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The World Bank

Report No: ICR00002178

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IBRD-48470)

ON A
LOAN
IN THE AMOUNT OF US\$200 MILLION
TO THE
PEOPLE'S REPUBLIC OF CHINA
FOR A
THIRD NATIONAL RAILWAY PROJECT

December 17, 2013

China and Mongolia Sustainable Development Unit
Sustainable Development Department
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective August 2013)

Currency Unit = RMB (Yuan)

RMB 1.00 = US\$ 0.163

US\$ 1.00 = RMB 6.12

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AAA	Analytical and advisory assistance
CNAO	China National Audit Office
CRC	China Railways Corporation
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPB	Environment Protection Bureau
FCTIC	Foreign Capital and Technical Import Center (of Ministry of Railways)
ICB	International Competitive Bidding
MoR	Ministry of Railways
MoF	Ministry of Finance
MoT	Ministry of Transport
NBF	Non-Bank financed
NDRC	National Development and Reform Commission
PMO	Project Management Office
RA	Regional [Railway] Administration
RAP	Resettlement Action Plan
SSDI	Second Survey and Design Institute

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PEOPLE'S REPUBLIC OF CHINA
Third National Railway Project

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MAPS: IBRD 34495R and IBRD 34496R	

A. Basic Information			
Country:	China	Project Name:	Third National Railway Project
Project ID:	P086515	L/C/TF Number(s):	IBRD-48470
ICR Date:	12/17/2013	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	P.R. CHINA
Original Total Commitment:	USD 200.00M	Disbursed Amount:	USD 199.76M
Revised Amount:	USD 200.00M		
Environmental Category: A			
Implementing Agencies: Ministry of Railways, Foreign Capital & Technical Import Center			
Cofinanciers and Other External Partners:			

B. Key Dates				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	10/26/2004	Effectiveness:	05/16/2007	05/16/2007
Appraisal:	09/26/2005	Restructuring(s):		03/29/2012
Approval:	01/23/2007	Mid-term Review:	NA	
		Closing:	06/30/2012	06/30/2013

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes:	Satisfactory
Risk to Development Outcome:	Low
Bank Performance:	Satisfactory
Borrower Performance:	Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)			
Bank	Ratings	Borrower	Ratings
Quality at Entry:	Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Moderately satisfactory
Overall Bank Performance:	Satisfactory	Overall Borrower Performance:	Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project	No	Quality at Entry	None

at any time (Yes/No):		(QEA):	
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA):	None
DO rating before Closing/Inactive status:	Satisfactory		

D. Sector and Theme Codes

	Original	Actual
Sector Code (as % of total Bank financing)		
Central government administration	1	1
Railways	99	99
Theme Code (as % of total Bank financing)		
Other public sector governance	33	33
Trade facilitation and market access	67	67

E. Bank Staff

Positions	At ICR	At Approval
Vice President:	Axel von Trotsenburg	James Adams
Country Director:	Klaus Rohland	David R. Dollar
Sector Manager:	Mark R. Lundell	Jitendra N. Bajpai
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F. Results Framework Analysis

Project Development Objectives

The Project aims to assist China in expanding the capacity of its railway system to meet the growing demand for transport of people and goods between Guizhou and Yunnan Provinces.

Revised Project Development Objectives (N/A)

(a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Commercial speed-freight (km/hr)			
Value quantitative or	23 km/hr	41 km/hr	NA	70 km/hr

Qualitative)				
Date achieved	12/31/2004	First full year of operation		10/15/2013
Comments (incl. % achievement)	The indicator was achieved, and the target values were surpassed.			
Indicator 2 :	Commercial speed-express passenger (km-hr)			
Value quantitative or Qualitative)	55 km/hr	90 km/hr		100 km/hr
Date achieved	12/31/2004	First full year of operation		10/15/2013
Comments (incl. % achievement)	The indicator was achieved, and the target values were surpassed.			
Indicator 3 :	Average number of trains (freight plus passenger) operated (pairs per day)			
Value quantitative or Qualitative)	31 train pairs/day	50 train pairs/day		45 train-pairs
Date achieved	12/31/2004	First full year of operation		10/15/2013
Comments (incl. achievement)	90% First full year of operation will be 2014.			

(b) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	% Civil works construction complete (on contracts financed by the Bank)			
Value (quantitative or Qualitative)	0	100%	100%	100%
Date achieved	02/15/2007	12/31/2011	12/28/2012	03/22/2013
Comments (incl. % achievement)	100% achieved.			

G. Ratings of Project Performance in ISRs

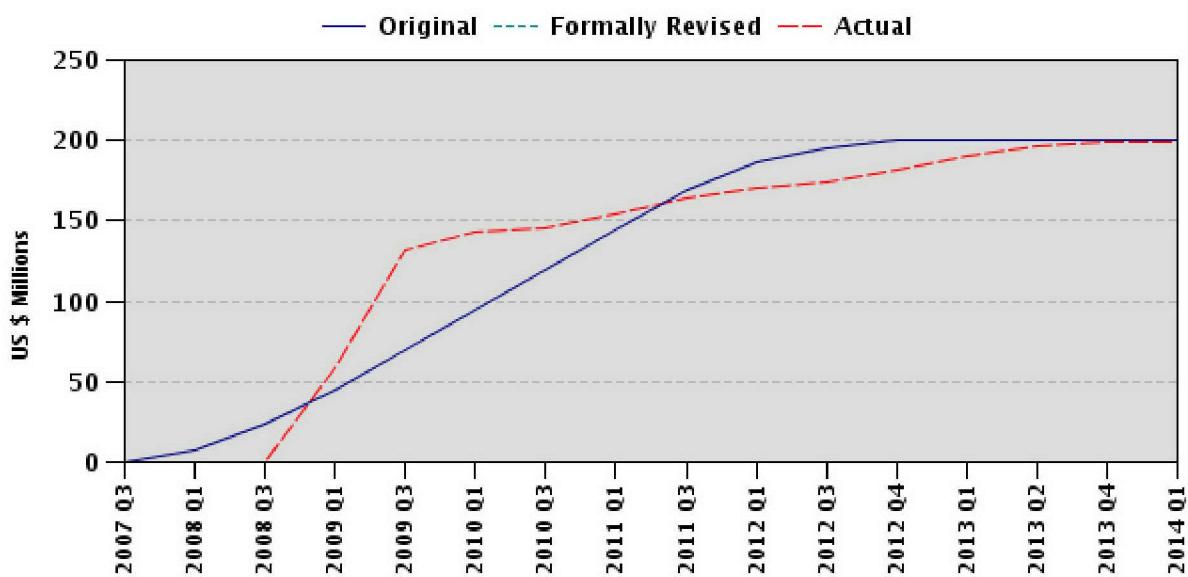
No.	Date ISR Archived	DO	IP	Actual Disbursements (USD millions)
1	06/26/2007	Satisfactory	Satisfactory	0.00
2	06/28/2008	Satisfactory	Moderately Satisfactory	0.00
3	06/26/2009	Satisfactory	Moderately Satisfactory	143.11
4	06/01/2010	Satisfactory	Moderately Satisfactory	145.31

5	06/27/2011	Satisfactory	Moderately Satisfactory	163.66
6	04/08/2012	Satisfactory	Satisfactory	174.47
7	11/12/2012	Satisfactory	Satisfactory	197.03
8	05/16/2013	Satisfactory	Moderately Satisfactory	197.03

H. Restructuring (if any)

Not Applicable

I. Disbursement Profile



1. Project Context, Development Objectives and Design

1.1 Context at Appraisal

The Bank's Country Assistance Strategy for China for the period 2003–2005¹ focused the Bank's support to facilitate China making two historic transitions --from a rural, agricultural society to an urban, industrialized society, and from a centrally planned economy to a more globally integrated market-based economy. To this end its main goals were to:

- improve the business environment and help accelerate China's transition to a market economy;
- address the needs of the poorer and disadvantaged people and regions (mainly central and western provinces); and
- facilitate a more environmentally sustainable development process.

The railway sector was vital to China's economic and social development, its international trade, its continued economic growth, and its ability to extend the benefits of development to people living in the central and western regions of the country. China was (and still is) a vast country where people and goods moved over long distances, for which railways provided the most economic means of transport. Railways also were more energy efficient, environment-friendly and consumed less land space than highways of comparable capacity.

Over the ten years from 1993 to 2003 China's rail network grew by nearly 25%, passenger traffic grew by over 50% and freight traffic by 30%. However, in spite of these increases, the railway system was not able to keep up with the growth in demand for transportation. In 2003 the Ministry of Railways (MoR) prepared an ambitious '*Mid- and Long-Term Railway Network Plan*' to identify railway investment requirements to 2020. The State Council approved this plan in March 2004. As a result, China Railway's network was increased from 73,000 route-km in 2003 to 98,000 at the end of 2012, an increase of 34%. Between 2003 and 2012, passenger traffic grew by 80% and freight traffic by 75%, showing sustained increase in demand for rail transportation that was met by expanding the network and increasing capacity.

An element of the Bank's strategy for China was to support government initiatives to bring the various parts of the country closer together in terms of personal mobility and the movement of goods. In this spirit, the present project, supported by the tenth World Bank loan to China Railways, aimed to upgrade transport infrastructure to serve the rapidly evolving needs of the economy in two inland and less developed provinces in the Southwest.

The Bank's strategic dialogue with the Government on railways development over the preceding decades had gone beyond the financing of infrastructure and included several studies on the institutional and regulatory experience of the world's leading railway systems, as prospective models for modernization and reform of China Railways. Since about 2004 the Bank and the Government had agreed that such studies were better conducted separately from specific

¹ The project was identified in 2004 and appraised in 2005.

infrastructure projects. The Bank had prepared several such studies using its budget for analytical and advisory assistance (AAA), and they were well received by the Government and MoR.

1.2 Original Project Development Objectives (PDO) and Key Indicators (*as approved*)

The Project aimed to assist China in expanding the capacity of its railway system to meet the growing demand for transport of people and goods between Guizhou and Yunnan Provinces. Accordingly, the key indicators measuring achievement of this increase of capacity were the average trip speeds and average number of trains per day in the first full year after the project was to be completed (see Annex 1(c)).

1.3 Revised PDO (as approved by original approving authority) and Key Indicators, and reasons/justification

There has been no change.

1.4 Main Beneficiaries

Since the preponderance of traffic on the project line was freight, the main beneficiaries would be the population of Yunnan Province, a hitherto remote province located far inland from the largest cities, farming and industrial areas of China's coastal provinces and its seaports, separated from them by a range of mountains. (The population of Guizhou province would benefit less, since most of the rail traffic is long-distance freight traveling from Shanghai and the central provinces to Yunnan and vice versa. Local traffic between Guizhou and Yunnan provinces is less than a quarter of the total.) Once the upgraded rail services were fully operational, the carrying capacity of the project line would be more than doubled and the distance shortened. Goods for export made in Yunnan would be delivered to seaports at lower cost; foodstuffs grown in Yunnan would be delivered to the markets of Central and Eastern China's mega-cities faster and more cheaply. As for passengers, travel times between Yunnan and the center and north of China would be substantially shorter. In effect, the province would be brought closer to the core of China's economy in Central and Eastern China.

