contained in circular No. RW/NH-11024/3/99-US/D-I dated 9.3.2000. It may also be ensured that the bids be allowed to be submitted simultaneously at Itanagar and in the Ministry (Room No. 242) to ensure wider participation of the bidders. After successful bidding, estimate based on tender rates of lowest bidder may be submitted to the Ministry for consideration and sanction.

5. Copy of BOQ is enclosed

enclo: as stated above.

Yours faithfully,

  
(Ravinder)

Executive Engineer

For Director General (Road Development) and Special Secretary

Copy forwarded to:

- ✓ (i) Chief Engineer, NH, PWD, Arunachal Pradesh for information and necessary action,  
(ii) Regional Officer, Itanagar

**Government of India**  
**Ministry of Road Transport and Highways**

**TECHNICAL NOTE**

**NH-12014/02/2009/ArP/SARDP –NE/P-9**

**New Delhi,**

**2<sup>nd</sup> December, 2009**

- |    |                              |   |  |                                       |
|----|------------------------------|---|--|---------------------------------------|
| 1. | Name of work                 | : | 2 laning of Hoj – Potin section of Trans Arunachal Highway from km 30.190 to 49.250 (corresponding to existing 31.020 to km 52.560 (net length = 19.060 km) in Arunachal Pradesh under Arunachal Pradesh Package of SARDP-NE |                                       |
|    |                              |   | (Job No. Ar Package/SARDP-NE/ArP/PWD/2009-10/ )  |                                       |
| 2. | State                        | : | Arunachal Pradesh  |                                       |
| 3. | NH No.                       | : | NH 229   |                                       |
| 4. | Estimated cost (Rs. in lakh) | : | As furnished by State P.W.D.<br>9414.00  | As allowed in the Ministry<br>9414.00 |
| 5. | Length (km)                  | : | 19.06  | 19.06                                 |
| 5. | Cost per Km ( Rs. In crore)  | : | 4.94   | 4.94                                  |
| 6. | Reference                    | : | Letter No. SPWD/MOST/SARDP-NE/09-10/3101-3104 dated 20.10.2009 from Commissioner ,PWD, Arunachal Pradesh.  |                                       |

**COMMENTS**

**1. Scope of work**

1.1 The estimate provides for the following major items of work:

- (i) Widening of existing 6m formation width to 12m formation width in mountainous/steep terrain, substantial improvements of geometrics and complete reconstruction of pavement,
- (ii) Construction of 8 minor bridges of total length 224 Rm.,
- (iii) Construction of 36 pipe culverts and 46 RCC Box culverts,
- (iv) Construction of RR masonry breast wall in 1715 RM, RCC Retaining wall 625 RM, PCC retaining wall 1188 RM and Gabion Breast wall 240 RM; and construction of other protection works
- (v) Construction of lined drain in 19670 Rm length in stretches on hill side and covered drain in 345 Rm ; and
- (vi) Road safety works including road markings, sign boards, shifting of utilities etc.

## 2. Alignment

The alignment is reported passing through mountainous (45% length) and steep terrain (55% length). The project road is designed for ruling design speed of 50 kmph. However, due to constraints approx. 4% of length is designed for 30 kmph, 39% for 40 kmph speed. The proposed gradient of road confirms to NH standards for mountainous/ steep terrain.

## 3. Right - of - Way

It is reported that existing ROW is 12m. It is proposed to adopt ROW of minimum 24m throughout the stretch.

## 4. Formation

4.1 It is reported that existing formation width is 6m. Provision of 12m formation width throughout the stretch has been made.

4.2 In order to achieve heavy compaction of earth, the mandatory use of vibratory roller shall be specified in the bid documents. It may be ensured by PWD that the earthwork in embankment is carried out strictly as per clause 305 of Ministry's specification for road & bridge works, 4th revision. Density/ compaction requirements as per table 300-1 & 300-2 of above mentioned specification shall be met with fully.

