



*20 years PIDP
for Assam*
PIDP for Road
Sector

Dec, 2014

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List of Acronyms

AACP	Assam Agricultural Competitive Project	JV	Joint Venture
ADB	Asian Development Bank	Km	Kilometre
AIDC	Assam Industrial Development Corporation	MDR	Major District Roads
AIIDC	Assam Industrial Infrastructure Development Corporation	MPDNA	Mukhya Mantrir Paki Dalang Nirman Achoni
Capex	Capital Expenditure	MPNA	Mukhyamantrir Pakipath Nirman Achani
Cr	Crore	MSME	Micro, Small and Medium Enterprise
ASTC	Assam State Transport Corporation	NABARD	National Bank for Agriculture and Rural Development
BRO	Border Road Organisation	NH	National Highway
DOE	Department of Environment	NHAI	National Highways Authority of India
DPR	Detailed Project Report	NEC	North East Council
DRRP	District Rural Roads Plan	ODR	Other District Roads
FR	Forest Department	PC	Planning Commission
GOA	Government of Assam	PCU	Passenger Car Unit
MMS	Maintenance Management System	PMGSY	Pradhan Mantri Grameen Sadak Yojana
PWD	Public Works Department	RR	Rural Roads
RIDF	Rural Infrastructure Development Fund	SH	State Highways

1. Executive Summary

1.1. Background

The Planning & Development Department, Government of Assam (GoA) has taken up the task of Preparation of Perspective Infrastructure Development Plan (PIDP) for Assam for a period of twenty years. The focus sectors for preparation of the PIDP are Roads and Inland Waterway Transport, Power, Urban Infrastructure and Industrial Infrastructure.

1.2. Overall Infrastructure Vision

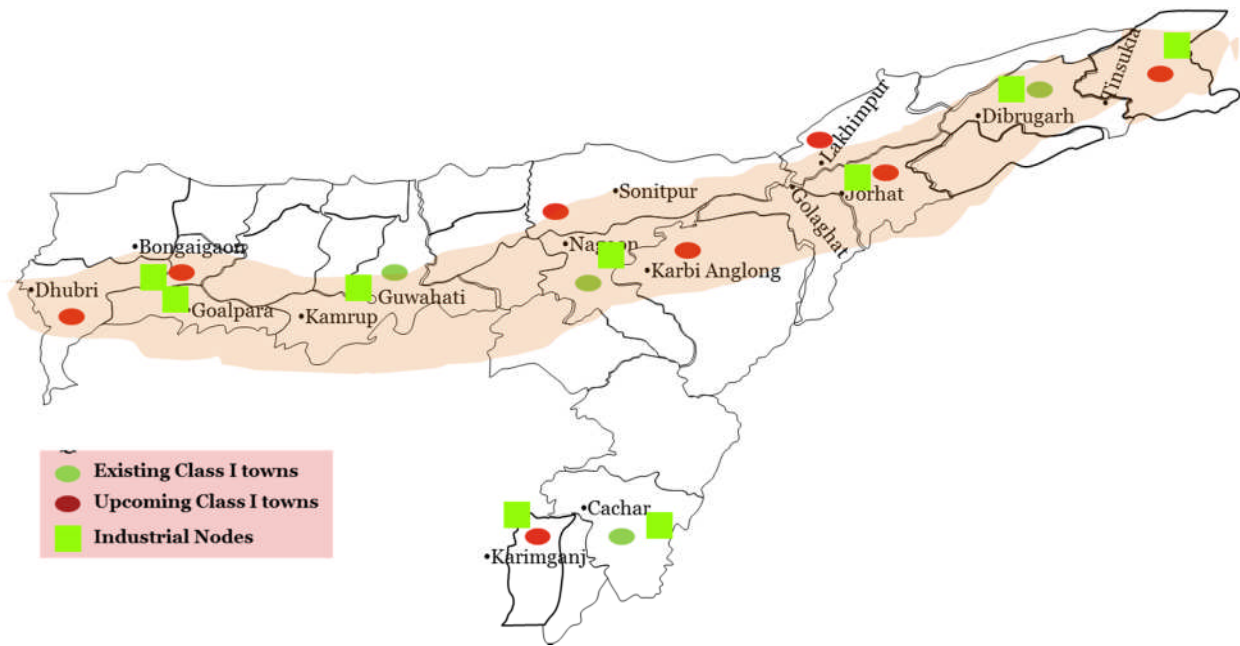
The overall Infrastructure Vision for the state envisages various **physical, policy level and institutional interventions in different sectors. Effective and efficient execution of these interventions is expected to –**

- **Lead to development of multi-modal Transport Corridors** with adequate feeder networks that provides seamless movement of traffic with minimum transshipment cost and connects the state to neighbouring countries and states
- **Ensure development of Urban Nodes and Industrial Growth Centres along these Transport Corridors** and will utilise synergies among the various government interventions - thereby contributing to uniform development across the state
- **Ensure augmentation and strengthening** of the power sector along these Transport Corridors

The Infrastructure Vision for the state **aims to align development of industrial growth centres and urban centres** across the state leading to the creation of Urban Nodes and Industrial Growth Centres. The development of the Vision is based on these facts –

- Urbanization acts as one of the key enablers for industrial development
- Urban development and industrial development should be aligned
- Development of industrial centres around smaller towns will facilitate their growth
- It will also prevent migration of population to larger towns and will facilitate a uniform urban development across the state

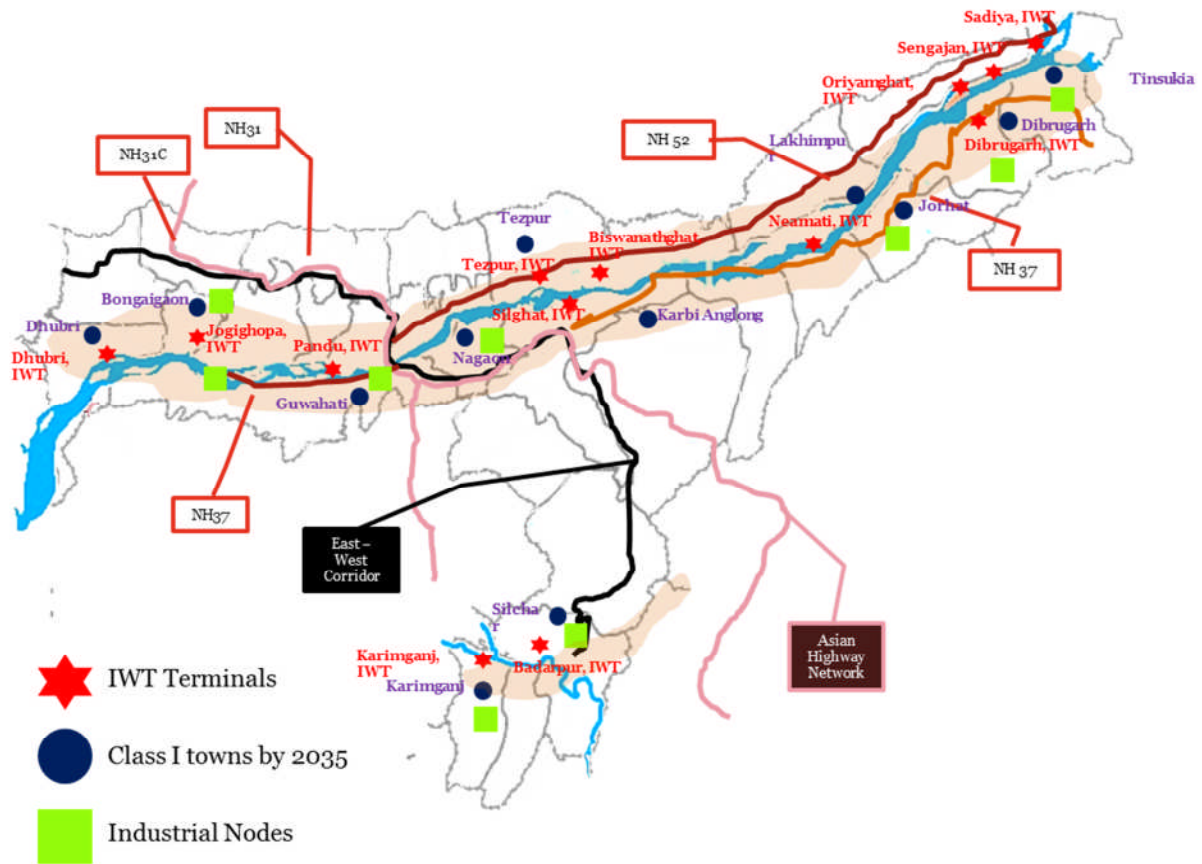
Figure 1: Development centres



Source: PwC Analysis

The overall Vision envisages development of robust multi-modal Transport Corridors connecting Urban Nodes and Industrial Growth Centres. The Transport Corridors will be developed by strengthening the 2 key modes of transport in Assam viz. roads as well as inland waterways.

Figure 2: Transport corridor, Class I towns and industrial nodes (by 2034 – 35)

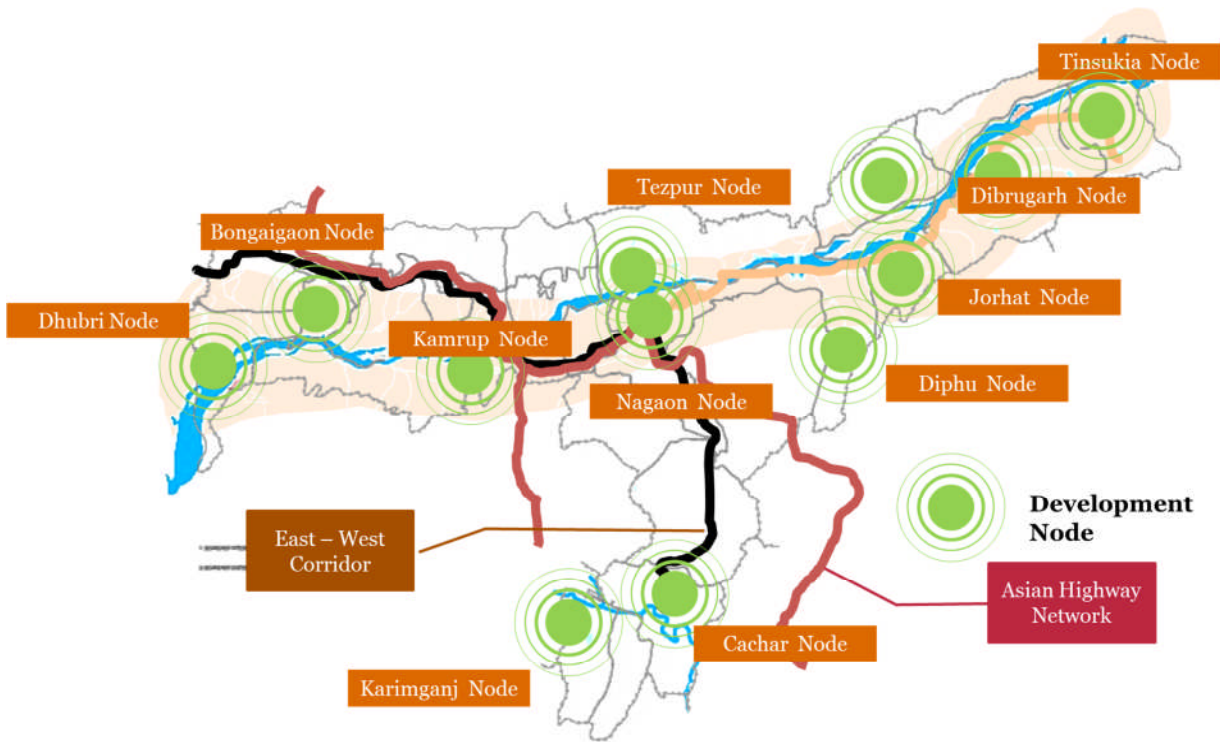


Source: PwC Analysis

The Infrastructure Vision proposes **development along the Transport Corridors and creation of Urban Nodes and Industrial Growth Centres**. These will, in turn, lead to **hinterland development through adequate feeder networks**.

- Ensure adequate supply of land along the Transport Corridor through innovative mechanisms such as higher FSIs along transport corridors, Transfer Development Rights
- Promote land reclamation along the IWT Channel and develop industrial areas along the banks of the rivers with adequate environmental safeguards

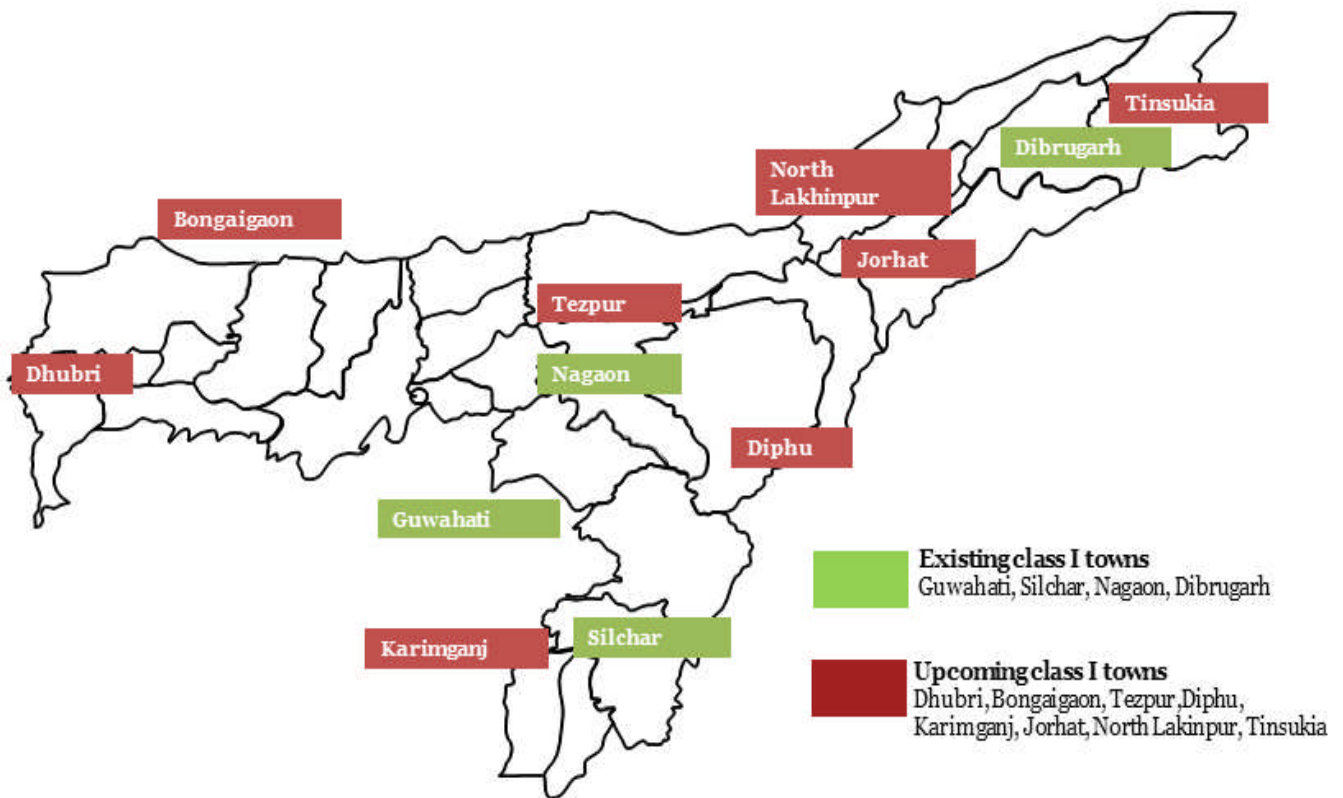
Figure 3: Development nodes (2034 - 35)



Source: PwC Analysis

This developments needs to be supported by augmentation and strengthening of the power infrastructure. ***In the next 20 years, 11.5x Load Growth is expected in Assam. With Class I cities like Guwahati, Silchar , Nagaon & Dibrugarh expected to rapidly industrialise and urbanise in the next 20 years, around 13x Load Growth is expected in Class I towns and around 11x Load Growth is projected for upcoming Class I towns.***

Figure 4: Existing and upcoming Class I towns



Source: PwC Analysis

1.3. Vision for the Road sector

Development of road network is crucial for the socio-economic development of Assam and the entire north east region of India.

Assam with a road network of 48,358 km plays an important role in the integration of the north east India region with the rest of the country. It also shares international borders with Bhutan, Myanmar and Bangladesh and has the potential to act as a gateway to these countries.

The road network of the state carries a significant 74% of the total cargo traffic in the state (including interstate traffic) highlighting its importance and makes its development and maintenance very vital.

The geographical isolation of Assam and the overall north east region makes it more imperative to develop the road network and other transportation modes to promote economic development of the region and establish the region as a gateway to India’s eastern neighbours and the ASEAN countries.

In order to bring about an overall development of the road sector in particular and transport sector in general, and to drive the social and economic growth of the state and the region as whole, a holistic Vision for the road sector is required:

Vision for the next 20 years

- *Creation of a strong road network providing connectivity to all habitation and key centres (Industry Centres, Tourism Centres and growing Urban Centres) of the state*
- *Develop and strengthen connectivity to neighbouring states*
- *Make Assam the preferred gateway to neighbouring countries*

1.4. Implications of the Vision

The key implications of the envisaged Vision are -

- 1. The overall length of Road Network of the State to increase by ~ 50% (from the current length of ~ 55,435 km to ~ 71,000 km) in the next 20 years for providing better and seamless connectivity.**

Table 1: Envisaged status of road network in the state of Assam by 2034 - 35

Categories of Road	Total Length (Km)	% of 6-lane (by 2034-35)	% of 4-lane (by 2034-35)	% of 2-lane (by 2034-35)	% Single Lane (by 2034-35)
NH	5,000	4%	96%		
SH	10,000		60%	40%	0%
MDR	12,000		5%	95%	
Rural Roads	~44,000			20%	80%

Source: PwC Analysis

- 2. Development of Core Road Networks covering connectivity to neighbouring states, countries and key growth centres**

1.5. Key interventions for achieving the Vision

In order to achieve the envisaged Vision and thereby realize the expected implications, interventions in terms of physical infrastructure development, institutional interventions and policy level interventions are required

Interventions are required across the spectrum – physical, institutional and policy level – of interventions. A summary of these interventions is provided below –

Table 2: Summary of action points

	Immediate Action Points	2015 – 17	2017 – 22	2022 – 35
Physical	<ul style="list-style-type: none"> ▪ Assist PWD (NH & Buildings) or any other agency such as NHAI involved in developing the recently declared National Highway networks including identified missing linkages (provide support in land acquisition and in getting environmental clearances) ▪ Project preparation for augmentation of NH 31B, NH 31 C and NH31 and NH37. The proposal should be placed before MoRTH highlighting the importance of these highways and the requirement for augmentation. ▪ Identify State Highways and MDRs that can be converted into National Highways. 	<ul style="list-style-type: none"> ▪ Develop a shelf of projects for PPP within the Core Road Networks ▪ Land acquisition and obtaining of necessary clearances ▪ Initiation of the development works on the identified Core Road Networks through PPP. Hybrid Tolling and Complete Tolling can be considered ▪ Maintenance of the existing network ▪ Development of feeder networks to the NH networks developed earlier 	<ul style="list-style-type: none"> ▪ Develop a shelf of projects for PPP within the Core Road Networks ▪ Land acquisition and obtaining of necessary clearances ▪ Initiation of the development works on the identified Core Road Networks through PPP. Hybrid Tolling and Complete Tolling can be considered ▪ Maintenance of the existing network ▪ Development of feeder networks to the NH networks developed earlier 	<ul style="list-style-type: none"> ▪ Completion of the development works on the identified Core Road Networks ▪ Development of the feeder networks to these Core Road Networks through PPP ▪ Enhancing the network to connect all centres of habitation

	Immediate Action Points	2015 – 17	2017 – 22	2022 – 35
Institutional	▪	<ul style="list-style-type: none"> ▪ Strengthening of the Assam State Road Board as an apex body and strengthening its mandate to include overall policy planning for the sector, regulation of the sector and overseeing of implementing agencies through an Act in the Legislative Assembly. ▪ Create Core Road Fund through an Act in the Legislative Assembly ▪ Operationalize the proposed Core Road Fund under the aegis of the Assam State Road Board. ▪ Creation of Assam Road Development Corporation capable of raising finances on its own and mandated with execution of road projects ▪ Capacity Building Plan for proposed institutions and the existing Public Works department 	<ul style="list-style-type: none"> ▪ Implement Capacity Building Plan – for proposed institutions and the existing Public Works department 	<ul style="list-style-type: none"> ▪ Implement Capacity Building Plan – for proposed institutions and the existing Public Works department
Policy level	▪	<ul style="list-style-type: none"> ▪ Formulation of a holistic road sector development policy for the state by Assam State Road Board and formulation of other key policies viz. Toll Policy and 	<ul style="list-style-type: none"> ▪ Formulation of master plan with inputs from all relevant stakeholders focusing on the Core Road Networks ▪ Periodic revision of all 	<ul style="list-style-type: none"> ▪ Five year and Annual master planning ▪ Periodic revision of all policies

	Immediate Action Points	2015 – 17	2017 – 22	2022 – 35
		<p>PPP Policy etc.</p> <ul style="list-style-type: none"> ▪ PPP policy – Assam has an overall PPP policy for the state. However considering the quantum of investment required for the road sector, a road specific policy can be explored with greater role for Assam State Road Development Corporation 	<p>policies</p>	
Planning	○	<ul style="list-style-type: none"> ▪ Integrated road network development – a holistic Master Plan for road development is required ▪ Capacity Building Plan for government employees across all levels and categories in all implementing agencies. 	<ul style="list-style-type: none"> ▪ Monitor implementation of Master Plan – including periodic review and refinement of Master Plan ▪ Monitor implementation of Capacity Building Plan – including periodic review and refinement of Capacity Building Plan 	<ul style="list-style-type: none"> ▪ Monitor implementation of Master Plan – including periodic review and refinement of Master Plan ▪ Monitor implementation of Capacity Building Plan – including periodic review and refinement of Capacity Building Plan

1.6. Investment requirements for achieving the Vision

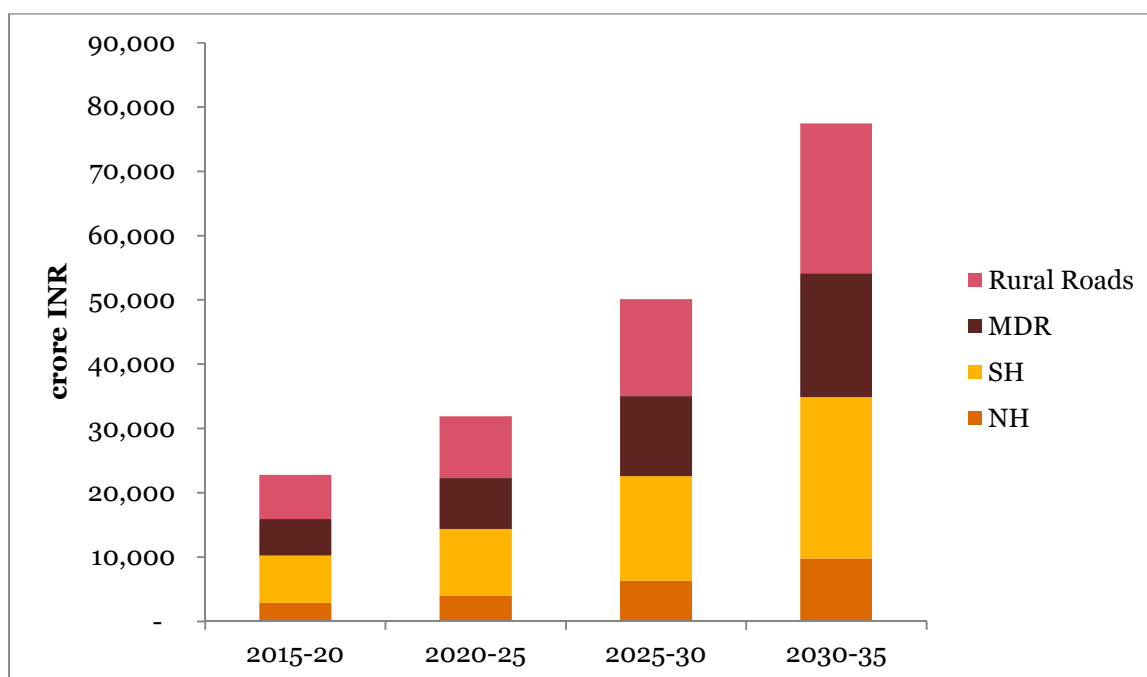
A total capital investment of ~ 183,000 crore INR has been estimated for the envisaged physical infrastructure development over the next 20 years.

Table 3: Envisaged capital investment for the sector

Categories of Road	Total investment (crore INR)
NH	23,151
SH	59,007
MDR	45,314
Rural Roads	54,778

Source: PwC Analysis

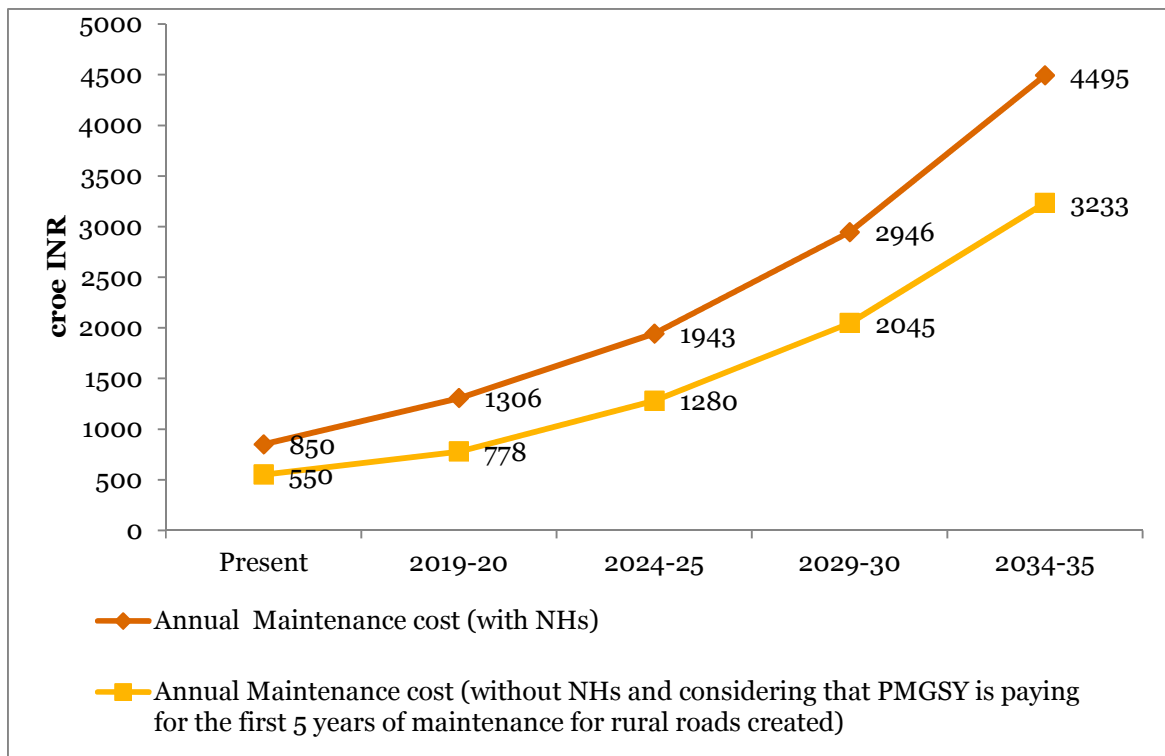
Figure 5: Capex phasing for the next 20 years (5 year block period)



Source: PwC Analysis

The total annual maintenance cost (for NHs, SHs, MDRs and Rural roads) is expected to increase from ~ 850 crore INR in 2014–15 to ~ 4,500 crore INR p.a. by 2034–35.

Figure 6: Annual maintenance cost

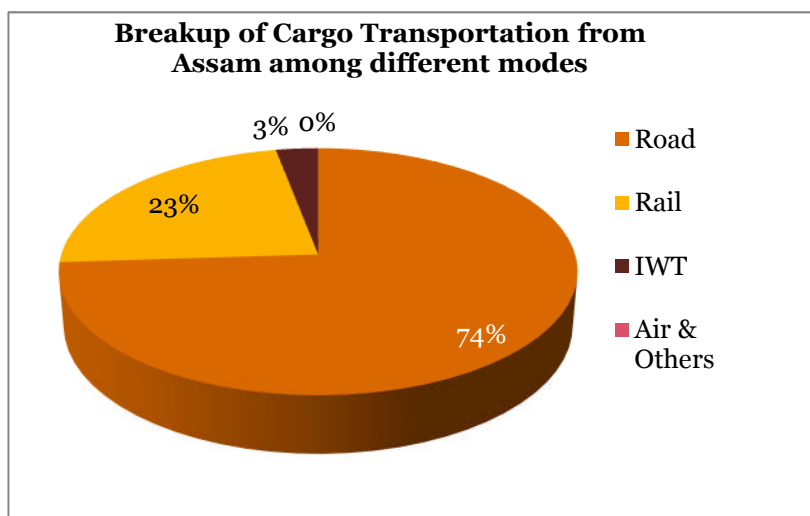


Source: PwC Analysis

While the capital investment for National Highways and Rural roads is expected to be met through funding from the Central Government through MoRTH and PMGSY, the state government will have the responsibility to meet the capex requirement for SH and MDRs which is estimated at ~ 104,321 crore INR.

2. Vision for Road sector

Assam is the largest state among the North Eastern states of India and acts as gateway for the entire North Eastern (NE) region. It connects NE states with the rest of mainland India via a narrow wedge of 27 km; popularly known as the “Siliguri corridor” or the “chicken neck”. Thus, Assam plays an important role in integration of north east region with the rest of the country. The geographical isolation of the Assam further demands huge thrust on the development of transportation via roads and other transport modes. In addition, its international borders with countries like Bhutan, Burma and Bangladesh further emphasise the criticality of development of roads, not only for Assam, but also for the entire NE region.



Source: Planning Commission, Total Transport Study, 2006

Moreover a significant 74% of the total cargo traffic in the state (including interstate traffic) is carried by the road network, which highlights its criticality and make the development of roads and adequate maintenance of these roads vital.

In order to ensure overall development of the sector to drive social and economic growth of the state and the region as whole, a holistic Vision for the sector is required:

Vision for the next 20 years

- *Creation of a strong road network providing connectivity to all habitation and key centres (Industry Centres, Tourism Centres and growing Urban Centres) of the state*
- *Develop and strengthen connectivity to neighbouring states*
- *Make Assam the preferred gateway to neighbouring countries*

3. Implications of the Vision

The Vision for the sector need to have specific time bound targets. Accordingly, the above Vision is slated to achieve the following.

3.1. Increase in overall road network

The overall length of Road Network of the state to increase by ~ 50% (from the current length of ~ 55,435 km to ~ 71,000 km) in the next 20 years for providing better and seamless connectivity

- The total length of **National Highways in the state will increase to 5,000 km with 96% 4-lane highways** by 2034 – 35, while the balance is expected to be 6-lane highways.
- At the national level, the average ratio of State Highway to National Highway is around 2. Assam is expected to achieve the same ratio, and accordingly, **the total length of State Highways will become 10,000 km** by 2034-35. Further, **60% of the State Highways will be 4-lane highways and balance 40% would be 2-lane highways.**
- The total length of **MDRs will increase to 12,000 km with 95% 2-lane highways and remaining to be 4-lane highways.**
- The total length of **rural roads will be around 44,000 km** thereby connecting all habitation centres.

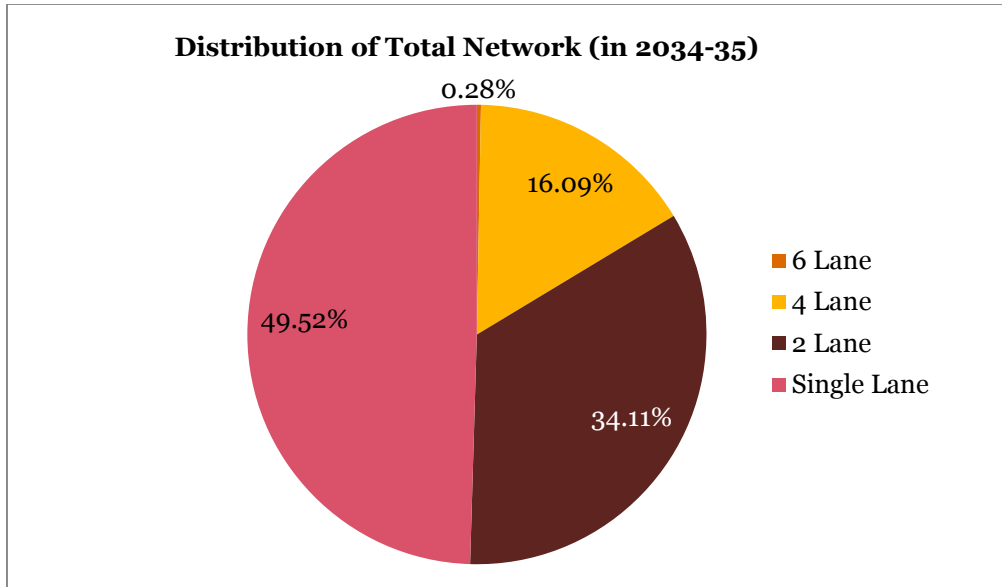
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NH	5,000	4%	96%		
SH	10,000		60%	40%	0%
MDR	12,000		5%	95%	
Rural Roads	~44,000			20%	80%
Total	~71,000	~ 0.3%	16%	34%	50%

Source: PwC Analysis

At an aggregate level, by 2034–35, ~ 16% and ~ 34% of road network are expected to be 4 lanes and 2 lanes respectively and balance ~ 50% will be all weather single lane roads.

Figure 7: Distribution of total road network of the state of Assam in terms of capacity (2034 - 35)



Source: PwC Analysis

3.2. Development of Core Road Networks

The Core Road Networks will provide all-weather connectivity to neighboring states, countries and key growth centres.

Physical infrastructure development will lead to development of Core Road Networks with adequate feeder networks providing connectivity to **key urban centres, industrial centres and tourism centres**. The Core Road Networks will also provide seamless connectivity to neighbouring countries and neighbouring states thereby making Assam as the preferred gateway.

