

# India Road Sector Outlook 2017-18

What is the “Road” - map for India’s Ambitious Infrastructure Development Plan?





LSI Financial Services Pvt Ltd

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- ◆ **Mergers and Acquisitions**
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- ◆ **Preparation of DPR/TEFR/TEVR**
- ◆ **Lender's Independent Engineers' (LIE) Services**
- ◆ **Due Diligence**
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# From the Managing Director's Desk



Dear Readers,

*LSI Financial Services Pvt. Ltd with its pan India presence, continues to be a one stop financial service provider. The company in addition to its focus on Debt Syndication, Issue Management (as a Category I Merchant Banker), PE advisory, Financial Restructuring Advisory and M&A Advisory, lays significant stress on creating knowledge pools on economically important topics. It is our belief that our research department is an enabler for dispersion of information and analysis, which we hope will support our esteemed readers in decision making and help build business strategies.*

*In our current edition of India's Road Sector Outlook, we are happy to present the **LSI State-wise Road Network Index** (Discussed in Chapter 3) which has been developed to assess the road development of 28\* Indian states. This composite index can be used to generate meaningful information regarding those elements of infra development which are responsible for putting one state ahead of the other and to understand the best practices adopted by the top-ranking states.*

*India has the second largest road network across the world at 5.23 million km. This road network transports more than 60% of all goods in the country and 85% of India's total passenger traffic. Road transportation has gradually increased over the years with the improvement in connectivity between cities, towns and villages in the country. In India, sales of automobiles and movement of freight by roads is growing at a rapid rate. For creating an adequate road network to cater to the increased traffic and movement of goods, Government of India has earmarked 20% of the investment of \$1 trillion, reserved for infrastructure during the 12th Five-Year Plan (2012-17), to develop the country's roads.*

*We sincerely hope that you will find the contents useful. We also look forward to your valuable feedback.*

A handwritten signature in black ink, appearing to read 'Raj Kajaria'.

**Raj Kajaria**

*\*For this study Andhra Pradesh and Telengana has been clubbed together due to the unavailability of separate data for the two States.*







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# Executive Summary

- Investments in infrastructure will lead to economic growth in India. Infrastructure spending can actually enhance the productive potential of the economy - improving its supply-side. Alternatively, greater state-financed investment in infrastructure can boost the productive potential of the economy by greasing the wheels of economic activity in future. With every 1% rise in infrastructure spending, the economy's GDP is expected to rise by 1%. In 2016, India jumped 19 places in World Bank's Logistics Performance Index (LPI) 2016, to rank 35th amongst 160 countries.
- The value of roads and bridges infrastructure in India was projected to grow at a CAGR of 17.4% over FY12-17. The country's roads and bridges infrastructure, which was valued at \$6.9 billion in 2009, is expected to touch \$19.2 billion by 2017.
- Highway traffic in the country is on a growth trajectory. Overall annual freight traffic in the country is estimated to reach around 13,000 billion tonne km (btkm) by 2030 from about 2,000 btkm in 2011-12. Overall annual passenger traffic is estimated to reach around 168,000 billion passenger km (bpkm) by 2030 from about 10,000 bpkm in 2011-12. For both of the above, road transport is likely to cater to around 50% of traffic. These factors will generate the demand for roadways to a great extent.
- Measuring infrastructure performance is required for decision making purposes to improve the availability and capacity of existing infrastructure and extend it in other directions as well. **The LSI State-wise Road Network Index** (discussed in Chapter 3) has been developed with an objective to assess the road network development in the Indian States. The index can be used to generate meaningful information regarding those elements of infrastructure development which is responsible for putting one State ahead of the other and to understand the best practices adopted by the top-ranking States.
- India has the 2nd largest road network in the world. However, India's national highways and expressways constitute only 1.7% of the road length, and the percentage of paved roads is only 49.3%, lagging behind both USA and China. Some of the biggest challenges faced by the Indian roads sector are congestion, poor quality, poor maintenance and poor access to rural areas. Despite the challenges, as on March 31st 2015, India's road density stood at 1.66 km/sq. km of area and was higher than that of Japan, USA, China, Brazil and Russia.

## 2 India's Road Sector Scenario - 2017

India has the second largest road network across the world at 5.25 million km. This road network transports more than 60% of all goods in the country and 65% of India's total passenger traffic. Road transportation has gradually increased over the years with the improvement in connectivity between cities, towns and villages in the country. In India, sales of automobiles and movement of freight by roads is growing at a rapid rate. For creating an adequate road network to cater to the increased traffic and movement of goods, Government of India has earmarked 20% of the investment of \$1 trillion reserved for infrastructure during the 12th Five-Year Plan (2012-17) to develop the country's roads.

**Market Size**  
The value of roads and bridges infrastructure in India was projected to grow at a CAGR of 17.4% over FY12-17. The country's roads and bridges infrastructure, which was valued at \$6.9 billion in 2009, is expected to touch \$19.2 billion by 2017.

The construction of highways had reached an all-time high of 6,029 km during FY 2015-16, and the increased pace of construction is expected to continue for the coming years.

Under the Pradhan Mantri Gram Sadak Yojana (PMGSY), 133 km of roads per day were constructed against 113-14 coverage of 979 km p

Exhibit 4: Roads/Bridges Spending, India, 2009 - 2017



- Roads and bridges infrastructure value in India at a CAGR of 13.6% over FY12-17.
- In 2016 the roads and bridges infrastructure value is valued at \$16.1 billion with up to \$19.2 billion in 2017.

Exhibit 5: Initiatives Undertaken in the Indian Road Sector, 2016-17

- National Highways length to reach 100,000 km by 2017.
- Government proposed to increase 7 lane highways to 4 lane (aid allocated \$63 billion).
- 100% FDI has been under automatic subject to approval.
- Companies enjoy 100% tax exemption in road projects for 5 years 20% relief over next 5 years.

**Basic Framework adopted for constructing the Index:**

- Theoretical Frameworks
- Data selection
- Normalization
- Weighting and aggregation
- Uncertainty and sensitivity analysis
- Visualization of the results

**Steps adopted for indexing:**

- Listing of indicators under broad heads namely, General, Access, Quality & Utilization and Costs, Revenue & Investments.

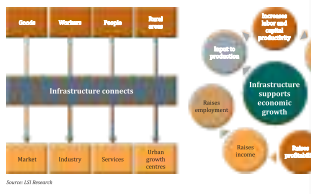
## 3 The LSI State-wise Road Network Index

World Bank in one of its report pointed out that productivity growth is higher in countries with an adequate and efficient supply of infrastructure services. Provision of infrastructure services to meet the demand of business, households and other users is one of the major challenges of economic development. Private investors do consider infrastructure services as an important consideration in their investment decisions. According to this report, a one percent increase in the stock of infrastructure is associated with a one percent increase in gross domestic product (GDP) across all countries. In an

increasingly globalising world, availability of good quality infrastructure is a crucial factor in attracting foreign investments. Availability and accessibility of adequate infrastructure in a country on par with international community is an indicator of the presence of high quality of life.

**How does Infrastructure help?**  
A country's development is strongly linked to its infrastructure strength and its ability to expand trade, cope with population growth, reduce poverty and provides people with the services they

Exhibit 12: Advantages of Infrastructure



**Measuring Infrastructure and its Importance**  
"You cannot manage what you cannot measure" is the stated adage. Measuring infrastructure performance is required for decision making purposes to improve the availability and capacity of existing infrastructure and extend it in other directions as well. Therefore, to create and manage good quality infrastructure, we need to have some measures of infrastructure.

The LSI State-wise Road Network Index Objective  
The LSI State-wise Road Network Index developed with an objective to assess the development in the Indian states. To use to generate meaningful information:

- Assess the condition of the existing assets
- Re-evaluate the extent to which the infrastructure meets current demand
- Assess whether infrastructure is likely to meet demand in the future
- Benchmarking to compare one state's availability with others.

The ministry has initiated a series of measures to decentralise work in the last two-and-a-half years, they have resolved issues that were stalling about 80 projects. Besides, the ministry also empowered states to approve projects worth up to ₹100 crore and invite tenders. Earlier all such projects used to come under the Centre resulting in delays.

**Demand for Roads**  
Greater connectivity between different cities, towns & villages has led to increased road traffic over the years. Growth in automobiles and freight movement commands a better road network in India. Rise in the number of 2 & 4 wheelers, increasing traffic supports growth.

## 6 The Road Construction Sector

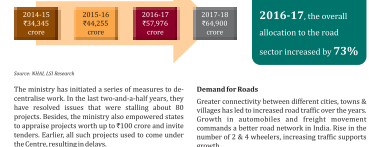
The present government built 22 km of roads per day in 2016-17, missing its ambitious target of constructing 43 km every day. Road transport minister Mr. Nitin Gadkar had set an all-time high target of building 13,500 km of roads in 2016-17 but only managed 8,200

km of roads. This construction figure, however, is the highest that the ministry has achieved till date and more than double of what the previous government managed between 2009 and 2014, on an average 4 km to 9 km of roads were built per day.



Mr. Gadkar had also set a target of averting 25,000 km of stretch under highway projects in 2016-17 as compared to around 14,000 km by March 31, 2017. Even though the target was not met, this is the highest figure so far. Delay in land acquisition and land response from private developers came in the way of the ministry meeting its target. According to the

Exhibit 36 : Allocation to the highway sector



Between 2014-15 and 2016-17, the overall allocation to the road sector increased by 73%.

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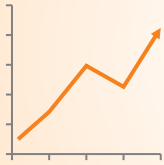
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# Economic Facts & Figures, India, 2015 - 2017

## GDP Growth (Annual)



**8.01%**    **7.11%**

## Roads & Bridges Spending (\$ Billion)



**13.40**    **16.10**

## Sectoral Contribution to GDP



Services

**52.9%**    **58.8%**



Industry

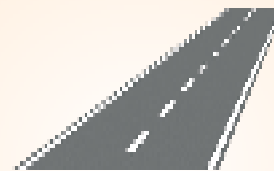
**29.6%**    **28.8%**



Agriculture

**17.5%**    **17.4%**

## Roads Budget Allocation



**US\$ 6.20 billion**

**US\$ 8.52 billion**

## Inflation, Consumer Prices (Annual)



**4.91%**    **4.94%**

## Current Account Deficit (% of GDP)



**-1.06%**    **-0.7%**

## Unemployment Rate



**3.49%**    **3.46%**

## Government Debt (% of GDP)



**69.60%**    **69.50%**

2015-16     2016-17

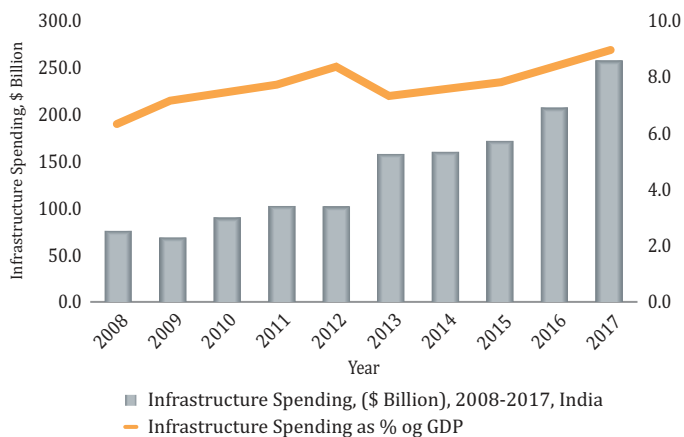
Source: World Bank Database, Ministry of Finance Government of India, Reserve Bank of India (RBI), Mint, First Post, Central Statistics Office



# 1

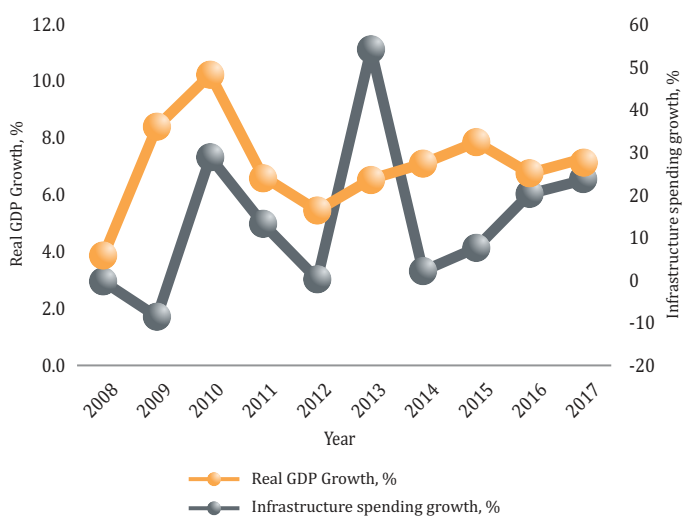
# Infrastructure Spending Leading to Economic Growth

**Exhibit 1 :  
Infrastructure Spending, India, 2008 - 2017**



Source: IBEF & LSI Research

**Exhibit 2 :  
Infrastructure Spending and  
Economic Growth, India, 2008-2017**



Source: IBEF & LSI Research

**Exhibit 3 : Summary of Projects Completed During 12th Five Year Plan, India**

	No. of Projects	Original Cost (₹)	Anticipated Cost (₹)	Cumulative Expenditure (₹)
Road Transport & Highways	91	44,413.24	44,620.56	55,843.73

Source: IMF, IBEF & LSI Research

Good transport infrastructure can enhance labour mobility in the same way as good energy infrastructure can deliver low cost power to fuel industry. When it comes to macroeconomic health, however, large numbers of politicians and economists now make the case that a lot more State-led infrastructure investment is needed to boost growth.

There are two separate arguments for this:

1. Infrastructure spending is a useful tool of Keynesian economics. This says that when an economy is in recession or slowing, and unemployment is high, government spending to finance and/or build infrastructure can help alleviate unemployment directly and have a strong multiplier effect on the economy more generally.
2. Infrastructure spending can actually enhance the productive potential of the economy – improving its supply-side. This argument says that greater State-financed investment in infrastructure can boost the productive potential of the economy by greasing the wheels of economic activity in future.

For the Indian economy, theory 2 will hold good where increase in infrastructure spending calls for more spending to boost the supply-side. They point to low interest rates at the moment and say that this is an opportune time for the government to invest in roads, rail, energy, housing and ports.

India's infrastructure spending has grown with a CAGR of 13.64% within the period 2008 to 2016 and is expected to be \$260.2 billion by 2017. This will be about 9% of the Indian GDP. While examining the relationship between the real GDP growth and the growth in infrastructure spending in India, a positive relation was observed where infra spending takes a lead to push economic growth. In 2016, India jumped 19 places in World Bank's Logistics Performance Index (LPI) 2016, to rank 35th amongst 160 countries.

## India's Road Sector at a Glance



### Second Largest Road Network

- FY16, India had the 2nd largest road network in the world, spanning over a total of 5.23 million kilometres. Over 64.5% of all goods in the country are transported through roads, while, 85.9% of the total passenger traffic uses road network to commute.



### Rising Budget Allocation for Road Sector

- During FY17-18, Government of India allocated US\$ 9.51 billion for development of national highways across the country, up from US\$ 8.52 billion allocated in FY 16-17.



### Increasing Private Sector Involvement

- The private sector is emerging as a key player in the development of road infrastructure in India. As of October 2016, 304 projects were recommended for development by the Public Private Partnership Appraisal Committee (PPPAC). Investment of US\$ 31 billion is expected under the PPP model by 2020 for national highways.



### Rapidly Growing National Highways

- Length of national highways in India increased from 97,135 kilometres in FY15 to 1,00,475 kilometres in FY16. As a part of infrastructure reforms, the government plans to double the length of national highways to 2,00,000 kms. As of February 2017, national highways of 6,604 kms in length were constructed, against a target of 15,000 kms under various road transport & highway projects.



### Foreign Investments in Infrastructure Development

- CPPIB (Canada Pension Plan Investment Board) plans to invest US\$ 322 million for infrastructural development in India.
- The Government has received public sector undertakings from countries like Malaysia & Japan for funding the upcoming highway projects in India. Malaysia is expected to fund these projects internally through the hybrid – annuity model. 60% of the investment is to be borne by the private investors and 40% by NHAI in 5 equal instalments.
- Japan International Cooperation Agency signed an agreement with the Mumbai Metropolitan Region Development Authority to provide official development assistance (ODA) loan worth US\$1.28 billion for the trans-harbour link project in the city of Mumbai, with a 30-year repayment period, including 10 years of grace period.
- As of November 2016, Union Government & Asian Development Bank signed a US\$ 500 million loan agreement to build the longest bridge across river Ganga, in Bihar.



Source: NHAI, MoRTH, IBEF

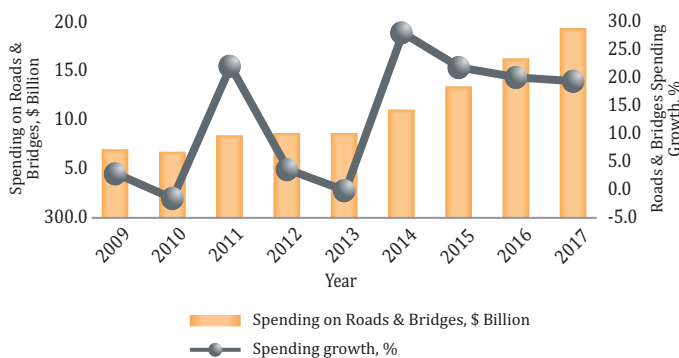


# 2

## India's Road Sector Scenario - 2017

India has the second largest road network across the world at 5.23 million km. This road network transports more than 60% of all goods in the country and 85% of India's total passenger traffic. Road transportation has gradually increased over the years with the improvement in connectivity between cities, towns and villages in the country. In India, sales of automobiles and movement of freight by roads is growing at a rapid rate. For creating an adequate road network to cater to the increased traffic and movement of goods, Government of India has earmarked 20% of the investment of \$1 trillion reserved for infrastructure during the 12th Five-Year Plan (2012-17) to develop the country's roads.

**Exhibit 4 :**  
**Roads/Bridges Spending, India, 2009 - 2017**



Source: IBEF, LSI Research

### Market Size

The value of roads and bridges infrastructure in India was projected to grow at a CAGR of 17.4% over FY12-17. The country's roads and bridges infrastructure, which was valued at \$6.9 billion in 2009, is expected to touch \$19.2 billion by 2017.

The construction of highways had reached an all-time high of 6,029 km during FY 2015-16, and the increased pace of construction is expected to continue for the coming years.

Under the Pradhan Mantri Gram Sadak Yojana (PMGSY), 133-kms of roads per day were constructed in 2016-17 as against a 2011-14 average of 73-km per day.

