



# Report and Recommendation of the President to the Board of Directors

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Project Number: 48373-007  
June 2016

## Proposed Loan and Technical Assistance Grant India: Bihar New Ganga Bridge Project

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Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 16 May 2016)

Currency unit – Indian rupee/s (Re/Rs)

Re1.00 = \$0.014923

\$1.00 = Rs67.0100

## ABBREVIATIONS

ADB	–	Asian Development Bank
BSRDCL	–	Bihar State Road Development Corporation Limited
EIA	–	environmental impact assessment
km	–	kilometer
LIBOR	–	London interbank offered rate
NGO	–	nongovernment organization
O&M	–	operation and maintenance
PAM	–	project administration manual
TA	–	technical assistance

## NOTES

- (i) The fiscal year (FY) of the Government of India and its agencies begins on 1 April and ends on 31 March. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2016 begins on 1 April 2015 and ends on 31 March 2016.
- (ii) In this report, “\$” refers to US dollars.

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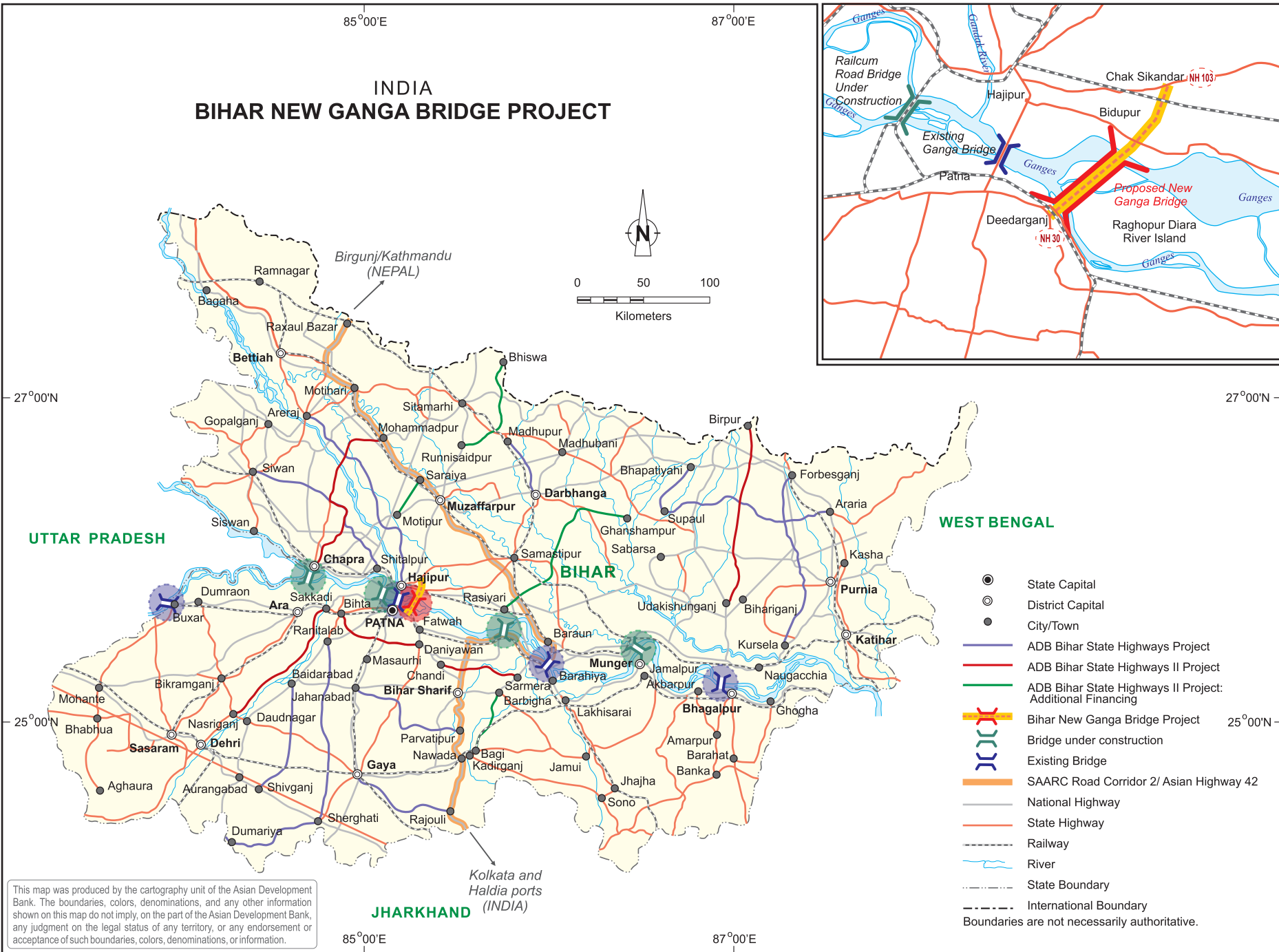
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## PROJECT AT A GLANCE