## 5. Crust thickness and composition

5.1 It is reported that the existing crust has been deteriorated and the top bituminous layer has been worn out and the existing road now functions as gravel/katcha track. It is also reported that, the geometry of the existing road needs to be improved, almost for the complete length of road. Hence, the pavement needs complete reconstruction.

5.2 The crust of carriageway has been allowed as follows:

Items	Proposed by PWD	Allowed by Ministry
GSB	250 (bottom 150 mm extended to full formation width)	250 (bottom 150 mm extended to full formation width)
WMM	250 mm	250 mm
DBM	60mm	60mm
BC	40mm	40mm

5.3 The GSB and WMM layers shall be properly compacted using vibrating rollers of appropriate specifications. This will be incorporated in the bidding document and enforced during execution.

5.4 The tack and prime coats shall be provided with bitumen emulsion, complying with the requirements of clause No. 503 and 502 of Ministry's specifications for road & bridge works, 4<sup>th</sup> revision, respectively. Further, the prime coat shall be provided @1 kg/ sqm, instead of 0.6 kg/ sqm, keeping in view the high rainfall region.

- 5.5 It shall be ensured by State PWD that earthen shoulders are constructed simultaneously with the layers of crust in carriageway, as per the guidelines of the Ministry contained in circular No. RW/NH-33054/20/88-DII dated 10.05.89.

## **6. Bridge**

The 8 bridges at following locations have been proposed:

### **6.1 Bridge at km 31+816**

The existing bridge is of 6.9m single span RCC Bridge. It is reported that the existing bridge is in poor condition and inadequate for 2 lane movement of traffic. To improve the geometry of the road, the new bridge is proposed on valley side, on RHS of the existing bridge. The bridge is proposed with 24m single span with RCC voided slab superstructure supported on Open foundation.

### **6.2 Bridge at km 35+303**

The existing bridge is of 22.20m single span Bailey bridge spanning over a deep valley. The new bridge is proposed on LHS of the existing bridge and the proposed bridge is in curve of 35m radius. The proposed bridge is of 24m single span with RCC voided slab superstructure supported on Open foundation.

### **6.3 Bridge at km 35+998**

The existing bridge is of 16.50m single span Bailey bridge spanning over a deep valley. The width of carriageway is inadequate for 2-lane carriageway. The new 2-lane bridge is proposed on LHS of the existing bridge on hill side. The bridge is proposed with 24m single span with RCC voided slab superstructure supported on Open foundation.

### **6.4 Bridge at km 36+748**

The existing bridge is of 22.80m single span Bailey bridge spanning over a deep valley. The width of carriageway is inadequate for 2-lane carriageway. The new 2-lane bridge is proposed on LHS of the existing bridge on hill side. The bridge is proposed with 24m single span with RCC voided slab superstructure supported on Open foundation.

### **6.5 Bridge at km 37+609**

The existing bridge is of 19.5m single span Bailey bridge and it is reported that the alignment at this bridge is very curvilinear and the gradient is also very high and is in the order of 8%. The new 2-lane bridge is proposed on LHS of the existing bridge on hill side. The bridge is proposed with 24m single span with RCC voided slab superstructure supported on Open foundation.

### **6.6 Bridge at km 37+760**

The existing bridge is of 29.0m single span Bailey bridge spanning over a deep valley. It is reported that the alignment at this bridge is very curvilinear and the gradient is also very high and is in the order of 8%. The new 2-lane bridge is proposed on LHS of the existing bridge on hill side. The bridge is proposed with

32m single span with PSC voided slab superstructure supported on Well foundation.

#### 6.7 Bridge at km 39+515 (Water Fall)

It is reported that, at km 39+515 project road cross a waterfall. At present, no cross drainage structure exists at this location and a concrete pavement of approx. 300mm thk. exists and on D/S PCC stepping has been provided for the smooth exit of water.

It is also reported that, existing alignment at this location has a curve of approx. 20 m radius. On both sides of the water fall, hill is very high and it is hard rock. Widening on LHS i.e., through water fall would involve cutting of very high hard rock hill and it would also disturb the water fall. Hence new alignment is proposed on RHS of the existing road i.e., on valley side. The width of valley is wide on D/S.