- **Roads and bridges** infrastructure value in India to grow at a **CAGR of 13.6%** within 2009 and 2017.
- In **2016** the roads and bridges were valued at **\$16.1 billion** which will go up to **\$19.2 billion** in **2017**.

**Exhibit 5 : Initiatives Undertaken in the Indian Road Sector, 2016-17**

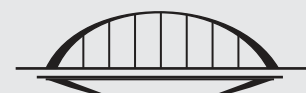
National Highways length to reach 100000 km by 2017



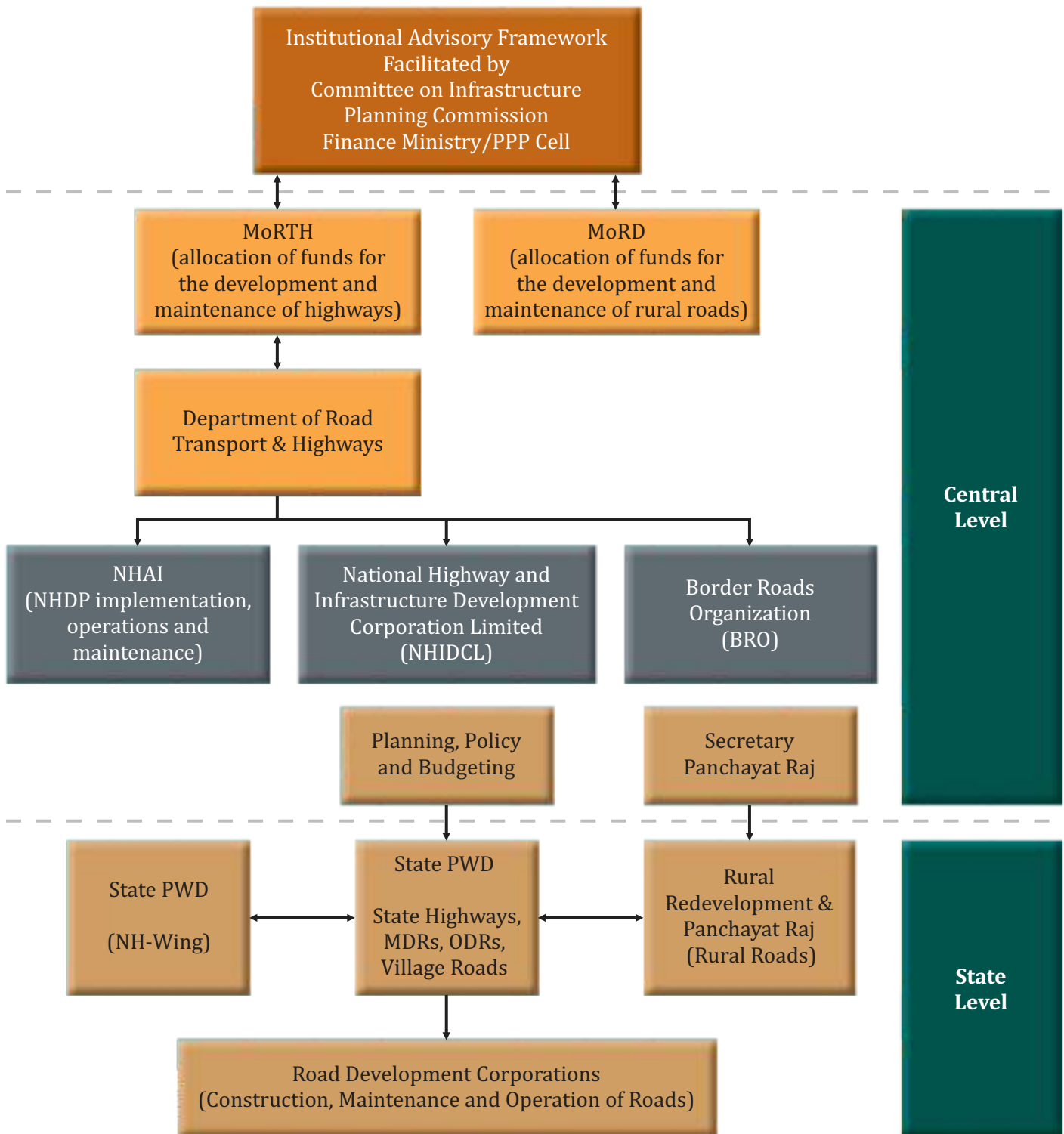
Government proposed to increase 2 lane highways to 4 lane; fund allocated \$65 billion

Companies enjoy 100% tax exemption in road projects for 5 years 30% relief over next 5 years

100% FDI has been allowed under automatic route, subject to applicable rules & regulations



## Administrative Framework for Roads



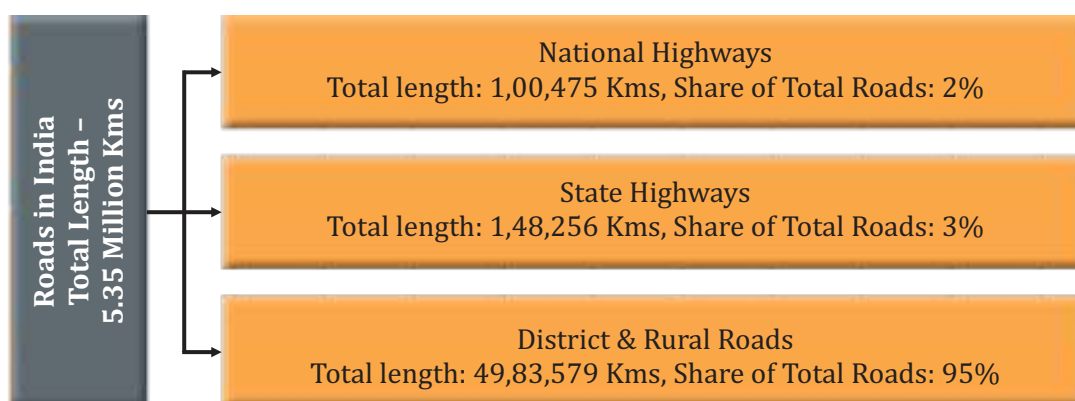
MoRTH : Ministry of Road Transport and Highways  
 MoRD : Ministry of Rural Development  
 NHAI : National Highways Administration of India  
 NHDP : National Highway Development Plan  
 PWD : Public Works Department  
 MDRs : Major District Roads  
 ODRs : Other District Roads  
 PPP : Public Private Partnerships

Source: LSI Research





## Exhibit 6 : Types of Road in Indian Road Network



Source: NHAI, LSI Research

The development of road network is the responsibility of the Government of India (GOI) and is being implemented on an agency basis. The Ministry of Road Transport & Highways (MoRTH) is the apex body overseeing other agencies. The National Highway Authority of India (NHAI), the State Public Works

Departments (PWDs) and the Border Roads Organizations (BRO) are the different agencies responsible for construction, maintenance and development of the roads network in India. The other relevant co-ordinating agencies for various types of roads are shown in the table below.

## Exhibit 7: Co-ordinating Agencies and Connectivity of Various Types of Indian Roads

Type of Road	Co-ordinating Agency	Connectivity to
Expressways	MoRTH, NHAI, State Road Development Corporation	State capitals and Tier-1 cities
National Highways	MoRTH, NHAI, BRO	Union capital, State capitals, Major ports, Strategic locations
State Highways	State PWDs	State capitals, District centres, Important towns, National highways, Other states
Major District Roads	State PWDs	State capitals, District centres, Important towns, National highways
Project Roads	State PWDs / Project Organizations	Projects on irrigation, power, mines, etc.
Urban Roads	Municipal Corporations	Intra city networking
Rural & Other Roads	Ministry of Rural Development (MoRD) and State Rural Road Development Agencies	Production centres, Markets, Highways, Railway stations
Village Roads	Zilla Parishads / State Governments	Villages, District Roads, Railway Stations, Riverside, etc.

Source: LSI Research

## Exhibit 8: Major Clearances required for Roads and Highways Development

Clearances	Clearing Authority
Cost Estimate	MoRTH / PWD / NHAI
Techno-Economic Clearances	MoRTH / PWD / NHAI
Pollution Clearance (Water & Air)	Central Pollution Control Board
Forest Clearance	Ministry of Environment & Forests
Environmental Clearance	Ministry of Environment & Forests
Company Registration	Registrar of Companies
Rehabilitation & Resettlement of Displaced families	MoRTH, State Governments and NHAI

Source: LSI Research

## National Highways

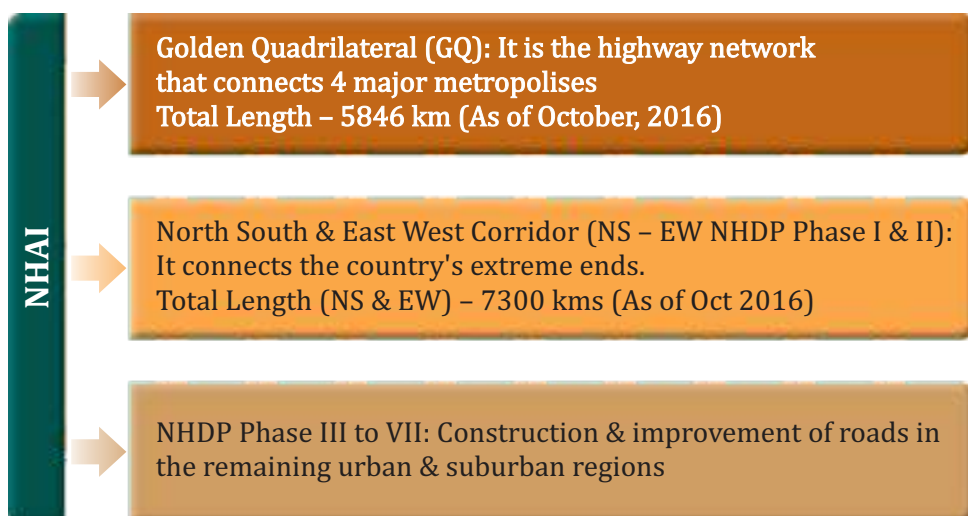
The size of national highway crossed 1,00,000 kms in 2016 from 97,135 kilometres as on FY15. Double-lane highways constitute the largest share of highways in India (40,658 kms). Double-lane highways are followed by single/intermediate-lane (19,330 kms) & 4/6/8-lane (19,128 kms) highways. The Government has proposed to upgrade 2 lane national highways into 4 lane national highways for which US\$ 65 billion has been allocated. This step is expected to reduce the passenger car units (PCU) to 10,000 per day.

The Government of India approved US\$ 1.04 billion

projects for construction & upgrading 558 kms of roads to link the country with Bangladesh, Bhutan & Nepal. The project will ease the movement of passengers & cargo and increase inter-regional trade by 60%. Around 50% funding for the projects would come from Asian Development Bank (ADB). In response from institutional investors from Canada, Middle East & the US, in February 2017, NHAI floated bids to monetise 10 national highway projects in the country.

Government of India has formulated a seven-phase programme, 'National Highway Development Project (NHDP)', vested with NHAI, for the development of National Highways in the country.

## Exhibit 9: Adoption of NHDP for Highway Development



## State Highways

State roads tend to suffer from low investments, inadequate carriageway width to meet traffic demand, weak pavement and bridges, congested stretches passing through cities and towns, poor safety features and road geometrics and inadequate formation width in hilly and mountainous regions, among others.

The 12th FYP focused to encourage states to develop a

core road network. The development of both the four-lane and two-lane roads will be taken up as part of this plan. The resources required for the government's programme of the above are estimated at INR 4900 billion of which 20% is expected to be funded via private sector investment. For this purpose, PPPs would be encouraged pursuant to the Viability Gap Funding (VGF) scheme available through the government.



The MoRTH finances the development of state roads through the Central Road Fund (CRF) and VGF.

The CRF was given statutory status by the Central Road Fund Act, 2000. The CRF consists of the cess collected on the sale of diesel and petrol. The MoRTH provides funds for the development of state roads from the amounts collected by the CRF and also provides funds for the development of roads under the Inter-State Connectivity Scheme and the Economic Importance Scheme.

The government created a VGF arrangement for projects in the infrastructure sector which are seemingly marginally viable or unviable to attract investments, including through PPPs. This was done to expand the network of roads in India, particularly the state highways, which are part of the secondary road transportation network.

States also generate their own funds through road cess and other such local taxes. States allocate these funds to State PWDs who are entrusted with road development and maintenance. Many states also have incorporated road development corporations to generate funds for road development through other ways, leases of government land and tolling of developed roads. States also look to long term loans from institutions like the

World Bank, the Asian Development Bank and the Japan International Co-operation Agency.

### **Pradhan Mantri Gram Sadak Yojna (PMGSY)**

#### **Rural Road Construction and Maintenance**

The PMGSY was launched in December, 2000. This has revolutionised the system of planning of road network for each district in consultation with the Panchayati Raj Institutions (PRIs), Members of Legislative Assembly (MLAs) and Members of Parliament (MPs) to create well engineered assets. The scheme aims to provide good quality all-weather single connectivity to every eligible habitation.

When the programme was launched, the Central Government provided 100% funding for construction and the State Government provided 100% for the maintenance of the rural roads. Recently, there has been a change in the funding pattern of construction of rural roads under PMGSY. Now, the share of the Central Government in construction is 90% in North Eastern States, Sikkim, Jammu and Kashmir, Himachal Pradesh and Uttarakhand and 60% in other states. For maintenance, the State Government is still 100% responsible. The entire programme is administered by the Ministry of Rural Development (MORD), Government of India.

### **Exhibit 11: Progress of Pradhan Mantri Gram Sadak Yojna (PMGSY)**



Source: Impact Assessment Study of Improved Rural Road Maintenance System under PMGSY, GOI

The maintenance of these roads on a timely and regular basis continues to be an area of concern. Maintenance is important because it prolongs the life of the roads. Studies in India and abroad have confirmed that ₹1 million invested in routine maintenance saves ₹2 million required for periodic surface renewal and ₹1 million invested in surface renewal saves ₹2 million required for reconstruction.

The construction of all-weather roads has led to continuity and uninterrupted connectivity which has opened up the flow of goods and services to the villages and regular and faster access to facilities outside the villages for villagers. However, when the roads are not maintained, the road access is disrupted for a

substantial period thereby causing huge discomfort to the residence therein who actually got used to the improved access after construction of the roads. Many important facilities like education, health, markets, administration and other important establishments become accessible for the rural population if roads are built and maintained to their villages.

#### **Impact of Rural Roads on Agriculture**

Roads also make access to markets easier for the farmers as they impact the cultivation choices and thereby result in positive changes in cropping patterns. Rural road infrastructure is also very important to maintain the supply and distribution of agricultural inputs. The biggest gain has been for the habitants in

Uttar Pradesh where the average distance travelled have reduced by 2.75 km and the saving in travel time by almost 61% after the road was constructed.

### **Employment Generation and Rural Roads**

The availability of roads facilitates more business in the villages and increases the employment opportunities as well as helps people to travel outside for jobs. Significant improvements have been found in increased employment amongst households engaged in other occupation than their own farms.

### **Impact on Health Factors and Education**

There has been a significant improvement in access to health facilities after construction of the rural roads to the habitations. The travel time to reach the nearest health facility has reduced largely after the building of rural roads. Improved road connectivity has also

resulted in very significant improvements in the status of education facilities in the villages and also access to higher education facilities available in the nearby cities

### **Impact on Other Aspects**

The living conditions and security have experienced upgradation after the construction of rural roads in villages. The income for many households engaged in farming, trading, transport and other services has increased. With the construction of roads, more households now construct 'pucca' houses and sanitary latrines. The number of NGOs and voluntary organizations visiting the habitations have also increased after the construction of roads. Furthermore, the roads have also increased the connectivity of villagers to various administrative centres and have resulted in many improvements in the Public Distribution System (PDS) in the connected villages.





# 3 The LSI State-wise Road Network Index

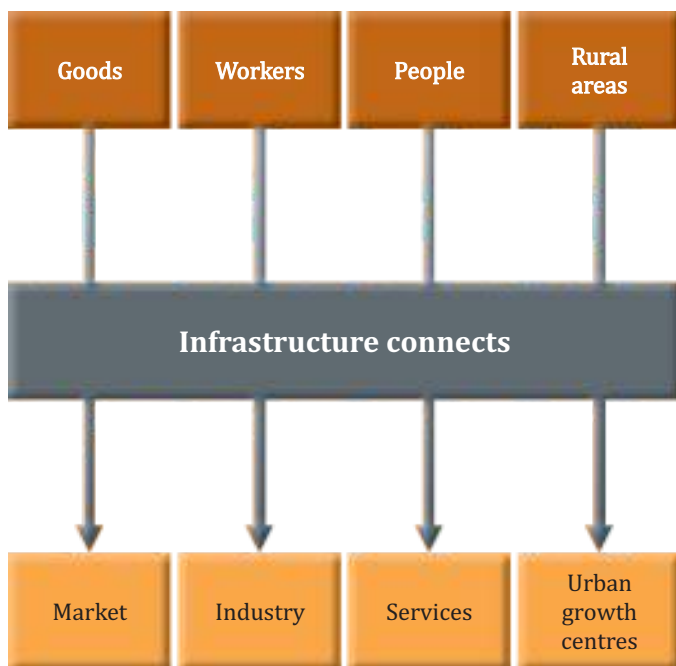
World Bank in one of its report pointed out that productivity growth is higher in countries with an adequate and efficient supply of infrastructure services. Provision of infrastructure services to meet the demands of business, households and other users is one of the major challenges of economic development. Private investors do consider infrastructure services as an important consideration in their investment decisions. According to this report, – a one percent increase in the stock of infrastructure is associated with a one percent increase in gross domestic product (GDP) across all countries”. In an

increasingly globalising world, availability of good quality infrastructure is a crucial factor in attracting foreign investments. Availability and accessibility of adequate infrastructure in a country on par with international community is an indicator of the presence of high quality of life.

### How does Infrastructure help?

A country's development is strongly linked to its infrastructure strength and its ability to expand trade, cope with population growth, reduce poverty etc. It provides people with the services they need and want.

**Exhibit 12: Advantages of Infrastructure**



Source: LSI Research

### Measuring Infrastructure and its Importance

“You cannot manage what you cannot measure” is the stated adage. Measuring infrastructure performance is required for decision making purposes to improve the availability and capacity of existing infrastructure and extend it in other directions as well. Therefore, to create and manage good quality infrastructure, we need to have some measures of infrastructure.

