ASIAN INFRASTRUCTURE INVESTMENT BANK

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PROJECT DOCUMENT

OF

THE ASIAN INFRASTRUCTURE INVESTMENT BANK

Republic of India

Gujarat Rural Roads (MMGSY) Project

CURRENCY EQUIVALENTS

(Effective as of February 1, 2017)

Currency Unit	–	Indian rupee (INR)
US$1.00	=	INR67.00
INR1.00		US$0.014

ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
CAAA	Controller of Aid Accounts and Audit
C&AG	Comptroller and Auditor General
CPF	Community Participation Framework
CVC	Central Vigilance Commission
CVO	Chief Vigilance Officer
DPR	Detailed Project Report
ECoP	Environmental Code of Practice
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FIRR	Financial Internal Rate of Return
FY	Financial Year
GAAP	Governance and Accountability Action Plan
GDP	Gross Domestic Product
GoG	Government of Gujarat
GoI	Government of India
GIS	Geographic Information System
GVC	Gujarat Vigilance Commission
IA	Implementation Agency
IFI	International Financial Institution
IRC	Indian Roads Congress
IQM	Independent Quality Monitor
IUFR	Interim Unaudited Financial Report
MDR	Major District Road
MMGSY	Mukhya Mantri Gram Sadak Yojana
NCB	National Competitive Bidding
NE	National Expressway
NH	National Highway
NIT	Notice Inviting Tender
NPR	Non-Plan Roads
ODR	Other District Road
PAC	Performance Audit Consultant
PDS	Project Delivery Strategy
PMC	Project Management Consultancy
PMGSY	Pradhan Mantri Gram Sadak Yojana
PPP	Public Private Partnership

PR	Plan Roads
R&BD	Roads & Buildings Department
ROW	Right of Way
SC	Scheduled Caste
SFD	State Finance Department (of Gujarat)
SH	State Highway
SQM	State Quality Monitor
ST	Scheduled Tribe
SWAGAT	State Wide Attention on Grievances by Application of Technology
TPPF	Tribal Population Planning Framework
TOR	Terms of References
VOC	Vehicle Operation Cost
VR	Village Road
WB	World Bank
WBM	Water-based Macadam

CONTENTS

1. PROJECT SUMMARY SHEET

Republic of India
Gujarat Rural Roads (MMGSY) Project

Project No.	000025
Borrower Project Implementing Entity/ Project Implementation Agency	Republic of India Government of Gujarat /Roads & Buildings Department,
Sector/Subsector	Transport/Road
Project Objectives/ Brief Project Description	The objective of the Project is to improve road transport connectivity by providing all weather rural roads to about 4,000 villages in all the 33 districts of the state of Gujarat. The Project plans to achieve the above objective by constructing rural roads to provide second and third connectivity, providing first connectivity (to villages where not available currently), upgrading existing metal and earthen roads to black-top roads, widening of roads, construction of roads and bridges to complete missing links and structures, provide approaches to educational institutions, and construction and upgrading of roads passing through tribal areas.
Project Implementation Period (Start Date and End Date)	Start Date: August 1, 2017 End Date: June 30, 2019
Expected Loan Closing Date	December 31, 2019
Project cost and Financing Plan	Project Cost: US$ 658 million Financing Plan Govt. of Gujarat: US$ 329 million AIIB: US$ 329 million
AIIB Loan (Size and Terms)	US$ 329 million Final maturity of 13 years, including a grace period of 5 years, with customized repayments at the Bank's standard interest rate for sovereign-backed loans
Co-financing	None
Environmental and Social Category	B
Project Risk (Low/Medium/High)	Medium
Conditions for Effectiveness and Disbursement	Adoption of Project Operation Manual and Financial Management Manual
Key Covenants	Quarterly Project reports, implementation in line with ESMF/ESMPs and TPPF, and utilizing PMC's services until the closing date
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that the Bank is in compliance with the policies applicable to the Project

President	Jin Liqun
Vice-President	D.J. Pandian
Director General, Operations	Supee Teravaninthorn
Manager, Operations	Ke Fang
Project Team Leader	Hari Bhaskar, Senior Investment Operations Specialist
Project Team Members	Chuntai Zhang, Economic and Financial Analysis Consultant Ian Nightingale, Procurement Advisor Kishor Uprety, Senior Counsel Somnath Basu, Senior Social Development Specialist Soon-Sik Lee, Senior Investment Operations Specialist Yitzhak Kamhi, Senior Transport Consultant Yige Zhang, Project Assistant

2. STRATEGIC CONTEXT

A. Country Context

1. India is a lower-middle-income country, with a population of 1.3 billion accounting for 17% of the world's population.[1] India is also the world's third largest economy based on gross domestic product (GDP)[2] measured in Purchasing Power Parity terms. The recent growth record of the Indian economy has been impressive. India's real GDP expanded at an average annual rate of 7.3 percent between FY2003[3] and FY2012. While this slowed to 5.1 percent in FY2013, it increased again to 7.3 percent in FY2015, with an expected growth of 7.5% for FY2016. While the momentum was initially supported by private consumption (average growth of 6 percent during FY2013–FY2015), it has more recently benefited from an increase in investments (4.6 percent in FY2015 and 5.8 percent in the first half of FY2016 vs. an average of 1.3 percent in the preceding two years).

2. Lack of infrastructure remains a key constraint to growth. Furthermore, the lack of infrastructure development also means that growth is not well distributed. Around 21 percent of India's population live below the poverty threshold of US$1.90 per day.[4] An estimated 35% of inhabited areas in India are without all-weather road access. This constrains economic activities in rural areas and prevents the rural population, which constitutes the majority of India's poor, from being fully integrated into the economy and to access essential services.

3. Located on the western coast of India, Gujarat is the sixth largest state in terms of area (196,000 km^2), and the ninth most populous, with around 62.7 million people. Gujarat is more developed on average than the rest of India, with 16.6 percent of Gujarat's population living below the poverty line compared to the national average of 21.2 percent. With 57% of the state's population living in rural areas,[5] rural connectivity and its consequent socio-economic development will be key to lift people out of poverty.

4. Gujarat is one of the leading industrialized states in India. With just 5% of India's population and 6% of its land mass, it accounts for 7.5% of its GDP, almost 10% of its workforce, 11% of its factories, 19% of its industrial output and 19% of its exports. Gujarat's average GDP growth per year is close to 10%, which is higher than the national average %. Gujarat is consistently ranked as one of the most investor friendly states in India.

B. Sectoral and Institutional Context

5. **The road network in India** consists of three categories: (i) national highways, totaling about 60,000 km; (ii) secondary roads, comprising about 600,000 km of state highways and major district roads; and (iii) rural roads, covering about 2.7 million km. Rural roads link rural communities with the highways and the major district road network, providing access to higher agricultural incomes, employment opportunities, and social services. They represent about 80% of the network and carry about 20% of the traffic. While the national highways are maintained by the National Highways Authority

[1] Department of Economic and Social Affairs, Population Division, United Nations.
[2] World Economic Outlook Database, International Monetary Fund (IMF).
[3] The Government of India's Fiscal Year (FY) begins in April and ends in March. FY 2015 means April 2014 to March 2015; FY 2016 means April 2015 to March 2016 and so on
[4] Poverty and Equity Data, The World Bank.
[5] 15th national census survey, Census Organization of India.

of India (NHAI), an autonomous agency of the Government of India (GoI), all other roads in the network, from the state highways down to the rural roads, are maintained by the respective state governments.

6. **PMGSY.**[6]. Inadequate road connectivity has been an obstacle to economic growth in the rural areas of India. To address this issue, the GoI established the Prime Minister's Rural Roads Program (Pradhan Mantri Gram Sadak Yojana, or PMGSY) in 2000. The PMGSY aims to provide all-weather road connectivity to unserved villages in India's rural areas, where 70% of the population live. The PMGSY also includes non-investment interventions to strengthen the capacity of state-level agencies to implement the program. The PMGSY obtained support from international financial institutions (IFIs) such as the World Bank (WB) and the Asian Development Bank (ADB).[7] It has substantially improved the connectivity and mobility of, and brought huge socioeconomic benefits to, the rural residents in the areas where the program is active, especially to poor women and children.

7. **Gujarat road network**. Gujarat has about 111,560 km of roads and is considered to have one of the best road networks in the country. The Road categories and lengths are shown in Table 1. The rural road network, comprising Major District Roads (MDR) down to Non-Plan Roads (NPR), constitutes around 80% (89,792 km) of the total road network. Under the PMGSY, the target was to construct/ upgrade 12,721 km of rural roads, connecting 3,373 villages with populations above 500 people in the plains, and above 250 people in hilly and tribal areas. As of March 2017, 98% of PMGSY targets had been achieved in Gujarat, with only a few targeted villages remaining to be connected.

Table 1: Gujarat Road Network

Road Category	**Length (km)**
National Expressway (NE)	93
National Highway (NH)	5,060
State Highway (SH)	16,615
Major District Road (MDR)	20,466
Other District Road (ODR)	10,226
Village Road (VR)	26,098
Non-Plan Roads (NPR)	33,002
Total	**111,560**

8. **MMGSY**[8]. In order to extend the benefit of rural road connectivity to villages with populations of below 500 people (as PMGSY covers villages with population of more than 500 people), the Government of Gujarat (GoG) launched the Chief Minister's Rural Roads Scheme (Mukhya Mantri Gram Sadak Yojana, or MMGSY), which intends to extend the rural road network to such villages. The state has planned INR100 billion (US$1.5 billion equivalent) for MMGSY implementation in the period

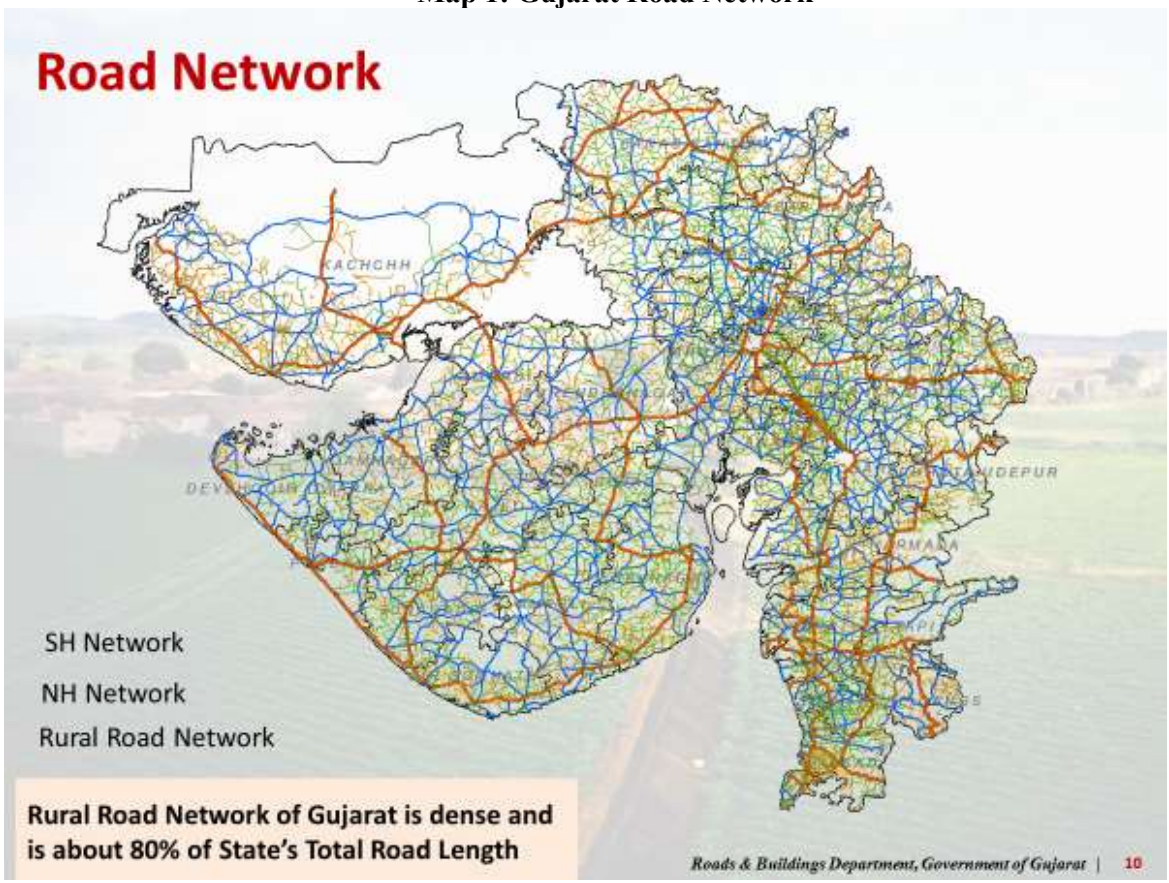
[6] PMGSY is Pradhan Mantri Gram Sadak Yojana (which translates to Prime Minister's Rural Roads Scheme) that was launched by the Government of India to provide nationwide all weather rural roads connectivity to connect villages with populations of 500 or more in plains and populations of 250 or more in hilly, tribal and desert areas

[7] The total support from the WB and ADB for PMGSY is around US$ 3.5 billion.

[8] MMGSY is Mukhya Mantri Gram Sadak Yojana (which translates to Chief Minister's Rural Roads Scheme) that was launched by the Government of Gujarat to provide state wide all weather rural roads connectivity to connect villages with population of less than 500

FY2017–FY2021, with the target to provide a good road network to 17,843 villages. It is estimated that 20 million people will benefit from implementation of the MMGSY.