4. *Interventions required*

In order to achieve the envisaged Vision and thereby realize the expected implications, interventions in terms of physical infrastructure development, institutional interventions and policy level interventions are required

Achieving the envisaged vision will require physical interventions, institutional interventions and policy interventions

- ***Physical interventions*** – It will involve augmentation of the existing network and development of new roads.
- ***Institutional interventions*** – It will involve development of necessary institutions to formulate policies, master plan and implement the same
- ***Policy interventions*** – It will involve formulation of necessary policies to provide guidelines and drive sectoral development

Table 5: Summary of actions points

	Immediate Action Points	2015 – 17	2017 – 22	2022 – 35
Physical	<ul style="list-style-type: none"> ▪ Assist PWD (NH & Buildings) or any other agency such as NHAI involved in developing the recently declared National Highway networks including identified missing linkages (provide support in land acquisition and in getting environmental clearances) ▪ Project preparation for augmentation of NH 31B, NH 31 C and NH31 and NH37. The proposal should be placed before MoRTH highlighting the importance of these highways and the requirement for augmentation. ▪ Identify State Highways and MDRs that can be converted into National Highways. 	<ul style="list-style-type: none"> ▪ Develop a shelf of projects for PPP within the Core Road Networks ▪ Land acquisition and obtaining of necessary clearances ▪ Initiation of the development works on the identified Core Road Networks through PPP. Hybrid Tolling and Complete Tolling can be considered ▪ Maintenance of the existing network ▪ Development of feeder networks to the NH networks developed earlier 	<ul style="list-style-type: none"> ▪ Develop a shelf of projects for PPP within the Core Road Networks ▪ Land acquisition and obtaining of necessary clearances ▪ Initiation of the development works on the identified Core Road Networks through PPP. Hybrid Tolling and Complete Tolling can be considered ▪ Maintenance of the existing network ▪ Development of feeder networks to the NH networks developed earlier 	<ul style="list-style-type: none"> ▪ Completion of the development works on the identified Core Road Networks ▪ Development of the feeder networks to these Core Road Networks through PPP ▪ Enhancing the network to connect all centres of habitation

Institutional	<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪ Strengthening of the Assam State Road Board as an apex body and strengthening its mandate to include overall policy planning for the sector, regulation of the sector and overseeing of implementing agencies through an Act in the Legislative Assembly. ▪ Create Core Road Fund through an Act in the Legislative Assembly ▪ Operationalize the proposed Core Road Fund under the aegis of the Assam State Road Board. ▪ Creation of Assam Road Development Corporation capable of raising finances on its own and mandated with execution of road projects ▪ Capacity Building Plan for proposed institutions and the existing Public Works department 	<ul style="list-style-type: none"> ▪ Implement Capacity Building Plan – for proposed institutions and the existing Public Works department 	<ul style="list-style-type: none"> ▪ Implement Capacity Building Plan – for proposed institutions and the existing Public Works department
Policy level	<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪ Formulation of a holistic road sector development policy for the state by Assam State Road Board and formulation of other key policies viz. Toll Policy and PPP Policy etc. ▪ PPP policy – Assam has an 	<ul style="list-style-type: none"> ▪ Formulation of master plan with inputs from all relevant stakeholders focusing on the Core Road Networks ▪ Periodic revision of all policies 	<ul style="list-style-type: none"> ▪ Five year and Annual master planning ▪ Periodic revision of all policies

		<p>overall PPP policy for the state. However considering the quantum of investment required for the road sector, a road specific policy can be explored with greater role for Assam State Road Development Corporation</p>		
<p>Planning</p>	<p>○</p>	<ul style="list-style-type: none"> ▪ Integrated road network development – a holistic Master Plan for road development is required ▪ Capacity Building Plan for government employees across all levels and categories in all implementing agencies. 	<ul style="list-style-type: none"> ▪ Monitor implementation of Master Plan – including periodic review and refinement of Master Plan ▪ Monitor implementation of Capacity Building Plan – including periodic review and refinement of Capacity Building Plan 	<ul style="list-style-type: none"> ▪ Monitor implementation of Master Plan – including periodic review and refinement of Master Plan ▪ Monitor implementation of Capacity Building Plan – including periodic review and refinement of Capacity Building Plan

4.1. Physical Interventions

Physical interventions will involve augmentation of the existing network and development of new roads to connect missing linkages. While capacity augmentation in almost all of the stretches in the network is required, physical interventions can focus on development of Core Road Networks covering –

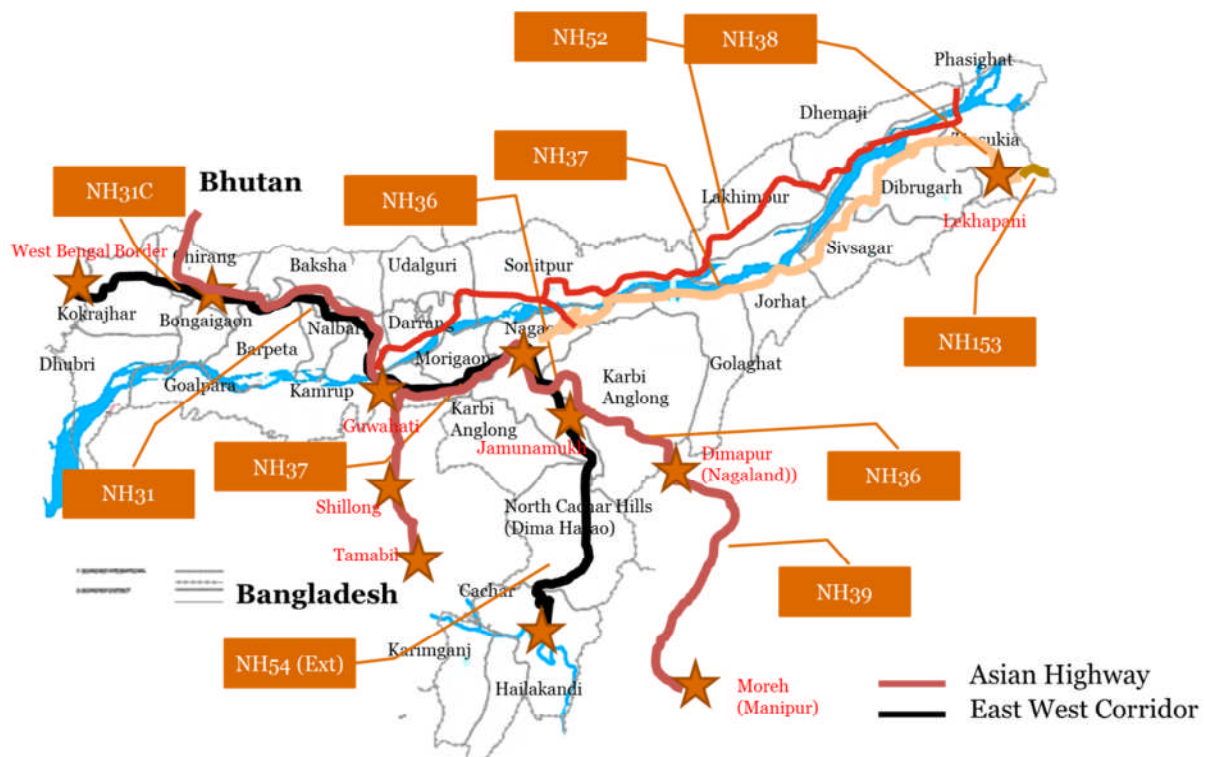
- Enhancement of interstate connectivity
- Enhancement of international connectivity
- Improving connectivity between North and South Bank of River Brahmaputra
- Improving connectivity between Brahmaputra Valley and Barak Valley
- Connectivity to Tourist Centres, Industrial Centres and urban centres
- Coverage of more and more habitation centres

Based on the above objectives, 6 Core Road Networks across the state have been identified:

4.1.1. Core Road Network 1

Core network running across the length and breadth of the state, comprising of NH31C, NH31, NH52, the East West Corridor and the Asian Highway

Figure 8: Core Road Network 1



Source: PwC Analysis

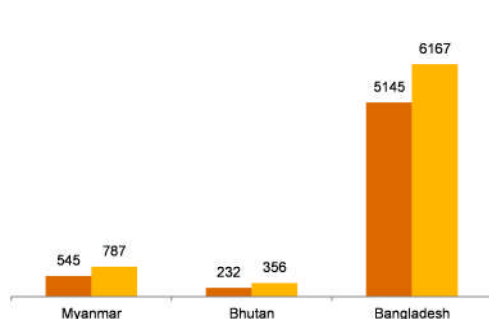
This network is spread across the entire state covering key urban centres and comprises key National Highways. It comprises the Asian Highway and therefore is key for connectivity to the neighbouring countries, connects Brahmaputra and Barak Valley and runs parallel to the NW2 connecting all key urban centres.

The objective of enhancement of such network is to establish the back bone of road infrastructure in Assam, on the basis of which trade in the region and through the region to other states as well as neighbouring countries may be augmented.

The trade scenario of the neighbouring nations that are crucial for trade and economic development of the region viz. Bangladesh, Bhutan and Myanmar is as follows. The existing export from India to these nations is around USD 7,310 million. On the other hand, an analysis of trade from the overall NE region to these countries suggests that accounts for merely 5% of the total potential!

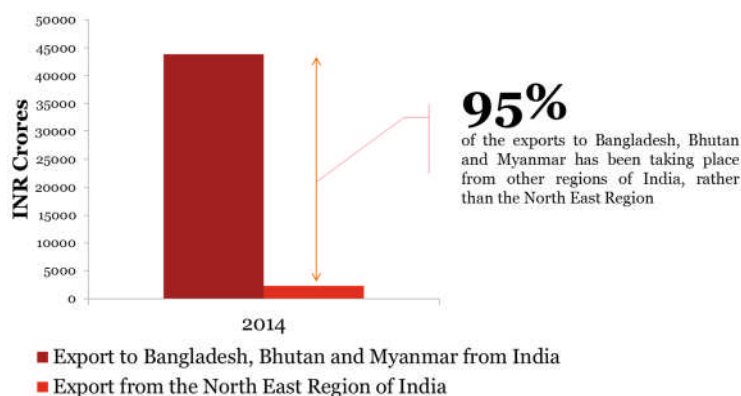
Figure 9: Current contribution of north east India to India's export to Myanmar, Bhutan and Bangladesh

India's export to Myanmar, Bhutan and Bangladesh (in million USD)



Source: Import-Export Databank, Ministry of Commerce, Government of India

Comparison between North East and other regions of India in terms of % share of exports to Bangladesh, Bhutan and Myanmar



Source: PwC Analysis

Clearly, creation of a strong road network that forms the back bone of states' transportation is the principal step in bridging the above gap in trade. Core Road Network 1 is being suggested to achieve this objective.

Enhancement of this Core Road Network and development of adequate feeder network to this Core Road Network will connect all the key centres in the state and will also improve connectivity to the neighbouring states and countries and truly make Assam as the preferred gateway.

Table 6: Stretches in Core Road Network 1

Road Name	Stretch	Proposed Augmentation
NH31C	Bengal border to Bongaigaon	6-lane
NH31	Bongaigaon to Guwahati	6-lane
NH37	Guwahati to Tinsukia	6-lane
NH36	Nagaon to Sarupathar (to the start of NH54 Extension)	4 lane by 2030 and 6 lane by 2035

NH54 (Ext)	Sarupathar to Silchar	4-lane
NH40	Guwahati to Tamabil via Shillong	4-lane
NH36	Nagaon to Dimapur	4-lane
NH153	Assam to Myanmar via Arunachal Pradesh	4-lane
NH52	Amingaon to Arunachal Pradesh via Pasighat (on the north bank of river Brahmaputra)	4

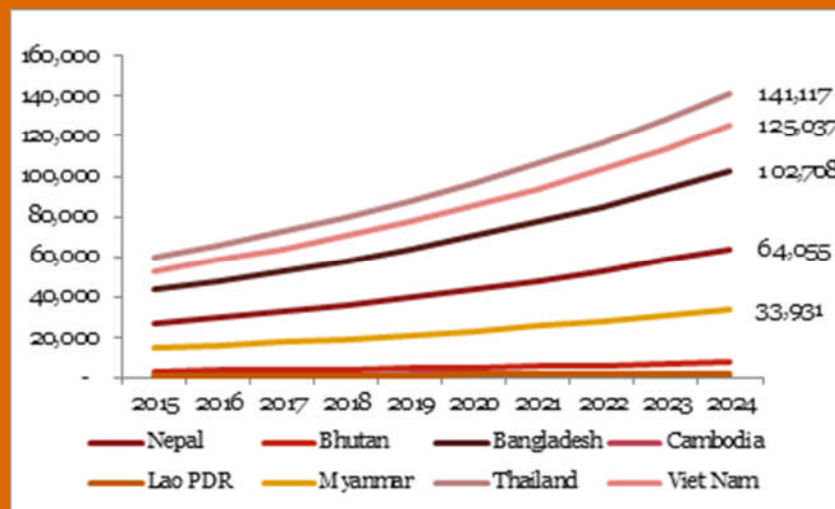
Development of this network will connect all key centres on both sides of river Brahmaputra as well as on the Barak valley to one another.

Moreover enhancement of the stretches of Trans Asian Highway through the state such as NH40 (in Meghalaya via Shillong), NH36 – (Guwahati to Nagaon), NH 36 (Nagaon to Dimapur), NH 39 – (to Myanmar via Nagaland and Manipur) and NH31 (to Bhutan), will establish Assam firmly as the gateway to the ASEAN countries and India’s eastern neighbours.

Assam as the center piece in developing north east India as an economic hub of the region

Bilateral trade between India and the ASEAN countries, China, Bangladesh, Bhutan and Nepal has been growing at a healthy rate; one may project the trade to grow at 8% CAGR for the next 10 years. However despite its geographical proximity to these countries, the contribution of north east India to this trade has been hovering at around 1–2%.

Development of this Core Road Network, combined with development of industrial infrastructure and urban infrastructure in Assam, and similar development in the north east India region as a whole; will enable Assam and the north east region to develop into an economic hub and gradually increase its share in the bilateral trade between India and its eastern neighbours, and the ASEAN countries.



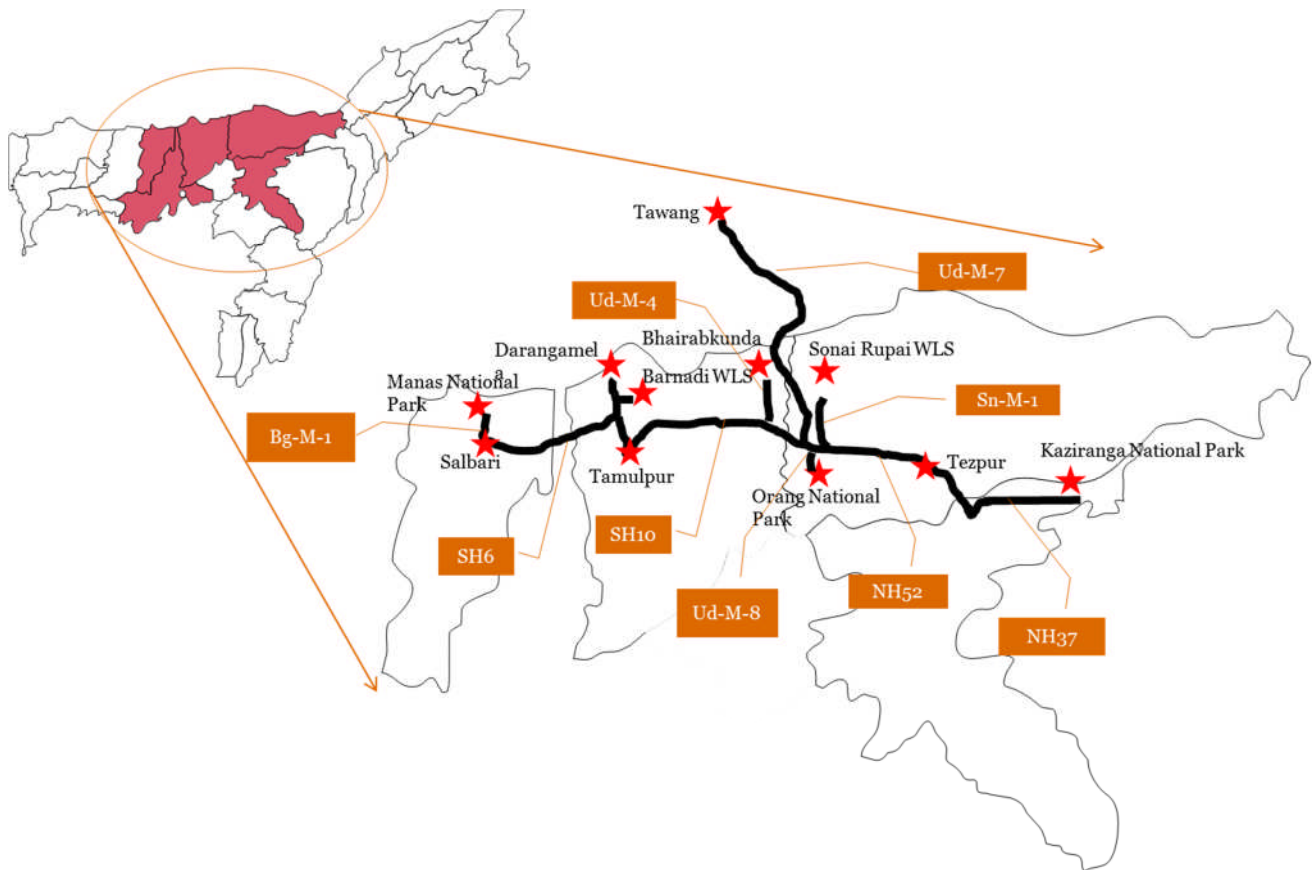
Source: PwC Analysis

It has been estimated that North East India has a trade potential in a range of 35,000 crore INR to 180,000 crore INR and development of this Core Road Network 1 will enable Assam to benefit from a significant portion of this trade

4.1.2. Core Road Network 2

A network connecting key tourism centres in the state and also in the neighbouring state of Arunachal Pradesh.

Figure 10: Core Road Network 2

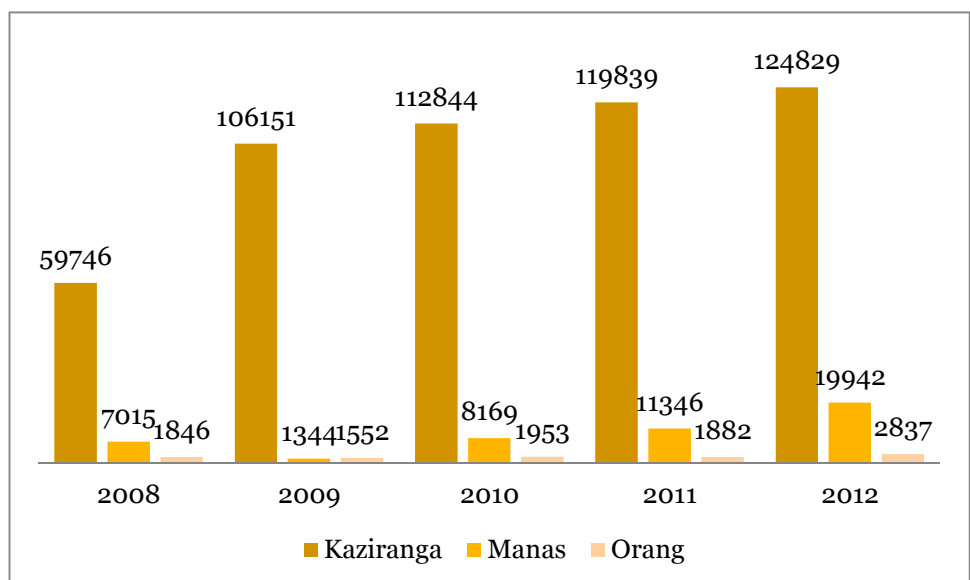


Source: PwC Analysis

In addition to industry, trade and commerce; tourism is a sector that has immense potential in the North East region and much of this potential has been unexplored. Connectivity to key tourist locations would be pivotal in promoting this sector in the state.

Core Road Network 2 will facilitate seamless movement of tourists from one centre to another. It connects the three **National Parks (Manas, Orang and Kaziranga)**, two **wild life sanctuaries (Barnadi and Sonai Rupai)** in Assam and also the popular tourist destination of **Tawang in Arunachal Pradesh**.

Figure 11: Historical tourist flow to the national parks in Assam



Source: Assam Year book 2012

Generally, tourists have a tendency to cover as many destinations as possible in their visit. With this hypothesis in mind, creation of the above Core Road Network 2 is expected to increase the footfall across various tourist destinations. To further support this argument, it has been found that tourist flow to Kaziranga on an average has been hovering between 1 lakh to 1.25 lakh per annum, while the tourist flow to other equally important and rich parks like Manas and Orang has been only a few thousand tourists per annum. One of the important reasons for the same is lack of adequate road connectivity to Manas and Orang National Parks, while Kaziranga is well connected to NH 37.

In order to create this network, following stretches and missing links needs to be upgraded or developed:

Table 7: Stretches in Core Road Network 2

Road Name	Stretch	Proposed Augmentation
Bg-M-1	Manas National Park to Salbari (on SH6)	2-lane
SH6	Salbari to Kumrikata	4-lane
New Road 1	A New Highway NH127 D is coming up, which will connect to Darangamela on Indo - Bhutan Border	4-lane
New Road 2	A Road connecting this new NH127D to Barandi WLS can be consider	2-lane
SH6	Kumrikata to Tamalpur	4-lane
SH10	Tamulpur to Rowta	4-lane
Ud-M-4	Kahilibari (on SH10) to Bhairabkunda	
NH52	Rowta to Tezpur	4-lane
Ud-M-8	Orang National Park to NH52	4-lane
Sn-M-1 & Sn-M-2	Sonai Rupai WLS to NH52	2-lane
Ud-M-6 & Ud-M-7	NH52 to Arunachal Border, from there a road leads to Tawang	2-lane
Kola Bhomura Bridge	Connects NH52 and NH37 (from North to South)	4-lane
NH37	Will lead to Kaziranga	4-lane

In addition, this Core Road Network 2 will also provide international connectivity to Bhutan through Darangamela and also provides connectivity to Bhairabkhunda, a Hindu pilgrimage spot in the state.

In addition to the impact on the economy of the state, creating such network is also expected to induce employment in the state. Empirical studies¹ have found that each domestic and foreign tourist has the potential of generating employment for 3 and 7 individuals respectively.

Using the above logic and the hypothesis that once the road connectivity is present for other national parks, a tourist visiting Kaziranga may also want to visit Manas and Orang, following scenarios of increase in tourist inflow has been created:

Table 8: Tourist inflow scenarios

	Existing Domestic Tourist Inflow at Kaziranga	Existing Foreign Tourist Inflow at Kaziranga	Induced tourist flow	Tourist flow in Manas and Orang	Additional Tourists due to enhanced road connectivity	Induced employment due to domestic tourists	Induced employment due to foreign tourists	Total Employment
Case 1	117308	7521	10%	12483	24966	74897	174761	249658
Case 2	117308	7521	20%	24966	49932	149795	349521	499316
Case 3	117308	7521	30%	37449	74897	224692	524282	748974

Source: PwC Analysis

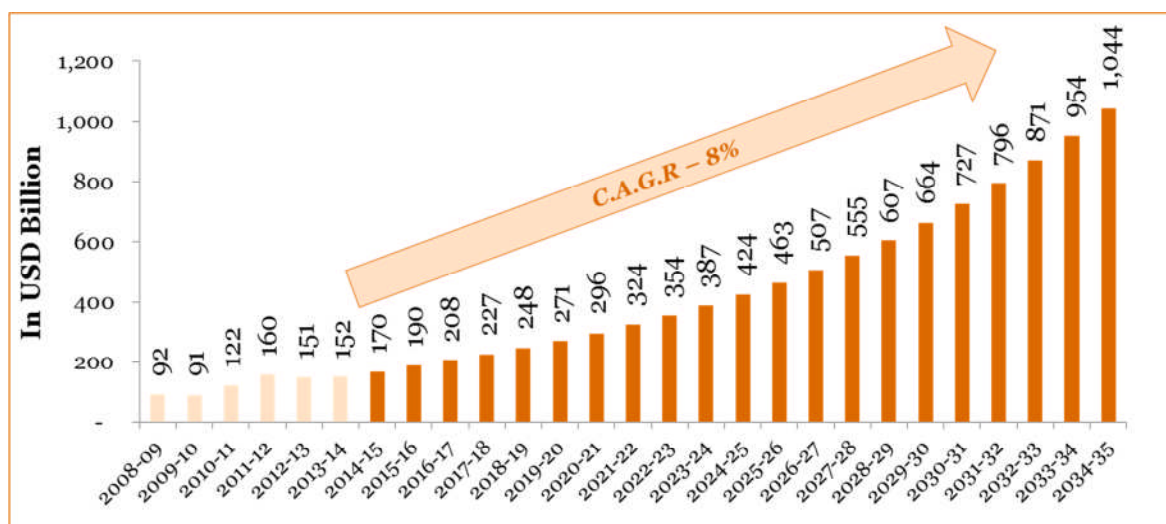
Accordingly, with creation of this Core Road Network 2, the distribution of the tourism traffic of Kaziranga to other tourism centres has the **potential of generating an employment in the range of 2.5 to 7.5 lakh** in the influence zone of each of the tourist centres in the state.

4.1.3. Core Road Network 3 – Capital Connection

A network connecting all the state capitals of 5 states in the region

For full exploitation of the potential in the North East Region, interstate as well as connectivity to the neighboring nations needs to be enhanced. In fact, if one considers an extended ASEAN +4 region (i.e. ASEAN + China, Bhutan, Bangladesh and Nepal), one finds that India's existing trade with this region is in the range of USD 150 billion. And, this is expected to cross USD 1 trillion in the next 20 years.

Figure 12: Forecast of India's bilateral trade with ASEAN + 4 countries



Source: Import-Export Databank, Ministry of Commerce, Government of India and PwC Analysis

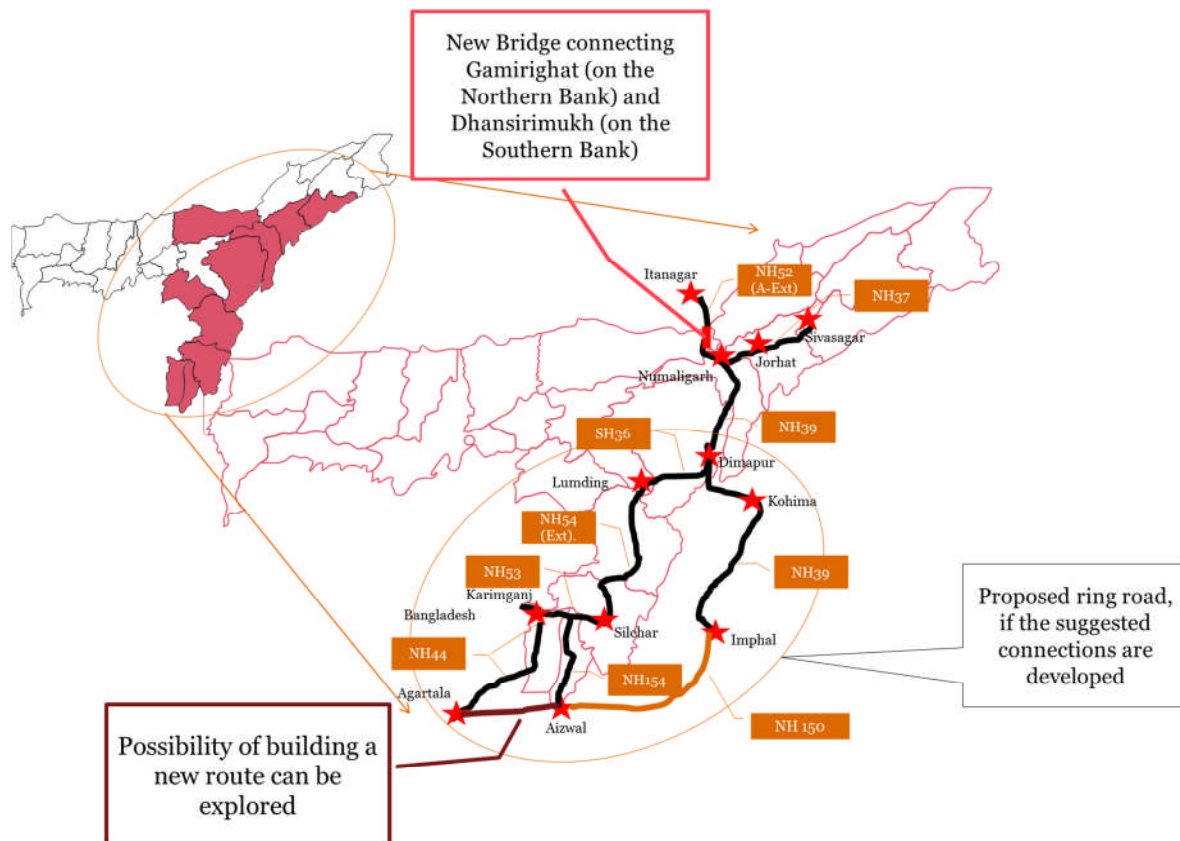
¹ Tourism in Assam: Status and Prospects. Planning Commission of India

This proposed network connects the state capitals of Tripura, Mizoram, Manipur, Nagaland and Arunachal Pradesh via Assam, making Assam as the gateway for interstate connectivity. In addition, an extension of this network connecting Agartala to Aizwal (shown in brown color in the figure below) would have two major impacts:

1. It will create a minor ring road connecting Agartala – Aizwal – Imphal – Kohima – Dimapur – Lumding – Silchar – Karimganj – Agartala²
2. This will also be instrumental in connecting Bangladesh at Karimganj to Imphal and Moreh to Myanmar thereby putting a foundation to another economic corridor passing across the Barak Valley region

Further, the proposed Core Road Network 3 also connects the industrial area of Numaligarh to the North Bank of River Brahmaputra. It also reduces the travel time between Sivasagar and Jorhat on South Bank, to North Bank of Brahmaputra, and beyond to Itanagar. It also provides connectivity between Brahmaputra Valley and Barak Valley by connecting the urban centres of Jorhat and Sivasagar in Brahmaputra Valley to urban centres of Silchar and Karimganj in Barak Valley.

Figure 13: Core Road Network 3



Source: PwC Analysis

The network comprising National Highways and State Highways needs to be enhanced. The following table shows the key stretches that need to be developed or augmented for this Core Road Network 3:

² It may be noted that given geographical terrain of the region, a tunnel may need to be created between Agartala and Aizwal

Table 9: Stretches in Core Road Network 3

Road Name	Stretch	Proposed Augmentation
NH52 (A-Ext)	Itanagar (Arunachal Pradesh) to Gohpur (Assam)	4-lane
Sn-M-11	Gohpur to Gamirighat	4-lane
New Bridge	Between Gamirighat (on the Northern Bank) and Dhansirimukh (on the Southern Bank)	4-lane
Gt-M-1	Dhansirimukh to Bokakhat (on NH37)	4-lane
NH37	Bokakhat to Numaligarh and beyond to Jorhat and Sibasagar	6-lane
NH39	Numaligarh to Kohima (via Dimapur) and beyond to Imphal	4-lane
SH36	Dimapur to Luming via Diphu	4-lane
NH54 (Ext)	Luming to Silchar	4-lane
NH53	Silchar to Panchigram (Near Badarpur)	4-lane
NH154	Panchigram to Mizoram	4-lane
NH44	Badarpur to Karimganj and to Agartala	4-lane
NH151	Karimganj to Bangladesh	4-lane

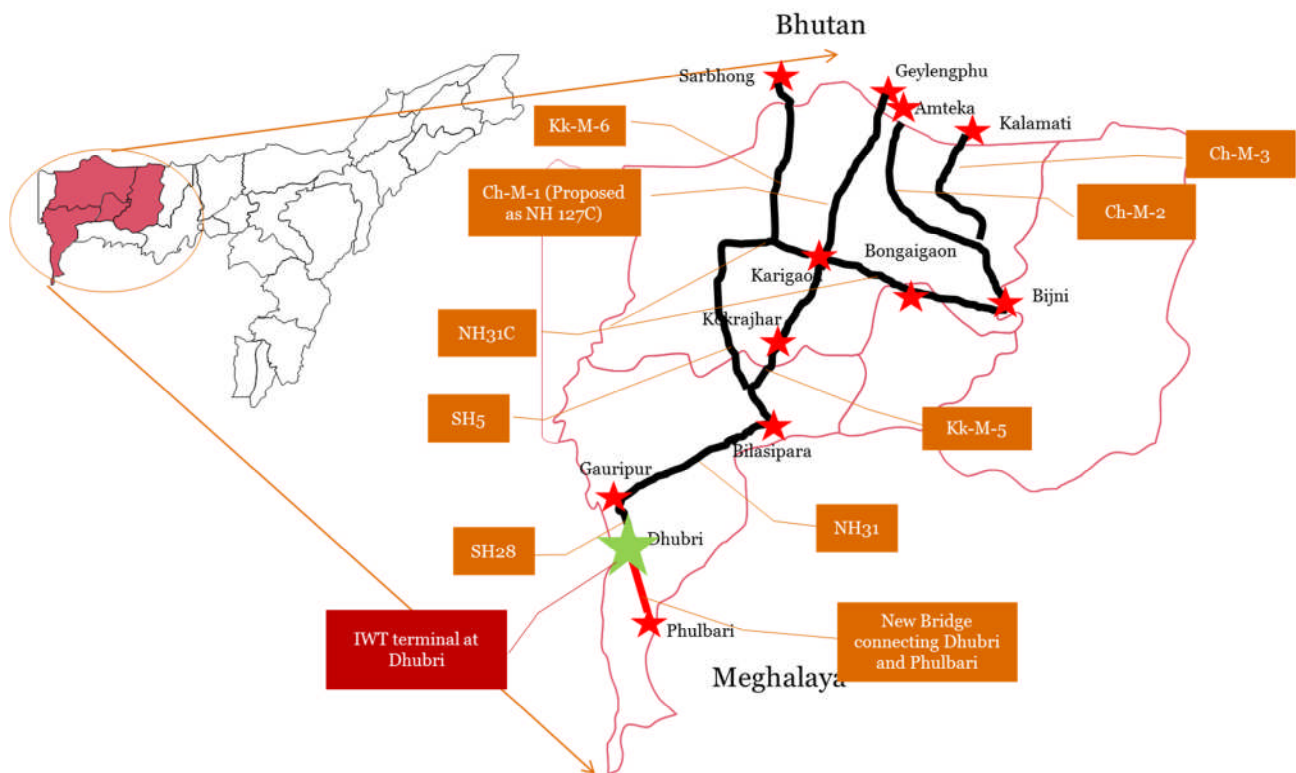
4.1.4. Core Road Network 4

A network which provides Bhutan an access to Brahmaputra via the IWT Terminal at Dhubri

Bhutan is a landlocked country and majority of the seaborne trade bound to Bhutan happens via Haldia port. Cargo from Haldia port is transported to Bhutan by road via Jalpaigudi in West Bengal. Development of this network will connect Bhutan to the IWT terminal at Dhubri and beyond to Bangladesh and Kolkata by inland waterways. The IWT terminal at Dhubri is strategically located to capture all cargo moving to and from Bhutan.

In addition, the network will also connect Bhutan to Meghalaya through a bridge between Dhubri on Northern Bank and Phulbari on Southern Bank and will also connect the major industrial area of Bongaigaon with Bhutan. Moreover, it will connect the three major urban centres of Kokrajhar, Bongaigaon and Dhubri in lower Assam.

Trade between India and Bhutan stood at ~ INR 3,046 crore in 2013–14, and this network has the potential of benefiting from a portion of this trade movement as well as trade between Bhutan and Bangladesh, with the IWT Terminal at Dhubri as the key node in the trade path to Bhutan.