Measuring the infrastructure will serve following purposes:

- Assess the condition of the existing assets
- Evaluate the extent to which the infrastructure



meets current demand

- Assess whether infrastructure is likely to be able to meet demand in the future
- Benchmarking to compare one infrastructure availability with others.

### The LSI State-wise Road Network Index

#### Objective

The LSI State-wise Road Network Index has been developed with an objective to assess the road network development in the Indian states. The index can be used to generate meaningful information regarding



those elements of infra development which are responsible for putting one state ahead of the other and to understand the best practices adopted by the top-ranking states. The rank/score obtained by one state in this index measures specifically the growth that happened in the road sector in the last 5 years.

### Methodology

The LSI State-wise road network Index is a composite index which ranks the 28 Indian States (Andhra Pradesh and Telangana have been clubbed together due to unavailability of data) on the basis of their road network status. 4 pillars have been used to construct this index.

Each pillar contains important indicators which measure the all-round road and transport infra development.

### Exhibit 13: Description of Pillars Used in the LSI State-wise Road Network Index

Pillar Name	Description
General	Indicators measure the demographic and economic profile of the states. It also takes into account the affordability aspect of the population with respect to the transport infrastructure.
Access	Indicators measure the availability of infrastructure over a geographic area and the proportion of population.
Quality & Utilization	Indicators measure the quality i.e. whether the available infrastructure is of use or not and whether the infrastructure is being utilized to its full capacity or not.
Costs, Revenue & Investments	Indicators include budget outlay, expenditure, investment and revenue generated with respect to the infrastructure/road sector.

Source: LSI Research

### Basic framework adopted for constructing the index:

- Theoretical framework
- Data selection
- Normalization
- Weighting and aggregation
- Uncertainty and sensitivity analysis
- Visualization of the results

### Steps adopted for indexing:

1. Listing of indicators under broad heads namely, General, Access, Quality & Utilization and Costs, Revenue & Investments.

2. Compilation of data for the listed indicators.
3. Rescaling of the data on a 10-point scale.
4. Assigning weights to each indicator under the 4 pillars.
5. Separate indices formed for General, Access, Quality & Utilization and Costs, Revenue & Investments.
6. Weights assigned to Sub-Indices. Assigned pillar weights as Access – 30%, Cost – 30%, Quality& Utilization – 20% and General – 20%.  
Logic: Giving access to roads is the most important issue and this will incur cost and will need substantial amount of investments. Next comes the quality of the infrastructure and to what extent it is utilized by the population. Last but not the least, the construction of the road network in a given state/area will depend on the requirement of the population, supported by their economic ability and affordability.
7. Composite State-wise Road Network Index formed.



## Indicators

### Exhibit 14: Indicators Used in the LSI State-wise Road Network Index

General Indicators	
Demographic	Land area (1000 Sq. Km) Total Population (000) Population Density (Per Sq. Km) Rural Population (% of Total Population) Rural Population (000) Urban Population (% of Total Population) Urban Population (000)
Economic	State GDP at Constant Prices (Crore INR 2011-12 prices) State GDP at Current Prices (Crore INR) State Per Capita GDP (INR) State NDP Growth, 2014-15(%) Economic Growth (2012-2016), %
Affordability	<b>Average annual price of fuel</b> Petrol Diesel <b>Monthly Per Capita Expenditure on Transport (INR)</b> Urban Rural
Access Indicators	
Road Network	National Highways State Highways Urban Roads Rural Roads Project Roads Other PWD Roads Total Roads Total number of roads & bridges projects done, 2010-2016
Road Density	<b>Lane (km/1000 sq. km)</b> National Highway State Highway <b>Population (Km/1000 people)</b> National Highway State Highway
Registered Motor Vehicles	Total (000) Per 1000 Population Vehicle Density (vehicle/Km)
Quality & Utilization Indicators	
Total Surfaced Road Network (Km)	National Highways State Highways Urban Roads Rural Roads Project Roads Other PWD Roads Total Roads % of Total roads

Contd.



Quality & Utilization Indicators	
Accidents	Total number per 1000 vehicles per 1000 km of roads
Costs, Revenue & Investment Indicators	
Costs & Revenue	Expenditure on Roads (in INR Crores), 2015-16 Outlay Expenditure Cost Escalation Rate (%) Delay of Transport Infrastructure Projects (in Months) Revenue Realised from Road and Transport sectors
Investments	Infrastructure Investment share in India's Infrastructure Investment, 2015 Infrastructure Investment Growth (CAGR), 2010-2015 Ownership-wise Infrastructure Investment Growth (CAGR), 2010-2015 - Public & Private

Note: Latest available data have been used for all indicators unless otherwise mentioned.

## Index Result

### Exhibit 15: Rank and Score of Indian States in LSI State-wise Road Network Index\*

Rank	State	Road Network Index Score
1	Maharashtra	5.70
2	Uttar Pradesh	5.60
3	Karnataka	5.00
4	West Bengal	4.90
5	Tamil Nadu	4.80
6	Rajasthan	4.70
7	Andhra Pradesh	4.70
8	Bihar	4.60
9	Gujarat	4.30
10	Orissa	4.10
11	Madhya Pradesh	4.00
12	Uttarakhand	3.90
13	Kerala	3.60
14	Haryana	3.40
15	Punjab	3.30
16	Himachal Pradesh	3.20
17	Jharkhand	3.00
18	Assam	2.90
19	Chhattisgarh	2.80
20	Tripura	2.70
21	Goa	2.70
22	Manipur	2.60
23	Nagaland	2.50
24	Jammu & Kashmir	2.50
25	Meghalaya	2.50
26	Mizoram	2.40
27	Sikkim	2.30
28	Arunachal Pradesh	2.30

Note: Andhra Pradesh and Telangana have been clubbed for this study due to the unavailability of separate data for the two states.

\*For detailed scoring please refer to Pg. Nos. 18 & 19.

Source: LSI Research



## Case Studies on States' Road Network

In this section, we present the case studies on the road network development of some of the Indian states.

- High Scoring States – Maharashtra, Uttar Pradesh and Karnataka
- Median Scores States – Orissa and Madhya Pradesh
- Low Scoring States – North Eastern States

### Maharashtra

As per the LSI State-wise Road Network Index score,

Maharashtra ranks first with a score of 5.7 (the range being between 1 to 10). The Road Development Plan 2001-2021 is being implemented in the state with a target to develop 3.37 lakh km roads. The total road length maintained by the Public Works Department (PWD) of the State Government and Zilla Parishads (ZP) (excluding road length maintained by other agencies) at the end of March 2016 was approximately 3.01 lakh km.

### Exhibit 16: Road Length (in Km) Maintained by PWD and ZP as on 31.03.2016

National Highways	Major State Highways	State Highways	Major District Roads	Other District Roads	Village Roads	Total
7,438	5,180	33,330	50,844	58,116	1,45,881	3,00,789

Source: PWD, Government of Maharashtra

The Government of India introduced the Central Road Fund (CRF) in 2001-2002 to disburse funds for the development and maintenance of national highways, rural roads, state roads (of economic importance and

to promote interstate connectivity) and construction of roads either under or over the railways by means of a bridge and erect suitable safety works at unmanned rail-road level crossings.

### Exhibit 17: Progress of CRF in Maharashtra

Year	Sanctioned Length (km)	Amount Sanctioned (INR crore)	Length Completed (km)	Expenditure (INR crore)
Up to 2012-2013	7,044.68	2,469.66	7,044.68	2,572.85
2013-2014	48.35	84.00	48.35	79.11
2014-2015	257.29	390.89	243.62	280.03
2015-2016	977.87	1,796.68	316.30	352.40
2016-2017*	1,233.63	3,106.39	6.50	237.06
<b>Total</b>	<b>9,561.82</b>	<b>7,847.62</b>	<b>7,659.45</b>	<b>3,521.45</b>

Source: PWD, Government of Maharashtra

\*Up to January

The **Pradhan Mantri Gram Sadak Yojana (PMGSY)** was launched by the Government of India to provide connectivity to unconnected habitations as part of a poverty reduction strategy. A target of 24,439km of road length for connecting 8,315 habitations in the state has been set under PMGSY. Up to November 2016, road length of 23,198km has been created connecting 8,218 habitations. The Government of India has sanctioned PMGSY-II (Sharing pattern is 60% of central government and 40% of state government) for the states achieving 100% target of connectivity to the unconnected habitations and 75% target of upgradation. Under this programme, only upgradation of roads can be undertaken. A target of 2,620 km road length has been set by Government of India for the State.

**Chief Minister Gram Sadak Yojana** is being implemented from 28th October 2015 for connecting unconnected habitations and upgradation of existing

rural roads in the State. During 2015-16 and 2016-17, physical target of 7,200 km of village roads is set. Under this scheme, total of ₹221.10 crores is spent on the works.

**Maharashtra State Road Development Corporation Ltd. (MSRDC)** is the nodal corporation in charge of road projects, flyover projects, toll collection rights and works under construction. It is fully owned by the Government of Maharashtra. MSRDC has completed 19 projects incurring an expenditure of ₹7,765 crores up to October 2016. The total toll collection from partially and fully completed projects up to October 2016 was ₹7,049 crores as against the total expenditure of ₹8,700 crores.

Some of its major projects are listed below:

- Bandra Worli Sea Link, 2010: It has an eight-lane facility with an automated toll collection system. The estimated savings in Vehicle Operating Costs

(VOC) is ₹100 crores per annum and the estimated savings in terms of time is between 20-30 minutes.

- 50 Flyovers (Mumbai Traffic Improvement Mega Project), 2012: These flyovers are located on major traffic corridors of- Sion-Panvel Expressway, Western Express Highway, Eastern Express Highway and other Major roads in Mumbai city. The total cost of the project stands at ₹1500 crores. Till June 2017, 37 flyovers have been completed and 2 are in progress.
- Flyovers at Barfiwala Lane Junction, Andheri, 2012: The revised contract value for the project was ₹46.33 crores and the overall length of the flyover is 567.7 meters.
- Mumbai Pune Expressway, 2002: The complete cost of this project was ₹1200.46 crores. This was India's first six lane access control expressway.

- Flyover between Eastern Express highway and V N Purav Marg at Suman Nagar Junction, 2012: The cost of the project was roughly ₹16.65 crores.
- The Versova- Bandra Sea Link Project: The distance between Bandra and Versova is approximately 10.1km. The cost of the project is estimated to be between ₹1,900-3,000 crores (depending upon the alternatives). The Pre-Feasibility study has been conducted and three alternate alignments have been suggested.

**Mumbai Metropolitan Region Development Authority (MMR)** has undertaken several infrastructure projects. One of its most important projects is the Mumbai Metro Rail Project. The MMR has also undertaken several Mumbai Urban Infrastructure Projects (MUIP). Under MUIP, 18 roads, flyover and subways have been built. The details of extended MUIP are as follows:

### Exhibit 18: Details of Extended Projects under Mumbai Urban Infrastructure Projects

Extended MUIP	Details	Expected Year of Completion
Phase I & II	267km roads, 18 flyovers, 3 creek bridges and 2 road over bridges	May 2018
Phase III	32 bridges, 3 tunnels and 133km roads	May 2018
Multi-Modal Corridor from Virar to Alibaug	Construction of a 126km freeway with 8 lanes	December 2023
Mumbai Trans-Harbour Link	Construction of 22km bridge across the sea from Sewri to Nhava	December 2021

Source: Directorate of Economics & Statistics, Planning Department, Government of Maharashtra

The Comptroller and Auditor General of India has ranked the best performing states in 2016. For the ranking, the performance of these states in the year 2013-2014 has been considered. Maharashtra is ranked as the best performance big state in terms of its economy and inclusive development. The state is also ranked the best under the category of most improved infrastructure amongst all the states between 2012-2013 and 2013-2014.

The length of total national highways in India is 100087.08km out of which 7434.79km are located only in Maharashtra as on 07.08.2015. The Nagpur-Aurangabad-Mumbai express highway with a total investment of ₹65,000 crores is to be completed in 2019. The state road development authority MSRD plans to collect toll of ₹2.5 per km from passenger's vehicles. The highway is to be 706-km long. Maharashtra has the highest state-wise share of infrastructure investment of 12.0%. (ASSOCHAM Report, 2016) Maharashtra is also one of the states whose new investment realization rate is better than that of other Indian States. Maharashtra ranks 5th (22.7%) in terms of private sector investment realization. However, Maharashtra has a higher

dependency on public sector for new investments to be made into the infrastructure than the All India level. (ASSOCHAM Report, 2016)

In December 2016, the Prime Minister laid foundations of ₹1.06 lakh crores in key infrastructure projects for Mumbai alone. This investment includes the country's longest sea bridge. Projects include 22.5km Mumbai Trans Harbour Link that will connect the city's eastern suburbs with the mainland across the harbour. The Mumbai Urban Transport Project will receive an investment of ₹52,000 crores. Major among the suburban networks include two more lines between Virar-Dahanu Road and the Panvel-Karjat double line suburban corridor. There will be investments in flyovers to ease traffic congestion at critical spots.

### Uttar Pradesh

Uttar Pradesh stands second to Maharashtra as per the LSt State-wise Road Network index. The State has received a score of 5.6.

The State has a distribution of 8,483km (8.47%) of National Highways.

**The Pradhan Mantri Gram Sadak Yojana (PMGS)** was launched on 25th December 2000 as a fully funded centrally sponsored scheme to provide all weather road connectivity in rural areas of Uttar Pradesh. The state has completed 17,542 roads/bridges out of 18,582 sanctioned and built 49,939 km length of road out of 57,397 km sanctioned under PMGSY. The State has to still complete 1,040 roads/bridges. The average length of PMGS road constructed in 2016-2017 would be 10.68km per day. The average target of habitations per month for 2016-2017 for the state is 13. The Principal Secretary for Rural Development in Uttar Pradesh has assured that by the end of March 2019, all road works sanctioned during 2016-2017 will be completed. In Uttar Pradesh, 100% of the fund released for PMGS are State share.

In June 2016, the central government announced that it will invest about ₹75,000 crores for augmenting the highway infrastructure in Uttar Pradesh over the next two years.

The state has 60 national highways with a total length of 8,483km out of which 4,529km are with NHAI and the remaining 3,143km are with State PWD (Public Works Department) while no objection certificate is awaited for highways totalling 811km.

31 major projects are ongoing with a total length of 2,156km with total project cost (TPC) of ₹19,436 crores. 24 major projects were awarded during 2014-15 and 2015-16, with a total length of 1,293km and

TPC of ₹16,949 crores. It is expected that 15 projects will be awarded in the year 2017-2018 with a length of 840km with a total cost of ₹6,790 crores.

In 2016, Uttar Pradesh (amounting over ₹99,000 crores and 14.8% of total allotted expenditure) accounted for the highest number of projects under the public private partnership (PPP) mode. UP was followed by Maharashtra, Gujarat, Karnataka and Tamil Nadu. The five states together comprise half of the ₹6,70,000 crore investment under PPP(ASSOCHAM). In 2016, the Road, Transport and Highway Ministry announced that the central government will invest ₹2 trillion for road development in the state for the next 2.5 years before the government's tenure is completed.

Out of the ₹2 lakh crores, road projects worth ₹60,000 to ₹70,000 crores have already been initiated. The projects include an access control eight-lane expressway between Kanpur and Lucknow. The project will approximately cost ₹1,500 crores. This project will reduce the travel time by 35-40 minutes. Uttar Pradesh recorded the highest growth in toll revenue between 2011-2012 and 2015-2016. Uttar Pradesh had a total toll collection of ₹1944 crores in 2016 and experienced annual growth rate of 50% for the same period when the national average stood at 25%. A consistent growth rate in service sector in Uttar Pradesh over the past 5 years could have driven the growth in toll revenue.

#### Exhibit 19: National Highway Density, India and Uttar Pradesh as in 2016

	Uttar Pradesh	All India
Length (in km/1000 sq. km of area)	34.87 (Area=243286 sq. Km)	28.25 (Area=3287263 sq. Km)
Length (in km/lakh of population) (as per 2011 census)	4.25 (Population=1996 Lakh)	7.67 (Population=12102 Lakh)

Source: Press Information Bureau, Ministry of Road Transport & Highways, Government of India

The current Uttar Pradesh government, is emphasizing investments in infrastructural projects. The Agra-Lucknow expressway is to be completed by May, 2017 and the work on the Purvanchal expressway taken forward. The state government wants to attract serious industrial investments and is working towards creating the relevant infrastructure of which road networks is a major part.

#### Karnataka

The state of Karnataka scores a 5.00 on the LSI State-wise Road Network Index and ranks 3rd after the states of Maharashtra and Uttar Pradesh. The state is well connected to its 6 neighbouring states and other parts of India through 14 national highways. Karnataka accounts for 6% of the total national highway network in India. On an average, about 80km of road exists per 100 sq. km of area.

In 2016, the state of Karnataka received the award for the most improved state in terms of its economy. The year-to-year performance improvement between 2012-2013 and 2013-2014 had been considered for this award.

In February 2016, the Road Transport and Highways Ministry announced that the Centre will spend ₹1 lakh crores to improve road network in Karnataka. The money is to be spent within 24 months from 2016. As in 2016, Karnataka had a highway length of 9,632km and the Centre announced to add another 4,000km. The Centre is estimated to have spent ₹60,000 crores to set up road network of 4,000km by December 2016, and the remaining ₹40,000 crores are estimated to be invested in the current financial year for national highways.

The government in 2016 was adding approximately



18km of road length a day. The government is targeting adding 30km of road length per day this financial year.

As per state budget 2016-2017, the state government allocated US\$551.32 million for the improvement of rural roads in the state.

In Budget 2017-2018, the state government has announced the development of 150km roads in and around Bengaluru, through Karnataka Road Development Corporation Limited (KRDC). The government has also announced the construction of an underpass and widening of the flyover along ORR at Hebbal Junction in Bengaluru.

### **Pradhan Mantri Gram Sadak Yojana (PMGSY)**

During 2015-2016, a total of 1,455.56km and 759.76km roads were constructed under 'Namma Grama Namma Rasthe' and PMGSY respectively by the state government. The Government of India released ₹38.32 crores to the State Government of Karnataka under PMGSY-II for financial year 2016-2017. Karnataka is one of the four states that fully utilised the funds released by the central government under PMGSY Phase-I.

### **Orissa**

The state has a total 2,77,934.52 km network of road, however, in terms of quality, Orissa's road network ranks among lowest. Only 22% is paved, significantly below India's average of 58%. At least half of the road network is considered in poor conditions with rough riding quality and poor safety. A large number of villages are still not connected to growth and service centres by all-weather roads despite of a significant proportion (83%) of people living in rural areas.

