Board of Directors

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R60-17
2 August 2017

Proposed Loan
Mountain Railway Safety Enhancement Project
(People's Republic of China)

1. The Report and Recommendation of the President (RRP: PRC 42019-013) on the proposed loan to the People's Republic of China for the Mountain Railway Safety Enhancement Project is circulated herewith.

2. This Report and Recommendation should be read with *Country Operations Business Plan: People's Republic of China, 2017–2019*, which was circulated to the Board on 17 April 2017 (DOC.IN.102-17).

3. In the absence of any request for discussion and in the absence of a sufficient number of abstentions or oppositions (which should be communicated to The Secretary by the close of business on 25 August 2017), the recommendation in paragraph 47 of the paper will be deemed to have been approved, to be so recorded in the minutes of a subsequent Board meeting. Any notified abstentions or oppositions will also be recorded in the minutes.

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Report and Recommendation of the President to the Board of Directors

Project Number: 42019-013
July 2017

Proposed Loan
People's Republic of China: Mountain Railway Safety Enhancement Project

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 5 July 2017)

Currency unit	–	yuan (CNY)
CNY1.00	=	$0.1471
$1.00	=	CNY6.7975

ABBREVIATIONS

ADB	–	Asian Development Bank
CKRC	–	Chengdu-Kunming Railway Corporation
CRC	–	China Railway Corporation
EIRR	–	economic internal rate of return
FMA	–	financial management assessment
GDP	–	gross domestic product
km	–	kilometer
PAM	–	project administration manual
PRC	–	People's Republic of China

NOTE

In this report, "$" refers to US dollars.

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PROJECT AT A GLANCE

1. Basic Data — **Project Number:** 42019-013

Project Name	Mountain Railway Safety Enhancement Project	**Department /Division**	EARD/EATC
Country	China, People's Republic of	**Executing Agency**	China Railway Corporation (Formerly Ministry of Railways)
Borrower	China, People's Republic of		

2. Sector	**Subsector(s)**	**ADB Financing ($ million)**
✓ **Transport**	Rail transport (non-urban)	180.00
	Total	**180.00**

3. Strategic Agenda	**Subcomponents**	**Climate Change Information**	
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	Climate Change impact on the Project	Low
Environmentally sustainable growth (ESG)	Disaster risk management		

4. Drivers of Change	**Components**	**Gender Equity and Mainstreaming**	
Governance and capacity development (GCD)	Organizational development	No gender elements (NGE)	✓

5. Poverty and SDG Targeting		**Location Impact**	
Geographic Targeting	No	Rural	High
Household Targeting	No	Urban	Low
SDG Targeting	Yes		
SDG Goals	SDG9		

