ROADWAYS

Roads have been existing in India for the last 5000 years. In early stages of Indian history, Ashoka and Chandragupta made efforts to construct roads. But the real progress was made during the Mughal period. A number of roads were laid during the Sultanate and Mughal periods. Most of the present trunk routes follow the Mughal routes. These routes were essential for strengthening and consolidating the empire. One such road was constructed by Sher Shah Suri which connected Peshawar to Kolkata. It was named as Grand Trunk (G.T.) Road and joined Amritsar with Kolkata after partition of India in 1947. Presently, it is known as 'Sher Shah Suri Marg'.

Importance of Roads

1. Roads play a very important role in the transportation of goods and passengers for short and medium distances.
2. It is comparatively easy and cheap to construct and maintain roads.
3. Road transport system establishes easy contact between farms, fields, factories and markets and provides door to door service.
4. Roads can negotiate high gradients and sharp turns which railways cannot do. As such, roads can be constructed in hilly areas also.
5. Roads act as great feeders to railways. Without good and sufficient roads, railways cannot collect sufficient produce to make their operation possible.
6. Road transport is more flexible than the railway transport. Buses and trucks may be stopped anywhere and at any time on the road for loading and unloading passengers and goods whereas trains stop only at particular stations.
7. Perishable commodities like vegetables, fruits and milk are transported more easily and quickly by roads than by railways.

Due to above-mentioned advantages, the road transport has become very popular and its share in traffic is constantly increasing.

Growth and Development

Road transport in modern sense *i.e.* vehicles driven by internal combusion engines using petrol or diesel as fuel was practically negligible in India before World War II. Following plans have been drawn to develop roadways in India.

1. **Nagpur Plan.** First serious attempt to develop roadways was made in 1943 when ***Nagpur Plan*** was drawn. This plan envisaged increasing of the kilometreage of major roads to 1,96,800 km and of other roads to 3,32,800 km by 1953. The highlight of the plan was that no village in a developed agricultural region should be more than 8 km from a major road or 3 km away from any other road while the average distance of villages from a major road should be less than 3.2 km. In a non-agricultural region, these distances were fixed at 32, 8 and 10 km respectively. This plan could not be implemented immediately because the country was ruled by a number of princely states outside British India. The concerted efforts to achieve the objectives of this plan were made only after the reorganisation of the states. The targets of this plan were more or less achieved by 1961.

2. Twenty Year Plan. After achieving the objectives of the Nagpur Plan, another plan known as ***Twenty Year Road Plan*** was drawn in 1961. It aimed at increasing the road length from 6.56 lakh km to 10.60 lakh km and the density to 32 km of road per 100 sq km by 1981. The other objectives of the Twenty Year Road Plan were (*i*) to bring every village in a developed agricultural area within 6.4 km of a metalled road and 2.4 km of any other road, (*ii*) to bring every village in a semi-developed area within 12.8 km of a metalled road and (*iii*) to bring every village in an undeveloped and uncultivated area within 19.2 km of a metalled road and 8 km of any other road.

3. The Rural Development Plan includes construction of rural roads under Minimum Needs Programme (MNP), Rural Landless Employment Guarantee Programme (RLEGP), Jawahar Rojgar Yojana (JRY) and Command Area Development (CAD) programmes to connect all villages having a population of 1,500 or more with all weather roads and those having less than 1,500 population with link roads.

4. Build Operate Transfer (BOT) is a scheme under which private operators are invited to construct roads and bridges. They are allowed to collect toll tax

from the vehicles using these roads and bridges for a specific period of time after which these assets are transferred to the government. The National Highways Act has been amended to facilitate private investment in real construction under BOT scheme.

5. Central Road Fund (CRF) is being raised for the betterment of roads by imposing additional excise/customs duty at the rate of ₹ 1.50 per litre on petrol with effect from 2 June 1998 and on High Speed Diesel (HSD) with effect from February 28, 1999. The annual accrual through this source was to be about ₹ 5,500 crore. A part of this (₹ 0.4 per litre against sale of high speed diesel oil and ₹ 0.86 per litre against sale of petrol) goes to fund the NHDP. (National Highway Development Projects).

The Central Road Fund Act 2000 was enacted in December, 2000 with the primary objective of providing regular and adequate flow of funds for development of the road sector. This is a non-lapsable fund. The Act empowers the Centre to administer, manage and allocate the accrued amount to the following :

(*i*) Development of rural roads. About 43 per cent of the levy on diesel is to be spent on improving road connectivity,

(*ii*) Development and maintenance of National Highways,

(*iii*) Construction of road under/over bridges and safety works at unmanned railway crossings, and

(*iv*) Development and maintenance of State roads.

Categorywise Growth in Road Length. Table 26.6 shows that the length of National Highways rose from 19,811 kilometres as on 31 March 1951 to 70,934 kilometres as on 31 March 2011 and to 79,116 kilometres as on 31st March, 2013 reflecting a compound annual growth rate (CAGR) of 2.1 per cent during the period. During the same period, the combined network of State Highways and Other Public Works Department (PWD) posted a seven-fold expansion in length. The combined length of State Highways and Other PWD roads stood at 11.69 lakh kilometres as on 31 March 2011. The highest CAGR of 4.4 per cent during 1951 to 2011 was registered by rural roads comprising Panchayati roads, and roads constructed under Jawahar Rozgar Yojana (JRY) and Pradhan Mantri Gram Sadak Yojana (PMGSY). The length of rural roads increased more than 13 times from 2.06 lakh kilometres in 1951 to 27.50 lakh