1.5 Original Components (*as approved*)

Part A: Liu-Zhan Railway Line Upgrading: The central section of the railway line between Guiyang, the capital of Guizhou Province, and Kunming, the capital of Yunnan Province, was single-track and winding through the mountains, limited to slow operating speeds. Under the project this section, between the cities of Liupanshui in Guizhou and Zhanyi in Yunnan, was to be upgraded. The new line would follow the existing route but, to enable running speeds to be increased, the alignment was to be straightened and sharp curves and steep gradients eased. The construction of two very long tunnels through the mountain range would substantially shorten the distance, cutting out steep sections and allowing far higher speeds. A second track would be added throughout. About 50 new tunnels were planned and about 100 new bridges: a technically ambitious project. The end-to-end distance between Lanba and Qujing would be cut by 35 km (from 254 km to 219) and the double-tracking would allow the line to carry more than twice as many trains each day. The improved line would be able to carry more than double the volume of freight, and the end-to-end trip time between Liupanshui and Zhanyi for express passenger trains would be cut from nearly 4 hours to about 1 hour 45 minutes.

The new track sections, like the old, would be electrified. Bridge and tunnel clearance height was to be raised to that required to allow freight trains of double-stacked containers². This showed constructive foresight, as it would take several years for China Railways to raise the clearance on the entire distance from Kunming to Shanghai or other eastern seaports. With the completion of this project a major portion of this corridor would be fit for double-stack container train operation, leaving only the line between Liupanshui and Guiyang to be likewise upgraded.

Part B: Strengthening MOR's Planning, Management and Technology Capacity: In addition to this infrastructure component, the capacity of the Ministry of Railways in railway planning, management and technology capacity was to be strengthened, through studies, technical assistance and training. Proposed studies and training included: (a) a technical study on the reliability of current collection and extra-high catenary design for high-speed rail lines, (b) research and a study on rail grinding methods for improving operating efficiency, and (c) training.

Over all, it was to be a challenging engineering project located in difficult terrain with limited access to worksites. It was foreseen that carrying out works with minimal disruption of existing traffic along the line would be complicated; implementation was expected to take five years. Accordingly, the target date for completion was set at December 31, 2011 and the loan closing date was set at June 30, 2012.

1.6 Revised Components

The studies and training component (less than 1% of the project cost) was changed and fully reoriented. During implementation, MoR asked to replace the topics cited above³ by another of greater interest to it: 'Social Costs of Railways'. With the Bank's agreement, it was carried out in conjunction with another topic: 'National Investment Policy Study for Railways Construction', funded from the Bank's AAA budget, and a study tour to Europe financed from the loan. Both studies examined international best practice in economic cost-benefit analysis of railway investment projects, making the argument that rail transport incurs substantially lower environmental costs than either road or air transport, costs that users of the latter modes do not pay in full for lack of appropriate instruments. It was legitimate for governments to favor investment in rail networks provided that its investment cost-benefit analysis took these externalities into account in a consistent manner.

1.7 Other significant changes

To accommodate delays in completing construction (explained in Section 2.2 below), the closing date of the Bank loan was extended a year from June 30, 2012 to June 30, 2013.

² Trains of flatcars, each of which carries international standard 8ft-high containers, one on top of the other

³ MoR studied the original topics of cutting-edge railway engineering using its own budget and technical institutes.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

MoR had ample prior experience of infrastructure projects funded by international development banks from nine prior projects supported by the World Bank and a similar number supported by the Asian Development Bank and others with bilateral financing. Under these projects, works were put out to bid in conformity with international competitive bidding practice, after full prior evaluation of environmental and social impacts, and action plans were carried out to mitigate these impacts.

The present project was prepared based on a pre-feasibility study carried out by one of China Railways' survey and design institutes. It gave due attention to the technical as well as social and environmental aspects and efficient solutions were proposed. The Bank and MoR had learned several lessons from implementation of the earlier railway projects in China. Among these were:

- Including in the project only the components that had full commitment of the borrower;
- Restricting the project to a few components, two in this case;
- Ensuring close co-ordination between the various agencies responsible for design and implementation of the project;
- Client's commitment to Bank guidelines, particularly those related with procurement and safeguards, including the hiring of firms as independent monitors of implementation of the agreed environmental and resettlement action plans; and
- Continuation of Bank's support for improving of business processes and policy reform of China Railways.

In accordance with the above lessons, this project included only two components, both having the client's full commitment. Co-ordination was satisfactory between the design institute, the MoR's Foreign Capital and Technical Import Center (FCTIC - responsible for managing relations with foreign lenders to investment projects), project managers at project sites, and the independent monitors for safeguard issues. Having the Bank's task team leader and safeguards and procurement specialists all based in Beijing for much of project preparation and implementation period greatly facilitated dialogue with MoR, which showed full commitment to the Bank's guidelines for the project's procurement, environmental and social aspects.

The Bank's appraisal of the project was completed in September 2005. However, the loan was not negotiated until November 2006, 14 months later. MoR needed this much time to reach agreement with the provincial governments on funding for the resettlement action plan (RAP) and how it would be carried out. MoR lacked a mandate to directly administer resettlement; and its cost was normally split 50/50 between the railway and the provincial governments. As two of China's poorest provinces, both governments but especially Guizhou had limited financial resources and little experience with such plans.

2.2 Implementation

The delays in funding land acquisition and completing the resettlement of project-affected people held up the start of the construction works by six months in the Yunnan province section and sixteen months in the Guizhou province section. The resettlement problem had two stages. The first involved MoR and the provincial governments reaching agreement on land compensation

rates, while the second was the process of identifying the affected persons in accordance with the project's detailed design and of compensating them or resettling them.

For those who were to lose housing it was necessary to identify and acquire land for their resettlement, build the new housing and move in the affected people; and then to demolish the old housing and clear the site for work by the railway contractor. In and around Liupanshui new tracks (known as the Liupanshui hub) were to be laid in densely populated areas. Resettlement took longer there than elsewhere on the project line, since new housing had to be built after acquiring suitable urban land. This delayed the completion of work at the Luipanshui hub.

Following previous MoR practice, works contracts were awarded on the basis of preliminary design. At the detailed design stage significant changes were made, based on more accurate assessment of the engineering details, including geological features. This had an impact on costs as well as the time it took to complete construction. For example, detailed geological surveys revealed the presence of natural gas and underground water flows at certain locations on the alignment proposed for the longest tunnel (19.8 km). It was decided to move the tunnel line laterally by about 500m. This allowed it to be split in two, with a bridge between what became two shorter tunnels. This change not only reduced the tunneling risk during construction, but also made train operations safer by improving ventilation and facilitating servicing of tracks inside the tunnels. The redesign substantially reduced these risks. However, it implied incorporating change orders in contracts already awarded, which led to delays and increases in the total price (see below).

On the basis of this experience and others, MoR has changed its practice and now routinely completes the detailed design stage before calling for bids.

The two long tunnels in Guizhou province were on the critical path. Their technical complexity in boring delayed project completion.

The Bank's loan was used for civil works, equipment and materials, together with the technical assistance. The goods contracts and the four civil works contracts financed by the Bank were completed by December 2012, a year later than planned. This made it necessary to extend the loan closing date as stated above to June 30, 2013, by which time the loan was fully disbursed.

Trial operations on the double tracks between Liupanshui and Zhanyi started well before the extended loan closing date. The number of trains has gone up from an average of 31 pairs per day before the project, to 45 pairs in October 2013. The remaining works at the Liupanshui hub are to be completed by December 2013. Their completion will allow the throughput to be raised throughout to 50 train pairs per day, as targeted.

In China a national-level evaluation of a new or improved railway is carried out after one year of trial operation: in this case at the end of 2013. Only upon satisfactory completion of the trials is the new timetable introduced, raising train speeds and frequencies to the full planned extent. From January 2014 express passenger trains will start operating over the entire line at a top speed of 160 km/hr, for which rolling stock capable of working at this speed will be deployed. (The

loan agreement made no explicit reference to this trial period, but stated that the key performance indicators would be achieved ‘in the first full year of operation’.)

The final cost was about 40% over the appraisal estimate (see Annex 1). The overrun was due mainly to:

- increase in prices for construction materials (steel, cement, copper, etc.), equipment and labor, attributable to the infrastructure boom launched by the Government to offset the international financial crisis that started in 2007-8;
- increases in the bills of quantities of civil works resulting from changes made between the preliminary design and the final construction drawings; and
- additional cost for renovating 14 existing stations, not included at appraisal, and other measures taken by MoR to hand over to local communities land and other facilities freed up by the closure of parts of the old line.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

Since this was essentially a single-component linear infrastructure project, it was agreed at loan negotiations that a continuous monitoring of the project would be carried out, negating the need for a mid-term review.

The monitoring and evaluation system was straightforward in its concept and implementation. The three indicators for measuring the ‘before’ and ‘after’ performance were the average number of trains per day and their average speeds for freight and passengers. These reasonably capture the objective of increased rail transport flows in the corridor. The targeted values were those to be achieved in the first full year of operation after the upgrading was complete. The volume and speed indicators are standard operating statistics collected by MoR’s Statistical Bureau on a routine basis out of its Train Monitoring System. Thus they also will allow continued monitoring of longer-term increase in these flows over the coming years.

2.4 Safeguard and Fiduciary Compliance

The environmental and social action plans have been duly implemented, and checked by Bank specialists on inspection visits carried out once or twice each year. (See Annex 4 for a full description.) Attention was paid to the cleaning up of construction sites and dumping areas for waste rock and soil from the tunnel excavations. Camp sites and access roads were reclaimed as farmland or with tree plantations, or transferred to local communities for public use or industrial land development. Passages over and under the tracks were provided for local inhabitants and animals, with a satisfactory average frequency of 2.5 per km of line.

The project’s land acquisition and resettlement activities have been managed in line with, and in some cases beyond, the requirements of the resettlement action plan (RAP). An independent resettlement monitor, reporting periodically, has concluded that the affected people’s livelihoods are better now than before their land was acquired and they were resettled. To minimize the number of people who needed to be resettled, the railway alignment was optimized. As an example, the additional passenger train track at the Liupanshui hub was relocated after appraisal from left to right of the existing track to reduce the number of people who would have to be resettled. As a result, compared to the original plan 16% less land finally needed to be acquired.

Along the abandoned old line sections (about 80 km in all) the railway bureaus have removed the rails, cross ties, power cables etc., and handed over the ballast/subgrade and station buildings to local communities for free. During the asset transfer, the railway bureaus and local governments conducted joint surveys along the line to identify potential safety risks, and remedial actions have been taken (e.g. repairing the safety fencing blocking access to bridges and tunnels, and taking other measures to restrict access). The future land use of the abandoned line segments will be decided by the local governments.

As noted above, delays occurred in both parts of the corridor, firstly because of disputes between the railway and local governments over release by the two provinces of their share of resettlement funding, and then over the level of payments per affected household. Agreement was gradually reached through negotiation. The cash compensation rates and other in-kind compensation paid to the affected villages and APs have together been the same or higher than those in the approved RAP.

Both the Chengdu and Kunming Railway Bureaus hired external environmental consultants to monitor performance in implementing environmental safeguards, to prepare for the Environmental Acceptance Approval by the Ministry of Environmental Protection. In short, the technical quality in the implementation of environmental protection measures continues to be very good.