Road construction and improvement works are taken up on a massive scale through different programs like the Pradhan Mantri Gram Sadak Yojana (PMGSY), Rural Infrastructure Development Fund (RIDF), Finance Commission grants and other programs funded out the state's own resources.

The road density for Orissa both in terms of land area and population are higher than the All India average. However, Orissa's road density considering the major road network (National Highways, State Highways, and PWD Roads) is lower than country's average road density. This is because Orissa has got a much higher density of rural, urban and project roads than country's average road density. The PMGSY has really benefitted the state and the intended beneficiaries. In Orissa, infant and child mortality has fallen sharply because of better access to health facilities. It also improved frequency of health workers visiting villages. However, despite the improvement, approximately 28% of the state's total population do not have all-weather road

connectivity. The state government currently has been trying for a growth rate of 9% in road connectivity to rural areas to further improve the scenario.

The state had a total 4,693 km of national highway in 2015 and was expected to add a length of 1,672 km by 2015-16. It further aimed to add 900 km of new national highway network by 2017-18. Most of the current highways, are not in a good state and are heavily congested. The state of the road network results in increasing road accidents. Some of the major challenges in improving the quality of road connectivity are- inadequate fund provision, difficulties in acquisition of land for widening of roads and scarcity of quality consultants.

The state could however witness drastic improvements as the government has prepared a road map to ensure better road connectivity. Widening of 5,000 km stretch to double lane is to be completed between 2017-18 and 2023-24 out of which work on 2,000 km will be done in the first three years. By 2023-24, 200 new bridges, 14 Railway Over Bridges, flyovers and 100 amenity centres along with bypasses around five congested towns of the state are also planned.

### **Madhya Pradesh**

Madhya Pradesh is behind most other states in terms of provision of essential infrastructure. The infrastructure in the state is well below that of even other less developed states like Bihar, Orissa and compares only with north-eastern states. Road is one of the critical sector where the state falls behind. The rate of road network growth of Madhya Pradesh did not keep up pace with the economic growth in general and the traffic in particular. The road density of the state is far less than the national average. Only 7% of India's of National Highway is in Madhya Pradesh. Because of the central location of the state, traffic from all the five neighbouring states passes through the state's road network.

Rural roads are 77.5% of total roads in the state. The low density of population scattered across small habitations makes the cost of roads per beneficiary much more expensive than in states with dense rural population. This problem is compounded by the poor maintenance of roads. There is an urgent need for improving the existing road infrastructure of the state, as its bad condition is hampering the economic and social progress of the state. The responsibility for construction and maintenance of roads in the state rest with the Public Works Department (PWD) and the Rural Engineering Service (RES). The performance of RES has significantly improved in recent years and it constructs approximately 4,000 km of rural roads annually.

Furthermore, MP is among the top ten worst

performers in road safety. Recently, the private sector has partnered in several major roads in the state for construction and maintenance. The efforts in rural connectivity through PMGSY and state government's own efforts should help the rural road connectivity in the state.

To reduce the financial burden on road maintenance, the MP government in 2016 started the process of identifying roads which can be converted into national highways. The state has a total of 7,806 km long national highways. In January 2017, the Ministry allotted ₹2,00,000 crores for the development of highways in Madhya Pradesh.

### North East Region (NER)

All of the states in the north-east region trail behind in the LSI Statewise Road Network Index and are among the lowest scorers. Roadways are the backbone of transport and communication in the North-east region, primarily due to terrain and sparse distribution of population. Despite this, the road infrastructure is very poor in the region.

The political leadership and the general population in the region have long recognised an increasing need to build adequate and quality roads to connect the north-east region internally and to mainland India. However, the overall road density of the region still remains below national average. The progress with regards to construction of roads and highways remains quite slow, with largely pre-construction activities being undertaken as of now.

The road network per capita is significantly higher in the region relative to the rest of the country, given the hilly terrain and the low density of population. However, a more accurate indicator of the ease of

movement of passenger and freight traffic is higher only in Assam, Nagaland and Tripura, and not the other states. In conclusion, the road infrastructure is still relatively deficient in the north-east states.

While the overall road density of the region may be lower than the national average, the length of national highways in the region for a given area as well as population is much better than the rest of India.

One of the issues faced by the region is that much concentration has now been put on building new road network, neglecting the maintenance of old ones which is an undesirable situation and will further exacerbate by the languid approach often leading to serious time and cost overruns.

Lately, the government has been taking measures to improve connectivity in the north-east region. In 2005, the Special Accelerated Road Development Program in North East (SARDP-NE) was started with the aim to upgrade the national highways connecting state capitals to two-or-four-lane roads. It will connect all 88 district headquarter towns of the region by double-lane roads and further improve the road infrastructure across border areas and strategically important locations.

The first highway project in the region is being developed along the Brahmaputra river in Assam at an estimated investment of ₹40,000 crores. This project is to be completed by the end of 2018.

The average road length construction (in km) per day in 8 States of North Eastern region during 2014-15 and 2015-16 as well as achievement w.r.t percentage of annual targets (2015-16, in terms of road length) is as follows:

### Exhibit 20: Progress in Road Construction in North-East Region 2014-16

State(s)	Average length of Road constructed km/day		Annual Target Length (in km) for 2015-16	Achievement % of Annual Targets (Up to Jan. 16)
	2014-15	2015 - Jan 16		
Arunachal Pradesh	1.49	1.26	511	76%
Assam	2.38	0.94	810	35%
Manipur	0.82	1.59	390	100%
Meghalaya	0.12	0.21	130	49%
Mizoram	0.13	0.24	104	67%
Nagaland	0.58	0.34	175	60%
Sikkim	0.33	0.24	156	48%
Tripura	0.65	0.23	250	29%

Source: Ministry of Regional Review Meeting, 2016

**LSI STATE-WISE ROAD NETWORK INDEX - DETAILED SCORE CARD**

Pillar Weight	20				30				20			30				
Pillars	General				Access				Quality & Utilization			Costs, Revenue & Investments			Road Network Index Score	Road Network Index Rank
Sub Pillars	Demographic	Economic	Affordability	General Score	Total Road Network (Km)	Road Density	Registered Motor Vehicles	Access Score	Total Surfaced Road Network (Km)	Accidents	Q&U Score	Costs & Rvenue	Investments	CR&I Score		
Max	6.70	6.40	8.30	5.40	7.90	6.60	9.90	6.20	7.10	10.00	6.40	5.90	8.00	5.60	5.70	
Min	2.20	0.40	1.80	2.80	0.10	0.60	3.30	2.60	0.70	1.90	2.10	0.00	0.00	0.00	2.30	
Sub Pillar Weight	25	50	25		40	40	20		80	20		80	20		Score	Rank
Maharashtra	6.10	6.40	2.70	5.40	7.90	5.30	4.50	6.20	7.10	3.50	6.40	4.00	8.00	4.80	5.70	1
Uttar Pradesh	5.20	3.70	6.70	4.80	7.50	5.20	5.10	6.10	5.80	6.50	6.00	5.90	3.30	5.40	5.60	2
Karnataka	6.10	3.60	4.10	4.40	6.50	5.50	6.00	6.00	4.90	4.40	4.80	4.80	3.50	4.60	5.00	3
West Bengal	4.90	3.70	5.70	4.50	4.50	5.40	8.30	5.60	2.90	7.70	3.90	5.80	2.30	5.10	4.90	4
Tamil Nadu	5.20	4.50	4.90	4.80	3.90	5.80	3.30	4.50	4.50	1.90	4.00	5.60	5.30	5.60	4.80	5
Andhra Pradesh	5.20	2.80	4.00	3.70	3.70	5.30	7.70	5.10	3.70	6.10	4.20	5.40	4.40	5.20	4.70	6
Rajasthan	5.40	2.90	4.90	4.00	4.60	4.30	6.50	4.90	4.10	6.70	4.60	5.80	2.30	5.10	4.70	7
Bihar	2.20	2.80	6.80	3.60	4.40	5.90	8.80	5.90	2.50	8.00	3.60	4.90	2.90	4.50	4.60	8
Gujarat	6.50	4.30	5.40	5.10	3.70	5.10	3.60	4.30	4.50	7.10	5.00	3.60	2.90	3.50	4.30	9
Orissa	4.20	2.40	6.60	3.90	3.30	4.60	8.60	4.90	5.30	8.10	5.80	2.70	1.50	2.40	4.10	10
Madhya Pradesh	5.40	3.30	4.40	4.10	5.50	4.30	6.90	5.30	3.80	1.90	3.40	3.50	1.70	3.10	4.00	11
Uttarakhand	3.90	2.70	1.90	2.80	1.60	5.00	8.90	4.40	2.00	9.40	3.50	5.10	1.30	4.40	3.90	12
Kerala	4.80	3.00	1.80	3.20	2.00	6.60	6.50	4.80	3.20	3.80	3.30	2.90	2.80	2.80	3.60	13
Haryana	5.00	3.40	4.20	4.00	1.20	6.10	3.80	3.70	2.40	7.30	3.40	2.30	5.10	2.90	3.40	14
Punjab	4.30	2.60	4.10	3.40	1.70	5.60	7.00	4.30	3.00	8.70	4.20	1.90	0.70	1.70	3.30	15
Himachal Pradesh	4.10	2.00	4.70	3.20	1.10	4.50	9.10	4.00	2.00	8.10	3.20	2.30	2.10	2.20	3.20	16
Jharkhand	4.60	2.30	6.60	3.90	2.30	4.90	8.50	4.50	2.10	7.60	3.20	0.60	1.40	0.80	3.00	17
Assam	3.90	1.60	5.90	3.30	3.30	5.40	9.40	5.40	0.70	7.60	2.10	0.90	0.00	0.80	2.90	18
Chhatisgarh	5.10	1.60	6.30	3.70	1.80	4.30	7.90	4.00	2.70	6.40	3.40	0.70	0.10	0.60	2.80	19
Goa	6.70	3.50	5.00	4.70	0.10	6.30	5.80	3.70	1.40	5.20	2.20	1.00	0.00	0.80	2.70	20
Tripura	3.70	2.20	8.30	4.10	0.30	5.80	9.80	4.40	1.20	8.70	2.70	0.00	0.00	0.00	2.70	21
Manipur	3.60	1.40	8.30	3.70	0.50	4.90	9.50	4.10	1.20	8.70	2.70	0.30	0.00	0.20	2.60	22
Jammu & Kashmir	6.10	0.40	4.50	2.80	1.20	3.80	9.10	3.80	2.10	6.40	3.00	0.30	1.60	0.50	2.50	23
Meghalaya	3.40	2.10	6.80	3.60	0.30	4.60	9.40	3.90	1.30	8.50	2.80	0.10	0.00	0.10	2.50	24
Nagaland	3.50	1.80	6.50	3.40	0.50	4.60	9.50	3.90	1.10	10.00	2.80	0.40	0.00	0.30	2.50	25
Mizoram	3.90	1.90	7.50	3.80	0.40	2.80	9.40	3.20	1.80	9.80	3.40	0.20	0.00	0.20	2.40	26
Arunachal Pradesh	5.20	1.90	7.10	4.00	1.10	0.60	9.70	2.60	1.90	9.10	3.30	0.00	0.00	0.00	2.30	27
Sikkim	3.40	2.70	4.40	3.30	0.10	4.00	9.90	3.60	2.00	7.30	3.00	0.00	0.00	0.00	2.30	28

**LEGEND** Max Pillar Score Min Pillar Score





**Arunachal Pradesh** has received the lowest score on the road network index. It is the largest state in the north-east region with a total road length of around 21,555 km as of March 2013.

For the Arunachal Pradesh, the government has planned to develop about 2,319km, including 2,205km of national highways and 114km of state, general staff and strategic roads. Out of these, 1,769km have been sanctioned and 388km have been completed. The target date to complete the entire Arunachal Pradesh Package is March 2018. The Union Ministry in January 2017 promised more road projects worth ₹50,000 crores to the state of Arunachal Pradesh that will include an 1,841-km frontier highway along the state's international boundary with China. The government assured that there would be no dearth of funds for road infrastructure projects in Arunachal Pradesh.

### Why Bihar precedes Gujarat in the LSI State-wise Road Network Index?

Among Bihar, Gujarat, Orissa and Madhya Pradesh, the highest scoring states is Bihar with a score of 4.60. This comes as a surprise given the economic status of the region. Bihar has the largest population, lowest land area and thereby the highest population density among these four states. Gujarat trails behind Bihar in the road network index. Gujarat does have a larger GSDP, however, Bihar has been experiencing a higher growth rate in the recent years compared to Gujarat.

**Bihar:** The state is one of the faster growing low-income states of India, however it faces serious growth and development challenges. The state government is addressing these challenges with a prudent development strategy that aims to exploit the state's potential for growth in the hitherto underachieving sectors on account of inadequate road infrastructure and market linkages. It has taken initiatives toward increased investment in the infrastructure

(particularly in strengthening the road transport network) and social sectors.

Excluding 4,594 km of National Highways, Bihar has a road network of 142,610 km, of which 14,887 km (around 10%) is under the Road Construction Department (RCD) and classified as State Highways and Major District Roads, while the remaining is under the Rural Works Department (RWD) and classified as rural roads.

Bihar has constructed about 6,000 km of rural roads in the last decade but still has a big task ahead. It has provided road access to 51% of its habitations, leaving a balance of 49%. Majority of the rural roads are in poor condition with missing linkages, dilapidated bridges, poor drainage, weak pavements, and missing road safety measures. One of the major challenges in the sector is the lack of an efficient management system.

Government expenditure on road has been found to have the largest impact on reduction of poverty as well as significant impact on increased productivity.

**Gujarat:** The total core length of road network in the state as of October 2015 was 77,030 km.

### Exhibit 21: Roads in Gujarat as of October 2015

Type of Road	Length (km)
National Highways	4,971
State Highways	19,761
Major District Roads	20,641
Other District Roads	10,493
Village Roads	21,119

Source: Roads & Building Department, Government of Gujarat, NHAI

The road density of Gujarat is 146 km per lakh of population which is better than the All-India average of 126 km. The state has 17,843 villages out of which





17,739 villages are connected with “pucca” roads. As of October 2015, Gujarat had 1,348 major bridges, 4,277 minor bridges and 88,141 causeways.

The annual state budget for Gujarat 2016-17 allocated a total of ₹8,402 crores for construction of roads and buildings. There is a ₹2,500 core provisions to build roads in rural areas. The government in Budget 2016-17, announced PMGSY with an objective to ensure quality and all-weather connectivity to 18,000 villages and 16,245 hamlets in the state. ₹1,168 crores have been allocated for construction and upgradation of other roads and bridges in the state. Provision of ₹477 crores have been made for resurfacing of roads which have not been resurfaced for the past seven years.

In March 2017, the central government announced the conversion of 8 state highways in Gujarat to national highways. The total length of these highway stretches is 1,200 km and will see an investment of ₹12,000 crores. Roads in the transport sector account for nearly 17.05% of the total planned investments amounting to ₹39,110 crores for the period up to 2020.

Bihar ranks above Gujarat in Road Network Index primarily because, Bihar had made the development of infrastructure a top priority in the recent years and it has really enhanced public investment in roads and bridges. The investment in road sector has increased three-fold from ₹2,696 in 2007-08 to ₹7,696 crores in 2016-17, indicating an annual growth rate of more than 10%. A total of 40 NHs, measuring 4621 km were there in Bihar till September, 2016, as compared to 35 NHs (4321 km) in 2014. There was 11,054 km of Major District Roads (MDR) in the state as on September, 2016, with a major portion (54 percent) of it being single-lane roads. Out of the total length of MDR, 5121 km have been converted into intermediate or double lane roads. Apart from this, rural roads, bridges and flyovers have also picked up the pace of rising investment and development. On the other hand, though the road sector in Gujarat may seem more optimal at present, the growth in the sector is not keeping up with the pace of growth in Bihar.



# 4

## National Highway Development Project (NHDP)

The GOI has undertaken the NHDP to upgrade, rehabilitate and widen major highways in the country to a higher standard. NHDP was launched in January 1999 formally to develop the Golden Quadrilateral (GQ) network under NHDP phase 1 and the North-South and East-West (NSEW) corridors under NHDP Phase 2. The scope of NHDP was further expanded when the GOI included five more phases, i.e from NHDP phase 3 to NHDP Phase 7 during the 11th FYP.

### Objectives of NHDP

The prime focus of developing roads to international standards by creating facilities for uninterrupted flow of traffic with:

- Enhanced safety features
- Better riding surface
- Better road geometry
- Better traffic management and noticeable signage
- Divided carriageways, service roads and grade separators
- Over bridges and under passes
- By passes
- Wayside amenities

### Major Highways Program

1. National Highways Development Programme – 54,748 Km of National Highways
2. SARDP-NE (Special programme for NE) – 10,141 Km
  - The Special Accelerated Road Development Programme for the North-Eastern region

(SARDP-NE) is aimed at developing road connectivity between remote areas in the North East with state capitals & district headquarters.

- SARDP-NE is vested with the development of double-/four-lane national highways of about 7,530 kms & double-laning improving about 2,611 kms of state roads, as on FY16
- Implementation of the road development programme would facilitate connectivity of 88 district headquarters in North Eastern states to the nearest National Highways

3. LWE (Left Wing and Extremist affected areas) - 5477 Km

- The government approved a Road Requirement Plan (RRP) for the development of 1,126 kms of National Highways & 4,351 kms of state roads in Left Wing Extremism (LWE) affected districts
- The project has been implemented in Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha & Uttar Pradesh at a total cost of USD1.2 billion
- The project would be vested with the Ministry of Road Transport & Highways (MoRTH) & is scheduled for completion by FY17
- Total outlay of USD1.3 billion has been allocated for this programme during FY16

National Highways Development Project is being implemented in all phases except phase VI at present. The present phases improving more than 49,260 km of arterial routes of NH Network to international standards. The project-wise details NHDP all Phases as below.