TABLE 26.6. Road Network by Categories (in kilometres) 1951 to 2011

Road Category	1951	1961	1971	1981	1991	2001	2011
1	2	3	4	5	6	7	8
National Highways	19,811 (4.95)	23,798 (4.54)	23,838 (2.61)	31,671 (2.13)	33,650 (1.45)	57,737 (1.71)	70.934* (1.51)
State Highways	1,73,723 (43.44)	257,125 (49.02)	56,765 (6.20)	94.359 (6.35)	1,27,311 (5.47)	1,32,100 (3.99)	1,63,898 (3.49)
Other PWD Roads	^	^	2,76,833 (30.26)	4,21,895 (28.40)	5,09,435 (21.89)	7,36,001 (21.82)	10,05,327 (21.43)
Rural Road	2,06,408 (51.61)	1,97,194 (37.60)	3,54,530 (38.75)	6,28,865 (42.34)	12,60,430 (54.16)	19,72,016 (58.46)	27,49,805 (58.63)
Urban Road	0 (0.00)	46.361 (8.84)	72.120 (7.88)	1,23,120 (8.29)	1,86,799 (8.03)	2,52,001 (7.12)	4,11,840 (8.78)
Project Roads	0 (0.00)	0 (0.00)	1,30,893 (14.31)	1,85,511 (12.49)	2,09,737 (9.01)	2,23,665 (6.32)	2,.88,539 (6.15)
Total	**3,99,942**	**5,24,478**	**9,14,979**	**14,85,421**	**23,27,362**	**33,73,520**	**46,90,342**

Note : Figures within parentheses indicate per cent to total road length in each road category.

*79,116 kilometres as on 31st March, 2013.

^ Included in State Highways

***Source* :** Statistical Year Book, India 2013, p. 301.

kilometres in 2011. Urban roads grew by a CAGR of 4.5 per cent between 1961 and 2011. Their length stood at 4.12 lakh kilometres as on 31 March 2011. The length of Project roads grew by CAGR of 2 per cent during 1971 and 2011 and was 2.88 lakh kilometres as on 31 March 2011.

Classification of Roads

The main significance of the Nagpur Plan lies in the fact that it classified roads into four categories on the functional basis. They are : (*i*) National Highways (*ii*) State Highways (*iii*) District Roads and (*iv*) Village Roads. A brief description of each category is given as under :

1. National Highways

The main roads which are constructed and maintained by the Central Public Works Department (CPWD) are known as the National Highways. These roads are meant for inter-state and strategic defence movements and connect the state capitals, big cities, important ports, big railway junctions and link up with border roads. The length of National Highways increased from 19,811 km in 1951 79,116 km in 2013. National Highways form the lifeline of road transport and constitute the framework of road system in India. Although the percentage share of the National Highways to the total road length has decreased considerably from 4.95 per cent in 1951 to only 1.7 per cent in 2013, they carry nearly 40 per cent of the road traffic of India.

The National Highways have been classified on the basis of carriage way width of the highway. Generally, a lane has a width of 3.75 m in case of single lane and 3.5 m per lane in case of multi-lane. National Highways. The percentage of National Highways in terms of width is as under :

Single Lane	19,330 km (24%)
Double Lane	40,658 km (52%)
Four Lane/Six Lane/Eight Lane	19,128 km (24%)

Source : India 2014, A Reference Annual, p. 845.

The Government has embarked upon a massive National Highways Development Project (NHDP) in the country. The NHDP is the largest highway project ever undertaken in the country. The NHDP is being implemented mainly by NHAI in phases I to VII.

- **NHDP Phase I & II:** Envisage 4/6 laning of about 14,000 km of National Highways, at an estimated cost of about ₹ 65,000 crore at 2004 prices. These two phases comprise Golden Quadrilateral (GQ), North-South and East-West corridor (NSEW), Port Connectivity and Other Projects. The GQ consists of 5,846 km and connects four major cities, *viz.*, Delhi, Mumbai, Chennai and Kolkata. The NSEW corridor comprising a length of 7,142 km connects Srinagar in the North to Kanniyakumari in the South including a spur from Salem to Kochi and Silchar in the East to Porbandar in the West, respectively. The NHDP also includes Port Connectivity Project comprising a length of 380 km for improvement of roads connecting 12 major ports in the country alongwith other projects involving a length of 965 km are also included.
- **NHDP Phase III:** NHDP Phase-II involves 4-laning of 12,109 km of NHS having high density corridor connecting State capitals, important tourist places, economically important areas, etc. on PPP basis at an estimated cost of ₹ 80,628 crore.
- **NHDP Phase IV:** It involves upgradation/ strengthening of 20,000 km of single/ intermediate /two lane National Highways to two lanes with paved shoulders on BOT (Toll) and BOT (Annuity) basis.
- **NHDP Phase V:** It involves six laning of 6,500 km of NHs comprising 5,700 km of GQ and balance 800 km of other sections of NHs at a cost of ₹ 41,210 crore.
- **NHDP Phase VI:** It involves construction of 1,000 km of expressways with hill access control on new alignments at a cost of ₹ 16,680 crore.
- **NHDP Phase VII:** It involves construction of 700 km of ring roads of major towns and bypasses and construction of other stand-alone structures such as flyovers, elevated roads, tunnels, undespasses, grade separated interchanges etc. on National Highways at a cost of ₹ 16,680 crore.

SpecialW Accelerated Road Development Programme for North Eastern region (SARDP-NE). It envisages improvement of road connectivity to the State Capitals with District Headquarters in the North Eastern region. The proposed programme includes improvement of 10,141 km of roads comprising National Highways (4,798 km) and state roads (5,343 km), to be implemented under Phase-A, Phase 'B' and Arunachal Pradesh Package for 'Road & Highways. Phase-A now consists improvement of 2,041 km of National Highways and 2,058 km of State Roads. Phase-B has now been modified to cover 2 laning of 1,285 km of NHs and 2 laning/ improvement of 2,438 km of State roads for preparation of Detailed Project Reports (DPRs). Arunachal Pradesh Package of roads and highways comprises 1,472 km of National Highways and 847 km of State Roads.

Development of Roads in Left Wing Extremism affected areas

The Government of India, approved the Road Requirement Plan (RRP) on 26 February, 2009 for upgrading 5,565 km long roads out of which 1,202 km are the national highways and 4,363 km are state roads. The upgradation is with respect to two-lane provision in 34 core districts affected by left-wing extremism (LWE). These districts are in the states of Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha and Uttar Pradesh. The project is expected to cost ₹ 7,300 crores. Development of 2,929 km length had been completed till 2013-14 and the rest is likely to be completed by March 2015. RRP-E covering a length of 5,624 km at an estimated cost of ₹ 9,900 crore is under consideration of the government.