Figure 14: Core Road Network 4

Source: PwC Analysis

The following table represents the key stretches (including missing links) that need to be developed or augmented to create this network:

Table 10: Stretches in Core Road Network 4

Road Name	Stretch	Proposed Augmentation
Kk-M-6	Indo-Bhutan Border at Sarbhong to NH31C (New name NH27) at Bismuri	2-lane
Ch-M-1	Samthaibari on NH31C (New NH27) to Geylengphu in Bhutan (Already proposed as NH 127 C)	4-lane
Ch-M-2	Amteka (on Indo-Bhutan Border) to Bijni on NH31C	2-lane
Ch-M-3 & Ch-M-2	Kalamati (on Indo-Bhutan Border) to Bijni on NH31 C	2-lane
NH31C	Bismuri to Karigaon, Shamtaibari to Karigaon, Bijni to Karigaon	4-lane
SH14	Karigaon to Kokrajhar	4-lane
Kk-M-5	Korajhar to Phutkibari	
SH5	Phutkibari to Bilasipara	4-lane
NH31	Bilasipara to Gauripur	6-lane
SH28	Gauripur to Dhubri	2-lane (current status)

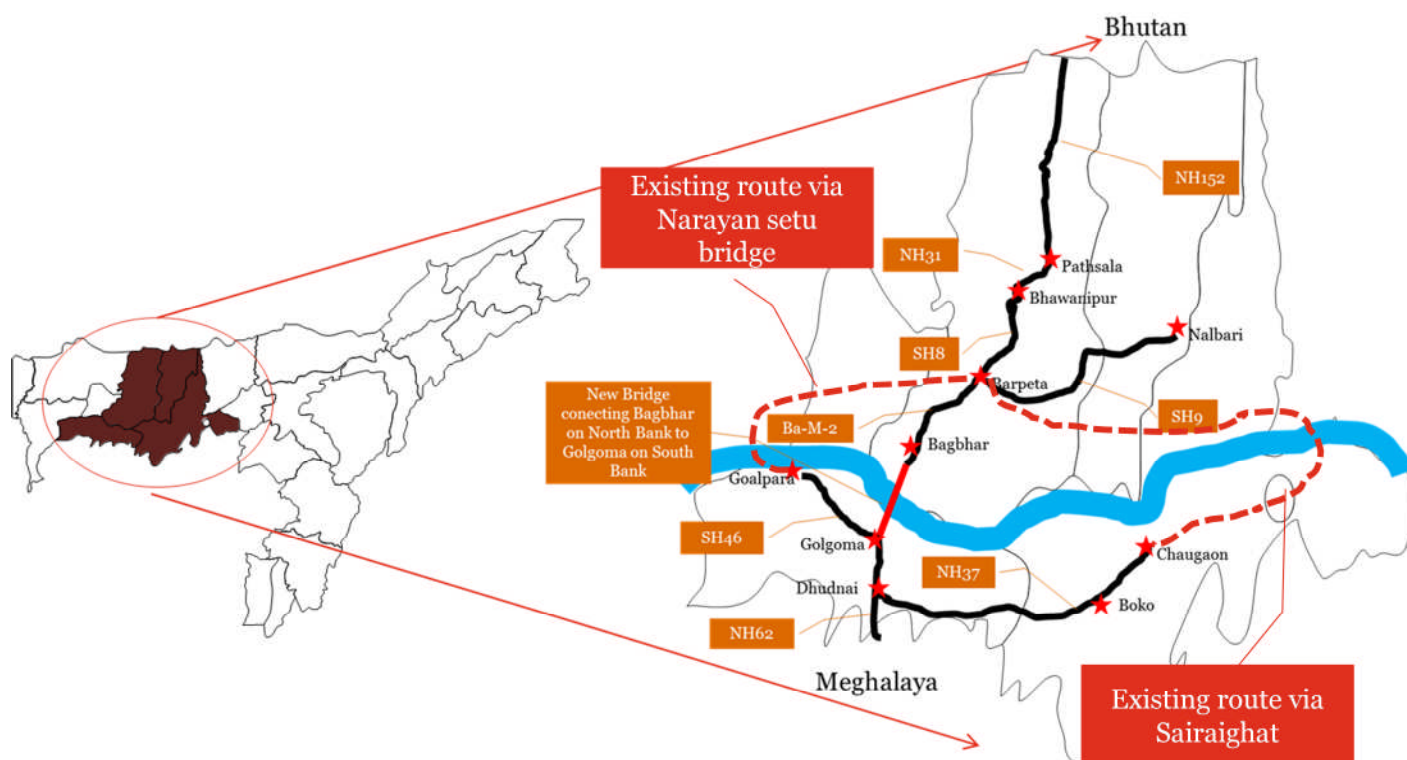
New Proposed Bridge	Dhubri to Phulbari (on Southern Bank) to Meghalaya	2-lane
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4.1.5. Core Road Network 5

A direct connection between Bhutan and Meghalaya via Barpeta

To further augment connectivity between Assam, Meghalaya and Bhutan, this network provides international and interstate connectivity by providing a direct connection between Bhutan and Meghalaya via Barpeta. At present, transportation happens via circuitous route as indicated by the red dotted line in the map below. Development of this network is expected to reduce the travel time between Barpeta and Goalpara, and between Barpeta and Chaygaon by at least 2 hrs. ***This network will result in direct savings of INR 392/tonne of cargo movement in fuel cost. Other indirect benefits include more traffic and trade movement between Bhutan and Meghalaya via Assam.***

Figure 15: Core Road Network 5



Source: PwC Analysis

The following table represents the key stretches (including missing links) that need to be developed or augmented to create this network:

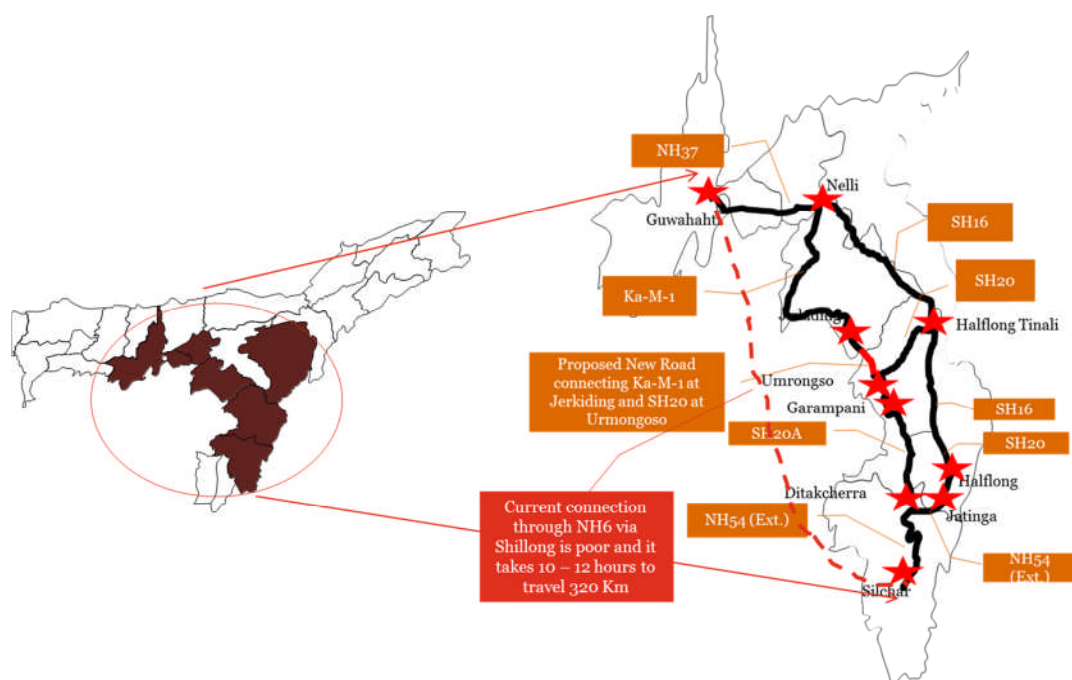
Table 11: Stretches in Core Road Network 5

Road Name	Stretch	Proposed Augmentation
NH152	Indo Bhutan Border to Pathshala	4-lane
NH31	Patshala to Bhwanipur	4-lane
SH8	Bhawanipur to Barpeta	2-lane
SH9	Nalbari to Barpeta	4-lane

Road Name	Stretch	Proposed Augmentation
Ba-M-2	Barpeta to Baghbar	2-lane
New Bridge	A bridge connecting Baghbar on Norther Bank to Golgoma on the South Bank	2-lane
SH46	Goalpara town to Golgoma and to Dhudnai	2-lane
NH62	Dhudnai to Meghalaya	2-lane
NH37	Dhudnai to Chaygaon via Boko	4-lane

4.1.6. Core Road Network 6

An alternative connection between Brahmaputra and Barak Valley



Source: PwC Analysis

The existing connection between Guwahati and Silchar via Shillong is not adequate and due to its poor conditions, it takes 10 -12 hours to travel a distance of 320 km. An alternate connection via Nagaon can be developed.

This network will provide an alternate connectivity to Silchar. ***It reduces the travel time from Nagaon to Barak valley by 5 – 6 hours resulting in a direct saving in fuel cost of INR 880/ tonne. At present, around 74 MTPA of cargo is transported through road. If one assumes that 10% of this cargo movement happens between Brahmaputra and Barak valley, the above savings in fuel translates to INR 650 crore of aggregate savings per annum.***

Further augmentation of MDR Ka-M-1 and development of new connection connecting Ka-M-1 (at Jerkiding) to SH20 (at Urmongso) will provide a 2nd alternative connection to Silchar, thereby making three parallel connection available between Bramaputra valley to Barak valley. This connection will also

- Ensure more coverage of habitation areas
- Provide more direct connection to Silchar
- Will help spawn future urban centres

The following table represents the key stretches (including missing links) that need to be developed or augmented to create this network:

Table 12: Stretches in Core Road Network 6

Road Name	Stretch	Proposed Augmentation
NH37	Guwahati to Neli	6-lane
SH16	Neli to Bhaithalangso	4-lane
SH16	Bhaithalangso to Halflong Tinali	4-lane
SH 16	Halflong Tinali to Dehangi	4-lane
SH20	Halflong Tinali to Garampani	2-lane
Ka-M-1	Nelli to Jirkinding	2-lane
New Road	Jirkinding to NH20 at Umrongso and to Garampani	2-lane
SH20	Garampani to Jatinga via Dehangi and Halflong	4-lane
SH20A	New Sangbar to Harangajao	2-lane
SH20A	Harangajao to Ditakcherra	2-lane
NH 54 (Ext)	Jatinga to Silchar via Ditakcherra	4-lane
Ka-M-1	Nelli to Jirkinding	2-lane

4.1.7. Other physical interventions required

In addition to the 6 Core Road Networks, other key roads/stretches across the state which requires capacity augmentation to handle the expected traffic over the next 20 years have also been identified. These have been discussed below:

- **5 key National Highway stretches (a total length of ~ 1,497 km) have been identified for capacity augmentation**

Table 13: Key National Highway stretches identified for capacity augmentation

Name of NH	Route/ Length**	Existing Traffic PCUs*	Traffic in 2030 PCUs	Analysis
NH 37	Goalpara - Roing/ 686 km	54,000	1,40,000	With exception of the road passing through Kaziranga National Park and stretches in Dibrugarh district, the highway is proposed to be converted to 6-lane to meet traffic requirements
NH 31	Guwahati - West Bengal Border/309 km	52,000	1,35,000	Traffic on nearly all the stretches of NH 31 is estimated to reach close to 60,000 PCUs by 2030. Hence the entire stretch in Assam is proposed to be developed as a 6-lane road.
NH 54	Dabaka-Silchar - Mizoram/ 335 km	--	40,000	To handle the proposed traffic the highway needs to be at least 4-lane. Work is currently underway.
NH 36	Nagaon- Dimapur/ 167	17,000	44,000	The stretch of NH 36 in the state is proposed to be developed in to a 4-

	km		lane road by 2030
NH 52	NH 52 has already been proposed to be developed to 4-lane under SARDP-NE scheme.		

Source: PwC Analysis

- **5 key State Highway stretches (a total length of ~ 643 km) have been identified for capacity augmentation**

Table 14: Key State Highway stretches identified for capacity augmentation

Name of SH*	Route/Length	Important for connectivity to	Existing Traffic in PCUs	Gap Analysis
SH-1	210	SH - 1 is the most important stretch of state highway passing through Golaghat and Jorhat regions	23,086	This SH serves as an alternative to NH-37. In line with the increase in traffic the road is envisaged to be developed into a 4-lane road by 2030.
SH-2	161	SH-2 passes through important towns around Bongaigaon, Barpeta, Amingaon and NorthGuwahati regions	23,327	The SH acts as an alternative to NH -31 which is congested due to heavy commercial vehicle movement, hence is critical for connectivity of local population in Lower Assam region. To handle the traffic by 2030 the road needs to be developed into a four lane road.
SH-3	190	Passes through important centers of Narengi, Chandrapur, Morigaon and Nagaon	32,953	To handle the traffic requirements in the short term the road needs to be developed into a four lane road, however in line with the requirements of traffic in 2030 the road needs to be developed into a six lane road
SH-9	35	Passes through important centers of Kalitakuchi, Nalbari, Sarthebari and Nagaon	20,319	SH -9 connect many important towns to the State Capital. To meet the traffic beyond 2030 the road needs to be converted to a four lane road.
SH-23	47	Passes through important centers of Lahowal, Bordubi and Tinsukia	23,295	SH 23 is an important road from industry perspective providing connectivity to oil reserves and tea gardens in upper Assam, however the existing traffic is far exceeding the capacity. To meet the traffic beyond 2030 the road needs to be converted to a four lane road.

Source: PwC Analysis

- ~ 4,415 km of MDR across 26 districts have been studied and identified for capacity augmentation

Table 15: Region-wise length of MDRs identified for capacity augmentation

Region	No of Districts	Length of MDR in the region	Key Industrial/ Tourist Centers served	Gap Analysis
Lower	10	1,045	Manas National park, Brass metal industry of Sarthebari, Bongaigaon power plant and refinery, Cakrasila wildlife sanctuary etc. are some important centers in the region	Around 350 km of MDR in the region are to be converted to black top. Only 58 km of roads are intermediate and double lane whereas at least 376 km are required as per the traffic analysis
North	4	933	There are various national parks & sanctuaries in the region like Pobitara, Kaziranga, Lowkhowa. Tea Processing, Cane Product, Food Product, Timber Sawing, & Tea Machinery Manufacturer etc are the major industries in the region	Around 270 km of MDR in the region are to be converted to black top. Around 113 km of roads are intermediate and double lane where as at least 335 km are required as per the traffic analysis
South	5	1,367	The region has a large number of natural resources & raw material/minerals. There are Cement plants, agro-based industry & tea plantations are the key industries located in the region.	Around 370 km of MDR in the region are to be converted to black top. Only 18 km of roads are intermediate and double lane whereas at least 492 km are required as per the traffic analysis
Upper	7	1,070	Oil and Tea are the major industries in the region. Various important industrial centers around Dibrugarh districts like Digboi, Naharkatia, Moran, Duliajan, Margherita etc are present. Many oil majors have office setups in this region	Around 245 km of MDR in the region are to be converted to black top. Around 186 km of roads are intermediate and double lane where as at least 385 km are required as per the traffic analysis

Source: PwC Analysis

- 14 interstate stretches have been identified for capacity augmentation

Table 16: Key interstate stretches identified for capacity augmentation

State	Key Stretches
Arunachal Pradesh	<ul style="list-style-type: none"> ▪ National Highways NH 52 is most critical road to be developed for connectivity to Arunachal Pradesh ▪ State Highway SH25 (via Kharsang) ▪ MDR Dm-M-4 (via Nari) ▪ Dm-M-3 (via Likabali) ▪ Sn-M-18 (from Balipara) ▪ Sn-M-9 (from Itakhola) ▪ Ud-M-7 (via Rupa to Tawang)
Nagaland	<ul style="list-style-type: none"> ▪ Apart from NH 61 a large number of State highways need to be improved for connectivity to Nagaland, these are ▪ SH31 (via Nagajanka), ▪ SH-33 (via Nagabat), ▪ SH-34 (via Merapani) ▪ SH-44 (via Uriumghat tiniali).
Mizoram	Development of NH54 and SH-40(via Sherkhan) is important for connectivity to Kaladan project in Mizoram. The route has the potential to act as an alternative trade route to the state of Assam.
Tripura	Augmentation of NH-44(via Lowairpoa and Churaibari) and MDR road Kj-M-7 (via Rangamati and Khanmum) is required.

- **13 stretches which connects Assam to Myanmar, Bhutan and Bangladesh have been identified for capacity augmentation**

Table 17: Key international linkages identified for capacity augmentation

Myanmar	Bhutan	Bangladesh
<ul style="list-style-type: none"> ▪ NH-36 (till Dimapur) and NH39 (via Imphal and Moreh to Myanmar) ▪ NH 153 (Stilwell Road - via Myanmar provides connectivity to China) 	<ul style="list-style-type: none"> ▪ SH-4 (via Chamrang) ▪ MDR road Ud-M-4 (via Bhairabkunda) ▪ Ch-m-1 (via Hatisar) ▪ Kk-m-6 (via Bismuri,Sarbhoga) ▪ Ch-m-3 (via Kalamati) ▪ Ch-m-5 (Via Mathanguri) 	<ul style="list-style-type: none"> ▪ NH 151 (provides connectivity from Karimganj to Bangladesh) ▪ NH 51 (via Tura in Meghalaya) ▪ NH62 (via Baghmara) ▪ MDR Dh-M-1 (via Hallidayganj, Hatsingimari, Purakasia to Tura) ▪ MDR Gl-M-3 (via Mendipathar)

Source: PwC Analysis

- **5 missing linkages to connect the north and south bank of river Brahmaputra has been identified**

Table 18: Missing linkages between north and south bank of river Brahmaputra identified for development

S No	Missing Link	Economic Importance
1	Disangimukh-Dhakuakhana-Lakhimpur - Majuli	<ul style="list-style-type: none"> Reduce the travel time from Nagaon – Dhakuakhana by 6-7 hrs, and Jorhat to Majuli by 2 hrs It will connect to cultural hub of Majuli Agriculture and horticulture in North side of Brahmaputra will improve significantly Huge tourism potential can be tapped
2	Narengi- Bonda-Kuruwa-Duminichowki	<ul style="list-style-type: none"> The link will help assist in minimising traffic on Jalukbari-Baihata Chariyali Distance from Guwahati to Mangaldoi, Tezpur will be reduced by 17 KM Convenient for people travelling from North bank to Guwahati Can enable development of a satellite town on North bank (Kuruwa)
3	Dhubri – Phulbari Bridge	<ul style="list-style-type: none"> Reduce the travel time from 8-10 hrs to 1 hour Will help in easy evacuation of goods traffic originating from Meghalaya Help in connectivity to Bangladesh via Meghalaya
4	Gohpur- Numaligarh Bridge	<ul style="list-style-type: none"> To help preserve the World Heritage Site of Kaziranga
5	Dhola-Sadiya Bridge	<ul style="list-style-type: none"> Critical to tap the tourism potential in Arunachal Pradesh Important for providing connectivity between Upper Assam and Arunachal.

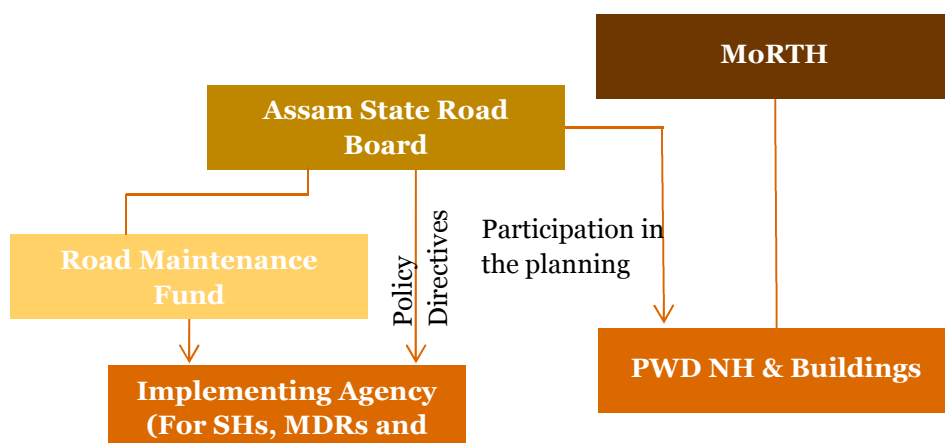
4.2. Institutional interventions

To execute the envisaged physical infrastructure development and for the formulation of policies and implementation of the same, the sector requires robust institutions – institutions that are empowered to carry out the necessary activities and raise the necessary finances.

4.2.1. Strengthening of Assam State Road Board

Formation of Road Board in the state was one of the key measures proposed in the Road Policy of 2002. Subsequently, Assam State Roads Board (ASRB), was registered as a society under the Societies Registration Act, 1860 and placed under the administrative control of PWD. ASRB has been authorized by Government of Assam (GoA) to be the agency responsible for all project related payments. It is currently assisting in the implementation of PMGSY project.

At the conceptualization stage, **the Board was envisaged as a comprehensive, professional and multidisciplinary body for providing policy direction and oversight for road sector development in the state. However, till now the role of Board has been limited to implementation of PMGSY project.**

Figure 16: Assam State Road Board

Recently, the Government of Assam has initiated the process of strengthening of this existing institution. In line with this process, the existing institution of Assam State Road Board should be developed as an **apex body mandated with policy planning, regulation** and overseeing of implementing agencies as was envisaged during its conceptualization stage.

This will involve an Act that provides the necessary authority to the Road Board to pass policy directives (maintenance benchmarks/targets, use of technology, network development targets etc. to name a few) to and monitor the activities of the implementing agencies. An accountability framework should be developed to ensure accountability of implementing agencies to the Road Board and this should be undertaken as part of the existing steps to strengthen the Road Board. The overall responsibilities of the Assam State Road Board should include:

1. Formulation of overall policy directives for the road sector in the state
2. Based on the sectoral policy, master planning for the sector with inputs from relevant stakeholders
3. Development of Five year Plans and Annual Plans
4. Overseeing of implementing agencies to ensure that the development is according to the master plan and that the sector development is moving as per the policy directives
5. Formulation of maintenance guidelines
6. Ensuring that the maintenance of assets is according to the guidelines
7. Operationalization of a Core Road Fund
8. Ensuring accountability of the implementing agencies for the use of the Core Road Fund

4.2.2. Operationalization of a Core Road Fund

Financing road development has traditionally been undertaken primarily through budgetary allocations. Inadequacy and volatility of the budgetary allocations have been one of the main challenges both for asset creation as well as asset maintenance in the sector; it is imperative to have dedicated funding for the sector. Formation of a Core Road Fund is one such means that is expected to (if enable in the right manner) ensure a steady flow of funds both for asset creation and maintenance of roads. On the asset creation side, the fund can be used for annuity payments for PPP, viability gap funding, project preparation costs and land acquisition cost, while at the same time; a proportion of the fund may be dedicated to road maintenance. The distribution of the fund for capital investment and maintenance should be based on proper financial planning for network development and maintenance.

Leveraging market borrowing through the creation of Development Corporation will be difficult in the initial stage without clarity and predictability of revenue streams. Commercial banks have clear cut credit policies indicating that they can't lend to any corporation if the repayment is envisaged to be made through government grants (except for non-commercial banks like HUDCO and NBFCs). Establishing a Core Road Fund will ensure steady flow of funds, will instil confidence among potential lenders / investors such as financial institutions, multilateral agencies; and also among developers as it shows the ability of the Government to regularly make payments to the developers.

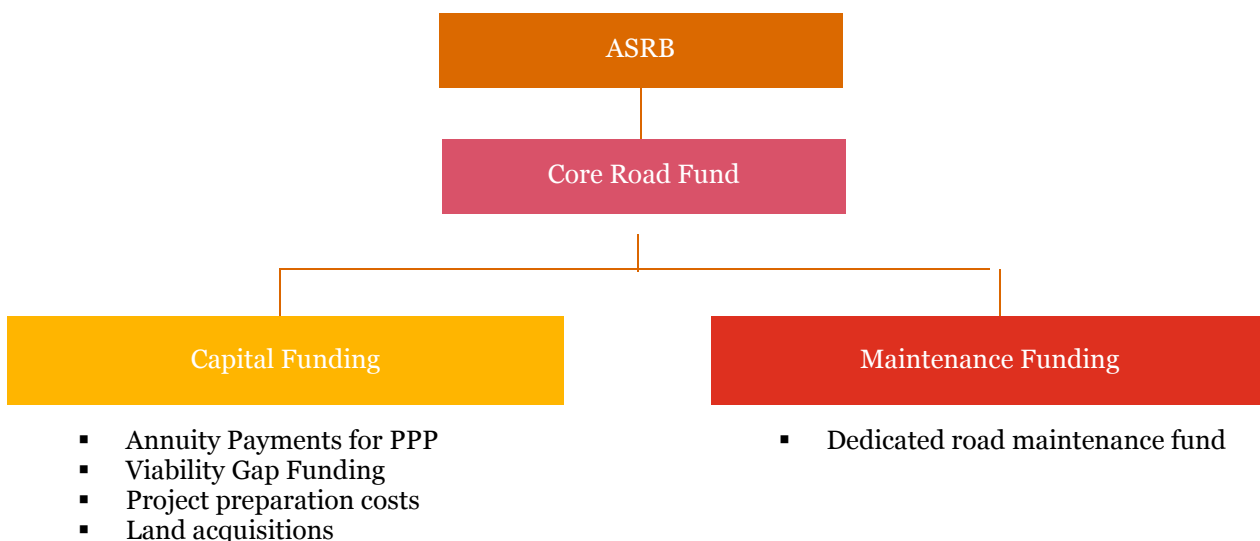
The Core Road Fund should be formed through an Act, which specifies sources of funds and restricts its usage to road sector asset creation and maintenance. The Act should also ensure that the fund is non-lapsable, so that the funds are not redirected to other areas.

The sources of funds can be –

- Dedicate a proportion of the existing entry tax, motor vehicle registration fees
- Dedicate a proportion of Toll Revenues from state highways to the fund
- Road Tax and other surcharges
- Fuel Cess
- Budgetary allocations
- Charges for overloading of vehicles
- Additional cess on motor vehicles
- Stamp duty charges on development
- Other grants, loans etc. lawfully received by the fund
- Allocation received from Central Road Fund for maintenance of State Highway and Major District Roads.
- Funds received for maintenance by Finance Commission

In addition, it is recommended that the control of the fund should be under the ASRB. The rationale being, since ASRB is expected to be an institution involved in planning, regulation and overseeing of implementing agencies; control of funds to the implementing agencies would give adequate power to the ASRB, which in turn may be used to control the quality, standards and timely maintenance of the roads.

Figure 17: Core Road Fund



Several states have developed road funds that derive their revenues from sources such as cess on fuel (e.g. Rajasthan) or motor vehicle taxes (Kerala). However, these road funds are often used to make 'lumpy' expenditures rather than to provide steady funding for multi-year investment programs. It was also observed that road funds which are not created through an act of the legislature tend to fail, as they do not have enough legal backing to ensure steady flow of funds from identified sources. Some case studies are presented in Appendix 2 to highlight the importance of forming the road fund through an act.

4.2.3. Formation of Assam State Road Development Corporation

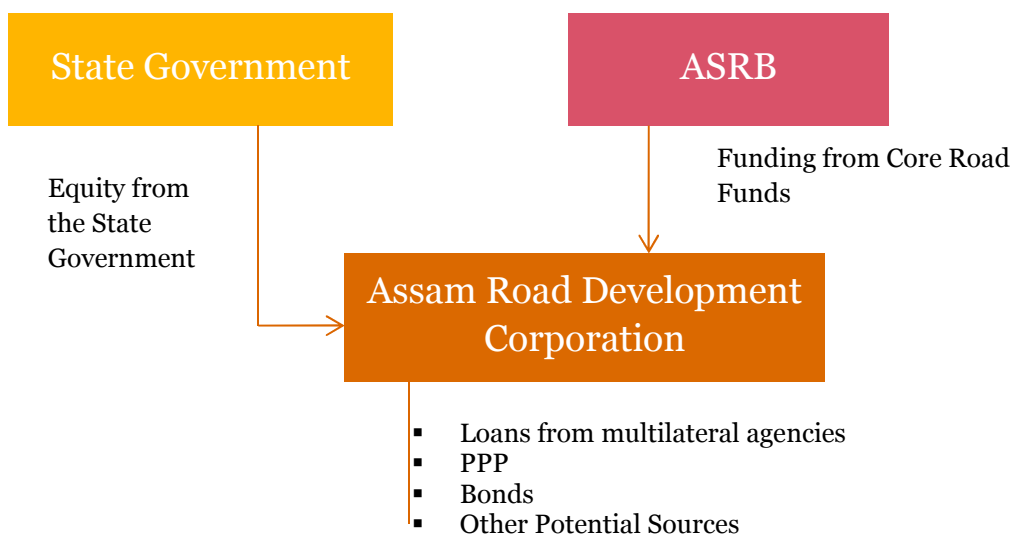
In addition to the Road Fund, a Road Development Corporation can be formed with an ability to raise funds on its own through issuing bonds, loans from multilateral funding agencies, and revenue earnings. This will reduce dependence on budgetary allocations.

The corporation should be incorporated under the Companies Act. **The Corporation should be mandated with the development of State Highways, Major District Roads and Rural Roads as per the Master Plan of ASRB.** Govt. of Assam will have equity in the Corporation and it will also receive funds from the Core Road Fund of ASRB.

Being a corporation, the envisaged agency will have the following advantages

- Ability to leverage through market borrowings. However this will depend on its ability to generate revenue. Hence in the initial stages the agency will be dependent on funding from government sources and the Core Road Fund. In the initial stages in the absence of revenues, steady funding from the Core Road Fund will help the envisaged Assam Road Development Corporation to showcase some sort of ability to pay back loans and build confidence among financial institutions and lenders.
- The Corporation will have relatively greater freedom in terms of human resource management. It will be able to hire directly from the market.

Figure 18: Assam Road Development Corporation



The proposed structure of the Corporation is presented in Appendix C. Some case studies of other corporations are presented in Appendix D.

4.2.4. Land acquisition cell

There is a need to develop necessary means and tools for smoothing the process of land acquisition. A dedicated Land Acquisition Cell can be formed within the envisaged Assam State Road Development Corporation. The unit should be headed by senior officer from the Revenue Department who will liaison with district authorities. In addition, the cell should be part of the Assam Road Corporation so that all the issues may be ironed out at the Board level of the corporation.

Case Study – NHAI’s land acquisition cells

- Land Acquisition had been a major reason for delay in NHAI projects. **To expedite land acquisition, NHAI had opened 150 special land acquisition cells in several states, headed by an additional district magistrate (ADM) or sub-divisional magistrate (SDM).**
- This has decreased the time taken for the land acquisition process to 11 months from 24 months.
- NHAI had set up five such cells in Assam.

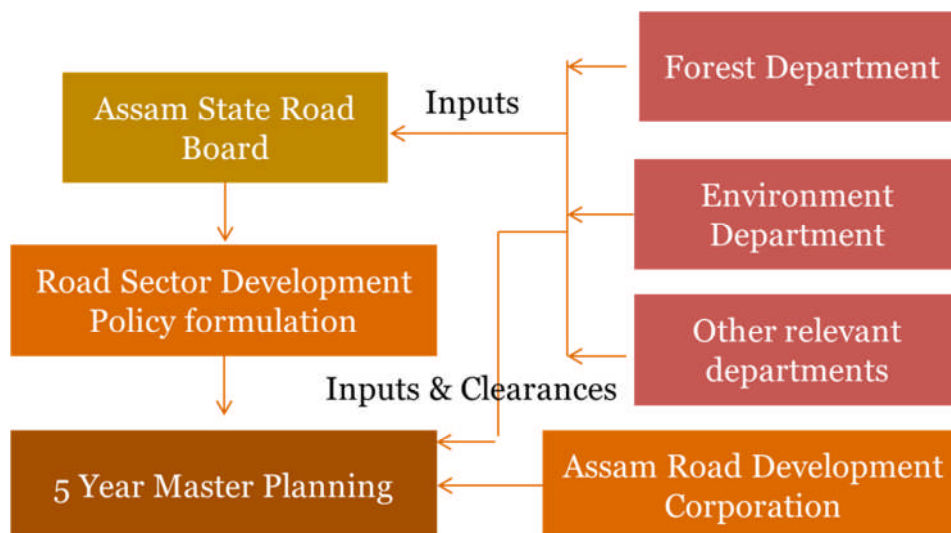
4.2.5. Resolution of execution issues

Collaboration at the highest level with key stakeholders is required to resolve the execution issues of environmental clearances and land acquisitions. Resolution of these issues is absolutely vital for creating conducive environment for promoting private investments in the sector in the state

As discussed earlier, Assam State Road Board should formulate the sectoral policies and the Master Plans, Five year plans and annual plans with inputs from relevant stakeholders. The necessary clearances should be acquired during the master planning stage itself

Special cells within the Assam Road Development Corporation should be formed to liaison with relevant departments

Figure 19: Master planning process



4.3. Policy Interventions

To achieve the envisaged physical development, an overall enabling environment is required – one of the essentials of such an environment is a clearly stated sectoral policy. The sectoral policy should be holistic covering all important aspects of the sector and provide necessary guidelines for carrying out the required physical infrastructure development. Besides a clearly laid-out sectoral policy, specific policy regarding critical aspects of road development also need to be brainstormed and clearly spelt out. The key aspects – critical to the development of the road sector – that require policy support, are outlined below.

4.3.1. Operations and maintenance of roads

Development of new linkages and capacity augmentation of the existing network will have to be supported by proper maintenance of the created assets. Some of the key pointers are as follows –

- a. Define service levels for different categories of roads – ASRB could be mandated to do this, along with periodic reviews and monitoring
- b. Setting maintenance targets for implementing agencies – both annual targets as well as 5-year targets. Specifying targets and monitoring of these targets could be included in the ASRB mandate.
- c. ASRB will be the overseeing agency and will set maintenance targets for the implementing agencies – Five Year and Annual Target setting
- d. Lay out criteria for upgradation of roads from a lower category to a higher category
- e. Operationalize a dedicated Road Maintenance Fund
 - i. Dedicate a portion of the existing entry tax, motor vehicle registration fees to the Road Maintenance Fund (RMF)
 - ii. Dedicate a portion of toll revenues to the RMF
 - iii. Road tax and other surcharges
 - iv. Budgetary allocations
- f. Accountability Framework to ensure accountability of the implementing agencies to ASRB for the use of the Road Maintenance Fund

4.3.2. Toll Policy

An Act, based on the policy outlined below, is required to empower the State Government to levy tolls. The policy should provide details of the following –

- a. Identify stretches where tolling should be enforced along with associated timelines. Specify certain classes of roads or stretches which can be exempted from tolling – for specific time periods.
- b. Toll tariff should be decided in relation to the estimated benefits to the user in terms of savings in travel time and vehicle operating costs. Base rates and rate escalation mechanism should be specified
- c. Rates for overloading of vehicles should be decided
- d. Ensure credible improvement in the service level of the network, to justify tolling – a relation between toll revenues and a standard service level
- e. The policy should provide guidelines for prosecution of vehicles which are not paying tolls
- f. Guidelines should be established for compensation of toll collecting agencies in case of any occurrence of loss

4.3.3. Road safety and security

- a. ASRB will responsible for providing design guidelines to ensure adequate safety on the roads.
- b. Implementing agencies will make sure road design adhere to the guidelines design by ASRB.

4.3.4. Public Private Partnership Policy

The PPP Policy should inter-alia provide details of the following –

- a. **A dedicated PPP cell for the Sector** - Development of road network involves integrated planning, more complexity and significantly higher quantum of investment as compared to other sectors. Therefore, a dedicated PPP cell for the sector within the existing Planning and Development Department, or as an exclusive one for the road sector would be very helpful.
- b. **PPP Capacity Building of the agencies** – Training of employees in key areas such as
 - i. Project identification and prioritisation
 - ii. Preparation of shelf of projects with proper Detailed Project Reports (DPRs) – through usage of external consultants
 - iii. Risk Assessment and Management
 - iv. Procurement modalities including – RFQ and RFP related details
 - v. Preparation of concession agreements
 - vi. Project management (use of project management and contract administration tools)
- c. **Standardized Contracts** – The contracts should be standardized and transparent. Building familiarity of the contracting procedures among potential developers is important gain their confidence
- d. **Focus on resolving execution issues like land acquisition and environmental clearances**
 - i. It has been observed that the unavailability of updated land records and dispute in the land records is one of the major issues that hamper smooth land acquisition. Digitization of land records and their periodic update will go a long way in smoothing the process of land acquisition not only for road network development but also for development of other infrastructure
 - ii. Formation of dedicated unit within Assam Road Development Corporation for land acquisitions. The unit can be staffed with retired senior officials from the revenue department such as retired teshildars. These retired officials can then leverage their contacts to liaison with the revenue department and other district authorities and push the process of land acquisition.
 - iii. The envisaged Assam Road Development Corporation should have a senior representative from the revenue department on its board
 - iv. Ensure participation of key stakeholders such as Power, Industry, Urban Development, Environment and Forest Ministry in the policy making and master planning process.
 - v. Inputs from Environment and Forest Ministry should be included in the master plan and the necessary clearances for the envisaged development should be acquired at the master planning stage

4.4. Planning

Further, careful and detailed planning is also very essential to achieve the envisaged physical development in the sector. Some pointers on planning related interventions are mentioned.

4.4.1. Promote Integrated Road Network Development

A holistic master plan for the sector should be prepared taking into account the overall scenario of the state such as industrial development, socio-economic development, urban development and development of other modes of transport such as railways, inland waterways, airways, etc. The master plan should also have provisions for environmental safeguards and disaster management.

- a. Identification of Core Road Networks which includes connectivity to key centres (Industrial Centres, Tourism Centres, Urban Centres), neighboring states and neighboring countries. As part of this PIDP, six Core Road Network have already been identified and these should be made part of the integrated Master Plan for the sector.
- b. Identification of bottlenecks in the network and development of identified stretches. The PIDP identifies key stretches important for the augmentation of the road capacity and these should be made part of the integrated Master Plan for the sector.
- c. Prioritization and phasing of the identified Core Road Networks
- d. Incorporation of Environmental and Social Safeguards in planning –
 - i. Use of green technology in environmentally sensitive areas
 - ii. Alignment planning to bypass environmentally sensitive areas
 - iii. Rehabilitation and Compensation Plan for the affected population
- e. Augmentation scheduling of feeder roads to the identified Core Road Networks.

4.4.2. Capacity building of the implementing agencies

A detailed Capacity Building Plan needs to be developed. A detailed mapping exercise needs to be carried out - mapping the skill sets (current as well as desirable) of all government employees across different levels and seniorities in the various implementing agencies involved in the sector. Based on this skill mapping, training needs assessment for different levels and categories of employees along with timelines need to be codified into a Capacity Building Plan for all the agencies. Some indicative areas are given below.