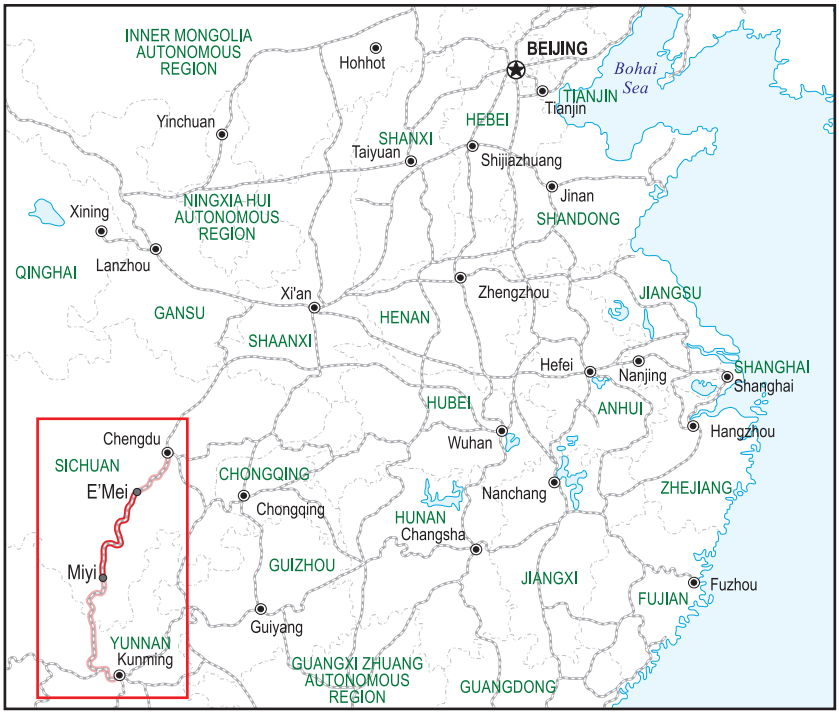
6. Risk Categorization: Low

7. Safeguard Categorization **Environment:** C **Involuntary Resettlement:** C **Indigenous Peoples:** C

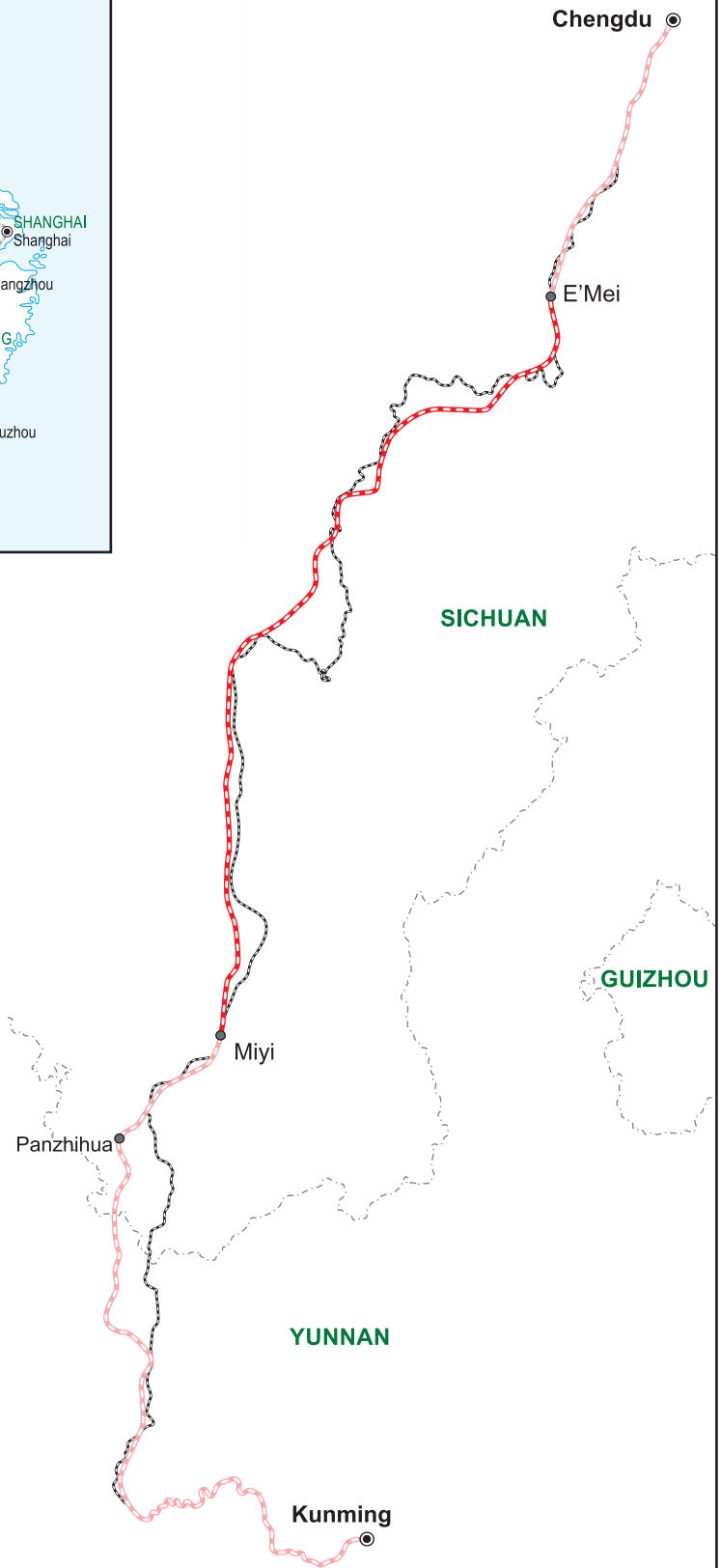
8. Financing

Modality and Sources	**Amount ($ million)**
ADB	**180.00**
Sovereign Project (Regular Loan): Ordinary capital resources	180.00
Cofinancing	**0.00**
None	0.00
Counterpart	**680.00**
Government	430.00
Others	250.00
Total	**860.00**

Source: Asian Development Bank



MOUNTAIN RAILWAY SAFETY ENHANCEMENT PROJECT
IN THE
PEOPLE'S REPUBLIC OF CHINA



N

0 50 100

Kilometers

- E'Mei–Miyi Section
- Proposed Chengdu–Kunming Railway line
- Existing Chengdu–Kunming Railway line
- National Capital
- Provincial Capital
- City/Town
- Provincial Boundary

Boundaries are not necessarily authoritative.

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the People's Republic of China (PRC) for the Mountain Railway Safety Enhancement Project.