1. Golden Quadrilateral Super Highway. National Highways Development Project (NHDP) has taken up a massive programme of road building in the country. Launched on January 2, 1999, this is perhaps one of the largest programmes of road development ever taken up in the country. The project is being implemented by National Highways Authority of India (NHAI). NHDP has following two components.

(*i*) ***Phase I—Golden Quaderilateral.*** Comprising National Highways connecting Delhi-Mumbai-Chennai-Kolkata-Delhi by six-lane super highways. This component has a total length of 5,846 km. The four sides of the quadrilateral have varying length. The side of quadrilateral between Delhi and Mumbai is 1,419 km long, Mumbai to Chennai is 1,290 km long, Chennai to Kolkata is the longest side which is 1,684 km long. The side between Kolkata and Delhi is 1,453 km long.

TABLE 26.7. Overall Progress of NHDP as on 31st May, 2011

Phases	Total (km)	4/6 laned (km)	km	Contracts (No)	Balance for award
GO (Golden Quadrilateral)	5,846	5,827 (99.67%)	19	8	—
NS & EW corridors	7,142	5,733.	988	87	421
Port Conductivity	380	318	62	4	0
Other NHs	1,383	936	427	6	20
SARDP-NE	388	—	112	2	276
NHDP Phase					
III	12,109	2,351	5,925	82	3,833
IV	20,000	—	873	6	19,127
V	6,500	619	2,018	19	3,863
VII	700	—	41	2	659
Total	**54,448**	**15,784**	**10,465**	**216**	**28,199**

(ii) *Phase II—North-South Corridor.* Comprising the National Highways connecting Srinagar to Kanniyakumari including Kochi-Salem Spur and *East-West corridor* comprising the National Highways connecting Silchar in Assam and Porbandar in Gujarat. The project has a total length of about 7,300 km, out of which the North-South corridor is 4,000 km and East-West corridor is 3,300 km long.

Main components of the Golden Quadrilateral are shown in **Fig. 26.4**.

Distribution of National Highways. A number of national highways run across the country in all directions linking important places to one another. The historically important Sher Shah Suri Marg is known as National Highway 1. It links Delhi and Amritsar. National Highway 2 links Delhi and Kolkata. National Highway 3 runs between Agra and Mumbai via Gwalior, Indore and Nasik. National Highway 7 is the longest one which links Varanasi with Kanniyakumari via Jabalpur, Nagpur, Hyderabad, Bangalore and Madurai. It traverses a distance of 2,325 km. National Highway 5 and 17 run along the eastern and western coasts respectively. National Highway 15 represents the border road in Rajasthan desert and runs through Kandla, Jaisalmer, Bikaner and joins the border road in the Punjab. **Fig. 26.5** shows the important national highways.

TABLE 26.8. Length of Various Sections of the Golden Quadrilateral

Name	Length of sides of the Golden Quadrilateral (Length in km)
Delhi-Mumbai	1,419
Mumbai-Chennai	1,290
Chennai-Kolkata	1,684
Kolkata-Delhi	1,453
Total	**5,846**
	Length of Corridors
North-South corridor Connecting Srinagar with Kanniyakumari	4,000
East-West corridor connecting Silchar with Porbandar	3,300
Total	**7,300**

Some of the important National Highways are listed in **Table 26.9**

TABLE 26.9. India : Some Important National Highways

No.	Route	Length (km)
1.	Delhi-Ambala-Jalandhar-Amritsar	456
1A.	Jalandhar-Madhopur-Jammu-Srinagar-Baramula-Uri	663
1B.	Batot-Doda-Kishtwar	107
2.	Delhi-Mathura-Agra-Kanpur-Allahabad-Varanasi-Mohania-Barhi-Kolkata	1,490
3.	Agra-Gwalior-Shivpuri-Indore-Dhulia-Nashik-Thane-Mumbai	1,161
4.	Thane-Pune-Belgaum-Hubli-Bengaluru-Ranipet-Chennai	1,235
4A.	Belgaum-Anmode-Ponda-Panaji	153
5.	Bahargagora-Cuttack-Bhubaneshwar-Vishakhapatanam-Vijyawada-Chennai	1,533
6.	Dhule-Nagpur-Raipur-Sambalpur-Baharagora-Kolkata	1,645
7.	Varanasi-Rewa-Jabalpur-Nagpur-Hyderabad-Bangalore-Madurai-Kanniyakumari	2,369
8.	Delhi-Jaipur-Ajmer-Udaipur-Ahmadabad-Vadodara-Mumbai	1,428
9.	Pune-Solapur-Hyderabad-Vijayawada	791
10.	Delhi-Fazilka	403
11.	Agra-Bharatpur-Jaipur-Bikaner	582
12.	Jabalpur-Bhopal-Kota-Bundi-Japiur	890
13.	Solapur-Chitradurga	491
14.	Beawar-Sirohi-Radhanpur	450