- a. Modern road construction technology (especially for environmentally sensitive areas) – Use of bio-degradable lubricants for machineries, advanced drilling and blasting techniques
- b. IT system for better data collection, storage, analysis and information flow, to make planning process more effective and efficient
- c. Project management (use of project management and contract administration tools), Master Planning, PPP procurement etc.

5. Investment requirement

To meet the physical targets set out in the Vision, investment would be required to undertake capital expenditure and maintenance of the roads. This section delves into the details of such requirements.

5.1. Capital investment

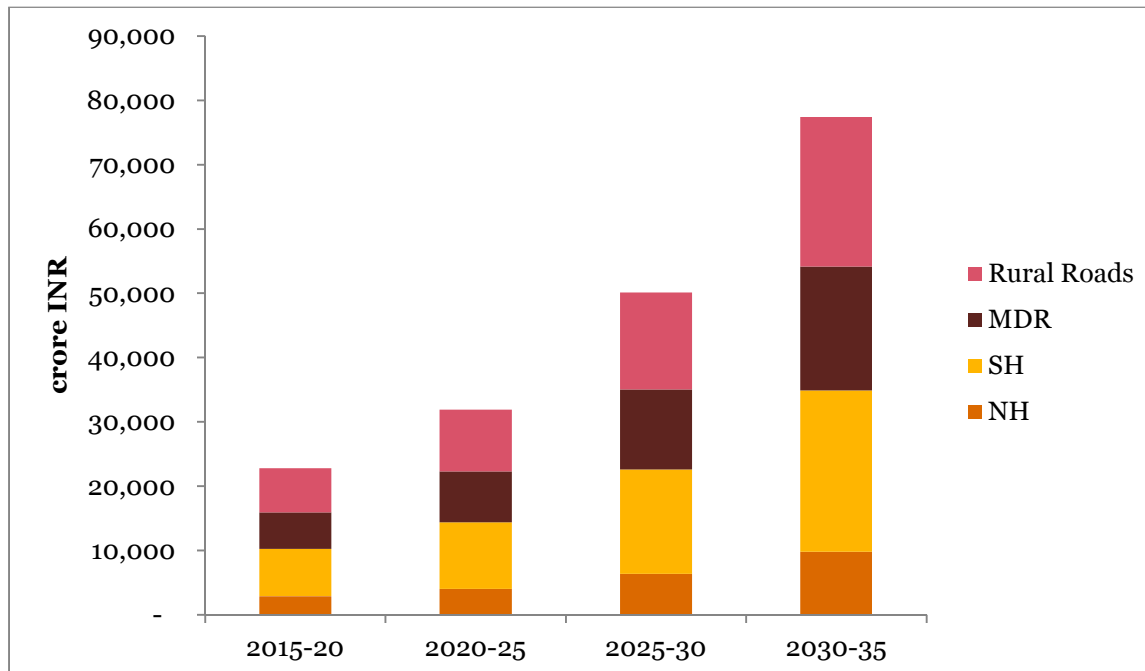
A total investment of ~ **1,83,000 crore INR** has been estimated for the envisaged physical infrastructure development over the next 20 years. The assumptions for these workings are detailed out in Appendix F.

Figure 20: Status of road network in the state by 2034 - 35 and the corresponding investment required

Categories of Road	Total Length (by 2034-35)	% of 6 Lane (by 2034-35)	% of 4 Lane (by 2034-35)	% of 2 Lane (by 2034-35)	% Single Lane (by 2034-35)	Total investment (crore INR)
NH	5000	4%	96%			23,151
SH	10,000		60%	40%	0%	59,007
MDR	12,000		5%	95%		45,314
Rural Roads	43,872			20%	80%	54,778

As the envisaged organizations strengthen, policies are implemented fully and PPP is promoted over the next 20 years, the investments will increase gradually over the next 20 years.

Figure 21: Capex phasing for the next 20 years (5-year period)



Source: PwC Analysis

5.2. Investment required for maintenance

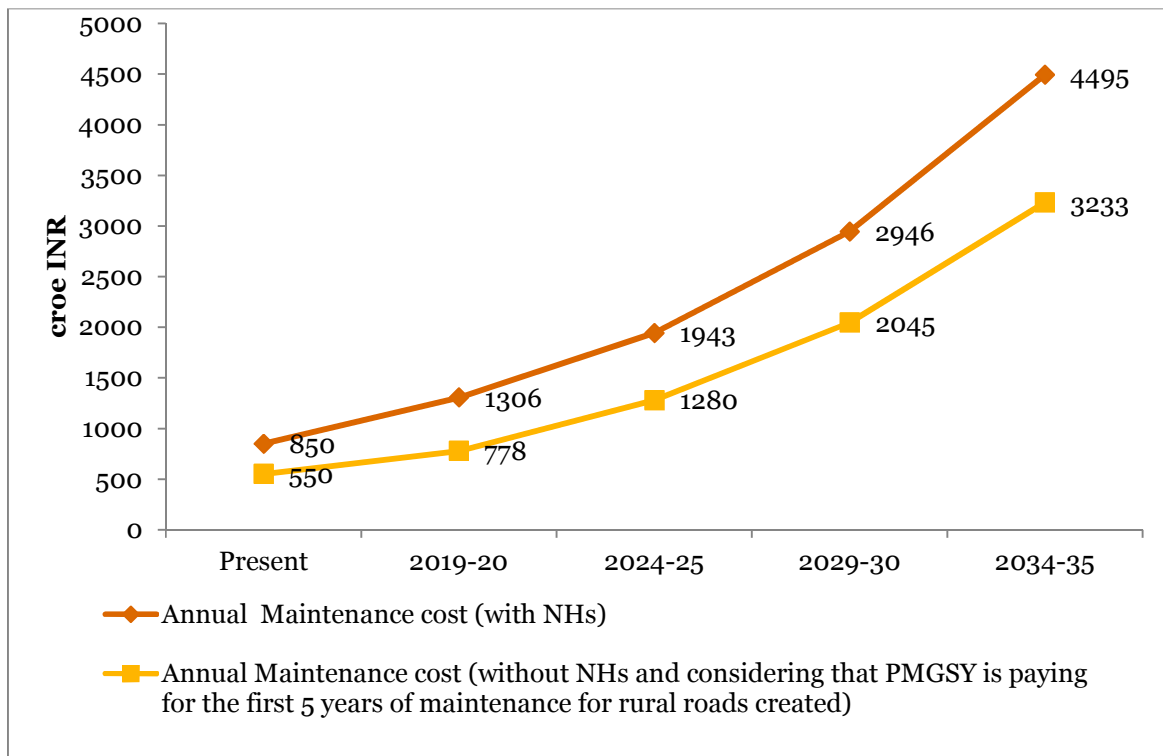
It has been estimated that generally in geographies like Assam, maintenance of 1 km of all-weather road cost around Rs. 1,75,000 per km or 2% of the capital value of the asset.

The total maintenance cost that is likely to be incurred in the next two years, provided the envisaged physical infrastructure development is carried out has been estimated at ~ 39,630 crore INR.

The total annual maintenance cost (for NHs, SHs, MDRs and Rural roads) is expected to increase from ~ 850 crore INR in 2014–15 to ~ 4,500 crore INR by 2034–35.

Maintenance for NHs will be provided through funds from MoRTH, and in case of rural roads, maintenance for the first 5 years after creation will be available through funds from PMGSY. Excluding these 2 categories of roads, the maintenance requirement will increase to 3,233 crore INR by 2034–35.

Figure 22: Annual maintenance cost



Source: PwC Analysis

6. Funding

As discussed in the previous chapter, the total investment has been estimated at ~ 183,000 crore INR over the 20-year period for upgradation of the overall road network in the state including National Highways, State Highways, Major District Roads and Rural Roads.

Categories of Road	Total investment (crore INR)
NH	23,151
SH	59,007
MDR	45,314
Rural Roads	54,778
Total	1,82,249

Primarily the State Government will have to take care of the investment required for SHs and MDRs

= ~ 1,04,321 crore INR

Source: PwC Analysis

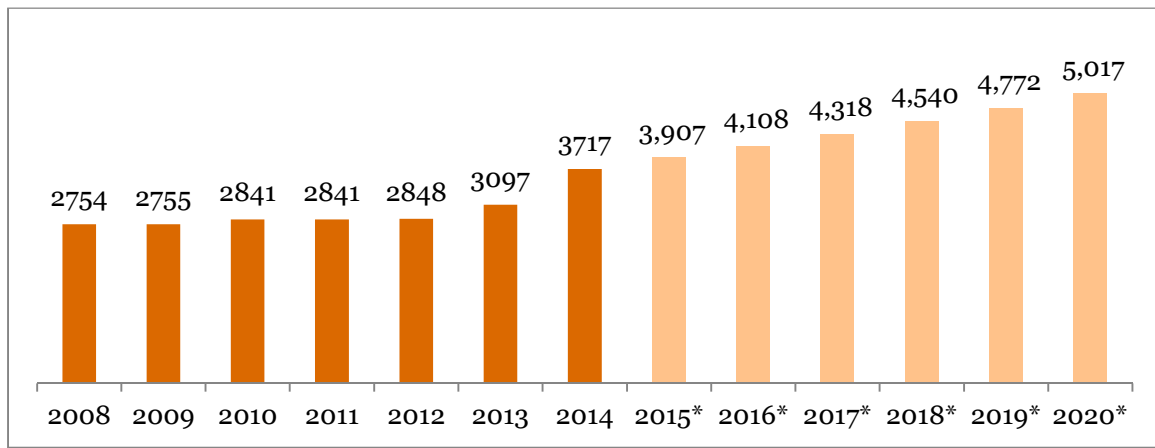
While capital investment for National Highways (~ 23,151 crore INR) and Rural Roads (~ 54,778 crore INR) is expected to come from central government directly through MoRTH for National Highways and through PMGSY for Rural Roads, the state government will have to provide for investments on State Highways and MDRs which is about **104,321 crore INR** (~ 58,000 crore INR for SHs and ~ 45,000 crore INR for MDRs). In addition to this there is also the maintenance cost which the state will have to fund.

6.1. Funding for NHs

The investment requirement for National Highways has been estimated at ~ 23,151 crore INR for the next 20 years. This investment can be funded directly by the Ministry of Road Transport and Highways under its various schemes such as the East West Corridor and the Special Accelerated Road Development Program for North East (SARDP – NE).

The length of NHs in the state has been growing at a rate of 5% and is currently 3,717 km. At this growth rate, the total length of NHs in the state will be 5,000 Km within the next 6 years, which is the envisaged length.

Figure 23: Forecasting of the NH length in Assam (in Km)



Source: PwC Analysis
*Estimated

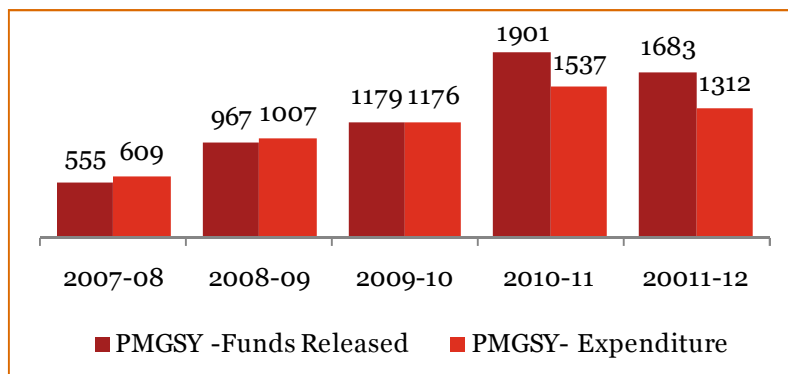
Most of the National Highways in the state are currently 2 lanes. If the length of NHs keeps on increasing at the current rate of 5% and as the current trend of 2 lanes NHs, then by 2035 there will be ~ 10,000 km of 2 lane National Highways. Hence if the development continues at the current rate, it can be expected that developing 96% of the envisaged 5,000 km of NHs in the state as 4-lane is possible by 2035.

6.2. Funding for Rural Roads

The investment requirement for rural roads has been estimated at ~ 55,000 crore INR for the next 20 years. This funding can be expected to be finance through PMGSY.

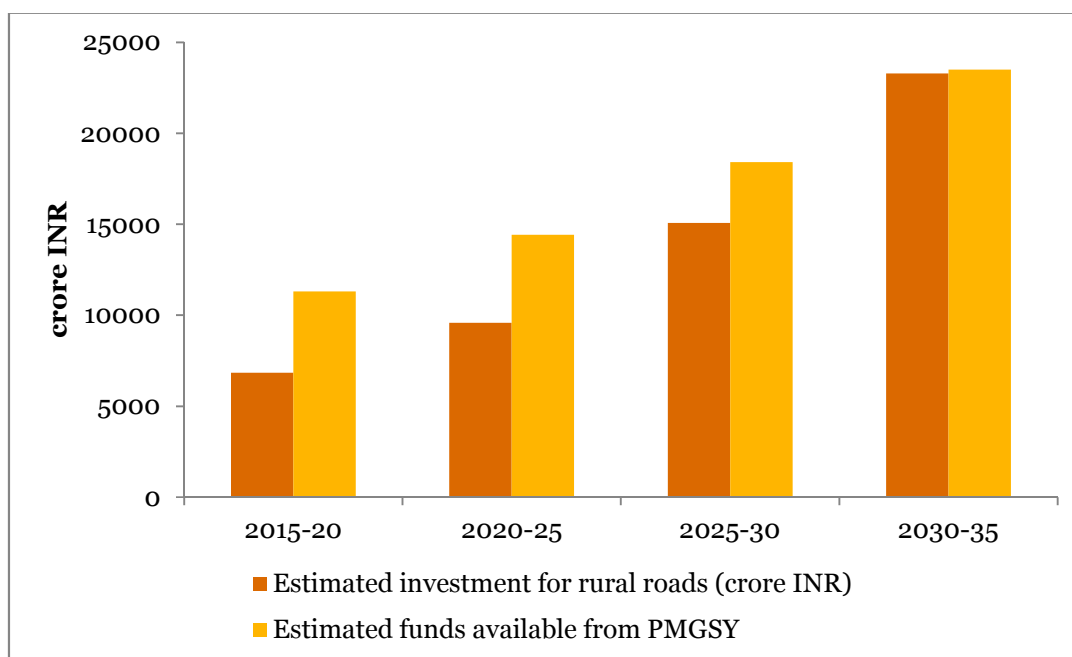
From 2007 to 2012, around ~ 6,285 crore INR was released for the state for development of rural roads. It has been observed that the funds were released at a high CAGR of 32%.

Figure 24: Past trends of PMGSY funding (in crore INR)



The high CAGR of 32% may not be sustainable and hence assuming a much more conservative CAGR of 5% it has been estimated that even at CAGR of 5%, the funds available from PMGSY over the next 20 years can be as high as ~ 67,500 crore INR, whereas the estimated requirement for rural roads stands at ~ 55,000 crore INR

Figure 25: Comparison between estimated funds required and forecasted funds availability (at 5%) from PMGSY



Source: PwC Analysis

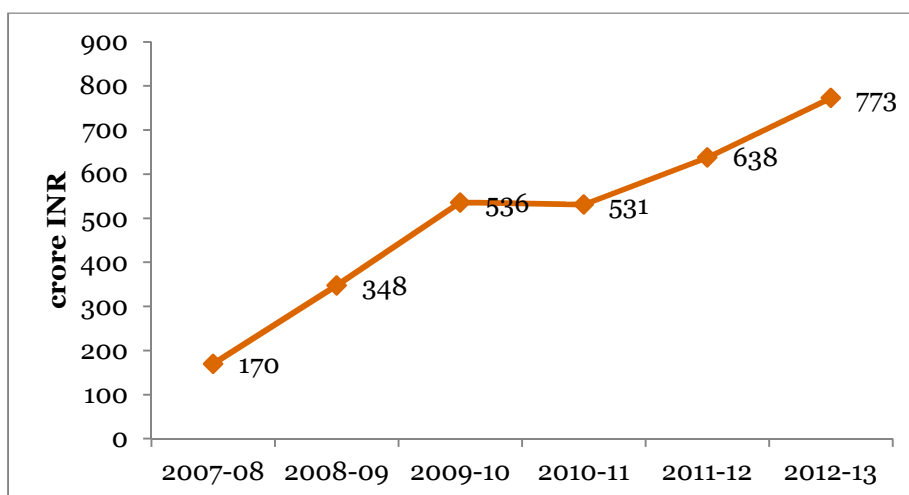
It is estimated that the investment demand for rural roads can be comfortably met by the funds available from PMGSY and the development of rural roads can be phased out according to the availability of funds

6.3. Budgetary sources (without multilaterals)

For State Highways and Major District Roads, till now, funds have come through state budgetary allocations. It has been observed that allocations from state budgetary resources (excluding multilateral funding which is currently accounted in the state budget) have grown. However the trend is unpredictable with growth ranging between -1% and 105% for the period 2007 to 2013.

State budgetary allocations to the sector is highly discretionary and it depends on –

- Sectoral allocation from the central government, which in turn depends on various other factors such as amount of funds available and priorities of the central government
- Available resources with the state government
- Sectoral priorities of the state government

Figure 26: Budgetary allocation to the PWD (from 2007-08 to 2012-13)

Source: PwC Analysis

If the state government increases the budgetary allocations from the current level at the rate of 5% to 10% then ~ 30,000 crore INR to 59,000 crore INR of funds will be available for the sector

Table 19: Estimated funds available from budgetary allocations under three scenarios

Scenario	Growth rate	2015-20 (crore INR)	2020-25 (crore INR)	2025-30 (crore INR)	2030-35 (crore INR)	Total (crore INR)
1	5%	4,942	6,307	8,050	10,274	29,572
2	8%	5,709	8,389	12,326	18,111	44,536
3	10%	6,278	10,110	16,283	26,224	58,895

This will still leave a gap of ~ 45,000 crore INR to ~ 75,000 crore INR, which will have to be filled by other sources such as multilateral borrowings, PPP and the envisaged Core Road Fund.

6.4. Core Road Fund

As discussed earlier, a core road fund should be operationalized to ensure steady funding to the sector. If we can consider the sources given below in the table and expect them to **grow by 6%** and **dedicate a uniform 2-4%** from each of the sources then **~ 1,000 crore INR to ~ 2000 crore INR** will be available for the sector.

Funds can be dedicated from more sources as highlighted in the earlier section on Core Road Fund and the different combination of % contribution can be tried.

Table 20: Tax revenues of Assam (in crore INR)

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14 ³
Taxes on vehicles	145	177	232	294	328	365
Taxes on Goods and Passengers	285	545	478	536	369	482
Other taxes and duties on commodities and services	8	9	10	12	71	79
Stamps and registration fees	111	108	123	175	252	

Source: State Finances – A Study of Budgets of 2013 – 14, Reserve Bank of India (January, 2014)

Table 21: Forecast of the tax revenues at 6% growth rate (in crore INR)

	2015-20	2020-25	2025-30	2030-35
Taxes on vehicles	2,312	3,094	4,140	5,540
Taxes on Goods and Passengers	3,053	4,085	5,467	7,316
Other taxes and duties on commodities and services	500	670	896	1,199
Stamps and registration fees	1,692	2,264	3,030	4,055

Source: PwC Analysis

Table 22: Forecasted funds available with the envisage Core Road Fund (in crore INR)

Scenario	% dedication of tax revenues under consideration	2015-20	2020-25	2025-30	2030-35	Total
1	2%	151.14	202.26	270.67	362.22	986
2	3%	226.71	303.39	406.00	543.33	1,479
3	4%	302.28	404.52	541.34	724.43	1,973

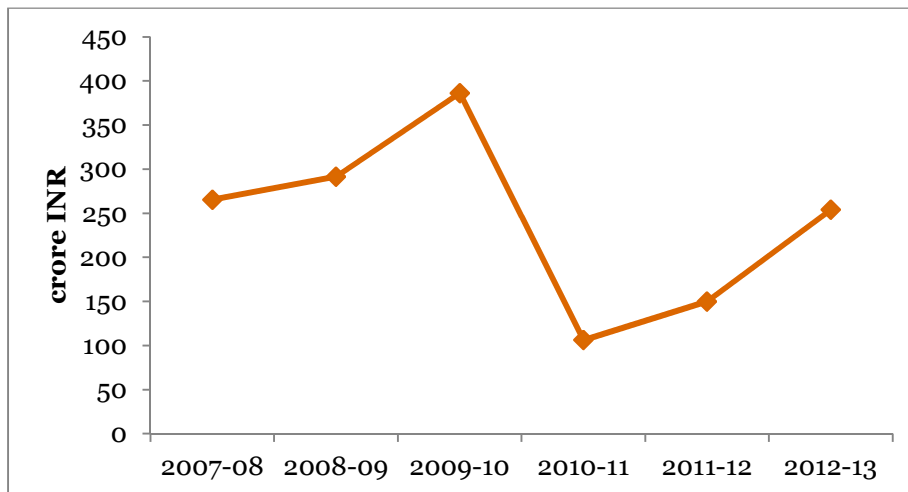
Source: PwC Analysis

6.5. Multilateral agencies

Funding from multilateral in the past has also followed an unpredictable trend as can be seen in the figure below. Most of the multilateral funding has been from the World Bank and were mostly earmarked for projects. With necessary institutional and policy interventions, more multilateral agencies can be attracted and the quantum of funding can be increase at a steady rate

If the overall funding from multilateral agencies in the sector in the state can be increase from the current level at a rate of 5 – 10%, then ~ 10,000 crore INR to ~ 20,000 crore INR of funds will be available for the road sector

³ Estimated

Figure 27: Trends of multilateral funding in the road sector in Assam (2007 - 2013)

Source: PwC Analysis

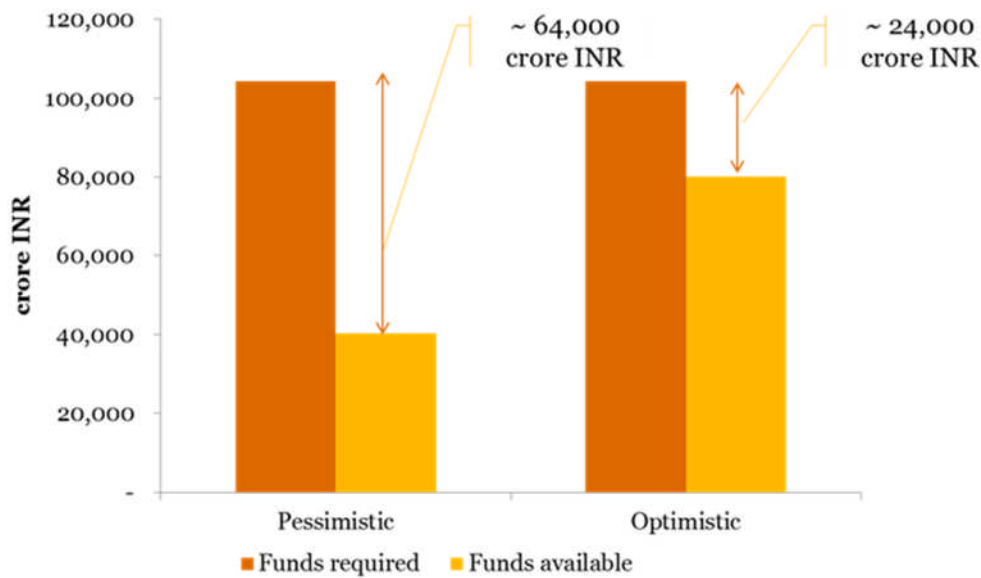
Table 23: Estimated funds available from multilateral sources under three scenarios

Scenario	Growth rate	2015-20 (crore INR)	2020-25 (crore INR)	2025-30 (crore INR)	2030-35 (crore INR)	Total (crore INR)
1	5%	1,625	2,074	2,647	3,378	9,723
2	8%	1,877	2,758	4,053	5,955	14,643
3	10%	2,064	3,324	5,354	8,622	19,364

Source: PwC Analysis

So if we consider the above sources of funds (budgetary allocations, multilateral funding and core road fund), based on the scenarios created we can have funds anywhere between ~ 40,000 crore INR to ~ 80,000 crore INR

Figure 28: Comparison between funds required and funds available under pessimistic and optimistic scenario



Source: PwC Analysis

Table 24: Pessimistic and optimistic scenario descriptions

Scenario	Conditions
Scenario 1 (Conservative)	<ul style="list-style-type: none"> ▪ Budgetary allocations to the sector growing at a rate 5% ▪ Multilateral funding to the sector growing at a rate of 5% ▪ Tax revenues from vehicle taxes, taxes on goods and passengers, stamps and registration fees, and other taxes on commodities and duties growing at a rate of 6%; and 2% from each sources is dedicated to the Core Road Fund
Scenario 2	<ul style="list-style-type: none"> ▪ Budgetary allocations to the sector growing at a rate 5% ▪ Multilateral funding to the sector growing at a rate of 5% ▪ Tax revenues from vehicle taxes, taxes on goods and passengers, stamps and registration fees, and other taxes on commodities and duties growing at a rate of 6%; and 2% from each sources is dedicated to the Core Road Fund

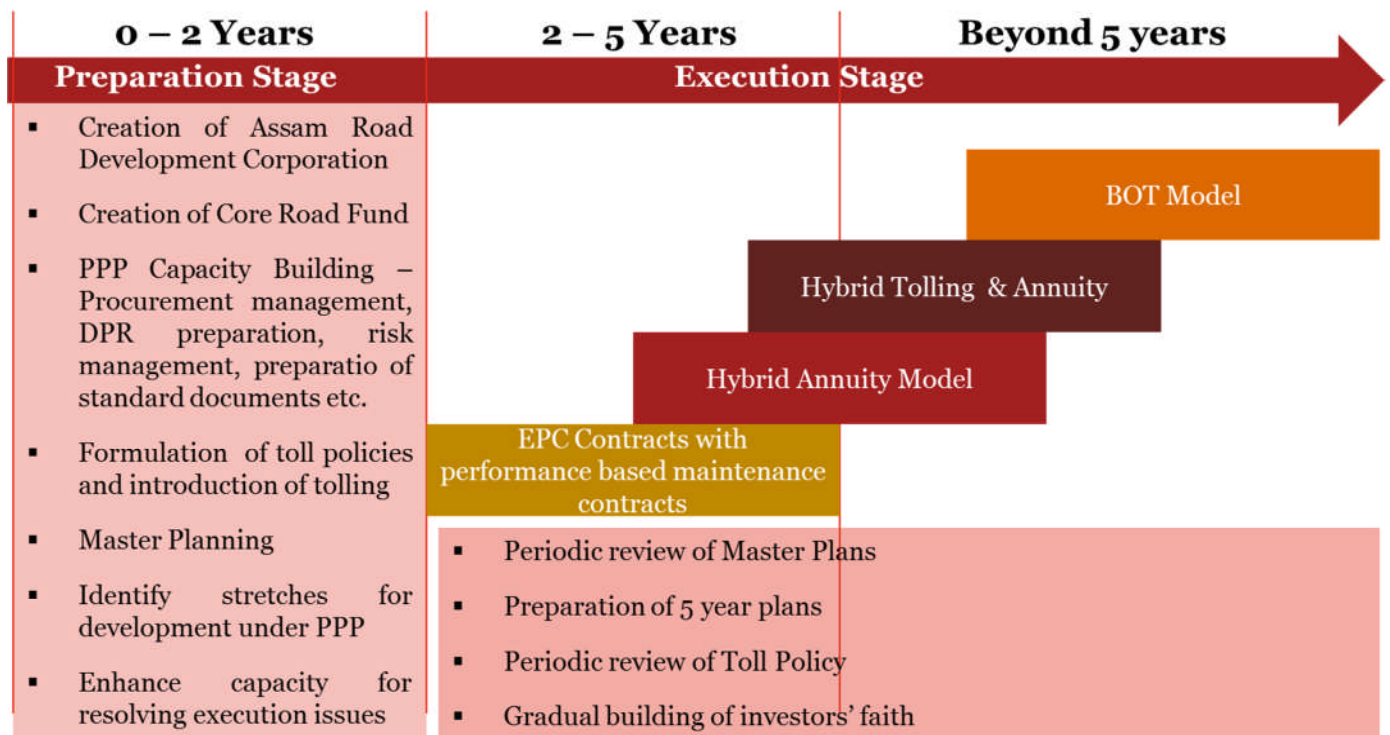
Source: PwC Analysis

Under pessimistic and optimistic scenarios, funding gaps of ~ 64,000 crore INR and ~ 24,000 crore INR respectively will remain.

6.6. Public Private Partnership (PPP)

The option of public private partnership should be explored as a procurement option – to bring in more technical expertise and efficiency. As discussed earlier conducive conditions to attract private players should be created through necessary policy and institutional interventions. The initial 2 years should be spent on preparing the necessary platform for promoting PPP in the sector in the state of Assam. Gradually PPP in the sector will evolve from EPC contracts to more complex BOT models. The necessary policies should be reviewed at definite intervals and capacity building and gaining of investor confidence will take place gradually.

Figure 29: PPP time line



In the initial stages funding from budgetary allocations, borrowings from multilateral agencies and other financial institutions by leveraging on the Core Road Fund should be focussed on developing the Core Road Networks that will form the back bone of the road transport. More involvement of and assistance from MoRTH should be sought to develop the National Highway stretches in the Core Road Networks and for development of more National Highways in the state. The option of PPP via the annuity route can be explored to meet the funding gaps and to bring the technical expertise and efficiency associated with private players to develop the core road networks

Development of Core Road Networks coupled with development of other infrastructure such as industrial infra, urban infra and power infra is likely to promote industrial development and an overall economic development in the state. Due to the industrial development in the state the overall traffic on road will increase. Further with the economic development and with better service level of roads, the willingness of people to pay tolls will increase. These subsequent effects of an overall increase in traffic and willingness of the people to pay will make BOT projects more viable in the future.

All along the necessary policy interventions should be formulated and implemented and necessary capacity to promote PPP should be built

The state needs to develop PPP capabilities in the state PWD to focus on road specific PPP projects. This “PPP cell” in the state PWD needs to detail out and then identify projects to be developed via PPP mode. In the initial stages the state can introduce trial PPP projects and other methods of bidding for improving the road network. Once the structure is matured in the state, PPP procurement mode can be targeted with full throttle

7. Action Points

In order to achieve the envisaged Vision, the identified physical interventions will have to be carried out gradually over the next 20 years. To push forward the envisaged physical development and for the overall long term development of the sector, the identified institutional and policy level interventions will have to be implemented.

While it will take time to develop the necessary policies and create the necessary institutions, it is also imperative to act on certain action points which are achievable in the current conditions and are vital for the overall development. Accordingly, we have identified implementable action points under two categories, as described below:

- **Immediate Action Points** – Action points that can be worked on under current conditions without any major institutional and policy interventions
- **Key Action Points** – These action points will include policy interventions and institutional development, which lays the platform for medium to long term overall development of the sector

The Immediate Action Points should be implemented in the first 2 years, whereas the Key Action Points should be implemented gradually over the next 20 years, with the initial 1–2 years focus on developing the necessary institutions and policies.

7.1. Immediate Action Points

The development of Assam State Road Board, operationalization of the Core Road Funds under its aegis, the creation of Assam Road Development Corporation and subsequently resulting in the ability of the state to mobilize required investments is expected to happen in the future. In the meanwhile, the stretches and networks which can be developed through funding from Ministry of Road Transport and Highways (MoRTH) should be focused on.

Certain stretches in the road network of the state has been recently declared as National Highways and these new networks of National Highways also include key missing linkages.

The following Immediate Action Points can be worked on under the existing conditions –

1. Assist the PWD NH & Buildings or any other agency such as NHAH involved in developing these recently declared National Highway networks which also include identified missing linkages, by assisting them in land acquisition and in getting environmental clearances
2. Project preparation for augmentation of NH 31B, NH 31 C and NH31 and NH37. The proposal should be placed before MoRTH highlighting the importance of these highways and the requirement for augmentation. NH 52 has already been proposed to be developed to 4 lanes under SARDP – NE – Scheme.
3. Identify State Highways and MDRs that can be converted into National Highways. Under the PIDP, we have identified six Core Road Networks and suggested SH and MDRs that could form part of such core networks. We have further suggested the capacity augmentation plans for each of the key stretches on these Core Road Networks. The same should be considered and the identified stretches of SH and MDRs should be converted to NH to strengthen the overall core network.
4. Preparation of Model Concession agreements for various types of PPP contracts
 - a. Preparation of inbuilt maintenance contracts in the above

- b. Undertake sectoral stakeholder consultation on the above documents so that there is a broad consensus and a sense of transparency in undertaking the PPP projects

7.2. Key Action Points

1) 1st stage agenda (Year 2015 - 2017)

1. Strengthening of the Assam State Road Board as an apex body and mandating it with overall policy planning for the sector, regulation of the sector and overseeing of implementing agencies. The same is recommended to be undertaken via an Act in the legislative assembly.
2. Create the Core Road Fund via an Act in the legislative assembly. This Core Road Fund is vital for
 - a. For maintenance – Providing an adequate and steady stream of funds for road maintenance
 - b. For capital investment – payment for project preparation cost such as land acquisition, DPR preparation, etc.; guarantee annuity payment to private developers, guarantee payment of loan installments to other financial institutions

The Core Road fund is vital for introducing PPP in the sector

3. Operationalize the proposed Core Road Fund under the aegis of the Assam State Road Board.
4. Creation of the proposed Assam Road Development Corporation capable of raising finances on its own and mandated with execution of road projects
5. Capacity building of the proposed institutions and the existing department
6. Completion of the ongoing road projects
7. Maintenance of the existing network
8. Formulation of a holistic road sector development policy for the state by Assam State Road Board including formulation of toll policies for PPP in the road sector
9. PPP policy – Assam has an overall PPP policy for the state. However considering the quantum of investment required for the road sector, a road specific policy can be explored with greater role for Assam State Road Development Corporation

For the first two steps, an RFP (Request for Proposal) has already been issued by the department via Assam State Road Project. The department has invited proposal from consultants for “Institutional Strengthening and Development of Assam State Road Board and other implementing agencies”.