Map 1: Gujarat Road Network



State Highways National Highways Rural Roads

9. The Roads & Buildings Department (R&BD) of the GoG oversees all activities pertaining to planning, construction and maintenance of roads and all government-owned buildings in the state. The R&BD implements, on an average, projects worth US$1 to 1.3 billion every year and has experience working with other international financing institutions such as the World Bank. The Secretary, R&BD, who heads the department is supported by experienced personnel, as shown in the R&BD organization chart in Annex 2, including the Chief Engineers (reporting directly to the Secretary) who are responsible for various functions (State Highways, Panchayat Roads[9] and so on). Each Chief Engineer is supported by a few Superintending Engineers (or SE, with each SE responsible for a few districts), 33 Executive Engineers (or EE, with one EE per district) and a large team of Deputy Executive Engineers, Assistant Engineers and Additional Assistant Engineers.

[9] Panchayat in Hindi translates to village in English. Panchayat roads mean the rural roads.

3. THE PROJECT

A. Rationale

10. Rural roads make a vital contribution to the overall socio-economic development of rural areas and the country, in turn. The Project will provide sustainable and safe connectivity to small villages and improve the mobility of the rural population of Gujarat. The primary beneficiaries are villagers who use the rural roads daily for social and economic activities and the secondary beneficiaries are the service providers to the rural population. The Project will extend economic development to the state as a whole by integrating isolated and poor rural populations with the rest of the state and markets.

11. One of the key requirements for small villages to grow faster is additional linkages to economic and market centers. Existing roads to villages are connected to state highways or major district roads but significant travel time is required between villages and between villages and market centers, schools and hospitals due to absence of direct linkages. The Project will better integrate rural population, businesses and industries with the national and state economy through better transport connectivity. Improved road access will have a transformational impact on rural poverty by contributing to improved agricultural productivity, higher non-farm employment opportunities and increased rural income. It will facilitate inclusion of rural communities in development through better access to markets, growth opportunities and services. The all-weather connectivity that will be provided by this Project will result in the following benefits:

(i) Increased agricultural productivity and industrial development (agro-industries, in particular) through improved connections to markets with more favorable prices for agricultural inputs and outputs;

(ii) Reduced travel time and hence better access to schools and hospitals for the rural population, resulting in improved healthcare and increase in literacy levels. Better access roads to villages also will result in setting up of more schools and healthcare centers around the villages (which are considered unviable by service providers without such roads), resulting in further improvement of healthcare and literacy levels;

(iii) New employment opportunities during Project implementation (construction labor force) and after (increased agricultural and industrial activities);

(iv) Changes in travel pattern from the existing bullock-carts to usage of motor vehicles, resulting in increased mobility and socio-economic activities. Where motor vehicles are already used in the existing earthen tracks, increased speed of travel, along with improvement in levels of safety and passenger comfort, will result in reduced vehicle operations cost (VOC); and

(v) Access to the administrative services, law and order, and welfare establishment (normally located at district headquarters) is significantly improved.

12. The MMGSY program is expected to benefit 20 million people in the rural areas of Gujarat. The Project, which supports Phase 1 of the MMGSY, as explained in paragraph 24, will benefit approximately 8 million people in rural areas. Connectivity and rural infrastructure improvement fully align with the Bank's mission and mandate.

13. While it is feasible for tolled roads (highways and expressways) with a revenue stream to attract private sector participation through the PPP route, rural roads that are fully owned by the public sector

and have no revenue stream cannot attract such investment. Public investment, with financial support from IFIs such as the Bank, is thus needed to provide rural connectivity.

14. **Value addition by the Bank**. The key value additions resulting from the Bank's support are as follows:

(i) Ensuring design consistency across the Project;

(ii) Enhanced quality and safety aspects through better design, implementation and maintenance;

(iii) Improved sustainability of the roads by including road maintenance requirements in contract procurement packages;

(iv) Management of environmental and social risks and impacts during Project implementation, as required by the Bank's Environmental and Social Policy and Environmental and Social Standards; and

(v) Similar programmatic approaches are likely to be followed in implementing rural road infrastructure activities in other states across India and in other emerging economies in Asia. The Bank's involvement in this Project can serve as a template for its future engagement in similar projects across India and beyond.

B. Project Objectives

15. The objective of the Project is **to improve the road transport connectivity** by providing all weather rural roads to about 4,000 villages in all the 33 districts of the state of Gujarat.

16. **Project beneficiaries**. The primary beneficiaries are the people living in the rural areas who are the users of the rural roads. The Project is expected to provide all-weather road access, economic benefits and social services to the rural population, among them the poor and vulnerable (16.6 percent of the state's population is below the poverty line and 46% of the state's population is female). Service providers, such as public transport operators, educational institutions, hospitals and traders, will also benefit.

17. **Results indicators**. The results indicators for the Project are:

(i) Increase in number of beneficiaries;

(ii) Increase in number of villages with new first, second and third connectivity; and

(iii) Increase in average traffic volume on the Project roads.

18. A series of intermediate outcome indicators are designed and their progress will be measured periodically to ensure that the Project is on the right track to achieve the results indicators listed above. The intermediate outcome indicators are:

(i) **Non-Plan Roads**: Length of new roads constructed and re-surfaced, length of new first-connectivity roads constructed for villages without such connectivity, number of missing

links and structures constructed, length of approach roads constructed connecting to educational institutions and length of roads constructed and re-surfaced that pass through tribal areas; and

(ii) **Plan Roads (PR)**: Length of roads upgraded from metal surface to black-top surface, length of roads upgraded from earthen surface to black-top surface, length of village and other district roads resurfaced (that have not been resurfaced for seven years or more), number of existing causeways and structures upgraded to high-level bridges and length of village roads VR and other district roads widened.

C. Project Description and Components

19. While PMGSY, which was implemented with the central government's support, covers villages with populations of 500 people and above, MMGSY was conceived by the State to serve the villages not covered in PMGSY. The Project consists of three components: (i) Construction and Upgradation of Non-Plan Roads (NPR); (ii) Upgradation of Plan Roads (PR); and (iii) Technical Assistance.

20. **Component 1: Construction and Upgradation of Non-Plan Roads (NPR)[10]** consisting of:

(i) This sub-component includes two parts. The first is construction of black-top surface NPR (which are currently cart tracks and earthen links) between the villages and between a village and an existing road network, to facilitate economical, short and useful connectivity to adjoining destinations. Around 5,045 km of NPR are planned to be constructed in this sub-component, out of a total of 15,000 km NPR awaiting black-top surfacing in the MMGSY program. The selection criteria for the roads in this phase include population of the connected villages, connectivity to growth centers (e.g., local markets) and the local demand. The second part is upgradation, by strengthening/resurfacing the black-top of 2,518 km of existing NPR that have not been resurfaced in 10 years or more.

(ii) **First connectivity roads**. The PMGSY has addressed first connectivity to villages with a populations of more than 500 in the plains and more than 250 in the tribal areas. Under this sub-component, the state will address first connectivity to villages with a population of less than 500 in the plains and less than 250 in tribal areas, which are not eligible under the PMGSY. This sub-component involves provision of 593 km of such first connectivity roads. Although first connectivity technical falls under PR and should therefore be included in Component 2 (that deals with PR), the sub-component has been included in Component 1 (which deals with NPR) since it involves construction of new roads. While Component 2 deals with PR, it comprises roads and bridges to be upgraded and does not include any new construction.

(iii) **Construction of missing links and missing structures**. Missing links are the left out portions of roads, usually at district or sub-district borders, connect to the road network. Around 800 km of such missing links will be constructed. Many existing roads are not able to function as all-weather roads due to flooding during the monsoon season and non-availability of structures (culverts and bridges) at various locations to direct the wa-

[10] Non-Plan Roads are the second and third connectivity roads to villages (any roads below first connectivity).

ter away from the roads. This sub-component also includes construction of 40 such culverts and bridges, thus enabling affected roads to be used in all weather conditions, including the monsoon season.

(iv) Construction of approach roads to educational institutions and healthcare centers.

(v) Construction and upgradation of roads passing through tribal areas. It is planned to construct and upgrade about 233 km of such roads.

21. **Component 2: Upgradation of Plan Roads (PR)[11] consisting of:**

(i) Upgradation of water-based macadam (WBM), or metal, roads to asphalt black-top roads. Out of 1,391 km of such roads now in use, 206 km of roads that form important links have been selected for upgradation in this phase.

(ii) Upgradation of earthen roads to asphalt black-top roads. Out of 2,051 km of such roads now in use, 237 km of roads that form important links have been selected for upgradation in this phase.

(iii) Plan Roads are resurfaced every 7 years by R&BD. This sub-component involves resurfacing of 4,386 km of Village Roads (VR) and Other District Roads (ODR).

(iv) Existing causeways and structures in some locations are insufficient and flooded/ breached during the monsoon season, thereby obstructing traffic on the roads and even isolating connected villages. Upgradation of 24 such causeways and structures to high-level bridges is planned under the Project, to enable these roads to be used in all weather conditions and preventing isolation of villages during the monsoon season.

(v) The development of the State necessitates the enhancement of traffic carrying capacity of the village roads and the district roads to facilitate safe and smooth traffic flow. Widening of 1,600 km of VR and ODR to 5.5 meters (IL) or 7 meters (DL) is planned in this sub-component.

22. **Component 3: Technical Assistance**

(i) Engagement of a Project Management Consultant (PMC) company to assist in managing the Project, including planning, implementation supervision, monitoring and reporting progress of the project to the counterpart and to the Bank.

(ii) Development of a digitized map of Gujarat's rural roads network and connection to a geographic information system (GIS) for real-time communication, which can be used to provide updates of Project progress during construction as well as updates on maintenance works during operation (to be discussed and elaborated with the GoG).

(iii) Institutional development and capacity building of R&BD through trainings, workshops and study tours in overseas locations in the areas of transport planning and management, contract law and contract models, economic analysis and environmental engineering.

[11] Plan Roads are the roads that provide the first connectivity.

23. **Component 4: Application of innovative technologies**

(i) Application of innovative technologies in construction, upgradation and maintenance of roads and structures on experimental basis. This includes use of recycled plastic waste, modified bitumen, additives, geo-textiles, soil stabilization techniques, slope protection techniques and mechanized routine maintenance.

D. Cost and Financing

24. The total cost of the MMGSY program is approximately US$1.5 billion (INR100 billion). The Indian Ministry of Finance has requested the Bank to consider providing a Sovereign backed loan of US$690 million (INR 46 billion) in 2 tranches for the entire program, since R&BD plans to roll out the program in 2 phases. This document covers Phase 1 of the program. The composition of the phases is described below:

(i) The estimated cost of Phase 1 (the Project) is US$658 million (INR44 billion) out of which the financing requested from the Bank is US$ 329 million (INR22 billion). The indicative cost and financing plan of the Project are as shown in Table 2.

(ii) The estimated cost of Phase 2 is US$842 million (INR56 billion). This phase will be rolled out starting in 2018 and is not covered in this document.

Table 2: Cost and Financing (US$ million)

Item	**Cost**	**Financing**			
		AIIB		**GoG**	
		Amount	**Share**	**Amount**	**Share**
A. Base Cost					
Component 1 Construction and Upgradation of Non-Plan Roads	410	203	50%	207	50%
Component 2 Construction and Upgradation of Plan Roads	242	120	50%	122	50%
Component 3 Technical Assistance	3	3	100%	0	0%
Component 4 Experimental roads with innovative technologies	2.18	2.18	100%	0	0%
Total Base Cost	657.18	328.18	50%	329	50%
B. Front-End Fees	0.82	0.82	100%	0	0%
Total	**658**	**329**	**50%**	**329**	**50%**

25. **Financing terms.** Final maturity of 13 years, including a grace period of 5 years, with customized repayments at the Bank's standard interest rate for Sovereign-backed loans.

E. Implementation Arrangements

26. **Implementation period.** The Project is expected to be implemented from August 2017 to June 2019.

27. **Project implementation agency**. The R&BD of the GoG will be the implementation agency (IA) of the Project. The Secretary, R&BD heads the department. Out of the nine Chief Engineers in the Secretary's office handling various functions, the Chief Engineer, Panchayat Roads manages the rural roads network and is responsible for implementing rural roads projects. Of the approximately 112,000 km of roads managed by the R&BD, close to 90,000 km are managed by the Chief Engineer, Panchayat Roads, who also serves as the Additional Secretary of R&BD.

28. The Chief Engineer, Panchayat Roads is assisted by six Superintending Engineers, thirty-three Executive Engineers (one in each of the thirty-three districts), Deputy Executive Engineers and Assistant/ Additional Assistant Engineers. The Executive Engineers are based in the field (in their respective districts) and are responsible for managing the rural roads projects in their districts. Each Executive Engineer is assisted by a team of Deputy Executive Engineers and Assistant/ Additional Assistant Engineers in project implementation.

29. R&BD has experience working with IFIs such as the WB. R&BD currently implements projects worth approximately US$ 1 to 1.3 billion every year. R&BD (specifically, Panchayat Roads) has sufficient professional staff to plan, manage and control the Project. In addition, the PMC will assist in managing the Project including planning, implementation supervision, monitoring and reporting on progress to the R&BD and the Bank. The Bank will make regular field visits to ensure that implementation is in line with agreed parameters.

30. **Monitoring and evaluation**. A Results Framework has been developed, including baseline data, for the Project (see Annex 1). The Results Framework provides the basis for Project results monitoring and evaluation (M&E). The R&BD will be responsible for collecting data and reporting on implementation progress for each indicator in the Results Framework. The achievements of the indicators will be evaluated by comparing the actual results against planned targeted values. The Results Framework, with appropriate data and associated evaluations, will be incorporated into the Project's annual progress reports.

31. **Quality monitoring system**. R&BD has established a quality monitoring system that is identical to the system being used successfully in the PMGSY. It consists of three tiers of monitoring and control. The first tier comprises R&BD's in-house team under the supervision of the Executive Engineer. The second tier consists of State Quality Monitors (SQM) appointed by the R&BD. Senior technical personnel appointed as Independent Quality Monitors (IQM) constitute the third tier. In addition, regular quality checks will be conducted by the R&BD through its Quality Control (QC) wing.