2.5 Post-completion Operation/Next Phase

China Railways have ample experience and capacity and well-established systems for maintaining and operating railways. They continue to enjoy strong government support, confirmed in the continued allocation of large budgets. No difficulty is therefore foreseen in the operation and maintenance of the project line.

Ensuring safety in train operation over the line has received high priority. The railway is equipped with a modern automatic signaling system. Other safety features include fencing of the track, cab signaling, a mobile communication system between locomotives and the control center, hot box detection units, and gas level monitoring devices in those tunnels known to have a risk of natural gas leaks from the rock strata.

Railway reform: In March 2013 the Chinese government reformed the Ministry of Railways, putting railway operations and investment in the newly formed China Railways Corporation (CRC), and transferring policy and strategic functions to the Ministry of Transport (MoT), which now for the first time has jurisdiction over the entire transport sector. The functions of railway sector policy and regulation, particularly in respect of safety in construction and operation of railways, have been assigned to MoT. A unit responsible for establishing and monitoring technical standards, safety standards, service quality and construction projects is to be established in MoT. MoT is empowered to develop a unified policy for all transport modes aiming at modal integration and optimal use of resources. (See Annex 9 for a fuller account.)

Responsibility for the railway's commercial operations has been assigned to CRC. It is manned by staff and managers of MoR. CRC is fully owned by the Ministry of Finance and has its own board of directors. The Minister of Railways has been appointed as the chief executive officer of

CRC. For now there is no change in the internal organizational structure and the existing railway administrations will continue to function as before. This ensures that there is no disruption in railway services as a result of MoR's restructuring. CRC is responsible for all railway operations and business activities, including construction projects. Its mandate is to operate the railway on commercial lines. It is understood that in line with this policy, CRC will be compensated financially if it is required to provide services that are financially not viable.

The above reforms were carried out at the initiative of the Chinese government, but are in line with recommendations made by the Bank from time to time.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

The project remains highly relevant to the objectives of the Bank's current country partnership strategy⁴, that include giving priority to the economic development of the inland provinces ("improving transport connectivity for more balanced regional development"), as well as drawing long-distance transport of both freight and passengers away from roads and air to rail, which has a far smaller carbon footprint ("promoting low-carbon transport"). Accordingly, relevance is rated **high**.

3.2 Achievement of Project Development Objectives

As already stated, the project's development objective was to assist the borrower in expanding the capacity of its railway system to meet the growing demand for transport of people and goods between Guizhou and Yunnan provinces. The capacity of the railway line has increased substantially, and is now fully equipped with a double track and modern technology to meet the growing transport demand that has been fueled by the growing economy in China and the project provinces. The train speeds for freight and passenger services have substantially increased, more than double that of the baseline values and higher than the target values set at appraisal. The number of trains per day has already risen substantially since appraisal, thanks to the completion of the second track and the reduction of travel times. The targets set in the Loan Agreement are already close to being met, the average number of trains per day having already increased by 45 percent from 31 pairs to 45 pairs, against the Loan Agreement target of a 61 percent increase to 50 pairs. The full target will be achieved early in 2014, the first full year of operation.

The technical assistance component, as modified, served to strengthen MoR's case for large-scale investment in railways despite their relatively low financial return, because of their environmental and social benefits compared against road and air transport. This applies throughout China, but particularly in the Kunming-Guiyang corridor, where the road network is not well developed and would have required equal or greater investment to deliver capacity comparable to the railway. The second of the two studies documented EU experience in reforming national railways into semi-independent corporate bodies better able to compete in their national transport markets, subject to a financial discipline and setting their own prices but compensated by the state for public service obligations imposed on them. The insights gained

⁴ The current Country Partnership Strategy is that of October 2012, covering the period FY13-FY16.

from the report and study tour will have been relevant to the restructuring of MoR into CRC that took effect in March 2013 (see Annex 9).

The recorded increase in the number of trains by 2013 shows that larger volumes of freight are being moved in and out of Yunnan Province, and its citizens are making more trips in and out of the region at a much higher speed than previously. Thus the project has met its developmental objective, and is rated **satisfactory**.

3.3 Efficiency

The Bank's ICR team estimates that the project's economic return, using actual costs and adjusting traffic forecasts to actual levels recorded between 2005 (appraisal) and 2012 (the most recent full year), will be about 13% (Annex 3). This is lower than the appraisal base forecast of 17% (with benefits starting in 2011), due to the two-year delay in completion and the approximately 40% increase in construction cost, off-set to some extent by higher trucking costs in the without-project case⁵. The financial rate of return is estimated at 4%, a little above CRC's cost of financing. It likewise is significantly lower than the corresponding appraisal forecast rate of 10%. In present value terms, the loss of two years of economic benefits and income at the start is costly in terms of economic and financial return. However, the customary threshold economic return for long-term rail infrastructure projects is 10-12%⁶. Considering China Railway's good record of traffic forecasts being achieved, and the environmental advantages of rail over road transport in this context, efficiency is rated **satisfactory**.

3.4 Justification of Overall Outcome Rating

Rating: **Satisfactory**. The project's objective remains highly relevant to China's economic development strategy, and CRC is already operating services at close to the levels targeted in the key performance indicators, which almost certainly will be achieved, once the new operating timetable takes effect in January 2014. Although there was two year delay in completing the civil works and 40 percent increase in cost, in part due to the complex engineering and resettlement, the economic efficiency is still satisfactory. The overall outcome rating is therefore rated satisfactory.

3.5 Overarching Themes, Other Outcomes and Impacts

(a) Poverty Impacts, Gender Aspects, and Social Development

The constructive relationship developed between the Railway, the environmental monitor, the resettlement monitor and affected communities have helped to improve public facilities now serving affected communities –beyond what was in the formal plans. As examples, three road bridges built to facilitate project construction were not dismantled upon completion but handed over to the local population to improve the connectivity of the road network in the area. Similarly, some of the existing buildings at railway stations that were closed or relocated were

⁵ For this evaluation trucking costs by road have been analyzed in more detail than at appraisal (see Annex 3).

⁶ For railway projects consideration may be given to the degree of uncertainty as to future traffic growth (arguing for a higher threshold for riskier projects), and to environmental and social externalities, not readily incorporated in the quantified benefits (defending a lower threshold).

handed over to local bodies for use for social activities. Sections of the existing track bed that the railway no longer needs are being used as roads after the track is removed. In this respect the project line is contributing to the economic and social development of the communities through which it passes.

(b) Institutional Change/Strengthening

The project's technical assistance component has contributed usefully to the institutional development and reform of MoR/CRC. The study on social costs of railways relative to other modes of transport confirmed, by examining international evaluations, that rail transport causes substantially fewer environmental costs than road or air transport. But since users of these other modes do not fully pay for these costs, consumers' choices are distorted in their favor. The study provided sound arguments for the Chinese government to take these 'externality' costs into account in framing national transport policy, and to continue investing substantially in improved rail infrastructure as a way to mitigate the environmental impacts of transport.

(c) Other Unintended Outcomes and Impacts (positive or negative)

While the project was being implemented, the world economy experienced a major financial crisis, with a consequent shrinking of international trade. The Chinese government cushioned its adverse impact on its economy by a large increase in spending on infrastructure, including fast-tracking of projects to expand and upgrade the rail network. A stimulus package of \$650 billion was launched in 2009. Infrastructure projects planned for implementation between 2010 and 2012 were brought forward to 2009-10 to maintain GDP growth and create employment opportunities to replace job losses due to shrinking exports. Wages continued to increase due to the sustained demand for labor and much progress was made in rebalancing of China's economy by encouraging domestic consumption and reducing reliance on exports.

The infrastructure boom included not only accelerated completion of railway improvements already planned, but also construction from scratch of a network of high-speed dedicated passenger lines. The massive increase in railway investment achieved its goal of avoiding large-scale unemployment. But it also had the disadvantage of pushing up the prices of key construction materials as well as wages (as noted above in Section 2.2).

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops

CRC held no such surveys or workshops on this specific project.

4. Assessment of Risk to Development Outcome

The risk to the development outcome is assessed as *low*. China Railways is a very experienced enterprise, technically competent and efficient. The high density of population and economic activity at each end of the project corridor augurs well for continued high reliance on railway transport. The tendency for passengers and freight to migrate from rail to road transport as incomes grow will be at least partly off-set by the upgrading of rail services -- a process already well documented in other railway corridors improved under earlier Bank-supported projects. As for the environmental and social impacts (resettlement), the outcomes in this case are very good. By their nature, these outcomes (e.g. return of work sites to their pre-project condition, and good quality resettlement housing) will endure over time.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: *Satisfactory*. The Bank took advantage of the considerable experience with China Railways that it had accumulated over the nine previous projects. In particular, it tightly limited the number of components, to avoid spreading its supervision effort too thin. A full Bank team, with specialists in all needed fields (Annex 5) carried out the project appraisal based on a pre-feasibility report prepared by an experienced railway survey and design institute. The team, based in Beijing, was in frequent contact with MoR during preparation and between appraisal and negotiations to address issues arising, clarify Bank policies and expectations, and to pre-negotiate solutions. Cost increases at the level that resulted could not reasonably have been foreseen, as these occurred in part as a result of the substantial acceleration of the high-speed rail investment program, part of the larger government stimulus launched in 2009.

(b) Quality of Supervision (including of fiduciary and safeguards policies)

Rating: *Satisfactory*. Implementation support missions, routinely including fiduciary and safeguard specialists, were fielded with appropriate frequency: project launch and eight other site visits over the five years 2007-2011. (No site visit took place in 2012, as by then all the Bank-financed contracts had been completed.) Project progress was reviewed frequently through meetings in Beijing of FCTIC staff and the full Bank team. The aide-memoires left with MoR were detailed and focused appropriately on resolution of delays and other issues arising.

(c) Justification of Rating for Overall Bank Performance

Rating: *Satisfactory*. The Bank played its role very well during project preparation, appraisal and implementation support. It provided useful advice to MoR through detailed aide memoires covering specific areas that needed attention. Activities related with environmental protection and resettlement were completed successfully as a result of the close supervision and advice from the Bank. It also showed appropriate flexibility in accommodating MoR's request to re-orient the technical assistance component to address pressing new priorities associated with the counter-deflationary increase in public investment in railways. In parallel, the Bank team wrote influential policy notes, including those that addressed railway governance structure. The government's new railway restructuring is consistent with what the Bank team had espoused to separate railway operations from policy and regulatory functions.

5.2 Borrower Performance

(a) Government Performance

Rating: *Satisfactory*. The central government fully supported the project during implementation. Its rapid expansion of the railway construction program nationwide was a macro-economic policy to offset the negative impacts of the global financial crisis that occurred a year after project construction started and persisted throughout most of the construction period. Even though project cost escalated by about 40 percent over the estimated cost, adequate counterpart funding was provided.

(b) Implementing Agency or Agencies Performance

Rating: *Moderately satisfactory*. MoR's implementation performance suffered somewhat from pressures put on it to deliver within very tight deadlines. In hindsight it would have been preferable if MoR had first completed detailed design before putting the big civil works contracts out to bid. Tunneling is almost always risky and in this project it was a central feature. Secondly, MoR had not adequately foreseen the lengthy consultation and coordination that would be needed between it and the two provincial governments regarding funding of the resettlement action plan. This caused more than a year's delay in the start of works in Guizhou province, and hence in completion of the upgraded corridor.