15.	Pathankot-Bathinda-Bikaner-Jaisalmer	1,526
16.	Barmer-Samkhiyali-Jagdalpur	460
17.	Panvel-Mangalore-Edapalli	1,269
18.	Kurnool-Nandyal-Cuddapah-Chittoor	369
20.	Pathankot-Mandi	220
21.	Chandigarh-Ropar-Mandi-Kulu-Manali	323
22.	Ambala-Kalka-Shimla-Narkanda-Rampur-Chini	462
23.	Chas-Ranchi-Rourkela-Talwar	459
24.	Delhi-Bareilly-Lucknow	438
25.	Lucknow-Kanpur-Jhansi-Shivpuri	319
26.	Jhansi-Lakhnaden	396
27.	Allahabad-Mangawan	93
28.	Barauni-Muzaffarpur-Gorakhpur-Lucknow	570
28A.	Pipra-Sagauli-Razaul	68
29	Gorakhpur-Ghazipur-Varanasi	198
30.	Mohania-Patna-Bakhtiyarpur	230
31.	Bakhtiyarpur-Siliguri-Nalbari-Aminagaon	1,125
31A.	Sivok-Gangtok	92
32.	Govindpur-Dhanbad-Jamshedpur	179
33.	Barhi-Ranchi	352
34.	Dalkhola-Barasat-Kolkata	443
35.	Barasat-Bangaon	61
36.	Nagaon-Dabaka-Dimapur	170
37.	Goalpara-Guwahati-Kamargaon-Saikhoa Ghat	680
38.	Makum-Ledo-Lekhapani	54
39.	Numiligarh-Imphal-Palel	436
40.	Jorhat-Shillong-Dawki	161
41.	Kolaghat-Haldia	51
42.	Sambalpur-Angul-Cuttack	261
43.	Raipur-Vizianagaram	560
44.	Shillong-Passi-Badarpur-Agartala	495
45.	Chennai-Tiruchchirappalli-Dindigul	387
46.	Krishnagiri-Ranipet	132
47.	Salem-Coimbatore-Thiruvananthapuram-Kanniyakumari	640
48.	Bangalore-Hassan-Mangalore	328
49.	Kochi-Madurai-Dhanushknodi	440
50.	Nashik-Pune	192
51.	Pekana-Tura-Dalu	149
52.	Baihata-Charali-Tezpur-Lakhimpur-Sekhoaghat	850
53.	Badarpur-Zirighat-Imphal-Silchar	320
54.	Silchar-Aizawl	560
55.	Siliguri-Darjeeling	77
56.	Lucknow-Varanasi	285

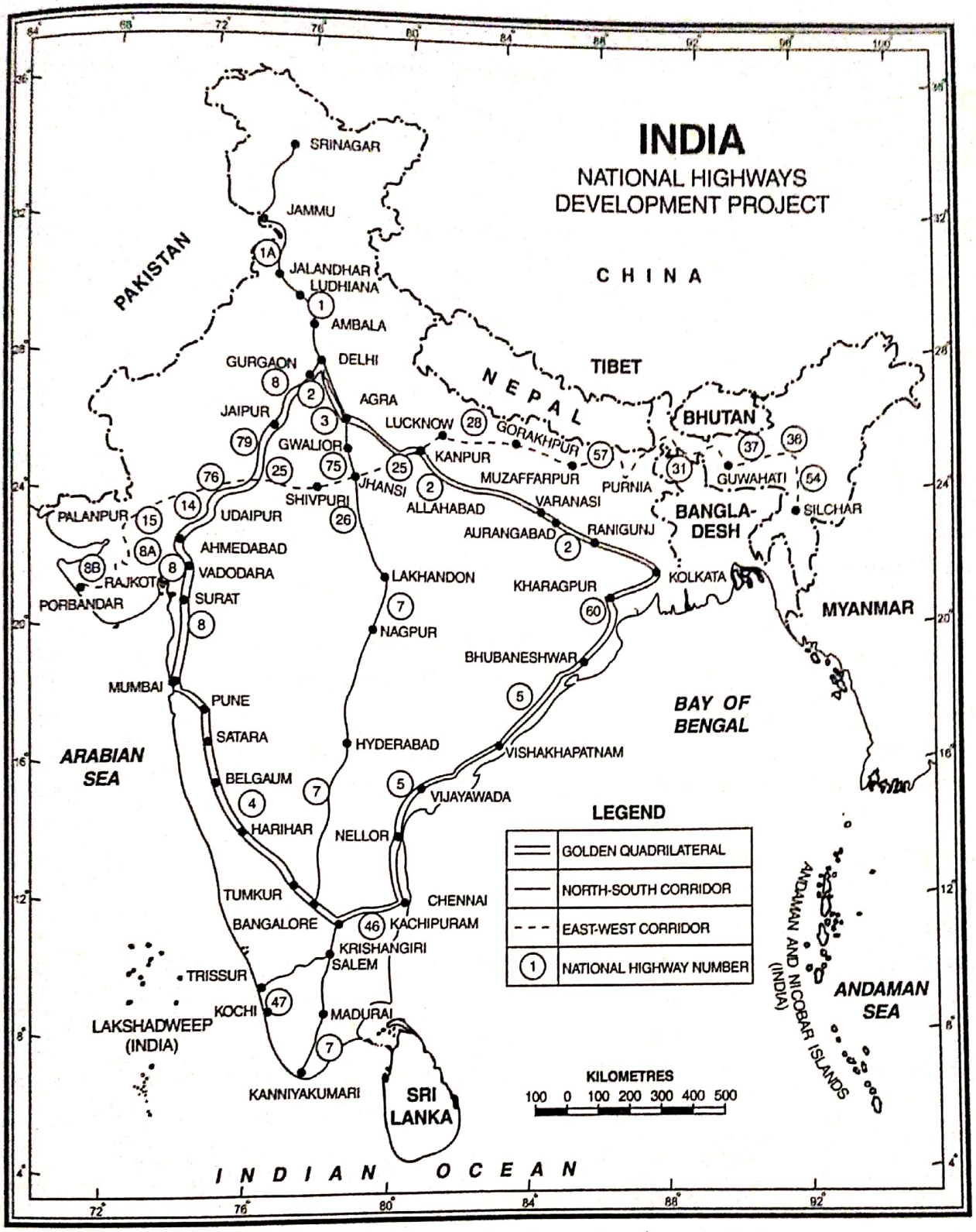

FIG. 26.4. India : National Highways Development Project.

Table 26.10 depicts the state-wise distribution of National Highways. This table shows that Uttar Pradesh has the longest length of National Highway covering a distance of 5,874 km. This is followed by Rajasthan (5,585 km), Madhya Pradesh (4,670 km), Andhra Pradesh and Telangana (4,472 km) and Tamil Nadu (4,462 km).

