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GOVERNMENT OF INDIA
MINISTRY OF ROAD TRANSPORT & HIGHWAYS

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

NH-12037/24/2009/Ar.P/Ar. Package/SARDP –NE/P-9

New Delhi, 2nd December 2009

To,

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

Sub: 2 laning of Yupia – Hoj road along with re-alignment from km 9.660 to km 29.700 (corresponding to existing km 10.0 to km 30.320 (net length = 20.04 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. 118.31 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. 118.31 crore based on the comments contained in the enclosed technical note.

3. 'In principle' approval to the modified proposal / estimate amounting to Rs. 118.31 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 26th July, 2006 and dated 12th 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

Yours faithfully,

enclo: as stated above.

Ravinder

(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-12037/24/2009/ArP/Ar. Package/SARDP –NE/P-9 New Delhi, 2nd December, 09

1.	Name of work	:	2 laning of Yupia – Hoj road along with re-alignment from km 9.660 to km 29.700 (corresponding to existing km 10.0 to km 30.320 (net length = 20.04 km) in Arunachal Pradesh under Arunachal Pradesh Package of SARDP-NE **(Job No. Ar Package/SARDP-NE/Y-P/ArP/PWD/2009-10/)**	
2.	State	:	Arunachal Pradesh	
3.	Category of road	:	State road	
4.	Estimated cost (Rs. in lakh)	:	As furnished by State P.W.D. 11831.0	As allowed in the Ministry 11831.00
5.	Length (km)	:	20.04	20.04
5.	Cost per Km (Rs. In Crores)		5.90	5.90
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 and 1 major bridge of total length 348 Rm.,

(iii) Construction of 44 pipe culverts, 38 RCC box culverts and 4 Slab culverts.

(iv) Construction of RR masonry breast wall in 1420 RM, RCC Retaining wall 690 RM, PCC retaining wall 456 RM and Gabion Breast wall 795 RM; and construction of other protection works

(v) Construction of unlined drain in 22140 Rm length in stretches on hill side and covered drain in 405 Rm ; and

(vi) Road safety works including road markings, sign boards, shifting of utilities etc.

2. Alignment

The alignment is reported passing through mountainous (75% length) and steep terrain (25% length). The re-alignment has been proposed in the following stretches :

Sl. No.	Existing Chainage			Proposed Chainage			Reason for re-alignment
	From (km)	To (km)	Existing Length (km)	From (km)	To (km)	Prop. Length (km)	
1	10.55	12.50	1.95	10.20	12.40	2.20	Steep Existing Gradient
2	22.83	24.93	2.10	21.92	24.50	2.58	Steep Existing Gradient
3	27.00	29.10	2.10	26.57	29.50	2.93	Submergence area due to the on-going Pare dam.
	Total		**6.15**			**7.71**	

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, 18% for 40 kmph speed. The proposed gradient of road confirms to NH standards for mountainous/ steep terrain. This has been noted.

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
BM	50 mm	50 mm
SDBC	25 mm	25 mm

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, 4th 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. Bridges

The 9 bridges at following locations have been proposed:

6.1 Bridge at km 13+728 (Heyr River)

The existing bridge over Heyr River is of 2 x 17.8m two spans RCC T-beam type superstructure supported over RCC wall type abutments/pier with open foundation. It is reported that the existing bridge is in poor condition and inadequate for 2 lane movement of traffic. The new bridge is proposed on RHS of the existing bridge. The bridge is proposed with 32m single span with PSC voided slab superstructure supported on Well foundation.

6.2 Bridge at km 15+927

The existing bridge is of 10.70m single span Bailey bridge with 3.5m carriageway width. It is reported that, the shape of nallah on both sides of the existing bridge is serpentine. New bridge on U/S or D/S of existing bridge would result in longer length of bridge. Hence, new bridge has been proposed at the same location of existing bridge. The proposed bridge is of 18m single span with RCC voided slab superstructure supported on Open foundation.

