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| IMPLEMENTATION COMPLETION AND RESULTS REPORT(IBRD-75580) ON ALOAN IN THE AMOUNT OF US$150 MILLIONTO THEPEOPLE’S REPUBLIC OF CHINAFOR AXi’an Sustainable Urban Transport ProjectSeptember 20, 2017Transport and ICT Global PracticeEast Asia and Pacific Region |

CURRENCY EQUIVALENTS

Currency Unit = Renminbi (RMB)

RMB 1.00 = US$0.146

US$1.00 = RMB6.85

FISCAL YEAR

January 1 – December 31

(Exchange Rate Effective June 2016)

ABBREVIATIONS AND ACRONYMS

|  |  |
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|  |  |
| ADB | Asian Development Bank |
| AP | Affected Persons |
| AQM | Air Quality Management |
| ATC | Area Traffic Control |
| BRT | Bus Rapid Transit |
| CBA | Cost-Benefit Analysis |
| CCTV | Closed Circuit Television |
| CH | Cultural Heritage |
| CPS | Country Partnership Strategy |
| EIA | Environmental Impact Assessment  |
| EIRR | Economic Internal Rate of Return |
| EMP | Environmental Management Plan |
| FM | Financial Management |
| FYP | Five-Year Plan |
| GDP | Gross Domestic Product |
| GEF | Global Environment Facility |
| GOC | Government of China |
| ICR | Implementation Completion and Results Report |
| ID | Institutional Development |
| IFR | Interim Financial Report |
| IIC | Infrastructure Investment Corporation |
| IRR | Internal Rate of Return |
| ITS | Intelligent Transport System |
| M&E | Monitoring and Evaluation |
| MPO | Metropolitan Planning Organization |
| MOF | Ministry of Finance |
| MV | Motorized Vehicle |
| MVECP | Motor Vehicle Emission Control Plan |
| MWC | Ming Walled City |
| NPV | Net Present Value |
| NMT | Non-Motorized Transport |
| PAD | Project Appraisal Document |
| PDO | Project Development Objective |
| PFM | Project Financial Management |
| PMO | Project Management Office |
| PSC | Project Steering Committee |
| PT | Public Transport |
| RAP | Resettlement Action Plan |
| RF | Results Framework |
| RMB | Chinese Yuan Renminbi |
| RPF | Resettlement Policy Framework |
| SPFD | Shaanxi Provincial Finance Department |
| SOE | State-owned Enterprises |
| TA | Technical Assistance |
| TOD | Transit-Oriented Development |
| TDM | Travel Demand Management |
| TM | Traffic Management |
| UICI | Urban Infrastructure Construction Investment Group |
| VOC | Vehicle Operating Cost |
| XEPB | Xi’an Environmental Protection Bureau |
| XMCB | Xi’an Municipal Communication Bureau |
| XMG | Xi’an Municipal Government |
| XPSB | Xi’an Public Security Bureau |
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| Senior Global Practice Director: | Jose Luis Irigoyen, GTIDR |
| Practice Manager: | Binyam Reja, GTI10 |
| Project Team Leader: | Reda Hamedoun, GTI10 |
| ICR Team Leader: | Reda Hamedoun, GTI10 |
| ICR Primary Author: | Antti Talvitie, GTI10 |

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| **PEOPLE’S REPUBLIC OF CHINA** |
| Xi’an Sustainable Urban Transport Project |
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| A. Basic Information  |

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 |
| Country: | China | Project Name: | Xi'an Sustainable Urban Transport Project |
| Project ID: | P092631 | L/C/TF Number(s): | IBRD-75580 |
| ICR Date: | 09/20/2017 | ICR Type: | Core ICR |
| Lending Instrument: | SIL | Borrower: | PEOPLE’S REPUBLIC OF CHINA |
| Original Total Commitment: | US$150.00M | Disbursed Amount: | US$150.00M |
| Revised Amount: | US$150.00M |  |  |
| **Environmental Category:** **A** |
| **Implementing Agencies:** Xi’an PMO  |
| **Co-financiers and Other External Partners:**  |

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| **B. Key Dates**  |
| **Process** | **Date** | **Process** | **Original Date** | **Revised / Actual Date(s)** |
|  Concept Review: | 12/05/2005 | Effectiveness: | 12/24/2008 | 12/24/2008 |
|  Appraisal: | 10/15/2007 | Restructuring(s): |  | 12/22/2014/06/30/2016 |
|  Approval: | 06/24/2008 | Mid-term Review: | 10/09/2013 | 10/09/2013 |
|   |  | Closing: | 06/30/2015 | 03/31/2017 |

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| **C. Ratings Summary**  |
| **C.1 Performance Rating by ICR** |
|  Outcomes: | Moderately Satisfactory |
|  Risk to Development Outcome: | Moderate |
|  Bank Performance: | Moderately Satisfactory |
|  Borrower Performance: | Moderately Satisfactory |

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

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| **C.3 Quality at Entry and Implementation Performance Indicators** |
| **Implementation Performance** | **Indicators** | **QAG Assessments (if any)** | **Rating**  |
|  Potential Problem Project at any time (Yes/No): | No | Quality at Entry (QEA): | None |
|  Problem Project at any time (Yes/No): | Yes | Quality of Supervision (QSA): | None |
|  DO rating before Closing/Inactive status: | Satisfactory |  |  |

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| **D. Sector and Theme Codes**  |
|  | **Original** | **Actual** |
| **Major Sector/Sector** |  |  |
|  Public Administration |  |  |
|  Sub-National Government | 9 | 9 |
|  Social Protection |  |  |
|  Social Protection | 15 | 15 |
|  Transportation |  |  |
|  Urban Transport | 76 | 76 |

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| **Major Theme/Theme/Sub-Theme** |  |  |
|  Environment and Natural Resource Management |  |  |
|    Environmental Health and Pollution Management | 8 | 8 |
|      Air-Quality Management | 8 | 8 |
|       Soil Pollution | 8 | 8 |
|       Water Pollution | 8 | 8 |
|  Public Sector Management |  |  |
|    Public Administration | 18 | 18 |
|      Administrative and Civil Service Reform | 8 | 8 |
|      Municipal Institution Building | 18 | 18 |
|  Urban and Rural Development |  |  |
|    Urban Development | 50 | 50 |
|      Urban Infrastructure and Service Delivery | 50 | 50 |

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| **E. Bank Staff**  |
| **Positions** | **At ICR** | **At Approval** |
|  Regional Vice President: | Victoria Kwakwa | James W. Adams |
|  Country Director: | Bert Hofman | David R. Dollar |
|  Practice Manager: | Binyam Reja | Ede Jorge Ijjasz-Vasquez |
|  Task Team Leader(s): | Reda Hamedoun | John Scales Rakhi Basu |
|  ICR Team Leader: | Reda Hamedoun |  |
|  ICR Primary Author: | Antti Talvitie |  |

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| **F. Results Framework Analysis**  |
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| **Project Development Objective (from Project Appraisal Document)** |

The project development objective is to improve transport accessibility and mobility in Xi’an Municipality while protecting its cultural heritage and reducing the environmental impact of the urban transport system. The priority area for achieving this objective is the Ming Walled City (MWC).

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| **Revised Project Development Objective (as approved by original approving authority)** |

The project development objective is to improve transport accessibility and mobility in Xi’an Municipality and enhance air-quality monitoring of the urban transport system.

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| **(a) PDO Indicator(s) after Restructuring on 12/22/2014** |
| **Indicator** | **Baseline Value** | **Original Target Values (from approval documents)** | **Formally Revised Target Values** | **Actual Value Achieved at Completion or Target Years** |
| **Indicator 1:** | Increase MV speed on the key corridors under the project (East Gate, South First Ring, Yuxiang Gate) |
| Value | 12 km/hr | NA | 20 km/hr | 45 km/hr |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | May 31, 2017 |
| Comments (incl. % achievement) | Target exceeded (125%).  |
| **Indicator 2:** | Increase in number of vehicles receiving emissions testing |
| Value | 40 | NA | 500 | 2500 |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target exceeded (400%).  |

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| **(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:** | Component 1–Road network: New road interchanges to replace existing roundabouts on the First and Second Ring Roads. |
| Value | 0 | NA | 4 | 8 |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target exceeded (100%).  |
| **Indicator 2:** | Component 1–Road network: Huxian–Crosstown (Dong Chen Lu to Lao Bin Lu) travel time across the railway line (min) |
| Value | 36 | 11–12 | 15 | 9.7 |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target exceeded (35%).  |
| **Indicator 3:** | Component 2–Public Transport: Area of bus terminals (m²) |
| Value | 159,574 | NA | 320,214 | 320,214 |
| Date achieved | Dec 31, 2009 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target achieved.  |
| **Indicator 4:** | Component 2–Public Transport: Number of days for maintenance |
| Value | 93 | NA | 163 | 135 |
| Date achieved | Dec 31, 2009 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target partially achieved (-17%).  |
| **Indicator** | **Baseline Value** | **Original Target Values (from approval documents)** | **Formally Revised Target Values** | **Actual Value Achieved at Completion or Target Years** |
| **Indicator 5:** | Component 3–Traffic Management: Journey speeds for cars and buses on selected routes in MWC: average speed in km/h: Bei Dajie |
| Value | 12 | 13 | 20 | 31 |
| Date achieved | Dec 31 2008 | June 30, 2015 | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target exceeded (55%) |
| **Indicator 6:** | Component 3–Traffic Management: Journey speeds for cars and buses on selected routes in the MWC: average speed in km/h: Nan Dajie |
| Value | 16 | NA | 22 | 37  |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target exceeded (68%).  |
| **Indicator 7:** | Component 3–Traffic Management: Journey speeds for cars and buses on selected routes in the MWC: average speed in km/h: Dong Dajie |
| Value | 12 | 13 | 19 | 41 |
| Date achieved | Dec 31, 2008 | June 30, 2015 | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target exceeded (116%) |
| **Indicator 8:** | Component 3–Traffic Management: Journey speeds for cars and buses on selected routes in the MWC: average speed in km/h: Xi Dajie |
| Value | 18 | NA | 25 | 21 |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target substantially achieved (-16%).  |
| **Indicator 9:** | Component 3–Traffic Management: Journey speeds for cars and buses on selected routes in the MWC: average speed in km/h: Lianhu Rd. |
| Value | 14 | NA | 22 | 43 |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target exceeded (95%).  |
| **Indicator 10:** | Component 3–Traffic Management: Journey speeds for cars and buses on selected routes in the MWC: average speed in km/h: Dongxi 5th Rd. |
| Value | 16 | 18 | 25 | 37 |
| Date achieved | Dec 31, 2008 | June 30, 2015 | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target exceeded (48%) |
| **Indicator 11:** | Component 3–Traffic Management: Area traffic control system installed. |
| Value | No system | NA | ATC System Installed | ATC System Installed |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target met after a delay of 3.5 months.  |
| **Indicator** | **Baseline Value** | **Original Target Values (from approval documents)** | **Formally Revised Target Values** | **Actual Value Achieved at Completion or Target Years** |
| **Indicator 12:** | Component 3–Traffic Management: Monitoring Center operational |
| Value | No Monitoring | NA | Center operational | Center operational |
| Date achieved | Dec 31, 2008 | NA | June 30, 2016 | March 17, 2017 |
| Comments | Target met after a delay of 9.5 months.  |
| **Indicator 13:** | Component 4–Air-Quality Management: Environmental management information system established and operational |
| Value | No info system | NA | Database established and operational | Database established and operational |
| Date achieved | Dec 31, 2008 | NA | Dec 31, 2016 | March 17, 2017 |
| Comments | Target met after a delay of 3.5 months.  |
| **Indicator 14:** | Component 4–Air-Quality Management: Development and submission to the Xi’an Municipality of a plan to reduce vehicle emissions |
| Value | No plan | Plan submitted to Xi’an Municipality and adopted | Plan submitted to Xi’an Municipality | Plan submitted to Xi’an Municipality |
| Date achieved | Dec 31, 2008 | Dec 31, 2013 | Dec 31, 2013 | March 17, 2017 |
| Comments | Target met after a delay of 3.3 years.  |
| **Indicator 15:** | Component 5–Cultural Heritage: Han Chang’an Road Network in operation |
| Value | Network not functioning | Fully operational | Fully operational | Fully operational |
| Date achieved | Dec 31, 2008 | Dec 31, 2014 | Dec 31, 2014 | May 31, 2016 |
| Comments (incl.  | Target met after a delay of 1.5 years. |
| **Indicator 16:** | Component 6–Institutional Development: Completion of investment and debt risk control study |
| Value | No study | NA | Study completed | Study completed |
| Date achieved | Dec 31, 2008 | NA | Dec 31, 2016 | March 17, 2017 |
| Comments (incl.  | Target met after a delay of 3.5 months.  |
| **Indicator 17:** | Component 6–Completion of Accident Analysis Study |
| Value | No study | NA | Study completed | Study completed |
| Date achieved | Dec 31, 2008 | NA | Dec 31, 2016 | March 17, 2017 |
| Comments  | Target met after a delay of 3.5 months. |
| **Indicator 18:** | Component 6–Institutional Development: Training and study tours in urban management. New indicator, which did not exist before restructuring. The original indicators are listed in Table 1 of the ICR. |
| Value | 0 | NA | 18 | 15 |
| Date achieved | Dec 31, 2008 | NA | Dec 31, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target substantially achieved (-17%) |
| **Indicator 19:** | Component 6–Institutional Development: Completion of strategic planning study jointly by XMG UT Unit and consultant team. |
| Value | No study | Study completed | Study completed | Study completed |
| Date achieved | Dec 31, 2008 | Dec 31, 2010 | May 31, 2016 | March 17, 2017 |
| Comments (incl. % achievement) | Target met 7 months early. |