2) 2nd stage agenda (Year 2017 - 2022)

1. Formulation of master plan with inputs from all relevant stakeholders focusing on the six Core Road Networks proposed in the PIDP
2. Develop a shelf of projects for PPP within the Core Road Network
3. Land acquisition and obtaining of necessary clearances
4. Introduction of toll policies
5. Initiation of the development works on the identified Core Road Network through PPP. Hybrid Tolling and Complete Tolling can be consider
6. Maintenance of the existing network

-
7. Development of feeder networks to the NH networks developed earlier (as referred in Section 1 sub section 1.2 point 1& 2) through Annuity Model. Development in Annuity model
 - a. Will introduce PPP in the sector and act as a pilot
 - b. Is a step towards building investor confidence in the state
 - c. Will helped to gradually move up in learning curve

3) 3rd stage agenda (Year 2022 and beyond)

1. Completion of the development works on the identified Core Road Network
2. Development of the feeder networks to these core networks through PPP
3. Enhancing the network to connect all centres of habitation

8. Project Bouquets

A bouquet of projects which will form the core of the sectoral development has been identified and presented below. These projects will have to be taken up over the next 20 years to achieve the envisaged vision

These projects have come out from the study and form the key components that will have to be developed to achieve the envisaged vision

Table 25: Bouquet of projects

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
1.	Srirampur Gate – Dhubri	75	<ul style="list-style-type: none"> Provide connection between Srirampur Gate and IWT Terminal at Dhubri. Trucks moving into Assam can be diverted to the IWT Terminal at Dhubri, and then the goods can transported upstream via IWT. Similarly goods moving out of Assam can be transported to the IWT Terminal at Dhubri via IWT and then by trucks beyond Assam Will enhance connection between north Bengal and the upcoming Class town of Dhubri 	<ul style="list-style-type: none">
2.	Kk-M-6 – Indo-Bhutan Border at Sarbhong to NH31C (New name NH27) at Bismuri	35	<ul style="list-style-type: none"> Main and the initial stretch of the proposed network which aims to provide access to Bhutan to the IWT Terminal in Dhubri 	<p><i>Network that provides access to Bhutan to the IWT Terminal at Dhubri</i></p> <ul style="list-style-type: none"> All these stretches (2 to 6) together forms a network that provide access to Bhutan to the

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<ul style="list-style-type: none"> Connects Bhutan to NH31C and thereby to West Bengal and rest of India Current traffic stands at 1501 PCUs/day and is expected to increase to 3926 PCUs/day by 2030 (business as usual case). However development of the overall network, IWT Terminal at Dhubri and IWT channel, and the growing trade will result in a much higher traffic 	<p>IWT Terminal at Dhubri and then beyond to Bangladesh and West Bengal via IWT</p> <ul style="list-style-type: none"> IWT Terminal at Dhubri is strategically located to capture goods moving to and from Bhutan (from and to mainland India and Bangladesh) Trade between India and Bhutan stood at ~ INR 3,046 Crores in 2013 – 14, and this network has the potential of influencing a portion of this trade movement as well as trade between Bhutan and Bangladesh, with the IWT Terminal at Dhubri as the key node in the trade path to Bhutan Connect Bhutan and Meghalaya
3.	SH5 – NH31C to Bilasipara	38	<ul style="list-style-type: none"> This is the stretch which connects the NH31C and NH31 and will play a key role in the overall network Moreover it passes through Fakiragram, where there is a railway junction. Coupled with Kk-M-6, this road can also give access to Bhutan to the Indian Railways Currently it is 38% Single lane and 62% intermediate lane and is handling traffic volumes way above its design capacity leading to congestions Based on business as usual traffic forecast, it will need to be developed into 4 lane highway 	
4.	NH31 – Bilasipara to Gauripur	35	<ul style="list-style-type: none"> NH31 as a whole is one of the main arteries of the state This is the only National Highway 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<p>which connects Dhubri to rest of the Assam</p> <ul style="list-style-type: none"> Traffic on this stretch is expected to be ~ 60,000/day PCUs by 2030 (business as usual case) 	
5.	SH28 – Gauripur to Dhubri	9	<ul style="list-style-type: none"> The final stretch of the proposed network It connects Dhubri to NH31 and thereby to rest of Assam and India 	
6.	Bridge between Dhubri and Pulbari	~ 11	<ul style="list-style-type: none"> This bridge will connect Dhubri to the south bank of river Brahmaputra and Meghalaya Currently the route between Dhubri and Phulbari is a circuitous route via the Narayan Setu Bridge at Jogighopa and requires 8 – 10 hours. This travel time will be reduce to 1 hour It will connect the NH31 entering Assam to Meghalaya and will help in easy evacuation of goods traffic originating from Meghalaya It will also help in improving connectivity to Bangladesh via Meghalaya 	
7.	Ch-M-1 Geylenghpur to Karigaon	~ 40	<ul style="list-style-type: none"> This road runs parallel to Kk-M-6 and it again connects Bhutan to NH31C It connects Bhutan to Kokrajhar 	<ul style="list-style-type: none"> Coupled with stretches 2 to 6, these stretches again provide direct connection between Bhutan and IWT Terminal at Dhubri via Kokrajhar, and also connect

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<ul style="list-style-type: none"> This stretch again plays a key role in ensuring Bhutan (Hatisar region) an access to IWT Terminal at Dhubri The current traffic stands at 9764 PCUs/day and is expected to go up to 25,539 PCUs/day (business as usual) Ch-M-1 should be developed into 4 lane 	Bhutan and Meghalaya
8.	Kokrajhar to Bilasipara (Kk-M-5 and a little bit of SH5)	~ 10	<ul style="list-style-type: none"> It reduces the travel time between Kokrajhar and Bilasipara 	
9.	Bg-M-1 – Manas National Park to Salbari	12	<ul style="list-style-type: none"> Key road for connectivity to the Manas National Park It connects Manas National Park to SH6. Current traffic stands at 1,363 PCUs/day and is expected to increase to 4,059 PCUs/day (business as usual). However with the development of the overall network, this may go up Based on business as usual traffic forecast, the road may be develop into intermediate/double lane 	<p><i>Stretches 9 to 20, together forms a network which connects most of the tourism centres in the state together</i></p> <ul style="list-style-type: none"> Connect the two national parks facilitating smooth tourist movement Owing to better access, tourist inflow to Kaziranga on an average has been 1 – 1.25 lakh per annum, whereas tourist inflow to Manas and other National parks such as Orang has been only in thousands. Development of this network will distribute some of the tourist inflow to Kaziranga to other national parks as well
10.	SH6 – Salbari to Tamulpur	~ 90	<ul style="list-style-type: none"> The road is key to the proposed network It is the main artery for connectivity in the areas near the Bhutan border especially in the 	<ul style="list-style-type: none"> From this network, small stretches branching out to Organg National Park, Darangamela in Bhutan, Bhairabkhunda, Barnadi and Sonai Rupai Wild Life Sanctuaries and to Tawang can be developed, thereby connecting all the

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<p>Bhaksa district</p> <ul style="list-style-type: none"> ▪ The road runs parallel to the Bhutan border and is important for connectivity to Bhutan as different roads connecting Bhutan branches out from SH6. For e.g. NH152 and the road connecting SH6 (at Kumurikata) to Bhutan via Daranga ▪ Crucial for connectivity to Barnadi Wildlife sanctuary ▪ Currently 76% of SH6 is single lane and 66% black top, and is operating at more than capacity leading to congestion ▪ Business as usual traffic forecast puts the traffic at 37,277 PCUs/day by 2030 and the road will have to be developed into a 4 lane road 	tourism centres to one another
11.	SH10 – Tamulpur to Rowta	~ 94	<ul style="list-style-type: none"> ▪ Provides connectivity to Udalguri ▪ Crucial for connectivity to Bhairabkunda, a Hindu Pilgrimage place. Ud-M-4 leading ot Bhairabkunda starts from Kahibari at SH10 ▪ Vital link in the envisaged tourism network. Together with SH6, NH52 and MDR Ud-M-8, it connects Manas National park to Orang National Park 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<ul style="list-style-type: none"> ▪ The road is 100% single lane and 87% black top as of now ▪ The current traffic stands at 14,676 PCUs/day and is expected to increase to 38,387 PCUs/day by 2030 ▪ SH10 may be developed into a 4 lane road 	
12.	NH52 Rowta to Tezpur to Kaliabor Tinali	83	<ul style="list-style-type: none"> ▪ NH52 as a whole is an important artery of the state of Assam, connecting all the key centres on the north bank of river Brahmaputra ▪ This particular stretch is crucial to the envisaged tourism network. Roads connecting to tourism places like Orang National Park, Sonai Rupai Wild Life Sanctuary and Twang branches out from this main artery 	
13.	NH37 – Kaliabor Tinali to Kaziranga	30	<ul style="list-style-type: none"> ▪ Vital for connectivity between north and south banks of river Brahmaputra ▪ Only connection between north and south banks of river Brahmaputra via the Kalia Bomora bridge, in the span of Brahmaputra between Amingaon and Dibrugarh which is ~ 630 Km ▪ Connects the part of the proposed network on the northern banks of 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			river Brahmaputra to the rest of the network on the southern bank	
14.	Ud-M-8	15	<ul style="list-style-type: none"> ▪ Connects the Orang National Park to NH52 ▪ Key artery in the proposed tourism network ▪ Current traffic stands at 2,879 PCUs/day and it is expected to increase to 8,573 by 2030 ▪ This road may be converted into double lane 	
15.	Ud-M-4	25	<ul style="list-style-type: none"> ▪ It connects Bhairabkunda to SH10 ▪ Interstate connectivity to Arunachal Pradesh ▪ Currently the traffic stands at 2,479 PCUs/day and is expected to increase to 6,484 PCUs/day by 2030 	
16.	Sn-M-1	36	<ul style="list-style-type: none"> ▪ Coupled with Sn-M-2, it connects Sonai Rupai Wild Life Sanctuary to NH52 and beyond to Orang National Park ▪ Current traffic stands at 1,490 PCUs/day and is expected to increase to 3,897 ▪ The road may be converted to 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			double lane	
17.	Sn-M-2	20	<ul style="list-style-type: none"> Coupled with Sn-M-1, it connects Sonai Rupai Wild Life Sanctuary to NH52 	
18.	Ud-M-6 and Ud-M-7	45	<ul style="list-style-type: none"> Crucial from the perspective of connectivity to Twang in Arunchal Pradesh (a major tourist attraction) Current traffic stands at 2,335 PCUs/day and 2,118 PCUs/day for Ud-M-6 and Ud-M-7 respectively and is expected to increase to 6,108 PCUs/day and 5,540 PCUs/day respectively 	
19.	New Road	10	<ul style="list-style-type: none"> A new road connecting Darranga at Bhutan border to SH6 	
20.	NH37 (from Kaliabor tinali to Kaziranga National Park)	30	<ul style="list-style-type: none"> One of the most important stretch of NH37 Existing traffic in the stretch stands at 48,788 PCUs/day and is expected to increase to 1,26,779 PCUs/day 	
21.	NH37 – Guwahati to Nellie	71	<ul style="list-style-type: none"> One of the most important stretch of NH37 The stretch is a part of both East West Corridor and the Asian Highway 	<p><i>Brahmaputra Valley to Barak valley connection (Guwahati to Nelie to Silchar via Haflong)</i></p> <ul style="list-style-type: none"> Stretches from 21 to 24 together forms a network that provides an alternate

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
22.	SH16 – Nellie to Haflong Tinali to Dehangi	127	<ul style="list-style-type: none"> ▪ One of the key stretches of the proposed network ▪ Runs parallel to NH 54 (Extn) and help in easing the traffic on the National Highway ▪ The road is 100% single lane and is currently operating above its designed traffic capacity ▪ The existing traffic stands at 9,279 PCUs/day and is expected to increase to 28,333 PCUs/day ▪ SH16 may be converted to 4 lane 	<p>connection between Guwahati in Brahmaputra valley and Barak valley</p> <ul style="list-style-type: none"> ▪ The current connection through NH44 via Shillong is in poor conditions and it takes 10 – 12 hour to travel a distance of 320 Km ▪ It reduces the travel time from Nagaon to Barak valley by 5 – 6 hours resulting in a direct saving in fuel cost of INR 880/ tonne. At present, around 74 MTPA of cargo is transported through road. If one assumes, that 10% of this cargo movement happens between Brahmaputra and Barak valley, the above savings in fuel translates to INR 650 crore of aggregate savings per annum.
23.	SH20 – Dehangi to Haflong	95	<ul style="list-style-type: none"> ▪ One of the key stretches in the proposed network ▪ Provides connectivity to Jatinga (a key tourism center in the state) ▪ The existing traffic stands at 2,563 PCUs/day and is expected to rise to 7,632 PCUs/day 	
24.	NH54 (Ext) – Haflong to Silchar	105	<ul style="list-style-type: none"> ▪ NH54 (Ext) as a whole provides connectivity between Barak and Brahmaputra valley ▪ Together with NH44, NH53 and NH36, it can provide connectivity 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<p>between Bangladesh and Brahmaputra valley of middle and upper Assam via Karimganj</p> <ul style="list-style-type: none"> Silchar is a Class I town and with proposed industrial development around it, it will evolve into a development node. Development of this stretch will connect Silchar to Haflong (a key town in the region) and thereby enabling Silchar to influence the development of Haflong 	
25.	Ka-M-1 – Nellie to jerkiding	145	<ul style="list-style-type: none"> This is an important stretch in the proposed network Development of this road is align with the sectoral vision of developing connection to all centres of habitation. It will provide better connectivity to a large area of Karbi Anglong District It runs parallel to SH16 and can help in easing the traffic in SH16 It joins SH18 at Khanduli and can provide connectivity between Nellie and Jowai in Meghalaya The road is not 100% black Current traffic stands at 482 PCUs/day and is expected to increase to 1,261 PCUs/day by 	<p><i>Brahmaputra valley to Barak valley connection (Nellie to Silchar via Umrongso and Garampani)</i></p> <ul style="list-style-type: none"> <i>Stretches 25 to 27 together forms another network that will provide another alternate connection between Guwahati and Silchar</i> It will run parallel to the network 5 and provide a more direct connection between Nellie and Silchar It will ensure more coverage of habitation areas It will help spawn more towns

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			2034 – 35	
26.	Proposed new road connecting Ka-M-1 at Jerkiding and SH 20A at Urmongso	15 – 20	<ul style="list-style-type: none"> This new road is the key stretch of the entire network. It connects Ka-M-1 and SH20 which continues to meet NH54 (Extn), which then runs to Silchar one of the upcoming growth centres in the state 	
27.	SH20 & SH20A & NH54 Ext – Urmongso to Silchar	209	<ul style="list-style-type: none"> This stretch connects Silchar and Urmongso The stretch runs parallel to NH40 and NH44 If the above new road is developed, it will provide an alternate connection between Shillong and Silchar 	
28.	NH152 – Indo Bhutan border (Alabari Chek post) to Patshala	44	<ul style="list-style-type: none"> One of the key connection to Bhutan Connects Bhutan to NH31, one of the main arteries of Assam Connects the urban centre of Patshala with Bhutan 	<ul style="list-style-type: none"> Stretches 28 to 35 together forms a network provides a direct connection between Meghalaya and Bhutan It reduces the travel time between Goalpara and Barpeta Connects the three major urban centres of Nalbari, Barpeta and Goalpara Reduces travel time between Chaygaon and Barpeta This network will result in direct savings of INR 392/tonne of cargo movement in fuel cost and a time saving of average 2 hours
29.	NH31 – Patshala to Bhawanipur on NH31	19	<ul style="list-style-type: none"> 	
30.	SH8 – Bhawanipur to Barpeta	20	<ul style="list-style-type: none"> One of the key stretches of the network. Together with NH31 and NH152, it provides a direct connection between Barpeta and Bhutan 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<ul style="list-style-type: none"> ▪ It connects Barpeta to NH31 ▪ The road is 100% single lane and is operating above the designed capacity ▪ Existing traffic stands at 5,617 PCUs/day and is expected to increase to 13,515 PCUs/day by 2030 ▪ If the proposed network is developed as a whole, the traffic figures may go up 	<ul style="list-style-type: none"> ▪ Other indirect benefits include more traffic and trade movement between Bhutan and Meghalaya via- Assam
31.	Ba-M-2 – Barpeta to Bagbhar	31	<ul style="list-style-type: none"> ▪ This is the key stretch of the proposed network ▪ It connects Bagbhar on the banks of river Brahmaputra to Barpeta ▪ The road is a single lane and is not adequate to handle the current traffic level ▪ Highly affected by flooding ▪ The traffic currently stands at 6,062 PCUs/day and is expected to increase to 15,856 PCUs/day by 2030. ▪ Again if the network is developed as whole, the estimated traffic figures may go up ▪ The road may be converted into 2 lane as per business as usual traffic forecast 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
32.	A New bridge connecting Baghbar on Norther Bank to Dolgoma on the South Bank	10 - 15	<ul style="list-style-type: none"> ▪ The bridge is a key component of the proposed network. ▪ It will reduce the travel time between Barpeta and Goalpara ▪ Direct connection between Barpeta and the Meghalaya border via Dhudnai 	
33.	SH46 – Dolgoma to Goalpara	27	<ul style="list-style-type: none"> ▪ This will connect the end of the proposed bridge to Goalpara 	
34.	New road SH46 – Dolgoma to Dhudnai	20	<ul style="list-style-type: none"> ▪ This will connect the end of the proposed bridge to Dhudnai ▪ SH46 as a whole is an important road as it connects Phulbari to NH37 and Goalpara town ▪ Development of SH46 and the bridge connecting Phulbari and Dhubri will also reduce the travelling time between Goalpara and Dhubri 	
35.	SH9 – Nalbari to Barpeta	53	<ul style="list-style-type: none"> ▪ It connects Nalbari to SH2 (one of the important State Highways running parallel to the NH31) and thereby to Barpeta ▪ If the overall network is developed, it will also reduce the travel time between Nalbari and Goalpara ▪ SH9 is highly congested and is carrying traffic over 5 times its 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<p>designed capacity</p> <ul style="list-style-type: none"> The current traffic stands at 20,319 PCUs/day and is expected to increase to 56,723 PCUs/day by 2030 	
36.	NH31C – Bengal border to Bongaigaon	83	<ul style="list-style-type: none"> This stretch connects Assam and North East India to the rest of the country It runs parallel to the Bhutan border and is crucial for connectivity to border with various roads leading to Bhutan branching out from the Highway The stretch forms a part of the East West Corridor The current traffic stands at 17,419 PCUs/day and is expected to increase to 45,264 PCUs/day 	<p><i>Stretches 36 to 50 together forms the core network running across the length and breadth of the state, comprising of NH31C, NH31, NH52, the East West Corridor and the Asian Highway</i></p> <ul style="list-style-type: none"> Development of this network will connect all the key centres on both sides of river Brahmaputra as well as on the Barak valley to one another Enhancement of this core network and development of adequate feeder network to this core network will connect all the key centres in the state and will also improve connectivity to the neighboring states and countries and truly elevate Assam as the preferred gateway Development of this core road network, coupled with development of industrial infra and urban infra in the state of Assam, and similar development in the north east India region as a whole; will enable Assam and the north east region to develop into an economic hub and gradually increase its share in the bilateral trade between India and its eastern neighbors, and the ASEAN
37.	NH31 – Bongaigaon to Guwahati	175	<ul style="list-style-type: none"> It is one of the main artery of the state and it connects the lower Assam districts with Guwahati Along with NH31C it connects Assam and north east India to the rest of India The stretch is a part of both the Asian Highway and the East West Corridor The current traffic stands at 20,962 PCUs/day and is expected 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<p>to rise to 54,471 PCUs/day by 2030</p> <ul style="list-style-type: none"> The road is proposed to be converted to 6 lane 	<p>countries</p> <ul style="list-style-type: none"> It has been estimated that North East India has a trade potential of anywhere between 35,000 crore INR to 180,000 crore INR and development of this core road network will enable Assam to influence a significant portion of this trade
38.	NH54 Ext – Sarupathar to Silchar	273	<ul style="list-style-type: none"> The stretch is a part of the East West Corridor Connects Brahmaputra valley to Barak valley Provides interstate connectivity to Mizoram Current traffic stands at 15,369 PCUs/day and is expected to rise to 40,000 PCUs/day by 2030 	
39.	NH36 – Nagaon to Dimapur	151	<ul style="list-style-type: none"> The road forms a part of the Asian Highway and connects Nagaon to Dimapur It joins NH39 at Dimapur which continues to Moreh in Manipur and to Myanmar The road is key in developing Assam as the gateway to neighboring states and countries At present traffic at NH36 varies between 8,500 PCUs/day near Doboka to 17,000 PCUs/day at Kathiatoli The minimum traffic is expected to rise to anywhere between 22,000 PCUs/day and 44,000 PCUs/day 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			by 2030	
40.	NH37 – Guwahati to Nagaon	122	<ul style="list-style-type: none"> ▪ One of the most important stretches of NH37 ▪ It connects the two key growth centres of the state (Guwahati and Nagao) and meets NH36 and NH54 Ext at Nagaon and continues beyond Nagaon as NH37 to Tinsukia ▪ It forms a part of both the Asian Highway and East West Corridor ▪ The current traffic in the stretch stands at 48,788 PCUs/day and is expected to rise to 1,26,779 PCUs/day 	
41.	NH37 – Nagaon to Jorhat	187	<ul style="list-style-type: none"> ▪ This stretch again connects the two key growth centres (Nagaon and Jorhat) ▪ The traffic in the stretch can be as high as 87,608 PCUs/day by 2030 	
42.	NH37 – Jorhat to Sibsagar	56	<ul style="list-style-type: none"> ▪ The current traffic stands at 48,663 PCUs/day and is expected to rise to 1,26,455 PCUs/day by 2030 (at Sibasagar) 	
43.	NH37 – Sibsagar to Dibrugarh	84	<ul style="list-style-type: none"> ▪ Dibrugarh is an existing Class I town and will evolve into a key growth center of the state ▪ This stretch connects the urban area of Sibasagar to Dibrugarh and will facilitate development of 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<p>Sibasagar under the influence of Dibrugarh</p> <ul style="list-style-type: none"> The current traffic stands at 48,663 PCUs/day and is expected to rise to 1,26,455 PCUs/day by 2030 (at Sibasagar) 	
44.	NH37 – Dibrugarh to Tinsukia	47	<ul style="list-style-type: none"> Dibrugarh is an existing Class I town and will evolve into a key growth center of the state This stretch connects the urban area of Tinsukia to Dibrugarh and will facilitate development of Tinsukia under the influence of Dibrugarh The traffic is expected to rise to ~ 60,000 PCUs/day by 2030 (at Sibasagar) 	
45.	NH31 & NH15 – Guwahati to Mangaldai	70	<ul style="list-style-type: none"> Facilitate development of urban centres on the north Bank of river Brahmaputra under the influence of Guwahati 	
46.	NH15 – Mangaldai to Tezpur	95	<ul style="list-style-type: none"> The road is important from the perspective of connectivity of northern bank of river Brahmaputra in central and upper Assam with the rest of the country Important for connectivity to Orang National Park and Tawang Important for connectivity to Arunachal Pradesh, as roads 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			leading to Arunachal Pradesh branches out from the Highway	
47.	NH15 – Tezpur to Gohpur	129	<ul style="list-style-type: none"> ▪ The road runs parallel to river Brahmaputra on the north Bank ▪ Important for connectivity to Itanagar ▪ Will help the area to develop under the influence of Tezpur which will evolve into one of the key growth centres of the state ▪ The highway is highly flood affected ▪ Together with NH 37A, it helps in connecting the region on the north bank of river Brahmaputra in central Assam to the south bank of river Brahmaputra 	
48.	NH43 & NH52 – Gohpur to North Lakhimpur	77	<ul style="list-style-type: none"> ▪ North Lakhimpur will developed into one of the key growth centres of the state ▪ This road will facilitate development of the nearby regions ▪ Important for connectivity to Arunachal Pradesh 	
49.	NH52 – North Lakhimpur to Dhemaji	68	<ul style="list-style-type: none"> ▪ NH52 as a whole is one of the main arteries of the state ▪ It is important for connectivity to the upper Assam area on the north bank of river Brahmaputra 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<ul style="list-style-type: none"> The highway is highly flood affected and becomes cutoff from the other regions during monsoon season North Lakhimpur will developed into one of the key growth centres of the state This road will facilitate development of the nearby regions 	
50.	NH52 – Dhemaji to Pasighat	135	<ul style="list-style-type: none"> Important for connectivity to Arunachal Pradesh It is important for connectivity to the upper Assam area on the north bank of river Brahmaputra 	
51.	New bridge connecting Disangimukh on South bank to Dhakuakhana on north Bank	2 – 3	<ul style="list-style-type: none"> Key element of the envisaged network 	<p><i>Stretches 51 to 53 together forms a network that connects Disangimukh, Dhakuakhana, North Lakhimpur and Majuli together</i></p> <ul style="list-style-type: none"> Reduce the travel time from Nagaon – Dhakuakhana by 6-7 hrs, and Jorhat to Majuli by 2 hrs It will provide connection to the cultural hub of Majuli Agriculture and horticulture in North side of Brahmaputra will improve significantly Huge tourism potential can be tapped The network will facilitate the development of the region under the influence of North Lakhimpur which is an upcoming Class I
52.	Lk-M-2 (Dhakuakhana to North Lakhimpur)	46	<ul style="list-style-type: none"> The current traffic stands at 1,368 PCUs/day and is expected to rise to 3,578 PCUs/day 	
53.	SH21 (North Lakhimpur to Majuli)	42	<ul style="list-style-type: none"> Connects the urban centre of North Lakhimpur to the tourism and cultural hub of Majuli The road is 100% single lane and is currently operating at traffic levels more than the designed capacity The road is only 57% blacktop Traffic level currently stands at 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			6,216 PCUs/day and is expected to increase to 17,353 PCUs/day by 2030	town
54.	New bridge between Bonda and Kuruwa	~ 2	<ul style="list-style-type: none"> Connects Kuruwa on North Bank to Guwahati on South Bank Key element of the envisaged network 	<p>Stretches 54 and 55 together connects Narengi- Bonda, Kuruwa and Duminichowki together</p> <ul style="list-style-type: none"> The link will help assist in decongesting Guwahati city by minimising traffic on Jalukbari- Baihata Chariyali road Distance from Guwahati to Mangaldoi, Tezpur will be reduced by 17 KM Convenient for people travelling from North bank to Guwahati as this route will provide and alternate connectivity to Guwahati Can enable development of a satellite town on North bank (Kuruwa)
55.	Dr-M-2	33	<ul style="list-style-type: none"> The current traffic level stands at 6,377 PCUs/day and is expected to rise to 16,680 PCUs/day by 2030 The road maybe converted to double lane 	
56.	New Bridge connecting Gamirighat on north Bank to Dhansrimukh on South Bank of river Brahmaputra	5 – 6	<ul style="list-style-type: none"> Key element of the envisaged network Provide another Brahmaputra's north and south bank connection Itanagar is directly connected to NH37 via this bridge 	<p>Stretches 56 to 58 together connects Gohpur and Numaligarh together</p> <ul style="list-style-type: none"> Reduce the travel time by 4-5 hours Will connect the industrial region around Numaligarh to North bank Direct connection between Itanagar and NH37
57.	Sn-M-11 (Gamirighat to Gohpur)	13	<ul style="list-style-type: none"> Traffic is expected to increase to 3,638 PCUs/day by 2030 	
58.	Gt-M-1 (Dhansrimukh to NH37)	5	<ul style="list-style-type: none"> Traffic is expected to increase to 2,302 PCUs/day by 2030 	
59.	New Bridge connecting Dhola on south bank	2.5	<ul style="list-style-type: none"> Critical to tap the tourism 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
	to Sadiya on north bank of river Brahmaputra		<p>potential in Arunachal Pradesh</p> <ul style="list-style-type: none"> To provide raw materials for upcoming hydel power projects by Jindal & Reliance in Arunachal Important for providing connectivity between Upper Assam and Arunachal. Reduce travel time by 4-6 hours 	
60.	SH-4 (via Chamrang)	63	<ul style="list-style-type: none"> It connects Bhutan to NH52 at Mangaldai 80% of the road is single lane and 57% of the road is gravel The current traffic which stands at ~ 15000 PCUs/day is more than its designed capacity The traffic is expected to rise to ~ 40,000 PCUs/day by 2030 	<ul style="list-style-type: none"> Stretches 60 to 63 are all important for connection to Bhutan Trade between India and Bhutan stood at ~ INR 3,046 Crores in 2013 – 14 ad is growing Various economic zones and industrial parks have been proposed. These roads will help in moment of goods from those industrial areas to the markets in Bhutan
61.	Ch-M-3 (via Kalamati)	44	<ul style="list-style-type: none"> Connects Bhutan to NH31 Traffic is expected to increase to 6,644 PCUs/day by 2030 	
62.	Ch-M-5 (Via Mathanguri)	61	<ul style="list-style-type: none"> Along with Bhutan it also provides connectivity to Manas National Park. Connects Bhutan and the Manas National Park to NH31 Traffic is expected to increase to 6,856 PCUs/day by 2030 	
63.	Ch-M-2 (via Amteka)	58	<ul style="list-style-type: none"> Traffic is expected to increase to 7,222 PCUs/day by 2030 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
64.	NH 151 (provides connectivity from Karimganj to Bangladesh)	~ 14	<ul style="list-style-type: none"> ▪ Karimganj is an upcoming Class I town ▪ A multi sector economic zone has been proposed at Karimganj and this road will facilitate trade exports from the economic zone to the markets in Bangladesh 	Stretches 64 to 68 are key for the connection to Bangladesh
65.	MDR Dh-M-1 (via Hallidayganj, Hatsingimari, Purakasia to Tura) + New road to Phulbari	~ 70	<ul style="list-style-type: none"> ▪ Development of this road and a new road connecting Haldiyaganj to Phulbari and a bridge over river Brahmaputra connecting Phulbari to Dhubri, will connect Dhubri to the Manchachar area in Bangladesh ▪ A multi sector economic zone has been proposed in Dhubri, and this road will facilitate export of goods from the economic zone to the markets in the Mankachar area of Bangladesh ▪ Currently the traffic on Dh-M-1 stands at 7,184 PCUs/day and is expected to increase to 18,791 PCUs/day by 2030 	
66.	State Highway SH25 (via Kharsang)	8	<ul style="list-style-type: none"> ▪ Important for connectivity to Arunachal Pradesh 	Stretches 69 to 73 are important for connection to Arunachal Pradesh
67.	MDR Dm-M-4 (via Nari)	4	<ul style="list-style-type: none"> ▪ Connects Arunachal Pradesh to NH52 	
68.	Dm-M-3 (via Likabali)	12	<ul style="list-style-type: none"> ▪ Connects Arunachal Pradesh to NH52 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
69.	Sn-M-18 (from Balipara)	30	<ul style="list-style-type: none"> ▪ Traffic is expected to rise to 5,210 PCUs/day by 2030 ▪ The road is also important for connectivity to the Nameri National Park ▪ Connects Arunachal Pradesh to NH52 	
70.	Sn-M-9 (from Itakhola)	19	<ul style="list-style-type: none"> ▪ Traffic is expected to rise to 3,855 PCUs/day by 2030 ▪ Provides connectivity to the Sijusa area of Arunachal Pradesh 	
71.	SH31 (via Nagajanka),	23	<ul style="list-style-type: none"> ▪ Connects Jorhat to Mokokchang in Nagaland ▪ Provides Nagaland an access to the IWT Terminal at Neamati via Jt-M-3 ▪ Good coming to Nagaland can be transported via IWT and then on road from Neamati to Nagaland and vice versa ▪ The State Highway is operating at traffic levels more than its capacity ▪ A multi sector economic zone has been proposed at Jorhat and this road will facilitate movement of goods from the economic zone to markets in Nagaland ▪ Current traffic stands at 14,212 PCUs/day and is expected to 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			increase to 39,675 PCUs/day by 2030	
72.	SH-33 (via Nagabat),	62	<ul style="list-style-type: none"> ▪ It connects the Merapani region of Nagaland to Jorhat ▪ Provides the Merapani region of Nagaland an access to IWT Terminal at Neamati via Jt-M-3 ▪ The road is 87% black top and 87% single lane and is operating at traffic levels more than its designed capacity ▪ Current traffic level stands at 14,852 PCUs/day and is expected to increase to 41,461 PCUs/day by 2030 	
73.	SH-34 (via Merapani)	52	<ul style="list-style-type: none"> ▪ It connects Golaghat to Merapani in Nagaland ▪ Current traffic level stands at 4,290 PCUs/day and is expected to increase to 11,976 PCUs/day by 2030 	
74.	SH-44 (via Uriumghat tiniali).	32	<ul style="list-style-type: none"> ▪ Connects Nagaland to NH39 ▪ Facilitate movement from the Nagaland region near Uriumghat to Dimapur and Kohima 	
75.	NH54	~ 65 (in Assam)	<ul style="list-style-type: none"> ▪ Connects Silchar to Aizwal ▪ Silchar is an existing class I town in Assam and will evolve into one of the key growth centres of the 	<i>Development of NH54 and SH-40(via Sherkhan) is important for connectivity to Kaladan project in Mizoram. The route has the potential to act as an</i>

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			state	alternative trade route to the state of Assam.
76.	SH40	16	<ul style="list-style-type: none"> Connects Mizoram to NH54 	
77.	NH44	~ 53 (in Assam)	<ul style="list-style-type: none"> Connects Karimganj to Tripura A multi sector economic zone has been proposed at Karimganj. This road will facilitate the movement of goods from the economic zone to the markets in Tripura and beyond to Bangladesh 	Stretches 80 and 81 are important for connection to Tripura
78.	Kj-M-7	27	Connects that region of Tripura near Khanmun to Karimganj	
79.	SH1	210	<ul style="list-style-type: none"> It connects Golaghat to Namrup It runs parallel to NH37 and can act as an alternative to NH37 It also runs parallel to the Nagaland border and is important from the perspective of connectivity to Nagaland Connectivity to Nazira, which is a region rich in oil and gas reserves. Prominent companies such as ONGC, Schlumberger and haliburton have offices in Nazira. The Nazira area is also surrounded by a large number of tea estates The highway is currently operating at traffic levels above its designed 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<p>capacity</p> <ul style="list-style-type: none"> Current traffic level stands at 23,086 PCUs/day and is expected to increase to 68,743 PCUs/day by 2030 	
80.	SH2	161	<ul style="list-style-type: none"> It runs from Bongaigaon to Amingaon It runs parallel to NH31 and act as an alternative to NH31 It connects important urban centres like Bongaigaon, Barpeta and Guwahati The highway is currently operating at traffic levels higher than its designed capacity and the highway is only 73% black top Current traffic level stands at 23,327 PCUs/day and is expected to increase to 69,460 PCUs/day by 2030 	
81.	SH3	190	<ul style="list-style-type: none"> It runs parallel to NH37 from Guwahati to Nagaon and act as an alternative to NH37 Connects the three urban centres of Guwahati, Morigaon and Nagaon Provides connectivity to Pobitora Wildlife sanctuary a tourism spot 	
82.	SH24	44	<ul style="list-style-type: none"> Important for connectivity to 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			Digboi	
83.	Db-M-7	29	<ul style="list-style-type: none"> ▪ Provides connectivity to Namrup, a major industrial centres with three key industries – Brahmaputra Valley Fertilizers Corporation Ltd., Assam Petrochemicals Ltd. and Namrup Thermal Power Station ▪ Current traffic stands 5,240 PCUs/day and is likely to increase to 13,706 PCUs/day 	
84.	NH38	57	<ul style="list-style-type: none"> ▪ It connects NH37 to NH153 (Stillwell road), which goes into Arunachal Pradesh and beyond to Myanmar ▪ It is important for the connectivity of Digboi, which is known as the oil city of Assam. IOCL Assam Division Headquarters is located here 	
85.	Tn-M-4	35	<ul style="list-style-type: none"> ▪ Connects Digboi to Arunchal Pradesh 	
86.	Sb-M-3	30	<ul style="list-style-type: none"> ▪ Current traffic stands 3,949 PCUs/day and is likely to increase to 10,329 PCUs/day ▪ Important for improving connectivity to Nagaland ▪ Important for improving the connectivity to Nazira, a region rich in oil and gas reserves. The 	

Stretch No.	Stretches to be consider for pre-feasibility studies	Length (Km)	Stretch specific rationale	Overall rationale for the network
			<p>region has number of tea estates</p> <ul style="list-style-type: none"> ▪ A multi sector economic zone has been proposed to be set up at Sibasagar and this road will facilitate movement of goods from the economic zone to Nazira and Nagaland 	

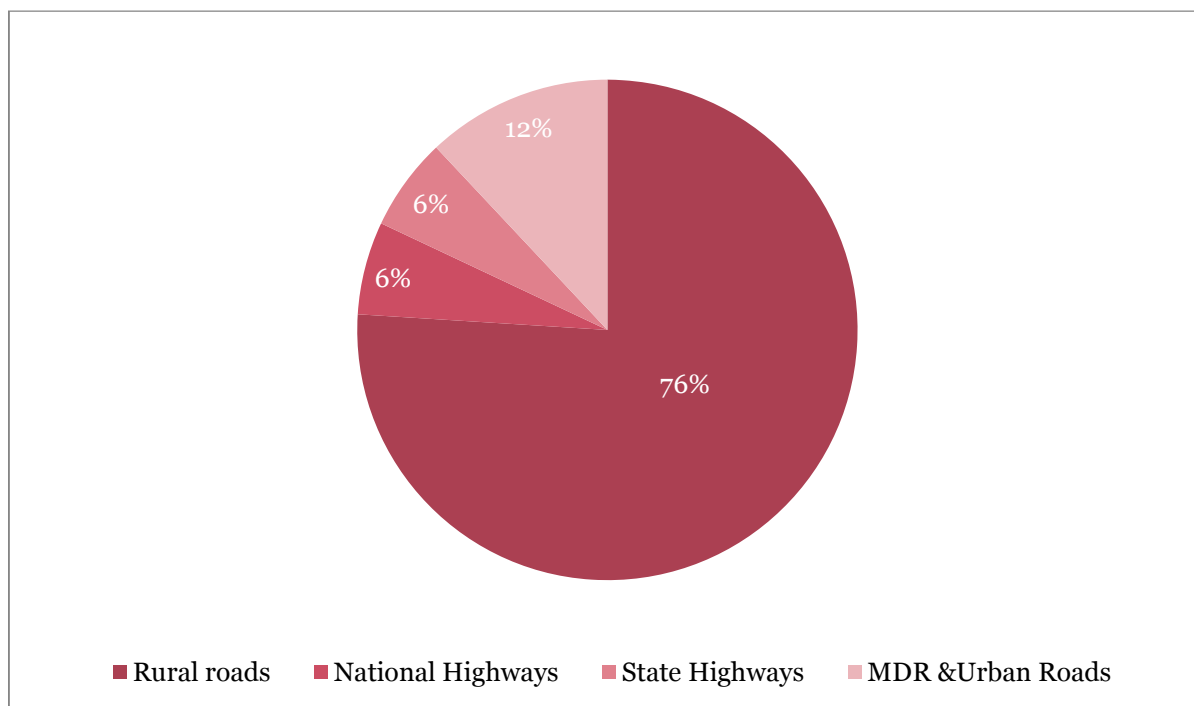
Appendix A. - Overview of the sector

Assam is the largest state among the North Eastern states of India and acts as gateway for the entire North Eastern (NE) region. It connects NE states with the rest of mainland India via a narrow wedge of 27 km; popularly known as the “Siliguri corridor” or the “chicken neck”. Thus, Assam plays an important role in integration of north east region with the rest of the country. The geographical isolation of Assam further demands huge thrust on the development of transportation via roads and other transport modes. In addition, its international borders with countries like Bhutan, Burma and Bangladesh further emphasise the criticality of development of roads, not only for Assam, but also for the entire NE region.