<b>1. Basic Data</b>		<b>Project Number: 48373-007</b>	
<b>Project Name</b>	Bihar New Ganga Bridge Project	<b>Department /Division</b>	SARD/SATC
<b>Country</b>	India	<b>Executing Agency</b>	Bihar State Road Development Corporation Ltd.
<b>Borrower</b>	India		
<b>2. Sector</b>	<b>Subsector(s)</b>	<b>ADB Financing (\$ million)</b>	
✓ <b>Transport</b>	Road transport (non-urban)		500.90
		<b>Total</b>	<b>500.90</b>
<b>3. Strategic Agenda</b>	<b>Subcomponents</b>	<b>Climate Change Information</b>	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	Adaptation (\$ million)	200.00
Environmentally sustainable growth (ESG)	Global and regional transboundary environmental concerns	Climate Change impact on the Project	High
Regional integration (RCI)	Pillar 1: Cross-border infrastructure		
<b>4. Drivers of Change</b>	<b>Components</b>	<b>Gender Equity and Mainstreaming</b>	
Governance and capacity development (GCD)	Organizational development	Some gender elements (SGE)	✓
Private sector development (PSD)	Public sector goods and services essential for private sector development		
<b>5. Poverty Targeting</b>		<b>Location Impact</b>	
Project directly targets poverty	No	Regional	High
<b>6. Risk Categorization:</b>	Complex		
<b>7. Safeguard Categorization</b>	Environment: A Involuntary Resettlement: A Indigenous Peoples: C		
<b>8. Financing</b>			
<b>Modality and Sources</b>		<b>Amount (\$ million)</b>	
<b>ADB</b>		<b>500.90</b>	
Sovereign Project loan: Ordinary capital resources		500.00	
Sovereign Capacity development technical assistance: Technical Assistance Special Fund		0.90	
<b>Cofinancing</b>		<b>0.00</b>	
None		0.00	
<b>Counterpart</b>		<b>215.00</b>	
Government		215.00	
<b>Total</b>		<b>715.90</b>	
<b>9. Effective Development Cooperation</b>			
Use of country procurement systems		No	
Use of country public financial management systems		Yes	



# INDIA BIHAR NEW GANGA BRIDGE PROJECT



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## I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to India for the Bihar New Ganga Bridge Project. The report also describes the proposed technical assistance (TA) for the Strengthening Bridge Operation and Management Project, and if the Board approves the proposed loan, I, acting under the authority delegated to me by the Board, approve the TA.<sup>1</sup>

2. The project will construct a new road bridge (the new Ganga Bridge) across the Ganges River and an integrated approach roadway network in the state of Bihar. It will improve transport connectivity between north and south Bihar, which is divided by the Ganges River, and better link Patna, the state capital city, and the surrounding areas. The main bridge structure of about 9.8 kilometers (km) is expected to become the longest river bridge in India. It will have a transformational impact by promoting the geographical integration of Bihar, and help balance the benefits of social economic development. In the regional context, it is strategically located near India's neighboring country of Nepal, and will enhance the existing road corridors between the two countries. This will lead to greater physical cross-border connectivity, which is supported by the Regional Cooperation and Integration Strategy of the Asian Development Bank (ADB).<sup>2</sup>

## II. THE PROJECT

### A. Rationale

3. Bihar is the 12th largest state in India by area, the 3rd most populous with about 104 million inhabitants, and the 6th most densely populated. It is in the eastern region of the country, bordering Uttar Pradesh in the west, West Bengal in the east, and Jharkhand in the south. The Ganges River flows through the middle of the Bihar plain from west to east, physically dividing the state into northern and southern regions. The northern region is bound by Nepal. Bihar has lagged behind other states in terms of social and economic development. According to Government of India estimates based on 2011–2012 data, 34% of Bihar's population lives below the poverty line, compared with 22% nationally.<sup>3</sup> Bihar continues to be at the bottom among major states in India with per capita income in 2013–2014 of only 39% (Rs15,650) of the national average (Rs39,904), although the gap has since narrowed thanks to increased investment in social infrastructure and improved governance.<sup>4</sup>

4. The problem of low per capita income in Bihar is accentuated by the physical north–south divide. In 2012, district-wise per capita gross domestic product was on average 40% higher among districts in the south (footnote 4). Among the 38 districts of the state, 7 of the 10 most prosperous districts were in the south, while 7 of the 10 poorest districts were in the north. This disparity is clearly attributed to the Ganges River and its enormous scale, which makes providing connectivity between north and south Bihar a very difficult task. Currently, along the entire length of the Ganges River in Bihar (approximately 200 km), only four bridges are operational, and the combined capacity is far too limited to meet traffic demand.<sup>5</sup> This not only constrains connectivity but also overall socioeconomic development.<sup>6</sup>

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<sup>1</sup> The design and monitoring framework is in Appendix 1.

<sup>2</sup> ADB. 2006. *Regional Cooperation and Integration Strategy*. Manila.

