

कार्यालय प्रमुख अभियन्ता एवं विभागाध्यक्ष, लोक निर्माण विभाग उत्तराखण्ड देहरादून

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पत्रांक : 1587/10 अधि.शा.नि.1/13

दिनांक : 31/10/13

कार्यालय ज्ञाप


वर्तमान में NRRDA द्वारा जारी किए गए निर्देशों के अनुपालन में PMGSY के अन्तर्गत पर्वतीय क्षेत्रों में निर्मित ग्रामीण मार्गों हेतु संलग्न प्रपत्र के अनुसार Geometric Standards का प्राविधान किया जा रहा है। अतः भविष्य में लोक निर्माण विभाग द्वारा विभिन्न योजनाओं के अन्तर्गत निर्मित किए जाने वाले समस्त ग्रामीण मार्गों में भी NRRDA द्वारा PMGSY हेतु अपनाए गए संलग्न Geometric Standards का प्राविधान तत्काल प्रभाव से सुनिश्चित किया जाए।

प्रमुख अभियन्ता
लोक निर्माण विभाग
देहरादून

प्रतिलिपि निम्न को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित :-

1. प्रमुख सचिव, लोक निर्माण विभाग उत्तराखण्ड शासन।
2. अपर सचिव, लोक निर्माण विभाग उत्तराखण्ड शासन।
3. मुख्य अभियन्ता गढ़वाल / कुमायूँ क्षेत्र / ए0डी0बी0 / रा0मा0 / नियोजन लो0नि0वि0, पौड़ी / अल्मोड़ा / देहरादून।
4. समस्त अधीक्षण अभियन्ता, (सिविल) लोक निर्माण विभाग उत्तराखण्ड। अधीक्षण अभियन्ता अपने स्तर से अधिशासी अभियन्ताओं को उपलब्ध कराना सुनिश्चित करें।
5. अधिशासी अभियन्ता टी0ए0सी0 वित्त विभाग, उत्तराखण्ड शासन।
6. वरिष्ठ स्टाफ आफिसर I, II / अधिशासी अभियन्ता I II III IV V VI कार्यालय मुख्य अभियन्ता स्तर-I, लो0नि0वि0 देहरादून।
7. कनिष्ठ अभियन्ता (प्रा0), कार्यालय विभागाध्यक्ष, लोक निर्माण विभाग, देहरादून।

संलग्न : उपरोक्तानुसार


प्रमुख अभियन्ता
लोक निर्माण विभाग
देहरादून

Geometric Design Standards for Rural Roads in Hill Areas (Adopted by NRRDA for PMGSY Works)

S. No.	Item	As per IRC:SP:20 (Rural Roads Manual) / Hill Road Manual IRC:SP:48	As Adopted by NRRDA for PMGSY Works	
			New Construction	Improvement of Existing Roads (Tolerances that can be considered)
1.	Carriageway width	3.75m but can be reduced to 3.00m where traffic is less than 100 motorised vehicle per day.	Through Roads – 3.75 m Link Roads* – 3.00 m * If a link road carries traffic more than 100 motorised vehicles per day, the carriageway width will be 3.75 m.	<u>Through Roads</u> Existing roads with carriageway 3.0 m or more can wait unless evidence of safety hazard. <u>Link Roads</u> As for new construction.
2.	Roadway width minimum	6m in SP:20 (virtually 6.7 m including parapet and drain) 5.95 m in Hill Road Manual for ODR 5.20 m in Hill Road Manual for VR	(a) Through Roads: 5.5 m (including parapet and drain) (b) Link Roads: 5.5 m (including parapet and drain) Notes (i) In hard rock stretches, roadway width may be reduced by 0.5 m (ii) The width indicated are for roads in straight. These are to be increased on horizontal curves.	Existing roads with formation upto 5.0m may wait. Notes: (i) In hard rock stretches, an additional tolerance of 0.5 m can be considered. (ii) For curves see item 3 below. (iii) Provide passing places at suitable locations.