A.1. Physical road infrastructure

At present, current road network in Assam aggregates to 48,358 km comprising National Highways (NH), State Highways (SH), Major District Roads (MDR), Urban and Rural Roads.

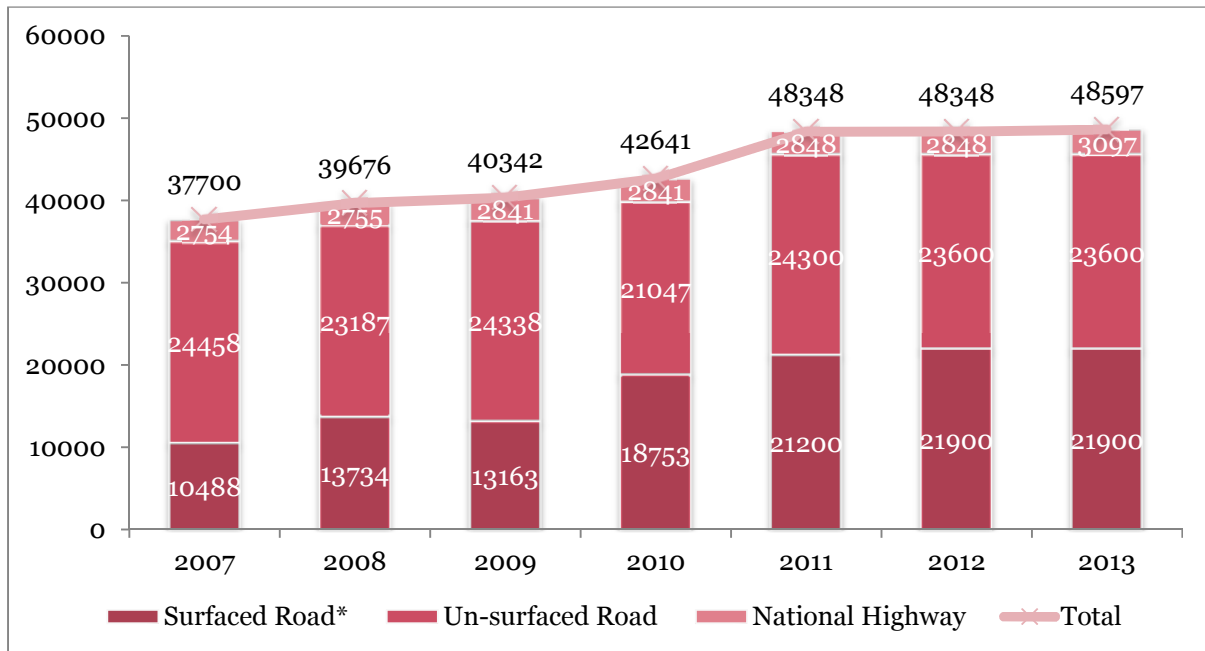
Figure 30: Distribution of Roads network (2012-13)



Source: ADS Economic Survey of Assam

Government of Assam realizes the importance of healthy road network in the state, rendering road development as one of the priority sectors.

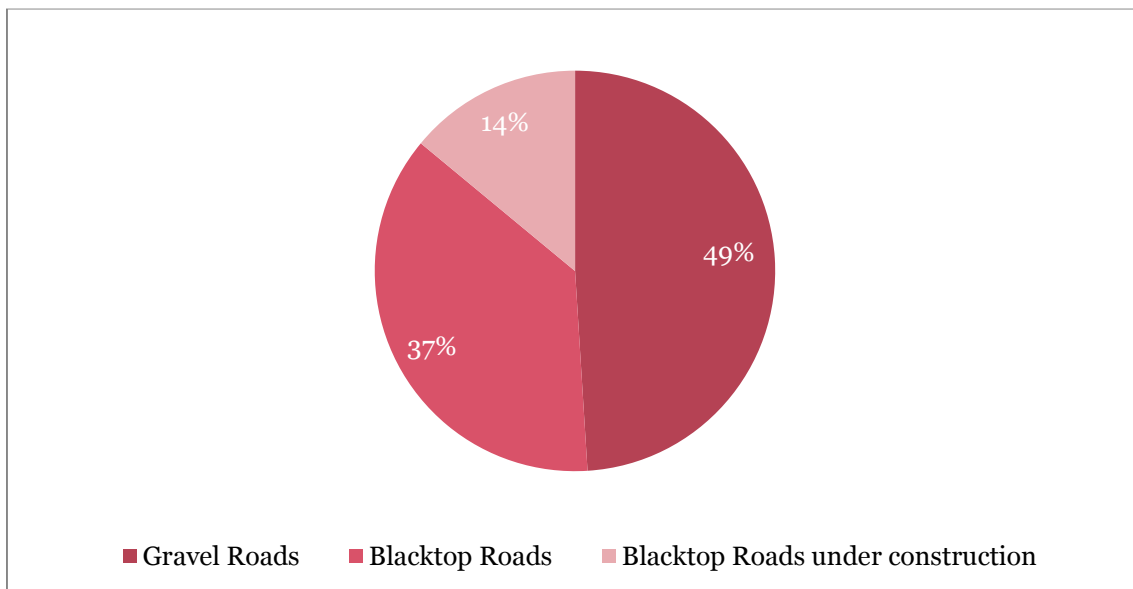
Figure 31: Development of roads in Assam (in km)



Source: Assam annual plan 2012-13, ADS Economic Survey of Assam, APWD and PwC Analysis. *Excluding NH

Even though the length of the roads has increased, the quality of the roads is not good. A huge part of the road network still remains without surface indicating poor quality of roads.

Figure 32: Distribution of the road network according to quality of construction



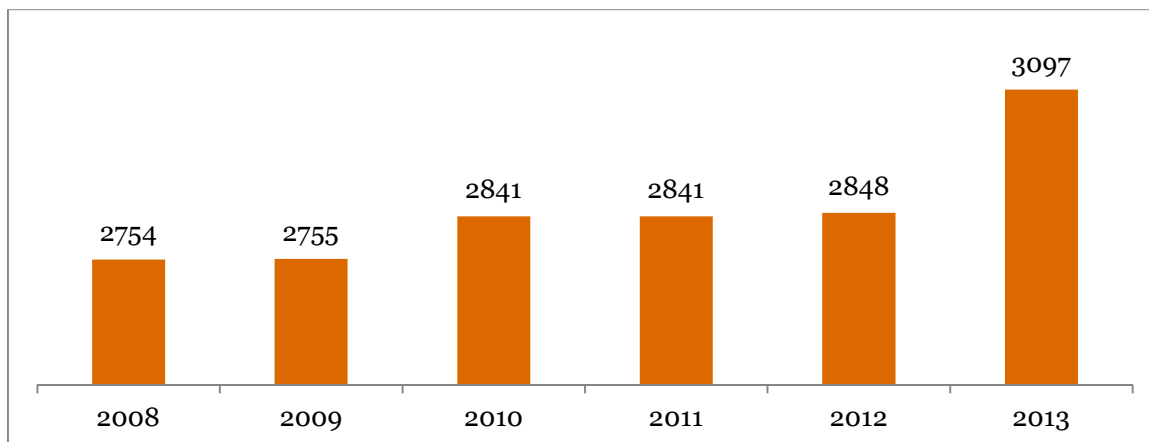
Source: Annual Plan of Assam 2012-13

While 49% of the roads (apart from National Highways) in Assam are black topped, more than 90% of these black topped roads are single lane constructions.

A.1.1. National Highways (NHs)

These roads are financed directly by Ministry of Road Transport and Highways (MoRTH). Most of these roads have been developed under the NHDP (National Highway Development Program).

Figure 33: National Highway Length in Assam (in Km)⁴

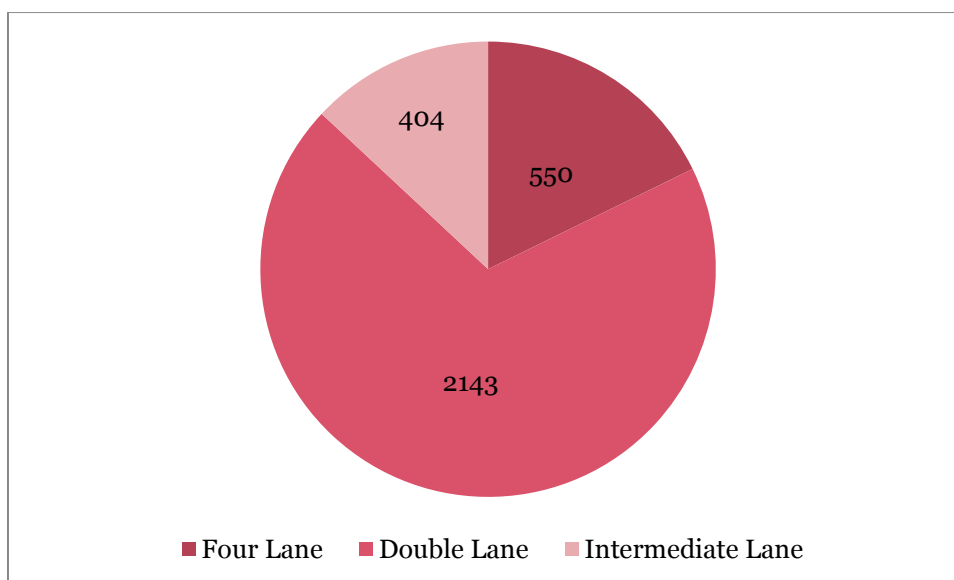


Source: PWD NH & Buildings, Govt. of Assam

In comparison to the national average of 24%, Assam currently has around 11% of the roads in the state as National Highways. In states like Haryana, Tamil Nadu and Gujarat, more than 40% of the total roads in the state are NH. Total length of NH in the State is around 3,717 Km.

Around 550 km⁵ of the NH in Assam are 4-lane, most of which have been developed by NHAI. Remaining NH stretches in the state are primarily 2-lane. Of the NH maintained by the state PWD, 2143 km⁶ are 2-lane. All National Highways in the state are black topped apart from a few stretches along the recently declared NH. All bridges on these NH stretches are RCC bridges.

Figure 34: National Highways in Assam (in Km)⁷



Source: PWD NH & Buildings, Govt. of Assam

⁴ Source: Annual Plan Assam 2012-13. Length for 2013 has been provided by PWD department

⁵ Source: Primary interactions with PWD officials

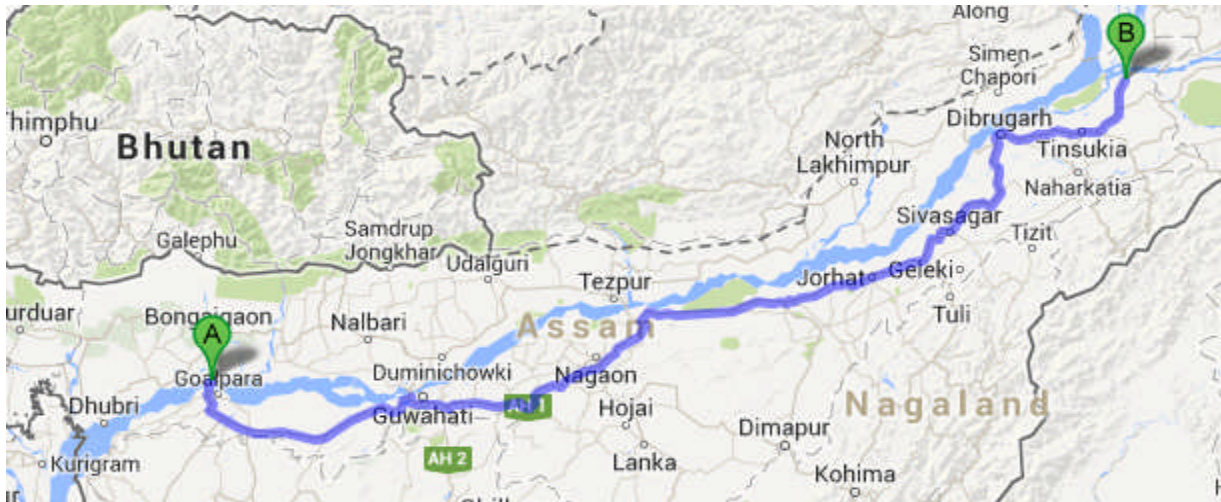
⁶ Source: State PWD department

⁷ Source: MoRTH basic Statistics, 2011

1) NH 37 - Assam Trunk Road

It is the longest national highway that runs through Assam. It is also called the Assam Trunk (AT) Road in Assam. The places along the highway are Guwahati (from where NH 40 bifurcates to Shillong), Nagaon (from where NH 36 bifurcates to Dimapur), Jorhat, Sibsagar, Dinjan, Dibrugarh and Tinsukia. NH 37 passes through Kaziranga National Park in the state of Assam, and ends near Roing in the state of Arunachal Pradesh.

Figure 35: NH 37 - Assam



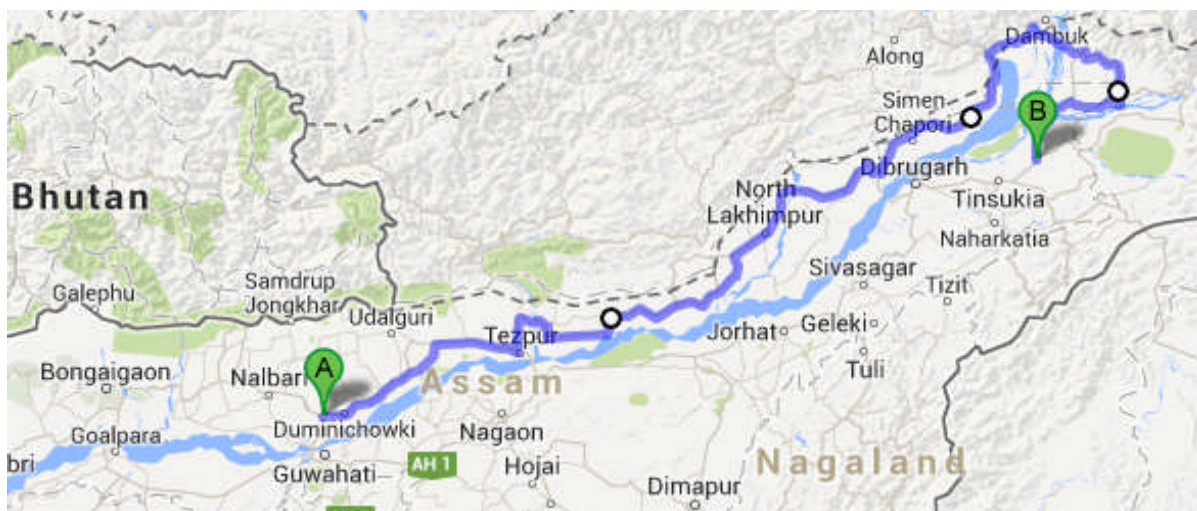
National Highway 37 also connects the Asian Highway 1 from Numaligarh passing through Kaziranga and Nagaon to Guwahati. This route is primarily double laned with four lane from Nagaon to Guwahati.

Existing traffic ranges between 15,000 PCUs around Dibrugarh to around 54,000 PCUs in Guwahati region. By 2030, the minimum traffic is estimated to reach around 40,000 PCUs with the maximum traffic reaching 140,000 PCUs.

2) NH 52

This highway runs parallel to NH 37, is on the northern side of the Brahmaputra and is considered very important for connectivity to Arunachal Pradesh. This NH is the only road that connects the northern part of Assam and Arunachal Pradesh with the rest of the country.

Figure 36: NH 52 - Assam



NH 52 starts at the intersection of NH 31 north of Guwahati and generally traverses east and northeast – it is 850 km long, of which 540 km is in Assam and the rest in Arunachal Pradesh. The major places along the highway are **Tezpur, Gohpur, North Lakhimpur, Pasighat and Tezu**.

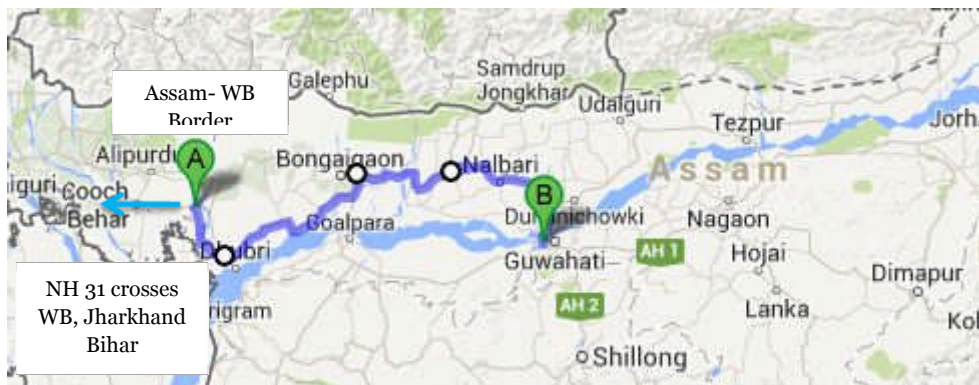
Brahmaputra river flows between NH37 and NH52, hence connectivity between the two highways by means of bridges is critical. A few projects like NH-52B from Kanubari to NH 37 near Bogibeel bridge approach, from NH 37 terminal point at Saikhowa Ghat to NH 52 and Kalibor (NH 37)-Tezpur (NH 52) are under implementation stage. **The NH -52 is highly flood affected and becomes cut off from the other regions during monsoon season.**

A part of NH 52 is being maintained by State PWD and the remaining 33% is being maintained by BRO. The road is proposed to be developed into a 4-lane road under the SARDP-NE scheme

3) NH 31

National Highway 31 is important for the state from the viewpoint of connectivity of the region to the rest of India.

Figure 37: NH 31 - Assam



It is 1125 km long, of which 309 km is in Assam. The highway runs till Guwahati and along with extensions NH 31B and NH 31C connects the Dhubri, Bongaigaon, Nalbari and Kajalgaon regions. Part of the highway in Assam is being developed by NHA as the East-West corridor. The condition of the road is satisfactory; however it is also impacted by floods during the monsoon season.

Existing traffic ranges between 22,000 PCUs around South Raipur to around 52,000 PCUs near Baihata Chariyali. By 2030, the minimum to reach around 55,000 PCUs with the maximum traffic reaching 135,000 PCUs.

4) NH 54

NH 54 is 850 km long, of which around 335 km lies within Assam and the rest in Mizoram. NH 54 stretches from Dabaka, Assam at the intersection of NH 36 and generally runs southward passing through Lumding, Silchar and Mizoram state capital Aizwal before terminating at Tuipang in Mizoram.

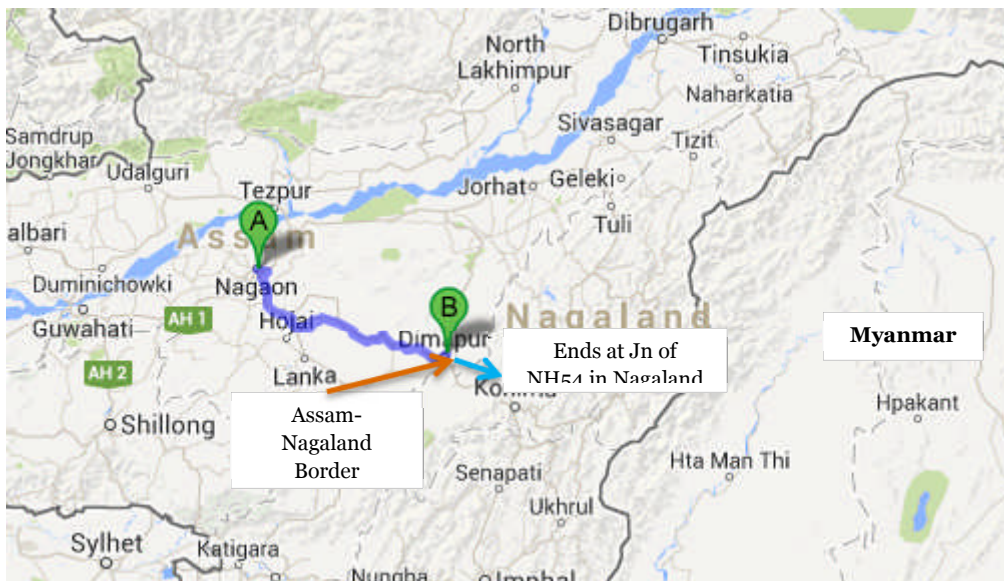
Figure 38: NH 54 - Assam



5) NH 36

NH 36 connects Nagaon in Assam and Dimapur in Nagaland and is 170 km long, out of which 167 km is in Assam and remaining is in Nagaland. It starts from the junction of NH 37 in Nagaon and ends in the junction of NH 54 in Dimapur.

Figure 39: NH36- Assam

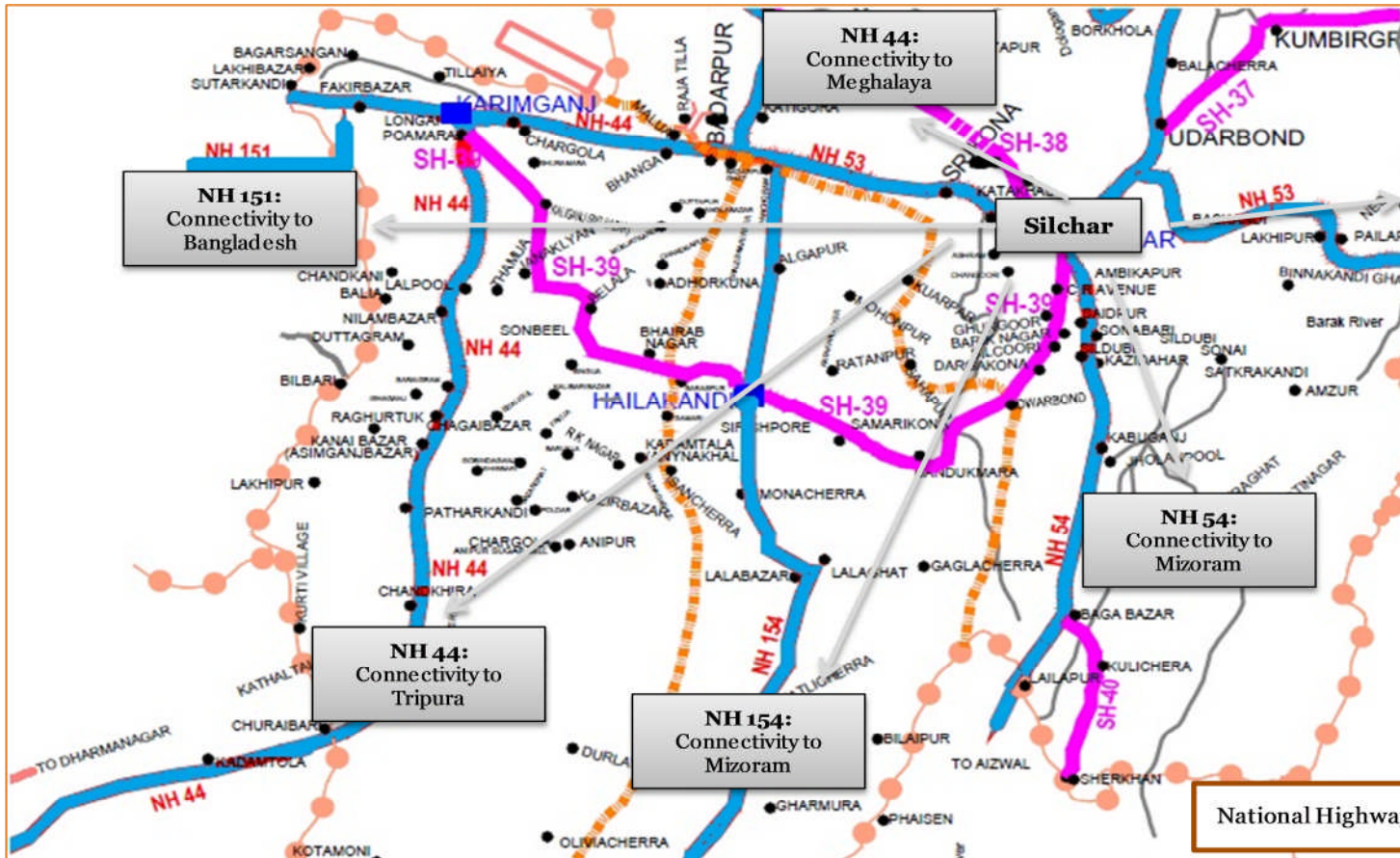


Traffic at NH36 varies between 8,500 PCUs near Doboka to 17,000 PCUs at Kathiatoli. The minimum traffic in 2030 is expected to reach around 22,000 PCUs and maximum traffic of 44,000 PCUs around Kathiatoli.

6) Other Important NH in Assam

From Silchar region in South Assam, connectivity to various neighbouring states is provided by NH 44, NH 154, NH 54 and NH 53. Hence developing the region and providing interconnectivity between these various highways is critical. Silchar region has the potential to be developed as a hub for providing interstate and international connectivity.

Figure 40: Other important NH in Assam

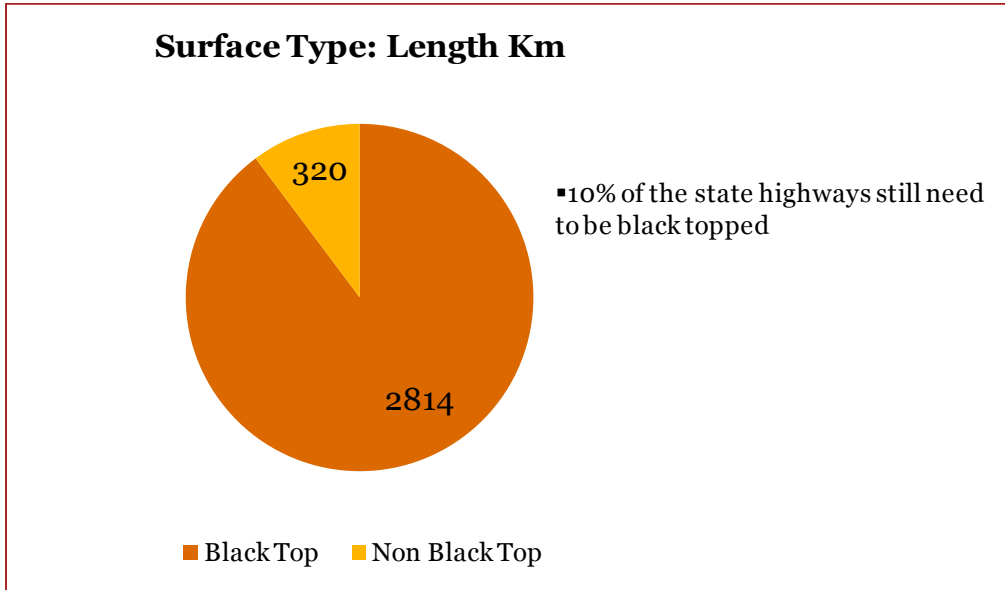


A.1.2. State Highways (SHs)

State Highways constitute the secondary system of road transportation. State Highways connect the State capital with the various district centres, other important cities, towns and minor ports within a State. The State Highways also provide connectivity to the National Highways and the highways of the neighbouring States.

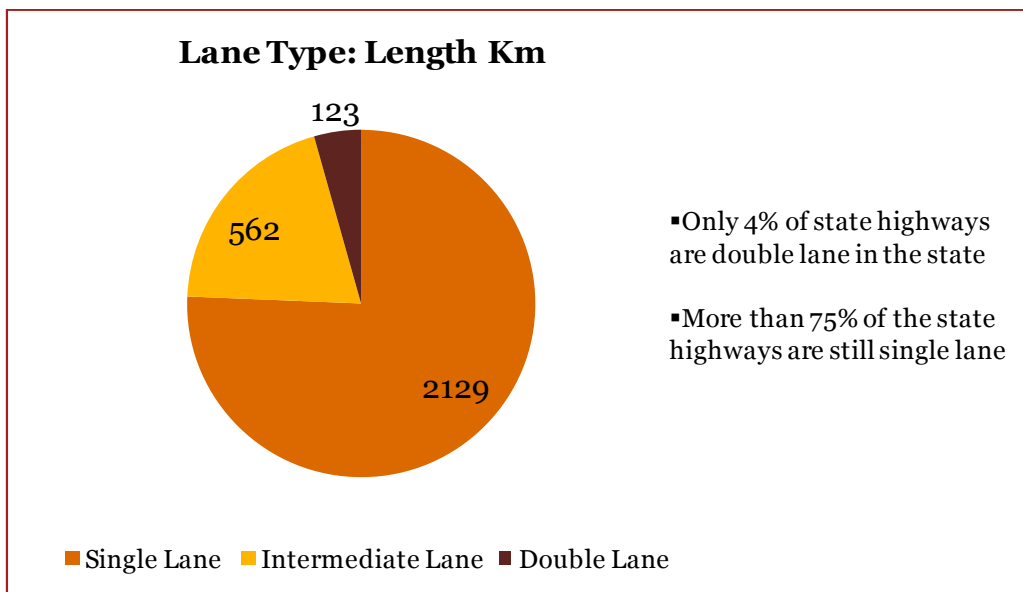
There are a total of 53 SH in the state with a total length of 3,134 km. The SH is under the jurisdiction of State PWD. The status of black topping and lane widening of these roads is shown below:-

Figure 41: State Highways - Black Topping Status



Source: PwD Roads, Government of Assam

Figure 42 State Highways -Lane Widening Status



Source: PwD Roads, Government of Assam

Table 26: Summary of Key SH stretches in Assam

Name of SH*	Route/ Length	Important for connectivity to
SH-1	210	SH - 1 is the most important stretch of state highway passing through Golaghat and Jorhat regions
SH-2	161	SH-2 passes through important towns around Bongaigaon, Barpeta, Amingaon and NorthGuwahati regions
SH-3	190	Passes through important centers of Narengi, Chandrapur, Morigaon and Nagaon
SH-9	35	Passes through important centers of Kalitakuchi, Nalbari, Sarthebari and Nagaon
SH-23	47	Passes through important centers of Lahowal, Bordubi and Tinsukia

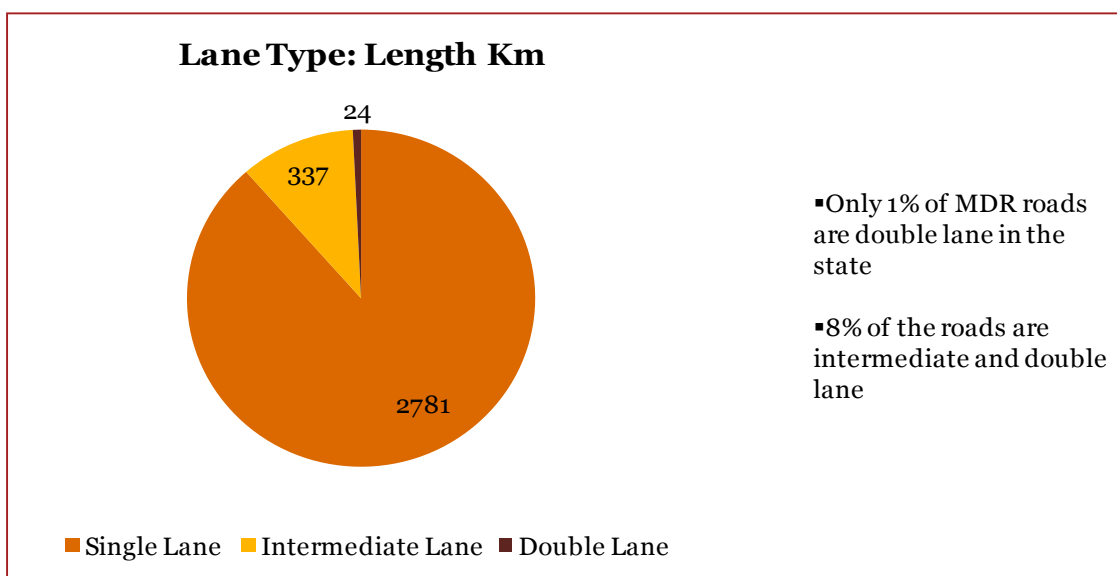
* SH stretches where the traffic has exceeded 20,000 PCUs have been identified as key SH stretches.

A.1.3. Major District Roads (MDRs)

Major District Roads (MDR) are high significance roads within a district connecting key centres to places of importance or with the State Highways & National Highways. These roads also connect Taluka headquarters and rural areas to District headquarters within the state. MDRs are critical for long term sustainable development of the state.

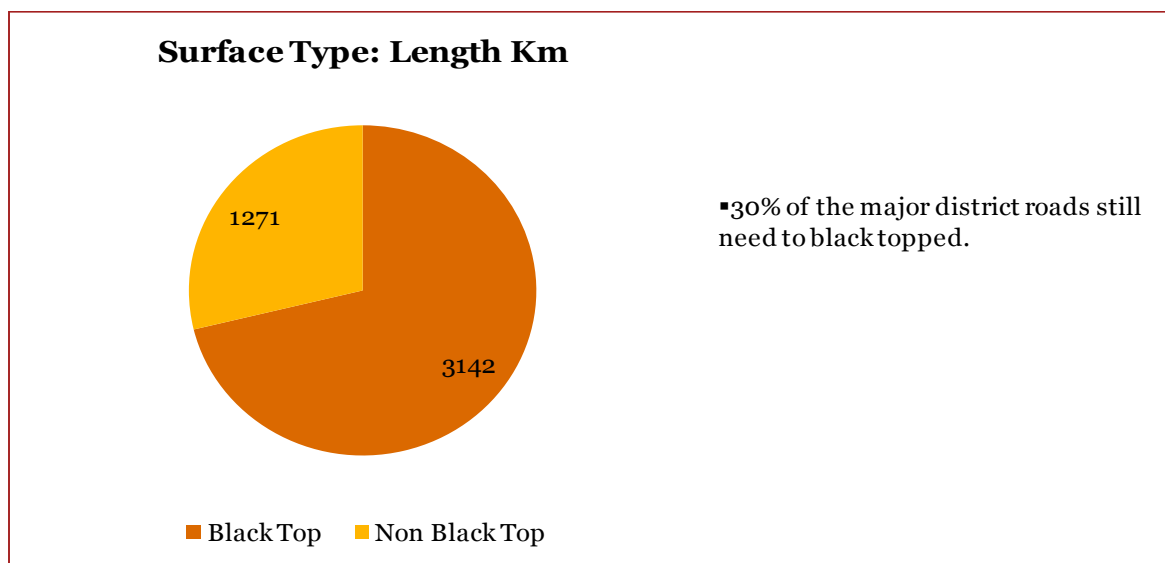
Total length of MDR in Assam is 4,413 km. They are under the jurisdiction of State PWD. Profile of the MDRs in Assam on the basis of their physical characteristics like number of lanes, black toppings, etc. is presented below.