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| **G. Ratings of Project Performance in ISRs** |
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| --- | --- | --- | --- | --- |
| **No.** | **Date ISR** **Archived** | **DO** | **IP** | **Actual Disbursements****(US$ millions)** |
|  1 | 06/26/2009 | Satisfactory | Satisfactory | 0.00 |
|  2 | 06/28/2010 | Satisfactory | Satisfactory | 10.00 |
|  3 | 06/27/2011 | Satisfactory | Satisfactory | 26.91 |
|  4 | 12/28/2011 | Satisfactory | Moderately Satisfactory | 26.91 |
|  5 | 12/26/2012 | Satisfactory | Moderately Satisfactory | 41.45 |
|  6 | 06/28/2013 | Moderately Satisfactory | Moderately Unsatisfactory | 41.45 |
|  7 | 12/18/2013 | Moderately Satisfactory | Moderately Unsatisfactory | 50.35 |
|  8 | 05/11/2014 | Moderately Satisfactory | Moderately Unsatisfactory | 59.41 |
|  9 | 12/14/2014 | Moderately Satisfactory | Moderately Unsatisfactory | 59.41 |
|  10 | 03/25/2015 | Satisfactory | Satisfactory | 129.44 |
|  11 | 11/04/2015 | Satisfactory | Satisfactory | 129.44 |
|  12 | 06/28/2016 | Satisfactory | Moderately Satisfactory | 148.56 |
|  13 | 12/22/2016 | Satisfactory | Moderately Satisfactory | 148.56 |
|  14 | 03/31/2017 | Satisfactory | Moderately Satisfactory | 150.00 |

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| **H. Restructuring (if any)**  |

| **Restructuring Date(s)** | **Board Approved PDO Change** | **ISR Ratings at Restructuring** | **Amount Disbursed at Restructuring in US$ millions** | **Reason for Restructuring & Key Changes Made** |
| --- | --- | --- | --- | --- |
| **DO** | **IP** |
| 12/22/2014 | To improve transport accessibility and mobility in Xi’an Municipality and enhance air-quality monitoring of the urban transport system. | MS | MU | 59.41 | The original PDO was too broad, hard to monitor and was not reflected in the project components. Components Cultural Heritage and Environmental Protection did not relate to the achievement of the PDO, and some indicators had no baseline. Disbursements were delayed due to: (i) project design requiring several implementing agencies; (ii) multi-part procurement for air-quality and traffic-management components comprising works, goods, utilities, hardware, software and consultations, all with different disbursement percentages.Key changes were: (i) the revision of the PDO; (ii) changes in the Results Framework; (iii) the modification of the Road Network, Public Transport, Air Quality and Cultural Heritage components; (iv) the reallocation of loan proceeds among categories; (v) the adjustment of disbursement percentage within categories; (vi) the addition of direct contracting as a method of procurement for training and study tours; and (vii) the extension of the loan closing date by one year to June 30, 2016 to allow time for the completion of all project activities. |
| 06/30/2016 | No change in PDO | S | MS | 100.00 | Delayed resettlement of 76 households. The key change was the extension of the loan closing date by nine months to allow completion of the resettlement. |

**I. Disbursement Profile**



## 1. Project Context, Development Objectives and Design

1. Context at Appraisal
2. **The historic city of Xi’an is a popular tourist destination and an important center for industry, commerce and education in Western China**. The Qin Terracotta Army, Tang Pagodas, the archaeological site of Han Chang’an, the Ming Walled City (MWC) and other cultural relics attract millions of tourists each year to Xi’an. Xi’an is also a diverse city of eight million residents with high-tech industry and numerous educational institutions, including a world-class university, and is a developing industrial, transport and logistics hub for western China.
3. **At the time of project preparation and appraisal, Xi’an was confronted with the challenges of rapid economic growth, urbanization and motorization.** During the project preparation period (2005–2008), China’s economic growth rate was consistently above 10 percent. After the economic slowdown of 2009, it maintained an annual growth rate of seven to eight percent. Xi’an’s economy has been bolstered by foreign direct investment, strong export growth, and its location as the starting point of the Silk Road.
4. **Xi’an faced an array of complex urban transport challenges.** Rapid economic growth and increasing motorization level coupled with lagging infrastructure financing tested the Xi’an’s transport system. The city faced congestion and environmental degradation in the MWC; insufficient infrastructure and public transport services; absence of transport management technology; and conflicting policies on developing public and Non-Motorized Transport (NMT). In addition, there was a lack of experience and institutional capacity for developing and managing urban transport. The Xi’an Municipal Government (XMG) realized the urgency to maintain the accessibility and mobility of its citizens while preserving the city’s cultural and historic heritage and minimizing environmental stress.
5. **The project was consistent with the Country Partnership Strategy and Government of China (GOC) policies.** The project concept was framed by the World Bank Group’s (WBG) Country Partnership Strategy (CPS) for China (2006–2010), which called for improving urban transport infrastructure to help balance urbanization; improving access to public services; managing environmental challenges, especially air pollution; and developing urban administration and management. China’s 11th Five-Year Plan (FYP) designated Xi’an as one of the hubs for the promotion of development in the western regions of the country. GOC policies paralleled the Bank’s CPS (2011–2015), which emphasized investments in urban public transport, cultural heritage, traffic safety, and emission regulation.
6. **The Bank was well positioned to help Xi’an address its challenges.** The Bank had a long experience in China, as well as in other developing countries, in policy reforms and infrastructure financing, multimodal urban transport systems, congestion management, environmental impact mitigation, social assessment and relocation, institutional capacity building, and cultural heritage. The Bank was therefore an ideal development partner to help address Xi’an’s unique and challenging urban transport issues.
7. Original Project Development Objectives and Key indicators
8. The original Project Development Objective (PDO) was to “improve transport accessibility and mobility in Xi’an Municipality while protecting its cultural heritage and reducing the environmental impact of the urban transport system. The priority area for achieving this objective is the MWC.”[[1]](#footnote-1) Two outcome indicators and 11 intermediate results indicators were designed to measure the achievement of this objective.
9. Revised PDO, Key Indicators, and Justification
10. **The project had a Level 1 restructuring in November 2014.** The Level 1 restructuring and revision of the PDO included: (a) changes to the Results Framework (RF); (b) the modification of the Road Network (RN), Public Transport (PT) and Cultural Heritage (CH) components; (c) the reallocation of loan proceeds among categories; (d) the adjustment of the disbursement percentage within categories; (e) the addition of direct contracting as a method to procure training and study tours; and (f) the extension of the closing date by one year to June 30, 2016 to allow sufficient time for the completion of the revised project. The project, which had disbursed 40% in its first 6 years of implementation, then proceeded to be fully disbursed within the next 18 months.
11. **The original PDO was too broad and was not directly supported by project activities related to the protection of cultural heritage and the reduction of environmental impact.** Some results indicators had no baseline values, while some were not appropriate; some indicators were revised at the client’s request after approval; and, at restructuring, the indicators for CH and environmental protection were modified to tally with the new PDO. A tangible reduction in environmental impacts would have required the city to undertake actions beyond the scope of this project, and the content of the CH heritage component could not be perceived in the restructuring process. Both were modified: the former was expanded and the latter pared down.
12. **The revised PDO was to “improve transport accessibility and mobility in Xi’an Municipality and enhance air-quality monitoring of the urban transport system.”** Table 1 shows the PDO and the intermediate results indicators for before- and after-restructuring. The improved RF with revised PDO and intermediate results indicators led to better monitoring and evaluation of the project performance, including procurement, disbursement and benefits.
13. **There also were reasons, other than the ambiguous PDO and its indicator, for restructuring the project.** Implementation gridlock and delays were the results of four important factors: (i) deficient quality at entry; (ii) project design that required several implementing agencies; (iii) procurement design of subcomponents consisting of works, goods, utilities, hardware and software, and consultancy services to be procured separately rather than as joint products; and (iv) slow disbursement.
14. **The project was proposed for restructuring in mid-2012, placed on “problem status” and the Regional Vice-Presidency (RVP) watch-list in 2013, and finally restructured in December 2014 with satisfactory remedies.**[[2]](#footnote-2) A consequence of the restructuring is a split evaluation of the outcome, with considerable effects on the evaluation of supervision and Bank and Borrower performance.



1. Main Beneficiaries
2. The beneficiaries of the project are the citizens of Xi’an Municipality, users of public and private transport services, and visitors and tourists in Xi’an. Many XMG agencies’ and their employees’ capacity were improved as a direct benefit from project preparation and implementation.[[3]](#footnote-3) The beneficiaries remained unchanged after restructuring.
3. Original Components
4. The original project comprised six interrelated components, separated into three investment components (Components 1, 2 and 5) and three enabling components (Components 3, 4 and 6). The project consisted of 47 sub-components and the procurement of 114 contracts. The total project costs were US$414.29 million, of which the GOC was to provide US$264.29 million (64 percent) and the IBRD US$150 million (36 percent).