The Government of India declared the following new National Highways in August, 2014.

NEWLY DECLARED NATIONAL HIGHWAYS

- **NH-11** Narnaul—Rewari
- **NH-54** Dabwali—Hanumangarh—Goluwala
- **NH-248A** Nuh—Gurgaon
- **NH-344B** Sonepat—Jhajjar—Joharu
- **NH-703** Sirsa—Haryana/Punjab border

TABLE 26.10. List of State-wise National Highways in India

Sl. No.	Name of State	National Highway No.	Total Length (in km)
1	Andhra Pradesh (including Telangana)	4, 5, 7, 9, 16, 18, 43, 63, 202, 205, 214, 214A, 219, 221 & 222	4,472
2	Arunachal Pradesh	52, 52A & 153	392
3	Assam	31, 31B, 31C, 36, 37, 37A, 38, 39, 44, 51, 52, 52A, 52B, 53, 54, 61, 62, 151, 152, 153 &154	2,836
4	Bihar	2, 2C, 19, 28, 28A, 28B, 30, 30A, 31, 57, 57A, 77, 80, 81, 82, 83, 84, 85, 98, 99, 101, 102, 103, 104, 105, 106, 107 & 110	3,642
5	Chandigarh	21	24
6	Chhattisgarh	6, 12A, 16, 43, 78, 111, 200, 202, 211, 216 and 217	2,184
7	Delhi	1, 2, 8, 10 & 24	72
8	Goa	4A, 17, 17A & 17B	269
9	Gujarat	NE-I, 6, 8, 8A, 8B, 8C, 8D, 8E, 14, 15, 59, 113 & 228	3,245
10	Haryana	1, 2, 8, 10, 21A, 22, 64, 65, 71, 71A, 71B, 72, 73, 73A , & NE-II	1,512
11	Himachal Pradesh	1A, 20, 21, 21A, 22, 70, 72, 73A & 88	1,208
12	Jammu & Kashmir	1A, IB, 1C &1D	1,245
13	Jharkhand	2, 6, 23, 31, 32, 33, 75, 78, 80, 98, 99 & 100	1,805
14	Karnataka	4, 4A, 7, 9, 13, 17, 48, 63, 67, 206, 207, 209, 212 & 218	3,843
15	Kerala	17, 47, 47A, 47C, 49, 208, 212, 213, & 220	1,457
16	Madhya Pradesh	3, 7, 12, 12A, 25, 26, 26A, 27, 59, 59A, 69, 75, 76, 78, 86 & 92	4,670
17	Maharashtra	3, 4, 4B, 4C, 6, 7, 8, 9, 13, 16, 17, 50, 69, 204, 211 & 222	4,176
18	Manipur	39, 53.150 & 155	959
19	Meghalaya	40, 44, 51 & 62	810
20	Mizoram	44A, 54, 54A, 54B, 150 & 154	927
21	Nagaland	36, 39, 61, 150 & 155	494
22	Odisha	5, 5A, 6, 23, 42, 43, 60, 75, 200, 201, 203, 203A, 215, 217 & 224	3,704
23	Puducherry	45A & 66	53
24	Punjab	1, 1A, 10, 15, 20, 21, 22, 64, 70, 71, 72 & 95	1,557
25	Rajasthan	3, 8, 11, 11A, 11B, 11C, 12, 14, 15, 65, 71B, 76, 79, 79A, 89, 90, 112, 113, 114 & 116	5,585
26	Sikkim	31A	62
27	Tamilnadu	4, 5, 7, 7A, 45, 45A, 45B, 45C, 46, 47, 47B, 49, 66, 67, 68, 205, 207, 208, 209, 210, 219, 220, 226 & 227	4,462
28	Tripura	44 & 44A	400
29	Uttar Pradesh	2, 2A, 3, 7, 11, 12A, 19, 24, 24A, 24B, 25, 25A, 26, 27, 28, 28B, 28C, 29, 56, 56A, 56B, 58, 72A, 73, 74, 75, 76, 86, 87, 91, 91A, 92, 93, 96, 97, 119 & NE-II	5,874
30	Uttarakhand	58, 72, 72A, 73, 74, 87, 94, 108, 109, 121, 123 & 125	1,991
31	West Bengal	2, 2B, 6, 31, 31A, 31C, 31D, 32, 34, 35, 41, 55, 60, 60A, 80, 81 & 117	2,524
32	Andaman & Nicobar	223	300

Source : India 2014, A Reference Annual, pp. 1065-66.

FIG. 26.5. India : National Highways

2. State Highways

These are constructed and maintained by state governments and join the state capitals with district headquarters and other important towns. These roads are also connected to the national highways. The length of state roadways in India has almost tebled within a span of about four decades and has increased from 56,765 km in 1971 to 1,63,898 km in 2011.

These roads constitute about 3.5 per cent of the total road length of India.

Although construction and maintenance of state highways is the responsibility of the concerned state governments, yet with the revamping of the Central Road Fund (CRF) in 2000, the Centre provides financial assistance for development of state roads. Further, to promote inter-state facilities and also to assist the State Governments in their economic development through construction of roads and bridges, Central Government provides 100 per cent grant for inter-state connectivity and 50 per cent grant for projects of economic importance from CRF. Loan assistance from external funding agency is also taken by some states.

The distribution of State Highways is very uneven. Maharashtra has the maximum length of state highways. This is followed by Gujarat, Madhya Pradesh, Rajasthan, and Andhra Pradesh (including Telangana). Smaller states such as Goa, and states in hilly areas like Mizoram, Sikkim, Nagaland, Tripura, etc. have less than five hundred km length of State Highways.

3. District Roadways

These roads join the district headquarters with the other places of the district. Development and maintenance of these roads fall within the purview of Zila Parishads. There has been more than five times increase in the length of district roadways. Formerly most of the district roads were unsurfaced and lacked bridges and culverts. But now the situation has changed and most of these roads are surfaced. Such a situation has improved connectivity and paved way for economic development.