## Exhibit 22 : NHDP & Other NHA I Projects as of 31st May 2017

		Total Length (Km)	Already 4/6 Laned (Km)	Under Implementation (Km)	Contracts Under Implementation (Number)	Balance length for award (Km)
NHDP	GQ	5,846	5,846 (100%)	0	0	-
	NS - EW Ph. I & II	7,142	6,568	300	28	274
	Port Connectivity	435	383	52	7	-
	NHDP Phase III	11,809	7,621	2,161	71	2,027
	NHDP Phase IV	13,203	4,058	6,050	105	3,095
	NHDP Phase V	6,500	2,564	1,428	33	2,508
	NHDP Phase VI	1,000	-	184	9	816
	NHDP Phase VII	700	22	94	4	584
NHDP Total		46,635	27,062	10,269	257	9,304
Others (Ph.-I, Ph.-II & Misc.)		2048	1,743	305	18	-
SARDP- NE		110	110	0	1	-
<b>Total by NHA I</b>		<b>48,793</b>	<b>28915*</b>	<b>10,574</b>	<b>276</b>	<b>9,304</b>

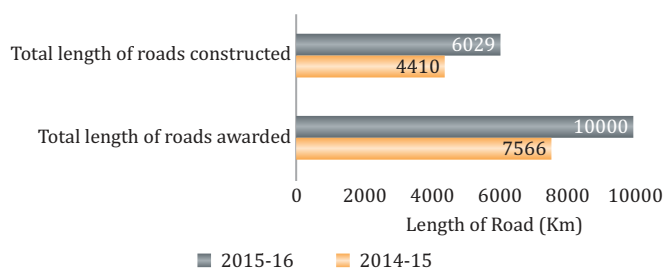
\*Total 20,000 Km. was approved under NHDP Phase IV. Out of which 13,203 Km. as assigned to NHA I remaining Km. with MORTH.

Source: NHA I

### Progress at a Glance

#### Exhibit 23 : Projects Awarded / Completed during 2014 -15 and 2015 -16

Development of Highways, India, 2014-2016



Source: MoRTH

In **2015-16,**

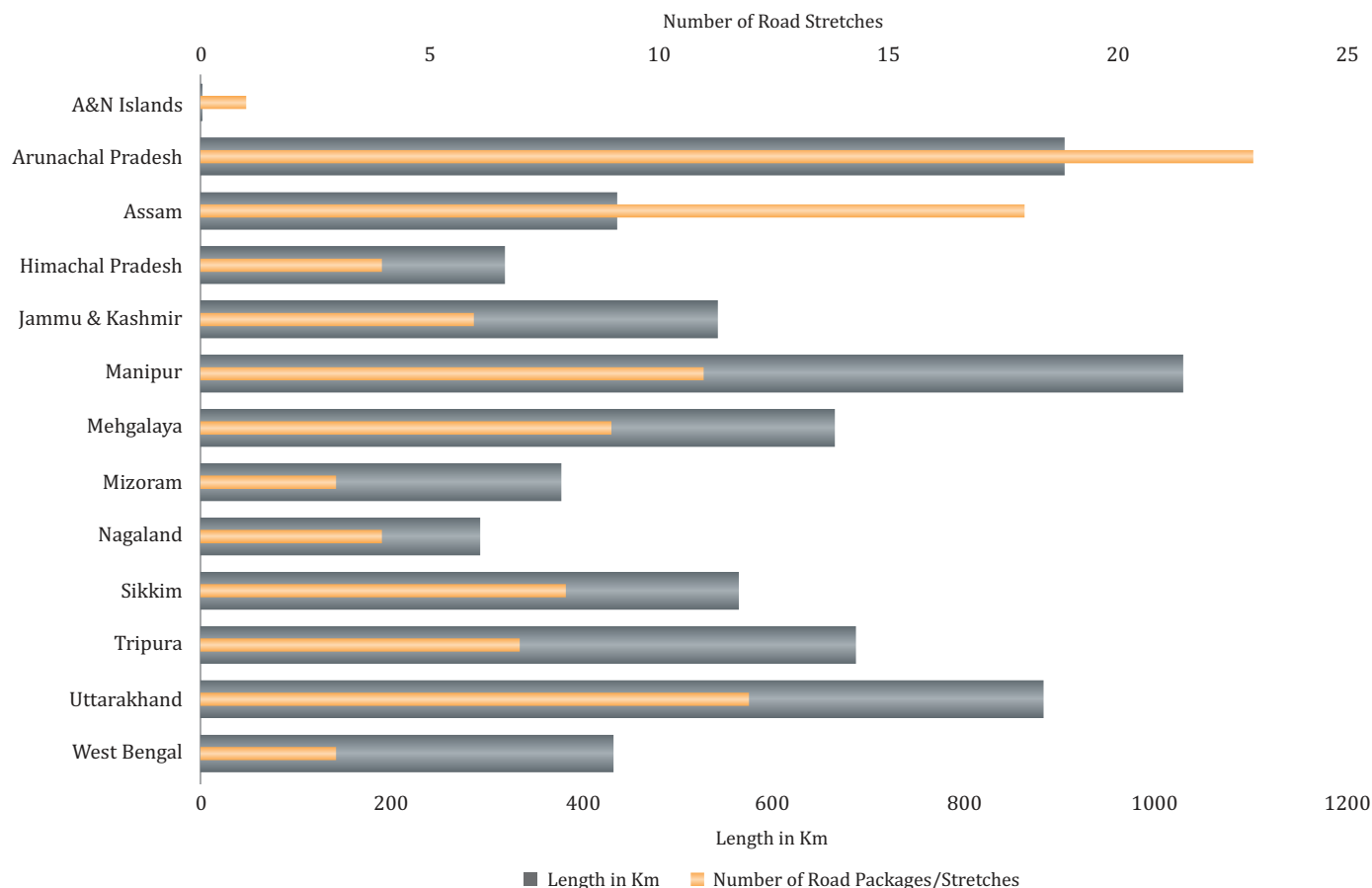
**60.3%** of the total length awarded

was constructed compared to **58.3%**

done in **2014-15.**



## Exhibit 24 : Development of National Highways in the Northern and Eastern Regions, 2015-16



Source: MoRTH

## Exhibit 25 : Development of National Highways in Naxal Areas and Ranchi - Vijaywada Corridor

Naxal Areas	2014-15	2015-16
Total Length of roads awarded	82	309.5
Total Length of roads constructed	655	392
Ranchi - Vijaywada Corridor	2014-15	2015-16
Total Length of roads awarded	0	157
Total Length of roads constructed	94	81.4

Source: MoRTH

### New Initiatives

#### Bharatmala

This is a project that aims to build National Highways to connect coastal/ border areas including small ports, backward areas, religious places, tourist places, improve connectivity to Char-Dham and connect all district headquarters to National Highways.

#### Setu Bharatam

This is a programme to make road travel safe by constructing Railway Over Bridges or Under Passes at all 208 level crossings in the country. The aim is to make national highways free of railway level crossings by 2019. This is being done to prevent the frequent accidents and loss of lives at level crossings. 208

Railway Over Bridges (ROB)/Railway Under Bridges (RUB) will be built at the level crossings at a cost of ₹20,800 crore as part of the programme.

#### High Density Corridors

The Government has approved a plan for constructing 1000 km of Expressways along High Density Corridors like the Vadodara-Mumbai Corridor and Delhi-Meerut Corridor. The approved expressways on High Density Corridors are:

- Delhi-Meerut (66km)
- Eastern Peripheral Expressway
- Western Peripheral Expressway
- Vadodara-Mumbai Corridor (400 km)
- Bangalore-Chennai (334 km) on NH-4
- Delhi-Jaipur (261 km) on NH-8
- Delhi-Chandigarh (249 km) on NH-1 and NH-22
- Kolkata-Dhanbad (277 km) on NH-2 and
- Delhi-Agra (200 km) on NH-2.

The Government has prioritized the following Expressways:

Eastern Peripheral Expressway, Delhi-Meerut Expressway and Vadodara-Mumbai Expressway.



# 5

## Financing of Road Projects

Traditionally, financing for development of National Highways in India was from the budgetary resources of the Government of India. In order to augment the available resources, loans have also been raised from multilateral agencies like World Bank, Asian Development Bank (ADB) and Japan Bank of International Cooperation (JBIC).

Presently, the development and maintenance of National Highways is financed by following modes:

1. Government's general budgetary sources
2. Dedicated accruals under the Central Road Fund (by levy of cess on fuel)
3. Lending by international institutions:
  - World Bank
  - ADB
  - JBIC
4. Private financing under PPP frameworks
  - Build Operate and Transfer (BOT Toll) mode on Design Build Finance Operate and Transfer (DBFOT) basis - Investment by private firm and return through levy and retention of user fee
  - Build Operate and Transfer (BOT Annuity) mode on DBFOT basis - Investment by private firm and return through semi-annual payments from NHAI as per bid.
  - Special Purpose Vehicle – SPV (with equity participation by NHAI)
  - Operations, Maintenance and transfer (OMT)
  - Market Borrowings

NHAI also has a provision for providing grant up to 40% of the project cost to make projects commercially viable. However, the quantum of grant is decided on a case to case basis and typically constitutes the bid parameter in BOT projects generally not viable based on toll revenues alone. The disbursement of such grant is subject to provisions of the project concession agreements.

### Public Funded Projects

The traditional method of executing public funded projects was by item rate contract. This method was, however prone to time and cost overruns. This method has since been replaced by new EPC (Engineering, Procurement & Construction) contracts. Projects which are not viable as BOT (Toll) projects, such as those in the remote areas, are now carried out as EPC

projects. This EPC contract agreement relies on assigning the responsibility for investigations, design and construction to a contractor for a lump sum price determined through competitive bidding. The EPC agreement incorporates international best practices and provides a contractual framework the specifies the allocation of risks and rewards, equity of obligations between the Government and the contractor, precision and predictability of costs, force majeure, termination and dispute resolution apart from transparent and fair procedures.

### Public Private Partnership in Highway Development

Public Private Partnerships (PPP) are going to be the main mode of delivery for future phases of NHDP. While there are a number of forms of PPP, the common forms that are popular in India and have been used for development of National Highways are:

- Build, Operate and Transfer (Toll) Model
- Build, Operate and Transfer (Annuity) Model
- Special Purpose Vehicle (SPV) for Port Connectivity Projects

NHAI is also proposing to award projects under a long-term Operations, Maintenance and Transfer (OMT) concession.

### BOT (Toll)

Private developers/ operators, who invest in toll able highway projects, are entitled to collect and retain toll revenues for the tenure of the project concession period. The tolls are prescribed by NHAI on a per vehicle per km basis for different types of vehicles. The Government in the year 1995 passed the necessary legislation on collection of toll.

A Model Concession Agreement (MCA) has been developed to facilitate speedy award of contracts. This framework has been successfully used for award of BOT concessions. The MCA has been revised recently and current projects are being awarded under the revised MCA.

### BOT (Annuity)

The concessionaire bids for annuity payments from NHAI that would cover his cost (construction, operations and maintenance) and an expected return on the investment. The bidder quoting the lowest annuity is awarded the project. The annuities are paid

semi-annually by NHAI to the concessionaire and linked to performance covenants. The concessionaire does not bear the traffic/ tolling risk in these contracts.

### **Operate, Maintain and Transfer (OMT) Concession**

NHAI has recently taken up award of select highway projects to private sector players under an OMT Concession. Till recently, the tasks of toll collection and highway maintenance were entrusted with tolling agents/operators and subcontractors, respectively. These tasks have been integrated under the OMT concession. Under the concession private operators would be eligible to collect tolls on these stretches for maintaining highways and providing essential services (such as emergency/ safety services).

### **Special Purpose Vehicle for Port Connectivity**

NHAI has also taken up development of port connectivity projects by setting up Special Purpose Vehicles (SPVs) wherein NHAI contributes up to 30% of the project cost as equity. The SPVs also have equity participation by port trusts, State Governments or their representative entities. The SPVs also raise loans for financing the projects. SPVs are authorised to collect user fee on the developed stretches to cover repayment of debts and for meeting the costs of operations and maintenance.

### **International Competitive Bidding Process**

General procedure for selection of concessionaires adopted by NHAI is a two-stage bidding process. Projects are awarded as per the model documents - Request for Qualification (RFQ), Request for Proposal (RFP) and Concession Agreement - provided by the Ministry of Finance. NHAI amends the model documents based on project specific requirements.

The processes involved in both stages are set out as follows:

**Stage 1:** Pre-qualification on the basis of Technical and Financial expertise of the firm and its track record in similar projects which meets the minimum criteria set

out in the RFQ Document. The current process of pre-qualification shortlists the top 6 applicants with highest technical score, based on the pre-qualification criteria. Notice inviting tenders is posted on the web site and published in leading newspapers.

**Stage 2:** Commercial bids from pre-qualified bidders are invited through issue of RFP. Generally, the duration between Stage 1 and 2 is about 30-45 days. Wide publicity is given to NHAI tenders so as to attract attention of leading contractors/developers/consultants. The Government has put in place appropriate policy, institutional and regulatory mechanisms including a set of fiscal and financial incentives to encourage increased private sector participation in road sector.

### **Opportunities for Private Investors/Developers in the Road Sector**

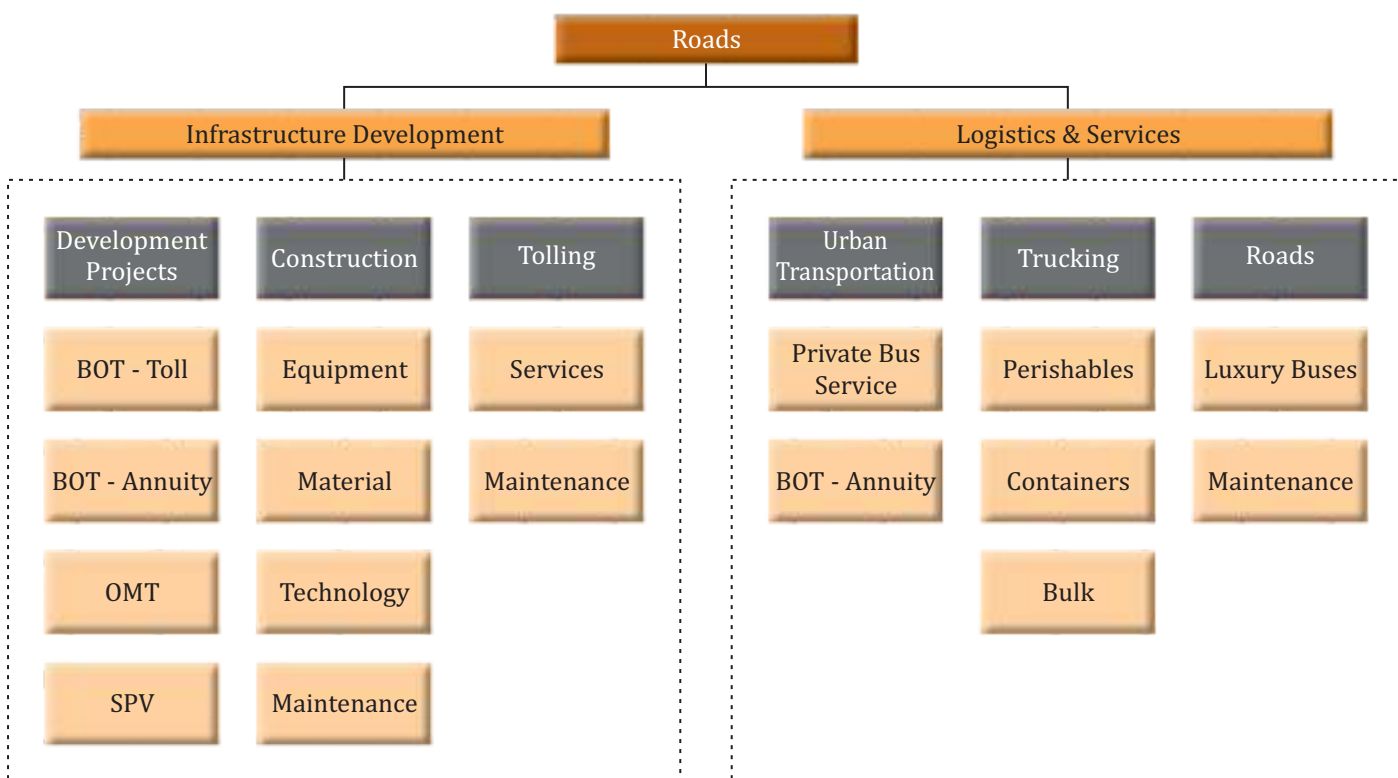
More than 60% of the projected investment requirement for the NHDP is expected to be privately financed, primarily through the BOT/DBFOT (Toll) route, offering enormous opportunities. With a large number of new projects on offer under PPP in the road sector, there exists several investment opportunities for investors and companies with diverse business lines such as engineering companies, civil work contractors, O&M contractors, toll operators, construction equipment manufacturers etc. and other stakeholders such as advisors, financiers and sector professionals. Only about 15% of the total highways in India are 4-laned and the sheer potential for investments in this sector is likely to create opportunities in the core construction industry which may also be attractive for foreign players.

The opportunity for private players in the road sector can be broadly categorised in two segments:

- a) Infrastructure Development
- b) Logistics and Services.



## Exhibit 26 : Segments of the Indian Road Sector for Private Investment



Source: LSI Research

### Model Concession Agreement (MCA) for PPP

The highways sector in India has witnessed significant investment in recent years. For sustaining the interest of private participants, a clear risk-sharing and regulatory framework has been spelt out in the Model Concession Agreement (MCA). The MCA has been developed to facilitate speedy award of contracts. This framework has been successfully used for award of BOT concessions. The MCA has been revised recently and current projects are being awarded under the revised MCA. This framework addresses the issues, which are typically important for PPP, such as unbundling of risks and rewards, symmetry of obligations between the principal parties, equitable sharing of costs and obligations, and risk mitigation options under various scenarios including force majeure and termination, under transparent and fair procedures.

### A Special Mention: Hybrid Annuity Model for PPP Projects

In India, road projects are awarded via one of the three models: Build-Operate-Transfer (BOT)-Annuity, BOT-Toll, and EPC (engineering, procurement and construction) contract. After the BOT model of Public Private Partnership (PPP), an advanced version of the Model Concession Agreement (MCA), presently called as Hybrid Annuity Model (HAM) is paving the way for road projects. HAM provides a government grant of 40% of the total project cost and rest of the investment

is compensated through semi-annual annuity payments on completion of the project. Tolling rights rest with the government.

The hybrid model is a win-win situation for the government and developers. This comes as a welcome step in the situation of dismal performance of highway construction projects awarded under MCA.

### What led to the introduction of the HAM?

Since the new union government took over in May, 2014 the question of languishing BOT projects was on top priority due to dismal performance of high-way construction projects awarded under existing model concession agreement. In very short time, the government came up with HAM to address the various concerns felt by the stakeholders.