32. A **Project Management Consultant (PMC)** provides day-to-day capacity support to ensure that the skills and systems are in place to implement the MMGSY guidelines. The PMC's key responsibilities include sub-project selection, scrutiny of detailed project reports (DPRs), checking of bills of quantities, review of test results of the quality monitoring agencies, day-to-day project management activities, including data entry and the operation of the road project monitoring system (RPMS), generation and submission of progress reports, and training and capacity building of R&BD.

33. The **Road Project Monitoring System (RPMS)** is a web-based monitoring system that has been developed by the PMC to monitor, among other parameters, the physical and financial progress of the Project and the status of quality monitoring. As a web-based system, the RPMS can be accessed by users from any computer, with a user name and password to be provided by the R&BD. The RPMS will also provide instant information and update of any road/bridge works under implementation, including planned vs actual progress, with photographic evidence. Considering the volume of works involved in the Project, which are spread over a wide geographical area, the RPMS will be effective in monitoring and controlling progress during Project implementation.

34. **The Bank's supervision** during the implementation period will include focused oversight and works supervision through a chain of technical/financial audits. The Bank plans to engage a consulting firm to perform this supervision (over and above the scheduled supervision missions by the Bank), which will encompass, among others:

(i) Technical verification of standards and specifications used;

(ii) Quantity and Quality Assurance Control /Audit of each category of works by selectively, and randomly, visiting sites and offices of the contractor, supervision engineers and the R&BD;

(iii) Procurement and financial audit of randomly selected components for each group of works; and

(iv) Verification and comparison of physical and financial progress.

35. **Maintenance and sustainability**. The Project has been evaluated as economically viable and the economic benefits are likely to increase over time. However, the sustainability of the economic benefits can only be assured with adequate maintenance of the roads. Inadequate maintenance could lead to premature failure. The Project ensures adequate maintenance by including the maintenance it of the constructed / upgraded roads and culverts/bridges in the construction contractors' scope for a period of 5 years from completion of construction / upgrading of the roads and structures. The contractors will forfeit their retention payments if any faults reported by the R&BD are not rectified within a certain period of time. This innovative method of including maintenance in the construction contractors' responsibility for the rural roads is likely to be replicated in the other states in India.

36. **Procurement**. The R&BD has submitted its Project Delivery Strategy (PDS) to the Bank for its review. The PDS requires the placement of nearly 1,400 small works contracts to support improvement and strengthening of rural road infrastructure. There is also a requirement for consultant services contracts to assist the R&BD with project management and implementation quality monitoring. The individual contract values for works range between US$80K and US$3 million and the contracts will be implemented over a wide geographic area in the state of Gujarat. All procurement would be conducted in accordance with Gujarat's competitive tendering regulations, utilizing an e-tendering platform, "N-procure."

37. The procurement process follows a series of well defined steps involving approvals at various levels depending on the size of the contracts.

(i) High-level approval of works, including the estimated amount, by the Ministry of Roads and Buildings.

(ii) Technical sanction of the works after completion of surveys and estimates by the field engineers. The technical sanction of the individual works will be done by the officer at the appropriate level based on the estimated amount of the works. The tendering process can start only after this step is completed.

(iii) Draft tender papers prepared for the works that have completed step (ii) above. Approval of draft tender papers are again done at appropriate levels.

(iv) Notice inviting tender is published in the public domain inviting bidders to submit their bids in the N-procure platform of the R&BD.

(v) Opening of the bids, tender approval, issuance of acceptance letter and work order are the subsequent steps.

38. **Funds-flow arrangements**. R&BD will have overall accountability for maintaining the financial management system of the Project and will ensure that the activities are carried out in accordance with the Project's legal agreements. The funds-flow arrangements are as follows:

(i) **From the GoI to the GoG**: Based on the Project expenditure report, the office of the Controller of Aid Accounts and Audit (CAAA), Ministry of Finance, GoI will submit withdrawal applications to the Bank for disbursement. Bank funds will be disbursed to the GoI, which will pass on these funds to the GoG in accordance with its standard arrangements for development assistance to states. The funds will be deposited in the Consolidated Fund of the State.

(ii) **From the GoG to the R&BD**. The GoG uses its own funds for financing Project expenditures and applies for a reimbursement (up to the loan amount) from the Bank. The Project funds are budgeted annually within the overall budget of R&BD. The State Finance Department (SFD) of the GoG will transfer the allocated budget to the R&BD, through R&BD's finance department, in four tranches, at the beginning of each quarter of the financial year. The funds are transferred to designated accounts called the Public Ledger Accounts, which are maintained in each district under the responsibility of the Executive Engineer assigned for that district. Every scheme implemented by the R&BD, including the MMGSY, has such an account in each district. Each scheme is identified with a unique 17-digit code, which is used in recording all the receipts and expenditures for that particular scheme.

39. **Disbursements**. The disbursement of funds will be based on the reimbursement method for the expenditures reported every quarter. R&BD will report the expenditures incurred in the quarter, in the form of an Interim Unaudited Financial Report (IUFR), to the GoG, which will then verify it and submit it to the office of the CAAA. The CAAA will then submit withdrawal applications to the Bank for disbursement. The Bank's funds will be disbursed to GoI which will then disburse the funds to GoG as per its standard arrangements for development assistance to the States. The estimated disbursement plan is as shown in Table 3.

Table 3: Disbursement Plan in US$ million

	2017	2018				2019			
Period	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Disbursement	70	40	50	50	30	25	25	20	19
Cumulative	70	110	160	210	240	265	290	310	329

40. **Retroactive financing**. All eligible Project expenditures meeting the Bank's procurement guidelines and in respect of which payments were made on or after August 15, 2016 can be claimed from the Bank for up to 20% of the loan amount (US$65.8 million). The IUFR will clearly indicate the amount claimed under retroactive financing along with the details of the expenditure incurred. Such IUFRs will be subject to audit during the annual Project audit.

4. PROJECT ASSESSMENT

A. Technical

41. **Scope and selection criteria**. The scope of works involves construction and upgradation of rural roads, construction of high-level structures (culverts and bridges) and widening of district roads. The scope is well defined, with all roads and bridges/culverts to be built and upgraded in every district listed in a detailed spreadsheet for each district. The R&BD has developed and applied a rigorous methodology in prioritizing and selecting the roads and bridges to be covered in the Project. The criteria applied in selecting the roads/ bridges are detailed in Annex 2. The selection criteria are simple, sound and meet the Project needs and requirements.

42. **Technical design**. Upon selection of the roads and bridges to be included in the scope of the Project, the R&BD prepares the design and the DPR for each road in the same format as the one used in the PMGSY. The design standards follow the codes of the Indian Roads Congress (IRC).[12] The Senior Engineers of the R&BD and the PMC are involved in checking and evaluation of the DPR. The detailed design aspects of the Project follow the PMGSY standards, thereby reducing the duration of design review and errors/re-works by the contractor. The typical technical designs are shown in Annex 6. Considering that the nature of the works is not technically complex, the technical design of the Project is considered robust and fit for purpose. The technical aspects behind the innovative technologies to be used in the Project as proposed in component 4 were assessed to be simple and effective. The combination of rigorous selection criteria and a robust technical design are vital steps to achieve the Project's objectives.

43. **Climate change considerations in technical design**. In addition to the design considerations listed in paragraph 42, the designs of the roads and other facilities have also taken into account the possible influence of climate change in the region and the potential for faster than anticipated deterioration of the conditions (specifically pavement) of the designed roads. While it is difficult to predict climate change, there are several models that can assist in determining possible climate hazards and/or influences. Learning from past cases is an important factor in designing such climate protection and applying it in road design.

44. The terrain in Gujarat is arid and semi-arid, characterized by high temperatures in summer and mild night temperatures. Damages to road infrastructure have been observed in the past during the monsoon seasons due to flash floods and road blocks. With climate change, these events are likely to intensify in the future; it is therefore important to make the road infrastructure resilient to such climate change induced events. The Project has taken into consideration increased rain impacts in future and has translated that into the design criteria, considering 50 years' flood data for roads and 100 years' flood data for major structures. Increased rainfall intensity of 25% has been considered. Consequently, appropriate hydrological calculations have been applied in the design of all included components of the Project.

45. **Quality monitoring system**. This Project is spread across 33 districts of the state and consists of a large number (approximately 1,400) of smaller volume contract packages. Recognizing the challenges in monitoring of quality across the project during the implementation, the IA has put in place an effective and robust three-tier quality monitoring system that has been successfully followed in PMGSY. The IA's quality control wing conducts regular quality checks over and above the three tier quality monitoring system that has been put in place. The three-tier quality monitoring system is implemented as follows:

[12] The IRC is the apex body of road sector engineers and professionals in India.

(i) The first tier comprises the R&BD's in-house team in each district under the supervision of the Executive Engineer. In this tier, the day to day supervision, quality and quantity control are done by the field engineers at various levels, namely Junior Engineer, Deputy Executive Engineer and the Executive Engineer.

(ii) The second and most comprehensive tier consists of the State Quality Monitors (SQM). The SQM will conduct independent quality tests, including laboratory tests, on every road and bridge covered in this Project. The SQM detect systemic flaws, if any, in the quality control process and suggest actions to improve the process while also independently monitoring the corrective and preventive measures in coordination with the first-tier supervisors and the contractors. The SQM also perform quantity control by ensuring that the contractors deliver the work according to the approved contract bill of quantities. Regular reports from the SQM, including status updates with photographs, and laboratory test results are updated using a web-based tool.

(iii) Senior technical personnel in the form of Independent Quality Monitors (IQM) constitute the third tier.

In addition, regular quality checks will be conducted by the R&BD through its Quality Control (QC) wing.

46. **Project Management Consultant**. The R&BD has engaged a PMC to provide day-to-day capacity support in Project implementation including monitoring and reporting on Project progress. The Bank's team met with the PMC's management and operations team and is satisfied with the capacity of the PMC based on their experience in managing similar projects in the past.

47. **Project monitoring software**. The software tool developed by the PMC, the Road Project Monitoring System or RPMS, is a comprehensive tool to monitor the physical and financial progress of the Project. As a web-based system, the field engineers and PMC can upload the status of the roads and structures under construction from any of the project sites. The RPMS also provides instant updates of the current status of the project, even on a day-to-day basis since the field engineers are expected to upload progress daily, with photographic evidence. At any point in time, the planned vs actual progress can be compared, thereby enabling the R&BD and the PMC to take corrective action well in time if there are deviations from the plan. Regular updating of data in the RPMS by the R&BD's field engineers is considered vital for the Project's success (updates, if not done at regular intervals, will be reported by the PMC to the head of the R&BD). The Bank team witnessed an RPMS demonstration at the R&BD's offices twice, once during the development and again during the roll-out and is satisfied with the system. This system will very likely be replicated in other road sector projects across the country. The details of the RPMS can be found in Annex 5.

48. **Implementation capacity of the R&BD**. The Bank team had assessed the technical, procurement and financial implementation capacity of the R&BD through various discussions and clarifications with the Project team, the Chief Engineer and the Secretary. The Bank is satisfied with the implementation capacity of the R&BD for the following reasons:

(i) R&BD has an annual budget of about US$1.3 billion which it has been able to absorb so far. Out of the total budget for R&BD, the Chief Engineer (Panchayat Roads) has been allocated a budget of approximately US$500 million every year, even before the start of MMGSY program's implementation. With the MMGSY program, the R&BD is expected to absorb about US$1.5 billion in three years, which is their normal absorbing capacity.

(ii) With a robust e-procurement system in place, the R&BD has already procured 1,000 contract packages for the MMGSY since November 2016, which demonstrates its procurement capacity. The R&BD has a realistic and verified procurement plan.

(iii) As for the technical capacity of the R&BD to deliver the Project, the team under the Chief Engineer (Panchayat Roads) has delivered projects of similar volume in the past. A well defined organization, as shown in Annex 2, exists to deliver the Project. The R&BD has 1,400 staff in its department with a majority working in the field, including officers at the level of Executive Engineer (one per district). Additionally, the R&BD has the support of the three-tier quality monitoring system, the PMC and the RPMS, thus making it well equipped to manage the technical aspects of the Project.

B. Economic and Financial Analysis

49. **Project costs and benefits**. Upon completion, the rural roads constructed and upgraded under the Project will substantially improve the road conditions and connectivity in the Project areas, thereby accruing important socio-economic benefits to the rural population. A cost-benefit analysis was carried out to assess the economic viability of the Project on a "with-" and "without-project" basis. The costs considered were the capital costs and the maintenance costs. Due to shorter distances and/or the improved road conditions, vehicles on Project roads will operate at increased speed, with reduced travelling time and operations & maintenance costs. Accordingly, savings in VOC and passenger time costs are the economic benefits considered in the economic analysis. The details of the costs and the benefits are provided in Annex 3.

50. **Traffic analysis and forecast**. The R&BD conducted a traffic analysis for the Project roads based on information obtained from the DPRs and according to its best estimation. The traffic analysis, classified by 8 vehicle types, provides the average traffic counts for each type of road under the Project. The Bank had intensive discussions with the R&BD on the traffic counts and made necessary adjustments to get reliable base-year traffic. Consequently, the traffic development trends in the last few years have been analyzed and the future traffic developments on the Project roads were projected based on historical traffic development trends, future economic development and the associated traffic demand.

51. The traffic projections have been calculated for three time horizons, 2017–2020, 2021–2025, and beyond 2026. It was assumed that the average traffic growth rates will be about 8–10% in 2017–2020, given immediate high growth on the improved roads, especially for the new roads and missing links; about 7–8% in 2021–2025 and about 5–7% beyond 2026. In the traffic projections, diverted and suppressed traffic have been considered, since some traffic from other roads would be diverted to the Project roads due to shorter distances and/or improved road conditions. The traffic projections were used in the calculation of the Project's economic benefits. The details of the traffic analysis and forecasts are in Annex 3.