6.3 Bridge at km 16+428

The existing structure is of 6m span slab culvert. The culvert is in fair condition and the width of carriageway is inadequate for 2-lane carriageway. The culvert has suffered extensive scouring of abutments and foundations due to less waterway / inadequate depth of foundations and HFL is nearer to soffit level. Hence, a new minor bridge of 1x12m span with open foundation is proposed at this location. The new bridge is on RHS of existing bridge.

6.4 Bridge at km 18+875

It is reported that, the existing structure at this location is a causeway of approx. 12m length. Earlier there was a bridge at this location and has been washed away. On both approaches of existing causeway hill slopes are steep and land slide prone and also the existing causeway is in very sharp curve of approx. 10m radius. Hence, the proposed alignment is shifted approx. 100m D/S. The new 2-lane bridge is in curve on RHS of the existing bridge towards valley side. The bridge is proposed with 48m, three spans of 16m each with RCC voided slab superstructure supported on Open foundation.

6.5 Bridge at km 19+245

The existing bridge is of 22m single span Bailey bridge spanning over deep valley. On both approaches of existing bridge hill slopes are steep and land slide prone and also in very sharp curve of approx. 6m radius. Hence, the proposed alignment is shifted approx. 80m D/S. The new 2-lane bridge is on RHS of the existing bridge on valley side. The bridge is proposed with 40m single span with PSC Box Girder superstructure supported on Well foundation.

6.6 Bridge at km 20+253

The existing bridge is of 7m RCC Bridge in poor condition. The new 2-lane bridge is proposed on LHS of the existing bridge on hill side. The bridge is proposed with 10m single span with RCC voided slab superstructure supported on Open foundation.

6.7 Bridge at km 22+002 (Boka River)

The existing bridge over Boka River is of 13m single span steel bridge supported over RCC wall type abutments with open foundation. The new 2-lane bridge is proposed on RHS of the existing bridge. The bridge is proposed with 24m single span with RCC voided slab superstructure supported on Well foundation.

6.8 Bridge at km 26+755

The existing bridge is of 9.40m single span steel bridge spanning over deep valley. This Bridge is at the start of NEEPCO re-alignment. On both approaches of existing bridge hill slopes are steep and land slide prone and also in very sharp curve of approx. 5m radius. Hence, new bridge is proposed on D/s of existing bridge at a distance of approx. 80m from the existing bridge. Proposed crossing is square and this would result in a length reduction of approx 200m with better geometry. The new 2-lane bridge is on RHS of the existing bridge on valley side. The bridge is proposed with 3x40m spans with PSC Box Girder superstructure supported on Well foundation.

6.9 Bridge at km 27+019

This bridge is on the NEEPCO re-alignment section. The length of the bridge along the existing road on the same nallah is 7.3m steel bridge. It is reported that the width of the nallah at the proposed crossing is wider than the width at existing crossing. The bridge is proposed with 3x16m spans with RCC Voided slab superstructure supported on Open foundation. It is also reported that longer span (3 x 16) is proposed to reduce the height of abutment for open foundation and also to avoid high retaining wall on the approaches.

6.10 The above provision of construction of 9 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 86 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.	29	1x2x2	12	1x1.8x1.6	4
Single row having 1.2m int. dia.	15	1x2x3	7		
		1x3x3	9		
		1x3x4	4		
		1x4x3	3		
		1x4x4	4		
TOTAL	**44**		**38**		**4**

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 3361 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	1420
Gabion Breast wall	5	795
RCC Retaining wall	3-10	690
PCC Retaining wall	2-4	456
TOTAL		**3361**

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 22140 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 405 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 4189 m as proposed may also be allowed.

10.4 The provision of parapet wall in stretches of 1110 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. 11831.0 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	1100.00
2010-11	60	7100.00
2011-12	100	11831.00

Ravinder

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