(c) Justification of Rating for Overall Borrower Performance

Rating: *Satisfactory*. The Government and MoR/CRC are committed to railway capacity improvement and continued operational improvement. Despite some complex engineering, the construction was carried out to high standard. CRC is already providing higher capacity services to users and is well poised to meet all targets when the new timetable is fully operational in 2014. The government has launched a major reform program designed to improve the governance structure of railways and subject it more to market forces.

6. Lessons Learned

1. Technically ambitious projects of this nature are often vulnerable to unforeseen complications at the detailed design stage as well as during the construction phase. It is advisable that bidding for civil works contracts of this complexity should be done based on detailed designs and construction drawings rather than on preliminary design.
2. Having the Bank's task team leader (TTL) and most members of the project team based in Beijing resulted in close co-ordination with the implementing agency, also in Beijing. The practice of basing TTLs in the borrower's country (especially large ones) should be encouraged.
3. Managing resettlement of project-affected persons by provincial governments who were not parties to the loan agreement created a risk for delay in implementation. This risk should be mitigated by having clear and specific agreements between the implementing agency and provinces as to the sharing of funding, timely release of funds, and adherence to compensation rates specified in the Resettlement Action Plan.
4. The use of an independent environmental compliance monitor, an established practice in China for major projects with potential environmental sensitivity, proved its value in this project, ensuring that proper attention was paid to environmental safeguards while freeing the supervising engineer to concentrate on technical issues. The same is true for the independent resettlement monitor.
5. For the benefit of project-affected communities, wherever feasible the borrower's project management (and through it the design engineers) should be encouraged to make a useful contribution to such communities by handing over to them facilities that are no longer needed, once the project is completed.

6. Sustained sector dialogue in parallel to project implementation can sometimes be more influential than including all technical assistance in the project. The revised technical assistance component provided a pertinent instrument for policy dialogue between the Chinese government and the Bank on the subject of national transport policy, market pricing, and railway restructuring. The successful sector dialogue can be attributed to the development of high-level AAA assignments, along with a series of lending operations, sustained over two decades, fostering mutual trust and close engagement in what for China is a key strategic sector.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

Comments from CRC

The NR3 project had been constructing for 7 years from 2006 to 2012. In the construction process, we encountered many different difficulties, such as resettlement compensatory problem and tunnel construction problem. Under the great effort of MOR's different departments and design institute, the project has been implemented successfully. According to the operation of a year, the actual situation meets our target. We think the project is satisfactory. Chengdu and Kunming railway bureaus and the two construction offices have made great contribution to the project. In addition, we appreciate the support of WB in many aspects.

(b) Cofinanciers

Not applicable

(c) Other partners and stakeholders

(e.g. NGOs/private sector/civil society)

Not applicable

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in RMB million)

	Appraisal Estimate	At Completion	Completion as % of Appraisal	Disbursement Rate (WB)
Liu-Zhan Line	8,972	12,476	139	
- civil works	6,777	0		40%
- goods	1,698	0		100%
- resettlement	497	0		
Technical Assistance	8	11	138	100%
Total Baseline Cost	8,980	12,487	139	
Physical contingencies	28			
Price contingencies	65			
Total Project Costs	9,073	12,487	138	
Interest during construction	360	798	221	
Total Financing Required	9,433	13,285	141	

Note: The above costs are based on actual RMB expenditures. Since 2006, the RMB has strengthened significantly against the US\$ and the exchange rate in Oct 2013 is \$1=RMB 6.1

(b) Project Cost by Component (in US\$ million equivalent)

	Appraisal Estimate	At Completion ⁽¹⁾	Completion as % of Appraisal	Disbursement Rate (WB)
Liu-Zhan Line	1,107.7	1,540.2	139	
- civil works	836.6	0		40%
- goods	209.6	0		100%
- resettlement	61.4	0		
Technical Assistance	1.0	1.4	138	100%
Total Baseline Cost	1,108.7	1,541.6	139	
Physical Contingencies	3.5			
Price Contingencies	8.0			
Total Project Costs	1,120.2	1,541.6	138	
Interest during construction	44.4	98.5	221	
Total Financing Required	1,164.6	1,640.1	141	

(1) To show the % cost increase between the appraisal estimate and the outcome as seen by CRC, expenditures in both years have been converted from RMB at the same rate of \$1 = RMB 8.1, the rate used at appraisal in 2006. (The import content of the project was minimal; all works and goods contracts were priced in RMB; only one technical assistance contract for \$300k was priced in US\$.)

(c) Financing

Source of Funds	Appraisal Estimate (US\$ million)	At Completion (US\$ million)	Completion as % of Appraisal
Borrower	965.6	1,440.1	149
IBRD	200.0	200.0	100

(d) Key Indicators

Project Development Indicators ⁽¹⁾	Base-line values	Target values	Actual values	Planned values	Data Collection and Reporting			
					2004	2012 ⁽⁴⁾	2013 ⁽⁵⁾	Jan 2014
Commercial speed ⁽²⁾ – freight (km/hr)	23	41	70	70	Project completion	operating statistics	MoR	
Commercial speed ⁽²⁾ – express passenger (km/hr)	55	90	100	143	Project completion	operating statistics	MoR	
Avg number of trains (freight + passenger) operated (pairs/day) ⁽³⁾	31	50	45	50	Project completion	operating statistics	MoR	

Notes:

- ⁽¹⁾ All indicators are measured on the line between the stations of Liupanshui (origin) and Zhanyi (destination).
- ⁽²⁾ The commercial speed from origin to destination is the average speed including intermediate stops for operational purposes.
- ⁽³⁾ Averaged over the year.
- ⁽⁴⁾ In the loan agreement these target values were set for the ‘first full year of operation’. Since the project will be completed in December 2013, the first full year of operation will be 2014.
- ⁽⁵⁾ Actual train numbers are the average for the full length, while speeds are for just the Kunming section.

Annex 2. Outputs by Component

Part A: Liu-Zhan Railway Line Upgrading

The project consists of upgrading and double-tracking of the existing single-track electrified railway between the city of Liupanshui in Guizhou Province and the city of Zhanyi in Yunnan Province. The project section is located in mountainous terrain and crosses three mountains which reach a height exceeding 2,200m above sea level. The project was implemented by Chengdu Railway Bureau for the portion lying in Guizhou Province⁷ and by the Kunming Railway Bureau for the portion lying in Yunnan Province. Besides the construction of the second track, most of the existing track was realigned and reconstructed with larger radius curves to raise the speed to 160 km/hr. The project design included construction of double-track tunnels including two very long tunnels exceeding 12 km in length. None of the existing single-track tunnels would be retained. The construction work encountered significant difficulties due to the mountainous terrain, limited access and additional safety concerns, since construction work had to be carried out while the existing track carried traffic. Operating safety on the existing track and that of construction crews was given special attention, and as a result no deaths or injuries occurred.

Chengdu Bureau was responsible for constructing 97 km of track between Lanba and the boundary with Kunming Bureau over an operational length of 118 km, as some of the existing track was used (25 km shorter than the existing line). This section required 62.3 km of tunnels and 15.7 km of bridges and viaducts. Of the 12 stations in this section, two are newly built and seven were renovated. The longest tunnel is 12.3 km long. Two of the 39 tunnels experienced high construction risk due to long lengths exceeding 12 km each, presence of gases, weak surrounding rocks and steep grades.

All work except construction of the Liupanshui hub at the northeastern end of the project line was completed by December 2012. Work at the Liupanshui hub involves construction of a freight line 20.9 km long (already operational), a passenger line 19.5 km long and a 4.6 km long connection between the freight and passenger tracks, expected to be completed by December 2013 (i.e. about two months after the ICR mission).

The Kunming Bureau was responsible for constructing 99.7 km of track between the boundary with the Chengdu Bureau and Qujing (10 km shorter than the existing line). Of the eight stations in this section seven were renovated. This section required construction of 9.2 km of bridges and 10.7 km of tunnels. The longest tunnel in this section is 4.6 km in length. All construction work under the Kunming Bureau was completed by December 2012.

The Bank financed four civil works contracts and procurement of goods. The Bank-funded works were completed satisfactorily and all Bank-funded goods have been delivered.

⁷ CRC manages the section in Guizhou province from its regional headquarters in Chengdu. The Chengdu bureau's section extends a short distance into Yunnan province as far as the first station.

The technical quality and the implementation of environmental protection measures continued to be very good.

Under the original project schedule, construction was to start in September 2007 and be completed by 2011. However, due to delays in land acquisition and resettlement, the start of construction was delayed by six months in Yunnan province and sixteen months in Guizhou. As construction progressed more slowly than expected, project completion has been delayed until December 2013, two years late. Although the completed portions of the track (except the Liupanshui hub) were certified for a speed of 160 km/hr in December 2012, trains have continued to run at a maximum speed of 120 km/hr through December 2013. The works in the Liupanshui hub are planned for completion the same month, December 2013. The national-level evaluation of the project is also planned before the end of 2013. After successful evaluation, express trains operating at a maximum speed of 160 km/hr are planned on the entire project line from January 2014, with the deployment of rolling stock capable of working at this speed.

The following key indicators for this project were targeted for the first full year of operation;

- Average number of trains (freight plus passenger) operated to be increased from 31 to 50 pairs per day.
- Commercial speed of freight trains to be increased from 23 to 41 km/hr,
- Commercial speed of express passenger trains to be increased from 55 to 90 km/hr, and

In September-October 2013 the average number of trains was 45 pairs. The actual average speed of trains was 70 for freight trains and 100 for passenger trains (Kunming data; Chengdu speeds are not yet available). The target values are expected to be complied with or exceeded early in 2014, since the project is poised to be fully operational in January 2014 with all works completed and speeds raised to the maximum of 160 km/hr.

Part B: Strengthening MoR's Planning, Management and Technology Capacity

Originally the technical assistance was to cover two technical areas. However, during implementation, instead of these two studies MoR decided (with the Bank's agreement) to carry out a study on 'Social Costs of Railways'. This was financed (\$150,000) from the loan and delivered in conjunction with another study (National Investment Policy Study for Railways Construction) funded from the Bank's operating budget for implementation support and strategic dialogue (\$100,000). These two studies were carried out consecutively with a study tour financed from the loan (\$150,000).

All three activities were designed as a collaborative effort between the Bank and MoR as part of the separate policy dialogue track. The study tour and the studies have been successful in demonstrating that international best practice takes environmental costs into account in investment cost-benefit analysis, fairly across competing transport modes. The information provided and recommendations put forth have been internalized by MoR and have helped to influence decisions made and policy initiatives launched during the 12th Five Year Plan process. The TA activities financed under this project were thus completed successfully.

Annex 3. Economic and Financial Analysis

A 3.1 Introduction

This annex presents the economic and financial re-evaluation of the project. It is expected to yield a net present value, discounted at 12% to 2013, of RMB 3 billion and to achieve an economic rate of return of 13 per cent.