Maharashtra is at the top followed by Uttar Pradesh, Madhya Pradesh, Rajathan, Punjab, Karnataka, Assam, Himachal Pradesh, Haryana and Kerala.

4. Village Roads

The village roads are mainly the responsibility of village panchayats and connect the villages with the neighbouring towns and cities. These are generally dusty tracks and are usable only during the fair weather. They become muddy and unserviceable during the rainy season. Efforts have been made in the recent past to connect the villages with metalled roads. The length of these roads has increased by about 13 times from 2,06,408 km in 1951 to 27,49,805 km in 2011. These roads accounted for over 58.6 per cent of the total road length of the country in 2011. Still about 10 per cent of the villages having a population of 1,000 or more and 60 per cent of the villages with less than 1,000 people are not connected by all-weather roads. The network needs expansion and upgradation of existing roads to all-weather roads.

A new thrust was given to village roads when the Pradhan Mantri Gram Sadak Yojna (PMGSY) was launched in December 2000. This is a 100% Centrally Sponsored Scheme to provide rural connectivity to unconnected habitations with a population of 500 persons or more (250 persons in case of hilly, desert and tribal areas) in rural areas by the end of the Tenth Plan period. The scope of PMGSY has been expanded to include both construction of new links and upgradation of existing through routes associated with such link routes to form one complete sub-network for providing connectivity between the village and the market. A survey undertaken to identify the "core network" as part of PMGSY showed that over 1.70 lakh unconnected habitations needed to be undertaken under this programme. This would require new construction of 3.68 lakh kilometres of rural roads at a total cost of ₹ 1,33,000 crore.

Border Roads. Border Roads Organisation (BRO) Board was set up in May 1960 for accelerating economic development and strengthening defence preparedness through rapid and co-ordinated improvement of roads in the north and north-eastern border areas. This organisation has constructed world's highest road joining Chandigarh with Manali in Himachal Pradesh and Leh in Ladakh. This road runs at an average altitude of 4,270 metres above sea level and negotiates four passes at heights ranging from 4,875 to 5,485 metres. It is a vital road link in the western Himalayas and has considerably reduced the distance between Chandigarh and Leh. The Border Roads Organisation has now spread its activities throughout the country and is presently working in states of Rajasthan, Jammu and Kashmir, Himachal Pradesh, Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Sikkim, Assam, Meghalaya, Nagaland, Tripura, Manipur, Mizoram, Arunachal Pradesh, Bihar and Andaman and Nicobar Islands.

IMPORTANT MILESTONES

- Entrustment of construction of 8.8 km long Rahtag tunnel, related access roads to its portals and a 292 km long Alternate Route to Leh.
- Entrusted with four-laning of a stretch of NH-IA from Jammu to Vijaypur as part of NHDPs North-South Corridor on behalf of NHAI.
- Part of Phase 'A' of Special Accelerated Road Development Programme for North-East (SARDP-NE) has been entrusted to BRO. The work involves construction of new roads and improvement of existing roads along with widening of 1,103.58 km.
- Upgradation of 94 km long Srinagar-Uri Road (NH-1A) and 17.25 km long Uri-LOC road, double laning of 265 km long Batote-Kishwar-Anantnag road (NH-1B) and 422 km long Srinagar-Leh road Uri Kargil (NH -1D), construction of 290 km long Nimer-Padum-Darcha road, and widening of 14.14 km long Domel-Katra (NH-1C).
- Completed 120 metre long cut and cover tunnel at NH-44 near Sonapur in Meghalaya in 2008. It facilities uninterrupted communication at Sonapur landslide prone area during monsoons for forward areas of Meghalaya, Mizoram, Tripura and Cachar region of Assam.

A prestigious project of developing the 160 km long Tamu-Kalemyo-Kalewa road in Myanmar was taken up in 1997 and completed in 2001. Another important work is the construction of Indo-Bangladesh Border (IBB) Roads and fencing of the border.

Urban Roads. A road within the limits of the area of municipality, military cantonment, port or railway authority is called an urban road. There has been a phenomenal growth in urban roads from a meagre 46,361 km in 1961 to 4,11,840 km in 2011 as a result of accelerated growth in urbanization.

Project Roads. A road within the limits of the area of a development project of a public authority for the exploitation of resources such as forests, irrigation, hydro-power, coal, sugarcane, etc. is called a project road. Various developmental projects have been undertaken as a result of which the length of project road has increased from 1,30,893 km in 1971 to 2,88,539 km in 2011.

International Highways

The roads which are financed by the World Bank and connect India with neighbouring countries are called international highways. There are two categories of such highways. (*a*) the main arterial routes linking the capitals of neighbouring countries. Some of the important routes of this category are (*i*) the Lahore-Mandalay (Myanmar) route passing through Amritsar-Delhi-Agra-Kolkata-Golaghat-Imphal (*ii*) Agra-Gwalior-Hyderabad-Bengaluru-Dhanushkodi road and (*iii*) Barhi-Kathmandu road. (*b*) Routes joining major cities, ports etc. with arterial network such as : (*i*) Agra-Mumbai road (*ii*) Delhi-Multan road (*iii*) Bengaluru-Chennai Road and (*iv*) Golaghat-Ledo road.

Geographical Distribution of Roads

The network of roads is more or less similar to that of railways, although former far excels the later with respect to kilometreage. A look at **Figure 26.5** and shows that there are great variations in the distribution pattern of roads in India. Uttar Pradesh, Rajasthan, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka, Gujarat, Odisha and Bihar have much longer length of national highways. Incidently these are larger states with high density of population and comparatively advanced stage of industrial growth. However, length of National Highways passing through a state is not always a true index of economic well being of a state as they serve only the main routes. For example, Madhya Pradesh and Bihar have longer route length of the national highways and still have some of the most backward areas which are located far away from the main road routes.

The length of state highways could be a better index of road accessibility at the state level. The picture is slightly different with regard to state highways when compared to that of the national highways.