52. **Economic analysis**. Economic evaluation of the Project was carried out to assess its economic viability. In the evaluation, the traffic on the Project roads was analyzed and projected for future years, the Project financial costs were converted into economic costs, the economic benefits were calculated by comparing the "with-" and "without-project" scenarios, the economic internal rate of return (EIRR) of the Project was calculated and a sensitivity analysis was carried out. The EIRR of the Project was calculated by comparing the economic costs and benefits streams over a period of 22 years, including 2 years of construction and 20 years of operation. The evaluation results show that the EIRR is 15.8% for the Project, with an EIRR of 14.1% for the NPR and 18.4% for the PR. The lower EIRR for the

NPR is mainly due to lower traffic volume (which are mainly secondary roads but will generate substantial social benefits that are not captured quantitatively). The Project's EIRR of 15.8% well exceeds the Bank's recommended opportunity cost of capital (12%), thereby providing economic justification for the investment.

53. **Sensitivity analysis**. The sensitivity analysis of the EIRR was carried out by varying the Project costs and benefits. The analysis suggests that the economic viability of the investment is robust to withstand significant variations in Project-specific parameters including (i) capital cost over-runs, ((ii) maintenance cost over-runs, (iii) delay in construction and (iv) reduced economic benefits. The details of the economic analysis are shown in Annex 3.

54. **Financial analysis**. The rural roads, unlike the expressways and highways, are not tolled and so do not have a revenue stream. Therefore, traditional financial evaluation (calculating the financial internal rate of return) was not performed. The availability of counterpart funding from the GoG and its willingness to commit this funding were assessed as a part of the financial analysis.

55. **Counterpart funds**. For the MMGSY, the GoG has so far allocated a budget of around US$600 million (INR40 billion) in total for FY2016-17 and FY 2017-18 with US$225 million allocated (and disbursed to R&BD) in FY 2016-17 and another US$ 375 million allocated for FY 2017-18 thereby ensuring availability of counterpart funding for the Project. The allotted amounts will be received by R&BD in four tranches every year, with each disbursement happening at the beginning of the quarter. The budget allocations were verified by referring to the approved budget document of R&BD. Rural road development has always been a priority for the GoG and accordingly, the budget allocation to rural development has seen an annual increase of 20% in the last few years. Further details of the financial analysis performed are shown in Annex 3**.**

C. Fiduciary and Governance

56. **Anti-corruption.** The Bank is committed to preventing fraud and corruption in the Projects that it finances. It places the highest priority on ensuring that Projects that it finances are implemented in strict compliance with the Bank's Policy on Prohibited Practices (2016). Implementation will be monitored rigorously and regularly by Bank staff. The Bank reserves the right to investigate, directly or indirectly through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to the Project and to take necessary measures to prevent and redress any issues in a timely manner, as appropriate. Detailed requirements will be specified in the Loan Agreement.

57. **Governance and Accountability Action Plan (GAAP).** The R&BD has an existing GAAP that was prepared earlier for the WB-funded Second Gujarat State Highway Project or GSHP-II. Some of the good corporate governance initiatives in place are:

(i) Gujarat Vigilance Commission (GVC), patterned along the lines of the Central Vigilance Commission (CVC) of the GoI, that has jurisdiction on complaints of fraud/corruption over public servants in the state;

(ii) R&BD has an ex-officio officer as the Chief Vigilance Officer (CVO), who acts as a watchdog to handle fraud and corruption complaints/cases in coordination with the GVC;

(iii) A centralized, functioning e-procurement system for all works valued at more than US$12,500 (approximately), irrespective of source of funding, that has significantly reduced procurement-related complaints, according to the GVC; and

(iv) Implementation of SWAGAT, a state-wide grievance redress mechanism, which received the United Nations Public Service Award 2010 for improving transparency, accountability and responsiveness in the public service category.

58. **Financial management**. The Project will use the existing financial management arrangements of the R&BD and the state. The R&BD has implemented the PMGSY and other projects financed by IFIs such as the WB. Financial management assessment of the R&BD, including assessment of the institutional arrangements in place for financial management, funds-flow arrangements and accounting/financial reporting arrangements, indicates that its financial management arrangements are satisfactory to meet the essential fiduciary requirements.

59. **Institutional arrangement for financial management**. A complete institutional arrangement exists for the financial management of the Project. The GoI's Department of Economic Affairs, Ministry of Finance, represents the Borrower and assumes overall responsibility for the management and supervision of the loan utilization. The State Finance Department represents the GoG and is responsible for providing the counterpart funding and for execution of the loan. R&BD will implement the Project and take primary responsibility for the financial management of Project implementation, making financial plan and budgeting, preparing loan withdrawal applications, and transferring Project funds to the district offices. R&BD's district offices, each headed by an officer at the level of Executive Engineer, will be responsible for managing Project contracts and making payments to the contractors under the Project. Currently, the R&BD's Financial Division has 4 sections, including budgeting, planning, auditing, and accounting sections. The Financial Division is well staffed with clear responsibilities for each position.

60. **Funds-flow arrangements**. The flow of funds from the Bank to the GoI and from the GoI to the GoG are as described in paragraph 38 of this document. Every district is staffed with a Divisional Accountant. Any payments to be made to the contractors need to be authorized by both the Executive Engineer and the Divisional Accountant and will be verified by the District Accounts Officer who represents the State Finance Department of the GoG, thereby ensuring an impartial verification of such payments by the GoG's finance department representative, who is not an employee of the R&BD.

61. **Accounting and financial reporting.** The accounting and financial reporting of the R&BD follow the GoG's regulations and standards. All financial records and transections are made using the well-established domestic financial management software package, which is used by all government agencies in the country – the Integrated Financial Management System (IFMS). The R&BD will manage, monitor, and maintain the Project accounting records and prepare interim financial reports and financial statements for the activities executed. A Financial Management Manual is under preparation by the R&BD. During implementation, the R&BD will prepare IUFRs, in a form to be agreed between the Bank and the R&BD, for Project expenditures, based on its books of account, at least on a quarterly basis, and submit to the Bank within 60 days from the close of the quarter. The accounts in each district that include the Project's accounts are subject to audit every year by the GoG's auditor (also called Local Fund Auditor or LAF) and once in three years by the Comptroller & Auditor General (C&AG, external auditor from the GoI). As explained in the previous paragraph, every payment to the contractors is verified by the District Accounts Officer representing the GoG, before such payments are effected. Such a verification by the District Accounts Officer effectively constitutes a first level of audit of the Project's accounts before the GoG audit and C&AG audits are performed. The R&BD will submit the annual audit report of Project financial statements with the auditor's opinion to the Bank within 9 months after the end of each fiscal year.

62. **Procurement**. The R&BD has submitted its Project Delivery Strategy (PDS) to the Bank for its review which includes the tendering and contracting strategy for the Project. The Bank has determined that the proposed tendering and contracting strategy outlined in the PDS is fit for purpose. All procurement would be conducted in accordance with the state of Gujarat's competitive tendering regulations utilizing the national e-tendering platform. The platform has been evaluated by the Bank and its use found to be satisfactory. Both the WB and ADB have also evaluated the national system and both institutions permit its use on their projects in most Indian states, including Gujarat. The Bank determined that the state procurement procedures are fully consistent with the Bank's Core Procurement Principles and therefore fully aligned to the provisions for National Competitive Tendering under the Bank's Procurement Policy and the Interim Operations Directive: Procurement Instructions for Recipients.

63. The R&BD have successfully implemented the PMGSY and IFI-financed infrastructure projects in the past, in which they followed the state procurement regulations and national competitive tendering procedures. The R&BD has a well established and experienced project implementation team, which is headed up at Secretary-level with supporting engineering, administrative and financial expertise. For this Project, the implementation team is to be further supported by project management and quality monitoring consultants.

64. During appraisal of the Project, it was established that over 1000 contracts have been awarded on an advanced contracting basis and there will be a requirement for retroactive financing estimated to be around 20% of the loan amount. The Bank is undertaking a sample post review of the contracts awarded to date to establish whether the contracts are eligible for Bank financing. The review comprises a check on the tender document template used, the applied tendering procedure, the e-tender award evaluation and contract award process and the capability of the successful contractor to implement the contract. Checks are also made against all contract awards to ensure that the successful contractors are not subject to sanctions by the other IFIs. The Bank's review of contract management and implementation was facilitated by monitoring the information provided by the R&BD web-based RPMS, which included details of contract value, payment and evidence of the physical progress of each contract. The post review of tenders on a sampling basis will continue for the remaining contracts that have yet to be tendered. While the procurement review as explained above will continue, the Bank is satisfied with the results of the procurement review conducted so far.

D. Environmental and Social

65. **Categorization and documentation**. The Project has been assigned **Category "B,"** in accordance with the Bank's Environmental and Social Policy (ESP) and Environmental and Social Standards (ESS). The anticipated environmental and social risks and impacts of the Project are limited, temporary in nature and reversible. As required by the Bank's ESP for Category 'B' projects, an Environmental and Social Management Framework (ESMF), which provides for the use of Environmental and Social Management Plans (ESMPs), has been developed. ESS 1 (Environmental and Social Assessment and Management) is applicable to assessment of environmental and social impacts of Project construction activities. ESS 2 (Involuntary Resettlement) is not applicable, since it is anticipated that there will be no land acquisition and no displacement of people. ESS 3 (Indigenous Peoples) is applicable since about 4% of the roads will be constructed in districts where Scheduled Tribes are living.[13]

66. **The key environmental and social issues** associated with the Project were identified through a field-based rapid assessment for the Project. The rapid assessment included a series of stakeholder

[13] The Scheduled Tribes is one of the officially designated groups of historically disadvantaged Indigenous Peoples. The term Scheduled Tribe is recognized in the Constitution of India.

meetings, on-site observations of completed and on-going road construction and proposed sub-project locations, and review of secondary data on environment, biodiversity and social parameters. As part of the ESMF, a Social Management Framework (SMF) and a Community Participation Framework (CPF) have been prepared to provide guidance on community consultations to support Project implementation. A Tribal Population Planning Framework (TPPF) has been prepared to address special approaches to Project planning and management in areas inhabited by Scheduled Tribes.

67. **Legal and policy provisions**. The national legislation of India has been reviewed to determine the legal provisions applicable to the Project in relation to the provisions of the Bank's ESP. The Notification on Environmental Impact Assessments for Development Projects (2006, amended 2011) of the GoI exempts rural road construction from Environmental Clearance, however, as discussed in the ESMF, an Environmental and Social Impact Assessment (ESIA) was conducted to generate baseline data and information. Public consultations were conducted to disseminate and ratify the findings of the ESIA. The generic ESMP provided in the ESMF will be used to develop sub-project specific ESMPs, based on the findings of the ESIA. The TPPF will address impacts of the Project in areas inhabited by Scheduled Tribes. The GoI has stipulated legal tools such as the 5th Schedule of Article 244 (1) of the Constitution regarding Scheduled Tribes. Also, to ensure smooth implementation of the Project in Scheduled Tribe areas, convergence with ongoing Government schemes (Vanbandhu Kalyan Yojana) has been planned. This is separate from the mandatory provisions of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (2006). Regulations on wildlife protection, coastal regulation zone, forest, etc. have also been reviewed and documented in the ESMF. The list of mandatory clearances is included in the Environmental Code of Practice (ECoP) developed for the construction activities.

68. The ESMF, ESIA and TPPF have been disclosed by the Bank and the R&BD. The documents can be found on the Bank's website at https://www.aiib.org/en/projects/proposed/2017/gujarat-rural-roads-project.html

69. **Project impacts, mitigation and monitoring measures**. Consultations held with communities in various districts of the state indicated that the population is strongly in favor of construction of the roads. This is because the roads connect the villages to the mainstream of the state's economy and thus contribute to improvement in their day-to-day life. The advantages of the Project as perceived by the stakeholders are (i) faster and easier access to local and regional market centers, enabling smooth movement of people and goods; (ii) faster and consistent access to educational institutions and medical facilities, which will in turn facilitate sustainable development outcomes; and (iii) significant reduction in travel time.

70. The key potential adverse impacts are temporary disturbance due to rehabilitation of existing roads, and the impact of new small-scale road and structure construction activities (dust, noise, etc.). The ECoP includes requirements for public consultations and community engagement to ensure that stakeholders are aware of Project activities and have an opportunity to share their views in final design, including road alignment, and execution of the works. The ECoP also includes stipulations to be followed for safety and labor conditions during construction activities.

71. In some cases, new link roads will be constructed to connect villages with the main district roads or to establish connections between villages. The envisaged black-top link roads are a key attribute of the Project. Currently, these are in the form of earthen roads, with well-defined alignments, and the land is owned by the government. Field visits indicated that in some cases, the width of the link roads has been narrowed due to encroachment by expansion of agricultural fields. Such encroach-

ment is typically narrow strips of land, in the Right of Way of the roads. Meetings with local communities revealed that land owners are willing to cooperate with the construction activities and withdraw voluntarily from the encroachments. This phenomenon has been observed to be prevalent in similar road construction projects (such as the PMGSY) in the state. Generally, a process of public consultation involving the user communities under the Panchayats has been envisaged to address the issue of clearing the alignment for road upgrading and construction. Guidance on this matter, based on existing practices, is provided in the CPF to address these issues. Some small religious structures can also be found on the edge of the alignments and measures will need to be taken to adjust the design to avoid these structures or, with agreement of the community, to relocate them.

72. The ESMPs will include provisions for orientation and capacity building to familiarize people with the Plans, as community participation is integral to their effective implementation. Public consultations and information dissemination have been designed to be included throughout the implementation process. There are also provisions for regular monitoring and feedback to improve the efficacy of the ESMPs.

73. **Grievance Redress Mechanism**. A Project-level Grievance Redress Mechanism (GRM) has been designed to ensure that local concerns are heard and resolved. The Panchayat and Field Engineer of the R&BD are the two contact points for raising concerns and submitting complaints. The Panchayats have a consultative framework to resolve complaints and develop community consensus. For complaints registered with the Field Engineer, a process for complaint resolution has been formulated involving the District-level Engineer and finally the headquarters of the R&BD.

