

Document of  
The World Bank

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Report No: PAD1068

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT  
PROJECT APPRAISAL DOCUMENT  
ON A  
PROPOSED LOAN  
IN THE AMOUNT OF US\$120 MILLION  
TO THE  
PEOPLE'S REPUBLIC OF CHINA  
FOR THE  
WUHAN INTEGRATED TRANSPORT DEVELOPMENT PROJECT

February 3, 2016

*Transport and ICT Global Practice  
East Asia and Pacific Region*

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective January 4, 2016)

Currency Unit = Renminbi (RMB)  
RMB1 = US\$0.16  
US\$1 = RMB6.405

## FISCAL YEAR

January 1 – December 31

## ABBREVIATIONS AND ACRONYMS

|          |  |
|----------|--|
| ACDIC    | Anlu Construction Development and Investment Company, Ltd. |
| ACFB     | Anlu City Finance Bureau                                   |
| ALG      | Anlu Leading Group   |
| AMG      | Anlu Municipal Government                                  |
| APMO     | Anlu Project Management Office                             |
| ASP      | Application Service Platform                               |
| ATC      | Area Traffic Control                                       |
| BEC      | Bid Evaluation Committee                                   |
| CBA      | Cost-Benefit Analysis                                      |
| CCTV     | Closed-Circuit Television                                  |
| CNG      | Compressed Natural Gas                                     |
| CPS      | Country Partnership Strategy                               |
| CQS      | Selection Based on Consultants' Qualifications             |
| DA       | Designated Account   |
| DOF      | Department of Finance                                      |
| EA       | Environmental Assessment                                   |
| ECOPs    | Environmental Code of Practices                            |
| EHS      | Environmental Health and Safety                            |
| EIA      | Environmental Impact Assessment                            |
| EIRR     | Economic Internal Rate of Return                           |
| EMP      | Environmental Management Plan                              |
| E-police | Electronic Police  |
| ESMAP    | Energy Sector Management Assistance Program                |
| ETC      | Electronic Toll Collection                                 |
| FM       | Financial Management                                       |
| FMM      | Financial Management Manual                                |
| FSR      | Feasibility Study Report                                   |
| GDP      | Gross Domestic Product                                     |
| GIS      | Geographic Information System                              |
| GoC      | Government of China  |
| GPS      | Global Positioning System                                  |
| GRM      | Grievance Redress Mechanism                                |
| GRS      | Grievance Redress Service                                  |

|                 |   |
|-----------------|---|
| ha              | hectare(s)  |
| HPAO            | Hubei Provincial Audit Office                         |
| HPFB            | Hubei Provincial Finance Bureau                       |
| HQ              | (World Bank) Headquarters                             |
| IBRD            | International Bank for Reconstruction and Development |
| ICB             | International Competitive Bidding                     |
| ICM             | Integrated Corridor Management                        |
| ICT             | Information and Communications Technology             |
| IFI(s)          | International Financial Institution(s)                |
| IOT             | Internet of Things                                    |
| IPF             | Investment Project Financing                          |
| ITS             | Intelligent Transport System(s)                       |
| km              | kilometer(s)  |
| km <sup>2</sup> | square kilometer(s)                                   |
| LED             | Light-emitting Diode                                  |
| LIBOR           | London Interbank Offered Rate                         |
| LNG             | Liquefied Natural Gas                                 |
| m <sup>2</sup>  | square meter(s)                                       |
| M&E             | Monitoring and Evaluation                             |
| MIIT            | Ministry of Industry and Information Technology       |
| MOF             | Ministry of Finance                                   |
| MR              | Metropolitan Region                                   |
| NBSC            | National Bureau of Statistics of China                |
| NCB             | National Competitive Bidding                          |
| NDRC            | National Development and Reform Commission            |
| NMT             | Non-motorized Transport                               |
| NPV             | Net Present Value                                     |
| O&M             | Operation and Maintenance                             |
| OCR             | Optical Character Recognition                         |
| OP              | (World Bank) Operational Policy                       |
| OP/BP           | (World Bank) Operational Policy/Bank Policy           |
| PAD             | Project Appraisal Document                            |
| PDO             | Project Development Objective                         |
| PIU             | Project Implementation Unit                           |
| PLG             | Project Leading Group                                 |
| PMO             | Project Management Office                             |
| PT              | Public Transport                                      |
| PTIs            | Public Transport Interchanges                         |
| QBS             | Quality-based Selection                               |
| QCBS            | Quality- and Cost-based Selection                     |
| RAP             | Resettlement Action Plan                              |
| RMB             | Renminbi  |
| RPF             | Resettlement Policy Framework                         |
| RSA             | Road Safety Audit                                     |
| RUE             | Road User Education                                   |
| SORT            | Systematic Operations Risk-Rating Tool                |

|        |  |
|--------|--|
| TA     | Technical Assistance   |
| TCC    | Traffic Command Center   |
| TDM    | Transport Demand Management  |
| TORs   | Terms of Reference   |
| VOC    | Vehicle Operating Costs  |
| WB     | World Bank   |
| WIAC   | Wuhan “Internet+” Action Committee                                     |
| WMFB   | Wuhan Municipal Finance Bureau   |
| WMG    | Wuhan Municipal Government   |
| WMR    | Wuhan Metropolitan Region  |
| WPC    | Wuhan Parking Corporation  |
| WPMO   | Wuhan Project Management Office  |
| WSUTP  | Wuhan Second Urban Transport Project                                   |
| WTC    | Wuhan Transportation Commission  |
| WTDSRI | Wuhan Transport Development and Strategy Research Institute            |
| WTMB   | Wuhan Traffic Management Bureau  |
| WUCFM  | Wuhan Municipal Government’s Urban Construction Fund Management Office |
| WUTP   | Wuhan Urban Transport Project  |

|                                  |                             |
|----------------------------------|-----------------------------|
| Regional Vice President:         | Axel van Trotsenburg, EAPVP |
| Country Director:                | Bert Hofman, EACCF          |
| Senior Global Practice Director: | Pierre Guislain, GTIDR      |
| Practice Manager/Manager:        | Michel Kerf, GTIDR          |
| Task Team Leader:                | Arturo Ardila-Gómez, GTIDR  |

**CHINA**  
**Wuhan Integrated Transport Development Project**

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## PAD DATA SHEET

*China*

*Wuhan Integrated Transport Development (P148294)*

### PROJECT APPRAISAL DOCUMENT

*EAST ASIA AND PACIFIC*

*0000009381*

Report No.: PAD1068

| Basic Information  |  |                                       |                                    |
|--|--|---------------------------------------|------------------------------------|
| Project ID<br>P148294  | EA Category<br>B - Partial Assessment          | Team Leader(s)<br>Arturo Ardila Gomez |                                    |
| Lending Instrument<br>Investment Project Financing   | Fragile and/or Capacity Constraints [ ]        |                                       |                                    |
|  | Financial Intermediaries [ ]                   |                                       |                                    |
|  | Series of Projects [ ]                         |                                       |                                    |
| Project Implementation Start Date<br>15-Apr-2016   | Project Implementation End Date<br>31-Dec-2021 |                                       |                                    |
| Expected Effectiveness Date<br>15-Apr-2016   | Expected Closing Date<br>31-Dec-2021           |                                       |                                    |
| Joint IFC<br>No  |  |                                       |                                    |
| Practice<br>Manager/Manager  | Senior Global Practice<br>Director             | Country Director                      | Regional Vice President            |
| Michel Kerf  | Pierre Guislain                                | Bert Hofman                           | Axel van Trotsenburg               |
| Borrower: People's Republic of China   |  |                                       |                                    |
| Responsible Agency: Wuhan Urban Construction Utilization of Foreign Investment Project Management Office |  |                                       |                                    |
| Contact:<br>Telephone No.:   | Kejun Dai<br>(86-27) 858-4312                  | Title:<br>Email:                      | Director<br>Whcjwzmb@163.com       |
| Responsible Agency: Anlu City World-Bank Loan Project Management Office                                  |  |                                       |                                    |
| Contact:<br>Telephone No.:   | Jiawei Wen<br>86136-3581-7581                  | Title:<br>Email:                      | Deputy Director<br>alshbgs@163.com |
| Project Financing Data(in USD Million)   |  |                                       |                                    |

|   |                                      |                                    |                          |                          |        |        |      |      |      |      |
|---|--------------------------------------|------------------------------------|--------------------------|--------------------------|--------|--------|------|------|------|------|
| <input checked="" type="checkbox"/> Loan              | <input type="checkbox"/> IDA Grant   | <input type="checkbox"/> Guarantee |                          |                          |        |        |      |      |      |      |
| <input type="checkbox"/> Credit                       | <input type="checkbox"/> Grant       | <input type="checkbox"/> Other     |                          |                          |        |        |      |      |      |      |
| Total Project Cost:                                   | 207.91                               | Total Bank Financing:              | 120.00                   |                          |        |        |      |      |      |      |
| Financing Gap:  | 0.00                                 |                                    |                          |                          |        |        |      |      |      |      |
| <b>Financing Source</b>                               |                                      | <b>Amount</b>                      |                          |                          |        |        |      |      |      |      |
| Borrower  |                                      | 87.91                              |                          |                          |        |        |      |      |      |      |
| International Bank for Reconstruction and Development |                                      | 120.00                             |                          |                          |        |        |      |      |      |      |
| Total   |                                      | 207.91                             |                          |                          |        |        |      |      |      |      |
| <b>Expected Disbursements (in USD Million)</b>        |                                      |                                    |                          |                          |        |        |      |      |      |      |
| Fiscal Year   | 2017                                 | 2018                               | 2019                     | 2020                     | 2021   | 2022   | 0000 | 0000 | 0000 | 0000 |
| Annual  | 10.00                                | 14.00                              | 22.00                    | 30.00                    | 30.00  | 14.00  | 0.00 | 0.00 | 0.00 | 0.00 |
| Cumulative  | 10.00                                | 24.00                              | 46.00                    | 76.00                    | 106.00 | 120.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| <b>Institutional Data</b>                             |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <b>Practice Area (Lead)</b>                           |                                      |                                    |                          |                          |        |        |      |      |      |      |
| Transport & ICT                                       |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <b>Contributing Practice Areas</b>                    |                                      |                                    |                          |                          |        |        |      |      |      |      |
|   |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <b>Cross Cutting Topics</b>                           |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <input checked="" type="checkbox"/> Climate Change    |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <input type="checkbox"/> Fragile, Conflict & Violence |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <input checked="" type="checkbox"/> Gender            |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <input type="checkbox"/> Jobs                         |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <input type="checkbox"/> Public Private Partnership   |                                      |                                    |                          |                          |        |        |      |      |      |      |
| <b>Sectors / Climate Change</b>                       |                                      |                                    |                          |                          |        |        |      |      |      |      |
| Sector (Maximum 5 and total % must equal 100)         |                                      |                                    |                          |                          |        |        |      |      |      |      |
| Major Sector  | Sector                               | %                                  | Adaptation Co-benefits % | Mitigation Co-benefits % |        |        |      |      |      |      |
| Public Administration, Law, and Justice               | Public administration-Transportation | 9                                  | 92                       | 92                       |        |        |      |      |      |      |
| Information and communications                        | Information technology               | 33                                 | 100                      | 100                      |        |        |      |      |      |      |
| Transportation  | Urban Transport                      | 58                                 | 26                       | 32                       |        |        |      |      |      |      |