At the time of project preparation, the Liu-Zhan line was double-tracked from Shanghai to Zhuzhou with double-tracking in progress between Zhuzhou and Liupanshui and between Zhanyi and Kunming. In 2004, as project preparation was beginning, the network-wide Medium and Long-Term Development Plan was approved. This included the creation by 2020 of a new 10,000 km network of dedicated high-speed passenger lines ('passenger dedicated lines' - PDL) together with a supplementary network of mixed-use lines which would allow passenger operations at high speeds. The plan envisaged that by 2020 the Shanghai-Zhuzhou section of the Shanghai-Kunming corridor would be four-tracked, with freight and passenger traffic separated, and the Zhuzhou-Kunming section would be double-tracked carrying mixed traffic but with passenger services at increased speeds. The project was consistent with this plan.

However, in 2009 and 2010, the Government responded to the global financial crisis by accelerating investment in rail infrastructure. This included extending the Shanghai-Zhuzhou PDL from Changsha to Kunming, thus creating a parallel route to NR3. Construction of this entirely new line began in March 2010 and is expected to be completed in October 2015. Its impact on the project is taken into account here.

This ICR re-evaluation adopts the same approach as used in the PAD and concentrates on the operating cost savings from several factors: adding a second track (which eliminates time spent waiting in passing loops for access to the single track); the speeding up of trains thanks to improved track alignment and gentler gradients; and reduced distance thanks to new tunnels. It also includes the benefits to additional traffic carried from 2012 on because of the increased line capacity. In the 'without-project' case this traffic is assumed to be either suppressed or to require additional road capacity to be constructed at the time of its diversion.

The re-evaluation has revised the unit rates for the revenues and operating costs of each mode, as well as the unit value of time, and updated them to 2012 prices. To maintain consistency with the PAD methodology, the evaluation has been done over a 25-year period following construction. It concludes that, based on a discount rate of 12 per cent, the net present value (NPV) for the project is RMB 3 billion (in RMB of 2012) and the economic rate of return (EIRR) is 13 percent for the base case – compared to the 17 percent figure reported in the PAD.

A 3.2 Traffic Forecasts

In 2002, the last normal⁸ year before project appraisal, traffic on the section was 28 million tons of freight per year and 10 pairs of passenger trains per day (approximately 6.3 million

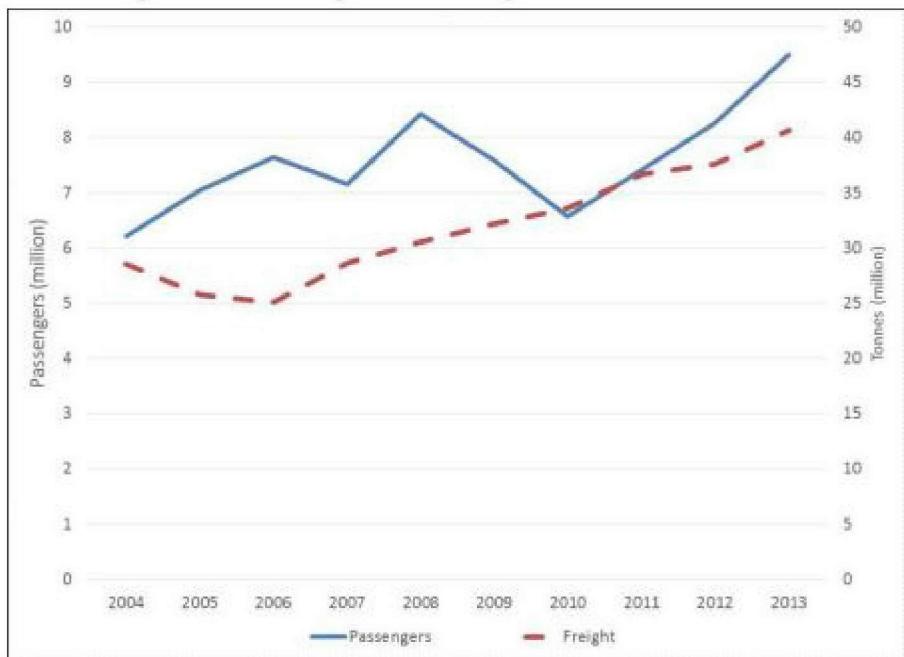
⁸ 2003 was the year of the SARS epidemic in China, which suppressed rail passenger travel by about 10%.

passengers); freight predominated by about 4 to 1 in traffic units. The forecast density on the section in 2012 was 46 million tons of freight and 11.6 million passengers, increasing by 2020 to 61 million tons and 16 million passengers, well beyond the capacity at that time. In 2013, when the line had been completed but operations were still being undertaken at somewhat reduced speed pending the final inspection, the estimated traffic was 41 million tons of freight and 9.5 million passengers (Table 2), about 15-20% less than the appraisal forecasts.

Table 2: Average Traffic Liupanshui - Zhanyi 2004-2013

	Tons (million)	Passengers (million)	Average speed (km/hr)	
			Freight	Passenger
2004	28.5	6.2	23	55
2005	25.8	7.0		
2006	25.0	7.6		
2007	28.6	7.2		
2008	30.5	8.4		
2009	32.2	7.6	24	43
2010	33.6	6.6	26	41
2011	36.7	7.4	22	28
2012	37.6	8.3	20	28
2013	40.7	9.5	70	100
Growth 04 – 12	3.5%	3.5%		
Growth 07 – 12	5.6%	2.9%		

Figure 1: Passenger and Freight Demand 2004-2013



The PAD assumed annual growth rates of 4.1 per cent for freight traffic and 4.7 per cent for passenger traffic to 2020, with annual growth of 2.3 per cent and 1.8 per cent respectively thereafter. These growth rates were conservative based on trends over the last eight years (2004-

2012) for the network as a whole (on which annual growth has been 6.4 per cent for freight and 7.0 per cent for passengers), but they have been maintained for the re-evaluation. Allowance has also been made for 10 per cent passenger growth in 2014 to reflect the earlier suppression of trips caused by the project works. The PDL services, scheduled to be operating by 2015, will also affect passenger demand. Analysis of the passenger figures for existing PDLs suggest it will attract around 25% of the demand in the corridor from the conventional service. Table 3 compares the forecasts adopted for the re-evaluation with those used at appraisal.

Table 3: Comparison of ICR forecasts with those at appraisal (million tons, passengers)

	Appraisal		ICR	
	Tons	Passengers	Tons	Passengers
2013	49.4	12.4	40.7	10.5
2015	55.9	14.0	44.1	8.6 ⁽¹⁾
2020	61.3	15.9	53.9	10.8
2025	67.1	18.0	60.4	11.8
2030	73.4	20.3	67.7	12.9
2035	80.4	23.0	66.3	14.1

(1) Allows for diversion to PDL

The freight forecasts are about 10-20% lower than at appraisal, reflecting the downturn in traffic on this line in 2004-6, when traffic elsewhere on the network grew by 28%. The passenger forecasts are significantly lower than at appraisal, due to the diversion to the PDL.

Sections of the project have been progressively implemented during the construction period. This has enabled capacity to be increased by about 26% in 2012 compared to 2008, albeit with a significant reduction in commercial speed. For the purposes of evaluation, the 2008 throughput was taken as the absolute capacity of the line and adopted as the capacity for the ‘without-project’ case, with all demand above this level assumed to be suppressed or diverted.

A 3.3 Project Costs

The estimated cost of the project, excluding interest during construction, is RMB 12.5 billion at current prices (RMB 14.8 billion at 2012 prices). The economic analysis assumes that all input costs are adjusted to market prices and thus no shadow price factors have been used.

A 3.4 Project Benefits

Operating cost savings: The project has reduced transit times and significantly reduced the distance covered, as well as eliminating much of the previous curvature. Against this, infrastructure maintenance costs have increased through the additional track-km.

The appraisal evaluation in 2006 assumed that the new line would allow commercial speeds of 90 km/hr for passengers and 41 km/hr for freight. Although the line is currently operating under somewhat reduced speeds until its final inspection in December 2013, passenger trains in the 100 km segment from Xuanwei to Qujing are already operating at around 100 km/hr; passenger trains currently travel between Liupanshui and Xuanwei at an average speed of 63 km/hr, but it is planned to increase this to over 100 km/hr in the 2014 timetable. Freight trains are expected to take about 4.5 hours between Liupanshui and Zhanyi when the line is fully operational.

The ability to carry heavier axle-loads and to double-stack containers following the project will also, over time, generate operating cost savings for freight. These are assumed to begin in 2020, with 20% of the freight being carried in higher axle-load wagons, at a 5% saving in unit transport costs, increasing to 50% by the end of the evaluation period.

Time savings. The upgrading has saved express passengers about two hours. This has been valued using an average value of time savings based on recent surveys of passengers undertaken on various lines, increasing at 5% per year in future (as in the appraisal evaluation) to reflect the growth in incomes. Benefits to freight traffic from the reduced transit time are likely to be small given the long distance over which the freight moves (on average over 2,200 km) and, as in the appraisal evaluation, have been excluded.

Benefits to additional traffic. The increase in capacity will allow a significant volume of both freight and passenger traffic to be carried by rail which would otherwise have to go by alternative rail routes, by road or by air (in the case of passengers), or would not have traveled at all. An estimated three-quarters of the additional traffic, representing the longer-distance traffic on the corridor⁹, is assumed to travel by road between Kunming and a railhead at Liupanshui in the absence of the line and is expected to gain the full benefit of the difference in road and rail costs along the corridor.¹⁰ The remaining quarter of the additional traffic, which has been assumed would make its entire trip by road in the absence of the additional rail capacity, has been allowed benefits calculated at half of the benefits to the base additional traffic. The average distance traveled by freight to and from the assumed railhead at Liupanshui was taken as 400 km, based on an analysis of 2011 flows by origin and destination. A similar approach was adopted for suppressed passenger travel, but with a shorter distance travelled by road of 200 km.

Externalities. This project, which enables a significant volume of road traffic to be avoided, will in principle generate benefits from reduced accidents, less congestion to other road users and a reduction in the emission of greenhouse gases. However, much of the expressway network over which this traffic will travel will be relatively uncongested for at least the medium term, and such benefits will be small compared to the operating cost savings. None of these externalities were included in the original evaluation and they have been omitted from this re-evaluation.

A 3.5 Economic Rate of Return and Sensitivity Analysis

For the economic re-evaluation, net benefits are calculated for the 32-year period covering the seven-year construction period (2007-2013) and 25 years of operation from 2014 to 2038. The net present value (discounted at 12% to 2012) is estimated at RMB 3 billion and the economic internal rate of return (EIRR) at 13 percent. Table 4 summarizes the contributions to the NPV (excluding the discounted construction cost of RMB 23.7 billion).

⁹ That moving more than 500 km to and from the east of Liupanshui.

¹⁰ This traffic is also traveling beyond the corridor, but the additional benefits of rail compared to road for the remainder of their journey are conservatively assumed to be balanced by the benefits of door-to-door transport compared to the access/egress and quality benefits of road transport.

