

SECTOR ASSESSMENT (SUMMARY): TRANSPORT (ROAD TRANSPORT [NONURBAN])¹

1. Sector Performance, Problems, and Opportunities

1. **State context.** Karnataka state in southwest India has an area of about 192,000 square kilometers and a population of about 64 million.² Economically, Karnataka is one of India's better-performing states—the per capita net income is about 50% above the national average, and grew at over 10% per year during fiscal year (FY) 2012 to FY2016.³ The population density is lower than the national average, and the sex ratio (number of females to males) is 968 per 1,000 males, vs. the national average of 940.⁴ The unemployment and poverty rates are also lower than the national averages, and the state receives substantial foreign direct investment (third-highest nationally, after the National Capital Region and Maharashtra).

2. **Transport network.** Roads and railways are primary means of transport and carry the bulk of total traffic. With limited growth in railways in the state—nearly 50% of *Talukas* (administrative divisions) lack rail connectivity—roads will remain critical in accelerating the pace of the state's economic development through (i) increased accessibility, connectivity, and mobility; (ii) intermodal transport development, by linking ports, airports, railway stations; and (iii) increasing connections among agriculture, industries, and tourism centers, as well as rural and urban centers. Air passenger traffic is growing at a rate of 9.2% per year, and air freight traffic at 9.7% per year (both more rapidly than the national average), making it important to improve road connections with airports.

3. **Road network.** Compared to many other states, Karnataka's road network is extensive in terms of total coverage, about 209,871 km in total road length. However, most (nearly 75%), unpaved mud tracks. About 9,481 km (4%) of the total network has 2 or more lanes, which includes national and state highways and major district roads (MDRs); the rest are either single or intermediate lane roads. Given the state's poor rail connectivity, the road network is often the only linkage between rural and urban areas.

4. **Road institutions.** The Karnataka Public Works, Ports and Inland Water Transport Department (KPWD) is the main institution of the Government of Karnataka (GOK) responsible for state highways and MDRs. KPWD established the Karnataka Road Development Corporation, Ltd. (KRDC) in 1999 to promote surface infrastructure by taking up specific road works and bridges, and to establish public-private partnerships (PPPs). In addition, the Karnataka State Highways Improvement Project (para. 13) established a project implementation unit (PIU) to undertake multilaterally financed projects; it has an independent structure, with its own offices and staff, and is headed by a chief project officer, who is a senior officer from the Indian Administrative Services. For rural roads, GOK has established the Karnataka Rural Roads Development Agency (KRRDA), under the state's Rural Development and Panchayati Raj department. Rural roads have been specifically addressed through KRRDA, with funds made available from the state budget and national rural roads scheme.⁵

¹ This summary is based on Karnataka Public Works Department. *State Highways Improvement Project: Karnataka Road Sector Policy, 2009*. Karnataka.

² Government of Karnataka (GOK), Directorate of Economics and Statistics. *Collection of Statistics*. 2015. <http://des.kar.nic.in/docs/sip/GSDP%202015-16AE.pdf>

³ Government of India, Ministry of Finance. 2017. *Economic Survey*. Karnataka, 2016-2017. <http://indiabudget.nic.in/estatvol2.asp>

⁴ Government of India. 2011. *Census*. http://censusindia.gov.in/2011-prov-results/data_files/india/Final_PPT_2011_chapter5.pdf.

⁵ Pradhan Mantri Gram Sadak Yojana is the national rural roads plan.

5. **Transport characteristics.** Demand for road transport in the state has increased rapidly. The number of annually registered vehicles in the state has increased at an average annual rate of about 11% since 2001, with over 17 million motor vehicles on roads in the state in 2016. Two-wheeled vehicles account for about 70% of the total, commercial vehicles for 10%, cars for 11%, and buses for less than 1%. Two-wheeled and non-motorized vehicles are particularly vulnerable to poor road conditions.

