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Ministry of Physical Infrastructure Development
Infrastructure Development Directorate
Janakpurdham, Nepal

Standards, Norms and Specifications for Road & Bridge

Sept 2024

CONTENTS

1 INTRODUCTION

1.1 Background

Nepal has transitioned to a new system of Federal governance encompassing three levels of authority: Central (Federal), Provincial, and Local Government.

Under this new structuring, Nepal comprises 7 Provinces encompassing a total of 77 Districts. Within these districts are a total of 753 local units, consisting of 6 metropolitan cities, 11 sub-metropolitan cities, 276 municipalities (Nagarpalikas) and 460 rural municipalities (Gaunpalikas). Each local unit is further divided into wards (5-33 wards per local unit) with a total of 6,743 wards in Nepal. Each and every wards, local units, districts, Provinces and Centre are connected with road network for providing easy accessibility comprising approximately 80,000km of road network which is now falls under the management of the 3-tier government system.

There is often a lack of co-ordination and uniformity in the adoption of road standards and specifications. DoLI has an interim road standard, 2019 prepared for the use of the Provincial Government and Local-level entities. However, it is noted that each Province is preparing Province Road Act, and road and bridge standards. While the provinces have made progress with their Province Road Act, the Federal Government has yet to approve the Nepal Road Act compatible with federalism and clarifying provincial and local roads, and ownership, which the earlier Public Road Act 1974 does not cater to. Also, instead of a selection of appropriate road standards for the projected traffic, the provinces and municipalities are considering much higher standard roads in terms of both the road width as well as pavement type. In the case of Specification and Norms for road and bridge works, it is noted that the provinces and the municipalities are found to follow the DoR documents as the Norms and Specification.

Based on Provincial Road Act – 2076, Madhesh Province has prepared Provincial Road Network Master Plan (PRNMP)-2081 that includes 2238 km of Provincial Highway (PH) and 3368 km of Provincial Secondary Highway (PR) to be implemented under provincial budgets and DP funds. For the implementation of such Road and Bridge Projects, this "Provincial Road and Bridge Standard , Norms and Specification-2081" has been prepared.

1.2 Recommendation of Road/ Bridges Design and Construction Standards and Specifications

This document provides review of various standards, specifications and norms for road, bridge design and construction and recommendations for the use with modification if any.

2 Review of Documents

2.1 Road and Bridge Standards

2.1.1 Nepal Rural Road Standards (DoLIDAR, 2014)

The Nepal Rural Road Standard (NRRS) was first introduced in 1998 (2055 BS) and 2nd revision was published in 2014 (2071 BS) by the DoLIDAR. The standard provides the road classification and geometric standards for rural roads (then district roads & village roads) in Nepal.

2.1.2 Nepal Urban Road Standards (DUDBC,2019)

The Nepal Urban Road Standard (NURS) was prepared by DUDBC in 2019 (2076 BS) It provides the standard for classification, geometric design, cross section elements, etc. for the urban roads in Nepal.

2.1.3 Nepal Road Standards (DoR, 2013)

The Nepal Road Standard published by DoR in 2013 (2070 BS) provides road classification, road design capacities, geometric design standards, etc. It is second revision of the road standard originally published in 1970 (2027 BS) and first revision was published in 1988 (2045 BS).

2.1.4 Nepal Bridge Standards (DoR 2010)

This standard provides standard for the bridge works including hydraulic modeling, free board, and bridge geometry. DoR also has produced standard drawings for bridges in 2015 which includes standard drawings of bridges from 15m span to 40m span.

2.2 Standard Specifications for Road and Bridge Works

2.2.1 Standard Specifications for Road and Bridge Works (DoR, 2016)

The specification was published by DoR in 2001 (2058 BS) and later revised in 2016 (2073 BS). The latest version includes many items required for road and bridge construction. It also includes standards for various maintenance activities.

2.2.2 Technical Specifications for Agricultural and Rural Roads (DoLIDAR, 1998)

The specification covers many aspects of the rural road construction.

2.3 Norms for Rate Analysis

2.3.1 Norms for Rate Analysis of Road and Bridge Works (DoR, 2018)

The norms was published by DoR in 2018 (2075 BS) which is based on the specifications published in 2016. The norms include many items including mechanized earthwork excavation and also has simplified rate analysis for road construction works. It also has norms for road maintenance works.

2.3.2 Work Norms for Agricultural and Rural Roads (DoLIDAR, 1998)

The norms covers rate analysis for various work items described in the technical specifications for the agricultural and rural roads.

2.3.3 Other Norms

The Department of Urban Development and Building Construction(DUDBC) has published norms for rate analysis for building works. The Department of Water Resources and Irrigation (DWRI) also has published Rate Analysis Norms and Specifications for Irrigation, River Training & Study Works. The Department of Water Supply and Sewerage Management (DWSSM) also has published its own norms for rate analysis of water supply and sewerage management works. The Department of Forests and Soil Conservation (DFSC) also has its own norms for rate analysis of works related to forestry and soil conservation.