Maharashtra is the best served state by the state highways. Gujarat is a distant second with respect to length of state highways. The other states with sufficiently long route length of state highways are Madhya Pradesh, Rajasthan, Karnataka, Uttar Pradesh and Andhra Pradesh. The north-eastern states do not have sufficient route length of state highways.

The nature of roads, rather than their total length is more significant from the utility point of view. The largest concentration of roads is found in the Northern

Plain, especially in West Bengal and in the Punjab-Haryana plain. But the ratio of surfaced road to the total road length is lower in the Northern Plain than the national average. For example, Bihar and West Bengal are the two large states in the plain but have only 42.32 per cent and 56.48 per cent of surfaced roads to the total length of roads respectively. Uttar Pradesh with 68.74 per cent of the surfaced roads is in a slightly better position. Punjab and Haryana are the two richest states of the country and have 100 per cent and 94.83 per cent of the surfaced roads respectively. The main cause of small proportion of surfaced roads in the Northern Plain is that it is made up of sand, silt and clay and there is shortage of stone for constructing surfaced roads. In contrast, the proportion of surfaced roads is much higher in the Peninsular plateau area because it is composed of hard rocks and stone for constructing roads is readily available here in plenty. Gujarat (93.95%), Maharashtra (79.68%), Goa (61.00%) are some of the states having higher than the national average of 60.33 per cent. Odisha presents an anomaly and is the poorest of all the states where surfaced roads account for less than one-third of the total length of roads. Among the Himalayan states Sikkim with 86.11 per cent is at the top and this is followed by 70.97 per cent in Jammu and Kashmir. All other Himalayan states have surfaced roads less than the national average. Among the union territories, Chandigarh, Dadra and Nagar Haveli, Daman and Diu. Delhi and Lakshadweep have 100 per cent surfaced route. This is followed by 97.47 per cent in Andaman and Nicobar Islands and 77.09 per cent in Pondicherry.

Density of Roads

A still better index of road accessibility is the *density of roads* which is defined as the length of roads per 100 sq km of surface area.

The Himalayan region, western Rajasthan and North-eastern states have low to very low density of road network. Most of these parts are served by roads constructed by Border Roads Organisation.

It varies from 10.0 km per 100 sq km in Jammu and Kashmir to 526.9 km per 100 sq km in Kerala with a national average of 96.5 km per 100 sq km (2013). Density of 200 to 400 km per 100 sq km is found in Assam, Goa, Tripura and West Bengal. Andhra Pradesh, Bihar, Karnataka, Nagaland, Odisha,

TABLE 26.11. State-wise Road Density per 100 sq km (2013)

State	Length of roads per 100 sq km
1. Andhra Pradesh (including Telangana)	125.4
2. Arunachal Pradesh	19.6
3. Assam	293.6
4. Bihar	127.5
5. Chhattisgarh	55.0
6. Goa	285.5
7. Gujarat	74.8
8. Haryana	67.2
9. Himachal Pradesh	65.2
10. Jammu & Kashmir	10.0
11. Jharkhand	21.9
12. Karnataka	133.2
13. Kerala	526.9
14. Madhya Pradesh	53.8
15. Maharashtra	72.6
16. Manipur	73.2
17. Meghalaya	43.9
18. Mizoram	29.2
19. Nagaland	134.5
20. Odisha	138.4
21. Punjab	89.7
22. Rajasthan	50.1
23. Sikkim	26.4
24. Tamil Nadu	139.3
25. Tripura	302.6
26. Uttar Pradesh	118.2
27. Uttarakhand	76.7
28. West Bengal	238.6
All States	**95.8**
Union Territories	
1. Andaman & Nicobar Islands	15.8
2. Chandigarh	1,857.9
3. Dadra & Nagar Haveli	128.7
4. Daman and Diu	200.0
5. Delhi	1,993.2
6. Lakshadweep	525.0
7. Puducherry	562.8
All Union Territories	**334.8**
All India	**96.5**

Tamil Nadu and Uttar Pradesh have road density varying from 100 to 200 km per 100 sq km. These two sets of states have moderate to high road density due to high level of urbanization and industrialisation. Level land of the Great Plain of North India provides ideal conditions for road construction but building material for road has to be transported from hilly region of the Himalayas or from the northern part of the plateau region as this plain is entirely made up of sand, silt and clay. On the other hand, the Himalayan region abounds in building material but rugged topography and rough terrain hampers the process of