6. In 2004, GOK realized the need to expand and upgrade a well-defined core network of at least 40,000 km of national and state highways and MDRs in the state on a priority basis to retain Karnataka's advantage in terms of economic development. The very high traffic growth from 2005 has produced capacity constraints on almost all existing roads, resulting in both serious congestion and intensive wear and tear. From 2004 to 2009, GOK vigorously sought to improve the state's road network; work has been completed on 958 km of national highways by the National Highways Authority of India (NHAI), 2,414 km of state highways through the Karnataka State Highways Improvement Project, 970 km of state highways and 560 bridges by KRDCCL, and 1,000 km of state highways and MDRs by KPWD, in addition to 8,900 km of village connectivity roads under Pradhan Mantri Gram Sadak Yojana (footnote 5). However, the pace of development is inadequate and GOK envisages faster development by mobilizing private sector resources on a large scale for the construction, operation and maintenance of roads. By 2020, GOK is seeking to develop 25,000 km of the core road network (CRN) of state and national highways, upgrade 35,000 km of feeder roads (MDRs), and provide 150,000 km of village connectivity roads.

7. **Road safety.** Karnataka roads accounted for 44,011 accidents (9% of national accidents) resulting in 10,856 fatalities (7% of national road deaths) in 2015. Karnataka was ranked 4th in terms of the number of accidents and fatalities. Although the number of accidents in Karnataka declined marginally (from 44,731 in 2011 to 44,011 in 2015) despite increasing traffic, the number of fatalities increased from 8,971 to 10,856 in the same period. Karnataka's 20,770 km of state highways accounted for 31%–33% of accident cases, injuries and deaths, with an average of 37 accidents reported per day, causing injury to 51 people and 9 deaths. Most of accidents reported are driver-related, but other causes—such as lack of road infrastructure; vehicles parked at road shoulders (1%); accident with trucks and buses (22%); bicycles, pedestrians and others (11%); and accidents at night (43%)—are also significant. Pedestrians, bicyclists, and two-wheeled vehicle users are especially vulnerable, with significant numbers of fatalities among these groups.

8. **Road accident analysis system.** A road accident analysis system was implemented during 2008, and aims to systematize the acquisition, storage, and retrieval of data and thus aid in the design of countermeasures to reduce road traffic accidents. The road accident analysis system application has been implemented at the KPWD server situated at Koramangala, and can be accessed by the KPWD divisions across the state, including the national highway division.

9. **Road information system.** KPWD developed a road information system in 2000, which acts as a comprehensive central database for essential information (e.g., inventory, condition, traffic data, and road finance schemes) in KPWD relating to the road and bridge assets. An integrated mapping function links the database with an electronic road network map. It is well established within KPWD, with many staff aware of its role and functions, and is used in many ways as a source of road network information. An internet interface is available on the KPWD website.⁶ Much of the system's information is publicly available through a web interface.

⁶ Karnataka Public Works, Ports & Inland Water Transport Department. <http://www.kpwd.gov.in/gis.asp>

2. Government's Sector Strategy

10. **Karnataka Road Sector Policy.** GOK formalized its commitment to improve the road sector through preparation of the Karnataka Road Sector Policy, which was approved by the Council of Ministers on 15 March 2009. The policy's seven objectives are to:

- (i) promote economic growth in the State through improved road connectivity, by developing a CRN of national and state highways and MDRs that meets Indian Road Congress (IRC) standards with a minimum two-lane width;
- (ii) promote socioeconomic development in interior and remote areas of the state by ensuring connectivity to the closest MDR for all villages with a population of more than 500, with an all-weather two-lane road available within 3 kilometers of each village;
- (iii) improve transportation network efficiency through an integrated, improved road network connecting intermodal hubs with existing and potential economic growth centers, such as special economic zones, industrial hubs, tourist and heritage centers, and agri-business centers;
- (iv) strengthen road sector institutions to enable orderly, efficient and regulated development of the road sector and maintenance of its assets;
- (v) create a funding mechanism to enable sustainable financing of the development and maintenance of road sector assets;
- (vi) attract and expand PPPs in developing new and maintaining existing roads; and
- (vii) improve road safety and thus reduce the high incidence of road accidents and the associated economic and social losses.

11. ADB technical assistance identified the state's CRN (table), and developed a master plan that addresses many of the state's road sector policy objectives.⁷ The master plan addresses development of the road network while preserving existing road assets through sound asset management principles.

Core Road Network Length	
Administrative Class	Total km
National Highways (NH)	4,491
State Highways (SH)	18,470
Major District Roads (MDR)	1,265
Total	24,226

km=kilometers.