**Public Transport Component**

**Road Infrastructure Component**

**Cultural Heritage Component**

**Traffic Management and Road Safety Component**

**Ai Quality Management Component**

**Institutional Development Component**

**Investment Components**

**Enabling Components**

**Enabling Components**

1. **Road Network (RN) Component:** (i) Xi’an city improvements to the First and Second Ring Roads and Taibai Nan Road; and (ii) upgrading of four roads in Huxian. Total cost of US$232.07 million, with an IBRD contribution of US$75.49 million.
2. **Public Transport (PT) Component:** (i) Eastern (Textile City) and Southern City Passenger Transport Terminals; (ii) Integrated public transport priority/traffic management measures in thirteen bus corridors; and (iii) Xinzhu bus depot. Total cost of US$67.27 million, with an IBRD contribution of US$24.65 million.
3. **Traffic Management (TM) Component:** (i) an Area Traffic Control (ATC) system with junction channelization; (ii) a Road Safety program to analyze accidents; (iii) implementation of remedial measures; (iv) enforcement and Road User Education; (v) parking measures and equipment; and (vi) traffic facilities for cyclists and pedestrians, and road marking equipment. Total cost of US$38.12 million, with an IBRD contribution of US$14.93 million.
4. **Air-Quality Management (AQM) Component**. Support to the Xi’an Environmental Protection Bureau (XEPB) for air-quality improvement and reduction of vehicle emissions, comprising: (i) a building to house the Xi’an Ambient Air Supervision and Monitoring Center; (ii) equipment for motor vehicle emission inspection; (iii) civil works and equipment for two ambient air-quality monitoring sub-stations and two traffic air-pollution monitoring sub-stations; (iv) equipment for improvement of air-quality assessment and information; and (v) development of a Motor Vehicle Emission Control Plan (MVECP). Total cost of US$17.51 million, with an IBRD contribution of US$10.56 million.
5. **Cultural Heritage (CH) Component:** (i) Han Chang’an Site: re-creation of Han Dynasty road network in the Weiyang Palace area; and (ii) MWC: construction of a network of bicycle routes linking the main tourist sites. Total cost of US$54.17 million, with an IBRD contribution of US$21.62 million.
6. **Institutional Development (ID) Component**. Support for capacity development for transport planning and policy in Xi’an: (i) Strategic Urban Transport studies (which duplicated and replaced Asian Development Bank (ADB) studies); (ii) implementation of the TM component; and (iii) domestic and international training, workshops and study tours. Total cost of US$4.16 million, with an IBRD contribution of US$2.75 million.
7. Revised Components
8. **The original project comprised 47 subcomponents and the procurement of 114 contracts.** In the face of extremely slow implementation, it was necessary to restructure the project and streamline its design to give it a greater focus. Changes were also necessary to tailor the project to the initiatives and services that the XMG (with changed leadership) was undertaking on its own. Dongcheng Road in Huxian was dropped for technical reasons (design with crossing on an existing expressway). A second bus depot was added to the PT component to increase bus maintenance capacity. The TM component was refocused: intersection channelization with accident remedial measures proved to be difficult in a dense urban area and was replaced by the engineering and installation of an ATC system (monitored by intermediate indicators) and accident recording and analysis capability to establish clear links with the RF. The inadequately prepared Road User Education program was postponed because it lacked clarity for implementation. The AQM component received increased funding for laboratory and analytical equipment. The CH component, whose rationale for inclusion was tenuous as designed, was cut by 58 percent.
9. **The revised components and changes are listed below:**

1. **RN Component**. Retained: Xi’an City road improvements in the First and Second Ring Roads and Taibai Nan Road. Canceled: Dongcheng Road in Huxian. (IBRD loan expenditure: US$86.37 million, an increase from US$75.49 million.)
2. **PT Component**. Retained: the two bus passenger terminals. Added: the construction of the new Chengchen bus depot with equipment in western Xi’an. Reduced: the number of the project’s bus priority lanes from 12 to 1. (IBRD loan expenditure: US$21.17 million, a decrease from US$24.65 million.)
3. **TM Component**. Retained: the ATC system; the Road Safety program to analyze accidents; parking measures and equipment; and traffic facilities for cyclists and pedestrians, and road-marking equipment. Added: engineering project supervision. Canceled: (a) intersection channelization; (b) accident remedial measures; and (c) road-user education. (IBRD loan expenditure: US$16.20 million, an increase from US$14.93 million.)
4. **AQM Component**. Retained: the entire component. Added: additional adequate ventilation and water purification equipment for laboratory construction and equipment for the air-quality monitoring center. (IBRD loan expenditure: US$14.08 million, an increase from US$10.56 million.)
5. **CH** **Component**. Retained: the re-creation of the Han Dynasty road network in the Weiyang Palace area. Canceled: Ming City bicycle route. (IBRD loan expenditure: US$8.99 million, a decrease from US$21.62 million.)
6. **ID Component**. Retained: the (augmented) financial management studies (three studies in the end) and consultant service for implementing the TM component, and training and study tours. Added: analysis of Xi’an’s sustainable transport project experiences and achievements. Canceled: strategic urban transport studies. (IBRD loan expenditure: US$3.19 million, an increase from US$2.75 million.)
7. Other significant changes and their rationale
8. **The RF was modified to reflect the new PDO.** The reasons for changes were clear: many of the original indicators lacked a baseline value; there were no realistic means to measure the indicators or use them in the evaluation of the results; and some outputs were supported by others, which would have made it difficult to attribute the results to this project. Table 1 provides a summary of the changes to the RF.
9. **Loan proceeds were reallocated between categories and disbursement percentages within categories were adjusted to speed up implementation.** The civil works share was increased to a 90 percent expenditure rate (up from 43 percent). This increased the value of eligible expenditures for the civil works from US$53 million to US$105 million, and enabled a larger share of Bank loan disbursements. For Goods and Consultancy Services, the expenditure rate was increased to 100 percent (up from the initial 66 percent and 75 percent, respectively). This increase mainly affected the TM component, with a minor effect on the ID component.
10. **Other changes are summarized in Section H of the Data Sheet.** Implementation arrangements did not change.