2. The proposed project will improve railway safety by installing advanced railway signaling equipment, communication, power supply, and tunnel monitoring systems on the E'Mei–Miyi section of the Chengdu–Kunming railway line in southwestern PRC. It will also enhance institutional capacity to manage railway safety.[1]

II. THE PROJECT

A. Rationale

3. **Railway development in the PRC**. The railway sector is vital to the PRC's economic and social development, international trade, continued economic growth, and ability to extend the benefits of development to people living in the more remote regions of the country. The PRC is a vast country where people and goods move over long distances, and railways provide the most economic means of transport. Railways have the competitive advantage in moving passengers, bulk goods, and containers over medium to long distances. The government has therefore prioritized the expansion and modernization of the railway network. During 2003–2015, the railway network expanded by 65%, from 73,000 kilometers (km) to 121,000 km. The PRC has also developed the world's longest high-speed railway network (19,000 km). However, improvements have mainly occurred in eastern PRC and the network remains rather sparse and basic in western and southwestern PRC.

4. **Railway development in southwestern PRC**. Despite the PRC's vast expertise in developing the high-speed rail network, constructing medium-speed rail lines in a highly mountainous region such as southwestern PRC poses considerable problems. The difficult and dangerous terrain in southwestern PRC is one of the main reasons why the rail network in the region remains inadequate. This region has also lagged in economic development and gross domestic product (GDP) per capita remains quite low compared to the more prosperous eastern provinces (e.g. provinces of Sichuan and Yunnan are ranked 23 and 30 respectively out of 31 administrative divisions in the PRC). The limited capacity for freight movements and the long travel times of passenger trains are considered major obstacles to economic development and poverty reduction in the region. Hence, the PRC is prioritizing the development of the railway infrastructure in this region to increase speeds and more than double the freight-carrying capacity through its Western Development Strategy. However, the PRC needs assistance and expertise in ensuring that the railway lines are well designed, properly constructed, and conform to the highest standards of safety.

5. **Railway safety**. Safety is an integral part of providing competitive, high-quality, and reliable transportation for people and goods. As the PRC railway sector expands, introducing new concepts and technologies and increasing speeds, the safety needs are changing as well. The PRC recognizes this important aspect and seeks to promote modern rail safety technologies and emergency management systems consistent with the development needs of the country's railways. It seeks to attract foreign technology and expertise to meet these needs, an area where the Asian Development Bank (ADB) can play a significant role.

[1] ADB provided project preparatory technical assistance for the Railway Safety Enhancement Project.

6. The safety issue is a challenge because the trains encounter difficult operating conditions amid varying geological features as they crisscross the length and breadth of the country. This is particularly so in southwestern PRC, where the terrain is mountainous and railway lines should be built with many bridges and tunnels. Operating a railway through several tunnels poses significant challenges for railway safety. Special arrangements need to be made for signaling to ensure speed restrictions, real-time monitoring of tunnel conditions, and proper lighting, and emergency systems for firefighting, ventilation, and rescue need to be installed. Various new technologies now exist for improving the safety of rail tunnels, and can play a vital role in preventing accidents as well as enabling a swift emergency response.

7. Southwestern PRC has two major fault lines (Anning River Fault Line and Daliang Mountain Fault Line), so railway construction in the region requires high-intensity earthquake fortification. Mountainous areas are also prone to landslides, which cause rocks and debris to block the track and make train operations unsafe. A stronger safety management system, which includes advanced signaling and communication arrangements and more effective management information, is needed to prevent train accidents and to respond promptly if they do occur.

8. **Chengdu–Kunming railway line**. The Chengdu–Kunming railway line is a key part of a regional corridor that will eventually extend to the countries in the Greater Mekong Subregion, and thus become a part of an international railway route connecting the subregion to western PRC, Central Asia Regional Economic Cooperation countries, and the Eurasian land bridge.

9. The existing line between Chengdu and Kunming was built between 1958 and 1970. It is a single-track line with operating speeds in the range of 40 km–60 km per hour. It has been operating at near full capacity for more than 10 years. To expand capacity across the southwestern region of the PRC, the China Railway Corporation (CRC) is constructing a railway line from Chengdu to Kunming with 18 stations. This will involve construction of 860 km of double-track electrified main railway line for passenger and freight transport operations. The proposed alignment of the new Chengdu–Kunming railway line is shorter by 236 km (21.5%) compared with the existing single-track line (1,096 km) and has better geometry. The development of the line is being done in several phases: Guangtong–Kunming (2016), Miyi–Guangtong (2017), Chengdu–E'Mei (2018), and E'Mei–Miyi (2022).

10. The capacity along the entire route from Chengdu to Kunming will be greatly increased. Train speeds on the new railway line will increase to 160 km per hour from the existing 60 km per hour. The tonnage could increase from 3,200 tons to 4,000 tons net per freight train, and the capacity for passenger train pairs per day could increase from 12 to 35. The shorter alignment and faster train speeds will shorten the travel time to less than 8 hours for passenger trains. Presently, it takes 18–22 hours for people to travel from Chengdu to Kunming via rail.

11. The region is also one of the most scenic areas in the PRC, so better rail services along this route will support tourism. Sites such as Qionghai Lake in Xichang, hot springs and karst caves in Panzhihua, and Mount E'Mei will become much more accessible to tourists, and more visitors will also contribute to the overall economic development of southwestern PRC.