<sup>3</sup> Government of India, Planning Commission. 2013. *Press Note on Poverty Estimates, 2011–2012*. Delhi.

<sup>4</sup> Government of Bihar, Finance Department. 2015. *Economic Survey, 2014–2015*. Patna.

<sup>5</sup> As shown on the map, three bridges are between north and south Bihar (Gandhi Setu, Rajendra Setu, and Vikramshila Setu), and one bridge is between south Bihar at Buxar and the state of Uttar Pradesh in the west.

<sup>6</sup> The combined volume–capacity ratio is currently about 1.6—already three times higher than the desired level.

5. Four new bridges are under construction at critical locations to help remove the growing constraint on connectivity.<sup>7</sup> Moreover, the proposed project will construct a new Ganga Bridge, located about 10 km downstream and east of Patna. The main objective is to provide badly needed additional capacity, and improve connectivity for Patna and the surrounding areas. This includes the Raghapur Diara river island, which is situated and cut off in between two channels of the Ganges River. Its 250,000 inhabitants now have only a seasonal link (pontoon bridge) connecting it to Patna, apart from boats. The new Ganga Bridge will span the entire width of the Ganges River, including the two channels, with access ramps to the Raghapur Diara river island, and connect to nearby national highways along the north and south banks of the Ganges River. It will also serve as an alternative to the existing Ganga Bridge (also called Mahatma Gandhi Bridge), which currently is the main link between Patna and north Bihar. The old bridge is deteriorating and has insufficient capacity, which sees severe traffic congestion.<sup>8</sup>

6. The new Ganga Bridge, together with the other bridges already under construction, will provide the required transport capacity between north and south Bihar, and significantly improve connectivity. It will substantially reduce the travel time to Patna from the surrounding regions, in particular north Bihar, which will ease access to the state's administrative and social services, and health and higher education facilities. The inhabitants of the Raghapur Diara river island will gain year-round road access, allowing children access to higher-level schooling and women better access to pre- and postnatal health care. It will help balance the benefits of developments in agriculture, tourism, and industrial sectors, and contribute to achieving the priority goal of the Government of Bihar—to connect Patna to the remotest areas in the state, so that people can reach the capital in no more than 6 hours from any place within the state.

7. The Government of Bihar has stepped up investments in the development of quality infrastructure. Since 2008, ADB has provided three loans totaling \$1.02 billion to upgrade 1,466 km of state highways in north and south Bihar, linking rural areas to national highways. With these collectively, the new Ganga Bridge will improve mobility and accessibility between north and south Bihar, and is critical to ensuring that the overall development impact is optimized and its benefits are fully reaped. The new bridge is integral to the vision and action plan of the Road Master Plan for Bihar's State Highways Development, a 20-year strategy (2015–2035) prepared with ADB assistance to direct further investment into fostering overall economic development in the state.<sup>9</sup>

8. **Regional connectivity.** In the context of regional connectivity with India's neighboring countries, the new Ganga Bridge is strategically located at about 190 km southeast from Raxaul, an Indian border town across from Birgunj in Nepal, which enables major cross-border movement of goods and people between the two countries. The bridge will allow better distribution of traffic on the road network, which includes the international and regional trade corridors that connect Nepal to the eastern, northern, and northeastern states of India, including access to ports at Kolkata and Haldia in West Bengal.<sup>10</sup> The project complements ADB's ongoing support to the South Asia Subregional Economic Cooperation.<sup>11</sup>

<sup>7</sup> As shown on the map, two bridges by the Government of Bihar (Arrah–Chhapra and Bakhiarpur, to be operational in 2018), and two rail-cum-road bridges by the Government of India (Digha and Munger, to be operational in 2017).

<sup>8</sup> Urgent repairs are being made to maintain operations on the Ganga Bridge, albeit at reduced capacity, while the Government of India is considering options for its complete rehabilitation.

<sup>9</sup> ADB. 2012. *Technical Assistance for Road Master Plan for Bihar's State Highway Development*. Manila (TA 8170-IND, \$1,000,000, approved on 20 September).

<sup>10</sup> Asian Highway No. 42, which is also the South Asian Association for Regional Cooperation Corridor 2.

<sup>11</sup> The South Asia Subregional Economic Cooperation program is a project-based partnership that aims to strengthen cross-border transport networks that boost intraregional trade in the subregion (Bangladesh, Bhutan, India, the Maldives, Nepal, and Sri Lanka).



9. **Sustainable maintenance.** In 2013, the Government of Bihar enacted the Bihar Road Assets Maintenance Policy, which requires the execution of maintenance works throughout the design life of road infrastructure in place and under construction. The annual maintenance budget has more than doubled—from Rs3.500 billion in fiscal year (FY) 2012 to Rs8.932 billion in FY2015—thanks to increasing revenue from vehicle registration and license fees. Long-term performance-based maintenance by the private sector is also being encouraged to provide greater efficiency. In keeping with this, the contract for the new Ganga Bridge also includes post-completion performance-based maintenance for 5 years, to be financed by the state government. This approach, and a contract modality that combines engineering, procurement, and construction, optimizes incentives for design and construction quality while allowing the use of best practices and innovations for efficiency and economy. It emphasizes efficient use of available resources, and this is consistent with one of ADB's strategic drivers of change being adapted in the development of the private sector.