E. Risks and Mitigation Measures

74. Based on the assessment by the Bank, meeting with the R&BD, review of available documents from the R&BD and internal discussions and reviews, the Bank has assigned a *Medium* risk rating to the Project.

75. The possible risks and the mitigation measures are listed in Table 4. The implementation of the mitigation actions will be verified by the Bank during implementation through the reports from the PMC and during the Bank's supervision missions.

Table 4: Summary of Risks and Mitigating Measures

Risk Description	Current Assessment	Mitigation
Project Implementation Technology, concept, methodology and strategy	Low	The potentially associated risks are low given the fact that the Project follows the previously implemented PMGSY and has already procured more than 75% out of a total 1,400 contracts and completed some of them. The professional skills, technology and experience are adequate for timely and orderly implementation of the Project. The technology used is conventional and well within the capabilities of the R&BD.

Risk Description	Current Assessment	Mitigation
Procurement Transparency of e-tendering system	Medium	A live demonstration of e-tendering was shown to the Bank's team and the system is well designed to prevent any transparency related issues.
Procurement Delays in tendering, contract finalization and award due to huge number of contract packages to be awarded (~1,400)	Medium	A detailed and realistic Procurement Plan has been prepared by the R&BD, reviewed and will be monitored by the Bank.
Project Implementation: Delays and Quality Monitoring.	Medium	The R&BD has been implementing projects of similar nature worth more than US$1 billion every year, which demonstrates its capacity. The R&BD has a well designed and ready operational, robust, three-tier quality and quantity monitoring and interactive system and has already engaged a PMC to monitor and report on progress to the R&BD and the Bank. PMC monitoring will consist of sporadic visits to sites and by operating a specially developed web-based monitoring system (RPMS) for physical and financial progress of all components included in the Project. The Bank team has reviewed a pilot presentation of the RPMS and found it to be effective, practical and appropriate for day-to-day quality and quantity financial control of the Project.
Environmental and Social Implementation of ESMF/ESMPs/TPPF by the local contractors	Medium	The consultant hired by the R&BD for preparation of the ESMF, ESMPs and TPPF is also responsible for providing training to the field engineers of the R&BD and to the contractors in implementation of the ESMF/ESMPs/TPPF. The PMC will monitor effective implementation of the ESMF/ESMPs/TPPF. The Bank will also ensure that this aspect is covered during its supervision missions.

Annex 1: Results Framework and Monitoring
INDIA: Gujarat Rural Roads (MMGSY) Project

Project Objective: The objective of the Project is to improve rural road connectivity (by providing all weather connectivity) to 4,000 villages in all 33 districts of Gujarat.

PROJECT DEVELOPMENT OBJECTIVE INDICATORS

Indicator Name	Core	Unit of Measure	Baseline 2015/16	Cumulative Target Values			Monitoring Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition, etc.)
				2016/17	2017/18	2018/19				
Total beneficiaries	**X**	People million	0	3	6	8	Quarterly	Progress reports	R&BD	Total 20 million people will directly benefit from Phase I project.
Villages with new first connectivity	**X**	No.	0	47	291	364	Quarterly	Progress reports	R&BD	Total 364 villages will be provided with new first connectivity under Phase I.
Villages with new second and third connectivity	**X**	No.	0	450	1950	3650	Quarterly	Progress reports	R&BD	Number of villages to be provided with new second and third connectivity
Average traffic volume on sample Project roads										
4.1 Non-plan roads		Vehicle, AADT	119	132	145	160	Semi-annual	Traffic survey	PMC	10% annual increase
4.2 Plan roads		Vehicle, AADT	370	411	452	497	Semi-annual	Traffic survey	PMC	10% annual increase

INTERMEDIATE RESULTS INDICATORS										
Indicator Name	Core	Unit of Measure	Baseline 2015/16	Cumulative Target Values			Monitoring Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition, etc.)
				2016/17	2017/18	2018/19				
Non-plan roads										
1.1 New construction		Km	0	656	4,035	5,044	Quarterly	Progress reports	R&BD	Completed road length
1.2 Resurfacing		Km	0	453	2,014	2,518	Quarterly	Progress reports	R&BD	Completed road length
1.3 First connectivity for villages		Km	0	77	474	593	Quarterly	Progress reports	R&BD	Completed road length
1.4 Construction of missing link/structure		No	0	3	55	69	Quarterly	Progress reports	R&BD	Completed missing link/structure
1.5 Approaches to school and colleges		Km	0	0	2	2	Quarterly	Progress reports	R&BD	Completed road length
1.6 Construction and maintenance of roads passing through tribal areas		Km	0	12	186	233	Quarterly	Progress reports	R&BD	Completed road length
Plan roads										
2.1 Upgradation of metal to black-top surface		Km	0	31	165	206	Quarterly	Progress reports	R&BD	Completed road length
2.2 Upgradation of earthen to black-top surface		Km	0	36	190	237	Quarterly	Progress reports	R&BD	Completed road length
2.3 Resurfacing of village/other district roads		Km	0	877	3,509	4,386	Quarterly	Progress reports	R&BD	Completed road length
2.4 Upgradation of existing causeway/deep to high-level bridge		No.	0	1	18	24	Quarterly	Progress reports	R&BD	Completed high-level bridges

2.5 Widening of village/other district roads		Km	0	161	1,285	1,606	Quarterly	Progress reports	R&BD	Completed road length
Institutional strengthening Program										
3.1 Computer system development		%	0	0%	30%	100%	Semi-annual	Progress reports	R&BD	A GIS-based computerized mapping system of rural roads developed

AADT = Annual average daily traffic

Annex 2: Detailed Project Description

A. Gujarat Roads Sector

1. Gujarat is one of the leading industrialized states in India. With just 5% of India's population and 6% of its land mass, it accounts for 7.5% of its GDP, almost a tenth of its workforce, 11% of its factories, 19% of its industrial output and 19% of its exports. Gujarat's average GDP growth per year is close to 10%, which is higher than the national average of 7.6%. Gujarat has the world's largest diamond processing hub; 7 out of 10 diamonds in the world are processed in Gujarat. Gujarat is consistently ranked as one of the most investor-friendly states in India.

2. **The road network in India** consists of three categories: (i) national highways totaling about 60,000 km; (ii) secondary roads, comprising about 600,000 km of state highways and major district roads; and (iii) rural roads, covering about 2.7 million km. Rural roads link rural communities with the highway and the major district road network, providing access to higher agricultural incomes, employment opportunities, and social services. They represent about 80% of the network and carry about 20% of the traffic. While the national highways are maintained by the NHAI, an autonomous agency of the GoI, all other roads in the network, from the state highways down to the rural roads, are maintained by the respective state governments.

3. **PMGSY**. Inadequate road connectivity has been an obstacle to economic growth in the rural areas of India. To address this issue, the GoI established the PMGSY in 2000. The PMGSY aims to provide all-weather road connectivity to unserved villages in India's rural areas, where 70% of the population live. The PMGSY also includes non-investment interventions to strengthen the capacity of state level agencies to implement the program. The PMGSY obtained support from IFIs such as the WB and ADB. It has substantially improved the connectivity and mobility of, and brought huge socioeconomic benefits to, the rural residents in the areas where the program is active, especially to poor women and children.

4. **Gujarat Road Network**. Gujarat has about 111,560 km of roads and is considered to have one of the best road networks in the country. Road categories and lengths are shown in Table A2.1. The rural road network, comprising MDR, ODR, VR and NPR, constitutes around 80% (89,792 km) of the total road network. Under the PMGSY, the target was to construct/ upgrade 12,721 km of rural roads, connecting 3,373 villages with populations above 500 people in the plains, and above 250 people in hilly and tribal areas. As of March 2017, 98% of PMGSY targets have been achieved in Gujarat with only a few targeted villages remaining to be connected.

Table A2.1: Gujarat Road Network

Road Category	Length (km)
National Expressway (NE)	93
National Highway (NH)	5,060
State Highway (SH)	16,615
Major District Road (MDR)	20,466
Other District Road (ODR)	10,226
Village Road (VR)	26,098
Non Plan Roads (NPR)	33,002
Total	**111,560**

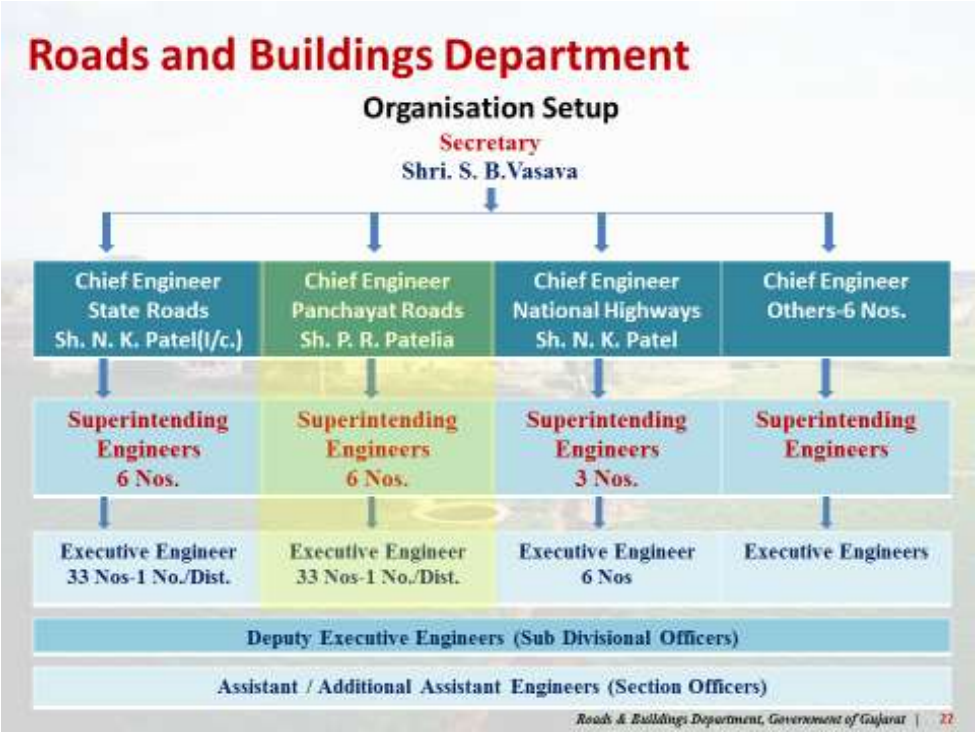
5. **MMGSY**. In order to extend the benefit of the rural roads connectivity to the villages with population of below 500 people (as PMGSY covers villages with population of more than 500 people), the GoG launched the MMGSY program, which intends to extend the rural road network to such villages . The state has budgeted INR100 billion (US$1.5 billion equivalent) for MMGSY implementation in FY2017–FY2019, with the target to provide a good road network to 17,843 villages . It is estimated that 20 million people will benefit from the implementation of MMGSY. The Project, which is essentially Phase 1 of the MMGSY program, which this Project supports, will benefit approximately 8 million people in rural areas.

B. Institutional Structure

6. The R&BD of the GoG oversees all activities pertaining to planning, construction and maintenance of roads and all government owned buildings in the state. The R&BD implements, on an average, projects worth US$1 to 1.3 billion every year and has experience working with other international financing institutions such as the World Bank. The Secretary, R&BD, heads the department. The Secretary is supported by experienced personnel, as shown in the R&BD organization chart in Table A2.2, including the Chief Engineers (reporting directly to the Secretary) who are responsible for various functions (State Highways, Panchayat Roads and so on). Each Chief Engineer is supported by a few Superintending Engineers (or SE, with each SE responsible for a few districts), 33 Executive Engineers (or EE, with one EE per district) and a large team of Deputy Executive Engineers, Assistant Engineers and Additional Assistant Engineers.

7. The Chief Engineer, Panchayat Roads, is responsible for rural roads and for implementing rural roads projects. He is assisted by six Superintending Engineers, thirty-three Executive Engineers (one in each of the thirty-three districts), Deputy Executive Engineers and Assistant/ Additional Assistant Engineers. The Executive Engineers are based in the field (in their respective districts) and are responsible for managing the rural roads projects in their districts. Each Executive Engineer is assisted by a team of Deputy Executive Engineers and Assistant/ Additional Assistant Engineers in project implementation. Out of the US$1.3 billion budget allocated to the R&BD every year, the department under the Chief Engineer, Panchayat Roads, receives an allocation of approximately US$500 million for construction, upgradation and maintenance of rural roads and bridges/structures.

Table A2.2: R&BD Organization



C. Project Description and Components

8. While PMGSY, which was implemented with the central government's support, covers villages with population of 500 people and above, MMGSY was conceived by the State to serve the villages not covered in PMGSY. The Project consists of three components: (i) Construction and Upgradation of Non-Plan Roads (NPR); (ii) Upgradation of Plan Roads (PR); and (iii) Technical Assistance

9. **Component 1: Construction and Upgradation of Non-Plan Roads (NPR)** consisting of:

(i) This sub-component includes two parts. The first is construction of black-top surface NPR (which are currently cart tracks and earthen links) between the villages and between a village and an existing road network, to facilitate economical, short and useful connectivity to adjoining destinations. Around 5,045 km of NPR are planned to be constructed in this sub-component, out of a total of 15,000 km NPR awaiting black-top surfacing in the MMGSY. The selection criteria for the roads in this phase include population of the connected villages , connectivity to growth centers (e.g., local markets) and the local demand. The second part is upgradation, by strengthening/resurfacing the black-top of 2,518 km of existing NPR that have not been resurfaced in 10 years or more.