12. **E'Mei–Miyi section**. ADB financing will support the provision of safety equipment for the E'Mei–Miyi section (386 km) of the Chengdu–Kunming railway line, which is the most difficult section of the railway.[2] It runs mostly through treacherous terrain traversing mountains and steep

[2] This section is currently under construction, and roughly 19% of the works are completed (30 June 2017).

river valleys and requiring 141 bridges (80.8 km) and 52 tunnels (211.4 km), 7 of which will be longer than 10 km each, and climbing 1,200 meters over 95 km in a grade of 1.2%.[3] The total length of bridges and tunnels is 292.2 km, accounting for 75.7% of the alignment. The complex terrain, coupled with the increased weight, speed, and number of trains, adds to the importance of the safety of railway operations on the Chengdu–Kunming railway line.

13. **Value added by ADB assistance**. While the PRC has made significant advances in railway technology, the areas of signaling and safety systems remain a challenge.[4] ADB's financing will support railway safety equipment that conforms to the best international standards. The cost of the equipment is relatively small compared with the cost of other capital assets or construction of a railway line, but the benefits are significant. For example, investing in a high-quality signaling and information system, trackside defect detectors, and advanced train control systems will ensure that unsafe movements of trains are prevented and train operators have the necessary and complete information needed for safe train operations, including routing, spacing, speed control, protection, and shunting. Since the line has many long tunnels, emergency rescue facilities and procedures are critical in preventing a disaster associated with an accident or a tunnel fire involving a train. The tunnel safety equipment planned for the E'Mei–Miyi section serves to minimize risk and mitigate any potential casualties.

14. The capacity-building component will assist the executing agency, implementing agency, and the Chengdu Rail Bureau in developing a strong understanding of international best practices in integrating safety and emergency response. Training railway staff in emergency response and evacuation procedures, along with recurrent emergency evacuation drills, will ensure that any emergency involving tunnels can be quickly dealt with by locally stationed personnel. The small investment would have a significantly high value addition, allowing considerable leverage of ADB financing.

15. **New technologies**. ADB financing will help introduce new and modern technologies for the mountain railway line in southwestern PRC. The equipment to be procured will be the most sophisticated available in the market, consistent with the safety needs of operating a mountain railway system with very long tunnels. Examples of this kind of equipment to be financed under the project are centralized traffic control,[5] train control,[6] and advanced ventilation and evacuation systems for tunnels. Other technologies to be installed along the railway line, such as hot box detectors and train fault detection, will enable detection and provide advance warning regarding rolling stock failures.

16. **Lessons from previous projects**. Railway safety has been a major focus of ADB support for PRC railways. In 2007, ADB provided a loan to develop emergency rescue and restoration systems.[7] More recently, the program for energy efficiency and railway safety supported installation of energy-efficient power supply equipment, railway electrification systems, and rail track safety.[8] In 2011, the safety of long tunnels and related emergency rescue plans and

[3] A grade of 1.2% means a 12-meter increase in elevation over a 1,000-meter length.

[4] This is evident from the railway accident that occurred in 2011 near Wenzhou when two high-speed trains collided owing to serious design flaws in crucial signaling equipment.

[5] Centralized traffic control refers to centralized railway signaling management that controls railway traffic flows through a control panel, which graphically depicts the entire railway line.

[6] A train control system is a signaling, control, and train protection system designed to replace conventional track signals and prevent overspeeding. It helps eliminate accidents owing to human error.

[7] ADB. 2007. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Railway Safety Enhancement Project.* Manila.

[8] ADB. 2009. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Railway Energy Efficiency and Safety Enhancement Investment Program.* Manila.

equipment were a particular focus of ADB technical assistance to study Europe's longest tunnels, the Chunnel and the Gotthard Base Tunnel, and to evaluate international best practices. The project seeks to build upon the earlier support, and provide financing, especially for safety interventions for railways in mountainous regions that have unique safety requirements. The specialized safety requirement for a mountain railway makes this project different from the previous support and provides additional value. It is expected that the PRC will continue to expand the railway network in southwestern PRC, a region where rail connectivity is presently limited, so technologies implemented in this project can be replicated in future projects.

17. **Strategic priorities**. The project is aligned with the strategic priority of "supporting inclusive economic growth" of ADB's country partnership strategy for the PRC, 2016–2020[9] since the railway line is in a less developed region covering two of the poorest provinces in PRC. The project also supports the priority of "managing climate change and the environment" because it assists the development of railways–a transport mode with significantly lower emissions and energy consumption. It will help the PRC tackle the challenges highlighted above, and deepen the cooperation between the government and ADB by helping develop the rail transport mode into a safe transport system for freight and passengers. The project is in line with ADB's Sustainable Transport Initiative, which highlights railway development as an important opportunity for sustainable transport operations.[10]