10. **Climate change resilience.** The probability analysis of rainfall extremes over the Ganges basin has shown a growing trend in maximum 1-day rainfall and in the count of consecutive rainfall days.<sup>12</sup> In view of this, the new Ganga Bridge will span from bank to bank over the two river channels and the Raghapur Diara river island. This helps minimize effects on the river regime and is an important climate adaptation measure because the alternative option of constructing an embankment road on Raghapur Diara river island, while less costly, could be vulnerable to floods. The bridge will also meet the navigation clearance requirements of India's Inland Waterways Authority, e.g., vertical clearance of 10 meters from the highest recorded flood level, and horizontal clearance of 100 meters between two piers of the bridge. This is maintained throughout the entire bridge length to accommodate the possibility of any future changes in the river morphology and meandering of the river channels.

11. **Finance plus.** The new Ganga Bridge will have a transformational impact by promoting the geographical integration of Bihar and helping balance the benefits of socioeconomic development. It will also have a systemic impact on large-scale bridge design and construction in India by introducing new engineering and technology, a first of its kind and scale in India.<sup>13</sup> This also includes the implementation of stringent environmental safeguard measures, and a biodiversity conservation plan that will monitor changes to the local biodiversity in the project area and implement conservation activities to avoid any net loss of biodiversity as a result of the project. These activities will be carried out by a joint venture of reputed international and national design-build contractors, and supervised by international and national experts, comprising a project management consulting team. This will enable the local industries to gain valuable experience and know-how that can be replicated for greater benefits in the future.

## B. Impact and Outcome

12. The impact will be improved mobility and accessibility within India, and connectivity with its neighboring countries.<sup>14</sup> The outcome will be improved transport connectivity across the Ganges River between north and south Bihar.

<sup>12</sup> Project Climate Risk Assessment and Management Reporting (accessible from the list of linked documents in Appendix 2).

<sup>13</sup> The adopted extradosed bridge design incorporates characteristics of a cable-stayed and externally stressed concrete-box segmental structure, which optimizes economy and efficiency. It will become the longest river bridge in India.

<sup>14</sup> Government of India, Planning Commission. 2013. *Twelfth Five-Year Plan, 2012–2017 Economic Sectors*. Volume II. New Delhi.

### C. Outputs

13. The project output will be the construction of the new Ganga Bridge and an integrated approach roadway network consisting of about 9.8 km of bridge structures, about 10 km of approach viaduct and embankments, widening of about 3 km of NH-103, and tolling and service facilities from Deedargunj on NH-30 in Patna district to Chak Sikandar in Vaishali district on NH-103. The loan will also finance consulting services for project management and authority engineer team, and external monitor for environmental safeguards. The TA will enhance bridge operation and management capacity by financing the preparation of an operation management plan for the new Ganga Bridge, development of model maintenance manuals for existing major bridges in Bihar, and transfer of knowledge in international best practices for bridge operation and management.

### D. Investment and Financing Plans

14. The project is estimated to cost \$715 million (Table 1).

**Table 1: Project Investment Plan**  
(\$ million)

Item	Amount <sup>a</sup>
<b>A. Base Cost<sup>b</sup></b>	
1. Works for main bridge and approach roads	483.85
2. Consulting services	17.32
3. Land acquisition and resettlement <sup>c</sup>	127.58
4. Project management	33.87
<b>Subtotal (A)</b>	<b>662.62</b>
<b>B. Contingencies<sup>d</sup></b>	<b>40.80</b>
<b>C. Financing Charges During Implementation<sup>e</sup></b>	<b>11.58</b>
<b>Total (A+B+C)</b>	<b>715.00</b>

<sup>a</sup> Includes estimated taxes and duties of about \$41.88 million for works to be financed from government resources by cash contribution, and about \$2.67 million for consulting services to be financed from the Asian Development Bank (ADB) loan resources. The amount from ADB loan resources is within the threshold identified during the preparations for the country partnership strategy (not exceeding 10% of the project cost), is not excessive (0.53% of ADB loan resources), applies only to ADB-financed expenditures, and is material and relevant to the success of the project.

<sup>b</sup> In end-2015 prices.

<sup>c</sup> Includes estimated expenses of about \$0.19 million for a local nongovernment organization toward facilitating resettlement and rehabilitation activities.

<sup>d</sup> Physical contingencies computed at 3.0% for works and consulting services. Price contingencies computed at 2.5% on foreign exchange costs and at 5.5% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

<sup>e</sup> Includes interest and commitment charges. Interest during construction for the ADB loan has been computed at the 5-year forward London interbank offered rate (LIBOR) plus a spread of 0.5% and applicable maturity-based premium of 10 basis points. Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

15. The Government of India has requested a loan of \$500 million from ADB's ordinary capital resources to help finance the project. The loan will have a 26-year term, including a grace period of 5 years, an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, a commitment charge of 0.15% per year, and such other terms and conditions to be set forth in the draft loan and project agreements.