|  |  |
|--|--|
| Total  | 100  |
| <input type="checkbox"/> I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project. |  |
| <b>Themes</b>  |  |
| Theme (Maximum 5 and total % must equal 100)   |  |
| Major theme  | Theme %  |
| Urban development  | City-wide Infrastructure and Service Delivery 90 |
| Urban development  | Municipal governance and institution building 10 |
| Total  | 100  |
| <b>Proposed Development Objective(s)</b>   |  |
| The PDO is to improve transport mobility in Wuhan and Anlu Municipalities.   |  |
| <b>Components</b>  |  |
| <b>Component Name</b>  | <b>Cost (USD Millions)</b>                       |
| Component 1. Integrated Corridor and Road Safety Improvements in Anlu  | 81.62  |
| Component 2. Public Transport Improvements in Anlu   | 33.67  |
| Component 3. Intelligent Transport Systems for Wuhan   | 72.59  |
| Component 4. Technical Assistance and Project Management   | 3.89   |
| <b>Systematic Operations Risk- Rating Tool (SORT)</b>  |  |
| <b>Risk Category</b>   | <b>Rating</b>                                    |
| 1. Political and Governance  | Low  |
| 2. Macroeconomic   | Moderate   |
| 3. Sector Strategies and Policies  | Substantial                                      |
| 4. Technical Design of Project or Program  | Substantial                                      |
| 5. Institutional Capacity for Implementation and Sustainability  | Substantial                                      |
| 6. Fiduciary   | Substantial                                      |
| 7. Environment and Social  | Moderate   |
| 8. Stakeholders  | Moderate   |
| 9. Other   |  |
| <b>OVERALL</b>   | Substantial                                      |

| <b>Compliance</b>   |                               |                 |                  |
|---|-------------------------------|-----------------|------------------|
| <b>Policy</b>   |                               |                 |                  |
| Does the project depart from the CAS in content or in other significant respects?   |                               | Yes [ ]         | No [ X ]         |
| Does the project require any waivers of Bank policies?  |                               | Yes [ ]         | No [ X ]         |
| Have these been approved by Bank management?  |                               | Yes [ ]         | No [ ]           |
| Is approval for any policy waiver sought from the Board?  |                               | Yes [ ]         | No [ X ]         |
| Does the project meet the Regional criteria for readiness for implementation?   |                               | Yes [ X ]       | No [ ]           |
| <b>Safeguard Policies Triggered by the Project</b>  |                               | <b>Yes</b>      | <b>No</b>        |
| Environmental Assessment OP/BP 4.01   |                               | X               |                  |
| Natural Habitats OP/BP 4.04   |                               |                 | X                |
| Forests OP/BP 4.36  |                               |                 | X                |
| Pest Management OP 4.09   |                               |                 | X                |
| Physical Cultural Resources OP/BP 4.11  |                               | X               |                  |
| Indigenous Peoples OP/BP 4.10   |                               |                 | X                |
| Involuntary Resettlement OP/BP 4.12   |                               | X               |                  |
| Safety of Dams OP/BP 4.37   |                               |                 | X                |
| Projects on International Waterways OP/BP 7.50  |                               |                 | X                |
| Projects in Disputed Areas OP/BP 7.60   |                               |                 | X                |
| <b>Legal Covenants</b>  |                               |                 |                  |
| <b>Name</b>   | <b>Recurrent</b>              | <b>Due Date</b> | <b>Frequency</b> |
| Mid-term review   |                               | March 1, 2019   |                  |
| <b>Description of Covenant</b>  |                               |                 |                  |
| PA, Schedule, Section II.A.2: The Project Implementing Entity shall prepare, under terms of reference satisfactory to the Bank, a consolidated mid-term review report for the Project, summarizing the results of the monitoring and evaluation activities carried out from the inception of the Project, and setting out the measures recommended to ensure the efficient completion of the Project and to further the objectives thereof. |                               |                 |                  |
| <b>Conditions</b>   |                               |                 |                  |
| <b>Source Of Fund</b>   | <b>Name</b>                   | <b>Type</b>     |                  |
| IBRD  | Subsidiary Agreement for Anlu | Disbursement    |                  |
| <b>Description of Condition</b>   |                               |                 |                  |
| LA, Schedule 2, Section IV.B.1(b): No withdrawal shall be made under Category (1) until the Bank shall  |                               |                 |                  |

have notified the Borrower and the Project Implementing Entity of its receipt of a copy of the Subsidiary Agreement entered into between Anlu Municipality and ACDIC, satisfactory to the Bank, and in accordance with the provisions of Section I.E.1 of the Schedule to the Project Agreement

| Source Of Fund | Name                           | Type         |
|----------------|--------------------------------|--------------|
| IBRD           | Subsidiary Agreement for Wuhan | Disbursement |

#### Description of Condition

LA, Schedule 2, Section IV.B.1(c): No withdrawal shall be made under Category (2) until the Bank shall have notified the Borrower and the Project Implementing Entity of its receipt of a copy of the Subsidiary Agreement entered into between Wuhan Municipality and WTDSRI, satisfactory to the Bank, and in accordance with the provisions of Section I.E.1 of the Schedule to the Project Agreement.

#### Team Composition

##### Bank Staff

| Name                     | Role                                     | Title                              | Specialization        | Unit  |
|--------------------------|--|------------------------------------|-----------------------|-------|
| Arturo Ardila Gomez      | Team Leader (ADM Responsible)            | Lead Transport Economist           | Urban Transport       | GTI02 |
| Jingrong He              | Procurement Specialist (ADM Responsible) | Procurement Specialist             | Procurement           | GGO08 |
| Yi Geng                  | Financial Management Specialist          | Sr Financial Management Specialist | Financial management  | GGO20 |
| Alejandro Alcala Gerez   | Counsel                                  | Senior Counsel                     | Legal                 | LEGES |
| Alejandro Hoyos Guerrero | Team Member                              | Transport Specialist               | Transport Economist   | GTI04 |
| Anita Shrestha           | Team Member                              | Procurement Assistant              | Fiscal Analysis       | GGO08 |
| Arturo Muenta Kunigami   | Peer Reviewer                            | Senior ICT Policy Specialist       | ICT Specialist        | GTI09 |
| Fatima Arroyo Arroyo     | Team Member                              | Operations Analyst                 | Transport Engineering | GTI02 |
| Geoffrey John Kurgan     | Team Member                              | E T Consultant                     | Road Safety           | GTI02 |
| Jean Paul Velez          | Team Member                              | Consultant                         | Urban Transport       | GTI02 |
| Jung Eun Oh              | Peer Reviewer                            | Senior Transport Economist         | Transport Economist   | GTI03 |
| Li Qu                    | Team Member                              | Young Professional                 | ICT                   | GTI04 |
| Limei Sun                | Team Member                              | Program Assistant                  | ACS                   | EACCF |
| Maria Luisa G. Juico     | Team Member                              | Program Assistant                  | ACS                   | GTI02 |

|                    |                       |                                      |   |       |
|--------------------|-----------------------|--------------------------------------|---|-------|
| Maya Sheli Port    | Counsel               | E T Consultant                       | Legal                                     | LEGES |
| Natasha Beschorner | Team Member           | Senior ICT Policy Specialist         | ICT                                       | GTI09 |
| Peishen Wang       | Safeguards Specialist | Consultant                           | Environmental Specialist                  | GENDR |
| Rumana Huque       | Peer Reviewer         | Senior Operations Officer            | Urban Specialist                          | OPSRR |
| Yan Zong           | Team Member           | Transport Specialist                 | Transport Specialist. Co-Task Team Leader | GTI02 |
| Yang Chen          | Team Member           | Urban Transport. Spec.               | Urban Transport                           | GTI02 |
| Yi Yang            | Team Member           | Operations Analyst                   | Gender and Urban Transport                | GTI02 |
| Zhefu Liu          | Safeguards Specialist | Senior Social Development Specialist | Social Development Specialist             | GSU02 |
| Zhuo Yu            | Team Member           | Finance Officer                      | Finance Officer                           | WFALN |

#### Extended Team

| Name                | Title   | Office Phone | Location  |
|---------------------|---|--------------|-----------|
| Gladys Frame        | Traffic Management and Road Safety Specialist, Consultant |              | Edinburgh |
| Michael Chiu        | Sr. Public Transport Consultant                           |              | Beijing   |
| Vellet E. Fernandes | Temporary   |              |           |
| Yuanyuan Tan        | Interpreter   |              |           |

#### Locations

| Country | First Administrative Division | Location | Planned | Actual | Comments |
|---------|-------------------------------|----------|---------|--------|----------|
| China   | Hubei                         | Wuhan    |         | X      |          |
| China   | Hubei                         | Anlu     |         | X      |          |

#### Consultants (Will be disclosed in the Monthly Operational Summary)

Consultants Required ? Consulting services to be determined

## I. STRATEGIC CONTEXT

### A. Country Context

1. **Over the past three decades, rapid economic development in China, supported by steady urbanization, has lifted more than 600 million people out of poverty.** Urbanization created a supportive environment for growth with abundant labor, cheap land and good infrastructure. The urbanized population grew from 30 percent in 1996 to 54.8 percent in 2014. As this urbanization continues, China is expected to have one billion urban residents by 2030.<sup>1</sup>

2. **Although China has avoided some of the common ills of urbanization—notably slums and urban unemployment—strains such as urban sprawl, environmental pollution and social inequities have emerged.** Many of China’s cities and metropolitan regions show a piecemeal, unplanned and sprawling pattern of urban development.

3. **Economic prosperity is concentrated on the eastern coast, especially in large cities with good access to international markets.** Using income and poverty as a lens, China’s central and western regions, home to 55 percent of the population, have lagged behind; their per capita income is about half that of the coastal region.<sup>2</sup> The Wuhan Metropolitan Region (WMR), located in Central China, reflects this pattern. In Eastern China, the gross domestic product (GDP) per capita in 2014 was RMB67,100, compared to RMB56,047 for the WMR and RMB38,242 for Central China.<sup>3</sup>

4. **Along with its rapid economic growth and urbanization, China faces a serious challenge from the rapid increase in motorization.** In 1995, there were 2.5 million private automobiles; by 2014 there were 123 million.<sup>4</sup> Although the motorization level is still very low compared to wealthier countries (91 motor vehicles per 1,000 inhabitants for China compared to 565 for the European Union and 790 for the United States<sup>5</sup>), Chinese cities are suffering from increasing levels of congestion, air pollution, and poor road safety.<sup>6</sup>

5. **Confronted with the growing challenges of urbanization, China’s leadership is seeking a new urban development model attuned to the national goals of promoting equity and environmental sustainability.** In 2005 the GoC proposed the “Two Oriented Society” strategy, namely the “resource-preserving oriented” and “environmental-friendly oriented” path for urbanization. The overall vision is to achieve more efficient growth patterns for the cities and metropolitan regions by balancing resources and services in a sustainable manner.

### B. Sectoral and Institutional Context

6. **In the context of the new urbanization model, the Government of China (GoC) has selected the WMR as a pilot.** In the WMR the vision of “Two Oriented Society”, named the

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<sup>1</sup> World Bank. 2012. China Country Partnership Strategy.

<sup>2</sup> World Bank. 2012. China Country Partnership Strategy.