## 2. Key Factors Affecting Implementation and Outcomes

* 1. Project Preparation, Design and Quality at Entry
1. **Preparation.** The Bank’s experience in urban transport and air-quality studies had a direct influence on the project design, including: public participation, importance of public transport and NMT, importance and “public visibility” of road and street capacity improvements accompanied by TM measures, air quality and management, and capacity development in integrated land use planning.[[4]](#footnote-4)
2. **Background work and analyses were comprehensive.** Project preparation began in 2003 and gained full speed in 2005. The preparation works included various scoping studies, reviews of other donors’ projects, and reviews of client and Bank objectives. However, more attention could have been paid to the project design, resettlement scope and possible changes in policy. The client and the Bank held different opinions regarding the most effective remedies for issues faced by Xi’an and the project content evolved right up to approval. The Bank emphasized improvement of PT and NMT, while the client focused improvement of private Motorized Vehicle (MV) travel speed.
3. **The project was assigned Category A** **as construction activities were envisaged in densely populated urban settings and there were sensitive cultural properties in the project area**. Two environmental safeguard policies were triggered: (i) OP 4.01 Environmental Assessment, and (ii) OP 4.11 Physical Cultural Resources. Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) were prepared during project preparation. During project implementation, new activities and locations, such as the bus depot, were proposed. Accordingly, supplemental EIAs were prepared in compliance with domestic regulations and OP 4.01.
4. **The project design was complex.** The ambitious project design interlocked road infrastructure and TM, PT and preservation of the CH (with enabling components for transport and environmental management) in disparate areas in and around Xi’an. All components were then overarched with institutional development. While the comprehensive project vision was supported by public consultations, studies and official inputs during preparation, hindsight proved that implementation of such a complex and sprawling project would be difficult. The TM and AQM components were parceled out to numerous procurements. The numerous implementing entities added to the difficulties. Although complex, the project design addressed significant congestion bottlenecks, accessibility and mobility and air quality issues.
5. **XMG was committed to the project’s vision, but its priorities changed.** Political support and project priorities were changing even before the Mid-Term Review (MTR) in 2013. Government concepts and priorities had evolved in Xi’an during project implementation (e.g., PT, bus lanes, CH, NMT).
6. **Risk** **assessment** **was comprehensive and largely correct.** The PAD lists 12 risks (six for project objectives and six for the components) with overall risk ratings as *substantial*. Two PDO risks were rated substantial: (i) political support for the project, and (ii) failure to reduce motor vehicle traffic in or through the MWC. Mitigation for leadership changes in Xi’an, investment priorities, and the (revised) TM measures achieved their aims. Mitigation against procurement risk (modest/average) was not effective and led to delays and dropping or revising some subcomponents. The risks for PT *(medium)* and ID *(substantial)* were gauged correctly.
7. **Quality at Entry**. Several shortcomings affected Quality at Entry:
* With 47 subcomponents laid out in the PAD and 114 contracts stipulated in the procurement plan, the project design was too ambitious and flawed;
* The PT and CH components were not technically ready. Economic analysis was limited to the road component, but was warranted for PT and TM as well. The fiscal “bearing-capacity” study was important but not sufficient;
* Safeguard and Fiduciary requirements were adequately addressed, although the magnitude of resettlement required was significantly underestimated (4,770 people estimated at appraisal versus 11,433 resettled);
* There were numerous implementing entities and a disjointed procurement plan. More attention should have been paid to the difficulties with new concepts in TM and emissions monitoring, and procurement of multi-part subcomponents.
* M&E was deficient due to the ambiguous PDO and some indicators had no baseline data at approval. The approach to outsource M&E data collection to a university was innovative and is sustainable. However, the design of the M&E could have been significantly improved (see Section 2.3).
	1. Implementation
1. **The p****roject faced significant challenges but was turned around and fully disbursed after its restructuring.** The loan had been low-disbursing since its inception, mainly due to a complicated design, too many implementing agencies and 114 contracts initially, which stretched the capacity of the PMO, and an International Horticultural Exposition in Xi’an organized at the start of the implementation period of the project (during which time no construction was allowed). The project was turned around after the Level I restructuring, which revised the PDO and streamlined the RN, PT and CH components.
2. **Implementation arrangements were complex.** The Project Steering Committee (PSC), included 15 municipal government line agencies for leadership, policy guidance and institutional coordination, both in project preparation and implementation. Under the PSC, the PMO executed project preparation and became the Executive Office of the PSC. TheXi’an’s Urban Infrastructure Construction Investment Group (UICI) became the manager of the Project Implementing Entities. Fully owned by the municipality, the UICI managed the procurement, disbursement, project accounts and financial management, audits, supervision and project reporting. UICI implemented the components with Xi’an line agencies, and in Huxian through an arrangement with the Huxian Construction Bureau. All project funds, including the loan proceeds and counterpart funds, were managed and accounted in the Infrastructure Investment Corporation (IIC) finance division.
3. **There were delays in implementation.** The Horticultural Exposition held in Xi’an in December 2010 delayed the start of project civil works. The PT component was not ready for implementation and the implementing agency lacked experience in procuring non-construction parts of the TM component. The metro stimulus package affected the bus terminals and the bus lanes. Road-user education and accident remedial measures were delayed and eventually canceled. A significant disbursement lag had persisted since the slow start. Mid-2013 Implementation Progress (IP) was downgraded to Moderately Unsatisfactory and in November 2013, with disbursement at only 35 percent and lagging further behind, the project was listed among the “problem projects.” The client wanted to prioritize PT and TM, but priority and policy changes, caused by numerous project and non-project factors and difficulties in finding locations for bus depots, had stalled implementation progress.
4. **MTR was held in October 2013.** Although PDO achievement and Safeguard Compliance were rated as Satisfactory, IP was Moderately Unsatisfactory, and the disbursement lag of 11 months raised red flags without prospects for catch-up. The MTR identified the activities to be dropped and it was agreed that the project would be restructured.
5. **The Level 1 Restructuring was carried out in late 2014.** The Board approved the revised PDO and new RF on December 22, 2014. The project closing date was extended by one year to June 30, 2016, and all the components were reorganized. XMG re-assured the PMO about its commitment and support to the project; the Steering Committee was renewed and augmented with Huxian representation.
6. **Disbursements jump-started after restructuring. In the first six years, the project had disbursed 40 percent; in the 1.5 years after restructuring it disbursed the remaining 60 percent.** In March 2015 already, progress toward the PDO and IP were upgraded to Satisfactory.
7. **The loan closing date was extended for the second time in June 2016**. The project had fully disbursed on June 30, 2016 when a nine-month extension of the loan closing date was approved to ensure that the relocation of the final group of 76 families was satisfactorily completed (2,371 families had already been resettled at that point). This extension also provided time for the remaining facilities (e.g., the two bus depots, Chang’an bus lane, and the air quality monitoring center) to become fully operational.
	1. Monitoring and Evaluation (M&E) Design, Implementation and Utilization
8. **M&E Design**.[[5]](#footnote-5) The original M&E design had serious shortcomings: i) ambiguous and broad PDO, ii) flawed results chain reflected by some components that did not contribute to the achievement of the PDO, and iii) lack of baseline for many indicators. The revised M&E design was substantially improved, and the outcome and results indicators established a good results chain for the PDO:
* ***“To improve transport accessibility and mobility in Xi’an*”** is measured by the increased MV speeds on key corridors in Xi’an and the MWC. Results indicators for speeds in MWC cross-town routes improved by the ATC Traffic Management system also support the compound PDO;[[6]](#footnote-6)
* ***“To enhance air-quality monitoring of the urban transport system”***is measured by the number of vehicles receiving emissions testing. Results indicators for the AQM component include a plan to reduce emissions and their measurement, and the construction of a well-equipped monitoring center with a laboratory to also support the PDO;
* Intermediate results indicatorswere designated for the PT, CH and ID components.
1. **The revised M&E and its indicators met the SMART criteria.** However some shortcomings subsisted, mostly for public transport: (i) there was no indicator for access (such as proportion of people within one km of a bus stop); (ii) bus terminals, which are important for dispatching, on-time service and passenger information, were built but not counted; (iii) ambiguity of some indicators remained (e.g., “maintenance days”); and (iv) there were no indicators for safeguards.
2. **M&E implementation*.*** Originally, the implementing entities, advised by the PMO, were to carry out the measurement of the M&E indicators but this did not work out as intended. Measurement tasks were subsequently outsourced to a university, and the M&E system was implemented in an acceptable manner.
3. **M&E utilization**. The originally deficient M&E, together with the lagging disbursement, motivated the decision to restructure the project. The revised M&E proved useful in monitoring the progress of implementation and achievement of the PDO. The M&E results were used to calculate benefits in the project CBA.
	1. Safeguard and Fiduciary Compliance
4. **Social safeguards.** Bank social safeguard instruments, including the Resettlement Action Plan (RAP) and the Resettlement Policy Framework (RPF), were complied with and implementation performance was rated Moderately Satisfactory. In all, 918,700 m2 (1,378 mu[[7]](#footnote-7)) of land was acquired, 152,000 m2 (228 mu) less than originally planned, and 99,945 meter2 of houses and buildings were demolished. A total of 2,371 households (11,433 people) were resettled under this project. This is significantly more than the 527 households (4,770 people) estimated at appraisal due to changes in the project design. Payments to 39 households in Xinjiamiao village and to 37 households at the Weiyang Palace construction site were delayed and resulted in the second extension of the loan closing date. The 39 households in Xinjimiao chose monetary compensation and received full compensations by December 31, 2016; however, the 37 households at the Weiyang Palace site chose to receive new housing instead of monetary compensation and elected to wait for the new resettlement site. These households will continue receiving transition subsidies until they move to their permanent houses.
5. **Environmental safeguards.** EIAs and EMPs were adhered to. Bank supervision missions rated compliance with environmental guidelines and EMP implementation as Satisfactory. Xi’an has stringent site management regulations for planning, construction, supervision and public communication. Comprehensive mitigation measures for noise and dust, worker camp management, handling of construction waste, and disturbance to local traffic were consistently implemented. The road component of the Weiyang Palace historic site adopted planning, design, construction and supervision practices that were consistent with the project’s EMP. Chance-find procedures were followed during construction.
6. **Financial management**. The project’s financial management system ensured proper use of project funds. The PMO provided information to the Bank in accordance with the legal agreement through timely project audit reports. Management Letter comments were duly addressed by the PMO. Due to the complex implementation arrangements and inefficiencies in coordination, the Bank’s implementation review noted minor shortcomings: (i) late submission of some Interim Financial Reports (IFRs); (ii) minor delays in disbursement before restructuring; and (iii) weaknesses in Huxian PMO’s financial management system. These issues were resolved through joint efforts by the Provincial Finance Bureau and the implementing entities; training was provided to the Huxian PMO to improve its financial reporting.
7. **Procurement.** The Bank’s procurement policies and procedures were complied with, as were China’s procurement laws and regulations. Professional procurement agents, knowledgeable and experienced with international financial institutions provided support when necessary. There were procurement delays due to the time taken for government approvals, site availability for bus depots, the complexity of technical specifications for issuing the bidding documents, and an occasional lack of coordination between participating City Bureaus and the PMO. The initial total of 114 contracts (the final number was 87) in multiple agencies was a management challenge in terms of specifications, approvals and implementation. [[8]](#footnote-8)
	1. Post-completion Operation/Next Phase
8. **Outputs of the RN, PT and TM components are functioning as planned.** There are observable reasons to believe that the operation of these project outputs will be sustained: for the roads, there is historical precedent with proven competence in road maintenance and its financial support; for public transport, the continued expansion of services indicate sustainability; in TM, the ATC system has improved vehicle traffic flow and is planned for expansion, and competence to manage and operate the system has been confirmed by observation. A follow-up World Bank urban transport project, the Shaanxi Xi'an Intelligent Public Transport Project (P157787), is under preparation. It is expected it will also address the issues laid out in Lessons Learned.[[9]](#footnote-9)
9. **Environmental management.** Modern equipment and a laboratory in the new and spacious building has boosted the ability to respond to expanded environmental responsibilities, e.g., ground contamination. No difficulties have been experienced in the transition to expanded post-project operations with the new environmental management information system and equipment.
10. **Remaining involuntary resettlement**. The 37 households in Weiyang District, who chose to move to houses in the new resettlement site will do so no later than March 2018. Monitoring and reporting are continuing to ensure that all households are resettled according to the RAP.
11. **Cultural heritage and urban planning.** XMG is committed to protecting Xi’an’s unequaled cultural heritage. This project will contribute to the protection of the Weiyang Palace and the MWC. Work on joint transport–land use planning and on public access to the archeological site will be continued by the responsible government agencies.

## 3. Assessment of Outcomes[[10]](#footnote-10)

### Relevance of Objectives, Design and Implementation

1. **Relevance of objectives, pre-restructuring:***Substantial*. The project’s original PDO captured the important policy priority themes in China at appraisal and at completion. The CPS (2006–2010) highlighted investments in urban transport to support urbanization with better infrastructure, network management and traffic safety, and to reduce pollution and fuel consumption. The PDO embraced these holistic urban transport goals, which were also prominent in China’s 11th FYP (2006–2010). However, the PDO was too ambitious and contained many disjointed elements (improve transport accessibility and mobility, protecting cultural heritage, and reducing the environmental impact of the urban transport system) that could not be realistically successfully achieved under a single project.
2. **Relevance of objectives, post-restructuring:***High*. The CPS (2011–2015) continued to support the holistic themes under the heading of *Greener growth for sustainable energy*: better urban environmental services, low-carbon urban transport, pollution management, and management of climate change. Urban infrastructure development was also a GOC objective in the 12th FYP (2011–2015), which sets targets to reduce pollution and increase energy efficiency. The revised PDO supported the CPS and 12th FYP objectives. The revised PDO was more tightly defined, with only two broad elements: improve transport accessibility and mobility, and enhance air quality monitoring of the urban transport system.
3. **Relevance of design and implementation, pre-restructuring:***Modest.* The RN, the PT, and the TM components were designed to contribute to the achievement of the “improve transport accessibility and mobility” aspect of the PDO. The CH and the AQM components were respectively meant to support the achievement of the PDO aspects: “protecting cultural heritage” and “reducing the environmental impact of the urban transport system”. However, the focus of the former was on strengthening air quality monitoring, rather than on reducing the environmental impact of the urban transport system. Similarly, the focus of the CH component was on the re-creation of a historic road network and the construction of bicycle routes. The latter was dropped from the project during restructuring. At the time of restructuring, it was recognized that these two components would not be adequate to contribute to the corresponding elements of the revised PDO. In addition, as discussed in Section 2.3, the original RF had weaknesses.
4. **Relevance of design and implementation, post-restructuring:***Substantial*. At restructuring, the weaknesses in the design of the project components and the RF were addressed through a reformulation of the PDO, as well as adjustments to the project components and the RF. The restructured project was implemented in a speedy and satisfactory manner. **The PDO indicator targets and all intermediate indicator targets were either exceeded or met as shown in the Data Sheet.**

### Achievement of Project Development Objectives

### Rating: Modest (Before restructuring) and Substantial (After restructuring)

1. **Achievement of the original PDO**: *Modest*. Of the three elements of the original PDO ("to improve transport accessibility and mobility in Xi’an Municipality while protecting its cultural heritage and reducing the environmental impact of the urban transport system”), the first (to improve transport accessibility and mobility in Xi’an Municipality) was retained unchanged in the revised PDO, while the second (protecting its cultural heritage) was deleted and the third (reducing the environmental impact of the urban transport system) was modified. As discussed below, the first element of the PDO was substantially achieved under the revised project. Despite the deletion of the “protecting its cultural heritage” element of the PDO, one of the two activities under the Cultural Heritage Component (Weiyang Palace Road Network) was retained in the restructured project and was satisfactorily completed (see Data Sheet, Section F, Intermediate Outcome Indicator 15), while the other activity (Ming City Bicycle Route) was dropped. The Air Quality Management Component (which was meant to support the achievement of the PDO element “reducing the environmental impact of the urban transport system”) was expanded under the restructured project to support the revised PDO element (“enhance air-quality monitoring of the urban transport system”) was satisfactorily completed, although the original PDO element was not achieved. Based on these factors, achievement of the original PDO is considered Modest.
2. **Achievement of the revised PDO:** *Substantial.* The revised PDO ("to improve transport accessibility and mobility in Xi’an Municipality and enhance air-quality monitoring of the urban transport system”) was measured by two outcome indicators: (i) increase in MV speed on the key corridors under the project; and (ii) increase in number of vehicles receiving emissions testing. The Project exceeded the PDO target indicator values by 125% and 400%, respectively. The 19 intermediate results indicators were all substantially achieved as detailed in the Data Sheet. All the indicators correlate with the PDO and support substantial achievement of the PDO. The key achievements of the project against the two elements of the PDO are summarized below:
* ***Improved quality of transport services in Xi’an*.** Xi’an Municipality and its surrounding areas had experienced strong economic growth, accompanied by even stronger growth in automobile ownership and travel. The road improvements in Xi’an and Huxian, as well as TM and PT investments, significantly improved accessibility and mobility in Xi’an. The Cost Benefit Analysis (CBA) in Annex 3 presents concrete evidence.
* ***Modern ATC system manages traffic in 200 intersections*.** The system, together with the two bus terminals provide more reliable service for both cars and public transport. Journey times have been reduced and there has been a 25% reduction in bus-related traffic accidents during the project’s duration.
* ***Improved bus terminals and maintenance facilities*.** The bus terminals have the capability to monitor bus schedule adherence and provide rest facilities to the drivers. A side benefit of the bus terminals is that close to half of the bus fleet can be parked in these facilities rather than on the street. Although more terminals and bus maintenance depots are needed, the new facilities are a good model for subsequent expansions.
* ***Functioning and well-equipped motor vehicle emission control plan (MVECP).*** Air quality management facilities are housed in a new building with modern laboratory analysis and information management system; there are stationary and mobile traffic air-quality monitoring facilities, and the MVECP enhanced capacity for systematic air-quality monitoring and planning in Xi’an. Air-quality improvement is also supported by the project’s successful TM measures. The air-quality component had positive consequences on soil pollution studies and management, which supported the Bank’s and GOC’s agenda.
* ***Strengthened institutions with greater administrative efficacy*.** The studies, training programs and study tours improved project implementation, management and inter-agency coordination. There is heightened awareness of cultural heritage.
1. **The Project inspired public transport policy thinking and development in Xi’an.** For example, XMG applied to and was approved by the Ministry of Transport to be one of the thirty pilot cities for a Transit City in China. To that end, the City then developed and put in operation 20 bus priority corridors with a total length of 325 km. The Municipality also implemented a city-wide bicycle program with a fleet of 52,000 public bicycles with annual 70 million users. The motor vehicle emission plan implementation is pursued with great vigor and over 31,000 vehicles have been tested this year (the project’s target was a more modest 500, with a final of 2,500 vehicles). And, as mentioned, plans are being developed for further development of the historic Weiyang Palace area.
2. **Project implementation took place in an environment of rapid economic growth and policy change, but delivered tangible results and outcomes.** It increased transport capacity, TM technology, congestion management, regulation and service quality but also enabled for forward-thinking about complexities of urban transport policy options, despite being implemented in a fluid political and institutional environment.