18. The project is supporting the safety of the E'Mei–Miyi railway section, which is an important project under the Thirteenth Five-Year Plan.[11] The railway development is consistent with the plan's objectives of balanced development of rural and urban areas, better transport connectivity, and inclusive urbanization. The railway line also directly contributes to the government's Silk Road Economic Belt initiative.[12] It is also part of the PRC's latest medium- and long-term railway network plan, which seeks to improve the railway system, especially in the central and western PRC.[13]

B. Impact and Outcome

19. The impact will be a developed safe, reliable, and efficient rail transport system in southwestern PRC (footnotes 11 and 13). The outcome will be a developed safe and efficient railway corridor between E'Mei and Miyi.[14]

C. Outputs

20. **Output 1: Railway signaling, communication, and power supply system developed**. This will include signaling and communication equipment to improve train operation safety, such as centralized train dispatching and monitoring, automatic block signaling, interlocking devices, and train control systems. This will also cover procurement of electric power supply, and bridge bearings for the safety of railway bridges.[15]

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[9] ADB. 2016. *Transforming Partnership: People's Republic of China and Asian Development Bank, 2016–2020*. Manila.

[10] ADB. 2010. *Sustainable Transport Initiative Operational Plan*. Manila.

[11] Government of the PRC, National Development and Reform Commission. 2015. *Outline of the Thirteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China*. Beijing (adopted in 2016).

[12] The Silk Road Economic Belt is also known as the Belt and Road Initiative. It is an economic development initiative of the Government of the PRC for integrating trade and investment in Eurasia.

[13] Government of the PRC. 2004. *Railway Development Plan.* Beijing.

[14] The design and monitoring framework is in Appendix 1.

[15] Installation of bridge bearings will be done as part of civil works contracts, which are domestically financed.

21. **Output 2: Tunnel safety operation and monitoring system installed.** This will comprise tunnel equipment to enhance safety. The equipment will cover lighting, ventilation, firefighting and fire control systems, and emergency rescue and disaster management systems.

22. **Output 3: Institutional capacity for railway safety management enhanced.** This will help build the capacity for railway safety measures and technology. Working with the executing agency, the design institutes, and the railway administrations, the existing institutional arrangements for integrating safety measures in railway management will be reviewed, and recommendations made to make these more strategic and focused. Staff from pertinent government agencies will receive training on railway safety, disaster prevention, and emergency tunnel rescue operations to better equip them to handle rescue efforts in the event of a tunnel accident. About 100 staff from executing and implementing agencies will be trained, and technical exchanges on advanced technologies and new maintenance techniques will be organized to familiarize staff in these areas.

D. Summary Cost Estimates and Financing Plan

23. The project is estimated to cost $860 million, including taxes and duties (Table 1).

24. Detailed cost estimates by expenditure category and by financier are included in the project administration manual (PAM).[16] The major expenditure items are equipment and consulting services.

Table 1: Summary Cost Estimates
($ million)

Item			Amount[a]
A.	**Base Cost**[b]		
	1.	Railway signaling, communication, and power supply system	368.80
	2.	Tunnel safety operation and monitoring system installed	338.71
	3.	Institutional capacity building for railway safety management	2.25
		Subtotal (A)	**709.76**
B.	**Contingencies**[c]		**109.11**
C.	**Financing Charges During Implementation**[d]		**41.13**
		Total (A+B+C)	**860.00**

Note: Numbers may not sum precisely because of rounding.

[a] Includes taxes and duties of $23.37 million to be financed from government resources as counterpart funds through cash contributions. Such amount does not represent an excessive share of the project cost.

[b] In June 2016 market prices.

[c] Physical contingencies computed at 7% of equipment and instruments. Price contingencies computed at an average of 1.4% for the first year and 1.5% annually thereafter on foreign exchange components, and at 2.3% for the first year and 2.4% annually thereafter on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

[d] Includes interest and commitment charges. Interest during construction computed at the 5-year US dollar fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.2%. Commitment charges for the ordinary capital resources loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

25. The government has requested a loan of $180 million from ADB's ordinary capital resources to help finance the project. The loan will have a 25-year term, including a grace period of 7 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 set forth in the draft loan and project agreements. Based on the loan terms and government's choice of 10% annuity repayment option, the average loan maturity is 18.76

[16] Project Administration Manual (accessible from the list of linked documents in Appendix 2).

years and the maturity premium payable to ADB is 0.20% per year. The interest charges will not be capitalized.

26. The summary financing plan is in Table 2. The loan will finance 20.93% of the project cost, including equipment, materials, and institutional strengthening. The government will finance the remaining $680 million through counterpart funds provided by the CRC and domestic commercial bank loans.

27. The Government of the PRC is the borrower of the loan and will relend the loan to the CRC on the same terms and conditions as those of the ADB loan. The CRC will assume the foreign exchange and interest variation risks of the ADB loan, including contingencies. The PRC, CRC, and Chengdu-Kunming Railway Corporation (CKRC) have assured ADB that counterpart funding will be provided in a timely manner, including any additional counterpart funding required for any shortfall of funds or cost overruns. The indicative flow of funds and the onlending arrangements are specified in the PAM (footnote 16).