S. No.	Item	As per IRC:SP:20 (Rural Roads Manual) / Hill Road Manual IRC:SP:48	As Adopted by NRRDA for PMGSY Works	
			New Construction	Improvement of Existing Roads (Tolerances that can be considered)
3.	Widening at Curves	Widening of Pavement and Roadway Upto 20m radius – 0.9 m 21 – 60m radius – 0.6 m More than 60 m radius - Nil	Widening of Pavement and Roadway Upto 20m radius – 0.9 m 21 – 60m radius – 0.6 m More than 60 m radius - Nil	For existing roads, widening of pavement and roadway can wait unless there is evidence of safety hazard.
4.	Width of Bridges	5.5 m Rural Roads Manual SP: 20 4.25 m clear width between kerbs Hill Roads Manual SP:48	Through roads 4.25 m Link roads 4.25 m	For existing bridges, widening may be undertaken at the time of replacing the old and distressed bridges unless there is evidence of safety hazard. Need to provide cautionary sign posts.
5.	Roadway width of culverts and causeways	6m in SP:20 (virtually 6.7 m including parapet and drain) 5.95 m in Hill Road Manual for ODR 5.20 m in Hill Road Manual for VR	(a) Through Roads: 5.5 m (including parapet and drain) (b) Link Roads: 5.5 m (including parapet and drain) Notes (i) In hard rock stretches, roadway width may be reduced by 0.5 m (ii) The width indicated is for roads in straight. These are to be increased on horizontal curves.	For existing culverts, widening may be undertaken at the time of replacing the old and dilapidated/distressed culverts and causeways unless there is evidence of safety hazard. Need to provide cautionary sign posts

S. No.	Item	As per IRC:SP:20 (Rural Roads Manual) / Hill Road Manual IRC:SP:48					As Adopted by NRRDA for PMGSY Works					
							New Construction					Improvement of Existing Roads (Tolerances that can be considered)
6.	Minimum radius of horizontal curves	As per IRCSP:20										(i) Through roads For existing roads, the horizontal geometry upto absolute minimum may be considered acceptable unless there is evidence of site-specific safety problem related to horizontal curvature such as skid marks, complaints from users, history of crashes, etc. (ii) Link roads For existing roads, the existing horizontal geometry may be considered acceptable unless there is evidence of site-specific safety problem related to horizontal curvature such as skid marks, complaints from users, history of crashes, etc. Need to provide cautionary sign posts.
			Mountainous terrain		Steep Terrain			Mountainous terrain		Steep Terrain		
			Not affected with snow	Snow bound	Not affected with snow	Snow bound		Not affected with snow	Snow bound	Not affected with snow	Snow bound	
		(i) ODR					(i) Through roads					
		Ruling	30m	33m	20m	23m	Ruling	30m	33m	20m	23m	
		Absolute minimum	20m	23m	14m	15m	Absolute minimum*	12m	15m	12m	15m	
		(ii) VR					(ii) Link roads					
		Ruling	20m	23m	20m	23m	Ruling	30m	33m	20m	23m	
		Absolute minimum	14m	15m	14m	15m	Absolute minimum*	12m	15m	12m	15m	
							* In rare cases with due justification, absolute minimum upto 10m can be considered.					