<sup>3</sup> Calculation based on the National Bureau of Statistics of China (NBSC), China Statistical Summary 2015, and Hubei Province Statistical Yearbook 2015.

<sup>4</sup> National Bureau of Statistics of China (NBSC) China Statistical Summary 2015.

<sup>5</sup> Data are for 2013, from the International Organization of Motor Vehicle Manufacturers; motorization report available at: <http://www.oica.net/wp-content/uploads/total-inuse-2013.pdf>

<sup>6</sup> World Bank; Development Research Center of the State Council, the People’s Republic of China. 2014. Urban China: Toward Efficient, Inclusive, and Sustainable Urbanization. Washington, DC: World Bank. © World Bank. <https://openknowledge.worldbank.org/handle/10986/18865> License: CC BY 3.0 IGO.

“1+8 Wuhan Metropolitan Area,” is to be realized by promoting a city cluster formed by eight smaller cities within a 100-kilometer (km) radius of the core city, Wuhan. The 1+8 cluster has a population of 30.9 million inhabitants. Wuhan, the largest city, has a population of 10.3 million. Anlu, a small city with 0.6 million inhabitants, is located within Xiaogan Municipality, one of the eight peripheral cities in the cluster. This is one of the first pilot demonstrations of proactive regional planning in China, and stands in contrast with the more piecemeal, unplanned and sprawling patterns of metro regions on China’s eastern coast. Part of this vision for the WMR is that the regional economy will grow less dependent on Wuhan (the 1) over the years by developing new engines of economic growth and offering higher standards of living in the surrounding cities (the 8).<sup>7</sup>

**7. Motorization in Wuhan is also increasing and the impact from congestion worsens year after year.** The city remains congested even with about 130 cars per 1,000 population and 224 km of urban expressways.<sup>8</sup> In 2010 Wuhan had 61 intersections with very large traffic volumes (congested);<sup>9</sup> by 2014 it had 125.<sup>10</sup> Congestion particularly hurts the poor who must take buses that share the roads with cars. Poor people—as pedestrians and cyclists—in developing countries also disproportionately bear the higher burden of injuries and fatalities from road incidents.<sup>11</sup> Poor transport can keep the urban labor market from functioning efficiently<sup>12</sup> and can constrain urban economic growth.<sup>13</sup> Poor transport also increases the urban area’s carbon footprint.<sup>14</sup>

**8. Improving transport within the 1+8 Region is therefore critical for the overall economic functioning of the WMR and for improving connectivity and integration.** Rail networks are under construction in the WMR. Wuhan itself is in the midst of an unprecedented construction boom to upgrade transport infrastructure through a metro system and an urban expressway network. Anlu has ambitious plans to steer urban and population growth in a sustainable manner: for example, by promoting and improving public transport to make it an efficient alternative to cars. However, there is a need to complement these investments with measures to improve regional links to suburbs as the urban area spreads; increase the attractiveness of public transport to slow down the shift to private vehicles; and enable smoother, safer and more convenient access and mobility for passengers through the use of technology and on-street measures.

**9. Chinese authorities chose the Anlu Municipal Government to be a part of this**

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<sup>7</sup> All data in this paragraph are 2014 year-end data from the Hubei Province Statistical Yearbook 2015.

<sup>8</sup> See Wuhan Comprehensive Transport Planning and Design Co. Ltd., Singapore CSE-ITS PTE Ltd. 2013. “Traffic Congestion Charging Feasibility Study.” Opening Report.

<sup>9</sup> Wuhan Project Management Office (PMO). 2013. Model Project of Transportation Integration in Wuhan Metropolitan Area with World Bank Loan—Subproject of Model Project of Intelligent Transportation in Wuhan; and Wuhan PMO. 2013. “Overview of Integrated Transportation Development in Wuhan Metropolitan Area.”

<sup>10</sup> WTDSRI. 2015. Annual Report Transportation Development for 2014.

<sup>11</sup> Vinand M. Nantulya, Michael R. Reich. 2002, “The neglected epidemic: road traffic injuries in developing countries.” *British Medical Journal (BMJ)*, May 11, 2002.

<sup>12</sup> Bertaud, A. 2014. “Cities as Labor Markets.”

[http://marroninstitute.nyu.edu/uploads/content/Cities\\_as\\_Labor\\_Markets.pdf](http://marroninstitute.nyu.edu/uploads/content/Cities_as_Labor_Markets.pdf)

<sup>13</sup> Leipziger, D. and Yusuf, S. 2014. “Making City Lights Burn Brighter.” <http://www.voxeu.org/article/making-city-lights-burn-brighter>

<sup>14</sup> Bertaud, A., B. Lefevre, and B. Yuen. 2011. “GHG Emissions, Urban Mobility, and Morphology: A Hypothesis,” In Hoornweg, D., M. Freire, M. Lee, P. Bhada-Tata, and B. Yuen (editors), “Cities and Climate Change.”

**project because it is typical of small, county-level cities within the WMR 1+8 cluster and because the city can learn from Wuhan’s experience.** Anlu is planning significant investments in its transport system to improve public transport through integrated corridors<sup>15</sup>—a comprehensive approach that improves the entire corridor by giving priority to public transport and non-motorized transport (NMT)—as well as additional sidewalk improvements. Wuhan also has ample experience with integrated corridors. Anlu wants to lay the foundation for a transit system that is an efficient alternative to cars. In this way, it can become an attractive city in itself with a working labor market, while being integrated with the rest of the WMR.

**10. The proposed project comprises transport integration measures at strategic and local levels, and contains a range of information and communications technology (ICT) investments and physical on-street measures.** The project will focus on using technology to enable more seamless trips and reduce congestion; improving public transport and NMT; and enabling more equal access to transport for all sections of society, especially the poor. Thanks to these features, the project will also help to achieve a more integrated and therefore balanced urban development pattern in the WMR. It will also showcase innovative integration solutions within each city as a model for replication in similar situations.

**11. Anlu will nurture sustainable transport modes to cope with growing motorization.** Anlu has the potential to channel economic and population growth. The city will have two high-speed rail stations that will integrate it with the WMR and beyond. Furthermore, as a small city, it facilitates NMT and two-wheeled transport modes comprising walking, cycling, and e-bikes. However, there is a need to ensure that these sustainable modes are not eroded further by rapid motorization. Measures will be necessary to preserve this NMT advantage in the future, to increase further the public transport modal share, and to reduce dependence on private motorized vehicles. The improvement of public transport and NMT facilities, in addition to integration with the regional rail systems, are important steps in this direction, but complementary policies aimed at improving transport and land-use planning will also be crucial.

**12. Wuhan has already invested in Intelligent Transport Systems (ITS) and built the foundations for “smart” transport planning, management and monitoring.** In recent years, Wuhan City agencies have implemented systems that include: (a) Area Traffic Control (ATC) signals; (b) closed-circuit television (CCTV) traffic monitoring cameras; (c) e-police enforcement cameras;<sup>16</sup> (d) a traffic guidance system; (e) public bus monitoring and dispatch systems; (f) a “floating-car” taxi monitoring system; (g) bridge and tunnel electronic toll-collection (ETC) systems; (h) a highway toll-collection system; and (i) a public transport monitoring system using Smart Cards. In addition, mobile—including mobile broadband (3G/4G)—penetration is very widespread in Wuhan, with extensive use of social media, which offers a strong foundation for the provision of access to transport data and information through smartphone apps as well. The added value of the investments under this project will be to utilize the very substantial data, which have been gathered and processed strategically and efficiently, in order to inform transport network design and operational planning and management, as well as system performance monitoring by the municipal government and by system users. Therefore,

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<sup>15</sup> Fang K., S. Zimmerman, W. Wang, S. Dahdah, G. Frame. 2012. Integrated Corridor Management for Urban Transport: Concept and Practices. *Urban Transport of China*, Issue 3, pp. 8–22.

<sup>16</sup> CCTV and e-police enforcement cameras are used primarily for traffic management purposes and not for security. The same will be the case for the cameras that the current project will finance.

significant focus is placed on “analytics” and “smart” evidence-based decision making.

13. **A key step at this stage is the integration of and data capture from Wuhan’s multiple ITS components and modules.** Separate agencies manage these modules without standardization or interoperability, and data or information sharing has been limited.<sup>17</sup> Analyses undertaken are also disaggregated, thus limiting their benefits and applicability. The project offers an excellent opportunity to apply leading-edge technologies to increase data capture (e.g., a variety of sensors/monitoring equipment–“Internet of Things” [IOT]); analytical tools and techniques to handle large data volumes (“big data/analytics”); and cloud computing to facilitate the more effective and efficient sharing of information-system infrastructure and resources. Non-compatible legacy systems will be progressively phased out and superseded by a unified portal. Developing such a “one-stop” portal for all of Wuhan’s ITS and associated systems will facilitate more widespread access to data and information and provide powerful tools for analysis and decision making.

14. **The proposed project is the third urban transport project that the Bank will finance in Wuhan.** The first (Wuhan Urban Transport Project [WUTP], P069852) was approved in March 2004 and completed in December 2010. It comprised investments in ITS, traffic management and bus priority measures, plus road construction and maintenance designed to promote an integrated package of urban transport measures with ITS at its heart in an area-wide context. With a focused technical assistance (TA) program, Wuhan also learned how to specify, design, implement and operate ITS for the first time. The Wuhan Second Urban Transport Project (WSUTP, P112838), which was approved in March 2010, is ongoing. Building on the expertise from the first project, the WSUTP focuses less on area-wide measures and more on integrated public transport and road safety corridors with a package of ITS, traffic management, road construction and TA. The roadmap linking these two projects with the third project is clear: first, experience with ITS has been engendered; second, ITS replication and a flowering of expertise in better integration have been fostered; third, the expertise and experience gained in ITS will serve as a springboard to enable better use of data and contribute to Wuhan’s Smart City initiatives; and fourth, the roadmap for Anlu (at the beginning of its ITS journey) is introduced.

### **C. Higher-Level Objectives to which the Project Contributes**

15. **The proposed project is aligned with the 2013–2016 World Bank Group Country Partnership Strategy (CPS) for China,** discussed by the Bank’s Board on November 6, 2012. The 2013–2016 CPS focuses on three main pillars: (i) supporting greener growth; (ii) promoting more balanced regional development; and (iii) advancing mutually beneficial relations with the world. The project addresses the first two pillars directly. On greener growth, the project responds to Outcome 1.3, which calls for the promotion of low-carbon urban transport. On more balanced regional development, Outcome 2.3 is associated with the enhancement of opportunities in rural areas and small towns, and Outcome 2.4 with the improvement of

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<sup>17</sup> Existing operational ITS are operated by three agencies under the municipality: the traffic police operate coordinated traffic signals, e-police enforcement and traffic guidance systems; the bus company operates bus monitoring, dispatch and passenger information systems; and the Urban Road and Bridge Management Center operates electronic toll collection on bridges, tunnels and highways. These were developed independently because they had different objectives and functions: traffic operations and enforcement; bus operations; and toll collection. This is fairly standard in most cities, even developed ones, and it is only very recently that cities are beginning to integrate these functions. In Wuhan, there have been no previous attempts to integrate these systems.



connectivity for more balanced regional development. One of the project's specific aims is to boost the development of Anlu, a peripheral secondary city to Wuhan, by improving its transport facilities and providing necessary data-analysis tools to support more balanced and integrated regional growth, based on the WMR 1+8 Cluster Plan.<sup>18</sup>

16. **The project supports the World Bank's twin goals, especially the goal of enhancing shared prosperity.** WMR is located in less-developed Central China. Its peripheral cities, such as Anlu, have a higher concentration of poor people. While 2.9 percent of Wuhan's population is urban poor, 10.6 percent of Anlu's urban population lives below the poverty line.<sup>19</sup> The bottom 40 percent uses public transport and NMT. The project will pay special attention to the travel needs of disenfranchised groups such as the poor, the elderly, women, and people with disabilities. It will also provide data and help to develop the necessary tools to enable the monitoring of these impacts. In Wuhan, a more efficiently managed transport system, with accurate, real-time information readily available to the public, will specifically benefit the bottom 40 percent of residents who rely on public transport to access jobs and other activities. Such information (e.g., route, price, transfers, timing, trip planning) will be accessible through public media as well as individual user devices that are increasingly affordable for the majority of the system's users. In Anlu, the project will bring in integrated corridors with special road safety considerations, help to establish a comprehensive public transport network, and improve NMT facilities.