Table 2: Summary Financing Plan

Source	Amount ($ million)	Share of Total (%)
Asian Development Bank		
Ordinary capital resources	180.00	20.93
Government	430.00	50.00
Domestic commercial bank loans	250.00	29.07
Total	**860.00**	**100.00**

Source: Asian Development Bank estimates.

E. Implementation Arrangements

28. The executing agency will be the CRC, which will be responsible for overall project implementation. The Planning and Statistics Department of the CRC will coordinate and supervise project preparation, while the Material Department of the CRC will be responsible for supervising procurement and project implementation.

29. The implementing agency will be CKRC, which is a joint-venture shareholding company established under the PRC company law. The shareholders are the China Railway Development Fund Company Ltd., Chengdu Railway Bureau (both under CRC) and Sichuan Provincial Railway Industry Investment Group Ltd. (under Sichuan Provincial Government). CKRC is responsible for project construction, operations management, finance and accounting, and maintenance of infrastructure assets. CKRC does not have any previous ADB or World Bank project experience, and its staff is not familiar with ADB procurement policies and procedures. The executing agency has engaged a tendering company to assist in procurement. Further support will be provided by engaging a consulting team under output 3 for guiding and training the staff in the implementing agency.

30. The project will be implemented over 7 years from September 2017 to June 2024. The longer implementation period is because this project is linked to the construction of the railway line. All procurement to be financed under the ADB loan will be carried out in accordance with ADB's Procurement Guidelines (2015, as amended from time to time). All consultant services will be recruited in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). The implementation arrangements are summarized in Table 3 and described in detail in the PAM (footnote 16).

Table 3: Implementation Arrangements

Aspects	Arrangements		
Implementation period	September 2017–June 2024		
Estimated completion date	30 June 2024 (Loan closing date: 31 December 2024)		
Management			
(i) Executing agency	China Railway Corporation		
(ii) Implementing agency	Chengdu-Kunming Railway Company		
Procurement	International competitive bidding	10 contracts	$178.25 million
Consulting services	Quality- and cost-based selection	1 contract	$1.75 million
Disbursement	The loan proceeds will be disbursed in accordance with the Asian Development Bank's *Loan Disbursement Handbook* (2017, as amended from time to time) and detailed arrangements agreed upon between the government and the Asian Development Bank.		

Source: Asian Development Bank estimates.

III. DUE DILIGENCE

A. Technical

31. The project will finance railway signaling equipment and tunnel monitoring and safety equipment. Some of the specific equipment to be procured under the project includes a train control system with centralized traffic control, an advanced automatic block signal system, wayside detectors, tunnel ventilation systems, and tunnel rescue systems. The preliminary technical specifications of the equipment have been reviewed, and it has been confirmed that the equipment is compatible with and suitable for the proposed railway line in terms of the requirements of the projected rail traffic and speeds, and conforms to the best international standards.

B. Economic and Financial

32. The ADB-financed components are limited to the safety systems on the E'Mei–Miyi railway line. However, it was not considered possible to do the economic analysis only on the safety equipment. The economic assessment[17] has been undertaken for the E'Mei–Miyi railway line and the existing railway line as a corridor, which includes track, stations, rolling stock, and other components. The railway corridor is economically viable with an estimated economic internal rate of return (EIRR) of 14.80%. Economic benefits include (i) user cost savings for freight and passenger traffic, (ii) time savings for diverted passenger and freight traffic, (iii) generated passenger and freight transport benefits, (iv) road user and shipper savings thanks to less congestion and increased railway competition, (v) road accidents avoided, (vi) reduced pollution, (vii) fuel savings, and (viii) national productivity benefits.

33. The sensitivity analysis of potential cost overruns and benefit reductions demonstrates that the railway corridor's economic viability is robust. The total cost would have to be more than 39.3% higher than estimated for the EIRR to fall below the threshold level of 9%. The freight benefits would have to decrease by about 63.7% to make the rail corridor economically nonviable. Cost for construction and installation and recurring fixed and variable costs carry relatively less risk. The EIRR is less sensitive to passenger traffic projections and delays in project implementation.

[17] Economic analysis (accessible from the list of linked documents in Appendix 2).

34. A financial analysis[18] was undertaken to assess the financial viability of the project based on the capital cost of construction of the E'Mei–Miyi railway line. The financial internal rate of return for the project, computed after tax, is 3.71%, which compares favorably with the estimated weighted average cost of capital of 3.13%. The average freight rate is assumed to increase by an annual 3%, and average passenger revenue rates are assumed to increase in real terms annually by an average 4% for express trains and 2% for conventional slower-speed trains until 2035. These increases also include the higher charges expected from moving high-value cargo such as containers and time-sensitive perishable goods, and from express freight services. The E'Mei–Miyi railway line will also provide passengers with significantly faster and better services, thus justifying an increase in fares. During 2011–2015, the average freight rate of the CRC increased by 5.9% and the passenger rate by 4.8% annually. The government is also implementing tariff reforms that will allow the CRC to set tariffs based on market conditions and cost increases. This will contribute to greater financial sustainability of the project.