The bridge is proposed with 48m, three spans of 16m each with RCC voided slab superstructure supported on Open foundation.

#### 6.8 Bridge at km 39+947

The existing bridge is of 22.60m single span Bailey bridge spanning over a deep valley. It is reported that the existing bridge is inadequate for 2 lane movement of traffic. The new bridge is proposed on LHS of the existing bridge and the proposed bridge is in curve of 30m radius. The proposed bridge is of 24m single span with RCC voided slab superstructure supported on Open foundation.

6.9 The above provision of construction of 8 minor bridges may be agreed to. However the adequacy of the bridges may be checked by CE(EZ), PWD, Ar. Pradesh before work is put to tender. It may also be ensured that proper geo-technical investigations, load tests etc are carried out and the depth of foundation is fixed accordingly. The overall width of the bridges may be kept as 12.9m in line with latest guidelines issued vide letter no. RW/NH/33044/2/88-S&R(B) dated 24/03/2009.

### 7. Culverts

The provision of 82 culverts as proposed is tabulated below:

HP culvert		Box culvert		Slab culvert	
Configuration	No.	Configuration (m)	No.	Configuration (m)	No.
Double row having 1.2m int. dia.	27	1x2x2	36		
Single row having 1.2m int. dia.	9	1x2x3	5		
		1x3x3	-		
		1x3x4	4		
		1x4x3	1		
<b>TOTAL</b>	<b>36</b>		<b>46</b>	<b>nil</b>	<b>nil</b>

The above provisions may be allowed. The working drawings of each of the culvert shall be approved by the Chief Engineer(EZ), PWD, Arunachal Pradesh keeping in view of guidelines vide IRC: SP:13, 2004.

## 8. Protection works

A provision of total 3768 Rm in stretches of retaining/ Breast walls have been made as shown below:

Type of protection works	Height (m)	Length (m)
RR masonry Breast wall	2.5	1715
Gabion Breast wall	5	240
RCC Retaining wall	3-10	625
PCC Retaining wall	2-4	1188
<b>TOTAL</b>		<b>3768</b>

These provisions may be allowed for estimate purpose. During execution retaining/ breast walls may be provided at the locations wherever these are absolutely necessary.

## 9. Drains

The provision for open RR masonry drains in 19670 Rm length in stretches on hill sides having 60 cm x 90 cm size may be allowed. The provision of covered RR masonry drain in 345 Rm length in stretches having 150x120cm size may also be allowed.

## 10. Other provisions

- 10.1 The provisions for road markings, road sign boards, Km stones, guard posts, road delineator etc. may be allowed as proposed.
- 10.2 The road markings shall be provided as per IRC: 35, 1997. The work of road marking with stipulated paint (Thermoplastic) shall be done as per Cl. 803 of Ministry's latest specifications.
- 10.3 The provision of metal crash barrier in stretches of 5420 m as proposed may also be allowed.
- 10.4 The provision of parapet wall in stretches of 1150 m as proposed may also be allowed.
- 10.5 It shall be ensured by State PWD Arunachal Pradesh that no item of this work will be splitted and entire work under one package including the road safety items shall be floated for tender.

## 11. Rates & Leads

- 11.1 The estimate is based on SOR 2009 applicable for Road and Bridge Works in Arunachal Pradesh. The rates of aggregates & cement have been adopted as per market rate. The hire charges of plants and machinery have been adopted 60% over rates mentioned in standard data book 2003.

- 11.2 While calling tender, the source for procurement of materials may not be indicated. The contractor shall be responsible to procure the materials conforming to the specifications of the work from all lead and lift and no extra lead shall be payable. This would be ensured while preparing BOQ and bid documents. The contractor shall quote rate for all leads and lifts, inclusive.

**12. Cost of work**

In the light of above comments, the estimated cost works out to Rs.9414.00 lakh, including 9% agency charges.