## II. PROJECT DEVELOPMENT OBJECTIVES (PDO)

### A. PDO

17. The PDO is to improve transport mobility<sup>20</sup> in Wuhan and Anlu Municipalities.

### B. Project Beneficiaries

18. **The project will benefit a wide range of groups in both Wuhan and Anlu:** (a) public transport and NMT users, with special attention to the needs of disenfranchised groups; (b) city dwellers as a whole; and (c) special groups, such as bus companies, logistics companies, and government agencies. Specifically, the Anlu integrated corridor and road safety improvement component will benefit 172,200 habitants (of whom about 85,000 are female) living in the downtown area, while the public transport component will benefit Anlu's total population of 642,500, including those living in rural areas. The Wuhan ITS component will benefit the 4.7 million (around 2.2 million female) residents living in the downtown area; the traffic information collection and traffic monitoring and management system will benefit more than 882,000 motor vehicles running on arterial roads and expressways within the third ring road; and the three application management systems will benefit all 10.3 million residents living in Wuhan.

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<sup>18</sup> See World Bank. 2012. China Country Partnership Strategy (pp. 21, 27, and 28).

<sup>19</sup> Using "eligibility of receiving low-income social security" as the proxy for poverty. Data sources: 2013 Wuhan City Economic and Social Development Report; 2013 Anlu City Economic and Social Development Report.

<sup>20</sup> Transport Mobility refers to the movement of people and goods throughout the urban area. An improvement in mobility means more possibility to travel and access opportunities such as jobs (Litman, 2011, "Measuring Transportation: Traffic, Mobility and Accessibility."). Improving mobility is key to making the urban labor market work better, particularly for the bottom 40% (Bertaud, A. 2014. "Cities as Labor Markets," opus cit.).

### C. PDO-Level Results Indicators

19. **The PDO indicators to be measured by both municipalities in the project, unless otherwise noted, are:**

- (a) Percentage of users satisfied with public transport service at the terminals of targeted corridors in Anlu, disaggregated by gender and income.
- (b) Percentage of pedestrians satisfied with the walking environment in the Anlu downtown area, disaggregated by gender and income.
- (c) Average vehicle trip speed during peak hours on major arterial roads within the third ring road in Wuhan.
- (d) Bus ridership in Anlu.
- (e) Level of utilization of transport information to improve mobility in Wuhan.

20. Mobility improvement in Wuhan is measured through the indicator of level of utilization of transport information through ITS and the indicator of average vehicle trip speed during peak hours on major roads, which captures congestion reduction thanks to better traffic management enabled by the ITS financed by the project. Reducing congestion benefits more than proportionally the buses that share lanes with cars and trucks. Mobility improvement in Anlu is measured by user-reception indicators such as satisfaction at bus terminals where users transfer, walking environments, and increased bus ridership.

## III. PROJECT DESCRIPTION

### A. Project Components

21. The project comprises four components, summarized below (see **Annex 2** for details).

22. **Component 1. Integrated Corridor and Road Safety Improvements in Anlu (Total Cost - US\$81.62 million; IBRD - US\$51.19 million, Counterpart Funds - US\$30.43 million):**

- 1) Road network refunctioning through the carrying out of improvements to selected road infrastructure and construction of new road sections.
- 2) Carrying out improvements to non-motorized transport facilities, including junction channelization, pedestrian facilities, signs, markings and barriers, on selected existing roads in Anlu's downtown area.
- 3) Implementation of traffic management and road safety measures including, *inter alia*, the procurement and implementation of systems and related equipment such as a traffic command center, a traffic-signal control system, traffic monitoring and traffic enforcement cameras, bus-lane enforcement mechanisms, construction of a road safety center and implementation of road user education measures.

23. **Component 2. Public Transport Improvements in Anlu (Total Cost - US\$33.67 million; IBRD - US\$16.75 million, Counterpart Funds - US\$16.92 million):**

- 1) Construction and/or upgrading of six public transport interchanges, including: (a) three bus transfer stations; (b) one bus terminal; and (c) two bus transfer and road passenger transport centers.
- 2) Procurement of clean-energy buses.

- 3) Establishment of an intelligent public transport system including, *inter alia*, a public transport control center, onboard bus information systems, bus dispatching systems, telecommunications, and a smart card system.

**24. Component 3. Intelligent Transport Systems for Wuhan (Total Cost - US\$72.59 million; IBRD - US\$48.23 million, Counterpart Funds - US\$24.36 million):**

- 1) Setting up of a transportation policy support center consisting of a city-level transport information repository and a transport decision service platform.
- 2) Provision of equipment along selected expressways and arterial roads, aimed at collecting traffic information, supporting traffic monitoring and enforcement, and providing real-time guidance for users.
- 3) Establishment of application management tools for transport-related government agencies, including: (a) a traffic monitoring and management system; (b) an external traffic monitoring and decision system; and (c) a smart parking management information system.

**25. Component 4. Technical Assistance and Project Management (Total Cost - US\$3.89 million; IBRD - US\$3.53 million, Counterpart Funds - US\$0.36 million):**

- 1) **Anlu.** Provision of: (a) technical assistance support and training activities, including for Project related studies in areas concerning, *inter alia*, urban transport strategy and planning, road safety, parking, and non-motorized transport; and (b) Project implementation support, including monitoring and evaluation activities, as well as Project management-related training, capacity building, and study tours.
- 2) **Wuhan.** Provision of: (a) technical assistance support and training activities, including for Project related studies in areas concerning transportation-related big data analytics and applications, data standards and data sharing; (b) support for knowledge-sharing activities among the ITS regional community, including local governments, transport service providers, and the telecommunications, ICT and transport industries; and (c) Project management-related training, capacity building, and study tours.

## **B. Project Financing**

26. **Lending instrument.** The proposed lending instrument for this project is Investment Project Financing (IPF). The Borrower has selected a US dollar-denominated, commitment-linked variable spread loan based on a six-month LIBOR plus an additional variable spread. It has also selected all available conversion options, a level repayment profile, payment of the front-end fee with IBRD loan proceeds, and a repayment period of 20 years, including a five-year grace period.

## **C. Project Cost and Financing**

27. The total cost of the proposed project is US\$207.91 million, with the Anlu part of the project costing US\$131.33 million and the Wuhan part of the project costing US\$76.58 million. The proposed IBRD loan will finance US\$120 million of project costs, with Anlu borrowing US\$70 million and Wuhan borrowing US\$50 million. Anlu and Wuhan will provide counterpart funding of US\$61.33 million and US\$26.58 million, respectively. Table 1 provides the project cost and financing plan. **Annex 2** provides more detailed information.

#### IV. IMPLEMENTATION

##### A. Institutional and Implementation Arrangements

28. Project Leading Groups (PLG) have been established in Wuhan and in Anlu to provide leadership, policy guidance and coordination in project preparation and implementation. In Wuhan, the PLG is the Wuhan “Internet+” Action Committee (WIAC), set up by the WMG to further promote and coordinate all Smart City investments in Wuhan.

**Table 1. Project Cost and Financing Plan**

| Project Cost by Component   | Total Cost         |                     | Financing Plan      |                         | % IBRD Financing |
|---|--------------------|---------------------|---------------------|-------------------------|------------------|
|   | Cost (RMB million) | Cost (US\$ million) | IBRD (US\$ million) | Borrower (US\$ million) |                  |
| Component 1: Integrated Corridor and Road Safety Improvements in Anlu | 522.79             | 81.62               | 51.19               | 30.43                   | 62.72            |
| Component 2: Public Transport Improvements in Anlu                    | 215.59             | 33.67               | 16.75               | 16.92                   | 49.75            |
| Component 3: Intelligent Transport Systems for Wuhan                  | 464.94             | 72.59               | 48.23               | 24.36                   | 66.44            |
| Component 4: Technical Assistance and Project Management              | 24.93              | 3.89                | 3.53                | 0.36                    | 90.75            |
| <b>Total Project Costs</b>  | <b>1228.28</b>     | <b>191.77</b>       | <b>119.70</b>       | <b>72.07</b>            | <b>62.42</b>     |
| Land Acquisition and Resettlement                                     | 55.92              | 8.73                |                     | 8.73                    |                  |
| Interest during implementation  | 45.60              | 7.11                |                     | 7.11                    |                  |
| Front-end fee   | 1.92               | 0.30                | 0.30                |                         | 100.00           |
| <b>Total Financing Required</b>                                       | <b>1331.69</b>     | <b>207.91</b>       | <b>120.00</b>       | <b>87.91</b>            | <b>57.72</b>     |

29. The Anlu Project Management Office (APMO) will be responsible for the overall coordination, management and supervision of Components 1, 2 and 4.1 of the project, including the review and approval of Annual Work Plans,<sup>21</sup> revisions to the project budget and allocation of resources, coordination of fiduciary aspects, and provision of guidance to the Anlu Construction Development and Investment Company, Ltd. (ACDIC) on project implementation. ACDIC will serve as the PIU for the Anlu part of the project to manage project implementation activities, and will have financial management (FM) and procurement responsibilities.

30. The Wuhan Project Management Office (WPMO), housed in WMG’s Urban Construction Fund Management Office (WUCFM), will be the primary coordinating body for both Wuhan and Anlu, and will be responsible for communications with the Bank. WPMO will be responsible for the consolidation of information under the project, submission of Project Reports to the Bank, and the overall coordination, management and supervision of Components 3 and 4.2 of the project, including the review and approval of Annual Work Plans, revisions to the project budget and allocation of resources, coordination of fiduciary aspects. WPMO will

<sup>21</sup> The Annual Work Plans are due on January 15 (draft) and February 15 (final) of each year during implementation, starting in 2017.

also provide guidance to the two PIUs on project implementation. The PIU for the Wuhan component will be the WTDSRI, which will have FM and procurement responsibilities for Components 3 and 4.2 of the project, and will also be in charge of project maintenance for a subcomponent after implementation. Three related agencies<sup>22</sup> will support the WTDSRI during implementation and will then assume operational responsibility for the remaining subcomponents. **Annex 3** details the implementation arrangements.