16. The Government of India has requested that repayment follow the straight-line repayment option in equal installments. Based on this and the above loan terms, the average loan maturity is 15.75 years and the maturity premium payable to ADB is 0.10% per annum. The Government of India will make available the loan proceeds to the Government of Bihar on a back-to-back basis.

17. The financing plan is in Table 2. The detailed cost estimates by expenditure category and detailed cost estimates by financier are in the project administration manual (PAM).<sup>15</sup>

**Table 2: Financing Plan**

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank	500	70
Government of Bihar	215	30
<b>Total</b>	<b>715</b>	<b>100</b>

Source: Asian Development Bank estimates.

### E. Implementation Arrangements

18. The implementation arrangements are summarized in Table 3 and described in detail in the PAM.

**Table 3: Implementation Arrangements**

Aspects	Arrangements		
Implementation period	January 2016–December 2020		
Estimated completion date	31 December 2020	Loan closing date	30 June 2021
Management			
Executing agency	Government of Bihar acting through the Bihar State Road Development Corporation Limited		
Procurement	International competitive bidding	1 contract	\$483.85 million
Consulting services	Project management and authority engineer, using QCBS	1 contract	\$15.14 million
	External monitoring for environmental safeguard, using QCBS	1 contract	\$0.98 million
Retroactive financing and advance contracting	Advance contracting and retroactive financing for works and consulting services. Retroactive financing is available for up to 20% of the loan amount for expenditures incurred up to 12 months before loan signing.		
Disbursement	The loan proceeds will be disbursed in accordance with ADB's <i>Loan Disbursement Handbook</i> (2015, as amended from time to time) and detailed arrangements agreed upon between the government and ADB.		

ADB = Asian Development Bank, QCBS = quality- and cost-based selection.

Source: Bihar State Road Development Corporation Limited.

### III. TECHNICAL ASSISTANCE

19. A capacity development TA is proposed to accompany the project. The objective of the TA is to enhance existing institutional capacity necessary to effectively operate and manage the new Ganga Bridge and other major bridges in the state. The key outputs and activities involve (i) preparing an operation management plan for the new Ganga Bridge that covers comprehensively all relevant aspects, including administration and organization, user services and quality, inspection, and maintenance procedures; (ii) developing a model maintenance manual for major bridges in about four selected districts, which can be replicated for other

<sup>15</sup> Project Administration Manual (accessible from the list of linked documents in Appendix 2).

districts in the state and which includes conducting condition surveys, prioritizing maintenance requirements, preparing cost estimates, and formulating a rolling work plan and budget; and (iii) learning international best practices, including on-the-job training of managers and technical staff during the above TA activities, in-house technical workshops, and overseas training, including case studies and observations.<sup>16</sup>

20. The TA is estimated to cost \$1,000,000, of which \$900,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF-other sources). The Government of Bihar acting through BSRDCL will be the executing agency. BSRDCL will provide counterpart support in the form of counterpart staff, office accommodation, and other in-kind contributions. The TA will be implemented from January 2017 to December 2018.

#### IV. DUE DILIGENCE

##### A. Technical

21. The location and alignment of the bridge and the approach road network are considered best among the alternatives reviewed during project preparation given the existing road network pattern, as well as minimal land acquisition, dislocation, and environmental impact. A hydrological survey of the Ganges River in the influence area was conducted and the historical data was collected from the Central Water Commission, which established the basis for the hydraulic design parameters, such as the river discharge and highest flood level. The main structure adopted is an extradosed bridge, which incorporates characteristics of cable stay and externally prestressed concrete box segmental structure, optimizing economy and efficiency for construction and maintenance in accordance with applicable international design standards. The environmental management plan includes provisions requiring the contractor to ensure the safety of workers and mitigate the accident risk from construction activities.

22. **Road safety.** The project management and authority engineer team will conduct a road safety audit and assessment, and make sure that any countermeasures proposed are incorporated in the detailed design. The team will also collaborate with a local nongovernment organization (NGO) to be engaged by BSRDCL for rehabilitation and resettlement activities. The NGO will also conduct road safety awareness campaigns in the local communities and secure the participation of women and school teachers for dissemination to children.