Table 4: Structure of Base Case NPV (RMB billion, 2012) (discounted at 12% to 2013)

	Operating Savings	Time Savings	Diverted/ Suppressed Traffic	Total	% of Total
Freight	3.3	-	17.5	20.8	78
Passenger	1.3	3.5	1.2	6.0	22
Total	4.6	3.5	18.7	26.8	100
% of total	17	13	70	100	

The robustness of these results was tested against changes in five base case assumptions (Table 5):

- 50% diversion of passengers to the PDL
- halving traffic growth rates from 2020 onwards
- including rail operating cost savings only
- including rail operating cost savings and passenger time savings only
- halving the benefits attributed to additional traffic

Table 5: Sensitivity of Project Evaluation

Test		IRR (%)	NPV (RMB bn)
1	Base	13	3.1
2	50% traffic diverted to PDL	13	1.7
3	Traffic growth rates halved from 2015	12	1.4
4	Diverted/suppressed benefits halved	10	-6.3
5	Rail operating and time savings only	4	-15.6
6	Rail operating savings only	2	-19.1

These results are similar in structure to those estimated at appraisal, although the make-up of benefits is a little different. The final construction cost was significantly higher than the base forecast, and forecast demand is lower due to the construction of the PDL and the relatively low growth of freight between 2004 and 2007. Nevertheless, the EIRR is comparatively high for such a large infrastructure investment and, although the project was implemented relatively slowly by Chinese standards, it has delivered very substantial physical improvements to what was for China a major bottleneck in an important rail corridor.

A 3.6 Financial Analysis of the Liu-Zhan Line

Background. MoR (now CRC) was responsible for implementing the project and mobilized all the financing. CRC is the sole owner of the Liu-Zhan line, and it will repay all borrowed funds. The project was financed using internal funds and loans obtained from domestic banks (China Construction Bank) and from the World Bank, amounting to RMB 13.3 billion in total, including 0.8 billion of interest during construction. Of this, the Bank loan funded about RMB 1.6 billion or 12 per cent (at the exchange rate prevailing at the time the loan was negotiated).

The Chengdu and Kunming regional railway administrations (RAs) are responsible for operating the sections of the line in their respective jurisdictions. The RAs forward revenues from

operations to CRC and in turn are compensated for costs incurred. CRC pays interest and principal on both domestic and foreign loans.

Cash flows: The largest share of cash inflows attributable to the project is the net incremental revenue obtained from the freight traffic which otherwise would not travel by rail. Following the upgrade, unit revenues are assumed at RMB 0.12 (2 US¢) per ton-km for freight (including the Railway Construction Fund surcharge) and RMB 0.15 (2.5 US¢) per passenger-km. Incremental revenue from other sources (parcels etc.) is estimated at 5 per cent of the sum of incremental freight and passenger revenues. The increased revenue is partially¹¹ offset by the associated operating costs, although there will also be operating cost savings for the base traffic. The costs and revenues for this additional traffic include an allowance for the additional rail distance traveled on sections other than the project, in place of the rail heading that is assumed in the ‘without-project’ case. The cash outflows are the project investment outlays at RMB 14.8 billion, with a credit of RMB 7.2 billion for the residual value of the investment at the end of the evaluation period. Recurrent cash outflows cover working capital, net non-operating costs and miscellaneous taxes.

Financial rate of return: Net cash flows from the project are calculated for 2007-2038. These are discounted to 2013 to give a real FIRR for the project of about 4 per cent and an NPV, using a real cost of capital of 4 per cent, of RMB -64 million (-0.5 per cent of the capital invested). For comparison, CRC’s current borrowing rate is around 4.5-5 per cent and inflation is currently about 3 per cent. The project is thus comfortably cash-positive from the viewpoint of CRC.

A 3.7 CRC’s Financial Viability

The project has a very small impact on CRC’s overall financial viability. In 2012, CRC’s total revenues and working expenditures were about RMB 500 billion and 400 billion respectively. The total revenue associated with this project is estimated at about RMB 1.3 billion, or 0.2% of the total. The project thus has a negligible influence on the overall financial viability of CRC.

Until the establishment of CRC, railway tariffs were set to approximately cover operating costs. Replacement of rolling stock and equipment was funded by the depreciation allowance in operating costs, while new construction was largely funded through government funds, largely channeled through local development bank loans. The large construction program since 2004 has seen the sources of finance expanding to include bonds and other sources. But until recently there has not been any significant creation of funds to service these various loans, which has been achieved by effectively rolling them over as they mature.

The creation earlier this year of CRC has been accompanied by a policy statement from the State Council under which CRC will move over the next three years to ‘commercial’ tariffs for both freight and passenger traffic. In practice, this is likely to mean that the tariffs for travel on lines constructed prior to 2000 will be increased, especially for freight, to generate additional funds for debt service.

However, the total debts of CRC are currently around RMB 2 trillion and will probably increase by a further RMB 500 billion as the current construction program continues. Notwithstanding

¹¹ 90% in the case of passenger and 55% in the case of freight

this increased revenue, CRC will therefore have to continue rolling over its bonds and bank loans, probably until the end of the decade and beyond, unless the government assumes a share of this debt, as was effectively done in Japan at a comparable period of rapid expansion.

In summary, in order to maintain a debt-to-equity ratio suitable for future lending by commercial banks, CRC will likely need either to be recapitalized through cash support from the government, to receive government support to access commercial financing on good terms, or to take other actions like increasing fares and tariffs. The recent establishment of CRC and the new policy of a more commercial approach to tariff-setting are encouraging first steps towards this, but the full package of policies is unlikely to become clear until next year (2014) at the earliest.

Annex 4: Environmental and Social Safeguards

A. Environment

Over all, implementation of the Environmental Management Plan (EMP) has been satisfactory. Throughout project implementation, MoR and its two Railway Administrations have paid close attention to protecting the environment. The overall satisfaction is confirmed by observations of consistent good environmental management practice at various construction sites visited by Bank supervision missions, and periodical monitoring reports prepared by the external environmental monitoring consultant.

As project construction has neared completion, environmental restoration has been carried out for all disturbed sites along the line. According to the report from the two railway administrations, all borrow and disposal sites (totaling 82), beam-casting plants and mixing plants (20) have been restored through replanting of grass and trees, reclaiming farmland, reusing railway stations and freight yards, or in some cases turning construction land over to local communities for development. Noise barriers have been installed for noise-sensitive communities, and initial noise monitoring during operation has indicated overall compliance with project standards all along the line. Extensive soil erosion control measures have been completed to protect sloping banks and at restoration/reclamation sites, with over 1 million m² of greening and tree plantation. It is also worth noting that paved access roads totaling about 70 km have been handed over to local communities, significantly improving the accessibility of many remote communities. In all 268 passages have been built (except tunnels and bridges/viaduct sections) for community connectivity, i.e. about 2.5 passages per km. According to Chinese regulations, a formal environmental protection acceptance check is to be conducted after one year of operation, and it is a prerequisite for final project completion approval. At the time the ICR was prepared, such a check was being conducted by two third-party consulting companies, and their final report will be available in March 2014. Based on initial findings of their field inspection, the general implementation of environmental protection measures is acceptable.

The project continued the practice of engaging an *independent environmental monitor* firm (which was first adopted for the National Railways I Project (Baoji-Lanzhou) and National Railways II (the Zhe-Gan Line), besides the traditional Supervision Engineer. One of the good practices of this project for environmental safeguards is that a standard environmental training textbook for railway construction activities was developed by the independent environmental monitoring consultant. This textbook has been used for all the later railway projects in China (including Shi-Zheng, Gui-Guang, Nan-Guang, Zhang-Hu and Ji-Tu-Hun lines).

B. Social Safeguards

Over all, implementation of the Resettlement Action Plan (RAP) has also been satisfactory. The project's land acquisition and resettlement activities have been jointly managed by the relevant local governments and the two railway administrations in line with, and in some cases beyond, the requirements of the RAP. The affected people's livelihoods are better now than before their land was acquired and they were resettled. Most are happy with their resettlement.

To keep to a minimum the number of people who needed to be resettled, the railway alignment was optimized. As a result, 16% less land finally needed to be acquired compared to the Plan, while the number of houses demolished was increased 16%, reflecting continuing local economic development along the line while the works went on.

Policies applicable to resettlement planning and implementation included Chinese laws and regulations, as well as the Bank's OP 4.12. All land acquisition and resettlement compensation has been allocated to the affected villages and affected persons (APs). The cash compensation rates and other in-kind compensation paid to the affected villages and APs have been the same or higher than those in the approved RAP. The total completed land acquisition cost was RMB 1.02 billion, 104% more than the estimates in the RAP. The main reason was that both the quantities of demolition and compensation rates were increased.

Cash compensation for land acquisition in Yunnan Province was paid to affected persons at the rates established by local government before July, 2009, which were at times below the RAP rates. However, additional compensation equivalent to RMB 49.7 million provided by the local government and MoR were also invested to affected villages to improve the affected persons' living conditions, including the provision of drinking water, irrigation, transportation and infrastructure within resettlement villages. The external monitoring showed that each village's in-kind expenditure was enough to offset its land compensation shortfall.

With the implementation of income restoration measures, the incomes of affected households have been either restored or improved as compared with those before resettlement. Sampling surveys conducted by the external monitoring agency showed that the average annual net income per head has increased to RMB 3,200 after resettlement, with an average increase of 7%. All the sampled households now earned more than before resettlement.

For house demolition (including residential and non-residential), APs could opt for either a right to exchange property or cash compensation. A total of eight concentrated resettlement relocation sites were built. Affected households who opted for the property right have been moved in with better livelihood conditions or environment.

Local governments, community and village leaders, and the affected population took part in the activities of census and inventory, optimization of the alignment, compensation rates and policies, and the relocation and livelihood development measures. Project information and resettlement policies were disseminated before and during the consultation process. A grievance and redress mechanism was set up. The APs could appeal to the village committees, township governments and resettlement implementing agencies, project implementing agencies, and MoR. At the same time, the APs could also appeal to the Independent Monitor and the World Bank.

The project office designed internal and independent monitoring mechanisms for overseeing implementation of the RAP. Internal monitoring was done through the resettlement offices at various levels of government, which focus on progress with the resettlement plan's physical implementation. At the same time, an ***independent resettlement monitor*** (firm) was hired to carry out external monitoring every six months. Apart from physical progress, it also evaluated

livelihood restoration efforts and their effectiveness. A total of five external monitoring reports and a resettlement ICR report were prepared and submitted.