C. Governance

35. **Financial management**. The financial management assessment (FMA) was conducted in accordance with ADB's Guidelines for the Financial Management and Analysis of Projects[19] and Financial Due Diligence: a Methodology Note[20] and related Technical Guidance Notes. The FMA concluded that the capacity of both the CRC and CKRC is adequate and the overall financial management risk is moderate. The CRC has prior and ongoing experience in implementing ADB projects and an understanding of ADB procurement, disbursement, and financial management procedures. The FMA recommended that CKRC further strengthen its financial management capability by undertaking training, particularly on ADB policy and its procedural requirements for financial management, including financial reporting and disbursement.[21]

36. **Procurement and anticorruption measures.** All procurement to be financed under the ADB loan will be done in accordance with ADB Procurement Guidelines (2015, as amended from time to time). The relevant sections of ADB's Anticorruption Policy (1998, as amended to date) will be included in all procurement documents and contracts. ADB's Anticorruption Policy was explained to and discussed with the government and the CRC. The specific policy requirements and supplementary measures are described in the PAM (footnote 16).

D. Poverty, Social, and Gender

37. A social and poverty analysis was conducted in accordance with ADB guidelines.[22] The project impact area comprises 10 counties, three of which (Ganluo, Xide, and Yuexi) are provincial-level poor counties. The project impact area contains 123 villages that are designated as "poverty villages".[23] The main causes of poverty are low-intensity agriculture because flat arable land is scarce, few income-generating opportunities, poor road conditions and lack of paved road access, and slow rail services limiting transportation of products and access to schools, markets, and medical services. The economic development level measured by GDP per capita varies considerably within the project counties given the isolation of the mountainous villages. The average GDP per capita was CNY12,000 in 2014 across the three poor counties of

[18] Financial analysis (accessible from the list of linked documents in Appendix 2).
[19] ADB. 2005. *Guidelines for the Financial Management and Analysis of Projects*. Manila.
[20] ADB. 2009. *Financial Due Diligence: a Methodology Note*. Manila.
[21] Financial Management Assessment (accessible from the list of linked documents in Appendix 2).
[22] Summary Poverty Reduction and Social Strategy (accessible from the list of documents in Appendix 2).
[23] List of the poor villages from the Sichuan Provincial Poverty Alleviation Office in 2015.

the project impact area, compared with the PRC average of CNY54,000. For poor households in these counties, the average GDP per capita was CNY5,500.

38. **Project beneficiaries**. The direct beneficiaries include existing rail users and road users, including women, who may transfer to rail to save on time and transport cost (freight carriers and bus passengers), while indirect beneficiaries include general goods and service providers, suppliers of agricultural products and services, people engaged in marketing (producers and consumers), and stakeholder agencies. Ethnic minority people from Qiang, Yi, and Zang groups, who are dependent on agriculture and livestock, are one of the major direct beneficiary groups. The Yi is the overwhelming majority ethnic group (after Han) in the three poorest counties in the project impact area (accounting for 75%–91% of the population).

39. The railway line has the potential to benefit people in the project area through (i) employment during construction; (ii) better access to markets, transport, and other services; and (iii) integration of the project area with regional trade and commerce. Rural households will increase and diversify agricultural production to more market-oriented agriculture because of expanded access to markets and the ability to move bulk goods, improving their quality of life thanks to better access to goods, services, and social infrastructure at less cost. Travel time will be reduced by half to tourist destinations such as Xichang in Liangshan prefecture.

40. **Gender.** The railway line will result in (i) greater participation of women in the labor and tourism markets, (ii) a rise in women's net income and savings, (iii) improved overall family welfare, and (iv) greater empowerment of women. Women and other vulnerable groups will benefit from railway development through equal access to local employment and wages. Expansion of secondary and tertiary industries will help generate additional jobs for both men and women, close to their homes. Since the ADB-financed project is only limited to procurement and installation of equipment, the project does not provide opportunities for integration of gender design elements. However, it is expected that the enhanced railway system will directly benefit people in terms of faster, safer, and affordable transport and indirectly benefit women and girls in accessing new economic opportunities.

E. Safeguards

41. The project is limited to the procurement of railway safety equipment along the E'Mei–Miyi section of the Chengdu–Kunming railway line. In compliance with ADB's Safeguard Policy Statement (2009), the project's safeguard categories are as follows.[24]

42. **Environment, Involuntary resettlement and Indigenous peoples (category C).** Environmental impacts of the safety equipment installation will be limited. Occupational health and safety measures and attention to solid waste management will be incorporated into the project and will be consistent with national laws and regulations. No adverse involuntary resettlement and indigenous peoples impacts are foreseen from the implementation of the project.