3 Recommendations

3.1 Road Standards

The NRS (2013) is comprehensive and can be adopted for Provincial roads implementation and donor funded Project like PLRIP with minor modifications in certain parameters included in Appendix A. For the design of provincial roads, the standards for particular class of road will be determined by the traffic volume on the road (ADT).

3.2 Bridge Standards

The DoR Bridge Standard (2010) along with the standard drawings for bridges published in 2015 along with DoLI (LRBP) standard can be adopted for the Provincial Bridge implementation and donor funded Project like PLRIP. Similarly, the LRBP also has prepared standard drawings of the bridges for DoLI.

The DoR standard drawings also include bridges for two lane carriageways (7.5m) with 1.5m footpath on each side and the LRBP standard includes bridges with 6.0m carriage way with 1.2m footpath on each side. Single lane bridges are not included in both the standards.

If proposed roads are double lane, DoR standard can be adopted and for single lane or intermediate lane roads, either DoR or DoLI standards can be adopted.

3.3 Norms for Rate Analysis

Norms for Rate Analysis of Road and Bridge Works (2018) published by Department of Roads covers all the work items to be included in roads and bridges construction. It also has norms for road maintenance works. So, Norms for Rate Analysis of Road and Bridge Works (DoR, 2018) can be adopted. In case of some items Norms not included in this Norms can be used from other departmental Norms if available.

3.4 Specifications

Standard Specifications for Road and Bridge Works (DoR, 2016) published by DoR covers all the specifications required for road and bridge works in Nepal. Some items specification not available in this specification can be added separately.

The Standard Specifications for Road and Bridge Works (DoR, 2016) can be included in the contract document as:

Part A: Standard Specifications for Road and Bridge Works (DoR, 2016): This refers to the standard document and is available freely from DoR Website.
https://dor.gov.np/home/publication/standard-specification-of-roads-and-bridges/force/standard-specifications-for-road-and-bridge-works-2-73

Part B: Special Provision to Standard Specifications: Any addition/substitute should be done here which generally depends on the nature of the project and specific items other than the standard specifications. It can also include additional specifications for survey (e.g. GPS based surveys), Drone Survey, Design software, etc. The RCIP and DoR has amended many clauses specific to the project.

Appendix A
Provincial Road Standard

Provincial Road Standards,2024 (Adopted from Nepal Road Standards(NRS), 2013 with minor modifications)

S.N	Design Parameters	Road Class - I	Road Class-II	Road Class-III	Road Class-IV	Comments
1	Design capacity- in both directions (P.C.U per day)	> 20000	5000-20000	2,000 - 5,000	< 2,000	Refer Section 3B of NRS Traffic figure are ADT expressed in PCU forecast after 20 years.
2	Design speed (km per hour)	P-120 R-100 M-80 S-60	P-100 R-80 M-60 S-40	P - 80 R - 60 M - 40 S - 30	P - 60 R - 40 M - 30 S - 20	Refer Table 7 - 1 of NRS P-Plain, R-Rolling, M-Mountainous & S-Steep
3.a	No. of lanes	≥ 4	≥ 2	2	< 2	Refer Annex 24.1, Table 24-1 of NRS
3.b	Roadway or Formation width (m)	Nx3.5+2Sw+Mw	Nx3.5+2Sw+3	9.0 to 11.0	5.5 to 8.5	Refer Section 11.4 &11.8 of NRS n -Number of lane Sw - Shoulder width Mw - Median width
4	Lane width (m)	3.5	3.5	7	3.75* or 5.5	* 3m in difficult sections
5	Shoulder width, either side (m)	P,R – 3.75 M,S-2.5	P,R-2.5 M,S-2	P, R - 2 M, S - 1.0	P, R - 1.5 M, S - 0.75	Refer Section 11.2 and Table 24-1 of NRS. -Shoulder along road side drain shall be paved to prevent breakage of edge and erosion
6	Total Right of Way (RoW) (m)	40	30	20	15	
7	Setback distance from Road land boundary / RoW to Building line on either side (m)	6	6	6	6	Also Refer Section 3.7.3 of NURS 2076 for urban roads.
8	Minimum safe stopping distance (m)	P-260 R-190 M-130 S-80	P-190 R-130 M-80 S-50	P - 130 R - 80 M - 50 S – 30	P - 80 R - 50 M - 30 S - 20	Refer Table 8.1 of NRS Based on design speed
9	Lateral Clearance between roadside object and the edge of the shoulder (m)	See Comments	See Comments	See Comments	See Comments	Refer Section 11.9.2 of NRS
10	Minimum radius in horizontal curve (m)	110-1730	40-870	20 - 440	10-200	Refer Table 9-1 of NRS
11	Hairpin Bends:					