(ii) **First connectivity roads**. The PMGSY has addressed first connectivity to villages with a population of more than 500 in the plains and more than 250 in the tribal areas. Under this sub-component, the state will address first connectivity to villages with a population of less than 500 in the plains and less than 250 in tribal areas, which are not eligible under the PMGSY. This sub-component in-

volves provision of 593 km of such first connectivity roads. Although first connectivity technically falls under PR and should therefore be included in Component 2 (that deals with PR), the sub-component has been included in Component 1 (which deals with NPR) since it involves construction of new roads. While Component 2 deals with PR, it comprises roads and bridges to be upgraded and does not include any new construction.

(iii) **Construction of missing links and missing structures**. Missing links are the left out portions of roads, usually at district or sub-district borders, that connect to the road network. Around 800 km of such missing links will be constructed. Many existing roads are not able to function as all-weather roads due to flooding during the monsoon season and non-availability of structures (culverts and bridges) at various locations to direct the water away from the roads. This sub-component also includes construction of 40 such culverts and bridges, thus enabling affected roads to be used in all weather conditions, including the monsoon season.

(iv) Construction of approach roads to educational institutions and healthcare centers.

(v) Construction and upgradation of roads passing through tribal areas. It is planned to construct and upgrade about 233 km of such roads.

10. **Component 2: Upgradation of Plan Roads (PR) consisting of**

(i) Upgradation of WBM, or metal, roads to asphalt black-top roads. Out of 1,391 km of such roads now in use, 206 km of roads that form important links have been selected for upgradation in this phase.

(ii) Upgradation of earthen roads to asphalt black-top roads. Out of 2,051 km of such roads in use now, 237 km roads that form important links are selected for upgradation in this phase.

(iii) Plan Roads are resurfaced every 7 years by R&BD. This sub-component involves resurfacing of 4,386 km of VR and ODR.

(iv) Existing causeways and structures in some locations are insufficient and flooded/ breached during the monsoon season, thereby obstructing traffic on the roads and even isolating connected villages. Upgradation of 24 such causeways and structures to high-level bridges is planned under the Project, thus enabling these roads to be used in all weather conditions and preventing isolation of villages during the monsoon season.

(v) Development of the State necessitates the enhancement of traffic carrying capacity of the village roads and the district roads to facilitate safe and smooth traffic flow. Widening of 1,600 km of VR and ODR to 5.5 meters (IL) or 7 meters (DL) is planned in this sub-component.

11. **Component 3: Technical Assistance**

(i) Engagement of a Project Management Consultant (PMC) to assist in managing the Project including planning, implementation supervision, monitoring and reporting.

(ii) Development of a digitized map of Gujarat's rural roads network and connection to a GIS system for real-time communication, which can be used to provide updates of Project progress during construction as well as updates on maintenance works during operation (to be discussed and elaborated with the GoG).

(iii) Institutional development and capacity building of R&BD through trainings, workshops and study tours in overseas locations in the areas of transport planning and management, contract law and contract models, economics and environmental engineering.

12. **Component 4: Application of innovative technologies**

(i) Application of innovative technologies in construction, upgradation and maintenance of roads and structures on experimental basis. This includes use of recycled plastic waste, modified bitumen, additives, geo—textiles, soil stabilization techniques, slope protection techniques and mechanized routine maintenance.

13. **Selection Criteria.** Each of the roads and bridges in the above Project components are carefully selected using the selection criteria shown in Table A2.3. Each criterion is then allocated a certain score and the final selection of the roads and bridges to be included in the Project is based on the total score obtained by each of the proposed roads/ bridges (with the highest score receiving the highest priority). This scoring system is similar to the one used successfully in the PMGSY.

Table A2.3: Selection Criteria for Roads and Structures

Type of Roads / Structures	Selection Criteria
New connectivity and new construction of roads	• Population of villages at both ends of the road (higher population receives a higher score) • Connectivity to markets, educational institutions, health care centers • Local demand (reference letters with justifications from the elected representatives)
Widening of roads	• Present and expected traffic growth • Importance of the roads in terms of social, economic and religious activities
Construction and upgradation of structures (bridges / culverts)	• Structures that are flooded and breached during the monsoon season • Importance of the roads passing through the structure (higher traffic receives higher score)

Annex 3: Economic and Financial Analysis

A. Introduction

1. Economic evaluation of the Project was carried out to assess the economic viability and sustainability of the Project. For the purpose of the economic evaluation, the methodology applied involved, among others: an analysis of the traffic on the Project roads projected for future years; the Project financial costs converted into economic costs; the economic benefits comparing "with-project" and "without-project" options; calculation of the EIRR of the Project; and a sensitivity analysis. The EIRR was calculated at 15.8% for the Project, which is above the Bank's recommended opportunity cost of capital (12%). Therefore, the Project is economically viable. In addition, the R&BD's financial capability and sustainability for financing and operating the Project were assessed. Following is the summary of the economic evaluation and the financial analysis of the Project.

B. Traffic Analysis and Forecast

2. In Gujarat, regular 3-days traffic surveys are conducted twice a year, in April and October, but only on some of the major plan roads. For most of the roads under the Project, there are no records of existing traffic counts. To prepare the Project, the R&BD, with assistance from the PMC, conducted a simple traffic analysis based on information received from DPRs and their best estimates. The simplified traffic analysis, classified by 8 vehicle types, provides the average traffic counts for each type of Project road, as indicated in Table A3.1 below. Consequently, the traffic development trends in the last few years have been analyzed and the future traffic developments on Project roads were projected based on historical traffic development trends, future economic development and associated traffic demand.

Table A3.1. Average Traffic Count on the Project Roads
(AADT, number of vehicles in 2016)

Category of Roads under the Project	Car/Jeep / Van	Three Wheeler	Two Wheeler	Bus	LCV	Truck	Articulat Truck	Tractor	Total
Non-plan roads									
1. Construction	8	13	38	4	5	0	0	23	**91**
2. Resurfacing	20	22	51	6	7	0	0	30	**136**
3. First connectivity for villages/hamlets	29	30	62	6	10	2	0	34	**173**
4. Construction of missing link/structure	0	5	10	0	0	0	0	3	**18**
5. Approaches to school and colleges	20	26	63	5	0	0	0	0	**114**
6. Construction and maintenance of roads passing through Tribal areas	40	50	95	15	15	10	0	35	**260**
Plan roads									
1. Upgradation of metal to black top surface	58	70	85	10	15	0	0	35	**273**
2. Upgradation of earthen to black top surface	56	60	20	10	17	0	0	30	**193**
3. Resurfacing of village/other district roads	169	76	45	33	5	297	0	231	**856**
4. Upgradation of existing causeway/deep to high level bridge	101	72	92	20	16	14	5	40	**360**
5. Widening of village/other district roads	105	80	101	20	15	11	3	38	**373**

3. The traffic projections have been calculated for three time horizons, 2017–2020, 2021–2025, and beyond 2026. It was assumed that the average traffic growth rates will be about 8–10% in 2017–2020, given immediate high growth on the improved roads, especially for the new roads and missing links; about 7–8% in 2021–2025 and about 5–7% beyond 2026. In the traffic projections, diverted and suppressed traffic have been considered since some traffic from other roads would be diverted to the Project roads due to shorter distances and/or improved

road conditions. The traffic projections were used in the calculation of the Project's economic benefits.

C. Economic Analysis

4. **Economic costs**. The Project costs in the economic evaluation include capital costs and road maintenance costs. The Project capital cost is estimated at US$658 million by the R&BD. In the economic evaluation, such capital costs were converted into economic costs by applying a conversation factor (0.90) adopted from a similar project. According to the implementation schedule, the Project will be completed in about 2 years.

5. The average maintenance costs based on the national norm for black-top roads were provided by the R&BD. It was estimated that the routine maintenance costs would be INR 0.299 million per kilometer for the district roads (5.50 meters wide) and INR 0.17 million per kilometer for the VR (3.75 meters wide). According to the national standards, periodic maintenance (mainly resurfacing) needs to be carried out every 5 years, depending on traffic volumes. For the Project, periodic maintenance costs were estimated to be 20% of the capital cost for the newly constructed roads and 65% for the rehabilitated roads. Periodic maintenance of the Project roads has been estimated to be every 5 years, starting from 2023.

6. **Economic benefits**. Due to shorter distances and/or the improved road conditions, the vehicles on Project roads will operate at increased speed with reduced travelling time and operations & maintenance costs. Accordingly, savings in VOC and passenger time costs are the economic benefits considered in the economic analysis. Meanwhile, the improvement of transport condition and lower transport cost would promote local socioeconomic development. The promoted agriculture production was also considered in the project economic benefits. The economic benefits were calculated for 20 years starting in 2019.

7. **VOC savings.** The Project will construct roads for first or secondary connections to villages. Upon completion, the road conditions will be improved from current earthen or metal surface to black-top. The road roughness will be changed from an International Roughness Index (IRI) of 10–14 to IRI 3–5. The same will apply to roads resurfaced under the Project. Such improvements in road conditions will substantially reduce the VOC. According to the unit VOC provided by the R&BD, VOC savings per vehicle-km will be about INR1.57 for earthen roads that are black-topped, INR0.69 for metal roads that are black-topped, and INR0.34 for roads that are resurfaced. The secondary connection and missing link construction will shorten travel distances, at least 5 km for secondary connections and 10 km for missing links (currently most of the vehicles take other roads and travel longer distances). The VOC savings were also calculated for the generated traffic, but 50% of the benefits was considered.

8. **Passenger time cost savings**. On the shorter and/or improved roads, the vehicles will operate at faster speeds and will need less time to reach their destinations. According to the R&BD's estimates, the average vehicle speeds in the Project areas are about 10 to 20 km per hour on the earthen roads, 15 to 25 km per hour on the metal roads, 25 to 40 km per hour on the poor black-top roads, and 30 to 60 km per hour on the good black-top roads. The passenger travelling time on the new/improved roads will be substantially reduced. According to the state statistics, the GDP per capita in Gujarat was INR154,880 in 2015/2016. Hence, the average passenger's economic time cost was estimated at INR 38.72 per hour. Such time cost was applied to the calculations of passenger time cost savings for the Project. In the calculation, the

unit costs by passenger group, percentage of business trips, and average load of passenger vehicles were also considered. In addition, in the "without-project" case, the missing links are totally unusable during monsoon seasons, therefore road users need to take a longer route to pass the disconnected locations. For such cases, for the "with-project" case, it has been estimated that at least 0.5 hour would be saved for each vehicle trip.

9. **Promoted Agriculture Production**. Due to improved road condition, less traveling time and lower transport cost, the agriculture production in the rural areas will be promoted. The total tonnages of the freight vehicles were calculated at average loads in the project areas, 2 tons for light commercial vehicle, 6 tons for truck, 8 tons for articulated trucks, 2 tons for tractor, 0.5 tons for three wheeler, and 0.1 tons for two wheeler.[14] It was assumed that the promoted agriculture products would be about 15% and 10% of the total tonnages carried by the freight vehicles on the non-plan roads and plan roads respectively under the project. According to the agriculture products and average market prices in the project areas, it was estimated that the net profits would be at least INR 5,000 per ton and 7,000 per ton respectively on the non-plan roads and plan roads for the promoted agriculture products.[15] For the generated traffic, 50% of such benefits were considered in the project benefits estimation.

10. **EIRR**. The EIRR of the Project was calculated by comparing the economic costs and benefit streams for a period of 22 years, including 2 years of construction and 20 years of operation. The evaluation results show that the EIRR is 15.8% for the Project with an EIRR of 14.1% for the NPR and 18.4% for the PR. The lower EIRR for the NPR is mainly due to lower traffic volume, since these are mainly secondary roads which will generate social benefits that are not captured quantitatively. The Project's EIRR of 15.8% well exceeds the Bank's recommended opportunity cost of capital (12%), thereby providing economic justification for the investment.

11. **Sensitivity analysis**. The sensitivity analysis of the EIRR was carried out by varying the Project costs and benefits. The analysis suggests that the economic viability of the investment is robust to withstand significant variations in Project-specific parameters including i) capital cost over-runs, ii) maintenance cost over-runs, iii) delay in construction and iv) reduced economic benefits. The Project is well defined with detailed designs and bill of quantities already available and so, it is unlikely that the costs will increase significantly. Based on the RB&D's past experience in similar projects, the cost increases are very limited and insignificant. In spite of the above situation, the Project is still robust enough to withstand even (an unlikely) increase of 20% of the costs thus establishing firmly the economic viability of the investment. The economic evaluation and sensitivity analysis are shown in Table A3.2 and the detailed cash flows of the EIRR calculation are shown in Table A3.3.

[14] The average loads also considered empty vehicles.
[15] On the plan roads, the freight might also include some industrial products, which have higher value.