43. The due diligence done by the government for the E'Mei–Miyi section of the railway was reviewed. The review confirmed that the railway line construction and environmental management plan is satisfactory and consistent with national requirements and ADB's Safeguard Policy Statement. Safeguards due diligence on the E'Mei–Miyi section will continue during its construction.

[24] ADB. Safeguard Categories. https://www.adb.org/site/safeguards/safeguard-categories.

F. Summary of Risk Assessment and Risk Management Plan

44. The overall risk is assessed to be low. The integrated benefits and impacts are expected to outweigh the costs. The project is formulated to minimize potential risks. Sensitivity tests indicate that economic circumstances would have to worsen substantially for the investment program to lose its economic viability. A potential risk is delay in implementation, which would delay the realization of benefits. The CRC has successfully implemented ADB-financed projects. Risks associated with potential changes in government policy are minimal. An analysis of the demand for railway transport shows that the southwestern PRC needs additional railway transport capacity to sustain its economic development. The equipment and materials to be procured and included in this project are based on proven and most suitable international designs. The CRC has experience in installing new technologies successfully, and these can be implemented within a relatively short time. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[25]

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
Geological phenomenon contributes to unforeseen safety hazards	The project is implementing advanced detection and monitoring technologies which will enable the mitigation of this risk.
Project implementation delay	Design and preliminary technical specifications of the equipment have been reviewed, and preparation of bid documents will be closely monitored.

Source: Asian Development Bank.

IV. ASSURANCES

45. The government and the CRC 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.

46. The government and the CRC have agreed with ADB on certain covenants for the project, which are set forth in the loan agreement and project agreement.

V. RECOMMENDATION

47. 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 $180,000,000 to the People's Republic of China for the Mountain Railway Safety Enhancement Project, from ADB's ordinary capital resources, in regular terms, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; for a term of 25 years, including a grace period of 7 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

27 July 2017

[25] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

DESIGN AND MONITORING FRAMEWORK

Impact the Project is Aligned With

Safe, reliable, and efficient rail transport system in southwestern People's Republic of China developed (Railway Development Plan, Thirteenth Five-Year Plan, 2016–2020).[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome A safe and efficient railway corridor between E'Mei and Miyi developed	By 2025: a. Over 90% train punctuality is achieved by minimizing safety-related incidents. (2016 baseline: 90%) b. Travel time between Chengdu and Kunming is reduced by at least 50% as a result of reliable operations. (2016 baseline: 22 hours) c. Corridor transportation capacity (number of trains dispatched daily) increased to 35 passenger train pairs between Chengdu and Kunming. (2016 baseline: 12 pairs)	a. Chengdu Railway Bureau's operational data b. Project progress reports and project review missions c. Annual Railway Statistical Bulletin issued by the National Railway Administration, People's Republic of China	Geological phenomenon such as landslides and rock falls contribute to unforeseen safety hazards
Outputs 1. Railway signaling, communication, and power supply system developed 2. Tunnel safety operation and monitoring system installed 3. Institutional capacity for railway safety management enhanced	By 2024 1. Signaling, communication, and power supply system is operational. 2. Safety monitoring system is operational. 3. 100 staff in the executing agency and implementing agency are trained in railway safety and project implementation and management.	1–3. Project progress reports	Project implementation delay

Key Activities with Milestones

1. Railway signaling, communication, and power supply system developed

1.1. Develop technical specification: Q3 2017–Q2 2019.
1.2. Procure and install equipment and related systems: Q2 2019–Q4 2023.
1.3. Conduct trial operations: Q1 2021–Q1 2024.

Key Activities with Milestones

2. Tunnel safety operation and monitoring system installed
2.1. Develop technical specification: Q3 2020–Q1 2021.
2.2. Procure and install equipment and related systems: Q2 2021–Q4 2022.
2.3. Conduct trial operations: Q4 2022–Q1 2024.

3. Institutional capacity for railway safety management enhanced
3.1. Identify staff for training: Q1 2017–Q1 2018.
3.2. Provide training: Q3 2018–Q1 2020.

Project Management Activities

Annual review missions
Project completion

Inputs

Asian Development Bank:	$180,000,000
Government of the People's Republic of China:	$430,000,000
Domestic commercial bank:	$250,000,000

Assumptions for Partner Financing

Not applicable

[a] Government of the People's Republic of China, National Development and Reform Commission. 2015. *Outline of the Thirteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China*. Beijing (adopted in 2016); and Government of the People's Republic of China. 2004. *Railway Development Plan*. Beijing.

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=42019-013-3

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

Supplementary Documents

12. Procurement Capacity Assessment
13. Financial Management Assessment
14. Environment Due Diligence Report
15. Economic Analysis Methodology