##### B. Economic and Financial

23. An economic analysis was carried out by comparing the societal cost of transportation with and without the project, considering the benefits of better connectivity between north and south Bihar as well as all-year connectivity to Raghapur Diara river island and its 250,000 inhabitants. The project will add capacity across the Ganges River and enable shorter travel times within its influence area. The added capacity will help decrease traffic on other bridges up- and downstream, thus reducing congestion, improving travel times, and lowering vehicle operating costs on these bridges. The analysis also considered the transport cost savings to inhabitants of the Raghapur Diara river island. Without the project, those inhabitants depend on boats for most of the year and a seasonal pontoon bridge, making the transport of passengers and goods very costly, and reducing the residents' ability to market the produce from their fertile land. Taking into account the benefits arising from the project, the economic internal rate of return is estimated at 16%, indicating that the project is viable in social cost–benefit terms. The

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<sup>16</sup> Attached Technical Assistance (accessible from the list of linked documents in Appendix 2).

sensitivity analysis tested the effects of possible unfavorable scenarios resulting from changes in the key parameters that determine the project's costs and benefits. The economic viability remained satisfactory at an economic internal rate of return of 13.7-14.9% above the 12% cutoff. The project will also provide large additional benefits to the residents of the Raghapur Diara river island in terms of better access to education and health facilities, and increased marketability of their produce, thus improving their socioeconomic situation.

24. The Government of Bihar intends to collect user fees in the form of toll charges, except for traffic from Raghapur Diara river island. A financial analysis was carried out to assess the viability of meeting the operation and maintenance (O&M) costs. It was done on an incremental basis using the discounted cash flow method and calculating the internal rate of return of the project. The capital cost includes construction of the bridge and its approaches. The O&M cost includes routine and periodic maintenance of the facility created. All financial projections are in 2015 nominal Indian rupees with no adjustment for inflation. The estimated financial internal rate of return for the project in real terms is 4.6%, which is above the estimated weighted average cost of capital of 2.3%. The cash flow projections indicate that the project would generate sufficient liquid cash resources to allow the project to meet its O&M costs and meet debt service obligations over the analysis period. BSRDCL's financial health is in good standing overall.<sup>17</sup>

### C. Governance

25. **Policy, legal, and institutional capacity.** BSRDCL was incorporated on 20 April 2009 under the Companies Act of 1956, and is a wholly owned company of the Government of Bihar, established to develop, execute, manage, and maintain all types of roads, highways, and bridges. BSRDCL has an 11-member board of directors and is headed by a managing director, with about 108 staff members.<sup>18</sup> The corporate structure was developed along good-practice principles, and a sound culture is emerging with an understanding of company values, which aim to provide high-class standards with regard to safety, performance, and user satisfaction, and to operate under sound ethical standards.

26. **Financial management.** A financial management assessment was conducted, considering the capacity of BSRDCL, including fund-flow arrangements, governance, staffing, budgeting, accounting and financial reporting systems, internal control procedures, financial information systems, and internal and external auditing arrangements. BSRDCL follows a double-entry, accrual accounting and reporting process, in accordance with the generally accepted accounting principles in India, and in compliance with the relevant provisions of the Companies Act of 2013 to the extent applicable. BSRDCL is experienced and familiar with managing ADB-financed projects. Further improvements to reporting procedures and accounting software are described in the PAM. The overall financial management arrangements are considered satisfactory, and the overall risk is moderate.

27. **Procurement and anticorruption measures.** All procurement of goods and works will be undertaken in accordance with ADB's Procurement Guidelines (2015, as amended from time to time). All consultants will be recruited in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and BSRDCL. The specific policy requirements and supplementary measures are described in the PAM.

<sup>17</sup> The recurrent cost for the project is about 2.8% of BSRDCL's annual expenditure.

<sup>18</sup> The current managing director is the secretary of the Road Construction Department. The board is chaired by the development commissioner of the Government of Bihar.

## D. Poverty and Social

28. A poverty and social survey of 366 households was conducted, and 8 focus group discussions were held in 18 villages. Respondents felt that the project would make access and mobility more reliable. The project will greatly benefit northern Bihar, including the Raghapur Diara river island, where socioeconomic indicators are low and the lack of reliable connectivity has hindered growth and development. Improved cross-river connectivity will allow residents in the north to transport their products more quickly to market centers in the south, and will also improve their profit margins since they will no longer depend solely on local markets and middlemen, or face long transport times. An estimated 9.3 million people live in the project districts and will experience the economic benefits brought about by the project.<sup>19</sup>

29. **Gender and development.** Most women in the project area are involved in household work. The project will improve connectivity, giving them better access to health services, higher levels of education, economic opportunities, and social interactions. Women living on the northern banks of the Ganges River and on the Raghapur Diara island will benefit in particular. Land acquisition and resettlement will affect 56 households headed by women. Special attention will be given to these households to ensure that they are equally well or better off than before the project. Meaningful consultations with women guided the design of practical and implementable gender-proactive features: (i) gender-sensitive design of project components, including separate toilets and rest areas for men and women, and lighting for pedestrians; (ii) grassroots road safety and safe mobility campaigns involving the participation of women, with a target of 30% as trained facilitators and 50% as beneficiaries; and (iii) awareness training on issues related to sexually transmitted infections for all project-affected communities and all contractors' staff before and during construction, targeting a 50% participation rate for women. Civil works contracts will have provisions to ensure that all applicable labor laws are complied with, including equal pay for men and women for work of equal value. Contractors are also encouraged to employ local women.