Table A3.2: Economic Evaluation and Sensitivity Analysis

Scenarios	EIRR %	Economic Net Present Value @ 12% INR million
Base Case	**15.8%**	**11,350**
Sensitivity Tests:		
Capital cost 10% higher	14.5%	8,135
Capital cost 20% higher	13.4%	4,919
Maintenance cost 10% higher	14.6%	7,647
Maintenance cost 20% higher	13.3%	3,945
Benefits 10% lower	13.1%	3,297
Implementation delay by one year (50% delay)	13.5%	5,020

Table A3.3: Economic Evaluation
Amounts in INR million

	Cost			Benefit				Net Benefit	Present Value
	Capital	Maintain	Total	VOC Saving	Passenger Time	Agriculture Production	Total		
2017	5,534		5,534					(5,534)	(4,941)
2018	34,138		34,138	397	530	-	927	(33,211)	(26,476)
2019		3,587	3,587	2,586	3,587	1,681	7,854	4,267	3,037
2020		3,695	3,695	2,895	3,857	2,189	8,941	5,246	3,334
2021		3,806	3,806	3,170	4,152	2,457	9,779	5,973	3,389
2022		3,920	3,920	3,430	4,471	2,669	10,570	6,650	3,369
2023	15,606	3,587	19,193	3,711	4,817	2,901	11,430	(7,763)	(3,512)
2024		3,695	3,695	4,017	5,193	3,153	12,363	8,668	3,501
2025		3,806	3,806	4,348	5,601	3,428	13,377	9,571	3,452
2026		3,920	3,920	4,585	5,911	3,631	14,127	10,207	3,286
2027		4,038	4,038	4,836	6,238	3,845	14,919	10,881	3,128
2028	15,606	3,587	19,193	5,101	6,583	4,073	15,757	(3,436)	(882)
2029		3,695	3,695	5,380	6,948	4,315	16,643	12,948	2,967
2030		3,806	3,806	5,675	7,334	4,572	17,581	13,775	2,819
2031		3,920	3,920	5,987	7,741	4,844	18,572	14,652	2,677
2032		4,038	4,038	6,317	8,171	5,133	19,621	15,584	2,542
2033	15,606	3,587	19,193	6,665	8,626	5,440	20,731	1,538	224
2034		3,695	3,695	7,032	9,106	5,767	21,905	18,210	2,368
2035		3,806	3,806	7,421	9,614	6,113	23,148	19,342	2,246
2036		3,920	3,920	7,832	10,150	6,481	24,463	20,543	2,130
2037		4,038	4,038	8,266	10,716	6,872	25,855	21,817	2,019
2038	15,606	3,587	19,193	8,725	11,315	7,288	27,328	8,135	672
							Net Present Value (NPV):		11,350
							Economic Internal Rate of Return (EIRR):		**15.8%**
							Discount Rate:		12%

D. Financial Analysis

12. The rural roads, unlike the expressways and highways, are not tolled and so do not have a revenue stream. Therefore, traditional financial evaluation (calculating the financial internal rate of return) was not performed. The availability of counterpart funding from the GoG and its willingness to commit this funding were assessed as a part of the financial analysis.

13. **Government fiscal revenue and allocation to rural road development**. Gujarat is one of the leading industrialized states in India. With just 5% of India's population and 6% of its land mass, it accounts for 7.5% of its GDP. In FY2015–FY2016, the total GDP of Gujarat reached INR 9,943.16 billion, with an annual increase rate of 11.1%. The GDP per capita was INR154,880. Along with the robust economic development, the fiscal revenue of the GoG maintained an increasing trend, with an average of 11.5% per year in the last 5 years, reaching INR 1,163.66 billion in 2015/16. To support its rural area development and anti-poverty program, the GoG has enhanced its efforts in rural road development. Fiscal allocations to rural road development have averaged a 20.6% annual increase in the past 5 years, especially NPR construction (average 53.2% per year). Table A3.4 provides the fiscal revenue and expenditures in the last 5 years, as well as the fiscal allocations to rural road development in the state.

Table A3.4. Fiscal Revenue and Allocation to Rural Road Development
(INR Million)

	2012/13	2013/14	2014/15	2015/16	2016/17
Total State Fiscal Revenue	752,285	799,757	919,778	974,826	1,163,660
Total State Fiscal Expenditure	698,585	752,585	866,517	957,785	1,131,299
Fiscal Allocation to R&BD					88,000
Fiscal Allocation to All Road Works					59,000
Fiscal Allocation to Rural Road Development					
for Plan Roads					
Construction	13,249	14,293	19,650	18,273	27,024
Maintenance	2,389	2,600	4,322	4,480	4,280
for Non-Plan Roads					
Construction	519	810	1,133	1,506	2,855
Maintenance					

Source: R&BD

14. **Counterpart funds**. Rural road development has always been a priority for the GoG. For the MMGSY, the GoG has so far allocated a budget of around US$600 million (INR40 billion) in total for FY2016–FY2017 and FY2017–FY2018, with US$225 million allocated (and disbursed to R&BD) in FY2016–FY2017 and another US$375 million allocated for FY2017–FY2018, thereby ensuring availability of counterpart funding for the Project. The allotted amounts will be received by R&BD in four tranches every year, with each disbursement happening at the beginning of the quarter. The budget allocations were verified by referring to the approved budget document of R&BD. The rural road development has always been a priority for GoG and accordingly, the budget allocation to rural development has seen an annual increase of 20% in the last few years.

15. **Financial sustainability**. The R&BD's current annual budget is around US$1.3 billion, out of which the budget allocation for the rural roads is around US$500 million. The budget allocation to rural roads development has seen an increase of approximately 20% every year and is expected to do so in future. This will ensure sufficient funds availability for further upgradation of rural roads and for the upkeep and maintenance of the roads constructed and strengthened under the MMGSY.

Annex 4: Sovereign Credit Fact Sheet

A. Recent Economic Development

India is a lower-middle-income country, with a population of 1.3 billion. India is also the world's 3rd-largest economy based on Purchasing Power Parity GDP. Indian real GDP expanded at an average annual rate of 7.3 percent between FY2003 and FY2012. In FY2012/13 and FY2013/14, real GDP growth had slowed to 5.1 percent and 6.9 percent, because of growing imbalances, binding supply constraints, and subdued sentiment.

However, since late 2014, a collapse of global oil prices has boosted economic activity in India and underpinned a further improvement in the current account and fiscal positions. It has also brought about a sharp decline in inflation. Growth reached 7.3 percent in FY2014/15 on the back of an improvement in sentiments. A range of supply-side measures (including release of surplus grain buffer stocks) and an appropriate monetary stance have also contributed to the decline in inflation, from an average of about 9.5 percent during 2011–2013 to 5.9 percent in FY2014/15.

Due to its reduced vulnerabilities and improved growth prospects, India experienced large foreign direct investment inflows in 2015. As a result, and in conjunction with the continued much-smaller current account deficit (largely due to continued low global commodity prices), international reserves have increased.

B. Economic Indicators

Selected Macroeconomic Economic indicators (2012/13–2016/17)

Economic Indicators	2012/13	2013/14	2014/15	2015/16*	2016/17*
National income and prices (change %)					
Real GDP	5.1	6.9	7.3	7.3	7.5
Industrial production	1.1	-0.1	2.8		
Consumer price (change %, average)	9.9	9.4	5.9	5.0	5.3
Central government operations (% of GDP)					
General government deficit	-7.4	-7.6	-7.0	-7.0	-7.0
External debt (% of GDP, EOP)	22.3	23.8	23.2	24.0	23.6
Gross external financing requirement (%GDP)		11.7	10.5	10.1	10.6
Nominal gross public debt (% of GDP)		65.8	66.3	65.7	64.8
Public gross financing needs (% of GDP)		12.2	12.1	12.1	11.9
Money and credit					
Broad money (% annual change, EOP)	13.6	13.4	10.8	11.1	13.6
Direct investment in India (% of GDP)	1.5	1.6	1.7	2.3	2.4
Gross reserves (months imports)	6.4	6.7	7.9	8.0	7.9
Current account balance (% of GDP)	-4.7	-1.7	-1.3	-1.3	-1.5
Exchange rate (Rupee/$, end period)	54.4	61.0	62.6	66.8	

Note: * denotes projected figures. Source: IMF Country Report No. 16/75, March 2016.
EOP = end-of-period

C. Economic Outlook and Risks

Looking ahead, Indian growth is projected at 7.3 percent for fiscal year FY2015, picking up to 7.5 percent in FY2016, supported by stronger domestic demand. However, economic risks remain tilted to the downside.

Despite the improvement in terms of trade due the decline in oil prices, the current account remains in deficit. Government deficits remain high, at around 7% of GDP. These imply a continuing reliance on external funding. The exchange rate has also weakened from USD 1.00 to INR 50 in 2011, to INR 67 in 2015.

At more than 60 percent of GDP, India's public debt level is relatively high compared to developing economies. Nevertheless, India's public debt remains sustainable so long as the economy continues to grow strongly and interest cost remains manageable. Under the baseline scenario, assuming gradual fiscal consolidation, the public debt-to-GDP ratio is forecast to decline gradually to around 61.6 percent of GDP in FY2020 from the current level of about 66 percent, with gross financing needs also declining slightly to about 10.7 percent of GDP in FY2020.

Externally, there could be disruptive impact arising from global financial market volatility stemming from unexpected developments in the course of U.S. monetary policy or China's growth slowdown. Domestic risks include continued weaknesses in corporate financial positions and public bank asset quality, in particular the banks that have lent heavily to infrastructure projects. There could also be setbacks in the reform process, which could weigh on growth. Realization of contingent liabilities coming from future bank recapitalization as well as the liabilities of the electricity distribution companies may also push the public debt trajectory up above the 70 percent benchmark, before the debt-to-GDP ratio declines gradually in the medium term.

Nevertheless, India's external debt, currently at 24 percent of GDP, remains sustainable.[16] India's reserves are also assessed to be adequate.

[16] International Monetary Fund (IMF), 2016. Country Report No. 16/75– 2016 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for India, March 2016.

Annex 5: Project Monitoring Tool – Road Project Monitoring System

1. The Road Project Monitoring System (RPMS) is a specialized web-based project monitoring software tool developed for the Project. RPMS enables monitoring of the Project's technical and financial progress at any point of time.

2. The Project involves construction, upgradation and maintenance of roads and bridges spread over a vast geographical area (33 districts) within Gujarat. It is critical for the R&BD's management to know the progress of the Project at any given point of time and without a system like the RPMS, collecting the progress reports from each district and collating them would be a time-consuming process with risk of inaccuracies characteristic of such manually compiled progress reports. The time needed for manual compilation also means it might be too late to implement mitigation measures by the time the R&BD's management identifies an issue.

3. The RPMS allows users to receive instant information on the Project's progress by providing information such as:

(i) Current status of the Project including approval information;
(ii) Actual physical and financial progress of every contract package;
(iii) Planned progress vs actual progress;
(iv) Photographic evidence of the works at the site which then can be used to verify the progress percentage reported;
(v) Details of quality checks done by the three-tier quality monitoring mechanism; and

(vi) Generation of various graphical reports and RPMS.

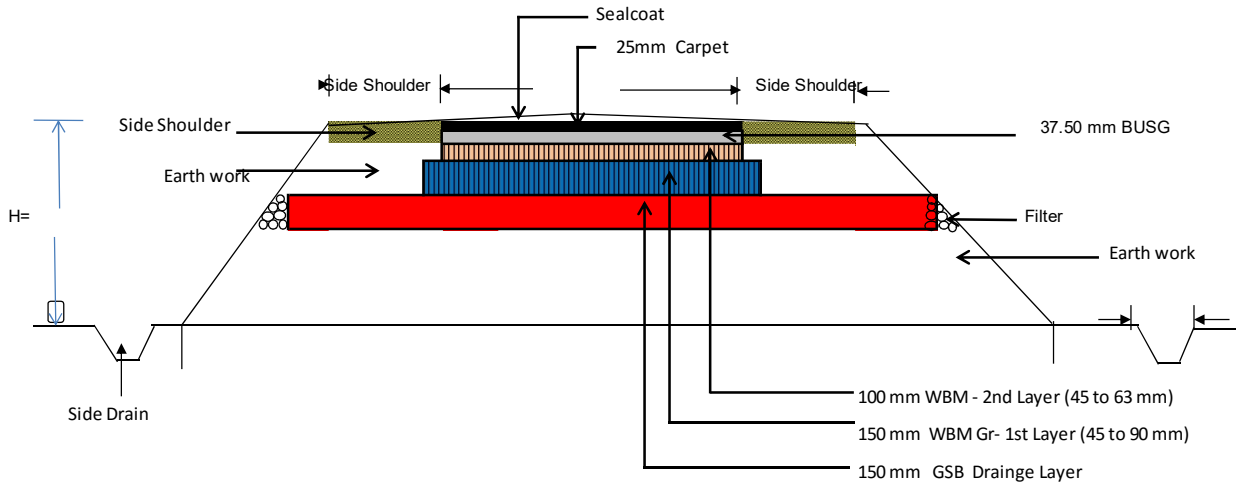
4. Key details of the Project, including the name of the sub-project or the road, length of the stretch of road or bridge to be constructed or upgraded, scope and timelines are keyed into the RPMS at the start of the Project by the R&BD. From then on, the field engineers of R&BD will update the progress regularly with photographic evidence. Any user with a web connection, a user name and a password (to be provided by the R&BD) will be able to access the RPMS to view the progress thus uploaded by the field engineers. The users, depending on the need, can also generate various graphical reports and management reports. The field engineers can enter the data regularly, with an alarm set if the data are not entered at specific intervals.

5. The Bank would be given a user name and password to access the RPMS. The Bank will rely heavily on RPMS reports to monitor progress apart from assessing the progress during its supervision missions. With more rural roads expected to follow such a programmatic approach in the other states across India, successful implementation of the RPMS in the Project will act as a template for future engagements of the Bank in similar projects.

Annex 6: Typical Cross Sections of MMGSY Roads and Bridges

Typical Cross Sections – MMGSY		
Sr. No.	**Description**	**Plate No**
A)	**Provision for Non-Plan Roads**	
1a)	Construction	Plate-1
1b	Resurfacing	Plate-3
2	Connectivity for Villages	Plate-1
3	Construction of Missing Link / Missing Link Structures	Plate-1
4	Approaches to Schools, Colleges	Plate-1A
5	Construction and Maintenance of Road passing through Tribal Area	
	a) For Construction	Plate-1
	b) For Maintenance	Plate-3
B)	**Provision for Plan Roads**	
6	Upgradation of Metal to Black-top Surface	Plate-2
7	Upgradation of Earthen to Black-top Surface	Plate-1
8	Resurfacing of Village / Other District Road	Plate-3
9	Upgradation of Existing Causeway/ Deep to High-level Bridge	
	a) Slab Drain	Plate-5
	b) Mass Concrete Pier & Abutment	Plate-6
10	Widening of Village / Other District Road	Plate-4

TYPICAL CROSS SECTION - PLATE 1



TYPICAL CROSS SECTION OF ROAD (Not to Scale)

This Cross Section is applicable to following type of Roads.