S. No.	Item	As per IRC:SP:20 (Rural Roads Manual) / Hill Road Manual IRC:SP:48			As Adopted by NRRDA for PMGSY Works			Improvement of Existing Roads (Tolerances that can be considered)
					New Construction			
7.	Longitudinal gradients (except hairpin bends)		Mountainous Terrain	Steep Terrain		Mountainous Terrain	Steep Terrain	For existing roads, the existing vertical curves up to limiting gradient may be considered acceptable. Gradients steeper than limiting gradient but upto exceptional gradient in short stretches could also be considered acceptable unless there is evidence of site-specific problem. Need to provide cautionary sign posts.
		Ruling Gradient	5%	6%	Ruling Gradient	5%	6%	
		Limiting Gradient	6%	7%	Limiting Gradient	7%	8%	
		Exceptional Gradient	7%	8%	Exceptional Gradient*	10%	10%	
					* Length of exceptional gradient not to exceed 100m at a stretch. Successive stretches to be separated by a minimum length of 100 m with gradient ruling or gentler			
8.	Hairpin Bends	(i)	Minimum design speed	20 km/hour	(i)	Minimum design speed	20 km/hour	The existing hair pin bends may be considered acceptable unless there is site-specific problem and evidence of complaints from users, history of crashes. Need to provide cautionary sign posts.
		(ii)	Minimum roadway		(ii)	Minimum roadway		
			(a) ODR	7.5 m		(a) ODTR / VTR	7.5 m	
			(b) VR	6.5 m		(b) ODLR / VLR	6.5 m	
		(iii)	Minimum radius for the inner curve	14 m	(iii)	Minimum radius for the curve at central line	12 m	
		(iv)	Minimum length of transition curve	15 m	(iv)	Minimum length of transition curve	15 m	
		(v)	Gradient		(v)	Gradient		
			(a) Maximum	2.5% (1 in 40)		(a) Maximum	2.5% (1 in 40)	
			(b) Minimum	0.5% (1 in 200)		(b) Minimum	0.5% (1 in 200)	
		(vi)	Superelevation	10 %	(vi)	Superelevation	10 %	

Prof. B.P. Chandrasekhar
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To,

Secretaries of Nodal Dept of all Hill States

Lr.#P-17035/1/2007-Tech.

11th December, 2007

Sir,

Please find herewith enclosed Minutes of the Expert Committee to review Standards, Specifications and Design of Rural Roads for achieving economy in the cost of construction under Pradhan Mantri Gram Sadak Yojana, held at Mussoorie during 29th & 30th November, 2007.

In this connection, I am directed to inform you that the geometric standards suggested for roadway, carriageway, gradients, curvature etc. for the hill roads are to be followed in all the proposals prepared from now onwards, including the proposals for the World Bank funding in the states identified.

Thanking You,

Yours sincerely

Encl:a/a

(B.P. Chandrasekhar)

Review of Geometric Design Standards for Rural Roads in Hill Areas (meeting at Mussorie – 29-30 November 2007)

S. No.	Item	As per IRC:SP:20 (Rural Roads Manual) / Hill Road Manual IRC:SP:48	Amendments proposed	
			New Construction	Existing Roads (Tolerances that can be considered)
1.	Classification	(a) Other District Roads (b) Village Roads	Same system as defined in NRRDA guidelines	Same system as defined in NRRDA guidelines
2.	Carriageway width	3.75m but can be reduced to 3.00m where traffic less than 100 motorised vehicle per day.	Through Roads – 3.75 m Link Roads* – 3.00 m * If a link road carries traffic more than 100 motorised vehicles per day, the carriageway width will be 3.75 m.	<u>Through Roads</u> Existing roads with carriageway 3.0 m or more can wait unless evidence of safety hazard. <u>Link Roads</u> As for new construction.
3.	Roadway width minimum	6m in SP:20 (virtually 6.7 m including parapet and drain) 5.95 m in Hill Road Manual for ODR 5.20 m in Hill Road Manual for VR	(a) Through Roads: 5.5 m (including parapet and drain) (b) Link Roads: 5.5 m (including parapet and drain) Notes (i) In hard rock stretches, roadway width may be reduced by 0.5 m (ii) The width indicated are for roads in straight. These are to be increased on horizontal curves.	Existing roads with formation upto 5.0m may wait. Notes: (i) In hard rock stretches, an additional tolerance of 0.5 m can be considered. (ii) For curves see item 4 below. (iii) Provide passing places at suitable locations.