Source: Government of Karnataka

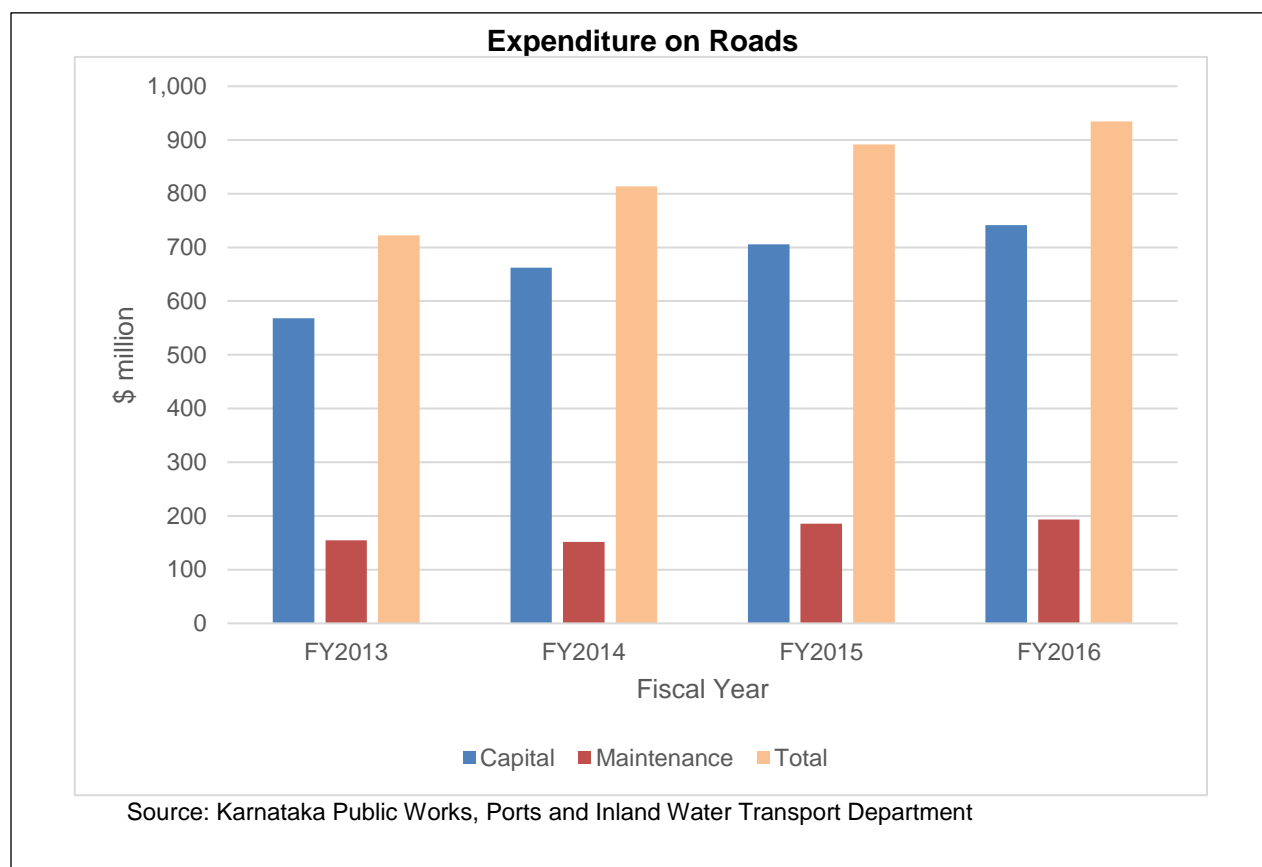
12. **Priority road corridors.** A pre-feasibility report conducted on the CRN, based on broad financial assumptions, categorized projects that could involve PPPs in some form.⁸ The potential modes included build–operate–transfer through the Viability Gap Fund of the Government of India; modified shadow fees (including a Viability Gap Fund payment plus additional payment by the state for exempted vehicles); hybrid annuity (either a toll plus an annuity model or one with upfront payment of specified amounts during construction). Based on the CRN study and the pre-feasibility assessment for PPPs, the PIU identified nine key road corridors, portions of which would be taken up for upgrading with ADB financial assistance, using appropriate PPP frameworks.

⁷ ADB. 2017. *Technical Assistance to India for Karnataka State Highway Network Improvement*. Delhi.

⁸ M/S Deloitte Touche Tohmatsu India Pvt. Ltd, Government of Karnataka. 2012. *Pre-Feasibility Report on Rehabilitation/Upgradation of Core Road Network in Karnataka on PPP Basis*. Bengaluru.