A) Non-Plan Roads

1a) Construction

2 Connectivity for Villages / Hamlets

3 Construction of Missing Link / Missing Link Structures (Only Missing Link Road Part)

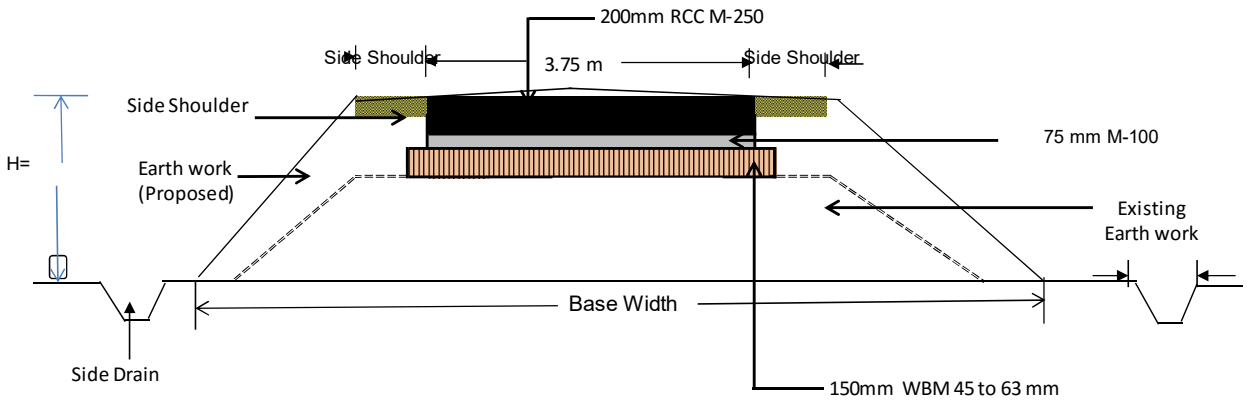
5 Construction and Maintenance of Road passing through Tribal Area (Only New Construction Part)

B) Plan Roads

7 Up gradation of Earthen to Black top Surface

LEGEND	
	G.S.B. (Granular Sub Base)
	WBM- Gr1 {Water Bound Macadam (45 - 90 mm)}
	WBM - 2nd Layer Water Bound Macadam (45 - 63 mm)
	BUSG (Built up Spray Grout)
	Carpet & Seal Coat
	Side Shoulder

TYPICAL CROSS SECTION - PLATE 1A



TYPICAL CROSS SECTION OF ROAD (Not to Scale)

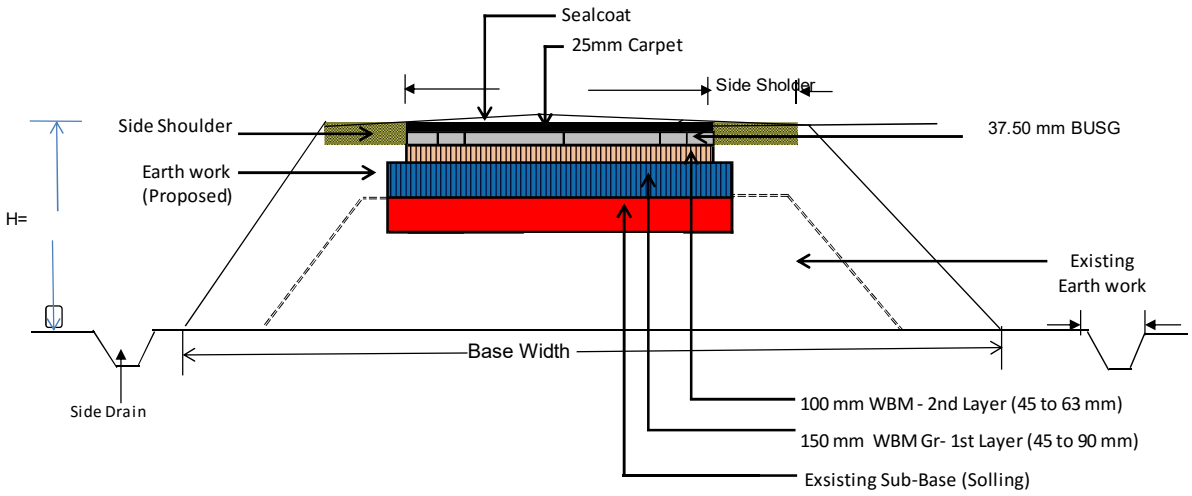
This Cross Section is applicable to following type of Roads.

A) Non-Plan Roads

4 Approaches to Schools, Colleges

LEGEND	
	WBM - 2nd Layer Water Bound Macadam (45 - 63 mm)
	75 mm Cement Concrete M-100
	200mm Reinforced Cement Concrete M-250
	Side Shoulder

TYPICAL CROSS SECTION - PLATE 2



TYPICAL CROSS SECTION OF ROAD (Not to Scale)

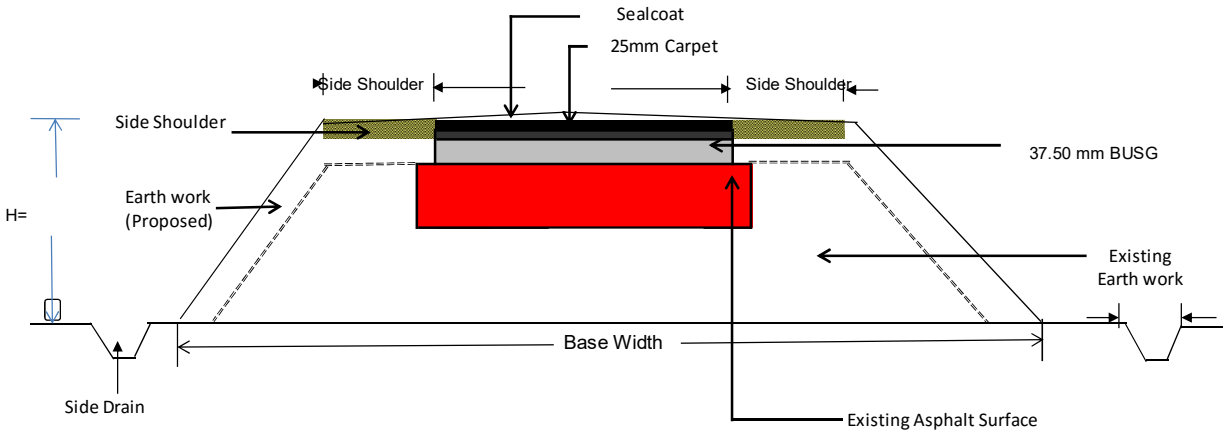
This Cross Section is applicable to following type of Roads.

B) Plan Roads

6 Upgradation of Metal to Black top Surface

LEGEND	
	Exsiting Sub Base (Solling)
	WBM- Gr1 {Water Bound Macadam (45 - 90 mm)}
	WBM - 2nd Layer Water Bound Macadam (45 - 63 mm)
	BUSG (Built up Spray Grout)
	Carpet & Seal Coat
	Side Shoulder

TYPICAL CROSS SECTION - PLATE 3



TYPICAL CROSS SECTION OF ROAD (Not to Scale)

This Cross Section is applicable to following type of Roads.

A) Non-Plan Roads

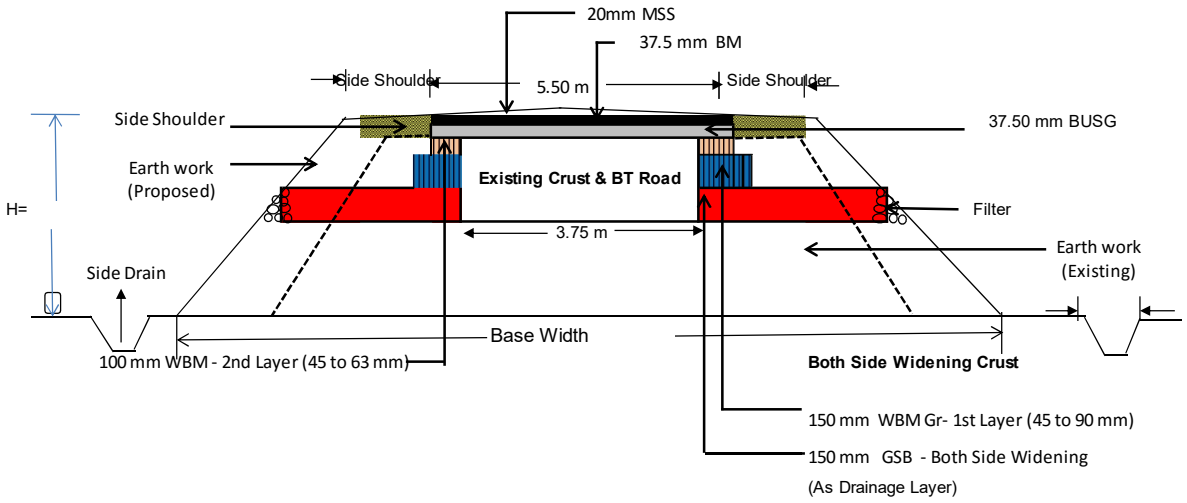
1b Resurfacing

B) Plan Roads

8 Resurfacing of Village / other district roa

LEGEND	
	Existing Asphalt Surface
	BUSG (Built up Spray Grout)
	Carpet & Seal Coat
	Side Shoulder

TYPICAL CROSS SECTION - PLATE 4



TYPICAL CROSS SECTION OF ROAD (Not to Scale)

This Cross Section is applicable to following type of Roads.

B) Plan Roads

10 Widening of Village / Other District Road

LEGEND
G.S.B. (Granular Sub Base)
WBM- Gr1 {Water Bound Macadam (45 - 90 mm)}
WBM - 2nd Layer Water Bound Macadam (45 - 63 mm)
BUSG (Built up Spray Grout)
Bitumen Macadam & Mix Seal Surfacing
Side Shoulder

PLATE-5 EXISTING CAUSEWAY ELEVATED BY SLAB

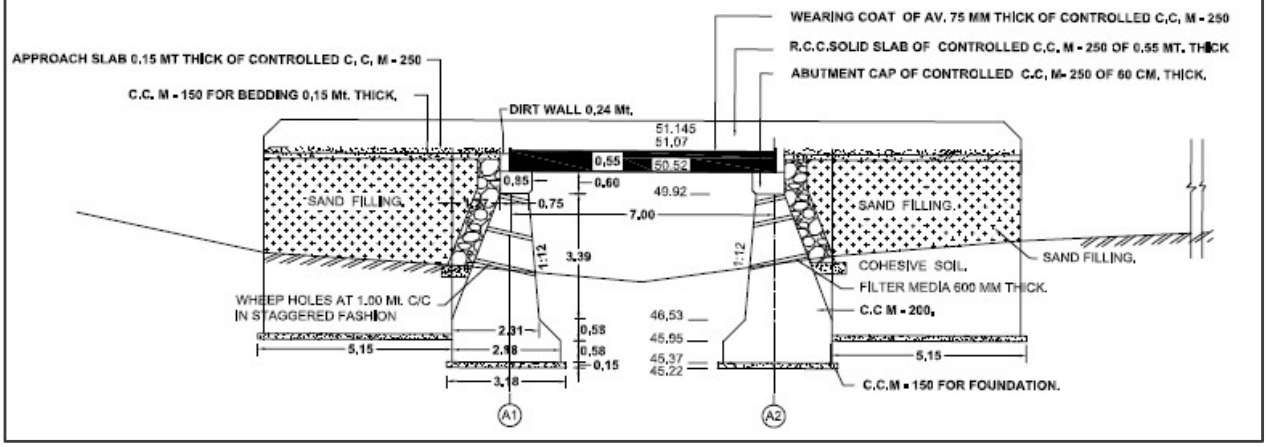
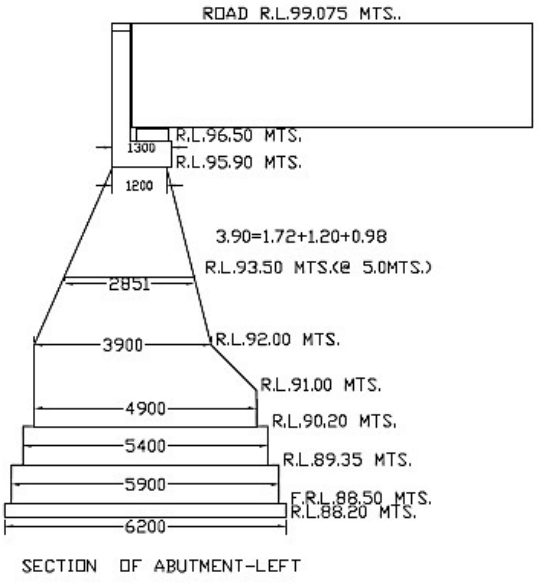
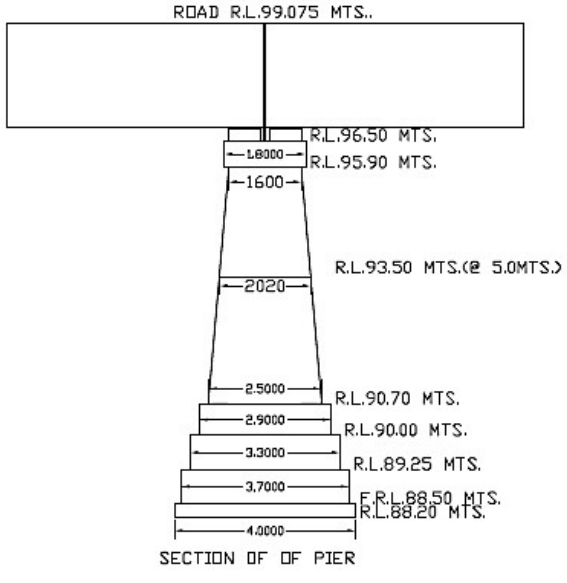


PLATE -6 TYPICAL CROSS SECTION FOR MASS CONCRETE PIER & ABUTMENTS



SECTION OF ABUTMENT-LEFT



SECTION OF OF PIER

PLATE-7 TYPICAL PIPE CULVERT