S.N		Design Parameters	Road Class - I	Road Class-II	Road Class-III	Road Class-IV	Comments
	a.	Minimum spacing between Hairpin Bends (m)	60	60	60	60	Refer Section 9.3 and Table 9-3 of NRS
	b.	Minimum radius of curve (m)	15	15	15	15	Refer Section 9.3 and Table 9-3 of NRS. In exceptional cases at steep mountainous and fragile terrain,a minimum radius of 10m may be adopted
	c.	Minimum Roadway width at apex (m)	Varies	Varies	Varies	Varies	Refer Table 9-4 of NRS
	d.	Maximum gradient (%)	4	4	4	4	Refer Section 9.3 and Table 9-3 of NRS
	e.	Maximum super elevation (%)	10	10	10	10	Refer Section 9.3 and Table 9-3 of NRS
	f	Minimum transition curve length (m)	Varies	Varies	Varies	Varies	Refer Section 9.2 and Table 9-2 of NRS
2	a.	Maximum Gradient (%)	P-4 R-5 M-6 S-7	P-5 R-6 M-7 S-9	P-6 R-7 M-9 S-10	P-7 R-9 M-10 S-12	Based on design speed, refer Table 10.1 of NRS. For Class IV, 15% can be adopted for maximum 50m length in steep terrain.
	b.	Grade Compensations	See Comments	See Comments	See Comments	See Comments	Refer 10.1.2 of NRS Grade Compensation (%) = (30+R)/R .....subject to a maximum of 75/R, R- Radius of vertical curve.
	c.	Maximum (Critical) length of Grade (m)	P-4%, 600 R-5%, 450 M-6% 400 S-7% 300	P-5% 450 R-6% 400 M-7% 300 S-9% 200	P - 6%, 400 R - 7%, 300 M - 9%, 200 S - 10%, 150	P - 7%, 300 R - 9%, 200 M - 10%, 150 S - 12%, 150	Based on maximum (critical) gradient, refer Table 10.2 of NRS
13.		Maximum gradient at bridge approach (%)	2	3	4	5	**Also Refer to Nepal Bridge Standards, 2067.**
14.		Minimum gradient on plain area roads (for better drainage) (%)	0.5	0.5	0.50	0.50	Refer Section 10.1.1 (e) of NRS.
15.		Co-ordination of horizontal and vertical alignment	Varies	Varies	Varies	Varies	- Sharp horizontal curve should be avoided at or near the apex of the summit vertical curve or the lowest point of the valley curve. - Horizontal and vertical alignment should coincide with each other as far as possible and their length should be more or less equal. If this is difficult for any reason, the horizontal curve should be somewhat longer than the vertical curve. - The degree of curvature should be in proper balance with the gradients. Excessive curvature in a road with flat grades, do not constitute balanced design and should be avoided. - Also Refer Section 19 of NRS.
16.		Cross slope in carriageway camber (%)					Refer Section 11.5 and Table 11-3 of NRS. Undivided carriageway - both direction from the centre Divided carriageway - unidirectional, Hill roads with undivided carriageway, a unidirectional carriageway can be adopted but adverse / negative camber on curves should be avoided.
		Earthen (existing)	5	5	5	5	
		Gravel	4	4	4	4	
		Bituminous Seal Coat	2.5	2.5	2.5	2.5	

S.N	Design Parameters		Road Class - I	Road Class-II	Road Class-III	Road Class-IV	Comments
		Cement Concrete	1.5 to 2	1.5 to 2	1.5 to 2	1.5 to 2	
17.	Passing Zone, Dimensions (width x length) (m x m)		NA	NA	NA	NA*	*For a single lane road with carriageway width 3.75 m, 5.5 m wide carriage way with 12 m along outside edge and 30 m along inside edge. The interval of passing zone should preferably be at 300-500 m.
	Bus Lay-bys, Dimension (width x length) (m x m)		3.75 * 15 N	3.75 * 15 N	3.75 * 15 N	3.75 * 15 N	Refer Section 13.5 of NRS. N = expected maximum number of vehicle to occupy.
18.	Carriageway width at culvert/bridge (m)		Full Width of Carriageway	Full Width of Carriageway	Full Width of Carriageway	*	Refer Section 5.1 of Nepal Bridge Standard 2067: •All bridges in Highways and Urban Roads shall be designed with a minimum carriageway width of 7.5m. •other provincial roads cross-drainage structures shall be designed with a minimum carriageway width of 6.0m.
19.	Level of embankment above HFL (m)		*	*	*	*	*Normally a detailed hydraulic design and analysis required
20.	Traffic sign and road safety		*	*	*	*	*Refer DoR Traffic Signs Manual Vol-I & Vol-II.
21.	Median width (m)		3-5	3	NA	NA	Refer Section 11.3 of NRS. -Minimum median width of 5 m is recommended but a width of 3 m can be adopted in areas where land is restricted. -In mountainous and steep terrain, maximum possible width dictated by the topography should be provided -In extreme condition, simple barriers may be provided or individual carriageways cloud be designed at different levels.