S. No.	Item	As per IRC:SP:20 (Rural Roads Manual) / Hill Road Manual IRC:SP:48	Amendments proposed	
			New Construction	Existing Roads (Tolerances that can be considered)
4.	Widening at Curves	Widening of Pavement and Roadway Upto 20m radius – 0.9 m 21 – 60m radius – 0.6 m More than 60 m radius - Nil	Widening of Pavement and Roadway Upto 20m radius – 0.9 m 21 – 60m radius – 0.6 m More than 60 m radius - Nil	For existing roads, widening of pavement and roadway can wait unless there is evidence of safety hazard.
5.	Width of Bridges	5.5 m Rural Roads Manual SP: 20 4.25 m clear width between kerbs Hill Roads Manual SP:48	Through roads 4.25 m Link roads 4.25 m	For existing bridges, widening may be undertaken at the time of replacing the old and distressed bridges unless there is evidence of safety hazard. Need to provide cautionary sign posts.
6.	Roadway width of culverts and causeways	6m in SP:20 (virtually 6.7 m including parapet and drain) 5.95 m in Hill Road Manual for ODR 5.20 m in Hill Road Manual for VR	(a) Through Roads: 5.5 m (including parapet and drain) (b) Link Roads: 5.5 m (including parapet and drain) Notes (i) In hard rock stretches, roadway width may be reduced by 0.5 m (ii) The width indicated is for roads in straight. These are to be increased on horizontal curves.	For existing culverts, widening may be undertaken at the time of replacing the old and dilapidated/distressed culverts and causeways unless there is evidence of safety hazard. Need to provide cautionary sign posts

S. No.	Item	As per IRC:SP:20 (Rural Roads Manual) / Hill Road Manual IRC:SP:48	Amendments proposed									
			New Construction					Existing Roads (Tolerances that can be considered)				
7.	Minimum radius of horizontal curves	As per IRCSP:20					<p>(i) Through roads</p> <p>For existing roads, the horizontal geometry upto absolute minimum may be considered acceptable unless there is evidence of site-specific safety problem related to horizontal curvature such as skid marks, complaints from users, history of crashes, etc.</p> <p>(ii) Link roads</p> <p>For existing roads, the existing horizontal geometry may be considered acceptable unless there is evidence of site-specific safety problem related to horizontal curvature such as skid marks, complaints from users, history of crashes, etc.</p> <p>Need to provide cautionary sign posts.</p>					
			Mountainous terrain		Steep Terrain				Mountainous terrain		Steep Terrain	
			Not affected with snow	Snow bound	Not affected with snow	Snow bound			Not affected with snow	Snow bound	Not affected with snow	Snow bound
		(i) ODR						(i) Through roads				
		Ruling	30m	33m	20m	23m		Ruling	30m	33m	20m	23m
		Absolute minimum	20m	23m	14m	15m		Absolute minimum*	12m	15m	12m	15m
		(ii) VR						(ii) Link roads				
		Ruling	20m	23m	20m	23m		Ruling	30m	33m	20m	23m
		Absolute minimum	14m	15m	14m	15m		Absolute minimum*	12m	15m	12m	15m
								* In rare cases with due justification, absolute minimum upto 10m can be considered.				