Figure 43 Lane Widening Status



Source: PwD Roads, Government of Assam

Figure 44 Black Topping Status



Source: PwD Roads, Government of Assam

Table 27: Region wise summary of MDR in the State

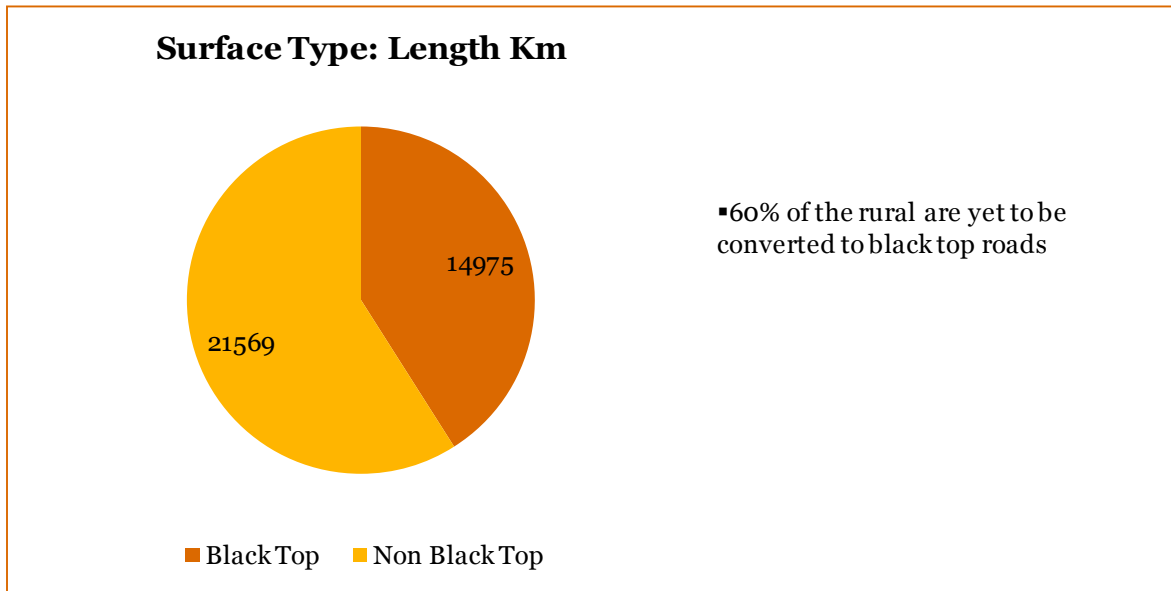
Region	No of Districts	Length of MDR in the region	Key Industrial/ Tourist Centers served	Current status
Lower	10	1,045	Manas National park, Brass metal industry of Sarthebari, Bongaigaon power plant and refinery, Cakrasila wildlife sanctuary etc are some important centers in the region	Around 350 km of MDR in the region are to be converted to black top. Only 58 km of roads are intermediate and double lane where as at least 376 km are required as per the traffic analysis
North	4	933	There are various national parks & sanctuaries in the region like Pobitara, Kaziranga, Lowkhowa. Tea Processing, Cane Product, Food Product, Timber Sawing, & Tea Machinery Manufacturer etc are the major industries in the region	Around 270 km of MDR in the region are to be converted to black top. Around 113 km of roads are intermediate and double lane where as at least 335 km are required as per the traffic analysis
South	5	1,367	The region has a large number of natural resources & raw material/minerals. There are Cement plants, agro-based industry & tea plantations are the key industries located in the region.	Around 370 km of MDR in the region are to be converted to black top. Only 18 km of roads are intermediate and double lane whereas at least 492 km are required as per the traffic analysis
Upper	7	1,070	Oil and Tea are the major industries in the region. Various important industrial centers around Dibrugarh districts like Digboi, Naharkatia, Moran, Duliajan, Margherita etc are present. Many oil majors have office setups in this region	Around 245 km of MDR in the region are to be converted to black top. Around 186 km of roads are intermediate and double lane whereas at least 385 km are required as per the traffic analysis

A.1.4. Rural Roads

Rural roads are critical for providing connectivity to rural habitations and areas, thereby enabling generation of higher agricultural incomes. These roads are also critical for promoting access to economic and social services.

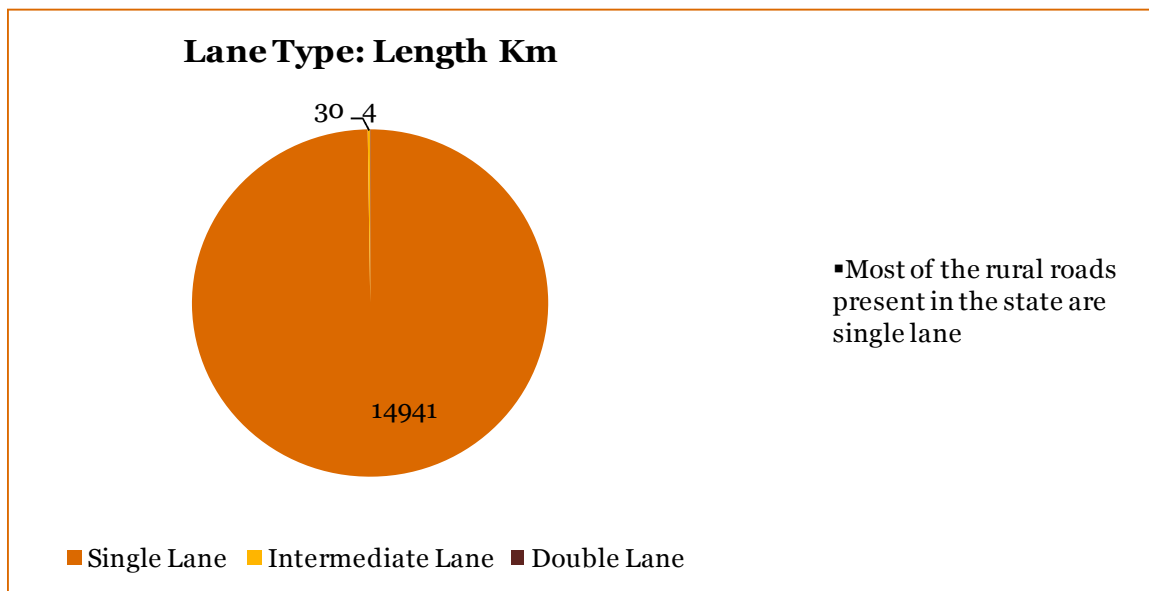
Total length of rural roads in Assam is 36,544 km. Most of these roads are being developed under the PMGSY scheme. The status of black topping and lane widening of these roads is shown below:-

Figure 45 Black Topping Status



Source: PwD Roads, Government of Assam

Figure 46 Lane Widening Status

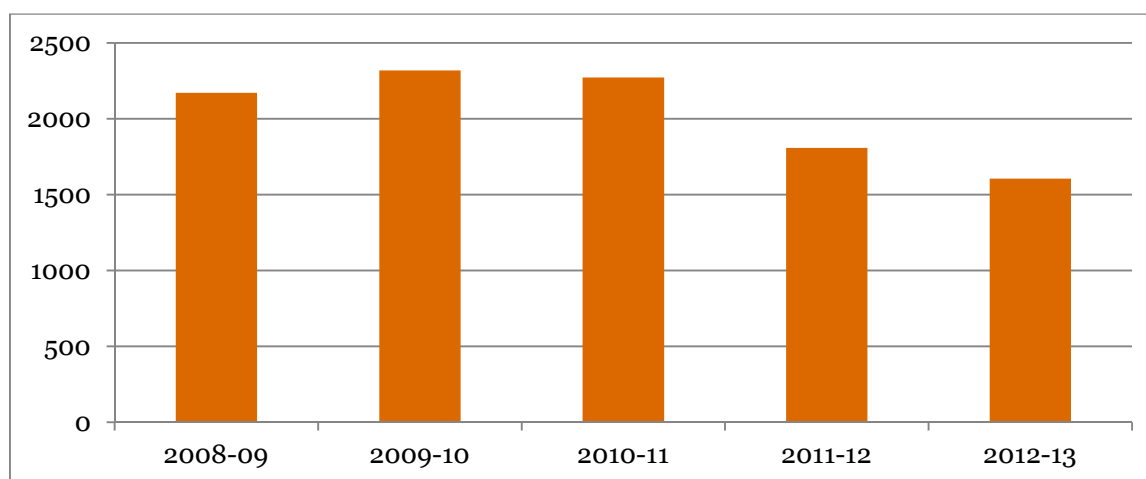


Source: PwD Roads, Government of Assam

While carrying out primary interactions with various stakeholders, it was highlighted that progress in development of rural roads has been significant. Most of the projects have progressed as per the ministry's timelines, as long as the EPC contractors were finalized in time.

Around 10,000 Km of rural roads have been constructed in the state over the past five years. These developments have taken place under the scope of key operational schemes in the state for rural sector. PMGSY scheme contributed around 90% of the length constructed over the past five years. Other key schemes are MPNA, MPDNA and RIDF.

Figure 47 Rural Roads constructed in Km in past 5 years



Source: PwD Roads, Government of Assam

The key constraint in developing rural roads in the state is the difficult terrain in certain parts of the state. One key challenge **which the state government may face in future is to maintain the roads built under PMGSY scheme.** Currently under PMGSY scheme, the contractor is expected to maintain the roads for a period of five years. This has resulted in development of quality roads in rural areas. In certain cases, rural roads are better than even some SH and MDR. However the challenge is maintaining the rural roads after the expiration of 5 years. As per the existing understanding, state government is required to provide funds for regular repairs of these rural roads. It has been observed that maintenance budget for existing NH, SH and MDR is inadequate, hence additional responsibility of maintaining rural roads is further expected to put burden on the State's Annual Budget.

A.1.5. Overall summary of the physical infrastructure

Overall it has been estimated that the sector requires significant augmentation in terms of length, capacity (lanes) and quality

1. Length

It has been observed that in terms of length, the National Highways (NHs) are adequate for the existing traffic; however a gap of 60% and more than 100% has been observed for State Highways (SHs) and Major District Roads (MDRs) respectively

Table 28: Status of National Highways, State Highways and MDRs

	Existing Length	Required Length	Gap
State Highways	2,622 km	5,000 km	60%
MDR	4,365 km	12,000 km	More than 100%

National Highways	3,717 km	Adequate	Negligible
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Source: PwD Roads, Government of Assam

2. Number of lanes

It has been estimated that as per the existing traffic 70% of the length of State Highways in the state should be double lane, whereas at present only 6% of the length is double lane. Again for MDRs, 36% of the total length should have been Intermediate or double lane, but at present only 9% is either intermediate or double

Table 29: Status of Capacity of SHs and MDRs

	Existing %	Required % as per existing traffic
SH Double Lane	6%	70%
SH Intermediate Lane	20%	23%
MDR Intermediate & Double Lane	9%	36%

Source: PwD Roads, Government of Assam

3. Surfacing

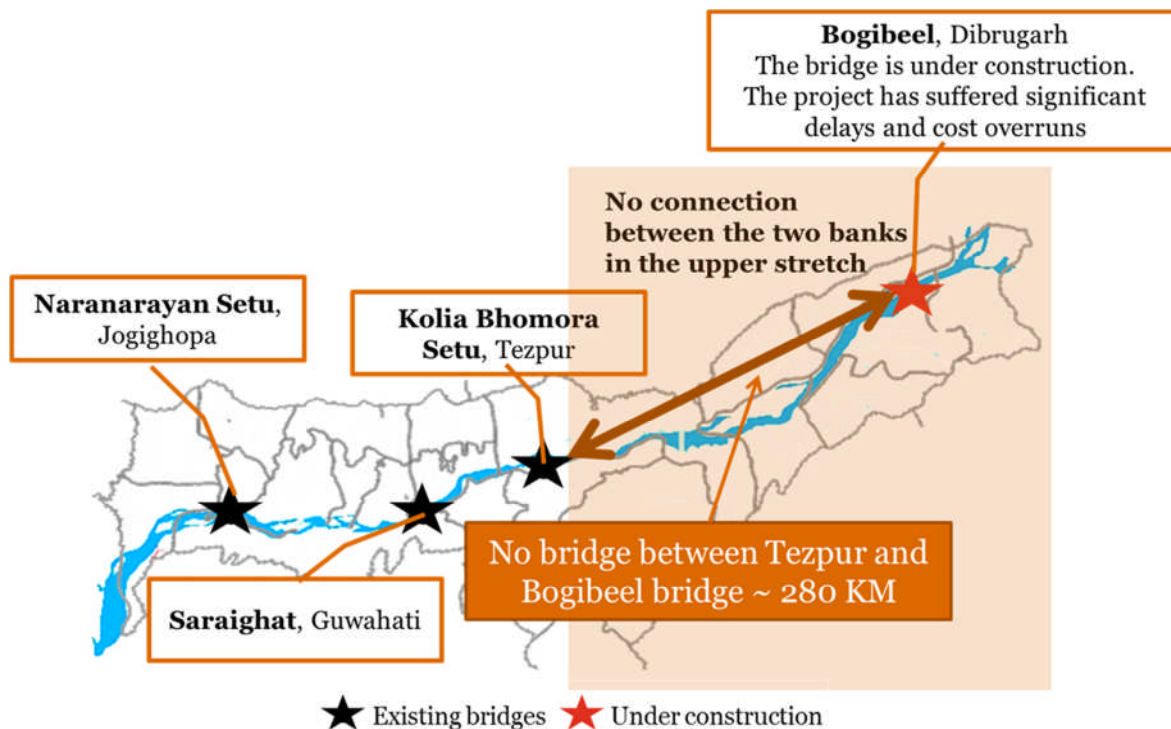
As discussed earlier, ~ 50% of the roads in the state are unsurfaced and requires immediate attention

Apart from the above points, there is a need to improve the connectivity between the north bank and south bank of the river Brahmaputra, and between Brahmaputra and Barak Valley

4. Connectivity between North and South Bank of river Brahmaputra

There are bridges only at three points along the entire stretch of Brahmaputra - a length of 891 km in Assam

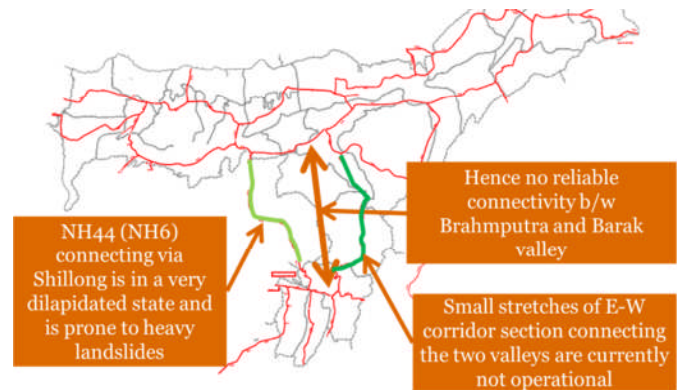
Figure 48: Bridges on river Brahmaputra



5. Connectivity between Brahmaputra valley and Barak valley

Currently NH-44 (renamed NH-6) provides connectivity from Guwahati to Silchar region via Meghalaya. The condition of the road is poor at certain stretches. The distance between Guwahati and Silchar is around 320 km, however due to poor condition of road it takes around 10-12 hours to travel the distance by road. Further the road is not operational for a few days during heavy rainfall. Hence an alternate connectivity is urgently required. Once the following two linkages are operational trade flow between Brahmaputra and Barak valley will improve significantly

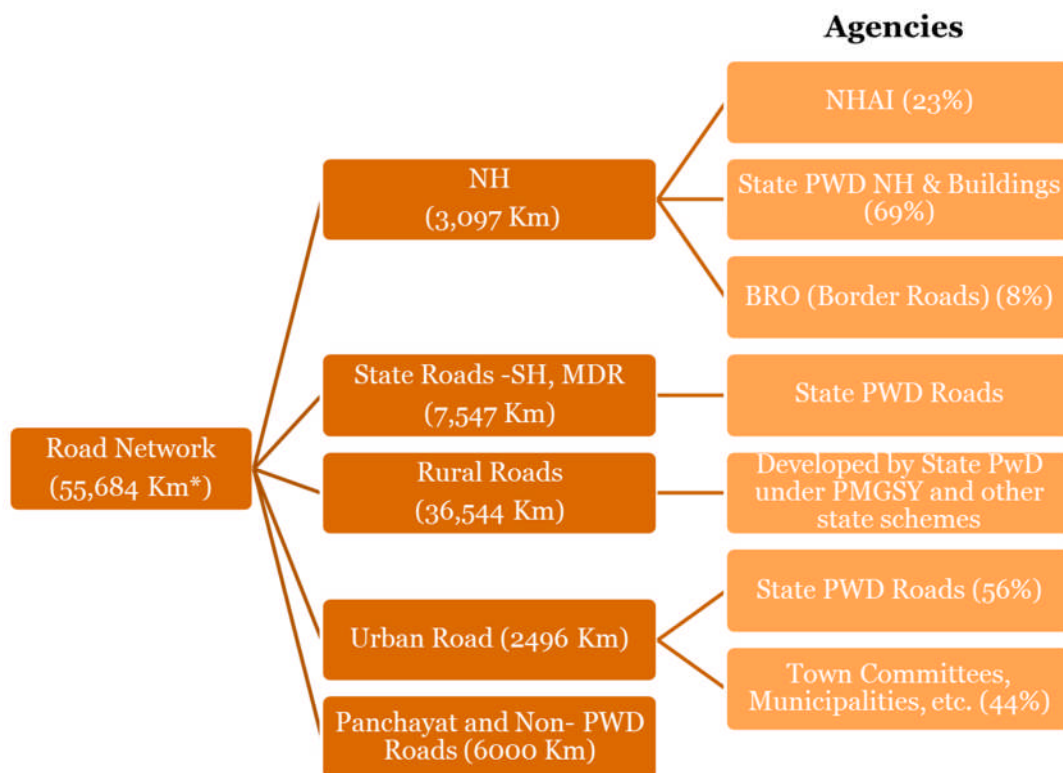
Figure 49: Status of connectivity between Guwahati and Silchar



A.2. Institutional structure

Currently the state PWD dominates the road development activities in the state

Figure 50: Institutional Structure

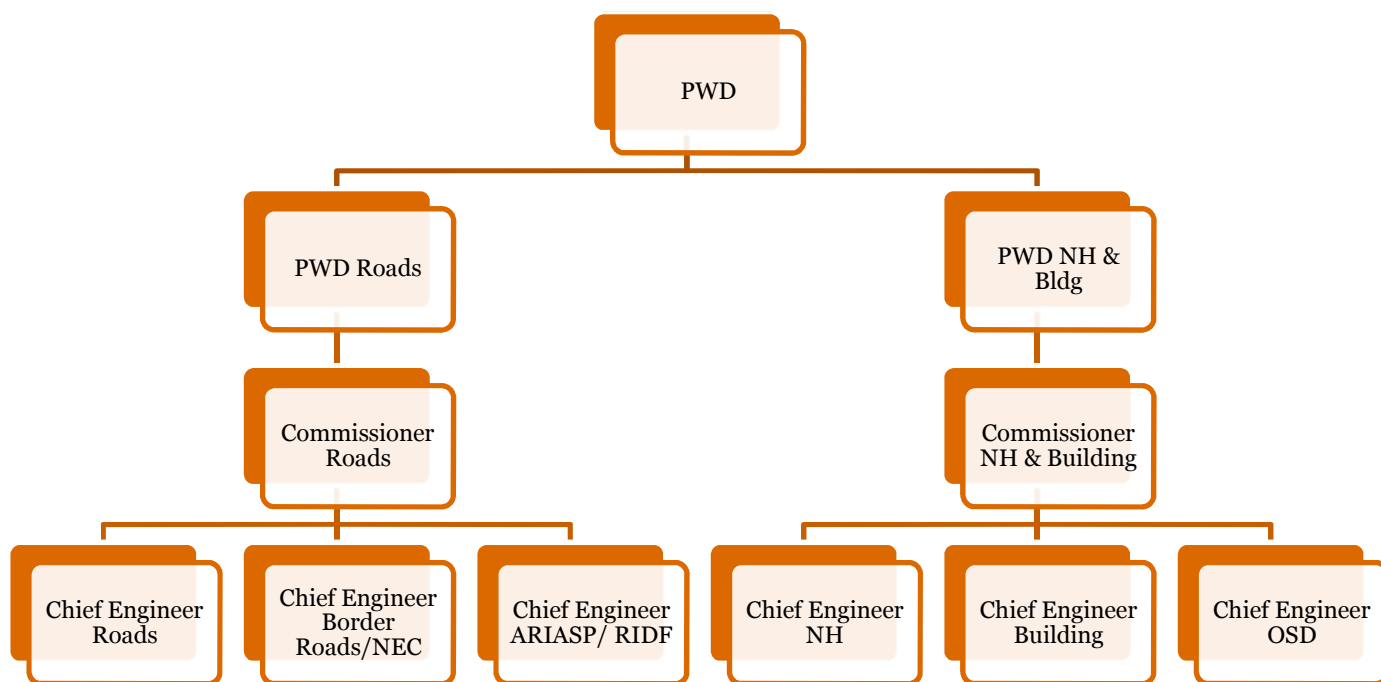


A.2.1. Assam Public Works Department

The Assam Public Works Department was established in the year 1880 under British Rule. At the beginning it had the responsibility for all public infrastructure development, construction and maintenance work, but, in the year 1956 the Embankment and Drainage wing came out of the parent department and was established as an independent Department. The principal function of the Public Works Department is to develop infrastructure for transport & communications of the State.

Broad organizational structure of the State PWD is shown in the figure below:

Figure 51 Organizational Structure of PWD



Apart from the key officials mentioned above the other key officials executing projects are Superintending Engineers and executive engineers. The details and number of such officials is provided in the table below.

Table 30: Officials in PWD

Rank of the official	Number of Employees
Addl. Chief Engineer (Civil)	9
Addl. Chief Engineer (Mechanical)	1
Addl. Chief Engineer (Electrical)	1
Superintending Engineer (Civil)	43
Superintending Engineer (Mechanical)	3
Superintending Engineer (Electrical)	1
Executive Engineer (Civil)	135
Executive Engineer (Mechanical)	11
Executive Engineer (Electrical)	6
Asstt. Executive Engineer (Civil)	392
Asstt. Executive Engineer (Mechanical)	21
Asstt. Executive Engineer (Electrical)	19
Total	642

Source: PwD Roads, Government of Assam

Apart from the officials mentioned above, there are around 2,500 more employees with the PWD who assist the key officials mentioned above. Most of the key officials are handling operations at various zonal and circle offices of PWD across the state. There are around 5 zonal offices and 20 circle offices. Details of various division and sub-divisions are provided in the table below.

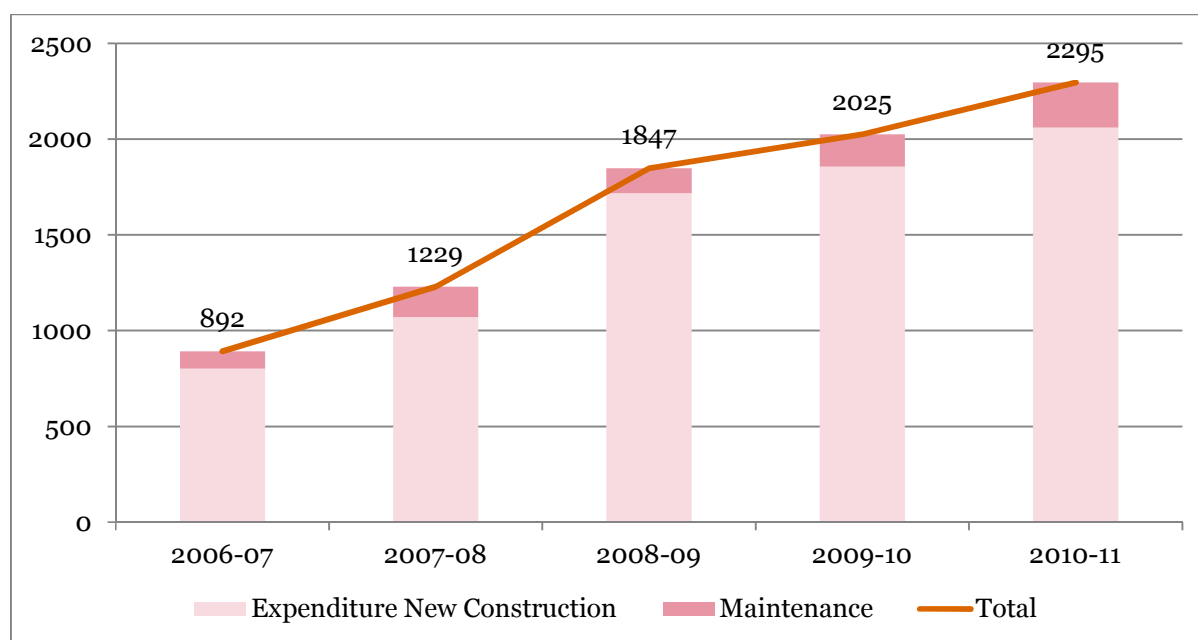
Table 31: Details of Division/ Sub Division

Details of Division/ Sub Division	Number of Divisions
State and Rural Roads Divisions	57
NEC project divisions	6
AACP (World bank) Division	5
Border Road Division	1
Mechanical Divisions	9
Total	78

Source: PwD Roads, Government of Assam

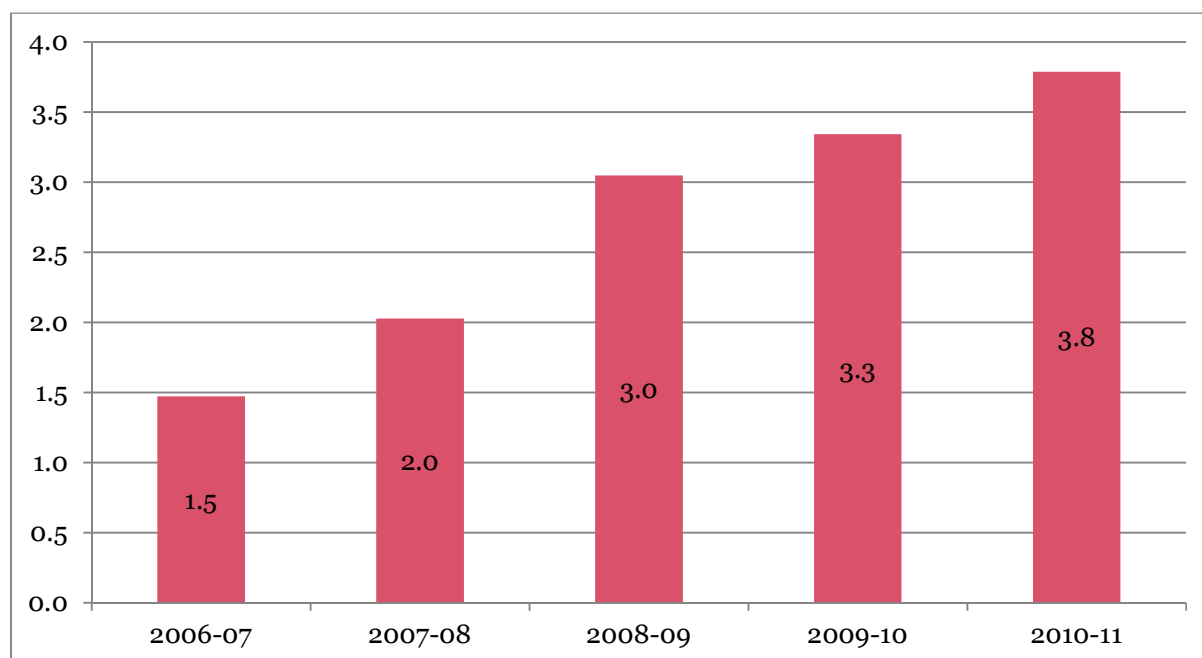
The road sector expenditure by the PWD Roads department is shown in the chart below.

Figure: 52 Road expenditure – in crore INR



Source: PwD Roads, Government of Assam

The overall number of employees has not undergone any significant change over the past five years, however the value of quantum of projects being undertaken by the department has been increasing significantly. As a result the work allocated per employee has increased significantly. For efficient functioning the increase in work allocated requires augmentation of the strength of the department.

Figure 53: Yearly work being allocated per employee (in Rs. crore)*

Source: PwD Roads, Government of Assam

*Employees in Mechanical within PWD have not been considered for the analysis

The PWD NH & Buildings department receives maintenance and capital funding from MoRTH, while PWD Roads department received funding from various central schemes, state's annual plan and from other multilateral agencies. Allocation from state budget is mostly discretionary leading to high volatility in funding and since most of the funding is scheme based and not demand based, there is a mismatch between demand and supply.

Unfortunately PWD Roads being a state government department is not capable of raising finances on its own to reduce its dependency on budgetary allocations.

A.2.2. Assam State Road Board

Formation of Road Board in the state was one of the key measures proposed in the Road Policy of 2002. Subsequently, Assam State Roads Board (ASRB), was registered as a society under the Societies Registration Act, 1860 and placed under the administrative control of PWD. ASRB has been authorized by GOA to be the agency responsible for all project related payments. It is currently assisting in the implementation of PMGSY project.

At the conceptualization stage, **the Board was envisaged as a comprehensive, professional and multidisciplinary body for providing policy direction and oversight for road sector development in the state. However, till now the role of Board has been limited to implementation of PMGSY project.**

Road Board has been constituted in the state. However, it has not completely assumed its intended roles and responsibilities. This leads to **lack of prioritisation of projects, implementation bottlenecks, inadequate monitoring of project progress etc.**

The Road Board needs to be further strengthened and developed into an apex organization mandated with policy formulation and overseeing of the road sector development, as envisaged during its conceptualization stage.

A.3. Policy and regulatory framework

A.3.1. Road sector policy

This policy for development of the sector was drafted in the year 2002 with the following key objectives⁸:

- To provide connectivity to all villages by all-weather roads with priority being accorded to villages under the Pradhan Mantri Gram Sadak Yojana (PMGSY)
- To enhance the capacity and improve level of service of existing State Highways and Major District Roads to cater to the needs of traffic expected in the next ten years so as to enable movement of goods and passengers in a safe, speedy and uninterrupted manner both within the state and also on inter-state routes.
- To improve road infrastructure in towns and cities so as to increase safety and reduce congestion on urban roads.
- To place maintenance of roads on a firm footing by quantum jump in allocation of funds and undertaking related institutional reforms.
- To review and upgrade existing technology in construction and maintenance of roads keeping in view local conditions and local skills.
- To improve the implementation capacity of the state for efficient delivery of projects by reorienting the existing PWD, encouraging steady growth of contracting industry and pursuit of excellence by consultancy firms with support from engineering institutions, etc.

Further, to achieve the aforesaid objectives, some key measures were suggested to be adopted by the department. The details of these measures along with existing status are provided in the table below:

Table 32: Measures suggested under Road Policy 2002

S.No	Measures	Status
1	Creation of Independent Road Fund	Process has been initiated by the department, however currently the approval from finance department is pending
2	Setting up Road Board to manage the road fund	Road Board has been formed, however it has not assumed its assigned roles and responsibilities
3	Pilot Projects for Maintenance by Contract	Pilot projects have been implemented. These projects were performance based and implemented in Jorhat district.
4	Preparing 5-year Plan Program for roads	Has been done on an five yearly basis by PWD
5	Strengthening of Road Research Laboratory, Guwahati	Work is ongoing
6	Preparing afresh PWD Manual	Work is ongoing

Source: PwD Roads, Government of Assam

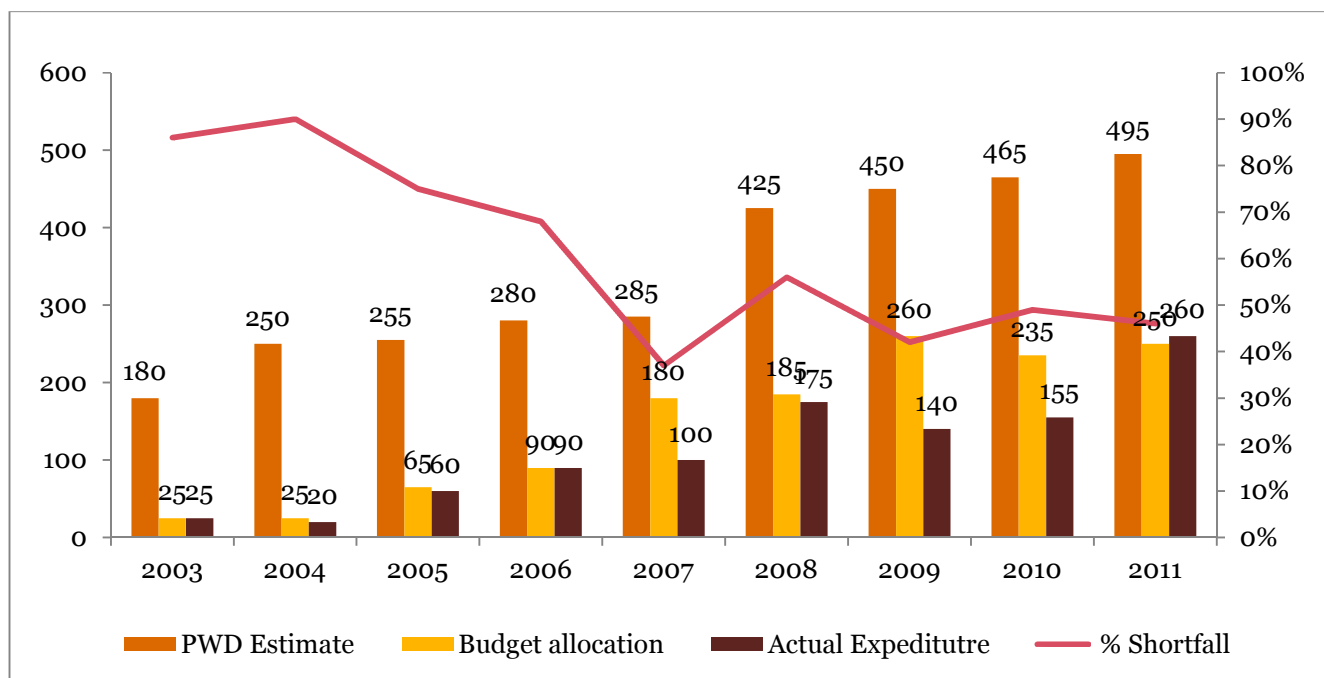
Creation of an independent Road fund will help reduce the dependency on budgetary allocations and bring in a steady flow of funds, thereby making planning for the sector easy. Also setting up the road fund under the aegis of Road Board which is envisaged to be developed into an overseeing body will bring in accountability for the use of the fund and ensure its proper usage.

⁸ Source: State PWD

A.3.2. Maintenance related policies/interventions

Road maintenance in the state is one of the most critical issues. Assam, being a flood prone region, needs timely periodic repairs and major breakdown level repairs in case of severe floods. It has been observed that in case of SHs and MDRs the maintenance level is not up to the mark and requires significant improvement. However there is significant short fall in the availability of adequate funds for the same as highlighted in the graph below:

Figure 54: Lack of funds for maintenance for Assam⁹



Although over years the shortfall in requirement of fund has reduced, however there is still a gap of around 50% present.

As discussed earlier, since most of the funds come from budgetary allocations which is discretionary and affected by various other factors, there is a mismatch between demand and supply of fund

Road Maintenance Policy:

Government of Assam has recently established a road maintenance policy to provide a guiding framework for the maintenance and repair of roads by PWD department. The objectives of the policy are:

- Adequate, timely and sound maintenance of roads to provide safe, convenient and efficient access and usage to road users in Assam
- Judicious and optimal utilization of available funds and resources for the maintenance and repair of the roads
- Efficient maintenance by using appropriate technology, state-of-the-art and effective repair treatments including by inducting new technology and equipment in road repair and maintenance work
- Capacity building and organizational development of manpower and agencies engaged in roads construction, maintenance & repair in the State for efficient discharge of road development & maintenance function.

The key measures suggested in the policy for achieving the objectives are as follows:

⁹ Source: State PWD department

- **Implementation of a Road Maintenance Fund**
- Computerized road maintenance management and monitoring systems
- In the budgetary allocation, separate sub-heads to be created for State Highways, MDRs and Rural Roads

Work on most of the measures proposed in the policy is in progress.