### Efficiency

1. **Economic Efficiency**. At appraisal, the economic analysis was conducted only for the road component (56 percent of the project costs) and the RN component had an economic internal rate of return (EIRR) of 14 percent. For the ICR, the CBA was expanded to cover the RN and TM components (71 percent of the project cost) and indicates an EIRR of about 33%. See Annex 3 for more details and assumptions of the economic analysis.
2. **Administrative Efficiency**. Pre-restructuring, the project experienced considerable implementation delays. At restructuring, the loan closing date was extended by one year to enable the restructured project to be completed. A further extension of nine months was approved to complete the resettlement of 76 households under the project. Considering the complexity of the project and the weak Quality at Entry, the total implementation period of 8.75 years (including the 1.75-year extension) is understandable. The extensions were effectively utilized and the loan was fully disbursed.
3. **Rating of Efficiency**. On the basis of the above, the efficiency of the restructured project is rated Substantial. While the assessment of economic efficiency applies to the original project as well, the weaknesses in administrative efficiency of the original project (see above) result in the efficiency of the original project being rated Modest.

### Justification of Overall Outcome Rating

1. Based on the ratings of the project before restructuring for Relevance of Objectives (Substantial), for Design and Implementation (Modest), and for Efficacy and Efficiency (Modest) in sub-sections 3.1, 3.2 and 3.3 above, the Overall Outcome of the original Project is rated Moderately Unsatisfactory. For the restructured Project, based on the ratings for Relevance of Objectives (High), of Design and Implementation (Substantial), and Efficacy and Efficiency (Substantial), the Overall Outcome of the project is rated as Satisfactory. **Table 2 below summarizes the ratings before and after restructuring, as well as the weighted overall rating of Moderately Satisfactory.**

 **Table 2: Overall Outcome Rating**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Outcome Rating before Restructuring** | **Outcome Rating after Restructuring** | **Combined** |
| 3.1 | Relevance of Objectives  | Substantial | High |  |
|  | Relevance of Design and Implementation | Modest | Substantial |
| 3.2 | Efficacy | Modest | Substantial |
| 3.3 | Efficiency | Modest | Substantial |
| **Overall rating** | **Moderately Unsatisfactory** | **Satisfactory** |
| Rating value | 3 | 5 |
| Weight (% disbursed before and after PDO revision) | 0.40 | 0.60 |
| Weighted value | 1.2 | 3.0 | 4.2 |
| **Final rating** |  |  | **Moderately Satisfactory** |

*Note:* Assigned value for each rating: Highly Satisfactory = 6; Satisfactory = 5; Moderately Satisfactory = 4; Moderately Unsatisfactory = 3; Unsatisfactory = 2; Highly Unsatisfactory = 1.

### Overarching Themes, Other Outcomes and Impacts

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

1. The PDO and project design were the product of extensive hearings of affected citizens in which a range of technical, social and cultural issues in urban transport in Xi’an were discussed. All project components, resettlement, and meticulous implementation of environmental and social safeguards delivered both quantitative and qualitative transport, as well as social environmental and benefits to an inclusive spread of socioeconomic classes. These benefits will also affect the poorer sections of the population and women. The project did not target the lower-income population or women directly.

**(b) Institutional Change/Strengthening**

1. The training program and study tours, which had an implicit institutional change and strengthening dimension, improved project implementation and inter-agency coordination. On-the-job training in project implementation and management contributed to: (i) improved road management in Huxian County; (ii) better understanding of the importance of policy and productivity in public transport; (iii) scientific basis in TM; (iv) expanding the scope of environmental protection; and (v) heightened awareness of cultural heritage (preservation, new exhibition hall). Project supported financial management studies (on government debt management and financial capability, budget analysis, risk management, and training of a network of professionals in financial management in the county) were ahead of the national work on these topics and influenced MOF policies on debt and risk management.

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

1. The new building and equipment enabled the Environment Bureau to begin monitoring not only air quality but also noise, soil, radiation, acid rain, and sandstorms. Another unintended impact is the heightened awareness of cultural heritage and the image of the city in urban transport planning and land use.

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

NA

## 4. Assessment of Risk to Development Outcome

Rating: *Moderate*

1. As discussed in Section 2.5, project outputs are expected to be sustained and there are no major risks. Government ownership is evident and citizen acceptance is not in doubt. Staff members are trained. Economic benefits are tangible, as evidenced by the CBA. The roads are managed by professionals whose observed past and proven competence was increased in the project; in public transport, competence in service quality and maintenance has improved through better facilities and on-the-job training in their use; the TM component is operated by competent staff and consultants on site. The ATC system is functioning demonstrably well and is planned for expansion to cover a larger area. Both public transport and TM are delivering travel and social benefits and making the city less congested and more livable. The MVECP for air-quality monitoring is institutionalized; it already had competent staff. Moreover, there are plans both to preserve and develop the Weiyang Palace cultural heritage site. The environmental impacts are fully positive. Based on the uncertainties related to improving public transport and expanding TM to cover a wider area, the risk to development outcome is rated as *Moderate.*

## 5. Assessment of Bank and Borrower Performance

**5.1 Bank Performance**

**(a) Bank Performance in Ensuring Quality at Entry**

Rating: *Moderately Unsatisfactory*

1. Quality at Entry is discussed in detail in Section 2.1. The Bank made a strong contribution in taking a comprehensive approach to addressing the urban transport issues faced by Xi’an, considering lessons from similar projects in China and elsewhere. However, the design of the original project was too complex and, as discussed in Section 2.3, the RF had major weaknesses. These had to be addressed through a Level 1 restructuring (see Section H of the Data Sheet). The Bank ensured that the technical aspects of the project components were generally appropriate and that the project met the Bank’s requirements on safeguards and fiduciary matters. Risks were assessed thoroughly.

**(b) Quality of Supervision**

Rating: *Satisfactory*

1. Initially, the Bank team and the PMO found it difficult to move the project forward, except for the road and institutional development components. Difficulties were due to the combination of an ambiguous PDO, a defective RF, and the lack of readiness of the PT, TM and AQM components. Weak supervision before the Level 1 restructuring contributed to implementation and disbursements delays. Once the project was streamlined and the PDO, component contents and indicators were reformulated, there was a striking change in the pace of implementation. The Bank task team, together with the PMO and the implementing agencies, worked proactively and effectively to ensure that the project went from 40% disbursement to 100% disbursement in the space of 18 months and results met or exceeded target values. The Bank team supervised the Bank-financed components at a brisk pace and with satisfactory results.

 **(c) Justification of Rating for Overall Bank Performance**

Rating: *Moderately Satisfactory*

1. Based on the ratings of Bank Performance at Quality at Entry and the Quality of Supervision, and taking into account the Outcome rating of Moderately Satisfactory, overall Bank Performance is rated Moderately Satisfactory. The project was ambitious, complex and challenging. These challenges derived mainly from project preparation and Quality at Entry, ambiguities in the PDO and M&E, and the Bank’s subdued responses to the challenges encountered during the early phase of the project implementation. After restructuring, the Bank team, supported by management, was proactive, effectively resolved implementation problems, and moved the project forward with the re-energized PMO, even while many implementing entities were on a steep learning curve. Complications and delays in procurement and resettlement, minor shortcomings in financial reporting, and local supervision oversights were resolved. The Municipality’s entities were assisted and encouraged to implement projects in a timely manner.

**5.2 Borrower Performance**

**(a) Government Performance**

Rating: *Moderately Unsatisfactory*

1. The project design with its numerous implementing entities faced several technical, contextual and institutional challenges: multiple entities were involved; key government officials changed during implementation; and there was rapid urbanization and growth in Xi’an. There were disagreements and changes in governance concepts, particularly on public transport (cost recovery and privatization), in implementation priorities (e.g., bus lanes and bike routes). The central government’s economic stimulus program (for metro construction) affected sub-project designs and priorities. Decision making in the PSC was sometimes slow and there were occasional delays or changes in approvals, counterpart funding for contractors, and grievance redress for affected interests. The ambitious project required horizontal coordination among government agencies, for which there was little or no prior experience. There were notable delays in restructuring and resettlement compensation; the latter required the second nine-month extension.

**(b) Implementing Agency or Agencies Performance**

Rating: *Moderately Satisfactory*

1. Early performance of the implementing agencies was affected by the project design and its Quality at Entry. Once restructuring was approved, all implementing agencies performed well. The PT component was negatively affected by changes in policies and priorities, and by the subway works.
* Rating for the RN component implementing agencies: *Satisfactory.* There were no glitches in Xi’an, while in Huxian a learning curve in financial and project management was aided by training. 10 of the 12 road contracts were completed before restructuring.
* Rating for PT implementing agencies: *Moderately Unsatisfactory.* The PT component was affected by changes in government priorities. The component faced repeated design and site-selection delays for the bus depots. However, the component fostered policy and PT development in Xi’an (para 51).
* Rating for the TM implementing agency: *Moderately Satisfactory*. This component was affected by the lack of design readiness and some parts were cancelled. The procurement of ATC, software, hardware, and the inter-agency coordination among four bureaus proved to be challenging. After restructuring and engineering support, this component delivered strong benefits*.*
* Rating for the AQM implementing agency: *Satisfactory.* This expanded component had the most diverse procurement portfolio (22 contracts), which caused delays due to coordination and the volume of work. A vital MVECP was implemented. The Air Quality Monitoring building with modern laboratories was executed well with benefits that exceeded project targets.
* Rating for the CH implementing agency: *Moderately Unsatisfactory*. This component was reduced by 60 percent. The Municipality used its funds to implement a citywide bicycle rental program and the cultural heritage display center at the site, which received UNESCO World Heritage status in 2014.
* Rating for the ID component (and the PMO of the project as a whole): *Satisfactory.* The PMO executed and managed the component well and on time. Study tours, training and technical assistance studies, consultancy and training in TM, and three useful financing studies were completed.