S. No.	Item	As per IRC:SP:20 (Rural Roads Manual) / Hill Road Manual IRC:SP:48			Amendments proposed			
					New Construction		Existing Roads (Tolerances that can be considered)	
8.	Longitudinal gradients (except hairpin bends)		Mountainous Terrain	Steep Terrain		Mountainous Terrain	Steep Terrain	For existing roads, the existing vertical curves up to limiting gradient may be considered acceptable. Gradients steeper than limiting gradient but upto exceptional gradient in short stretches could also be considered acceptable unless there is evidence of site-specific problem. Need to provide cautionary sign posts.
		Ruling Gradient	5%	6%	Ruling Gradient	5%	6%	
		Limiting Gradient	6%	7%	Limiting Gradient	7%	8%	
		Exceptional Gradient	7%	8%	Exceptional Gradient*	10%	10%	
					* Length of exceptional gradient not to exceed 100m at a stretch. Successive stretches to be separated by a minimum length of 100 m with gradient ruling or gentler			
9.	Hairpin Bends	(i)	Minimum design speed	20 km/hour	(i)	Minimum design speed	20 km/hour	The existing hair pin bends may be considered acceptable unless there is site-specific problem and evidence of complaints from users, history of crashes. Need to provide cautionary sign posts.
		(ii)	Minimum roadway		(ii)	Minimum roadway		
			(a) ODR	7.5 m		(a) ODTR / VTR	7.5 m	
			(b) VR	6.5 m		(b) ODLR / VLR	6.5 m	
		(iii)	Minimum radius for the inner curve	14 m	(iii)	Minimum radius for the curve at central line	12 m	
		(iv)	Minimum length of transition curve	15 m	(iv)	Minimum length of transition curve	15 m	
		(v)	Gradient		(v)	Gradient		
			(a) Maximum	2.5% (1 in 40)		(a) Maximum	2.5% (1 in 40)	
			(b) Minimum	0.5% (1 in 200)		(b) Minimum	0.5% (1 in 200)	
		(vi)	Superelevation	10 %	(vi)	Superelevation	10 %	

Minutes of the meeting of the Expert Committee to review the Standards, Specifications and Design of Rural Roads for achieving economy in the cost of construction under PMGSY

Venue: Mussoorie

Date: 29th -30th November, 2007

List of participants is at Annex 1.

Dr. B.P. Chandrasekhar, Director (Technical), NRRDA welcomed the members of the Expert Committee and representatives of the states and explained the objective of the meeting. He requested the representatives of the States to share their experiences and give inputs for the committee.

Shri. D.P. Gupta, Chairman of the Committee made a presentation emphasizing the need for finding the ways and means of achieving economy in Rural Roads construction. He stressed the need for taking initiative for R&D using locally available materials and training of consultants, contractors and the field engineers for preparing good DPRs.

Shri. Prabha Kant Katore, Director (P-III/CQC), NRRDA brought out the general deficiencies in DPRs and the confusion in the estimation of AADT and growth rate. He further brought out the ambiguities in the assessment of CBR, indicating that certain clauses in different Manuals create confusion rather than clarity on how to determine CBR in different circumstances. He stressed the need for amending some of the provisions of Standard Data Book (SDB) for achieving economy and to provide more clarity to the field engineers in preparing the DPRs. He indicated that the exercise of carrying out amendments to the existing provisions of the SDB will be taken up shortly.

Shri. K. Choudhary, an invited member of the Expert Committee stressed the need for providing optimal height for the embankment and proper side slopes under different conditions. He indicated that these have bearing on the cost of construction. There was need to take into account the natural drainage situation in the area.

Prof. C.E.G. Justo indicated that wet sieve analysis of the soil will enable correct interpretation of CBR value. He is of the opinion that the soaked CBR should not be used indiscriminately and the results are to be free from misinterpretation. He has indicated that proper and adequate compaction and integrated drainage system are the key for sustainability of Rural Roads and will certainly reduce the life cycle cost for the road.

Shri. V.V. Gulati spoke about the relaxation of standards for gradient, which will have cost implication. He expressed the need for the provision of appropriate and need based drainage structures including bridges and to keep a check on protection works such as breast walls for achieving economy. He suggested that CC Block Pavements can be effectively used in the built up areas instead of conventional CC Pavements.

Shri. N.D. Sharma stressed the need for proper route selection (finalization of alignment) duly

considering the geological and geotechnical aspects of the hill terrains, in order to avoid recurring slips and associated costs. He reiterated that drainage management should be given primary importance. He quoted the provisions of Road Note 16 for arriving at optimal cut and fill for hill roads. Stressing the fact that cost of retaining wall, if proper alignment is not chosen, could be as much as three times of rock cutting. He also advocated the need for adopting pre-cast box culverts, wherever appropriate. He agreed to send written comments on the background note, especially with reference to the retaining walls.