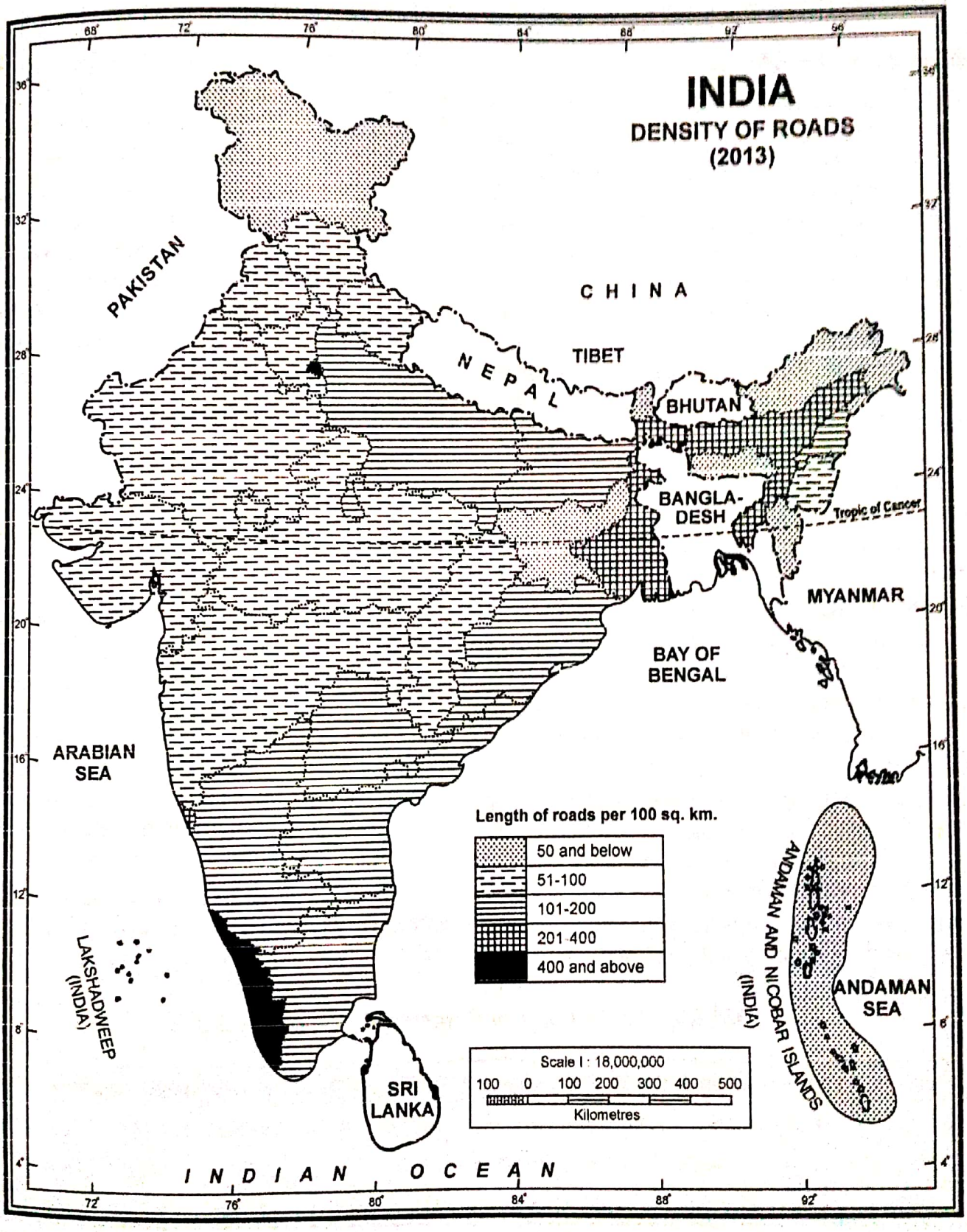

FIG. 26.6. India : Road Density (2013)

road building. This is the reason that most of the Himalayan states like Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Meghalaya, Manipur etc. have low density of roads. Most of the Union Territories are of small size and some of them are highly urbanized. As such they have high road density except Andaman and Nicobar Islands.

Problems and Prospects

Road transportation in India faces a number of problems. Keeping in view the vastness of the dimensions of the country, her physiography, her unlimited natural resources and the fast growing passenger and freight traffic, inadequacy of road network is quite glaring. India's road length of 96.5 km per 100 sq km of area is desperately low as compared to 294.6 km in Japan, 131.2 km in Austria, 451.8 km in Belgium, 147.2 km in France and 172.2 km in Switzerland. Again, India has low road length of 379.3 km per one lakh population as against 893.6 in Japan, 497.2 in Malaysia, 1277.7 in Saudi Arabia, 1392.4 in Austria, 1556 in Hungary, 1572.4 in Sweden, 2494.5 in the USA, 3184.9 in Canada, 4635.4 in Australia and 2705.7 in New Zealand. Lakhs of villages in remote areas are still awaiting a road to reach them.

Another problem is that a little less than half of the roads (40%) are unsurfaced. They can be used only in fair weather and become muddy and unfit for transportation during the rainy season. Efforts need to be made to construct as many surfaced roads as is practically possible.

The national highway network will have to be improved to meet the growing traffic of men and materials. A large section has insufficient road pavement thickness. Other deficiencies are inadequate capacity; poor riding quality, weak and distressed bridges/culverts, congested city sections, too many railway level crossings, lack of wayside amenities and weak road safety measures. About 20 per cent of national highways need widening from single to double lanes and 70 per cent of two lane roads have to be strengthened and selected corridors on national highways need conversion into *expressways*. This is clearly an enormous task and needs huge capital investment which is beyond the capacity of the public sector. Consequently, National Highway Act was amended in 1995 for encouraging private sector to participate in the construction, maintenance and operation of roads on Build, Operate and Transfer (BOT) basis.

The future challenge in road sector revolves around building all-weather roads connecting each and every village to a State Highway or a National Highway. It is imperative to strengthen the road infrastructure for carrying rapidly increasing volumes of agricultural produces to the consuming centres in the near future. *Rural development is closely associated with road development.*

Another very important factor to be considered is the rapidly growing population of motor vehicles and increasing commerce. The number of registered vehicles increased from 306 thousand in 1950-51 to 1,59,491 thousand in 2011-12, thereby registering over 521 times increase in a span of six decades (**Table 26.12**). However, carrying capacity of our roads has not been able to keep with the increase in vehicles. This has led to traffic jams, delays and environmental pollution. The most disturbing factor is that population of motor vehicles is likely to increase at an accelerated rate in the near future. As such there is an urgent need to take steps to increase the capacity of roads.

Building adequate road infrastructure to accelerate the pace of economic progress is an uphill task and requires huge sums of money. The current

TABLE 26.12. Number of Registered Vehicles in India

(in thousands)

Year	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2008-09	2009-10	2010-11	2011-12
All vehicles	306.0	665.0	1,865.0	5,391.0	21,374.0	54,991.0	1,14,051	1,27,746	1,41,866	1,59,491
Goods vehicles	82.0	168.0	343.0	554.0	1,356.0	2,948	6,041	6,432	7,064	7,658
Buses	34.0	57.0	94.0	162.0	331.0	634.0	1,486	1,527	1,604	1,677

Source : The Economic Survey 2013-14, Statistic Appendix, p.31.

estimates suggest that the cost of a four-lane highway works out at roughly ₹ 4.5 crore per kilometre and the cost of a protected access, six-lane express way works out at roughly ₹ 8.5 crore per kilometre. Funds on such a gigantic scale are managed by encouraging private participation, World Bank and imposing cess on fuel, etc.