In the last decade, many variants of PPP were experimented. Commonly adopted models were BOT with toll and BOT with annuity. Some early projects were awarded with success, mainly connecting important cities with steady and growing traffic. But soon it was clear that some road segments may not have adequate toll paying traffic thus requiring partial government support. This was achieved through offering Viability Gap Funding (VGF) from 20% to 40 % of project cost and the Contractor asking for minimum VGF Grant could get the project. While experimenting with this VGF model, Government realized that some road connecting important cities had good prospects of collecting toll more than required for recovery of



investment including interest and profits. This resulted into negative grant i.e. Contractors were willing to give money to government for awarding the project and those paying highest grant to government could get project awarded to them. More than 10 -12 projects were awarded on these lines, perhaps due to over-enthusiasm of Contractors to get the projects. But soon it was clear that the reality was not rosy and Contractors started backing out of project, by returning the concession granted to them.

Still there were few projects in remote areas, which were not commercially viable due to their poor toll collection prospects. For such projects government decided to offer 100% support, by annuity payment over the concession period and the Contractor asking for lowest annuity was awarded project without toll collection responsibility. This idea was well received due to assured annuity without the responsibility of collecting toll. But soon Government felt that such annuity payment for large number of projects will create a permanent burden of annuity pay-out in all future budget and they decided to discontinue with this model unless very essential in rare cases. In all this process, awarding of road construction projects slowed down. However, to keep some nationally important linkage in remote areas going and to give some push to road construction, EPC/Turnkey projects were awarded with full payment by Government for construction, without any deferred pay-outs mechanism, to revive the road sector.

Hence all these combinations of payment arrangement needed a relook, as many of these were not working well and contractor stopped quoting for new BOT

projects, due to various risks they were facing in the previously awarded projects.

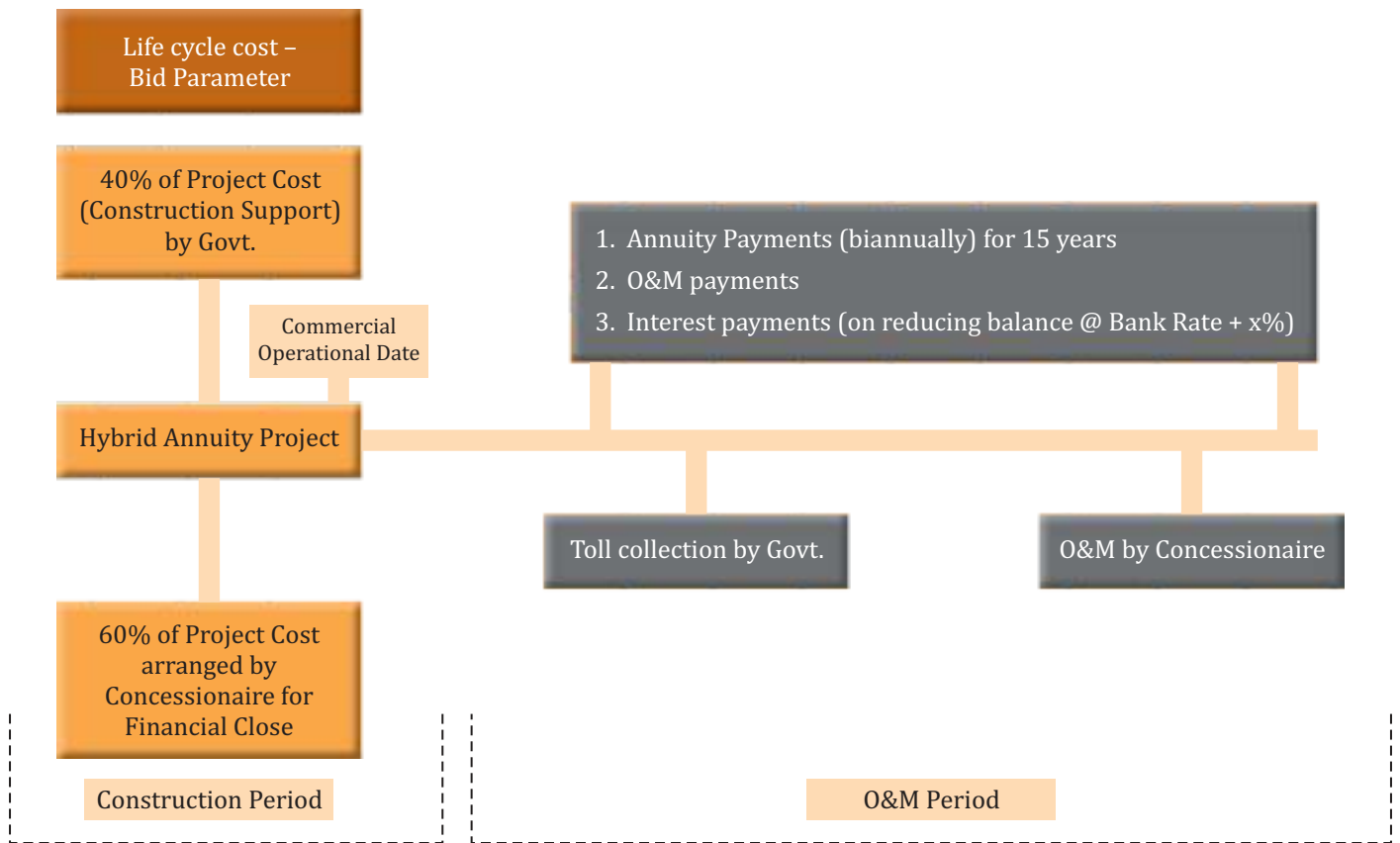
### Overview of the HAM

- a) MoRTH is promoting innovative project implementation models like HAM to encourage investments in the highway sector.
- b) This model has been adopted for implementation of highway projects in order to maximize the quantum of kms implemented within the available financial resources of the government.
- c) Bid parameter is Life Cycle Cost i.e. (NPV of the quoted Bid Project Cost + NPV of the O&M cost for the entire O&M period).
- d) Concessionaire receives 40% of Project Cost from Authority during construction period as "Construction Support" thereby reducing his exposure and risk.
- e) Concessionaire is responsible for designing, building, financing (60% of the Project Cost), Operating and transferring the project at the end of operations period (15 years).
- f) Amount financed by concessionaire during construction period is to be recovered from Authority through annuity payments along with interest payments (@ Bank rate + x%) on reducing balance method.
- g) O&M responsibilities are with the concessionaire with separate provisions for O&M payments
- h) Provision exists for inflation adjusted project cost over time.



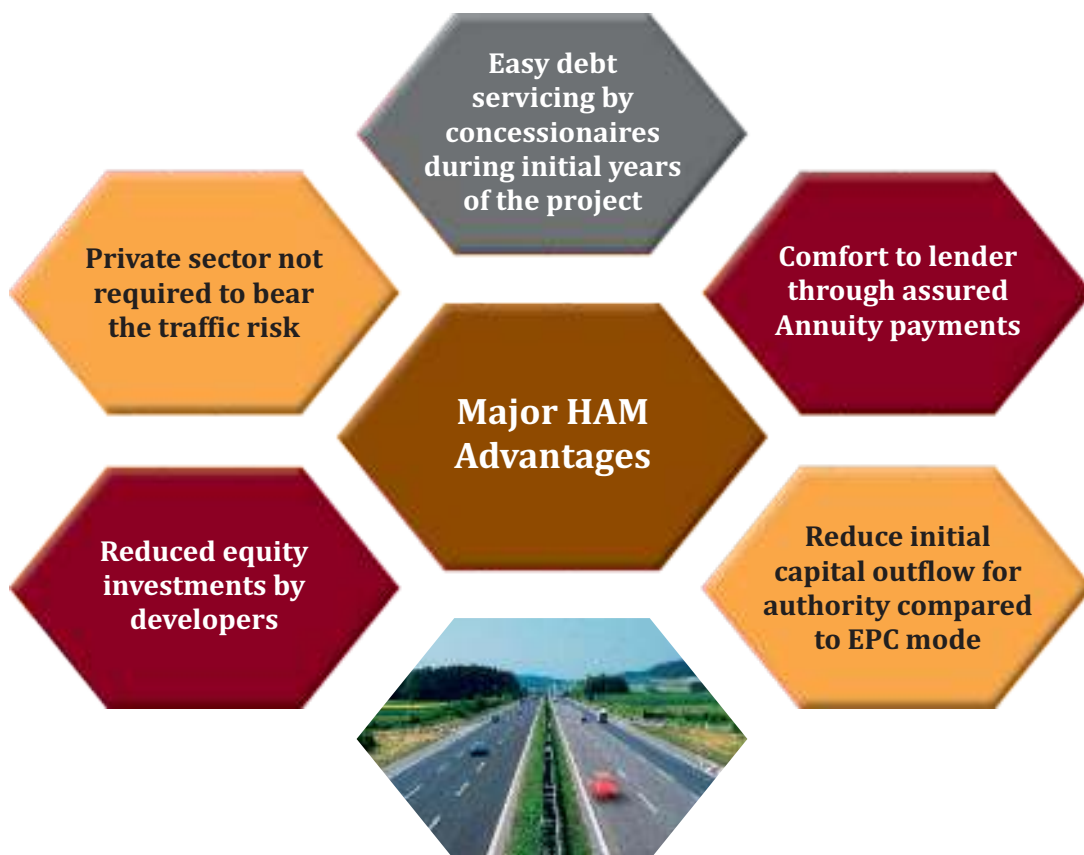


## Exhibit 27 : The Hybrid Annuity Model Layout



Source: MoRTH, LSI Research

## Exhibit 28 : The Advantages of the Hybrid Annuity Model



Source: MoRTH, LSI Research

### Preferred mode of implementation of projects

The highways sectors in the country has, of late, been facing difficulties in the award and implementation of project stretches particularly through the PPP mode. This is due to the overall economic downturn as well as sector specific issues. Though no effort is being left out by the Ministry in identifying and addressing the sector specific issues in consultation with the stakeholders, it is a fact that availability of equity in the market will be a critical factor to bring the sector back on track.

Till such time, it is considered prudent to pursue the public funded, or EPC mode, subject to the availability of resources. As the market reaches a certain level of maturity and stability with the private sector regaining confidence, the government intend to gradually switch

back to PPP mode with a judicious combination of Hybrid Annuity and BOT (Toll), as the preferred mode of implementation.

The MoRTH intends to increase the pace for award so as to have adequate works in hand to achieve accelerated road development in the country.

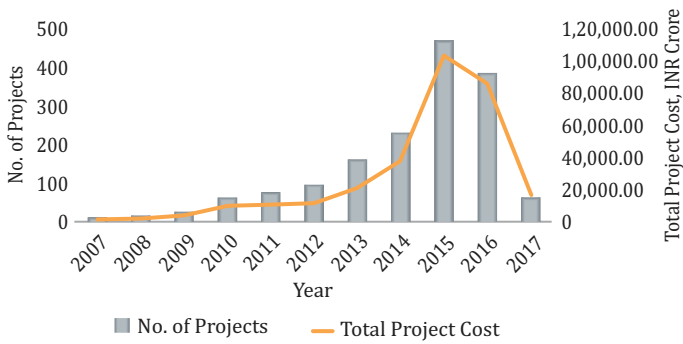
### Detailed Analysis of Roads & Bridges Projects, 2007-2017

The roads and bridges projects undertaken within the period 2007 to 2017 have been categorised as Traditional Procurement and PPP projects. The figures below show the number of projects, total project cost, project status and India's state-wise project segregation for both the traditional procurement and PPP projects.

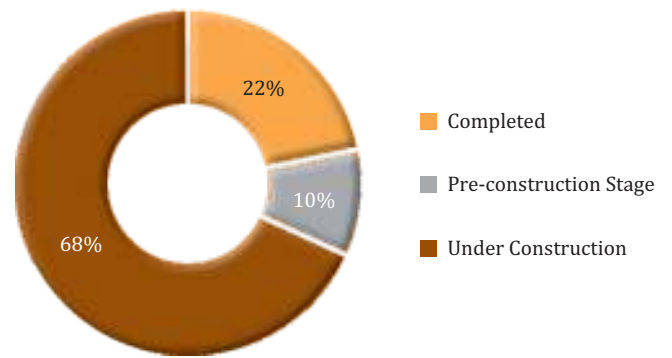


## Traditional Procurement

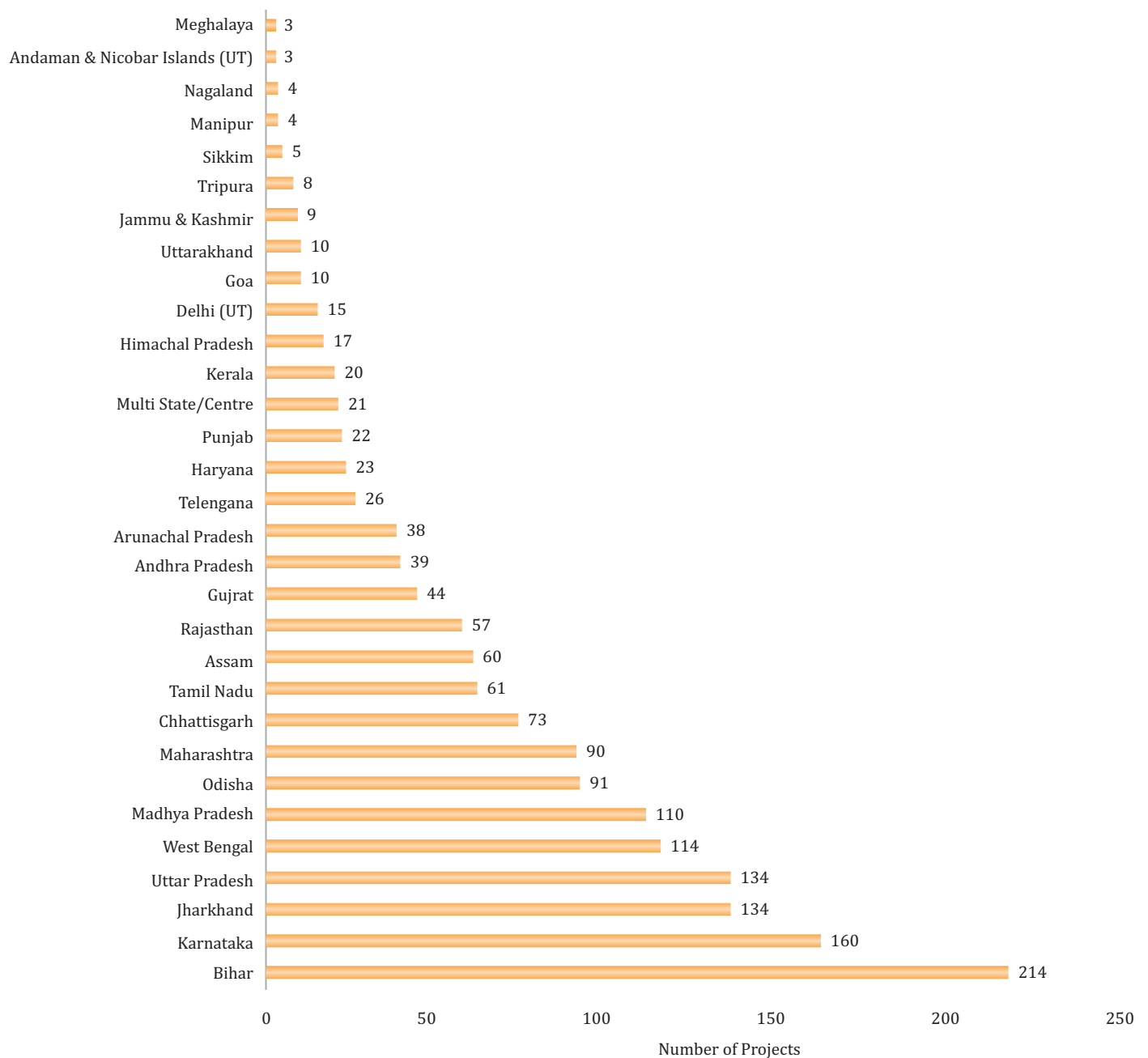
**Exhibit 29 : Number of Projects and Total Cost, Traditional Procurement, 2007-2017**



**Exhibit 30 : Project Status under Traditional Procurement, 2007-2017**



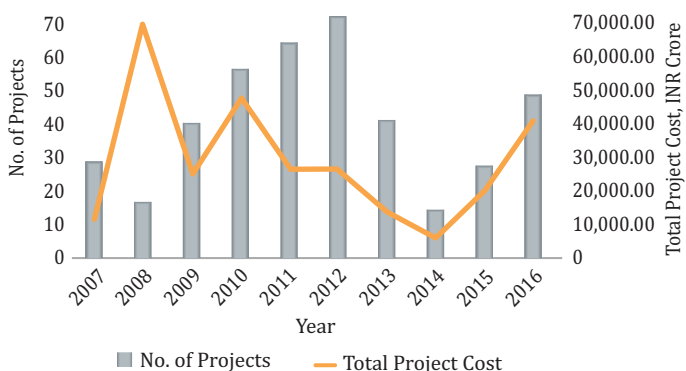
**Exhibit 31: State-wise Projects under Traditional Procurement, 2007 - 2017**



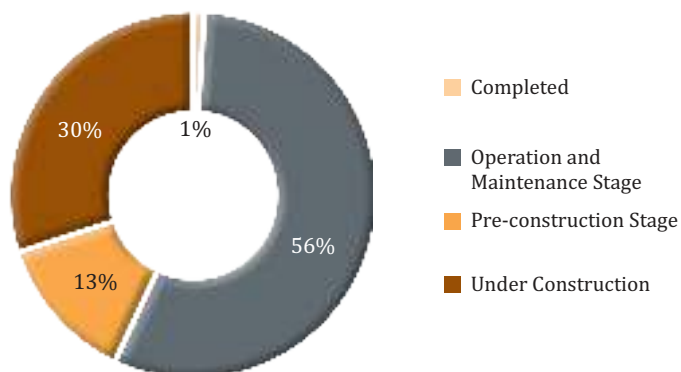
Source: InfrastructureIndia.gov.in; LSI Research