13. The initial Karnataka State Highways Improvement Project was approved by the World Bank in 2001 for \$360 million, and addressed about 2,400 km of roads;⁹ the Karnataka State Highways Improvement II Project is ongoing and covers about 1,500 km of roads, financed by a World Bank loan (approved in 2011 for \$350 million), and an ADB loan (approved in 2010 for \$315 million).¹⁰ However, development of the CRN roads requires further substantial funding, estimated to be in the amount of \$1.7 billion, and the government will continue road development using a mix of funding sources. The development will foster inclusiveness by providing larger segments of the state's population with improved access to markets and basic services.

14. **Budgetary resources.** KPWD currently maintains about 75,000 km of state and national highways, and MDRs, which is equivalent to about 95,000 km of single-lane road. In fiscal year (FY)2016, annual expenditure was about \$950 million. The ratio of capital expenditure to routine maintenance has generally been 80:20. Actual expenditures have been in line with the budget, but have sometimes been 15% higher (such as in FY2015). The budget distribution has roughly 11% for SHDP, 23% for the Karnataka State Highways Improvement II Project, 3% for KRDC, and 63% for other roads under the KPWD. The budget allocations for FY 2013–FY2016 are presented in the figure.



⁹ World Bank. 2001. *Karnataka State Highways Improvement Project*. Washington, DC (P070421).

¹⁰ The second project was a combination of ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Technical Assistance Grant to India for the Karnataka State Highway Improvement Project*. Manila (Loan 2705-IND); and World Bank. 2011. *Second Karnataka State Highways Improvement Project*. Washington, DC (P070421).

15. **Maintenance budget.** The maintenance budget allocation has increased gradually from about \$150 million to \$190 million from FY2014 to FY2016. However, using the 2012 CRN report estimates, these allocations are estimated to be only about 50% of the theoretical requirement. Clearly, the budget for maintenance needs to be augmented to meet the road sector requirements, which requires additional sources of funding. While the government of Karnataka recognizes this requirement, and adopted some measures—such as long-term (20+ years) and medium-term (7+ years) contracts for improving the maintenance of major roads— much remains to be done. As part of this project, a policy dialogue has been initiated with the government of Karnataka to focus on improving road asset maintenance, including through a shift to hybrid-annuity contracts, as proposed in the present project.

16. **Funding Core Road Network improvements.** As per Vision 2020 targets, a CRN length of 20,000 km is required by 2020; of this, about 12,000 km is being constructed to national standards. At the current development and management cost of ₹80 million (equivalent to about \$1.2 million) per km for improving to a two-lane standard with paved shoulders, an estimated additional capital of ₹640 billion (equivalent to about \$10 billion) will be required. This includes the cost of land acquisition, resettlement and rehabilitation (₹80 billion, or about \$1.19 billion) and maintenance cost (1% of construction cost per year). As limited public funds are currently available to finance large future development requirements, the use of innovative financing mechanisms is imperative. This investment is proposed to be met mainly through a combination of the government budget, PPPs, and multilateral borrowing.

17. **Road Safety Policy.** To improve road safety in the state, GOK formulated the Karnataka State Road Safety Policy 2015 that seeks to build a road network that is safe for all road users, with priority given to pedestrians and cyclists, and no road accidents in the long term.¹¹ Its mission is to reduce road accidents by 25% and fatalities by 30% by the year 2020. Major action points under the policy include:

- (i) strengthening the road crash database system, which will assist various government ministries in devising effective strategies for road safety;
- (ii) safe planning and design of roads by identifying accident-prone areas and black spots, taking corrective action to improve these areas, and forming a road safety cell under the KPWD Transport Department and Road Safety Unit;
- (iii) implementing several measures to improve driving conditions, including undertaking awareness campaigns, enforcing the use of seat belts and helmets;
- (iv) undertaking awareness, education and training programs for road users through road awareness programs, and mandatory training for drivers prior to issuance of a driving licence; and
- (v) provision of corpus funds to carry accident victims to the nearest hospital.

3. ADB Sector Experience and Assistance Program

18. **ADB assistance for the Karnataka road sector.** ADB has had significant involvement in the state road sector through the provision of technical assistance that identified the state's CRN (footnote 7), and ongoing assistance in the form of a \$315 million loan addressing 616 km of state highways (footnote 10).

¹¹ Government of Karnataka. 2015. http://transport.karnataka.gov.in/uploads/notice/RS_Policy.pdf

Problem Tree for
Karnataka State Highways Improvement Project-III