## **B. Results Framework and Evaluation**

31. The Results Framework provided in **Annex 1** will be the main tool for monitoring and evaluating overall project outcomes and intermediate outcomes/outputs. WPMO will coordinate the relevant agencies, including the APMO, in collecting the required M&E data and will report the results as part of the Project Reports during and after project implementation. Table 2 in **Annex 1** specifies detailed responsibilities and methods for collecting and calculating each indicator. WPMO has experience in previous Bank-financed projects, has sufficient capacity in M&E, and will transfer know-how to Anlu. During supervision, it will be important to pay special attention to PDO indicator 5, a qualitative composite indicator that measures the impact of innovative ITS activities for Wuhan.

## **C. Sustainability**

32. Each component has been designed to be as future-proof as possible, in the sense of not being superseded in the short or medium term by the fast pace of development typical in Chinese cities, but also to be a key element of a broader sustainable strategy. The project balances economic development, social equity and environmental quality by integrating transport investments and services with a focus on public transport, walking and cycling (NMT) and ITS.

33. **Sustainable urban mobility.** In Anlu, the package of road and NMT improvements, ITS and public transport (PT) investments aims to foster sustainable urban mobility for all road users (including pedestrians, the vulnerable and the poor) without the need to radically alter the city's streetscape through road widening and viaduct construction. In Wuhan, project proposals aim to improve sustainability by engendering a participatory approach that involves citizens and stakeholders in transport decision-making and planning processes.

34. **Fiscal and environmental sustainability.** The focus on PT and NMT in Anlu, together with the improved integration of transport information in Wuhan, are expected to result in more cost-effective services, reduce the fiscal burden on municipal finances, and reduce the environmental impact of air and noise pollution. The integration of transport provision in Anlu and transport information in Wuhan will contribute toward reducing congestion and pollution, and will enable a modal shift away from private cars. These benefits will be quantified in the Monitoring and Evaluation Framework.

## **V. KEY RISKS**

35. The Systematic Operations Risk-Rating Tool (SORT; see Data Sheet) assessed the project's overall implementation risk as substantial, based on the assessment of risks relating to (a) sector strategies and policies, (b) technical design of the project, (c) institutional capacity for

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<sup>22</sup> Wuhan Traffic Management Bureau (WTMB), Wuhan Transportation Commission (WTC), and Wuhan Parking Corporation (WPC).

implementation and sustainability, and (d) fiduciary aspects.

36. **Sector strategies and policies.** In Wuhan, the project’s success is associated with parallel transport sector initiatives, such as the improvement of public transport services. In Anlu, the challenge is to ensure coordination with other transport, land-use and housing policies and regulations. This risk is rated as substantial due to the possibility of unexpected changes in local strategies and their political backing from the leadership. The risk is mitigated by PMOs ensuring good communication and coordination with political leaders through PLGs on key project issues.

37. **Technical design of project.** Project design incorporates key lessons on Smart City initiatives worldwide and will build on Wuhan’s experience in implementing and operating ITS. During project implementation, the Bank (with assistance from expert consultants to support technical reviews and training) will work closely with WPMO, the design teams and related agencies on quality control, and to facilitate the adoption of best practices. The Bank will also organize study tours for key officials to learn first-hand about best practices in Smart Cities.

38. **Institutional capacity for implementation and sustainability.** Institutional capacity risks, rated as substantial, differ in each city. In Anlu, the risk lies in the lack of experience and limited resources of APMO and other government agencies. WPMO’s support to APMO on Bank procedures will be complemented by training and additional support from Bank staff. The Bank will also provide training on key technical aspects of project implementation, e.g., drafting of terms of reference (TORs), evaluation of proposals, and quality control of designs and civil works. In Wuhan, the risk is related to the achievement of the necessary degree of institutional-level collaboration for the proposed integrated ITS platform to succeed. This risk is mitigated by the choice of WTDSRI (which has technical capacity in transportation data analysis and research) as the PIU. In addition, WIAC (the PLG in Wuhan) is chaired by the city’s highest authorities.

39. **Fiduciary.** Designated staff in the implementing agencies lack experience in managing Bank-financed projects and policies. Additional risks identified include a potential lack of coordination due to the dual implementing-agency arrangement, and potential delays in procurement due to unacceptable contract award recommendations. Mitigation measures include: preparation of FM and procurement manuals; implementation of training plans for continuous strengthening of project financial staff capacities with respect to relevant policies and practices; and hiring of professionals with experience in Bank-financed projects.

## VI. APPRAISAL SUMMARY

### A. Economic and Fiscal Impact Analysis

40. **Economic analysis.** The economic internal rate of return (EIRR) of the Anlu part of the project is 14.16 percent; the net present value (NPV) at a 12 percent discount rate is US\$23.79 million. The EIRR of the Wuhan component is 18.15 percent; the NPV at a 12 percent discount rate is US\$64.58 million. Table 2 summarizes the results of the economic analysis. See **Annex 5** for further details on the economic analysis, including the justification for public provision and the value added of the Bank.

**Table 2. Summary Results of the Economic Analysis**

|  | Total | Anlu part of the project | Wuhan part of the project |
|--|-------|--------------------------|---------------------------|
|--|-------|--------------------------|---------------------------|

|                                  |          |          |          |
|----------------------------------|----------|----------|----------|
| Total Benefits (NPV, \$ million) | \$301.32 | \$137.96 | \$163.36 |
| Total Costs (NPV, \$ million)    | \$212.95 | \$114.17 | \$98.78  |
| NPV at 12% (\$ million)          | \$88.37  | \$23.79  | \$64.58  |
| EIRR (%)                         | 16.06%   | 14.16%   | 18.15%   |

41. **Fiscal impacts.** Both the Anlu and Wuhan Governments have substantial debt from international financial institutions (IFIs) and domestic banks as a result of financing rapid urban and rural development in the past few years. Anlu’s debt service to total fiscal revenue (including government transfers) in 2014 was 0.02, while the ratio of debt to GDP in 2014 was 0.17. In Wuhan, debt service to total fiscal revenue in 2014 was 0.33, while the ratio of debt to GDP in 2014 was 0.21.

42. Both Anlu and Wuhan plan to use fiscal revenue to meet project counterpart funding requirements. The requirement for debt service and counterpart funding during the construction is relatively small (1.98 percent of total disposable government revenue in Anlu and 0.04 percent in Wuhan) and would likely not place serious pressure on the governments’ fiscal expenditure. Moreover, Anlu and Wuhan have made a commitment that investments under the proposed project will be prioritized in their overall investment programs, and will include the yearly funding requirements in the respective fiscal budgets during the five-year construction period.

43. Funding requirements for O&M of project assets are also relatively low. When the first major maintenance works take place, O&M costs in Anlu (2030) and Wuhan (2024) would account for 5.1 percent and 0.1 percent, respectively, of available funds for transport investment and maintenance in those years. Total government expenditure for O&M of project assets and loan repayment would account for 0.1 percent in Anlu and 0.01 percent in Wuhan of total disposable revenue for those years. **Annex 6** provides further details of the fiscal analysis.

## B. Technical

44. **The project’s improvement of transport within the 1+8 Region is critical for the MR’s connectivity, integration and overall economic functioning.** The project promotes transport integration and contains a range of ICT and ITS investments that focus on using technology to enable travel, reduce congestion, and improve public transport and NMT. Reduced congestion benefits above all public transport and therefore benefits the poor in particular. The project will also help to achieve a more integrated and therefore balanced urban development pattern in WMR.

45. **Anlu.** The planned interventions seek to improve NMT facilities in downtown Anlu so as to strengthen the quality of the public transport and NMT experience<sup>23</sup> and to curb the growth of private motorized vehicle use as the city expands and its population increases. In addition to improving sidewalks, bicycle lanes and junction channelization, the project will also incorporate signs, markings, traffic signals, and safety measures in downtown Anlu to facilitate NMT. NMT improvements will also benefit from similar road safety risk assessments, as well as from the identification of, and design support for, appropriate countermeasures.

46. *Traffic Management* interventions—the first substantial deployment of traffic

<sup>23</sup> High-quality NMT facilities allow for ease of access from “origins” to public transport stations, and from public stations to “destinations” (last mile), thus bolstering the overall quality of public transport travel.

management equipment in Anlu—comprise the development of a Traffic Command Center (TCC), a traffic signal control system, CCTV monitoring equipment, e-police enforcement cameras, and bus-lane enforcement equipment. This effort will incorporate key lessons from the Bank’s experience in developing and implementing traffic management schemes in a wide variety of cities.

47. *Public Transport Interchanges (PTIs)* will improve or develop a total of six public transport interchanges and terminals serving local, peripheral and interurban routes. The strategic value of this intervention lies in the wide-ranging impact of improving the majority of the public transport facilities in the city over a short period of time, as opposed to the typical piecemeal approach that yields considerably more marginal impacts. The Bank will oversee the introduction of concepts and design features to improve operational efficiency, service quality, and overall accessibility (particularly through public transport and NMT).

48. **Wuhan.** Use of cloud computing (shared services) can help to make infrastructure more scalable for end users by enabling elastic capacity planning for individual participating agencies. Cloud computing will support and encourage the adoption of standardization and sharing of ICT services across WMG agencies responsible for transport and urban planning. The ability to use virtual servers, virtual storage and virtual networking should also result in much lower capital expenditure for establishing the overall cloud computing infrastructure.

49. WMG decided to use large-scale commercial cloud service for the integration of all transportation-related data from different agencies by establishing the city-level transport information cloud. Based on data security consideration and special needs of local agencies, this project will set up a transport information repository: a smaller-scale data center housed in WTDSRI. This repository will have raw and processed data feeds from the city-level transport information cloud, and will provide local data backup and data services for the two platforms hosted in the center. In other words, the city-level transport information cloud will be the hub for the storage, integration and sharing of all transport-related data in Wuhan, while the local transport information repository will complement the cloud and play two strategic roles: data backup, and hosting the decision service platform and basic data and research platform to support the government’s transportation policy making. WTDSRI is an institute specialized in transportation planning and transportation policy research and is considered ideal for managing the Transport Policy Support Center.

50. The city-level transport information cloud and the local Transport Policy Support Center (with integrated transport data from all sources) can provide high-quality data and analytical services to different agencies to help them improve management and planning and provide better transport services to residents. The intelligent comprehensive traffic management system to be developed for the Wuhan Traffic Management Bureau (WTMB) will improve operations, reduce congestion, and monitor road conditions, command and dispatch, and traffic signal control. The integrated transportation information system developed for the Wuhan Transportation Commission (WTC) will improve operations and management of in- and out-of-city traffic, with data integrated from urban railways, waterways, intercity roads, airlines, urban buses, subways and taxis, and will support the coordinated monitoring and management of all modes. The smart parking management information system for the Wuhan Parking Corporation (WPC) will integrate on-street, off-street, and public parking information in the city, and will provide real-time availability monitoring, hierarchy parking guidance, electronic payment, customized booking and searching services for residents. The project will emphasize capacity building—



both technical and institutional—for the sustainable operations of these systems.

### **C. Financial Management**

51. Hubei Provincial Finance Bureau (HPFB) will manage Bank loan proceeds, including oversight of the Designated Account (DA). The two PIUs—WTDSRI and ACDIC—will conduct project accounting and other FM work under WPMO’s guidance and monitoring. HPFB, with assistance from consultants, will closely monitor their implementation and review the consolidated project financial statements prepared by WPMO. FM assessments of these implementing agencies showed that both agencies lack prior experience in managing World Bank-financed projects. The action plan to strengthen the implementing agencies’ FM capacity includes preparation and distribution of an FM manual; provision of extensive training and peer learning; and hiring of professional consultants. The FM assessment concluded that with the implementation of the proposed actions, the project’s FM arrangements satisfy the Bank’s requirements under Operational Policy/Bank Policy (OP/BP) 10.00.