Assam Road Maintenance Fund (ARMF):

Assam is in advanced stages of operationalization of a road maintenance fund. **The fund is non lapsable** and is to be only used for maintenance of roads in the state. The key objectives of ARMF are:

- Provide funds on a sustainable basis for maintenance of State Roads.
- Regular routine maintenance and timely repair works to limit degradation of road condition.
- Ensure priority maintenance for the roads within the proposed Core Road Networks

The sources of the fund are:

- Allocation in state budget for maintenance of roads under the Non Plan head
- Allocation received from Central Road Fund for maintenance of State Highway and Major District Roads.
- Funds received for maintenance by Finance Commission
- Revenue collected by other sources such as:
 - Charges for Overloading of vehicles
 - Additional Cess on Motor Vehicles
 - Entry tax (State) if any
 - Tolls levied on State roads
 - Stamp duty charges on development
 - Other grants, loans etc lawfully received by the fund

Existing Status of ARMF: Approval from AG, Assam pending

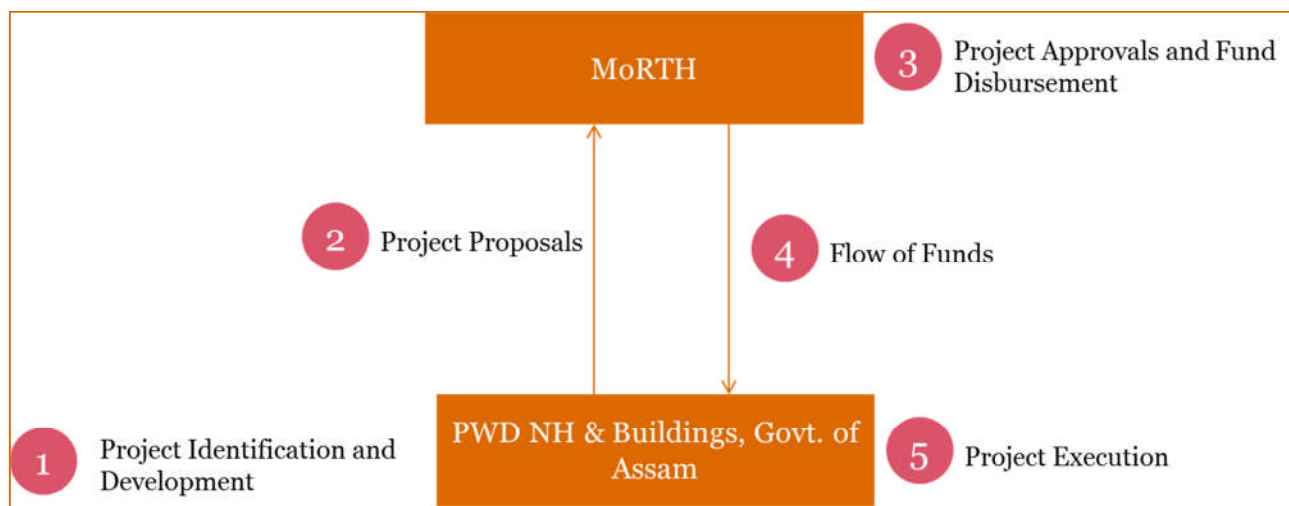
A.3.3. Tolling

Till now no toll projects have been implemented in the state. In 2008, NHAI decided to implement stretches of East - West corridor on toll, however due to lack of traffic later decided to develop on BOT basis. **The state does not have a toll policy.**

In order to promote PPP in the sector tolling is important and the state should formulate a tolling policy

A.4. Financing and Funding

As mentioned earlier funding for National Highways comes directly from the Ministry of Road Transport and Highways either as allocations and schemes earmarked for certain projects. The state PWD National Highways and Buildings identifies various projects under various schemes and submit their proposal to the ministry which in turn evaluate the proposal and disburse the funds



For State Highways, Major District Roads and rural roads, the funds mostly come from state budgetary allocations. State budgetary allocations include funding from multilateral agencies, central schemes which are mostly earmarked for projects and then funding from the state's own resources. There are certain central schemes which are not accounted for in the state budget. Till now PMGSY was not accounted in the state budget.

The various schemes which are currently undertaken by the state PWD Roads are as follows

Table 33: Road development schemes operational in the State

Scheme Name	Sanctioned Provision		Sanctioned Amount
	Roads (Length in Km)	Number of Bridges	Amount (Rs. in crore)
PMGSY	15,908	1,685	8,802
MPNA	1,039	2	321
MPDNA	0	171	115
NLCPR	147	176	345
CRF	878	20	339
ISC & EI	96	8	32
RIDF	468	375	924
NEC	2,049	338	1,160
AP (Gnl)*	1625	205	1,015
AP (TSP)*	185	0	79
AP (SCCP)*	550	0	176
ARIASP	735	207	337
AACP	716	181	502
ACA (excluding MPNA)	132	1	135
IBBR	297	115	297

IBBR link Road/Fencing	184		
Total	24,825	3,484	14,578

Source: PwD Roads, Government of Assam

Funding for road development has always been a major challenge. There are various sources of funding available to the department such as State Budget, State Borrowings (ADB, WB etc), Rural Development Ministry, central plan resources etc. However the existing sources of funding present certain challenges which in turn impact the project implementation and maintenance.

State budgetary allocations for PWD road depends on

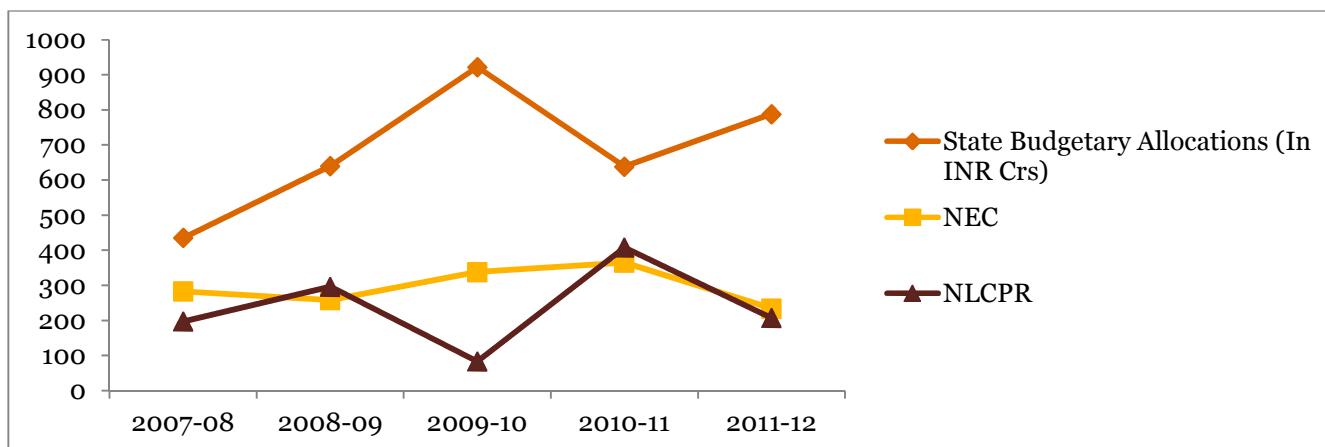
- Sectoral allocation from the central government, which in turn depends on various other factors such as amount of funds available
- Available resources with the state government
- Sectoral priorities of the state government

It has also been observed that although some funds from central sources are earmarked for road development, they are not adequate.

Volatile Funding:

Development and maintenance of the road sector is dependent on the allocations from the state budgetary resources and central assistance. The allocations from these resources can vary significantly from year to year. For example, the Thirteenth Finance Commission has reduced the allocation to state roads (non-PMGSY) to 50% of assessed requirement, while increasing the allocation to 90% of assessed requirement for PMGSY roads. Planning road sector expenditure is therefore often difficult for state agencies

Table 34: Fund allocation for PWD Roads (in crore INR)



Source: PwD Roads, Government of Assam

Mismatch between demand and supply of funds:

Most of the current funding sources available for the development of roads are scheme based rather than need based. Consequently, while the state governments may have their own development plan based on their own assessment of needs and priorities, it is not necessary that the scheme based funding sponsored by central government conforms to such plans. This often leads to a mismatch of demand and supply. In addition, most of the sources have specific objectives and are allocated with various terms and conditions. For example, funding

under schemes like PMGSY is dedicated for development of only rural roads and for up-gradation of such roads. The funds cannot be used for non-rural roads. Similarly, central resources such as Twelfth/Thirteenth Finance Commission (TFC) & Central Road Fund are allocated for specific objectives. These rules create silos within the state road sector, often leading to inefficient utilization of funds.

Reducing dependence on state budgetary allocation and schemes is necessary for better planning in the sector

A.5. Execution issues

A.5.1. Issues in land acquisition (LA)

The land in the state is fertile and most of it is being used for residential or agricultural purposes. Hence in certain projects, there is reluctance from the local populace for handing over land parcels. Also, it has been highlighted that even on existing roads there are Right of Way (ROW) issues, which need to be resolved. The issue of Land Acquisition (LA) is further compounded by the absence of Special Land Acquisition units.

The East West Corridor project is current not operational due to land acquisition issues; hence the connectivity to Silchar from the other regions of Assam is not good. Further, in order to attract private investment and bank loans, 100% land acquisition needs to be done prior to contracting. Earlier banks used to provide lending at 80% land acquisitions; however with many projects having had significant implementation issues, financial closure is difficult without 100% land acquisition completed.

A.5.2. Issues with environmental clearances

Assam has significant forest area present in the state i.e. around 35%¹⁰ of the entire geographical area of the state. Hence there are significant challenges to get timely environmental clearances. It is one of the key hurdles while applying for the land acquisition.

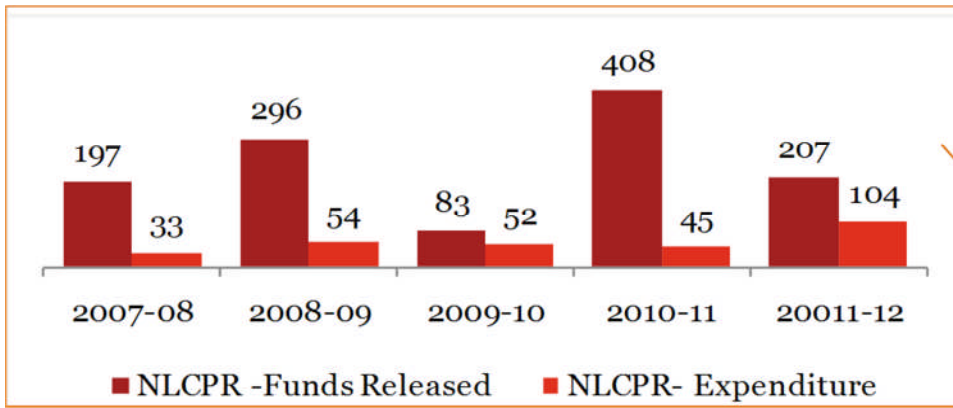
As per MORTH around 58 highway projects in 2012 were delayed due to want to such clearances i.e. shifting of utilities and environmental clearances. **Assam had the highest number of such delayed projects i.e. 18 in the entire country followed by 7 in Jammu & Kashmir.**¹¹

Govt of Assam has set up a social cell within PWD which further has been strengthened by appointing retired revenue officials with vast experience in LA and R&R issues and representatives of the Assam Environment and Forestry Department to facilitate environmental and forestry clearances, from the respective department

¹⁰Source: http://assamforest.in/forestGlance/assamForest_glance.php

¹¹ Source: <http://www.thehindubusinessline.com/industry-and-economy/hurdles-in-land-acquisition-delay-58-highways-projects/article3803539.ece>

Figure 55: NLCPR Funds released and expenditure



Funds released under NLCPR and NEC schemes not utilized due to LA issues

A.5.3. PPP procurement route

Lack of road development under PPP is reflected in the fact that not a single PPP road/highway has been developed in Assam till now. The key reasons for this are the lack of enabling environment for private investment. Private sector apprehensions while funding state road projects result from the lack of established process of project implementation. Till now state has been unable to resolve pending land acquisition and environmental issues which further acerbates the concerns of the private sector.

The private Sector has long been involved in building and maintaining roads under traditional procurement route in the state of Assam. The existing mode of procurement has its advantages as well as disadvantages, which are discussed below:

Advantages	Disadvantages
<ul style="list-style-type: none"> • Design complexities are resolved before tender award • Low cost of tendering to contractors • Because the full design is prepared and endorsed prior to tendering, the contract value is known before construction commences 	<ul style="list-style-type: none"> • Preparation of fully documented design drawings results in long lead times prior to construction • No input from the builder in design development • Innovative, lower operational costs design less likely when single design is developed • Public sector retains risk for overall design, 'fit for purpose and documentation errors • There is no link between construction payments and the provision of the facilities to agreed standards over time

Appendix B. - Road Fund – case studies

B.1. Uttar Pradesh State Road Fund

The fund was created in the year 1998 with the following aim:

- To utilize the fund for maintenance and rehabilitation of state highways and the fund shall not be used for funding staff salaries or labor costs.
- Revenue collected under this fund will be directly credited by the oil companies.

However, the fund had major issues which made it less effective:

- The road fund was merely an accounting mechanism used by PWD without any legal backing.
- The source of revenue for the fund was fuel cess alone, which made the fund smaller in size.
- Due to lack of a legal backing, although the states generated enough funds from cess, only a small part of the proceeds was transferred to the fund.

Key lesson:

- Legitimization of the fund through an Act is necessary.
- It is important to clearly identify the source of revenues and ensure that the funds are adequately transferred to create the road service that the users are paying for directly or indirectly.
- There were governance issues in absence of a governing Board.

The next generation of road fund was created in Kerala which correctly addressed the key issues of UP State Road Fund.

B.2. Kerala Road Fund

Kerala Road Fund was created in the year 2001 through The Kerala Road Fund Act (2001). The fund is managed by the Kerala Road Fund Board headed by the Chief Minister.

The sources of the fund are:

- All fund received from the Central Road Fund established under the Central Road Fund Act, 2000 (Central Act 54 of 2000);
- The contribution made by the Government which is an amount equal to ten per cent of the tax collected by them in the previous year under the provisions of the Kerala Motor Vehicles Taxation Act, 1976 (19 of 1976), and the said amount is charged on the Consolidated Fund of the State.
- All fees, fines and other amount collected by the Government as per the provisions of the Kerala Highway Protection Act, 1999 (6 of 2000);
- All payments made by the concessionaire as per the concession agreement;
- All amount standing to the credit of the Bridges Fund established under section 12 of the Kerala Tolls Act, 1976 (6 of 1977);
- The user fees collected by the Government agency or the statutory body under this Act;
- Grants or loans or advances made by the Government of India or any institution; grants or loans or advances made by the Government;
- All returns on investments made by the Board directly or through a Government agency or statutory body;
- Any amount borrowed by the Board;
- Any other amount authorized for credit to the Fund under the provisions of this Act or rules

- Made there under or any other law for the time being in force.

The usage of the fund shall be in following areas:

- For providing financial assistance to a concessionaire on behalf of a Government agency in respect of a transport facility approved by the Board;
- For meeting any development cost;
- For defraying the administrative expenses of the Board; and
- For any expenditure as may be prescribed.

Key lesson:

- The Kerala Road Fund was successful because it was formed through an Act, which fixed its sources as well as its usage and also the Act ensured that the fund is non-lapsable, thereby preventing its diversion to other areas, which was not the case in case of Uttar Pradesh Road Fund.
- Moreover a governance structure in the form of a board was seen in case of Kerala Road Fund

Appendix C. - Assam Road Development Corporation – proposed structure

C.1. Envisaged Board members of the corporation

Based on national and international instances, it has been observed that involvement of senior representatives from stakeholder agencies have been found beneficial especially for implementation of PPP projects and for promoting PPP.

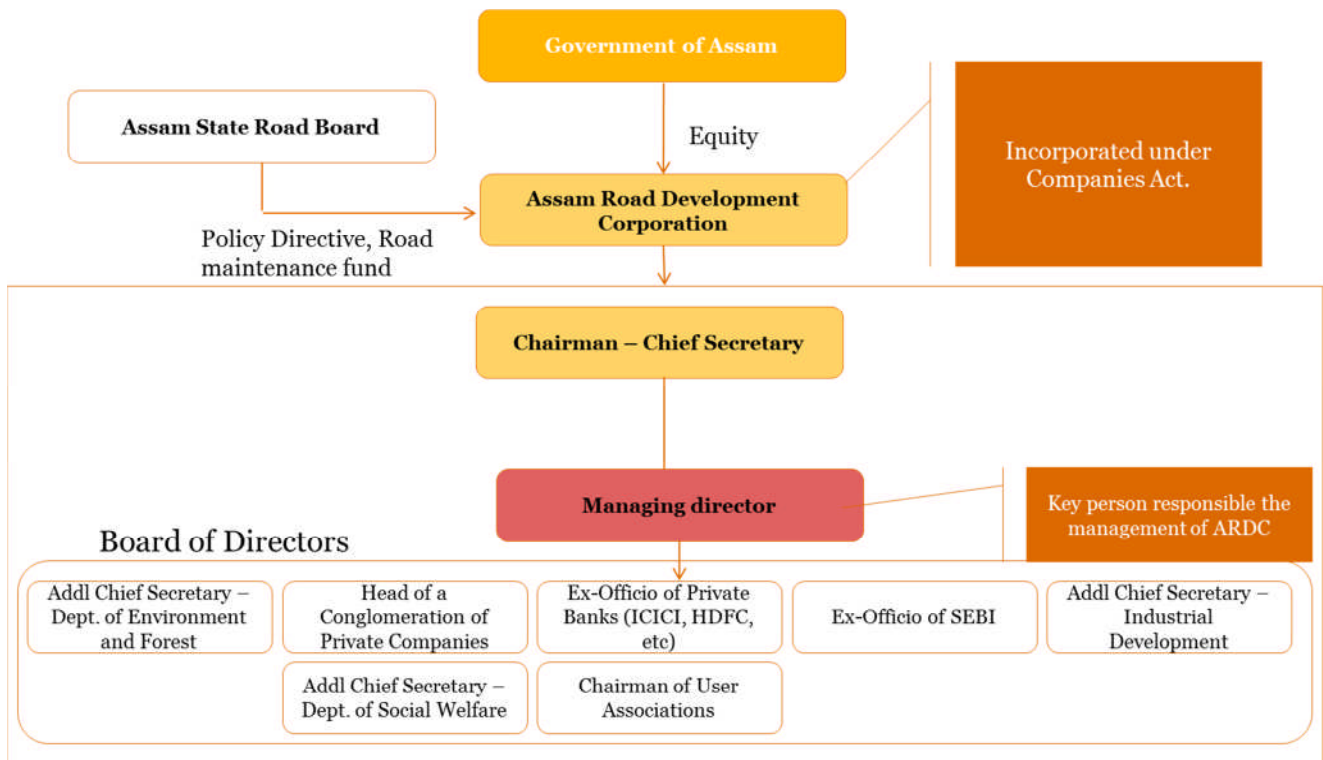
The board members will have representation from key stakeholders from both private and public sectors. The Chief Secretary of the state should be the chairman of the organization

Table 35: Proposed Board Members of Assam Road Development Corporation

Board Members	Justification
Senior representative¹² from Dept. of Forest and Environment	To ensure environmental safeguards are considered during the master planning and thereby facilitate in getting the necessary clearances
Senior representative from Industrial Development	Ensure integration of industrial development and road development
Senior representative from Dept. of Social Welfare	To ensure that the road development is inclusive and that no community/communities are excluded or suffered from the development. This will minimize political risks
Ex – Officio of Private Banks (ICIC, HDFC, etc)	Brings in Private discipline and accountability and expertise in innovative fund raising tools
Ex- Officio of SEBI	Funding is one of the key issues in the Road Sector and innovative go to market tools for fund raising is require. The Ex-Officio from SEBI can lend his expertise in developing such tools
Conglomeration of Private Industries	This will ensure integration of road development with industrial development
Representatives from various User Associations	They will bring in the user perspectives, necessary for master planning

¹² Senior representative can be Additional Chief Secretary or Principal Secretary of the Department

Figure 56: Structure of the envisaged Assam Road Development Corporation



Appendix D. - Other Road Development Corporations - case studies

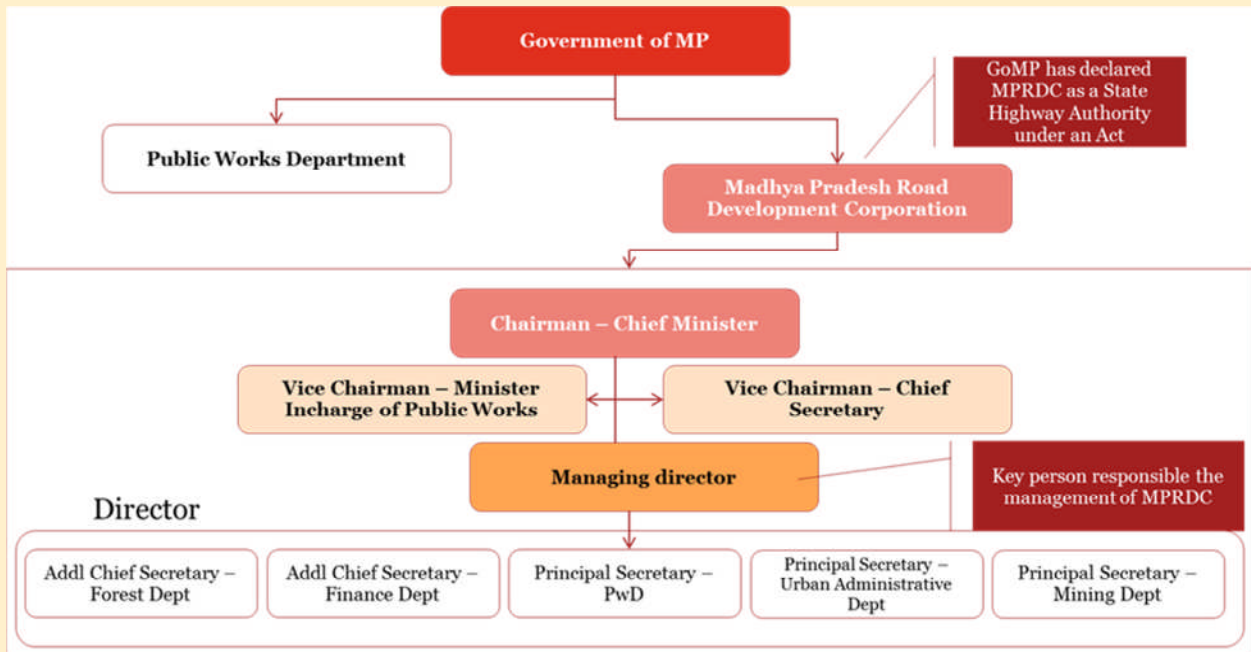
D.1. Karnataka Road Development Corporation (KRDCL)

- KRDCL was created as a limited company to facilitate borrowing of funds from external agencies and from financial institutions
- KRDCL was mandated and authorized to
 - Build Roads and Bridges
 - Facilitate PPP under BOT
 - Collection of Tolls
 - Borrow funds from different institutions/agencies
- KRDCL is mandated to create assets while ,maintenance lies with State PWD
- Current sources of funds for KRDCL
 - Toll collection on roads transferred to Corporation subject to approval of the State Government.
 - Income from development of land adjacent to the road projects subject to approval of the State Government.
 - Grant-in-aid received from the State Government.
 - Levy of tax/duty for provision of infrastructural facilities to be charged with prior permission of the State Government.

D.2. Madhya Pradesh Road Development Corporation (MPRDCL)

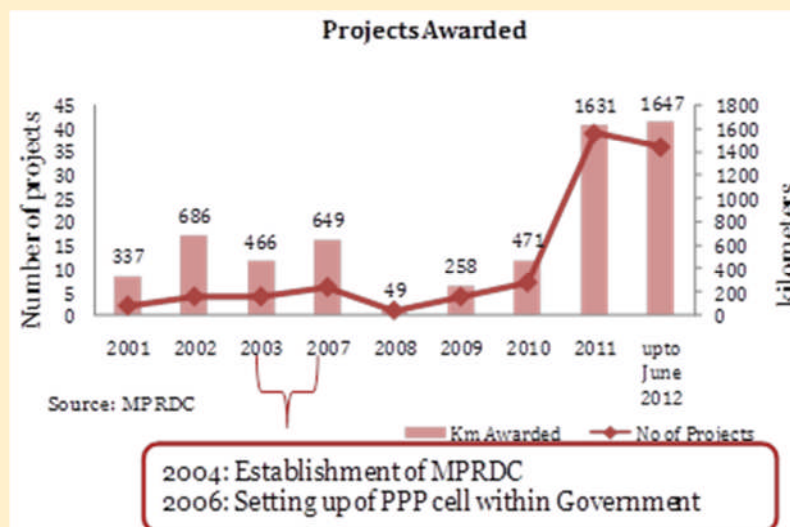
In Madhya Pradesh, the road development is being undertaken by MPRDC, which is a wholly owned company of the Government. The Chief Minister is the Chairman of the Corporation, with the Chief Secretary and Minister in-charge of public works as the two Vice Chairmen. The other board member comprises of senior bureaucrats from relevant departments

Figure 57: Structure of MPRDC



It was observed that after the formation of MPRDC, there was a sharp increase in the award of PPP projects in the state

Figure 58: Trend of PPP projects awarded in Madhya Pradesh



Appendix E. - Road Sector Policy – case study

E.1. Karnataka

The road development policy has been designed to provide clearly defined objectives of the department and it is expected that the departments internalize these objectives within its operation.

The objectives outlined in the policy are:

- To make road connectivity as the engine of economic growth in the State by developing a core road network (CRN) of NH, State Highways (SH) and Major District Roads to IRC standards with a minimum of 2-lane width.
- To promote socio-economic development in the interior and remote areas of the state by ensuring connectivity to the closest MDR for all villages having population less than 500, so that an all-weather two-lane road will be available within 3 km of every such village.
- To improve transportation network efficiency through an integrated improved road network connecting intermodal hubs with existing and potential economic growth centres like, SEZs, industrial hubs, touristic/heritage centres, agro-business centres etc.
- To strengthen institutions in the road sector for an orderly, efficient and regulated development of the road sector and maintenance of its assets.
- To create a funding mechanism to finance road sector development and maintenance of its assets on a sustainable basis.
- To attract and amplify private sector participation in the development of new roads as well as in maintaining existing roads
- To improve road safety and reduce the economic and human loss to the state resulting from the high incidence of road accidents currently witnessed in the State.

The key strategies to be adopted in achieving the objectives are:

- Master planning the State's road network adopting an integrated approach of socio-economic and transport logistics considerations and refining the Core Road Network (CRN) by identifying and prioritizing roads and high density corridors that would serve as the backbone of the State's economic development.
- Restructuring the Road sector in the State and bringing together the planning and regulatory functions under a single empowered authority
- Establishing a dedicated Karnataka Road Fund from contributions of state government, taxes and levies on motor vehicles, fuel and automobile components, borrowings and collections from tolls etc.
- Establishing the principle of "User Pays" and collecting user charges through tolling of all state highways.
- Facilitating infusion of private sector finances and management skills in road sector development and maintenance through Public Private Partnership.
- Improving sector efficiency and Capacity Building by adopting modern road construction technology and management techniques; strengthening of Road Sector Institutions, upgrading of technical skills of road sector professionals through training programs.
- Improving road safety and ensuring security of road assets.
- Establishing adequate mechanisms for Quality Control and Quality Assurance in all Road Sector Programs.

Appendix F. - Assumptions for investment requirements

Table 36: Cost Benchmark

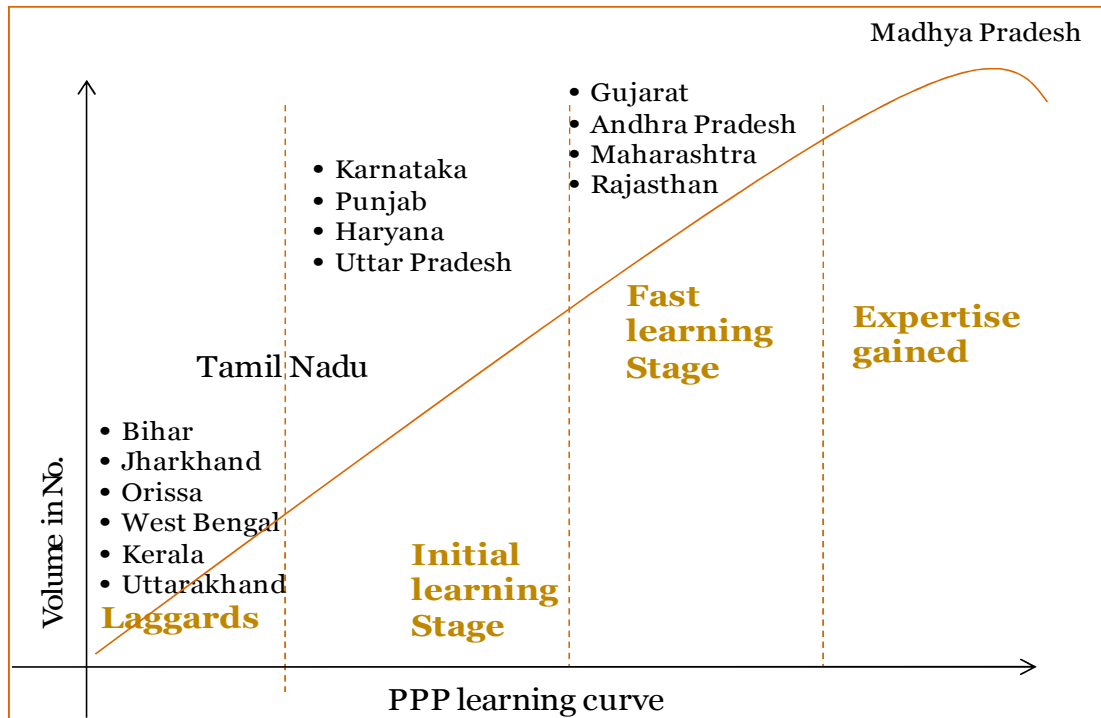
	Cost/km (Crores/km)
Single Lane	1.1
Intermediate Lane	1.7
2 Lane	3.9
4 Lane	8
6 Lane	11.7

Source: PwD Roads, Government of Assam

Appendix G. - PPP in Indian Road sector

Various states in the country have tried PPP routes and are at various stages of PPP learning curve. As can be seen in the figure above the state of Madhya Pradesh presents a good case that can be followed up by Assam state to develop its road network under PPP.

Figure 59: Positioning of Indian states on the PPP learning curve

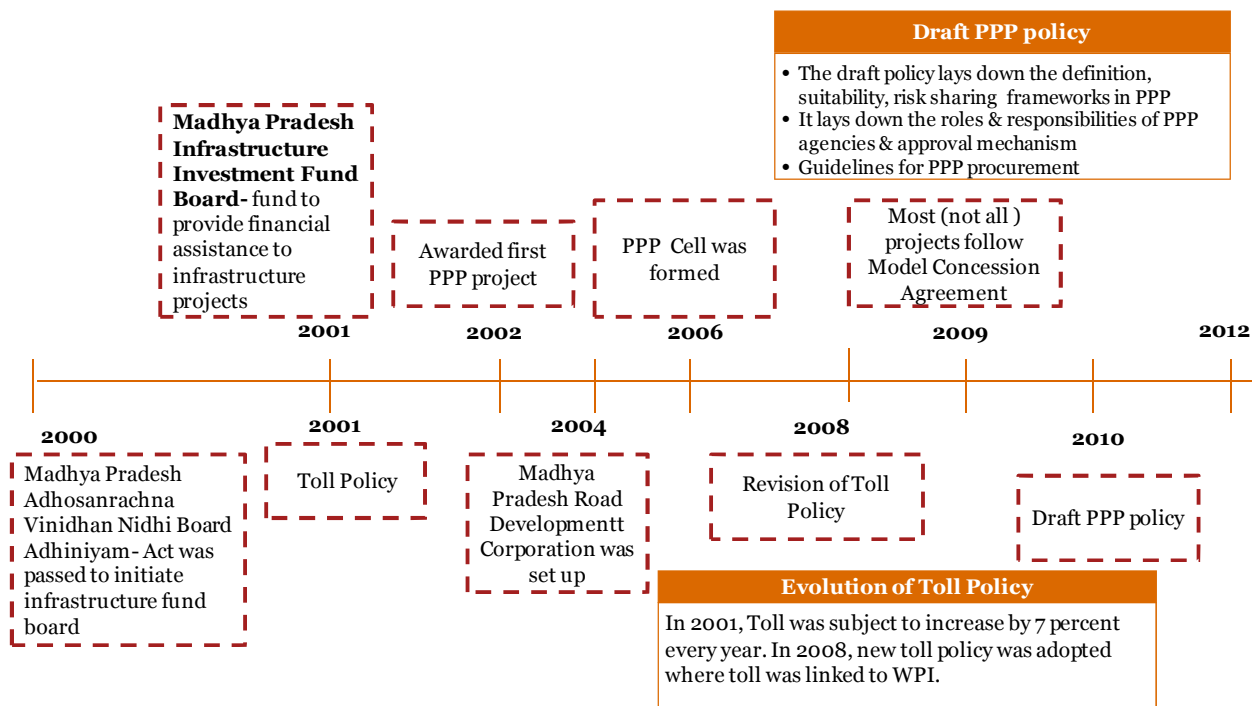


As discussed in earlier chapters, successful promotion of PPP requires necessary interventions such as formation of core road funds, introduction of toll policies and periodic review, robust regulatory framework and proactive resolution of execution issues such as land acquisition and environmental clearances issues. Moreover it has been observed that PPP evolves gradually with the initial years spend on preparing the right platform through necessary institutional and policy interventions, and subsequent evolution of PPP models over the years with the policies being reviewed periodically. **The following case studies are highlighted as examples of this phenomenon**

G.1. Case Study: PPP in road projects in Madhya Pradesh

PPP policy in MP has evolved over a period of past 10-12 years with the evolution being in-line with the practices adopted by NHAI at the Centre. Apart from policy initiatives, government has introduced ways to provide financial assistance to the developer, which has helped in reduction of funding issues in the sector

Figure 60: Evolution of PPP procurement route in MP



Bond BOT project: Government has raised infrastructure bonds to provide grant/subsidy to private builders. This helped to make a non-viable road projects financially feasible.

Madhya Pradesh Project Development Fund: Fund is setup to provide financial assistance (in form of interest free loan or advance) at project proposal & preparation stage.

Madhya Pradesh Infrastructure Investment Fund Board (MPIIFB): Fund utilized by the State Authority to provide VGF

Apart from that Government provides budgetary allocations at the department level which helps the department to extend support to PPP projects. **The state is also proactive in resolution of Land and Environment issues in the development of road sector. This in turn has positively impacted developer confidence in delivering the projects.**

Certain terrains in the state where toll projects were not feasible, state has adopted & proposed new model to make PPP viable on stretches. Two key models adopted by MP state to make projects feasible are:

- 1. Hybrid Model:** Projects unviable under pure BOT are awarded under Annuity +Toll. In the last two years, government has awarded 22 projects on the hybrid model. This model hedges traffic risk faced by the developer.
- 2. Deemed Shadow Tolling:** Government proposes to give toll in lieu of exempted vehicles like Government vehicles, Military vehicles etc. by State Government.

G.2. Case Study: PPP in road projects in Karnataka

Karnataka has developed a robust regulatory framework to provide direction to its road projects over the past decades

Table 37: Policy and Acts in Karnataka for road sector

Policy / Act	Key Features / Description
Draft Karnataka Infrastructure Development and Regulation Bill (2011)	<ul style="list-style-type: none"> Comprehensive guidelines on departmental responsibilities and processes related to infrastructure development, and key principles to be followed.
Karnataka Road Sector Policy (2009)	<p>Some of the key objectives as defined under KRSP 2009 are:</p> <ul style="list-style-type: none"> Development of Core Road Network Connectivity to all villages having population less than 500 Integrated road development connecting industrial hubs, sezs, etc Capacity building and Institutional development of road sector agencies Create funding mechanisms & attract private sector participation Improving road safety
Karnataka Highways Act, 1964 & Karnataka Highways Rules, 1965	<p>The Karnataka Highways Act provides clear description of the powers and responsibilities entrusted on the Department with respective operational protocols.</p> <p>The State also has a comprehensive toll policy and user fee rate notification.</p>
Toll Notification (May 2011)	Karnataka also has a Toll Policy in form of a Toll Notification released in May 2011.
New Infrastructure Policy (Govt of Karnataka) 2007	New Infrastructure Policy defines a comprehensive cross-sectoral guideline for PPP projects, aimed at enhancing private sector participation. The policy takes a 360D approach addressing aspects that includes procurement, financing, funding, incentivising, roles & responsibilities, and risk mitigation.
Karnataka Transparency in Public Procurement Act, 1999	The Karnataka Transparency in Public Procurement Act, 1999 (KTPP) provides strong guidelines for public procurement. While KTPP may not be wholly relevant to KSHIP due to involvement of International Financing Agencies, the Act may be significant with respect to other road agencies under PWP&IWT Department viz. KRDC, National Highways, etc.