**(c) Justification of Rating for Overall Borrower Performance**

Rating: *Moderately Satisfactory*

1. Based on the ratings of Government Performance and Implementing Agency Performance, and taking into account the Outcome rating of Moderately Satisfactory, overall Borrower Performance is rated *Moderately Satisfactory.* XMG and Shanxi Province, the implementing agencies and their leadership demonstrated commitment to the project’s objectives. There was steady and stable leadership in the PMO under a difficult implementation environment.

## 6. Lessons Learned

1. **Comprehensive projects are unavoidable, but implementation requires focus.** Xi’an Urban Transport Project addressed complex policy, transport, and air-quality issues in a rapidly changing environment. These issues required multi-dimensional and comprehensive solutions. However, the absence of a tightly defined PDO and measurable outcome and results indicators, as well as lack of well-designed components to achieve the PDO resulted in delays and the project required substantial restructuring.
2. **Procure whole products, not parts, because disjointed procurement leads to delays.** The PT, TM and AQM components included disjointed component designs (e.g., separate procurements and disbursement percentages for buildings, furniture and ventilation, and separate procurements for CCTV cameras, enforcement cameras, wireless networks, variable message signs), which caused delays and difficulties in coordination. Aggregation of component elements saves procurement resources and costs and helps avoid delays. For example, the hub-terminal facilities in the GEF Cluster-Cities project were procured jointly with apparent benefits in time and costs.
3. **An organization is needed for inter-jurisdictional and inter-agency coordination**. Urban transport requires an institutional framework to plan, program and finance it. This project, and the Xi’an metropolitan area, are a showcase of the importance of and difficulties in inter-jurisdictional decision making and horizontal agency coordination. A metropolitan-wide organization, such as the Metropolitan Planning Organization (MPO) in the United States, or its equivalents in the UK, Germany and Japan, should be evaluated for urban transport planning, financing, inter-jurisdictional decision making and interagency coordination. The Bank should consider piloting an institutional framework in the project under preparation in Xi’an and develop an urban transport “product” suitable to Chinese cities.[[11]](#footnote-11)
4. **Cost uncertainty in resettlement must be addressed during project preparation**. It is difficult to estimate the exact resettlement cost during project preparation. The cost depends on identification of affected households, permits for construction and land acquisition, and the agreed compensation rates that are known after the engineering designs are approved. Although the Bank requires estimation of the resettlement cost at project approval, circumstances often change after project approval due to design changes. Delays in engineering design approval or changes in designs lead to delays in reaching agreement with affected households on the resettlement terms. Therefore, it is important that this potential uncertainty is explicitly recognized during preparation, and that timely coordination is instituted between the different agencies tasked with engineering design and resettlement compensation.
5. **Maintain flexibility during implementation to address any potential issue not foreseen during preparation.** Despite lacking quality at entry, this specific project could at the end substantially and satisfactorily achieve its PDO outcomes thanks to close supervision, restructuring and adequately conceived corrective measures.Xi’an had undergone a rapid economic and social change since the start of this project’s preparation. The project had witnessed political crosswinds and resulting policy changes. For political and policy reasons, some diligently prepared sub-components were canceled at appraisal and during implementation. Generally, if the project city, province, and country circumstances are complex and the necessary remedies are comprehensive, the best approach would be to develop the project in one year or less (and not in three or more years as in the present project) to reach understanding and agreement on the principal issues and immediate implementable remedies. A more complete and effective set of responses and remedies to the principal issues can then be developed during implementation. This is because views on the issues and priorities will change once the specific remedies are being planned or implemented, or in response to dynamic circumstances.

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

**(a)** **Borrower/implementing agencies**

See summary of the Borrower’s ICR in Annex 7.

**(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 US$ million equivalents; RMB1 = US$0.146)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Components** | **Revised Estimate at Restructuring (US$ millions)** | **Actual/Latest Estimate (US$ millions)** | **Percentage of Appraisal** |
| Road Component | 276.37 | 284.92 | 103.09 |
| Public Transport | 78.09 | 53.55 | 68.57 |
| Traffic Management | 39.79 | 13.57 | 29.32 |
| Air Quality | 33.82 | 26.90 | 79.54 |
| Cultural Heritage | 26.40 | 17.30 | 65.53 |
| Institutional Development | 3.67 | 1.74 | 47.41 |
| **Total Baseline Cost**  | 458.14 | 397.98 | 86.87 |
| Physical Contingencies |  Not separated(about 20.01) | Not available  | Not available  |
| Price Contingencies | Not available | Not available |  0.00 |
| **Total Project Costs** | 458.14 | 397.98 | 86.97 |
| Front-end fee PPF | 0.00 | 0.00 | .00 |
| Front-end fee IBRD | (0.375) | (0.375) | .00 |
| **Total Financing Required** | 458.14 | 397.98 | 86.87 |
|  |  |  |  |

**(b) Financing**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Source of Funds** | **Type of Cofinancing** | **Appraisal Estimate****(US$ millions)** | **Actual/Latest Estimate****(US$ millions)** | **Percentage of Appraisal** |
|  Borrower |  | 308.14 | 247.98 | 80.48 |
|  International Bank for Reconstruction and Development |  | 150.00 | 150.00 | 100.00 |

## Annex 2. Outputs by Component

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **At Appraisal** | **At Mid-Term Restructuring** | **At Completion** | **Remarks****(reasons for cost variances from the estimates are unknown)** |
| Component 1: Road Network Xi’an City (app. 12 km with interchanges) | Improve six selected road corridors: Yuxiangmen, Changlemen, South IRR; NE Interchange, SE Junction with Jiangong Road, and Taibai Nan Road. | Improve six selected roads corridors: Yuxiangmen, Changlemen, South IRR; NE Interchange, SE Junction with Jiangong Road, and Taibai Nan Road. | Completed selected six road corridors: Yuxiangmen, Changlemen, South IRR; NE Interchange, SE Junction with Jiangong Road, and Taibai Nan Road. | Completed as planned at appraisal. |
| Component 1: Road Network(app. 12 km) | Upgrade four roads: Xincheng, Dongcheng, EW Lvgong and Railway crossing Lvgong, and Meibei.  | Upgrade three roads: Xincheng, EW Lygong and Railway crossing Lvgong, and Meibei. | Upgraded three roads: Xincheng, EW Lygong and Railway crossing Lvgong, and Meibei. | Completed as planned at mid-term restructuring. |
| Component 2: Public Transport  | Construct three new bus terminals and depot: Eastern Textile and Southern terminals, and Xinzhu bus depot; and thirteen bus priority lanes. | Construct four new bus terminals and depot: Eastern Textile and Southern and western terminals, and Xinzhu and Chengchen bus depots; and two bus priority lanes. | Constructed four new bus terminals and depots: Eastern Textile and Southern and western terminals, and Xinzhu Chengchen bus depots; and one bus priority lane. | Completed as planned at mid-term restructuring, and the rest of the bus priority lanes were completed using local financing. |
| Component 3: Traffic Management  | Develop: (i) an area traffic control (ATC) system (200 junctions), (ii) road safety equipment and software, (iii) vehicle parking equipment, (iv) traffic facilities for pedestrians (pedestrian barriers 22,605 meters) and bicycles (signs 338, markings 38,256 meters, barriers 15,795 meters), and (v) technical assistance. | Develop: (i) an area traffic control (ATC) system (200 junctions), (ii) road safety equipment and software, (iii) vehicle parking equipment, (iv) traffic facilities for pedestrians (pedestrian barriers 22,605 meters) and bicycles (signs 338, markings 38,256 meters, barriers 15,795 meters), and (v) technical assistance. | Developed: (i) an area traffic control (ATC) system (200 junctions), (ii) road safety equipment and software, (iii) vehicle parking equipment, (iv) traffic facilities for pedestrians (pedestrian barriers 22,605 meters) and bicycles (signs 338, markings 38,256 meters, barriers 15,795 meters), and (v) technical assistance. | Completed as planned at appraisal. |
| Component 4: Air Quality Management  | Implement: (i) one Xi’an Municipality Ambient Air Supervision and Monitoring Center, (ii) two ambient air-quality monitoring sub-stations, (iii) ten sets of provision of equipment and software for air-quality assessment and information publication, (iv) provision of equipment for vehicle emission inspections, (v) development of a motor vehicle emission control plan, and (vi) technical assistance. The four supporting systems were established, which included urban transport emission control, environmental quality monitoring air-quality information management and data analysis, and supporting maintenance system.  | Implement: (i) one Xi’an Municipality Ambient Air Supervision and Monitoring Center with adequate ventilation and water purification equipment, (ii) two ambient air-quality monitoring sub-stations, (iii) ten sets of provision of equipment and software for air-quality assessment and information publication, (iv) provision of equipment for vehicle emission inspections, (v) development of a motor vehicle emission control plan, and (vi) technical assistance. The four supporting systems were established, which included urban transport emission control, environmental quality monitoring air-quality information management and data analysis, and supporting maintenance system. | Implemented: (i) one Xi’an Municipality Ambient Air Supervision and Monitoring Center with adequate ventilation and water purification equipment, (ii) two ambient air-quality monitoring sub-stations, (iii) ten sets of provision of equipment and software for air-quality assessment and information publication, (iv) provision of equipment for vehicle emission inspections, (v) development of a motor vehicle emission control plan, and (vi) technical assistance. The four supporting systems were established, which included urban transport emission control, environmental quality monitoring air-quality information management and data analysis, and supporting maintenance system. | Completed as planned at mid-term. |
| Component 5:Cultural Heritage Han Chang’an Weiyang Palace RoadsMing Walled City Bicycle Route | Recreate about 8.4 km of five Han Dynasty roads Construct 26.7 km new bicycle route.  | Recreate about 8.4 km of five Han Dynasty roads.Canceled.  | Recreated about 8.4 km of five Han Dynasty roads. | Completed as planned at appraisal. |
| Component 6: Institutional Development  | Carry out four studies: Xi’an Urban Transport Strategy; Xi’an District Traffic Control; Xi’an Urban Traffic Accident Analysis; and Xi’an Financial Resource Planning and Analysis. Domestic and overseas training.  | Carry out three studies: Xi’an District Traffic Control; Xi’an Urban Traffic Accident Analysis; and Xi’an Financial Resource Planning and Analysis. Domestic and overseas training. | Carried out four studies: Xi’an District Traffic Control; Xi’an Urban Traffic Accident Analysis; and Xi’an Financial Resource Planning and Analysis. Analysis of Xi’an sustainable transport project experiences and achievements. Domestic and overseas training. | Completed more than planned at mid-term restructuring. Xi’an Financial Resource Planning and Analysis had a second phase. Xi’an Urban Transport Strategy Study was completed with local funds.  |

## Annex 3. Economic and Financial Analysis *(including assumptions in the analysis)*

**Economic Analysis at Appraisal**

1. **Methodology at Appraisal.** Due to the lack of a comprehensive network and travel demand model, transport user benefits (i.e., savings in vehicle operating costs [VOCs], accidents and public transport passenger travel time) were estimated based on individual estimates made for each criterion for each road scheme. Other project benefits, such as reduction in travel times for automobile users, and auto emissions were not quantified because of the lack of reliable data. The Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) presented in this annex can therefore be considered conservative.
2. **Main Assumptions**. Forecasts of traffic volumes were estimated by extrapolating recent trends. Table 1 presents the traffic growth rates used.