### **D. Procurement**

52. WPMO will be responsible for coordinating the implementation of procurement and contract management. The two PIUs—WTDSRI and ACDIC—will undertake the main procurement responsibilities under WPMO’s guidance and monitoring. The primary procurement risk is the two PIUs’ weak procurement capacity: both are new to Bank procurement policies and requirements. The other risk is that contract awards recommended by Bid Evaluation Committee (BEC) members (who are randomly selected from an expert database) may deviate from Bank procurement policies and requirements and thus delay procurement and project implementation. This was a lesson learned from the ongoing WSUTP.

53. To mitigate the above risks, the following measures have been taken or agreed: (a) preparation of a Procurement Management Manual for the project; (b) WTDSRI and ACDIC will hire jointly a qualified procurement agent with experience in procurement of ICT in Bank- or other IFI-financed projects; (c) a training plan to provide ongoing training to PMO and PIU staff on Bank procurement policies and requirements; (d) ongoing training for specialists on the expert database, and just-in-time training to BEC members prior to the deadline for submission of bids/proposals for strategic and large-value contracts; and (e) selection and hiring of a consultant (firm or individual) with experience in ITS equipment procurement to assist with technical specification preparation, bid evaluation, and contract management.

54. The PMOs and PIUs prepared a detailed and comprehensive Procurement Plan, acceptable to the Bank, for the first 18 months of project implementation, dated December 8, 2015. **Annex 3** provides further details on procurement.

### **E. Social (including Safeguards)**

55. Operational Policy (OP) 4.12 Involuntary Resettlement is triggered. In Wuhan, no land acquisition or resettlement relocation is anticipated. In Anlu, land acquisition and resettlement relocations will be incurred in two villages and one urban community, and will require 12.24 hectares (ha) of land, and house demolition of 17,877 square meters (m<sup>2</sup>) affecting 44 households (181 people). As a result, a Resettlement Action Plan (RAP) has been prepared for Anlu City (dated February 2015), and a Resettlement Policy Framework (RPF; dated December 2015) has been prepared for any unanticipated land acquisition and resettlement relocations that may arise in Wuhan and/or Anlu; both meet Bank requirements. While the project will finance in Wuhan

ITS investments only, the RPF was prepared in the unlikely event that a building will need renovation or to be built to house servers and other ITS equipment.

56. OP 4.11 Physical Cultural Resources is triggered. In Anlu, two rural family graves are to be relocated for road construction. This issue is addressed through the RAP. Chance-find procedures are incorporated in the Environmental Management Plan (EMP).

57. **Citizen engagement.** Intensive public consultations were conducted as part of the social and environmental assessment (in accordance with Bank OP 4.01 and OP 4.12) and during the project feasibility study. Public consultation and citizen engagement were emphasized during project preparation and will be continued during implementation. In Wuhan, a citywide public transport user survey was conducted to establish the baseline user satisfaction level on public transport service in the city. Consultations were also held with related agencies to understand the demand from stakeholders for integrating transport-related data. The results of these consultations were incorporated in the project design and documented in the feasibility study. In Anlu, two additional surveys with citizens were conducted: a public transport user survey on current public transport services; and a pedestrian satisfaction survey on current walking conditions in the downtown area. Both surveys recorded respondents' age and gender for further analysis. Survey results became the baseline for two PDO-level indicators for Anlu. The public transport user survey will be conducted again after project implementation, and the pedestrian satisfaction survey will be conducted again during and after project implementation.

58. A grievance redress mechanism (GRM) will be in place in Anlu to address issues related to the works in that city. Civil works contracts will include provisions to promptly address grievances raised. In Wuhan, the project will allow citizens to provide suggestions for improving the transport system, and will use the information generated by the ITS investments.<sup>24</sup> Two intermediate indicators (grievances registered and addressed related to construction and implementation of the project in Anlu, and suggestions by citizens for improving transport services based on data generated by the project in Wuhan) are associated with citizen engagement during implementation (see **Annex 1**).

59. **Gender.** Besides the citizen engagement activities mentioned above, a study, supported by a trust fund on the gender impacts of ITS in Wuhan, was conducted. A gender-impact analysis was also conducted during RAP preparation in Anlu. Concerns raised by stakeholders during this analysis included: (a) potential employment in the bus hub and in areas where the village community is converted to an urban citizen community; (b) availability of private career-development programs; (c) women's education programs; (d) provision of improved family living environment in relocated sites; (e) provision of educational and health-care facilities; (f) inclusion of community members in decision making on entitlements to resettlement schemes; and (g) enhancement of women's roles in their families' investments and the use of their compensation. These concerns have been incorporated in the RAP.

60. **Disclosure.** The Chinese versions of the RAP and RPF for Anlu were disclosed on the Anlu municipal website on February 15 and March 2, 2015, respectively. The Chinese version of

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<sup>24</sup> This bottom-up approach to citizen engagement is what transforms traditional ITS into Smart Mobility. For ITS it is "top-down," whereas Smart Mobility is "bottom up." See "Achieving energy savings by intelligent transportation systems investments in the context of Smart Cities," written in the context of the ESMAP-financed activity "Learning from Best International Practice in Smart Transport and Energy Efficiency: Applications to WITDP and Beyond (P152139)."

the RPF for Wuhan was disclosed on the Wuhan municipal website on February 16, 2015, and a final version dated December 2015 was disclosed on January 21, 2016. Wuhan updated the RPF to reflect changes to the project description. The World Bank's InfoShop disclosed the English version of the RAP and RPF for Anlu on March 3, 2015 and of the RPF for Wuhan on March 3, 2015 and on January 20, 2016.

#### **F. Environment (including Safeguards)**

61. Project activities in Wuhan do not involve civil works. Project components in Anlu will cause potential social disturbance and environmental impacts during construction, including: dust and noise; transportation of bulk materials; disposal of waste materials and solid waste generated from demolished buildings; wastewater management; traffic disturbance and public safety concerns; and disturbance to the daily life of nearby communities and businesses. There is also the potential for adverse impacts during the operational stage, including road safety, air quality, noise impacts from upgraded roads, and waste management from bus terminals.

62. There are no sensitive ecological–environmental sites (e.g., natural habitats, protected areas, parks) within the project's area of influence. The main sensitive environmental protection receptors are residential communities, hospitals, schools and kindergartens along the project streets and near bus terminals. The project's main environmental impacts are related to the construction stage; these are temporary in nature and will disappear upon project completion. These impacts can be readily avoided, minimized and mitigated with good construction management practices. Therefore, in accordance with OP 4.01, the project has been classified as Category B.

63. An environmental impact assessment (EIA), a stand-alone EMP, and an environmental assessment (EA) executive summary have been prepared for the project. The EIA addresses potential adverse environmental and social impacts, based on which a stand-alone EMP has been developed to identify the environmental management framework, mitigation measures, monitoring and reporting, and budget estimates. The EMP also includes a generic Environmental Code of Practices (ECOPs) for contractors and sub-contractors, which will be included in bidding documents and contracts.

64. **Consultation and disclosure.** During project preparation and design, public consultations were conducted in the project area, in accordance with national laws/regulations as well as World Bank policies. The public's main concerns include land acquisition and compensation, traffic and accessibility impacts during construction, noise (particularly during night-time construction) and dust, and traffic safety. These concerns have been addressed in the EIA. Necessary mitigation measures are included in the EMP and in the project design. The EIA and the EMP were disclosed locally on March 19, 2015 and in the World Bank's InfoShop on April 15, 2015.

#### **G. World Bank Grievance Redress**

65. Communities and individuals who believe that they are adversely affected by a World Bank- (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project-affected communities and individuals may submit their complaints to the WB's independent Inspection Panel, which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after

concerns are brought directly to the World Bank's attention, and Bank Management is given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate GRS, interested parties may visit <http://www.worldbank.org/GRS>. For information on how to submit complaints to the World Bank Inspection Panel, parties may visit <http://www.inspectionpanel.org>.

## Annex 1: Results Framework and Monitoring

**Country: China**

**Project Name: Wuhan Integrated Transport Development (P148294)**

### Results Framework

#### Project Development Objectives

PDO Statement

The PDO is to improve transport mobility in Wuhan and Anlu Municipalities.

**These results are at** | Project Level

#### Project Development Objective Indicators

| Indicator Name   | Baseline | Cumulative Target Values |       |       |       |       |            |
|--|----------|--------------------------|-------|-------|-------|-------|------------|
|  |          | YR1                      | YR2   | YR3   | YR4   | YR5   | End Target |
| 1. Percentage of users satisfied with public transport service at the terminals of targeted corridors in Anlu (Percentage)   | 33.25    | 33.25                    | 33.25 | 33.25 | 33.25 | 60.00 | 60.00      |
| 1.1 Percentage of female users satisfied with public transport service at the terminals of targeted corridors in Anlu (sub-indicator by gender) (Percentage–Sub-Type: Breakdown)     | 32.64    | 32.64                    | 32.64 | 32.64 | 32.64 | 60.00 | 60.00      |
| 1.2 Percentage of low-income users satisfied with public transport service at the terminals of targeted corridors in Anlu (sub-indicator by income) (Percentage–Sub-Type: Breakdown) | 32.64    | 36.36                    | 36.36 | 36.36 | 36.36 | 63.00 | 63.00      |
| 2. Percentage of pedestrians satisfied with walking environment in Anlu downtown area (Percentage)   | 9.57     | 9.57                     | 9.57  | 9.57  | 9.57  | 60.00 | 60.00      |

|  |                |                |                |                |                 |                 |                 |
|--|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
| 2.1 Percentage of female pedestrians satisfied with walking environment in Anlu downtown area (sub-indicator by gender) (Percentage–Sub-Type: Breakdown)     | 31.65          | 31.65          | 31.65          | 31.65          | 31.65           | 63.00           | 63.00           |
| 2.2 Percentage of low-income pedestrians satisfied with walking environment in Anlu downtown area (sub-indicator by income) (Percentage–Sub-Type: Breakdown) | 13.93          | 13.93          | 13.93          | 13.93          | 13.93           | 62.00           | 62.00           |
| 3. Average vehicle trip speed during peak hours on major arterial roads within third ring road in Wuhan (Number)   | 24.50          | 24.50          | 24.50          | 25.00          | 26.00           | 27.00           | 27.00           |
| 4. Bus ridership in Anlu (Number)  | 14000.00       | 14000.00       | 16100.00       | 18515.00       | 21292.00        | 27397.00        | 27397.00        |
| 5. Level of utilization of transport information to improve mobility in Wuhan (Text)   | Relatively low | Relatively low | Relatively low | Average        | Average         | Relatively high | Relatively high |
| 5.1 Level of automation in transport information collection  | Low            | Low            | Relatively low | Relatively low | Average         | Relatively high | Relatively high |
| 5.2 Level of transport data sharing and data openness  | Low            | Low            | Relatively low | Average        | Average         | Relatively high | Relatively high |
| 5.3 Level of public utilization of transport information services  | Relatively low | Relatively low | Relatively low | Average        | Relatively high | High            | High            |
| 5.4 Utilization of transport decision support platform in transport policy decision-making   | Average        | Average        | Average        | Average        | Relatively high | High            | High            |