Annex 5. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Graham Smith	Lead Transport Specialist (TTL at appraisal)	EASTR	Task Team Leader
John Scales	Senior Transport Specialist (TTL at negotiation)	EASTR	Task Team Leader
Carlos Escudero	Legal Counsel	LEGEA	Legal
Peishen Wang	Environmental Specialist	EASEN	Environmental Assessment
Chaohua Zhang	Senior Social Sector Specialist	EASSD	Social Development
Songling Yao	Social Sector Specialist	EASSD	Social Development
Xiaoping Li	Procurement Specialist	EAPCO	Procurement
Yi Geng	Financial Management Specialist	EAPCO	Financial Management
Jitendra Sondhi	Railway Engineering & Mgt Specialist Consultant	EASCS	Railway Engineer
Richard Bullock	Railway Econ & Financial Evaluation Specialist Cons	SASDT	Project Economics
Paul Amos	Transport Advisor/Railway Specialist Consultant	TUDTR	Railway Specialist
Robin Carruthers	Peer Reviewer – Railway Economics	TUDTR	Railway Economics
Ben Eijbergen	Peer Reviewer – Railways (Russian Railways)	ECSIN	Railway Specialist
Xin Chen	Program Assistant (Primary-Beijing	EACCF	Administrative Support
Teresita Ortega	Program Assistant (Secondary-Washington)	EASTR	Administrative Support

Supervision/ICR

John Scales	Senior Transport Specialist (TTL at project launch)	EASCS	Task Team Leader
Siélé Silué	Senior Transport Specialist (TTL at ICR preparation)	EASIN	Task Team Leader
Graham Smith	Consultant	EASCS	ICR Lead Author
Martha Lawrence	Senior Transport Specialist (TTL at ICR completion)	SASDT	Task Team Leader
Xiaoping Li	Procurement Specialist	EAPCO	Procurement
Peishen Wang	Environmental Specialist Consultant	EASEN	Environmental Assessment
Songling Yao	Social Sector Specialist	EASSD	Social Development
Mariana Torres	Junior Professional Associate	EASTE-HIS	Transport Specialist
Fang Zhang	Financial Management Specialist	EAPFM	Disbursement Specialist
Ning Yang	Environmental Specialist	EASCS	Environmental Assessment
Guo Jianjun	Senior Procurement Specialist	EAPPR	Procurement Specialist
Yi Geng	Senior Financial Management Specialist	EASFM	Financial Management
Fang Wanli	Urban/Regional Economics Specialist	EASPR	Economics
Zhu Qi	Financial Management Specialist Consultant	EAPFM	Financial Management
Jitendra Sondhi	Railways Engineering & Mgt Advisor Consultant	EASCS	Railway Engineer
Richard Bullock	Railway Economics & Finances Specialist Consultant	SASDT	Project Economics
Paul Amos	Railway Policy Advisor Consultant	TUDTR	Railway Specialist
Song Ye	Social and Resettlement Specialist Consultant	EASCS	Resettlement
Chen Shaojun	Social and Resettlement Specialist Consultant	EASCS	Safeguards Specialist
Jia Hanming	Interpreter	EASCS	Interpreter
Zhou Nanyan	Consultant	EASCS	Technical Support
Wu Lei	Program Assistant	EACCF	Administrative Support
Maria Luisa Juico	Program Assistant	EASIN	Administrative Support
Xiaofeng Li	Program Assistant	EACCF	Administrative Support

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	US\$ thousands (including travel and consultant costs)
Lending		
FY04	9	109.0
FY05	28	235.7
FY06	20	135.8
FY07	4	24.2
Total:	61	504.7
Supervision/ICR		
FY07	5	48.7
FY08	7	89.9
FY09	8	80.7
FY10	6	48.8
FY11	4	27.5
FY12	5	52.3
FY13	7	74.8
FY14	5	86.0
Total:	47	508.7

Annex 6. Beneficiary Survey Results
(Not applicable)

Annex 7. Stakeholder Workshop Report and Results
(Not applicable)

Annex 8. Summary of Borrower's ICR

A. Kunming Railway Administration

Summary of Construction Management of Liupanshui-Zhanyi Second Line

In accordance with requirements, construction management of the Liupanshui-Zhanyi Second Line within the Kunming Railway Administration is hereby summarized as below:

I. Basic Situation

1. The Shanghai-Kunming Railway is a main framework of China's railway network. The Liupanshui-Zhanyi Section of the Guiyang-Kunming Railway undertakes the mission to transport materials and personnel between Guizhou and Yunnan and central-south and eastern China. It is a link to connect an energy production zone and an energy consumption zone. As an important part of the Shanghai-Kunming Corridor in China's "Eight Verticals and Eight Horizontals" core railway network, it plays a backbone role in the transport network of Yunnan Province.
2. The section within the Kunming Railway Administration of Liupanshui-Zhanyi Second Line starts from Fenghuang Mountain in northeastern Yunnan Province and ends at Qujing City of Yunnan. The existing line is 110.2 km long. After reconstruction, the main track is 99.6 km long in total (excluding the 2.3 km-long Panxi Line and the 2.6 km-long diverting line). Initial total investment amounts to RMB 3.28 billion.
3. The project of this section involves reconstruction of the existing line. It requires 113 construction sites along the existing line, including 13 crossings between the new line and the existing line, 31 newly-built culverts along the existing line, 14 overpasses along the existing line, 36 culvert extensions along the existing line, 31 dial-up connections along the whole line and 6 emergency lines. Due to interference of transportation and construction, safety management and construction are of great difficulty.
4. The section of Liupanshui-Zhanyi Second Line within the Kunming Railway Administration passes close to a densely populated area. Within the engineering red line of nearly 100-km long, a total of 431,886 m² houses are demolished and 5,587.4 mu of land is newly acquired. Resettlement and compensation for land requisition are very complex.

5. Construction period

In accordance with the original construction period, the project is designed to be completed within 4 years. It was approved to be started on September 11, 2007 and actually was completed in June 2012. The actual construction period is 9 months more than the original schedule.



II. Key Points of Construction Management

i. Safety and Quality Management

This project is typical reconstruction of the existing line. While ensuring the smooth progress of construction, the absolute operating safety of trains must be guaranteed. Therefore there is huge pressure on the whole construction project. However, all participants have always adhered to the idea of “safety first and quality foremost for this project of vital and lasting importance”, been strict in site management, reinforced process control and realized the target with respect to safety, stability and quality. During the construction process for more than 4 years, there has been not one train operation accident or construction personnel injury or death. The construction of the line has been successfully completed.

1. Serious with basic work for safety and quality management

(1) The headquarters has successively established a series of management systems and measures like *Safety Production Responsibility System for Qujing Railway Construction Headquarters*, *Safety Management Measures for Railway Construction Engineering of Liupanshui-Zhanyi Second Line* and *Quality Management Measures for Construction Engineering of Liupanshui-Zhanyi Second Line*, and continuously perfected them in actual execution, laying foundation for normalized safety and quality management.

(2) To strengthen safety and quality management, the headquarters has sought its internal potential and added the 3 safety and quality department personnel to 6, ensuring the smooth

implementation of safety and quality management work.

2. Conducting training of participants to improve their safety and quality awareness

(1) 229 person-time training examinations about safety knowledge for the existing line have been carried out for responsible persons, technical supervisors, technicians, safety and quality department heads and supervisors of work areas of supervision organization and construction organization.

(2) After commencement, a total of 16 training classes on construction safety for state-owned business lines have been held and 819 person-time training for project managers, chief engineers, safety chief inspectors, engineering heads, safety and quality heads, safety officers and covering personnel of all participating organizations.

3. Implementing safety work system and standardizing management

(1) The headquarters holds a shift exchange meeting each week and focuses on assessment on safety and quality work. It holds an annual meeting to analyze trends of safety quality and establishes specific measures and countermeasures.

(2) For construction of the adjacent existing line, the headquarters and the supervision organization both assign professional personnel to track construction and make a real-time record of the supervision situation.

(3) Carefully formulating construction schemes. Each scheme must be delivered and implemented only after successive site survey, establishment of preliminary scheme, preliminary examination, site check and optimization and final examination.

4. Organizing immediate checks on engineering substantiality

Apart from quality control in construction process, the headquarters has entrusted a third organization to carry out entity check on completed works by technical means like ultrasonic wave, geological radar and core-bit sampling.

5. Establishing an incentive mechanism and being strict in safety and quality violation evaluation and award

During the whole construction process, the headquarters has imposed RMB 7.92 million liquidated damages on insufficient safety and quality management and awarded RMB 3.27 million to people who are outstanding at safety and quality management.

ii. Land requisition and demolition and resettlement

The section of Liupanshui-Zhanyi Second Line within Kunming Railway Administration almost passes through a densely populated area. There is a big pressure on land requisition and demolition and resettlement, as well as complex social situations and many contradictions. To smoothly accomplish the land requisition & demolishing and resettlement task, the headquarters has mainly carried out following work:

1. Key leaders of the headquarters have taken charge in person and assigned persons who are familiar with policies and capable of business operation to undertake land requisition and demolishing and to strengthen communication with local governments during the entire land requisition and demolishing process. Each month, they have held a coordination meeting with county governments, discussed problems with land requisition and demolishing, and worked out solutions.



2. Strictly implementing standards and regulations related to land requisition of China. Average compensation for land requisition along the whole line is RMB 24,000/mu for land and RMB 500/m² for houses (the railway owner compensates on basis of RMB 13,000/mu for land and RMB 240/m² for houses. The insufficient part is subsidized by local government). By the time engineering was completed, all compensation has been distributed to residents and all people suffering from land and house requisition and demolishing have been resettled in place.



3. Before starting land requisition and demolishing, the headquarters organized officials of local county and township governments as well as village committees, residents subject to land requisition and demolishing, and also construction organizations to publicize related work and conduct site surveys, measurement and endorsement. For unwilling residents, land requisition and demolishing should not be implemented forcibly. On the contrary, repeated publicity activities have been carried out for understanding and coordination of residents before land requisition and demolishing. From the commencement of construction of the line to completion, there has been neither any petitioning about that nor violent confrontation.

4. Temporary land in construction process has been reclaimed according to a temporary land reclamation scheme approved by the Department of Land Resources of Yunnan Province. Besides, rental of RMB 1,000/mu has been paid to temporary land each year. Grass and trees have been planted for temporary land that cannot be reclaimed apart from the above compensation. The whole line has utilized 3,702 mu of temporary land and paid to villagers RMB 17.24 million for that, also compensation of RMB 9.67 million for 671-mu temporary land that cannot be reclaimed, and RMB 14.10 million reclamation fee for remaining temporary land. During the construction, crop compensation of RMB 7.31 million has been paid to villagers for crops and fruit trees on newly acquired land and temporary land.

5. During construction of the entire Liupanshui-Zhanyi Second Line, based on the spirit of “building a railway and benefiting numerous people in the region”, the construction organization and the contractor have positively created sound living and production conditions for residents along the line.

(1) The project has invested in all RMB 82.17 million to build 45 highway bridges and passenger foot-bridges over the railway and RMB 41.60 million to build 52 culverts under the railway, which have effectively and actively solved residents’ problems in getting around.

(2) Apart from investing RMB 30.06 million in repairing and compensating for irrigation ditches and country roads that were occupied and damaged in construction, we have allocated RMB 40.98 million in our power to build roads, canals and infrastructure of relocation sites for villagers along the line according to their demand.

6. Positively solving damage of construction to villagers' interest and guaranteeing the legal interests of villagers along the line

During construction of the line, compensation of RMB 3.09 million has been paid to concerned villagers for crop loss due to flooding and dust pollution and RMB 4.04 million for houses damaged by vibration in construction.

7. The line passes by several minority-populated areas. During construction, all construction participants have fully respected the customs of minorities and tried to support religious buildings and avoid demolition of religious facilities, and have acquired full understanding and support of minorities.

iii. Water and soil conservation and environmental protection

8. All construction participants have always executed environmental protection and water conservation throughout the process of construction, earnestly implemented relevant policies, regulations and standards about environmental protection and land and water conservation of China, stuck to the policy of "prevention first, overall planning, comprehensive preventive treatment, adjustment to local conditions, management reinforcement and emphasis on benefit" and ensured that environmental protection and water conservation engineering are designed, constructed and accepted with the main work at the same time.

9. The headquarters has established management systems and measures like *Management Measures on Environmental Protection during Engineering Construction of Qujing Railway Construction Headquarters* (QZZ[2008] No. 16), *Management Measures on Water and Soil Conservation during Engineering Construction of Qujing Railway Construction Headquarters* (QZZ[2008] No. 17), and *Management Measures on Historic Preservation during Engineering Construction of Qujing Railway Construction Headquarters* (QZZ[2008] No. 18), and organized a leadership team for environmental protection and water and soil management.