**Table 1: Traffic Growth Rates**

|  |  |
| --- | --- |
|  | Forecast of Xi’an overall Traffic Growth Rate |
| 2005–2010 | 4.57% |
| 2010–2015 | 3.64% |
| 2015–2030 | 3.07% |

1. **Economic Internal Rate of Return (EIRR).** The overall EIRR for the entire package of improvements was estimated to be approximately 14 percent, while the NPV (at a 12 percent discount rate) was estimated to be RMB296 million, as summarized in Table 2.

**Table 2: RN Component**

**Economic Evaluation Summary**

| **Subcomponent**  | **Present Value of Total Costs (RMB millions, 12%)** | **Approx. EIRR (in %)** | **NPV (RMB millions, 12%)** |
| --- | --- | --- | --- |
| Xi’an City | 960 | 14 | 206 |
| Huxian | 220 | 15 | 90 |
| All projects | 1,180 | 14 | 296 |

**Economic Analysis at Project Completion: Methodology and Assumptions**

1. The cost-benefit analysis (CBA) at completion of this project uses the costs and benefits from the project’s Road and Traffic Management components; travel benefits are conferred by both components. Because there are no traffic-count or vehicle-classification data, it is assumed that the vehicle travel times equilibrate at citywide level. Traffic-management improvements in 200 city intersections and road-capacity improvements are felt citywide. This is the reason for including both the Road and Traffic Management components in the CBA.
2. There is an extreme paucity of data, both at appraisal and at completion. Necessary and cross-checked data used in the ex-post CBA are imported from several sources, as referenced in the footnote.[[12]](#footnote-12) A 20-year project life with no salvage value and a 12 percent discount rate are used.
3. Benefits from VOC savings are assumed to be nil (or very small). Reductions in accident costs are ignored due to the lack of data.[[13]](#footnote-13) No public transport benefits are quantified because only one bus lane was implemented in the project; and there undoubtedly are benefits from the bus depots and emission testing of vehicles. No data exist on the benefits of the one bus lane, improved bus maintenance or reduced emissions. All these benefits are positive and some can be substantial, but they are overshadowed by the travel-time savings, and would not affect the inference of the overall project economic efficiency.

*Key assumptions for travel demand*

1. Travel demand is assumed to follow the estimated increase in GDP/capita (seven percent between 2015 and 2020; four percent between 2020 and 2035).
2. Travel-time budget (65–75 minutes) is used to underpin the travel demand. It comes from Stopher *et al*’s review of travel-time budgets over 40 years in numerous countries. The travel-time budget (i.e., travel-time expenditure) shows remarkable stability worldwide, and has been studied using both aggregate cross-sectional data and disaggregate multi-year, multi-day panel diaries (ref. 1).
3. Car-travel distance elasticity from reduced travel time (-0.74), (ref. 2).
4. Predictions on car-ownership saturation level (500/1000 population) and travel behavior. (ref. 2–4).
5. Citywide equilibrium travel speed at appraisal was 25 km/h and at completion 35–40 km/h. This is based on project data and represents a substantial improvement in citywide traffic flow conditions. Because of car ownership increases up to the saturation level due to GDP growth in Xi’an’s economy and per capita income growth, the citywide travel speed is assumed to decline again to 25 km/h at the end of the project life (2035) if no other traffic or transport improvements are made.
6. Value of travel time of US$4.65–5.25/hr is used in many China ICRs. The approach taken here is to use the current GDP per capita in Xi’an (US$3.8/hr), and appreciate it at the same rate as the GDP growth.
7. There are 2.44 million cars in Xi’an at present. Based on population patterns (ref. 5, 6), it is assumed that 40 percent of them are in use daily in the areas affected by the Traffic Management and Road Improvement components.

*Key assumptions for costs*

1. Realized capital costs are from the project data. It is assumed that both the Road and Traffic Management components were implemented in five years with equal annual expenditures. The costs are discounted up to 2015, which is the base year for all discounting (both costs and benefits).
2. Periodic road maintenance costs are US$60,000/km every seven years. Routine maintenance costs are US$1,500/km each year. These costs come from past studies in China.
3. Area Traffic Control (ATC) capital costs come from the project data and are assumed to have a five-year life time (four sets needed during the project’s 20-year life). ATC maintenance costs are derived from the costs experienced in two European countries, deflated by the per capita GDP to result in a maintenance cost of US$750/intersection per year.
4. Both the renewal and maintenance costs are assumed to increase at three percent per year.
5. The gross discounted annual dollar amount benefit of the project, for the Road and Traffic Management components, at a 12 percent interest rate is **US$1,037** million**.** The present value of the capital and maintenance cost is **US$408** million for the Road component and **US$34** millionfor the Traffic Management component. The total project costs for the two components is **US$442** million and the resulting overall NPV of the project is **US$594** million. The EIRR is calculated to be **33 percent**. These are shown in Table 3.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component**  | **Present Value of Total Costs** **(US$ million, 12%)** | **Present Value of Gross Benefits (US$ million, 12%)** | **NPV (US$ million, 12%)** | **EIRR (%)** |
| Road  | 407.9 | Not possible to separate from Benefits of the Traffic Management Component | Not possible to separate from Benefits of the Traffic Management Component | NA |
| Traffic Management  | 34.3 | Not possible to separate from the Benefits of the Road Component  | Not possible to separate from the Benefits of the Road Component | NA |
| **Total** | **442.20** | **1,036.7** | **595.5** | **33** |

**Table 3: Summary of the ex-post Cost-Benefit Analysis**

 (Costs and benefits discounted to 2015 as the base year)

1. The results point out the great efficacy of urban traffic management, from which most of the benefits come, to improve traffic flow and to reduce delays. The most critical issue is the proportion of the vehicle fleet affected by the Traffic Management and Road components, now assumed to be 40 percent. If it were more, then the NPV would be higher; if less, the NPV would be lower.

## Annex 4. Bank Lending and Implementation Support/Supervision Processes

**(a) Task Team Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **Names** | **Title** | **Unit** | **Responsibility/****Specialty** |
| **Lending** |
|  Rakhi Basu | Transport Specialist | GTI06 |  |
|  Robin C. Carruthers | Consultant | GTCTC |  |
|  Edward B. Dotson | Consultant | SASDT–HIS |  |
|  Carlos Ricardo Escudero | Consultant | LEGLA–HIS |  |
|  Ke Fang | Lead Transport Specialist | GTI07 |  |
|  Brendan Finn | HQ Consultant ST | CASP9 |  |
|  Gladys Frame | HQ Consultant ST | GTI02 |  |
|  Yi Geng | Sr Financial Management Specialist | GGO20 |  |
|  Imogene B. Jensen | Consultant | GTI02 |  |
|  Maria Luisa G. Juico | Program Assistant | GTI02 |  |
|  Zhefu Liu | Senior Social Development Specialist | GSU02 |  |
|  Gerhard Menckhoff | Consultant | GTI06 |  |
|  Rafael Fontes Munoz | Consultant | EASTE–HIS |  |
|  Xuan Peng | Program Assistant | GTI10 |  |
|  Andre Pettinga | Consultant | EASTE– HIS |  |
|  Richard G. Scurfield | Special Representative | SACMV |  |
|  Jitendra J. Shah | Lead Environmental Specialist | GENDR |  |
|  Rodney J. Stickland | Consultant | SASDT–HIS | à |
|  Peishen Wang | Consultant | GENDR |  |
|  Dawei Yang | Consultant | EASTS–HIS |  |
|  Samuel L. Zimmerman | Consultant | GSU13 |  |

|  |
| --- |
| **Supervision/ICR** |
|  Yi Geng | Senior Financial Management Specialist | GGO20 |  |
|  Ying Jin | HQ Consultant ST | GSU08 |  |
|  Xuan Peng | Program Assistant | GTI10 |  |
|  Emmanuel Py | Senior Energy Specialist | GEE05 |  |
|  Peishen Wang | Consultant | GENDR |  |
|  Reindert Westra | Senior Urban Transport Specialist | GTIDR |  |
|  Jian Xie | Senior Environmental Specialist | GEN03 |  |
|  Dawei Yang | Consultant | EASTS–HIS |  |
|  Ning Yang | Senior Environmental Engineer | GEN2A |  |
|  Xiaoke Zhai | Senior Transport. Specialist | GTI10 |  |
|  Wenlai Zhang | Consultant | GWA06 |  |
|  Chuntai Zhang | Local Consultant ST | GTIDR |  |

**(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** |  |  |
|  **FY05** | 25.79 | 144.83 |
|  **FY06** | 30.15 | 228.18 |
|  **FY07** | 28.27 | 260.25 |
| **FY08** | 19.05 | 100.32 |
|  **FY09** | 00 | 5.39 |
| **Total:** | 103.26 | 733.574 |
| **Supervision/ICR** |  |  |
|  **FY09** | 21.84 | 157.54 |
|  **FY10** | 23.13 | 152.76 |
|  **FY11** | 18.77 | 135.18 |
| **FY12** | 29.61 | 130.85 |
|  **FY13** | 28.06 | 130.86 |
|  **FY14** | 32.25 | 172.90 |
|  **FY15** | 22.15 | 112.57 |
|  **FY16** | 19.25 | 136.24 |
|  **FY17** | 12.73 | 70.62 |
| **Total:** | 207.79 | 1.199.56 |

## Annex 5. Beneficiary Survey Results

Not Applicable

## Annex 6. Stakeholder Workshop Report and Results

Not Applicable

## Annex 7. Summary of Borrower’s ICR and/or Comments on Draft ICR

*Project Development Objective: To improve transport accessibility and mobility in Xi’an Municipality and enhance air quality monitoring of the urban transport system.*

1. The Borrower’s ICR was prepared by the Xi’an Sustainable Urban Transport Project Management Office (PMO) in June 2017 with the latest available information. The comprehensive ICR with all the project details, including implementation details, safeguard compliance, resettlement, contracts, costs of the component, and results indicators, are available in the project files.

**Project Components**

1. The Xi’an Integrated Urban Road Network Improvement Project supported by a loan from World Bank encompasses six components:

(1a) Xi’an Municipal Road Network Improvement Construction Project

(1b) Huxian Urban Road Infrastructure Construction Project

(2) Xi’an Municipal Public Transport Construction Project

(3) Xi’an Urban Traffic Management Construction Project

(4) Xi’an Municipal Air Pollution Monitoring and Prevention and Control Project

(5) Construction of Phase I of Weiyang Palace Han Dynasty Road Protection

(6) Capacity Building (Technical Assistance) Project

**Assessment of Performance of the World Bank**

3. During the preparation and implementation of the project, the World Bank’s performance is notable. During the nine-year implementation period, the Bank successively dispatched 24 semi-annual/annual supervision mission teams, and the project mid-term review was conducted in October 2013. The supervision missions provided valuable guidance and advice for various aspects of project implementation. During implementation, the Bank also took positive measures for the examination and evaluation of bidding documents and the bid award. The Bank also conducted timely examinations and approvals of disbursement applications for loan funds and the extension of loan closing. All this work greatly contributed to the project’s smooth implementation.

**Assessment of Performance of the Borrower and its Implementing Agencies**

4. The Borrower, the executing agency and the implementing agencies of the project cooperated well with each other. They fulfilled their obligations during the implementation of the project and kept the World Bank informed. The Xi’an Project Office (PMO) coordinated with World Bank, the implementing agency, the sub-project units, contractors and consultants. The project leading group demonstrated its leadership by providing the necessary domestic funds for the project. The implementing agency of the project executed the project in a responsible and effective manner. Rapid but unpredictable urban development activities took place in parallel with the project, and the project leading group made great efforts to provide policy guidance and coordination for the project. There were delays in timely and effective resettlement actions at one Ring Road Interchange near Xinjiamiao and at the Weiyang Palace Han Dynasty Road Protection Project. However, all these problems have been resolved.