### Intermediate Results Indicators

| Indicator Name   | Baseline | Cumulative Target Values |       |       |       |       |            |
|--|----------|--------------------------|-------|-------|-------|-------|------------|
|  |          | YR1                      | YR2   | YR3   | YR4   | YR5   | End Target |
| 1. Length of road constructed or rehabilitated in Anlu (Kilometers)    | 0.00     | 0.00                     | 7.80  | 14.96 | 20.59 | 22.69 | 22.69      |
| 2. Length of roads with NMT facility improvements in Anlu (Kilometers) | 0.00     | 0.00                     | 15.60 | 60.92 | 72.18 | 76.38 | 76.38      |

|  |      |        |        |        |        |        |        |
|--|------|--------|--------|--------|--------|--------|--------|
| 3. Relative road safety risk, disaggregated by road user types in targeted corridors in Anlu<br>(Number)   | 0.00 | 2.00   | 2.00   | 2.00   | 2.00   | 4.00   | 4.00   |
| 4. Number of energy-efficient buses purchased in Anlu<br>(Number)  | 0.00 | 0.00   | 100.00 | 150.00 | 210.00 | 210.00 | 210.00 |
| 5. Integrated terminals (bus–bus, bus–rail, urban–rural bus) built or improved in Anlu<br>(Number)   | 0.00 | 0.00   | 0.00   | 3.00   | 4.00   | 6.00   | 6.00   |
| 6. Transport Policy Support Center established in Wuhan<br>(Yes/No)  | No   | No     | No     | Yes    | Yes    | Yes    | Yes    |
| 7. Percentage of equipment and systems on expressways and arterial roads within third ring road installed and operational in Wuhan<br>(Percentage) | 0.00 | 0.00   | 50.00  | 100.00 | 100.00 | 100.00 | 100.00 |
| 8. Number of application management systems established in Wuhan<br>(Number)   | 0.00 | 0.00   | 1.00   | 3.00   | 3.00   | 3.00   | 3.00   |
| 9. Person-days of staff trained in Anlu and Wuhan<br>(Number)  | 0.00 | 120.00 | 260.00 | 640.00 | 760.00 | 906.00 | 906.00 |
| 9.1 Person-days of staff trained in Anlu<br>(Number–Subtype: Breakdown)  | 0.00 | 66.00  | 123.00 | 196.00 | 196.00 | 196.00 | 196.00 |
| 9.2 Person-days of staff trained in Wuhan<br>(Number–Subtype: Breakdown)   | 0.00 | 100.00 | 200.00 | 500.00 | 600.00 | 710.00 | 710.00 |
| 10. Strategic studies completed in Anlu and Wuhan<br>(Number)  | 0.00 | 0.00   | 1.00   | 2.00   | 3.00   | 5.00   | 5.00   |
| 10.1 Strategic studies completed in Anlu<br>(Number–Subtype: Breakdown)  | 0.00 | 0.00   | 0.00   | 1.00   | 2.00   | 3.00   | 3.00   |
| 10.2 Strategic studies completed in Wuhan<br>(Number–Subtype: Breakdown)   | 0.00 | 0.00   | 1.00   | 1.00   | 1.00   | 2.00   | 2.00   |

|  |    |     |     |     |     |     |     |
|--|----|-----|-----|-----|-----|-----|-----|
| 11. Grievances registered and addressed related to construction and implementation of the project in Anlu<br>(Yes/No)    | No | No  | Yes | Yes | Yes | Yes | Yes |
| 12. Suggestions by citizens for improving transport services based on data generated by the project in Wuhan<br>(Yes/No) | No | Yes | Yes | Yes | Yes | Yes | Yes |



## Indicator Description

### Project Development Objective Indicators

| Indicator Name   | Description (indicator definition etc.)  | Frequency  | Data Source/Methodology  | Responsibility for Data Collection |
|--|--|--|--|------------------------------------|
| 1. Percentage of users satisfied with public transport service at terminals of targeted corridors in Anlu. | Two sub-indicators, broken down by gender and income. Indicator measures the improvement of public transport services: as services improve, more public transport users will express satisfaction. | Baseline and three months after construction of terminals in Anlu. | Public transport user surveys to be commissioned by transport agencies. Sample size: 100–150 per terminal. Survey must ask the respondents' gender and income. User satisfaction could be measured using a 5-point Likert scale (1: unsatisfied; 2: moderately unsatisfied; 3: neutral; 4: moderately satisfied; 5: satisfied) in the questionnaire, asking whether the user is satisfied with the public transport service within the three recent months. Those who answer 4 or 5 would be counted as "satisfied." Survey instruments should be consistent for baseline and project years. For those terminals with no existing bus services, baseline will be defined as the average of all city terminals with existing bus services. For example, if the terminal has no existing bus service and terminals $y_1, y_2, \dots, y_n$ have bus service, the baseline for $x$ will be defined as $\sum y_i \text{ baseline}/n$ . Focus groups can be used to obtain a better understanding of user satisfaction. SMS or web-based (app) surveys could be used as complementary measuring tools. | Anlu PMO                           |
| 1.1 Percentage of female   | Sub-indicator measures the   | Baseline and three   | This sub-indicator will be built from the  | Anlu PMO                           |

|  |  |   |   |          |
|--|--|---|---|----------|
| users satisfied with public transport service at terminals of targeted corridors in Anlu (sub-indicator by gender).                              | percentage of female users satisfied with public transport services in Anlu.   | months after construction of terminals in Anlu.   | public transport user survey described above. It will report female respondents' answers.   |          |
| 1.2 Percentage of low-income users satisfied with public transport service at terminals of targeted corridors in Anlu (sub-indicator by income). | Sub-indicator measures the percentage of low-income users satisfied with public transport services in Anlu.  | Baseline and three months after construction of the terminals in Anlu.  | This sub-indicator will be built from the public transport user survey described above. It will report low-income respondents' answers. Based on baseline survey results in 2015, household incomes below RMB 3,000/month are considered as low income.   | Anlu PMO |
| 2. Percentage of pedestrians satisfied with walking environment in Anlu downtown area.   | Additional breakdown sub-indicator by gender and income. Indicator measures the improvement of the walking environment: as walking environment improves, more pedestrians will express satisfaction. | Three times (baseline, during project implementation and three months after the NMT improvement is complete). | Pedestrian satisfaction survey to be conducted three times. Sample size: 200–300. Surveys to be conducted on randomly selected pedestrians in all major zones within the downtown area in Anlu during both work and non-work hours. Survey must ask the respondents' gender and income. Pedestrian satisfaction could be measured using a 5-point Likert scale (1: unsatisfied; 2: moderately unsatisfied; 3: neutral; 4: moderately satisfied; 5: satisfied) in the questionnaire, asking whether the pedestrian is satisfied with the overall walking environment nearby. Those who answer 4 or 5 will be counted as "satisfied." Survey instruments should be consistent for baseline and project years. Focus groups can be used to obtain a better understanding of user satisfaction. | Anlu PMO |

|  |   |   |   |           |
|--|---|---|---|-----------|
|  |   |   | SMS or indeed web-based (app) surveys could be used as complementary measuring tools.   |           |
| 2.1 Percentage of female pedestrians satisfied with walking environment in Anlu downtown area (sub-indicator by gender).     | Sub-indicator measures the percentage of female pedestrians satisfied with the walking environment in the Anlu downtown area.   | Three times (baseline, during project implementation and three months after sidewalks are built). | This sub-indicator will be built from the pedestrian satisfaction survey described above. It will report female respondents' answers.   | Anlu PMO  |
| 2.2 Percentage of low-income pedestrians satisfied with walking environment in Anlu downtown area (sub-indicator by income). | Sub-indicator measures the percentage of low-income pedestrians satisfied with the walking environment in the Anlu downtown area.   | Three times (baseline, during project implementation and three months after sidewalks are built). | This sub-indicator will be built from the pedestrian satisfaction survey described above. It will report low-income respondents' answers. Based on the baseline survey results in 2015, household income below RMB 3,000/month is considered as low income. | Anlu PMO  |
| 3. Average vehicle trip speed during peak hours on major arterial roads within third ring road in Wuhan.                     | Average trip speed of vehicles during morning and afternoon peak hours on major arterial roads within the third ring road in Wuhan. Indicator measures the improvements of road transport services on major arterials roads using average speed increase during peak hours, i.e., congestion reduction. Unit: km/h. | Baseline and three months after project completion.   | Use GPS data collected by taxis to calculate the average vehicle trip speed during morning and afternoon peak hours.  | Wuhan PMO |
| 4. Bus ridership in Anlu.  | Average daily bus ridership for all routes in Anlu. Indicator measures the improvements of public transport services in Anlu  | Annual  | Total number of bus trips made on all bus routes during a period (bus company reports) divided by the number of days of that period.  | Anlu PMO  |

|   |  |        |   |           |
|---|--|--------|---|-----------|
|   | by the increase in bus ridership.  |        |   |           |
| 5. Level of utilization of transport information to improve mobility in Wuhan | This composite indicator measures at what level transport information is utilized to improve mobility in Wuhan.  | Annual | The composite indicator is calculated by averaging to a 5-point likert scale "low (1), relatively low (2), average (3), relatively high (4), or high (5)" based on the levels of the following 4 sub-indicators with equal weights, i.e. Xi is the point for each of the sub-indicators, the composite indicator is the level corresponding to $\sum Xi/4$ rounded to the nearest whole number. The baseline is: relatively low.  | Wuhan PMO |
| 5.1 Level of automation in transport information collection                   | This sub-indicator measures the level of automation in collecting transport information, including traffic flows, speed, violations, parking, gateway control, and travel surveys. | Annual | Based on the information provided by related agencies including the WTMB, WTC, WPC, and the WTDSRI, add one point when each of the following conditions is met: (1) traffic flow data is automatically and regularly collected, stored, and presented in an accessible/usable format for more than 70% of the arterial and expressway road sections within the 3rd ring road; (2) travel speed data is automatically and regularly collected, stored, and presented in an accessible/usable format for more than 60% of the arterial road sections within the 3rd ring road; (3) traffic flow data at all major gateways in the city is automatically and regularly collected, stored, and presented in an accessible/usable format; (4) parking information is automatically and regularly collected, stored, and presented in an accessible/usable format for more than 30% of parking spaces available | Wuhan PMO |

|   |   |        |  |           |
|---|---|--------|--|-----------|
|   |   |        | for public use; (5) more than 70% of travel surveys required for urban transportation planning (based on MOHURD, 2014, Urban Comprehensive Transportation System Planning Travel Survey Guideline) are done automatically (calculated by man-hours required). If total points is 5, high; 4, relatively high; 2-3, average; 1, relatively low; 0, low. The baseline is: low.   |           |
| 5.2 Level of transport data sharing and data openness             | This sub-indicator measures the level of data sharing and data openness therefore the easiness of accessing and utilizing the data collected. | Annual | Based on the information provided by related agencies including the WTMB, WTC, WPC, and the WTDSRI, add one point when each of the following conditions is met: (1) a transport data standard or guideline for data formatting is established; (2) more than 80% (calculated by data index) of all transport data fed to the city-wide transportation information cloud by the public agencies are transferred to transport information repository and made accessible to relevant agencies; (3) some transport dataset is made public and updated regularly; (4) some real-time transport raw data is provided to public through APIs; (5) an open data portal is established for public access to transport data. If total points is 5, high; 3-4, relatively high; 2, average; 1, relatively low; 0, low. The baseline is: low. | Wuhan PMO |
| 5.3 Level of public utilization of transport information services | This sub-indicator measures how much the public is using the transport information services enabled by this project.                          | Annual | Calculated from daily access volumes logged by the transport information repository. If > 1 million, high; 100,000- 1 million, relatively high; 2, 10,000-100,000  | Wuhan PMO |

|  |   |        |  |           |
|--|---|--------|--|-----------|
|  |   |        | average; 1,000-10,000, relatively low; <1000, low. The baseline is: relatively low.  |           |
| 5.4 Utilization of transport decision support platform in transport policy decision-making | This sub-indicator measures how much the transport policy support center (including the transport information repository and the transport decision service platform) is utilized to help Wuhan make decisions on relevant transport policies and projects. | Annual | Calculate the percentage of transport projects/policies in the 13th Five Year Plan important project list (compiled by WTDSRI based on annual urban construction plan and 13th Five Year Plan key project pool) that utilize the transport decision support platform. If >80%, high; 60-80%, moderately high; 40-60%, average; 20-40%, moderately low; <20%, low. The baseline is: average, estimated by urban construction plan for 2015. | Wuhan PMO |