30. **HIV/AIDS and trafficking.** Bihar is characterized as a low-HIV-prevalence state with an estimated adult HIV prevalence of 0.20%, lower than the national rate of 0.27%. Of 123,873 people in Bihar estimated to be living with HIV/AIDS, 39% are women. Major efforts in awareness building, prevention, and treatment are undertaken by the health department and the Bihar AIDS Control Society at the state, district, and block levels. Based on public consultations, the project incorporates measures to mitigate HIV/AIDS risks, such as NGOs undertaking semiannual awareness programs at construction sites and in project-influenced areas, in particular at important village locations and in schools and offices. Awareness-building will be conducted separately for men and women to discuss gender-specific issues. To combat the risk of human trafficking, the Government of Bihar launched a program in 2007 to prevent the trafficking of women and children and to ensure comprehensive rehabilitation for victims. Also, international NGOs are implementing awareness-building and prevention programs in Bihar.

## E. Safeguards

31. **Environment.** The project is classified as category A in accordance with ADB's Safeguard Policy Statement (2009) because of the presence of the Gangetic Dolphin and the Ganges softshell turtle, and the potential presence of the Gharial in the project area. According to the International Union for Conservation of Nature, Gangetic Dolphin is endangered, Ganges softshell turtle is vulnerable, and Gharial is critically endangered. They are also protected under

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<sup>19</sup> Summary Poverty Reduction and Social Strategy (accessible from the list of linked documents in Appendix 2).

the Wildlife Protection Act of India. Although the project area is not a critical habitat for these species, the large project scope requires sourcing, transport, and storage of substantial construction, labor, equipment, and material resources. The draft environmental impact assessment (EIA) was disclosed on ADB's website on 1 December 2015. Potential significant impacts entail destruction and disturbance of the natural habitat from on-site noise, vibration, air and water pollution, and increased sediment load in the river. The location, timing, and method of construction will avoid and minimize impacts on the natural habitat. A biodiversity conservation plan will be implemented to avoid any net loss of biodiversity. Other anticipated impacts involve dust, noise, exhaust, construction and domestic waste, water contamination, occupational health and safety, erosion, siltation, and traffic congestion. Measures to manage these have been included in the environmental management plan, which will be updated by the contractor. Meaningful consultations were held with affected persons and key stakeholders, such as the local Forestry Department, Zoological Survey of India, Patna University, and the World Wildlife Fund, and their recommendations were incorporated in the EIA. The EIA's grievance redress mechanism will further alleviate any concerns of affected persons and relevant stakeholders during project implementation.

32. BSRDCL will be responsible for ensuring the implementation of environment safeguards under the project. Two technical managers of the bridge construction works will be responsible for managing environmental and social safeguards. The project management and authority engineer team will include an environmental and biodiversity specialist to supervise the implementation of environment safeguards. The civil works contractor will employ environmental experts to ensure proper implementation of the EIA and the environmental management plan. An external monitor will be recruited to conduct third-party monitoring of the implementation and supervision of environmental safeguards, and the implementation of the biodiversity conservation plan. The project management and authority engineer team will conduct training workshops and on-site training on how to implement environment safeguards for BSRDCL staff and the contractor.

33. **Involuntary resettlement.** The project is classified as category A in accordance with the Safeguard Policy Statement. Project components are designed to minimize land acquisition and involuntary resettlement. A resettlement plan was prepared in line with the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act (2013), and the Safeguard Policy Statement, and has been disclosed.<sup>20</sup> About 256.58 acres of private land will be acquired, affecting 18,171 persons or 1,594 households, and 153 private structures. Of the households, 1,509 will experience economic displacement and 85 will experience physical displacement. Displaced persons will be compensated at replacement cost, and rates for different categories of loss and special assistance are detailed in the resettlement plan. The estimated cost of land acquisition and resettlement is about \$127.6 million. Impacts have been thoroughly assessed, and the measures proposed in the resettlement plan are commensurate to the assessed impacts. BSRDCL is experienced in implementing ADB projects and is committed to implementing the resettlement plan. BSRDCL will engage an NGO to assist with implementing the resettlement plan, and the project management and authority engineer team's resettlement specialist will be the external monitor.

34. **Indigenous peoples.** The project is categorized as C in accordance with the Safeguard Policy Statement. Due diligence confirms that no indigenous peoples are present in the project impact area.