**Assessment of Performance of the Government**

5. The Xi’an City Government has fulfilled its obligations through the project leading group, which has demonstrated its leadership by providing funds for the implementation of the project.

**Overall Project Assessment**

6. The implementation of the Xi’an Integrated Urban Road Network Improvement Project promotes the overall well-being of Xi’an City and improves the image of Xi’an as an ancient city; relieves traffic congestion in Xi’an; has a positive effect on the preservation of cultural relics; reduces environmental pollution in the region; and is favorable for promoting the development of tourism in Xi’an and improving tourism efficiency. Thus, the project provides significant social impacts. It significantly improves Xi’an City’s road traffic and is favorable for improving the ecological environment as well as expanding employment, accelerating the comprehensive social development, and improving people’s living conditions, the local cultural environment, the cultural education level, and the local hygiene and health level to directly benefit people and the government.

7. With accelerated urbanization in China, the traffic problems of large- and medium-sized cities will become increasingly severe. The successful implementation and accumulated experience of this project will have a great referential value for the design of future World Bank projects in urban transport and for the improvement of future urban infrastructures in China.

**Main Lessons Learned**

8. Successful implementation of the project is mainly ascribed to project design, which aligned it with local economic and social development strategies. The selected subprojects are important to the priorities of the local government, especially the Road Network, Public Transport, and Environmental Protection subprojects. All of them are classified as key construction and people-serving projects by the Xi’an Municipal People’s Government. These projects are strongly supported and coordinated by capital, land-use and other policies related to implementation of the project.

9. Technical assistance for the project design, such as ATC traffic research and analysis and research on government debt, are urgent issues of the Xi’an Municipal People’s Government. Therefore, the Xi’an Municipal People’s Government and relevant authorities place emphasis on such research. Several research recommendations are adopted and play a significant role in the development of urban traffic in Xi’an City. In the design of such technical assistance in future projects, communications should be held with local government departments for the benefit of urgent issues of local governments and to fully use their results.

10. During project preparation and implementation, emphasis was placed on the city’s ecological environment and cultural history, and on effective measures to minimize any adverse impact of the project. This emphasis served the project’s environmental and social development goals of the project, with results that were above expectations.

11. Under the agreement, the Xi’an Environmental Protection Bureau, an administrative authority without means for monitoring, was responsible for external environmental monitoring. For practical reasons, this responsibility was transferred to the Xi’an City Environmental Monitoring Station which was able to mobilize the necessary resources and carried out external environmental monitoring free of charge. World Bank specialists also provided guidance and oversight.

12. In the project, no external consultant expert was assigned or needed to provide consulting services for project management.

**Recommendations**

13. During project preparation, the World Bank team should carry out more intensive dialogue with the relevant authorities of domestic projects for purposes of mutual learning and to better understand the Borrower’s policies and regulations in order to prepare more reasonable implementation plans and reduce the need for changes in implementation. The implementing entities should learn about the World Bank’s rules and project cycle prior to applying for a project in order to choose project components that meet World Bank requirements and avoid excessive subsequent changes.

15. The government should carry out policy training in districts and counties where resettlement is implemented. Training in coordination between domestic and international policies is especially important.

16. Urban construction entails a large amount of expensive relocation of utility infrastructure. Budgets for utility infrastructure relocation should be fully considered early in budget preparation. In addition, better organization and coordination are needed for the relocation of power lines to manage their relationship with construction.

17. The stability and continuity of the World Bank project management team should be ensured to retain technical skills of relevant personnel and to support project management work.

18. The World Bank should improve training of the audit department, and combine auditing with project implementation.

19. The World Bank should coordinate its procurement policies with those in effect in China and establish detailed connections with China’s bidding procedures for the electronic bid evaluation system.

## Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

Not Applicable

## Annex 9. List of Supporting Document

1. Xi’an Comprehensive Urban Transport Project (September 2005), *Project Preparation Mission Aide-Mémoires* (four missions)

2. Xi’an Comprehensive Urban Transport Project (February 2007), *Pre-Appraisal Mission* Aide-Mémoire.

3. World Bank Report No. 40033-CN (May 29, 2008), *Project Appraisal Document, Xi’an Sustainable Urban Transport Project*.

4. World Bank (2008) Loan Agreement, Xi’an Sustainable Urban Transport Project, Loan No. 7558-CN.

5. World Bank (2008) Project Agreement, Xi’an Sustainable Urban Transport Project, Loan No. 7558-CN.

6. Project Aide-Mémoires, and Implementation Status & Results Reports (ISRs).

7. Ministry of Finance, People’s Republic of China (April 21, 2014), *Request for an Amendment to the Loan Agreement*. Xi’an Sustainable Urban Transport Project, Loan 7558-CN.

8. World Bank Report No: RES152144 (October 17, 2014), *Restructuring Paper on a Proposed Project Restructuring of the Xi’an Sustainable Urban Transport Project*. Loan No. 7558-CN, approved June 24, 2008.

9. Office Memorandum from Reda Hamedoun to Axel von Trotsenburg, EAPVP: Restructuring Paper for Xi’an Sustainable Transport Project, Loan No. 7558-CN, *Change of Project Development Objective and Reallocation of Loan Proceeds*. November 24, 2014

10. World Bank (January 6, 2015) *Amendment to Loan Agreement*, Xi’an Sustainable Urban Transport Project, Loan No. 7558-CN.

11. World Bank (January 6, 2015) *Amendment to Project Agreement*, Xi’an Sustainable Urban Transport Project, Loan No. 7558-CN.

12. China Communications Press Co., Ltd. (June 2016): *A Study and Practice on China City Cluster Integrated Ecological Transport Planning Guideline.*

13. Bank Procedure (2016) *Instructions: Investment Project Financing Implementation Support to Project Completion*

14. http://www.tradingeconomics.com/china/gdp-growth-annual (accessed May 17, 2017).

15. Oleh Havrylyshyn, Xiaofong Meng, and Marian L. Tuby (2016), 25 Years of Reforms in Ex-Communist Countries: Fast and Extensive Reforms Led to Higher Growth and More, Political Freedom CATO Institute Policy Analysis No.795

16. Borrower’s Implementation Completion Report (ICR draft, August 2017).

1. The last sentence of the PDO is not in the Loan Agreement. [↑](#footnote-ref-1)
2. Delays in restructuring was the result of many factors: the approval levels had competing views on the content; a new project portal which required a redo of the entire paperwork; and pauses in implementation of many project components and stalled disbursements. The new task team leader (TTL) acted quickly and cut dormant and non-performing components without compromising the intentions of the PDO. This speeded up implementation and disbursements. The fully disbursed project was extended again in June 2016 to complete the Borrower-financed activity while retaining Bank oversight as discussed later (paras. 29, 30). [↑](#footnote-ref-2)
3. Xi’an Development and Reform Commission, Xi’an Municipal Finance Bureau, Xi’an Municipal Planning Bureau, Xi’an Municipal Construction Bureau, Xi’an Municipal Environmental Protection Bureau, Xi’an Municipal Communication Bureau, Xi’an Municipal Civil Administration Bureau, Xi’an Municipal National Land and Resources Bureau, Xi’an Municipal Cultural Heritage Bureau, Xi’an Municipal Public Security Bureau, and Xi’an Infrastructure Implementation Corporation. [↑](#footnote-ref-3)
4. The Bank has a long history in urban transport in China, starting with the Shanghai urban transport projects and the 1995 Symposium in Beijing on Urban Transport Development Strategy (World Bank Discussion Paper, No. 352); Transport in China: An Evaluation of World Bank Assistance: (1998); and subsequent urban transport projects and several GEF projects, e.g., City Cluster ECO-Transfer Project (GEF Grant No: TF099421. [↑](#footnote-ref-4)
5. M&E concerns the restructured project, because the pre-restructuring M&E system was deficient with an ambiguous PDO and indicators without a baseline. The restructured project’s components are significantly different. The split pre-/post-assessment is valid for outcome, not for M&E. Pre- and post-restructuring measurements have connections to quality at entry, supervision and Borrower and Bank performance, and will be commented as appropriate. [↑](#footnote-ref-5)
6. Travel speed is an aggregate measure. It depends on time of day, travel volume, peak/off-peak ratio, vehicle composition, road/street type and control, location and season. [↑](#footnote-ref-6)
7. 1 mu of land equals 666.6 m2 [↑](#footnote-ref-7)
8. Procurement was a complex inter-component issue and requires more nuanced explanations, among them: (a) the original disbursement ratios for the civil works and equipment (which included ventilation, elevator, boiler, etc. in the AQM component) were different and had to be packaged separately; (b) during the lengthy project preparation and implementation period the environmental monitoring standards in China were markedly strengthened. The original design of the Air-Quality Laboratory, including its ventilation system, did not meet the new standards and required a9re-design; and c) the environmental monitoring system in the Air-Quality Laboratory building is highly specialized. For all these reasons, it was difficult to find a contractor capable of doing a “turnkey” project for the building. Similar considerations apply to the TM component (para. 44). [↑](#footnote-ref-8)
9. The project enables the improvement of intelligent transport services: (a) communication systems to prevent bunching of buses; (b) a passenger information system at bus stops and for mobile devices; (c) construction of additional bus terminals and depots; (d) capacity increases in selected corridors and integration of ATC traffic management with public transport service; and other services. [↑](#footnote-ref-9)
10. The outcome assessment ratings are “split evaluations” due to the Level I restructuring, with disbursement-weighted averages of 0.40 under the original PDO and 0.60 under the revised PDO. [↑](#footnote-ref-10)
11. China Communications Press Co., Ltd. (2016): *A Study and Practice on China City Cluster Integrated Ecological Transport Planning Guideline.* [↑](#footnote-ref-11)
12. The following documents were used in addition to the project PAD, the final project costs from the Bank’s project file, and the PMO ICR.

Peter R. Stopher, Asif Ahmed, Wen Liu (2016) “Travel Time Budgets: New Evidence from Multi-year, Multi-day Data” *Transportation*, In press.

Federal Ministry for Economic Cooperation and Development, Sustainable Urban Transport Technical Document #11. *Transport Elasticities: Impacts on Travel Behavior*, <http://www.sutp.org/files/contents/documents/resources/B_Technical-Documents/GIZ_SUTP_TD11_> Transport-Elasticities\_EN.pdf (accessed 8/6/2017)

*Xi’an Urban Road Network Improvement Project* (RRP PRC 43032): Summary of Traffic Forecasts, https://www.adb.org/sites/default/files/linked-documents/43032-013-prc-oth-02.pdf (accessed 8/7/2017)

Marcos Chamon, Paolo Mauro, and Yohei Okawa (2007) *Cars*. Washington, DC: International Monetary Fund

Ferenc L. Toth, GuiYing Cao, and Eva Hizsnyik. (2008). *Regional Population projections for China*. IIASA. p31ff

Zhang, Y (2015) “Density and diversity of OpenStreetMap road networks in China”*, Journal of Urban Management* Vol 2. [↑](#footnote-ref-12)
13. It is possible to add the benefits from reductions of the operating cost and traffic accidents by inflating the net benefits from the ex-ante analysis to 2015 and subtracting the higher ex-post costs. This would increase the net benefits by a negligible amount (about US$8 million) with no effect on the EIRR. [↑](#footnote-ref-13)