## Public Private Partnership (PPP)

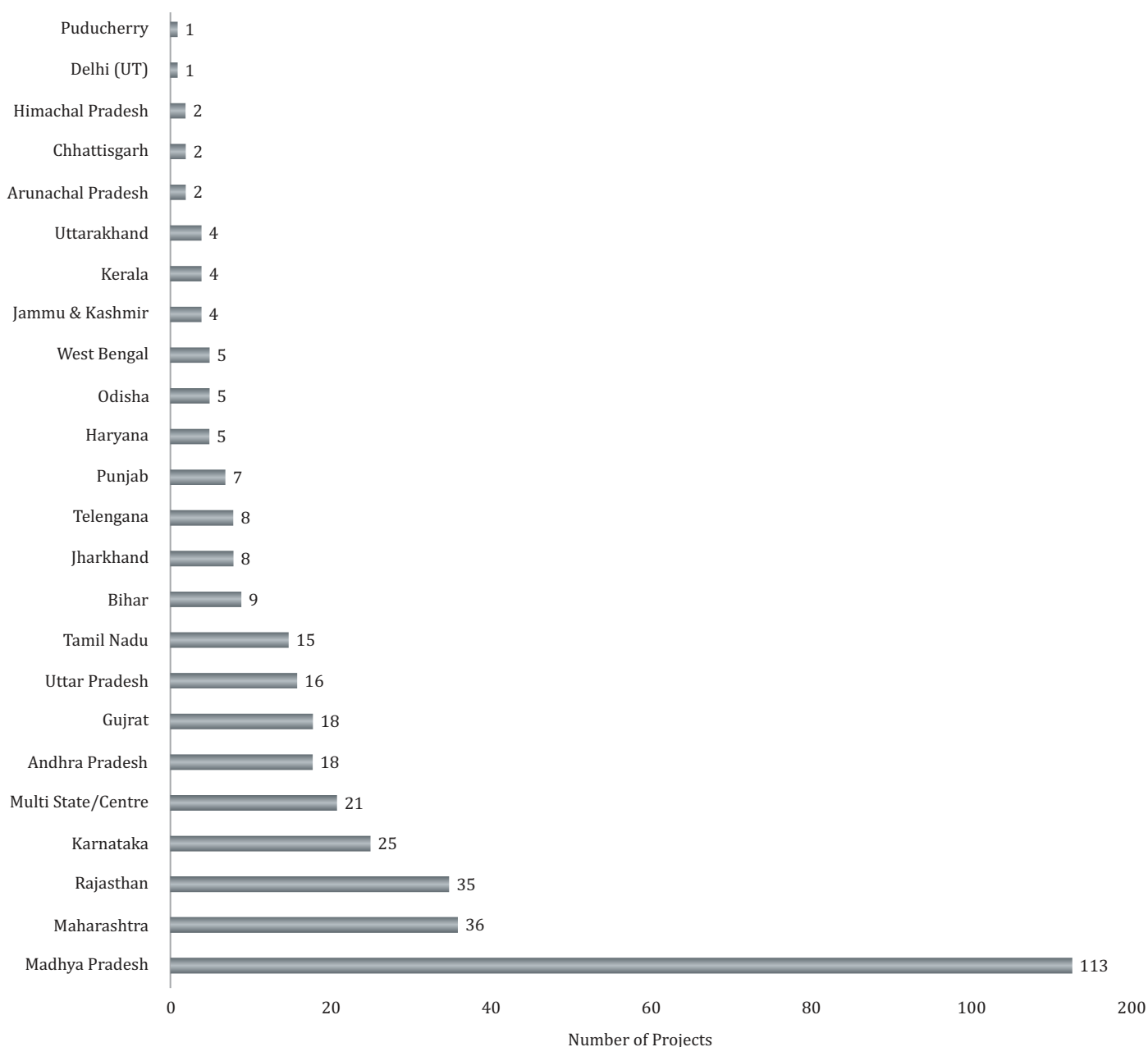
**Exhibit 32 : Number of Projects & Total Cost, PPP, 2007 - 2017**



**Exhibit 33 : Project Status under PPP, 2007 - 2017**



**Exhibit 34 : State-wise Projects under PPP, 2007 - 2017**



Source: InfrastructureIndia.gov.in; LSI Research



# 6 The Road Construction Sector

The present government built 22 km of roads per day in 2016-17, missing its ambitious target of constructing 41 km every day. Road transport minister Mr. Nitin Gadkari had set an all-time high target of building 15,000 km of roads in 2016-17 but only managed 8,200

km of roads. This construction figure, however, is the highest that the ministry has achieved till date and more than double of what the previous government managed. Between 2009 and 2014, on an average 6 km to 9 km of roads were built per day.

**Exhibit 35 : Road Built per Day, 2012 - 2017**



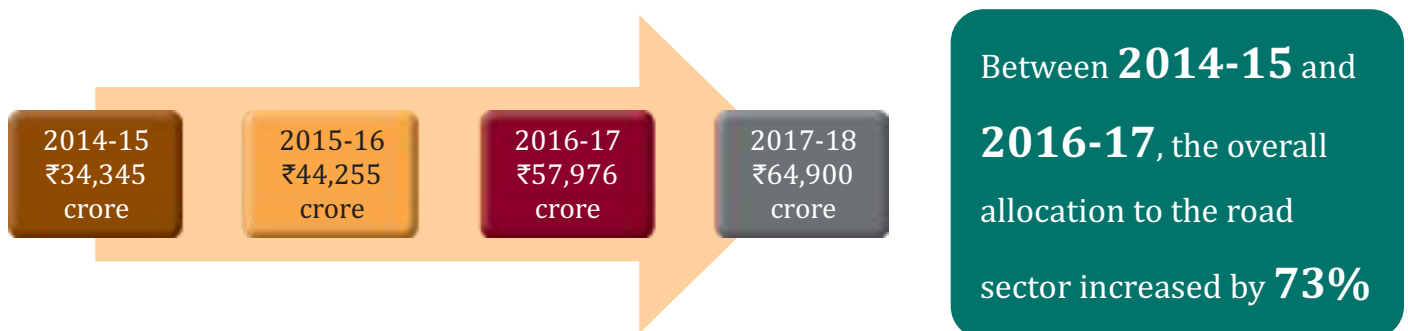
Source: NHAI, LSI Research

Mr. Gadkari had also set a target of awarding 25,000-km of stretch under highway projects in 2016-17 as compared to 10,000 km last fiscal. The government managed to award around 14,000 km by March 31, 2017. Even though the target was not met, this is the highest figure so far. Delay in land acquisition and tepid response from private developers came in the way of the ministry meeting its target. According to the

priority of roads, the government achieved an all-time high construction and award figures.

The highway sector had hit a rough patch since 2007. However, under the present government, between 2014-15 and 2016-17, the overall allocation to the sector increased by 73% — from ₹1.3 lakh crore to ₹2.25 lakh crore.

**Exhibit 36 : Allocation to The Highway Sector**



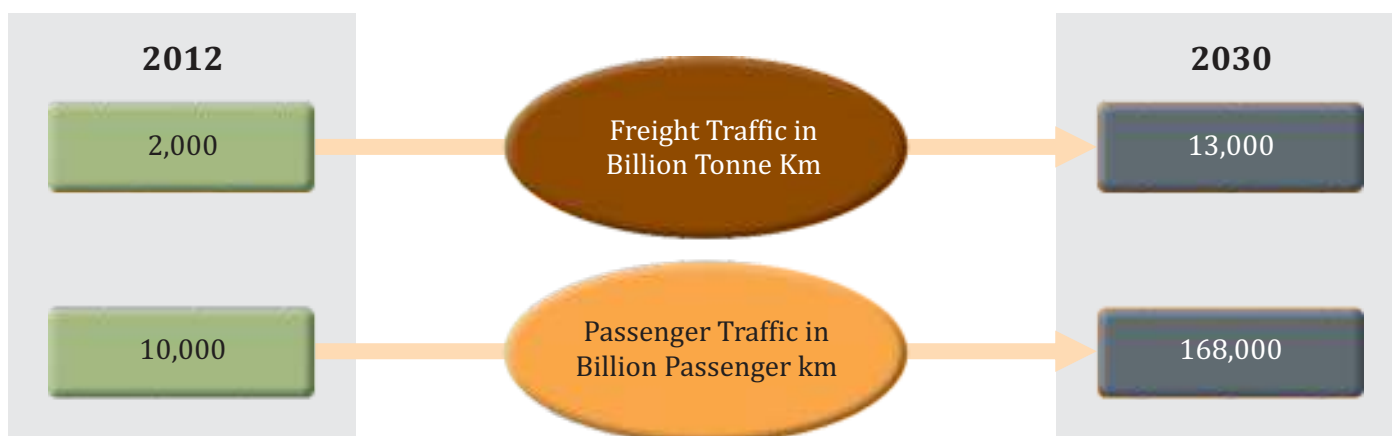
Source: NHAI, LSI Research

The ministry has initiated a series of measures to decentralise work. In the last two-and-a-half years, they have resolved issues that were stalling about 80 projects. Besides, the ministry also empowered states to appraise projects worth up to ₹100 crore and invite tenders. Earlier, all such projects used to come under the Centre, resulting in delays.

## Demand for Roads

Greater connectivity between different cities, towns & villages has led to increased road traffic over the years. Growth in automobiles and freight movement commands a better road network in India. Rise in the number of 2 & 4 wheelers, increasing traffic supports growth.

## Exhibit 37: Growth in India's Freight Traffic and Passenger Traffic



Source: NHAI, LSI Research

### Opportunities

- Roads and bridge infrastructure industry to be worth USD19.2 billion by FY17
- The Central Government has fast tracked at least 24 roads & highways projects
- Government is planning to offer a bonus of 10 per cent of the total project cost to firms that construct & deliver highway projects before deadline

### Investment Scenario

- Infrastructure expenditure estimated at USD1 trillion over FY13-17
- Government of India plans to approve almost 10000 kilometres of national highway in FY17
- Growing participation of the private sector through Public-Private Partnership (PPP)

### Investment Opportunities

Current investment opportunities in the sector include the following:

- Project Highways - Construction & O&M
- Expressway projects including the following
- Asset recycling ToT (Toll-operate-Transfer) model - proposed
- Innovative technologies, material, equipment etc.
- Tunnel projects- many are at bid stage
- Projects related to efficient operations & network management for improving logistics including development of Transport Nagars and Logistic Hubs, enabling seamless inter-state traffic movement, improved public transportation etc.
- Intelligent Transport Systems (ITS)
- Other opportunities- Road Safety, Driver Training Institutes etc.
- 'Bharatmala Project' (yet to be formally launched) is a new highway development programme that has

been recently identified as a premier, long-term, initiative.

### Policy Support

Road infrastructure has been a key government priority; the sector has received strong budgetary support over the years. Financial institutions received government approval to raise money through tax-free bonds. 100% FDI is allowed under automatic route subject to applicable laws & regulations. Standardised processes for PPP and public funded projects and a clear policy framework relating to bidding and tolling have been developed over the years.

Major policy initiatives undertaken by MoRTH during last two years include:

- Mode of delivery - MoRTH is now empowered to decide on mode of delivery of projects-EPC/PPP.
- Enhanced Inter-Ministerial coordination - An Infrastructure Group has been created under Chairmanship of Hon'ble Minister (Road, Transport & Highways) to resolve approval/clearance issues related to Environment & Forests, Railways and Defence, and most of the issues have been resolved.
- Exit Policy -Private developers can now exit all operational BOT projects two years from start of operations irrespective of the date of award of the project.
- Revival of Languishing projects - Now revival of BOT projects which are languishing in the construction stage is possible through one-time fund infusion by NHAI, subject to adequate due diligence of such projects on case to case basis through an institutional mechanism.
- Promoting innovative project implementation models- The Hybrid Annuity Model (HAM) has been developed and adopted for implementation of highway projects. The model takes into consideration appropriate risk allocation. Fifteen

projects have already been awarded under this model.

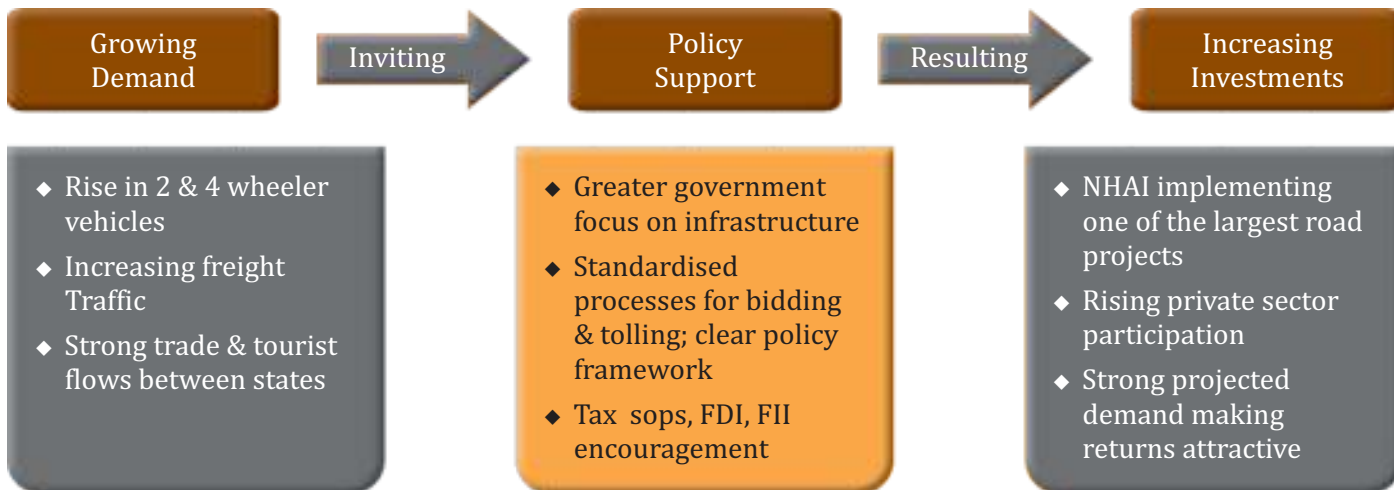
- Amendments to the Model Concession Agreement (MCA) for BOT projects - Certain changes in the MCA

have been approved by an empowered Committee headed by the Cabinet Secretary based on stakeholders' feedback. This would facilitate streamlined development and operation of highway projects

### Key Growth Drivers of the Road Construction Sector

#### Strong Demand and Policy Support Driving Investments Projects

Exhibit 38: Demand, Policy Support and Investment Scenarios in Indian Road Sector



Source: IBEF, LSI Research

#### Strong Demand and Policy Support Driving Investments Projects

- Sales of passenger vehicles increased at a CAGR of 10.1% FY06-16 and reached 3.4 million in FY16
- Sales of commercial vehicles in the country increased at a CAGR of 5.5% in FY10-16, with the

number reaching 782,814 during FY16

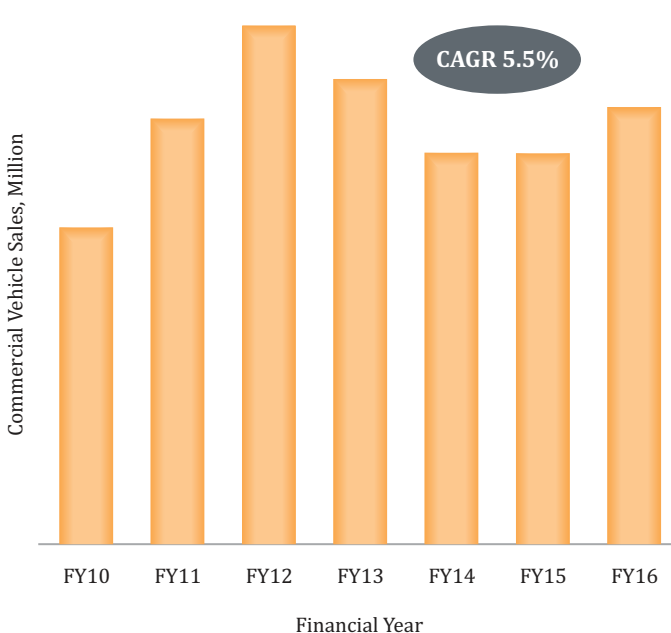
- Rising per capita income & growing middle class coupled with easier access to finance & a wider price range of vehicles have boosted car sales

Exhibit 39 : Passenger Vehicle Sales, India, FY06 - FY16



Source: IBEF, LSI Research

Exhibit 40 : Commercial Vehicle Sales, India, FY06 - FY16



Source: IBEF, LSI Research



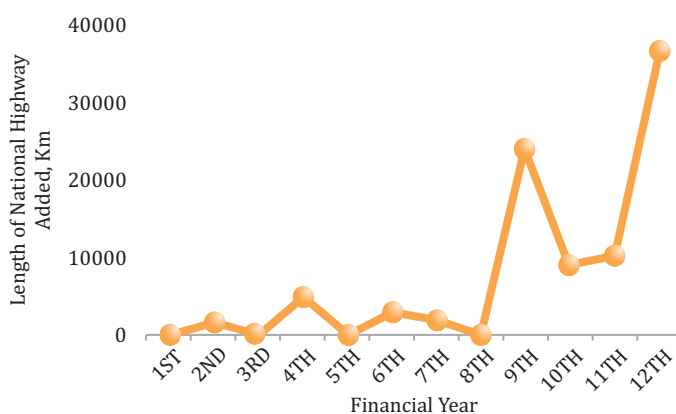
## Strong Growth Momentum in National Highways Construction

**Exhibit 41 : Overall Physical Target for Development of National Highways, as Included in the 12th Five-Year Plan**

Scheme	Target
Widening to 2-lane (km)	1,480
Widening to 4-lane (km)	9,826
Widening to 6-lane (km)	5,590
Strengthening / Improvement of Riding Quality Programme (IRQP) (km)	8,500
Construction of bridges (in No's)	50
Construction of bypasses (in No's)	5

Source: IBEF, LSI Research

**Exhibit 42 : Length of National Highway Added under Various Five-Year Plans (kms)**



## Policy Initiatives in Right Direction

Infrastructure is key government priority

Infrastructure investment is a major focus area for the government. The government earmarked US\$ 500 billion for infrastructure in the 11th Five-Year Plan (FY08-12); the amount is set to double to US\$ 1 trillion in the 12th Five-Year Plan (FY13-17).

Support from the Union Budget

The total expenditure on the Ministry of Road Transport and Highways for 2017-18 is estimated at ₹64,900 crore. This is 24% higher than the revised estimates for 2016-17. In 2017-18, of the total expenditure, the highest allocation is towards roads and bridges at 63%.

Rural Development

The Prime Minister's Gram Sadak Yojana (PMGSY) is a scheme for development of rural roads in India. In 2017-18 budget, the government has made an allocation of ₹19,000 crore for the Pradhan Mantri Gram Sadak Yojana or PMGSY—aimed at connecting all rural habitations in the country.

Taxes and other sops

Companies enjoy 100% tax exemption in road projects for 5 years & 30 per cent relief over the next 5 years. They have been granted a capital of up to 40% of the total project cost to enhance viability.

Issue of tax-free infrastructure bonds

Infrastructure finance companies, such as India Infrastructure Finance Corporation (IIFCL), National Highways Authority of India (NHAI), Housing & Urban Development Corp HUDCO), Power Finance Corporation (PFC) & India Railway Finance Corporation (IRFC), have been permitted to issue tax-free bonds.