Dr. Ashok Kumar, Sr. Rural Roads Specialist of the World Bank indicated that all rural roads cannot be treated at par while making provisions and there is a need for further sub-classification based on traffic for adopting design procedures and making provisions accordingly. He shared the experiences of road development in China and stressed the need for stabilization of local materials replacing the conventional WBM. He added that The DPRs should be prepared strictly based on the investigations and there should be adequate review mechanism and acceptance criteria built into the system. On a request from the Chairman, he agreed to get a comprehensive exercise undertaken in preparing a document on international best practices in planning, construction and maintenance of rural roads with the support of the World Bank.

Shri. P.K. Lauria indicated that though the standards in the manuals given are minimum adoptable in certain circumstances, the field engineers are tending to take them as ruling. He talked about the need for rationalization of land widths, particularly in the context of the practical constraints in getting adequate land. He also brought out the need for Environmental Management Plans (EMP) and emphasized the need for providing adequate space for storing the cut material, which may be indirectly used for other purposes. He is of the opinion that adequate drains and proper visibility are the keys to the sustainability and safety of the rural roads.

Later, the state representatives made presentations and expressed their views on different issues. Shri. K.C. Dhimole from Arunachal Pradesh indicated that geological mapping and geotechnical investigations are to be made pre-requisites in the finalization of alignment. According to him, such investigations will also cut down the costs on protection works. He further emphasized the need for the use of remote sensing data and quarry mapping for properly planning the alignment. The Engineers from Sikkim laid stress on protective works. The issues of ban on permanent structures near aqua farms, higher leads for suitable granular material and the need for using alternative materials were aired by the engineers of West Bengal. The engineers of Assam highlighted their problems of flood proneness, higher rainfall, frequent submergence and large number of CD works in the construction of Rural Roads. They further indicated that the soils are generally weak and there is a need for recommending appropriate and economic height of embankment and suitable technologies for submergible areas. The need for some expert group to consider such aspects in more depth was acutely felt. Such a group could consider similar problems of rural roads in plains.

The representatives of Uttarakhand indicated that in some parts of the state, two stage construction is resulting in problems of disposal of cut materials in Stage-I and hauling suitable materials in Stage-II. They requested for modernization in investigations and appropriate orientation and training for the engineering personnel freshly inducted in the PMGSY Programme. The Chief Engineer, Himachal Pradesh suggested

rationalization of the formation widths for the hill areas and also expressed his concern in providing parapets and hume pipes. He felt that for hume pipe culverts, consideration may be given to use NP2 pipes which could serve the purpose. He wanted suitable recommendations from the Expert Committee to address the above issues. CE, Jammu and Kashmir stressed for training of JEs and AEs who are responsible for implementation on the ground. He stressed that the DPRs should be reviewed by senior officers in the department before being sent even to State Technical Agencies. CE, Mizoram expressed concern over non-availability of suitable aggregates in their state and desired some steps being taken to promote use of locally available materials. The states also expressed concerns, particularly with reference to drainage, minimum radius of curvature at hairpin bends, relaxation of gradients and non-availability of good quality construction materials within normal leads. Some participants suggested that even the parapets design could be reviewed. For bridges, most states advocated for the width of bridge being a single-lane 4.25 m as provided in the Hill Roads Manual IRC SP:48.

Shri. D.P. Gupta, then, summarized the discussions and took up opinion of the members on the points covering several issues, with respect to geometrics for hill roads, already circulated. After arriving at general consensus, the critical and threshold values proposed to be recommended for the geometrics for hill roads were finalized. It was noted by all present that these will have marked impact on the cost of construction. Annex 2 gives the recommended values for the geometrics for rural roads in hills.

The meeting concluded with thanks to all the participants and the Chair.