**13. General observations**

- 13.1 The contractor shall possess or undertake to procure and deploy all machinery required for the work. The list of plant and equipment shall be prepared on the basis of scope of work and enclosed with the bid documents and the same shall be enforced during the execution. It must be ensured that the work is carried out in mechanized manner using appropriate equipment.
- 13.2 Collection of material on the roadside, if any, should be commensurate with the physical progress of work, so as to avoid any hindrance to traffic. It must be ensured that contractor arranges for separate land for storage of road construction material and machinery and these shall not be allowed to be stacked on the roadside.
- 13.3 It shall be ensured that, for production of materials in crushers, boulders of minimum 150mm size are utilized for the purpose.
- 13.4 Bitumen shall be heated in boilers and heating in drums on open fire shall not be permitted in any case. Spraying of bitumen shall be done only with the mechanical sprayers and premixing of bitumen and stone aggregates should be done only in proper mechanical mixer / hot mix plant. The manufacture of WMM will be carried out in pug mill.
- 13.5 Modified bitumen shall be used as binder for BC course. Since CRMB satisfies the requirement based on climatic condition of the area as per the guidelines contained in IRC:SP-53, the same may be used as binder for BC. The CRMB55 shall be preferably procured from refinery source in accordance with IRC: 53: 2002 & Ministry's circular issued from time to time. Performance of BC layer will be watched twice a year and reported to the Ministry till its life cycle.
- 13.6 In conformity to this Ministry's circular No.RW/NHIII/Coord/32/84 dated 19.5.84, no work beyond the scope of the sanctioned estimate leading either to increase in the scope of the work or change in specifications should be undertaken without obtaining prior written approval of the Ministry.
- 13.7 Neither the work nor any item of work shall be spilt into small parts for awarding the work to more than one Contractor, except that specialized items such as road marking and signage could be executed separately. In case any splitting is essential, over and above as mentioned above, due to the specific prevailing conditions, it should be done only after prior approval of this Ministry. In this regard instructions issued in the Ministry's letter No. NHIII/P/75/78 dated 4.8.84 refers.
- 13.8 The work shall be executed as per Ministry's "Specifications for Road and Bridge Works (Fourth Revision-2001)" and instructions issued by this Ministry from time to time.

- 13.9 Various measures will be taken to ensure quality of works in accordance with the "Hand Book of Quality Control for construction of Roads & Runways (Second Revision) – IRC: SP:11-1988" and the instructions contained in Ministry's letter No.NHIII/P/1/83 dated 19.4.84. Permanent record of the tests carried out shall be maintained.
- 13.10 The grade of bitumen to be used for the work shall be as per guidelines/ instructions issued vide Ministry's circulars No RW/NH-33044/3/98-(S&R) dated 04.11.99 and RW/NH-35074/7/2001-S&R( R ) dated 3.4.2001.
- 13.11 During execution of the work, traffic management shall be done in accordance with the guidelines contained in Ministry's Letter No.RW/NH-11060/1/1998-D.O.1 dated 7.10.87 and IRC: SP:55-2001 "Guidelines on Safety in Construction Zone".
- 13.12 The display boards giving details of the project shall be provided as per guidelines issued vide Ministry's Letter No.RW/NH-33044/10/2000-S&R (R) dated 12.8.2002.
- 13.13 Central Government machinery if available in the area shall be used for the work as spelt out in this Ministry's Letter No.RW-14(1)/83-RMP dated 7.6.88. In case of non-availability of the Central Government machinery in the area, the work will be allotted to such contractors only who possess the required machinery or produces proof of procuring or hiring the same to the satisfaction of the Chief Engineer.
- 13.14 It may be ensured that the site is free from any encumbrances before taking up the work.

#### 14. Targets for the work

The following **cumulative** physical and financial targets should be achieved depending upon the availability of funds:

Year	Physical phasing ( %)	Financial phasing (Rs. in lakh)
2009-10	10	940.00
2010-11	60	5650.00
2011-12	100	9414.00

  
(Ravinder)

**Executive Engineer  
For Director General (Road Development) & SS**