10. The headquarters has strictly followed requirements of *Environmental Impact Report on Liupanshui-Zhanyi Section and Water Conservation Plan for Liupanshui-Zhanyi Section*, and entrusted Beijing Aoxisi Environmental Protection Corporation and Yunnan Rundian Water Saving Technology Corporation to monitor environment protection and water & soil conservation for the line. The monitoring organization has compiled documents about problems that have been found. Then the headquarters has urged rectification.

11. All roadbed slopes have been covered with green plants. All temporary land and borrow areas and spoil ground have been guarded with engineering measures for reclamation treatment. Villages have been compensated for a small amount of spoil ground that cannot be reclaimed.



12. A primary school 50m away from the railway has been relocated. 4 schools 100m away have been installed with sound-proof windows. Residential houses 50m away have been equipped with sound barriers. The whole line has installed 17,175m² sound barriers.

III. Main Existing Problems

1. The Liupanshui-Zhanyi Second Line within the Kunming Railway Administration has an unreasonable line location. There are too many crossings and sections in parallel with the existing line. That put huge pressure on the construction teams to ensure safety and also disrupted trains using the existing line. Because of the construction, cost saving targets have not been met.
2. Xuanwei Station is arranged unreasonably. If properly moved outward to the east, it will not only reduce the quantity of resettlement residents, but also relieve adverse effect of its passing through the downtown on urban construction and city function exertion.
3. Some places which should have been designed with tunnels resorted instead to deep subgrade excavation. That has not only damaged above-ground vegetation and increased engineering investment, but also left hidden troubles for safe operation of trains in future.

B. Chengdu Railway Administration

Report on Preliminary Inspection for Second Line Build-out Project of Liupanshui-Zhanyi Section of Guiyang-Kunming Railway

December 1, 2012

The Second Line Build-out Project of Liupanshui-Zhanyi Section of Guiyang-Kunming Railway is located within Liupanshui City and Bijie City of Guizhou Province and Qujing City of Yunnan Province. It extends to Neiliu Line in north and Shuibai Line in south. It works as an important interregional transportation corridor for social and economic communication between Southeast Asia, South Asia and Yunnan and Guizhou provinces of western China and the developed areas in eastern and central China. It plays a significant role in reinforcing the connection of Southeast Asia and South Asia with the Chinese mainland and the developed areas in eastern and central China and promoting joint development in society and economy among different regions.

The Liupanshui-Zhanyi Multiple-track Line passes through important energy bases in Yunnan and Guizhou. It undertakes the mission of Guizhou and Yunnan to communicate materials, goods and personnel with central and eastern China. It is an important part of Shanghai-Kunming Channel in “Eight Vertical and Eight Horizontal” of the railway network of China. It plays a key role in the transportation network of Guizhou and Yunnan provinces. Listed into the adjustment for “railway network planning in middle and long term” approved by the State Council in 2008, it is a construction project that is arranged by the party group of the Ministry of Railways to implement the West Development strategy and accelerate economic development in southwest area. It has great significance for improving transport capability and quality, reducing operating costs, eliminating accident potential and ensuring traffic safety.

Process of Check and Acceptance

In accordance with the *Notice on Reissuing “Methods for Completion Acceptance and Delivery of Railway Construction Projects”* (TJSH[2008] No. 23) of the Ministry of Railways, the *Notice on Issuing “Guiding Opinions for Chengdu Railway Administration to Boost Completion Acceptance for Construction Projects According to Law”* (CTJS[2012] No. 204) and the *Notice on Acceptance for Liupanshui-Zhanyi Multiple-track Line* (CTJS[2012] No. 683) of Chengdu, Guiyang Construction Headquarters has made arrangements in accordance with the principle of achieving targets and organizing professional acceptance for individual sections based on the general target for opening to traffic, formulated *Arrangement for Completion Acceptance for Section from Meihuashan to Demarcation Point of the Administration of Liupanshui-Zhanyi Second Line Build-out Project* (GJZ[2012] No. 100), established a completion acceptance leader team, clarified team members and their duties and responsibilities, and organized and conducted acceptance. It has set up a static acceptance organization under which there are 17 specialty groups for tunnels, bridges and culverts, subgrade and track, including 12 specialty acceptance groups and 5 special item inspection groups. They all started professionals check and acceptance on engineering sites on October 15, 2012 and convened specific professional acceptance meetings for individual sections and specialties, set up a professional acceptance problem database, established measures and opinions on rectification and defect elimination, and set a deadline for that. By November 20, 2012, they had comprehensively completed the static

acceptance for the section open to traffic from Meihuashan to demarcation point of the administration. 958 problems had been found out for all specialties. Up to November 21, 2012, almost all problems were eliminated or rectified.

On November 22, 2012, in accordance with the arrangement of *Notice on Conducting Static Comprehensive Acceptance for Newly-built Liupanshui-Zhanyi Multiple-track Line* (CTJSD[2012] No. 750) of the Chengdu Railway Administration, the static acceptance leadership organized a meeting on static acceptance, which studied and treated problems put forward by all specialty groups and agreed that static acceptance was passed.

According to arrangement of *Notice on Dynamic Detection for Newly-built Liupanshui-Zhanyi Multiple-track Line* (CTJSD[2012] No. 761), dynamic acceptance was organized on November 26-30, 2012. On November 26, the dynamic acceptance leader team convened a preliminary meeting for dynamic acceptance and inspected and prepared for dynamic inspection. On November 26-30, inspection trains of the administration conducted a dynamic inspection for the Liupanshui-Zhanyi Multiple-track Line in aspects of public works, power supply, communications and signals in accordance with the acceptance standard for 160 km/hr speeds. The inspection report for all specialties showed that the Liupanshui-Zhanyi Multiple-track Line satisfied the requirements for trains operation at 160 km/hr. Therefore it was agreed that the line passed the inspection.

Acceptance Inspection Conclusion

On December 1, 2012, the Preliminary Inspection Committee for Liupanshui-Zhanyi Multiple-track Line held a preliminary inspection meeting in Chengdu. The committee concluded: construction scale, technical conditions and design principles of the section from Meihuashan to the demarcation point of the administration met relevant rules and regulations of the nation and the Ministry of Railways; route selection was reasonable; and production and auxiliary facilities were complete; the engineering satisfied the design requirement; water drainage facilities and environmental protection and water and soil conservation facilities were complete; bridges, tunnels and line were safe, reliable and in favorable conditions; post-station “four electricity” and house building engineering were equipped with basic supporting facilities; fire protection and labor safety and health facilities conformed to the requirements of relevant departments; environmental protection and water and soil conservation engineering were constructed according to *Approval of Environmental Impact Report on Second Line Build-out Project of Liupanshui-Zhanyi Section of Guiyang-Kunming Railway* (HS[2006] No. 156) and *Reply for Water and Soil Conservation of Second Line Build-out Project of Liupanshui-Zhanyi Section of Guiyang-Kunming Railway* (SBH[2006] No. 57); construction land approval procedures were complete; land requisition and occupancy-compensation balance met relevant requirements; and project completion documents were basically complete.

The preliminary inspection committee considered that the project under inspection conformed to the design document and engineering quality acceptance standard and met design requirements on train operation at 160km/hr. Therefore the committee agreed that it passed the preliminary inspection.

The preliminary inspection required that the relevant construction participants should continue promoting the spirit of teamwork and cooperation, rectify problems detected in preliminary inspection, complete special item inspection acceptance for environmental protection, water and soil conservation, fire protection, land and archives according to relevant regulations, hand over completion documents and prepare completion settlement in time, and finish assets transfer as soon as possible. Operation takeover organization should enhance operating management, establish and complete regulations and systems, continuously improve staff quality, manage and utilize all kinds of equipment, reinforce public security management, ensure traffic safety, strive to improve transport efficiency and make better positive contributions to local economic development.

The first train in operation





Annex 9: The 2013 Restructuring of China's Railway Sector (as seen by the Bank's Project Team)

China has been restructuring and reforming various sectors of its economy for several years now. The objective has been to enable them to respond effectively to the market economy and rapid economic growth, and to function effectively in the best national interest. These initiatives have included reform of several Government ministries in Beijing.

In March 2013, it was decided to restructure the railway sector by dissolving the Ministry of Railways (MoR) and separating railway policy and regulation from commercial operations. As a result the functions of railway sector policy and regulation, particularly in respect of safety in construction and operation of railways, were assigned to the Ministry of Transport (MoT). Within MoT a unit responsible for establishing and monitoring technical standards, safety standards, service quality and construction projects was set up. MoT would also establish policy for railways. It would develop a unified policy for all transport modes aiming at modal integration and optimal use of resources. Only a small number of MoR staff moved to MoT.

Responsibility for the railways' commercial operations was assigned to the newly formed China Railways Corporation (CRC), manned by virtually all the managers and staff of MOR except the few that moved to MoT. CRC is fully owned by the Ministry of Finance and has its own board of directors. The former Minister of Railways was appointed as CRC's chief executive officer. There has been no change as yet in the organizational structure, and the existing railway administrations continue to function as before. This ensures that there is no disruption in railway services as a result of MoR's restructuring. CRC's mandate is to operate the railways on commercial lines. It is understood that in line with this policy, CRC will be compensated financially if it is required to provide services that are not financially viable.

Broad objectives of recent changes include:

- Coordinated development of policy, macro-level planning and allocation of resources for the transport sector
- Independent supervision of CRC's performance
- Independent safety regulation of the rail sector
- Regulation of technical standards for railways
- Improved efficiency of railway management and operations (i.e. CRC)
- Creation of competition in the railway sector
- Encouragement of non-government investment in the rail sector

China's railway sector is very large and plays a vital role in supporting its economic performance. Changes that impact railway operations are to be implemented over time, so that there is no disruption to rail services. Since China's economy will continue to grow fairly rapidly, it is also imperative that, over the next two decades, the railways develop sufficient capacity to service increased demand for passenger as well as freight rail transport. It also needs to respond to demands for superior services, as incomes grow and more sophisticated commodities are transported.

The big decision to restructure MoR in China has only started the process of railway sector reform, and it will take a few years to be fully effective. As stated above, the aim is that this major step should not cause any disruption in railway services in the near future, and that the planned expansion of the railway should materialize. It is expected that several well-considered steps will be taken over the next two to three years, to realize fully the long-term benefits of the reform process.

Annex 10. List of Supporting Documents

The World Bank, *Third National Railway Project: Project Appraisal Document* (Report No. 33496-CN), December 20, 2006

The World Bank, *Third National Railway Project: Loan Agreement* (Loan IBRD 4847-CN) between the People's Republic of China and the International Bank for Reconstruction and Development, April 6, 2007

The World Bank, *Aide Memoires for the Third National Railway Project* (Loan IBRD 4847-CN), from 2007 to 2013

The World Bank, *Implementation Status Results Report for the Third National Railway Project* (Loan IBRD 4827-CN), from 2007 to 2013

The World Bank, *Restructuring Paper on a Proposed Project Restructuring of China Third National Railway Project approved on March 29, 2012 to the People's Republic of China*, March 27, 2013





CHINA

THIRD NATIONAL RAILWAYS PROJECT

LIU-ZHAN RAILWAY LINE



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