Infrastructure Debt Funds

Government of India has set up the IIFCL to provide long term funding for infrastructure projects. Interest payments on External Commercial Borrowings for infrastructure are now subject to a lower withholding tax of 5% vis-à-vis 20% earlier. IDF income is exempt from income tax.

Central Road Fund (CRF)

The Central Road Fund (CRF) assists the state government & union territories in the development of state roads. For 2017-18, the transfer to CRF is estimated at ₹46,907 crore. This is a 23% increase from the revised estimates of 2016-17 (₹38,209 crore). Most of these grants are expected to be used for the creation of capital assets.

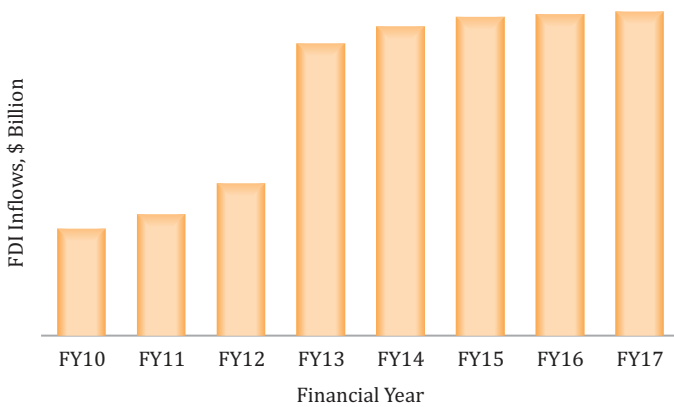
Investment in roads and other infrastructure

Allocation towards the National Highways Authority of India at 37%. In 2017-18, while revenue expenditure of the Ministry is expected at ₹10,723 crore, capital expenditure is expected at ₹54,177 crore. The ratio between revenue and capital expenditure for 2017-18 is expected at 17:83. Which was at 41:59, and 22:78 respectively in 2015-16 and 2016-17

## Private Funding being Encouraged to Reduce Financial Constraint

The government has aimed to attract funding from the private sector for infrastructure projects & thereby reduce strains on the budget. The PPP model has emerged as the favoured one for private sector participation in road projects. As a result of government's initiative, India has completed 112 PPP projects & 149 PPP projects are under progress as of December 2016.

**Exhibit 43 :**  
**Cumulative FDI Inflows, India, FY10 - FY17**

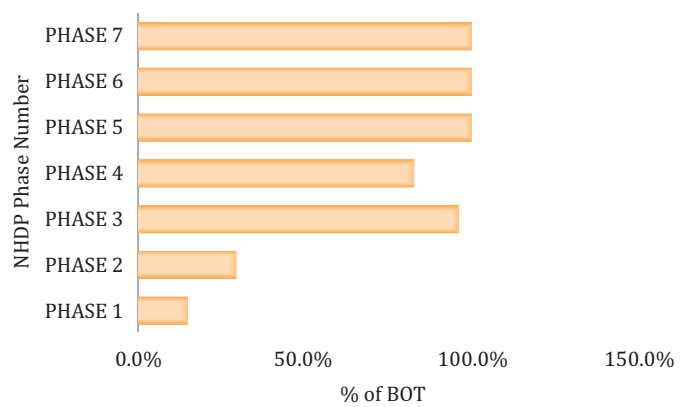


Source: Department of Industrial Policy & Promotion

Cumulative FDI inflows into the construction development sector, including roads & highways, has increased at a CAGR of 17.06% from USD8.06 billion in FY10 to USD24.28 billion till December 2016.

NHDP's Phase I & Phase II were mostly developed by public funds with BOT's share at 14.8% & 29.6%, respectively. The PPP model will be the favoured route for executing the remaining phases of NHDP.

**Exhibit 44 :**  
**Percentage of BOT in NHDP Phases**



Source: NHAI



## Porter's 5 Force Analysis


Porter's five forces analysis is a framework for analysing the level of competition within an industry and business strategy development. It draws upon industrial organization economics to derive five forces that determine the competitive intensity and therefore the attractiveness of an industry. The following 5 forces which are analysed are:

1. Competitive rivalry
2. Threat of new entrants
3. Substitute Product
4. Bargaining power of suppliers
5. Bargaining power of customers

With respect to India's road construction sectors the Porter's five force analysis can be explained as below:



Force Intensity Scale  High

 Medium

 Low

Source: IBEF, LSI Research





# 7 E-Governance in Road Sector

## The E-governance initiatives

- A web portal 'www.nhtis.org' has been launched to make available information of public interest concerning toll plazas on national highways and expressways.
- Bridge Design Cell has been set up and is equipped with latest software for design of roads and bridges.
- Online application for overweight cargo and over dimensional cargo has been rolled out.
- The records of the Ministry are in the process of being digitised.
- Online issue of National Permit has been initiated.
- ePACE (Projects Appraisal & Continuing Enhancements) has been created which is an online tool to monitor and improve the progress of works.

The Ministry has taken multiple initiatives for e-governance apart from the ones stated above. The expected outcome of this initiative is that there are going to be efficient operations leading to enhanced service delivery in terms of providing quality road infrastructure to the nation.

## INAM-PRO

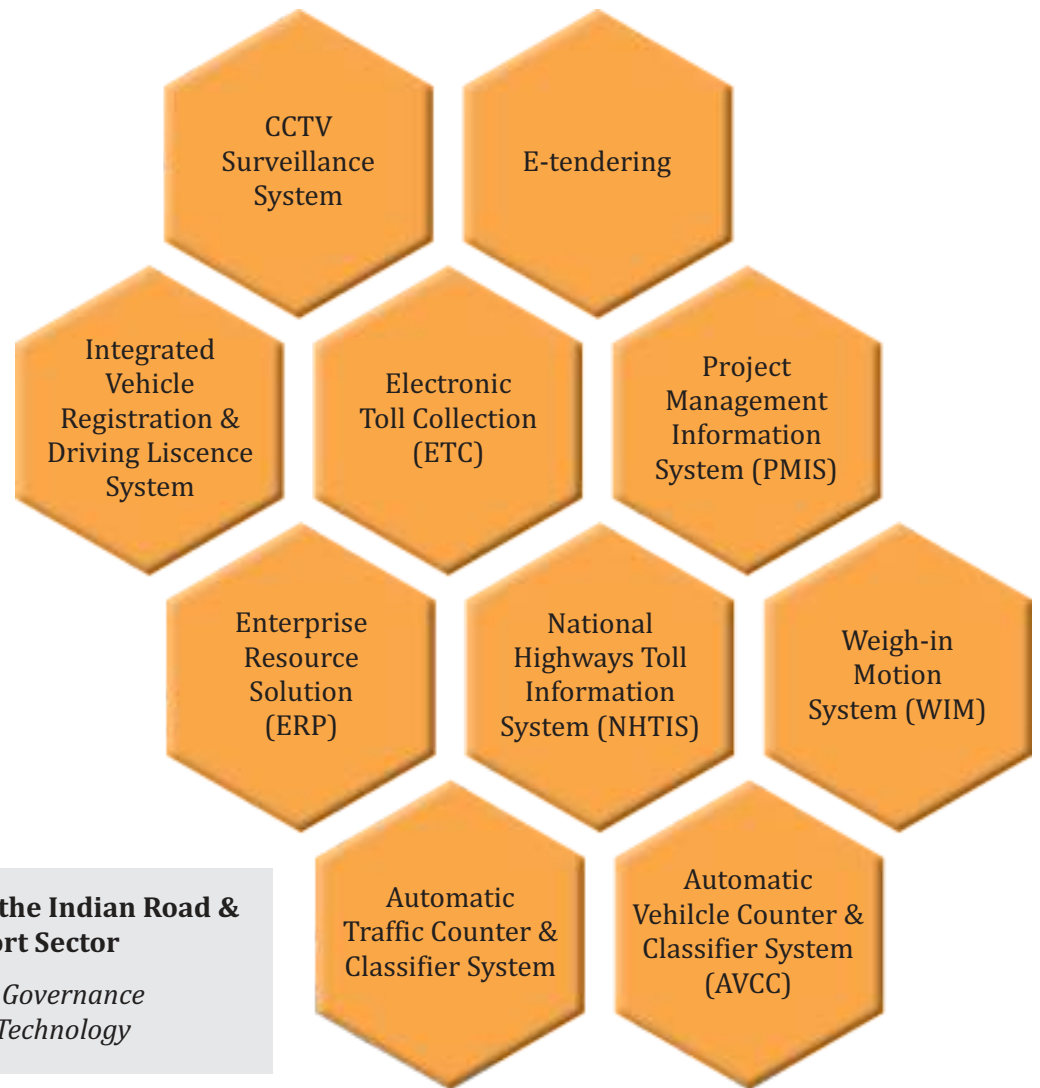
The Ministry has also launched a platform for linking the supplier to the road contractors/users. This portal

is called INAM-PRO which was launched in 2015. This will facilitate the monitoring of the supply of cement and expedite the process of placing purchase orders. This process will ensure transparency in the supply of cement and the cost of construction of rigid pavements will fall. This will end the cement cartelisation. Cement orders can now be placed online with registered cement companies offering competitive rates. This initiative will not only help reduce the cost of construction but it will also help the cement manufacturing factories to utilize their capacity to the full potential. The cement companies will be able to plan their annual production in advance and schedule deliveries with better precision. Under this portal, both the cement companies and the buyers will be able to track their orders and have access to complaints/suggestions.

## Electronic Toll Collection (ETC)

This initiative will enable road users to pay the necessary toll electronically without the need to stop at toll plazas. ETC system in one lane in each direction has already been installed at around 500 toll plazas. ETC lane has been made mandatory in all new Highway Projects. This technology will help in reducing the time road users spend waiting at toll plazas and thereby it will also cut down the final travel time.





**E-Governance in the Indian Road & Transport Sector**  
*Reforming Governance Through Technology*

Source: NHAI, LSI Research

### Quality of Roads Index, Global

The Index of Quality of Roads has been compiled by the World Economic Forum. United Arab Emirates (UAE) has achieved the top rank with a score of 6.6 on this index, while United States ranks 16th and has a score of 5.7. None of the BRICS nations have been placed within the top 30 countries. The quality of roads in South Africa has been ranked 37th globally with a score of 4.9, followed by China on the 49th position with a score of 4.6. The Indian economy ranks 76th globally on the quality of roads index and has a score of 3.8. Lagging far behind among the BRICS nations are Brazil and the Russian Federation, holding a rank of 122 and 124 respectively among the 144 countries considered. Brazil has scored 2.8 while Russia has a score as low as 2.7.

### Quality of Roads Index, South Asia

South Asia for the first time in 20 years may grow more quickly than China. Over the past decade, the region has focused on upgrading infrastructure amidst other growth parameters. Yet, infrastructure remains one of the weakest pillar for the subcontinent. The region is diverse, with a core of three heavyweight economies: India, Pakistan and Bangladesh. The overall quality of infrastructure has improved significantly (although from low levels) in India, Bangladesh, and Sri Lanka, while it stalls in Nepal and deteriorates in Pakistan. India tops the ranking for the quality infrastructure in South Asia with Nepal as the worst performer under the same pillar.

Amongst these countries, Sri Lanka leads the region in terms of quality of roads with a score of 5.1, followed by Bhutan with a score of 4.3. India and Pakistan have both received low scores of 3.8 while Bangladesh and Nepal have the worst quality of roads in the region with a score of 2.9 each.

### Quality of Roads, BRICS Nations



**Brazil (Score-2.8; Rank-122nd; Road Length-1,751,868km; Expressway Length-11,000km):** Brazil is one of the lowest performers in terms of its transport infrastructure with particularly poor results for roads quality. Brazil's rankings have been low for the past decade and have worsened over the past 5 years. The Brazilian transportation infrastructure faces several challenges and the roads and ports need to be upgraded.

Less than 15% of the roads in the country are paved (including municipal roads) and congestion is a concern. Moreover, multi-lane roads are still relatively rare in Brazil, although they have doubled over the past half-decade.

In June 2015, the Brazilian Government under the Logistics Investment Programme provided investment concessions of US\$52.2 billion for the construction and operation of railroads, roads, ports and airports. Roads received planned investments of US\$17.2 billion. The investments planned for highways, including doubling of lanes, third lanes etc.

Infrastructure investments in Brazil have been declining due to a reduction in public infrastructure investments. Meanwhile, private sector investments are not filling the space vacated by the public sector.

**Russia (Score-2.7; Rank-124th; Road Length-1,396,000km; Expressway Length-806km):** The lack of infrastructure investment over the last

10 to 20 years has dropped Russia's score of quality of infrastructure and roads. The road system in Russia is underdeveloped but has been receiving growing attention of the government. However, its density and quality still do not meet the needs of the country. The majority of roads are not adapted to heavy vehicles: less than 30% of federal and regional roads are adapted to standard modern axle loads of 10 tonnes or more.

Roads are something of a priority in Russia. Due to its sheer size, the country needs rugged highways and roads. Over US\$548 billion has been allocated towards construction of roads in rural areas. Over 1,000 km of new roads are planned for 2020.

Currently, the transport system in Russia is very Moscow-centred. Of total road system, only 336,000 km are paved. Poor roads are holding back the country's economic output. The road network density (kilometres of road per square kilometre of land) is one of the lowest in Europe.



**India (Score-3.8; Rank-76th; Road Length-5,472,144km; Expressway Length-1,324km) and China (Score-4.6; Rank-49th; Road Length-**



**4,696,300km; Expressway Length-131,000km):** India is the fastest growing large emerging market in the world, surpassing China.



Improvement in infrastructure picked up only post 2014, when the government increased public investment and sped up approval procedures to attract private resources. Though the performance of the country still remains low in terms of infrastructure, it has experienced one of the most important and significant improvements in India. The country is moving towards closing the infrastructure gaps. Though the economy has significantly improved its physical infrastructure, the lack of adequate infrastructure still remains a bottleneck. Further investments are necessary, especially to connect rural areas.

India has a rural road length of about 2.7 million km which is about 80% of the total road network in 2015. In the budget of 2016-2017, the budget allocation for road and highway development was ₹97,000 crores, out of which ₹19,000 crores were meant for rural roads under the Pradhan Mantri Gram Sadak Yojna. In the past, the rural roads scheme had suffered because of underfunding.

India in the 2017-2018 Union budget, has allocated US\$ 35.7 billion for the whole transport sector including rail, roads and shipping. China on the other hand is going to invest US\$1.13 trillion only in roads between 2016 and 2020. China will spend \$240 billion

only on roads in the financial year 2017.

In China, to go from Beijing to Shanghai, it takes around 12.5 hours for a distance of 1213 km while in India, to travel from Delhi to Mumbai, it takes around 22.5 hours for a distance of 1414 km. For 200 km extra in India, 10 additional hours are required. Average car speed on the roads of China is 100km per hour while that in India is 60 km per hour. Though the length of total of overall road network in China and India are around 5 million km, but they greatly differ in their expressway networks. China has an expressway network of over 1,30,000 km while India merely has an expressway length of 1,324 km. The US on the other hand ranks ahead of China in terms of total road network with a length of 6,722,347 km but has an expressway network of 77,000 km which is lesser than that of China's. China's speed of execution has been spectacular, yet The US is still ahead on a per capita basis.

Amongst the BRICS nations, India, Brazil and China have progressed and made significant commitments to infrastructure development. The BRICS countries don't rank well globally in terms of quality of roads. Amongst the five nations, China followed by India lead in terms of quality of infrastructure and the quality of roads. China plans to spend US\$1.13 trillion on roads between 2016-2020.

### China vs India

#### Exhibit 45 : Comparison of India and China Based on Infrastructural Growth

Variables	China	India
% of GDP spent on Economic Infrastructure annually (between 2008-2013)	8.8%	5.2%
Gap between spending and estimated infrastructure needs (2016-2030)	-3.3%	0.5%
Quality vs Spending on Infrastructure	China has high quality infrastructure with high spending on the same.	India has high quality infrastructure with low spending on the same.
Infrastructure Investment Rate	Decreased by 0.3% from 2005-08 to 2010-13.	Increased by 0.4% from 2005-08 to 2010-13.

It is expected that 60% of the investment need in infrastructure will be in emerging economies between 2016 and 2030. Out of this, China will account for 29% whereas India will account for 6% only. China is expected to extend its road network in rural areas to 3.95 million km by the 2020. The government aims to boost rural economic and social development and will encourage investments in rural infrastructure. China aims to upgrade and build 20,000 km of rural roads. Rural roads in China form 87.4% of the total road network and the percentage of rural population is 44.39% whereas, in India, rural roads form 80% of the total road network and 67.25% of the total population

lives in rural areas. It is expected that the rural population in China will fall to 45% in 2020 with due to large scale urban migration of the population.

Although India has progressed on the road and infrastructure forefront, it still has a long way to go compared to other similar countries, especially China. In 2016-2017, the government missed its target of building 41 km of roads per day and built only 22 km per day. The target in the same period was to build 15,000 km of roads but the country only achieved 8,200 km of roads.





**South Africa (Score-4.9; Rank-37th; Road Length - 947,014 km; Expressway Length-1,400km):**

South Africa has most developed road infrastructure among the BRICS nations. South Africa's road network is the longest of any African country. The market value of South Africa's infrastructure is US\$16.1 billion and is expected to be US\$24.3 billion by 2020 in nominal value terms.

In the National Budget of 2017, the government has allocated a total of US\$0.80 billion for national and provincial economic infrastructure, out of which US\$0.26 billion to The South African National Roads Agency Limited (SANRAL) for the strengthening and maintenance of the national road network.

However, lately, the roads sector has been facing many funding and skills challenges which have all contributed to a backlog of US\$3.39 billion. The government has recently highlighted the need for the sector to bring people from outside of South Africa to assist across the country.

### **Concluding Remarks:**

India has the 2nd largest road network in the world. However, India's national highways and expressways constitute only 1.7% of the road length, and the percentage of paved roads is only 49.3%, lagging behind both the US and China. Some of the biggest challenges faced by the Indian roads sector are congestion, poor quality, poor maintenance and poor access to rural areas.

Despite the challenges, as on March 31st 2015, India's road density stood at 1.66 km/sq. km of area and was higher than that of Japan, US, China, Brazil and Russia. The surfaced road length in India was 61% of the total road length which was much lower compared to UK, Korea, Russia and China. National Highways in India accounted for 1.8% of the total length which was much lower than some of the developed and developing countries of the world such as Japan, South Korea, United Kingdom, Russian Federation and Brazil.





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