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<sup>20</sup> Resettlement Plan (accessible from the list of linked documents in Appendix 2).  
<http://www.adb.org/projects/documents/ind-bihar-new-ganga-bridge-project-dec-2015-rp>

## F. Risks and Mitigating Measures

35. The overall risk assessment is low, while the integrated benefits and impacts are expected to outweigh the costs. Major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.<sup>21</sup>

**Table 4: Summary of Risks and Mitigating Measures**

<b>Risks</b>	<b>Mitigating Measures</b>
Project startup is delayed and disbursement is slow.	The advanced procurement action was expedited in accordance with ADB requirements under retroactive financing. An EPC contract for the bridge and approach road network was signed on 10 February 2016, and the PMAE consultant contract was signed on 8 April 2016.
Implementation capacity is not adequate.	The PMAE team will support BSRDCL by providing overall project management support and monitoring implementation of safeguard measures, including EMP and other requirements related to environmental protection.
Maintenance and future capacity for bridge operation and management is weak.	The EPC contract includes 5 years of post-completion performance-based bridge maintenance services to be financed by the Government of Bihar. The TA will strengthen the institutional capacity of the Government of Bihar and BSRDCL to effectively manage and maintain major bridges in Bihar and develop sustainable operation and maintenance plans for bridges in Bihar.

ADB = Asian Development Bank; BSRDCL = Bihar State Road Development Corporation Limited; EMP = environmental management plan; EPC = engineering, procurement, and construction; PMAE = project management and authority engineer; TA = technical assistance.

Source: Asian Development Bank.

## V. ASSURANCES

36. The Government of India, the Government of Bihar, and BSRDCL have assured ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents.

37. The Government of India, the Government of Bihar, and BSRDCL have agreed with ADB on certain covenants for the project, which are set forth in the loan agreement and project agreement.

## VI. RECOMMENDATION

38. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of \$500,000,000 to India for the Bihar New Ganga Bridge Project, from ADB's ordinary capital resources, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; for a term of 26 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Takehiko Nakao  
President

1 June 2016

<sup>21</sup> Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).



## DESIGN AND MONITORING FRAMEWORK

<b>Impact the Project is Aligned with</b> Mobility and accessibility within India, and connectivity with its neighboring countries improved (India's Twelfth Five Year Plan, 2012–2017) <sup>a</sup>			
<b>Results Chain</b>	<b>Performance Indicators with Targets and Baselines</b>	<b>Data Sources and Reporting</b>	<b>Risks</b>
<b>Outcome</b> Transport connectivity across the Ganges River between north and south Bihar improved	By 2021: a. 392,000 average daily vehicle-km used in the first full year of operation (2015 baseline: NA) b. Year-round road access for Raghapur Diara river island (2015 baseline: NA) c. 1.4 million tons of cross-border cargo facilitated in the first full year of operation (2015 baseline: NA)	a–c. Post-implementation measurement reports by BSRDCL as approved by the state government	Improvements to complementary national and state highways delayed
<b>Outputs</b> 1. New Ganga Bridge and integrated approach roadway network constructed  2. Bridge operation and management capacity enhanced	By 2020: 1a. 9.8 km of road bridge structure built 1b. 10 km of approach viaduct and embankment built 1c. 3 km of existing national highway widened 1d. Tolling and service facilities built 1e. 5-year performance-based maintenance period started  By 2018: 2a. Operation management plan for the Bihar New Ganga Bridge prepared 2b. Model maintenance manual for other existing major bridges in the state developed 2c. Satisfactory evaluation of knowledge transfer in international best practices	1a–e. Monitoring reports and completion report by BSRDCL as endorsed by the state government  2a. Operation management plan 2b. Model maintenance manual 2c. Retrospective evaluation of training participants by BSRDCL	Unpredicted river flow and soil conditions delay construction  Major turnover in key BSRDCL staff during implementation
<b>Key Activities with Milestones</b>			
<b>1. New Ganga Bridge and integrated approach roadway constructed</b> 1.1 Procurement of main works package by February 2016 1.2 Selection of consultants for project management and authority engineer by April 2016 1.3 Land acquisition and resettlement completed by December 2017 1.4 Construction works completed by December 2020			
<b>2. Bridge operation and management capacity enhanced</b> 2.1 TA consultant selection by January 2017			

2.2 Prepare operations management plan for the Bihar New Ganga Bridge by December 2018 2.3 Prepare model maintenance manual for other existing major bridges by December 2018 2.4 Train managers and technical staff by December 2018
<b>Inputs</b> ADB: \$500,000,000 (loan) and \$900,000 (technical assistance grant) Government of Bihar: \$215,000,000
<b>Assumptions for Partner Financing</b>  Not applicable.

ADB = Asian Development Bank, BSRDCL = Bihar State Road Development Corporation Limited, km = kilometer, NA = not applicable, TA = technical assistance.

<sup>a</sup> Government of India, Planning Commission. 2013. *Twelfth Five Year Plan, 2012–2017 Economic Sectors*. Volume II. New Delhi.

Source: Asian Development Bank.

**LIST OF LINKED DOCUMENTS**

<http://www.adb.org/Documents/RRPs/?id=48373-007-3>

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Transport (Road Transport [Nonurban])
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Attached Technical Assistance
8. Economic and Financial Analysis
9. Country Economic Indicators
10. Summary Poverty Reduction and Social Strategy
11. Environmental Impact Assessment
12. Resettlement Plan
13. Risk Assessment and Risk Management Plan

**Supplementary Document**

14. Project Climate Risk Assessment and Management Report