### Intermediate Results Indicators

| Indicator Name  | Description (indicator definition etc.).   | Frequency  | Data Source/Methodology   | Responsibility for Data Collection  |
|---|--|--|---|---|
| 1. Length of road constructed or rehabilitated in Anlu.                                       | Road rehabilitation and construction of new road sections in Anlu.   | Semi-annual  | This indicator will be measured from progress reports produced by the contractor and verified by the supervisor.  | Anlu PMO  |
| 2. Length of roads with NMT facility improvements in Anlu.                                    | NMT improvements on existing roads in the downtown area within the confines of Handan Railway, Jiefang Avenue and Fuhe Avenue.   | Annual   | This indicator will be measured from progress reports produced by the contractor and verified by the supervisor.  | Anlu PMO  |
| 3. Relative road safety risk, disaggregated by road user types on targeted corridors in Anlu. | Relative road safety risk will be measured using the ChinaRAP methodology, which is based on the International Road Assessment Program's approach to estimate apparent risk to road users. Road user categories are: | Baseline and three months after the completion of rehabilitation works and the introduction of road safety | ChinaRAP survey (star ratings): Surveys of project corridors in Anlu will be conducted using a specialized vehicle outfitted with equipment to record various aspects of the road for the indicated user types. A condition report on the existing road, along with recommended countermeasures, an | RIOH (Research Institute of Highways), under the Chinese Ministry of Transport, China RAP team. |

|   |  |   |  |           |
|---|--|---|--|-----------|
|   | cars, cyclists, motorcyclists, and pedestrians.  | infrastructure provisions.<br>Possible third survey prior to project closure. | estimate of deaths and serious injuries prevented, as well as an economic assessment, will be the basis of a “Safer Roads Investment Plan.” Using this plan and support from the ChinaRAP team, road safety provisions will be introduced at the design stage. Project roads will be re-surveyed at least once after the completion of civil works.<br><br>Using the ChinaRAP methodology, between one and five stars (one being the least safe and five being the safest) will be awarded to road segments for each modal choice, depending on road actual conditions. Surveys will be coded to compare conditions with various road infrastructure attributes that are known to have an impact on the likelihood of a crash and its severity, thus forming the basis of a “star rating.” |           |
| 4. Number of energy-efficient buses purchased in Anlu.                                  | Number of energy-saving buses purchased for the PT system that meet the technical standards required by the detailed design.                       | Annual  | This indicator will be measured from progress reports produced by the contractor.  | Anlu PMO  |
| 5. Integrated terminals (bus–bus, bus–rail, urban–rural bus) built or improved in Anlu. | No description provided.   | Annual  | This indicator will be measured from progress reports produced by the contractor and verified by the supervisor.   | Anlu PMO  |
| 6. Transport Policy Support Center established in Wuhan.                                | A Transport Policy Support Center established in Wuhan. It includes a city-level transport information repository and a transport decision service | Annual  | This indicator will be measured from progress reports produced by the contractor.  | Wuhan PMO |

|   |   |        |   |                        |
|---|---|--------|---|------------------------|
|   | platform.   |        |   |                        |
| 7. Percentage of equipment and systems on expressways and arterial roads within third ring road installed and operational in Wuhan. | The percentage of ITS-related equipment and systems installed and operational on expressways within the third ring road and on arterial roads within the third ring road in Wuhan.  | Annual | This indicator will be measured from progress reports produced by the contractor. | Wuhan PMO              |
| 8. Number of application management systems established in Wuhan.   | Application management systems established: traffic monitoring and management system; external traffic monitoring and management system; and smart parking management information system.   | Annual | This indicator will be measured from progress reports produced by the contractor. | Wuhan PMO              |
| 9. Person-days of staff trained in Anlu and Wuhan.  | Number of person-days of training programs or study tours (national and international) delivered for PMO and other relevant government agencies in project management, public transport operation, urban transport planning, ITS, and smart mobility. Unit: Person-day (unit mentioned explicitly because Bank format does not contemplate it in the system). | Annual | Training days and number of participants to be recorded by PMOs.                  | Anlu PMO and Wuhan PMO |
| 9.1 Person-days of staff trained in Anlu.   | Number of person-days of training programs or study tours (national and international) delivered for Anlu PMO, traffic police and other relevant government agencies in project   | Annual | Training days and number of participants to be recorded by Anlu PMO.              | Anlu PMO               |



|  |   |        |   |                        |
|--|---|--------|---|------------------------|
|  | management, public transport operation, urban transport planning, ITS, and smart mobility. Unit: Person-day (unit mentioned explicitly because Bank format does not contemplate it in the system).  |        |   |                        |
| 9.2 Person-days of staff trained in Wuhan.         | Number of person-days of training programs or study tours (national and international) delivered for Wuhan PMO and other relevant government agencies in project management, public transport operation, urban transport planning, ITS, and smart mobility. Unit: Person-day (unit mentioned explicitly because Bank format does not contemplate it in the system). | Annual | Training days and number of participants to be recorded by Wuhan PMO. | Wuhan PMO              |
| 10. Strategic studies completed in Anlu and Wuhan. | Number of strategic studies completed in Anlu and Wuhan.  | Annual | To be reported by Anlu PMO and Wuhan PMO.                             | Anlu PMO and Wuhan PMO |
| 10.1 Strategic studies completed in Anlu.          | Number of strategic studies on urban transport strategy and planning, road safety, parking, and non-motorized transport completed in Anlu.  | Annual | To be reported by Anlu PMO.   | Anlu PMO               |
| 10.2 Strategic studies completed in Wuhan.         | Number of strategic studies on big data/analytics and applications, data standards and data sharing, ITS and smart mobility completed in Wuhan.   | Annual | To be reported by Wuhan PMO   | Wuhan PMO              |

|   |   |        |   |           |
|---|---|--------|---|-----------|
| 11. Grievances registered and addressed, relating to construction and implementation of the project in Anlu.  | This indicator is part of “Citizen Engagement.” | Annual | Contractor and supervisor will record grievances. Information on works will also include a telephone number to call in case of a grievance. The Anlu PMO will resolve the grievance by working with the contractor and supervisor.  | Anlu PMO  |
| 12. Suggestions by citizens for improving transport services based on data generated by the project in Wuhan. | This indicator is part of “Citizen Engagement.” | Annual | <p>Indicator is of the “yes/no” type, but includes a qualitative report on whether the suggestions led to any change in transport service delivery.</p> <p>A citizen engagement platform, paired with an open data-sharing initiative and events that gather citizens with local authorities could allow citizens to suggest/create/innovate around service delivery.</p> | Wuhan PMO |

## **Annex 2: Detailed Project Description**

**Country: China**

### **Wuhan Integrated Transport Development Project**

1. The project is designed to strengthen integrated urban transport solutions in Wuhan and Anlu, with the aim of delivering more efficient and safer services while enhancing a sustainable approach for the development of the Wuhan Metropolitan Region (WMR) as a whole. In Wuhan, the project comprises a comprehensive information and communications technology (ICT) platform to improve the planning, operation and management of the city's transport system. Integration is addressed at a strategic level to strengthen the foundations for efficient and seamless trips. In Anlu, the focus is more local and built around the development of integrated public transport corridors, integrated public transport and non-motorized transport (NMT) networks, road safety measures, and road infrastructure improvements that support the refuncting of key roads (i.e., changing the cross-section of the road[s] in question through civil works, traffic signals and traffic facilities [signs, lines and barriers] to make them safer and more appropriate for their urban context). WMR's integrated development is enhanced by the improvement of railway and bus stations that connect Anlu with Wuhan, and by the development of analytical tools to better understand and predict travel patterns between the two cities.

2. This project comprises transport integration measures at strategic and local levels, and contains a range of ICT investments and physical on-street measures. It supports the principle of a "two-oriented society": a resource-saving and environmentally friendly society embedded in Chinese city and regional planning since 2005. In transport, this means a focus on using technology to reduce carbon emissions and enable more seamless trips; improving public transport and NMT; and enabling more equal access to transport for all sectors of society, especially the poor.

3. China's State Council has designated the greater Wuhan metropolitan area as a pilot area for coordinated regional development as a "two-oriented society." The regional development plan envisages a "1+8" cluster of cities, with Wuhan in the center and eight peripheral cities interspersed with green belts acting as growth buffers and areas of environmental protection.

4. Wuhan, with a population of 10.3 million, is in the midst of an unprecedented construction boom designed to upgrade transport infrastructure through the implementation of a metro system and bus priority measures, together with elevated roads. However, there is a need to complement these investments with measures to: improve regional links to dormitory cities as the urban area spreads; increase the attractiveness of public transport to engender a slowdown in the shift to private vehicles; and enable smoother, safer and more convenient access and mobility for passengers through the use of technology and on-street measures.

5. Anlu (population 642,500, with 172,200 in the urban area) is one of the eight peripheral cities and has the potential to channel economic and population growth. Anlu will have two high-speed rail stations that will integrate it with WMR and beyond. Furthermore, as a small city, it facilitates NMT and two-wheeled transport modes comprising walking, cycling, e-bikes and motorcycles. However, there is a need to ensure that these sustainable modes are not eroded further by rapid motorization. Measures will be necessary to preserve this NMT advantage in the future, to further increase public transport modal share, and to reduce dependence on private

vehicles. Improvement of public transport and NMT facilities is an important step in that direction, but complementary policies aimed at improving transport and land-use planning will also be crucial.

6. The project is designed not only to enhance the integration of Wuhan and Anlu by enabling a strong link between the provincial capital and this county-level city to the northwest, but also to showcase innovative integration solutions within each city as a model for replication in similar situations.

7. In Wuhan, the project comprises a comprehensive ICT platform to improve the planning, operation and management of the city's transport system and make it safer and more reliable, convenient and accessible. Integration is addressed at a strategic level to strengthen the foundation for efficient and seamless trips and to enhance the strategic link to Anlu.

8. ICT, an important enabling tool for the project, focuses on enhancing the value of ITS, particularly the effective capture, analysis and utilization of data. This range of technological interventions offers the potential for significant society-wide benefits, including improved mobility for people and freight; greater access to transportation for the poor, the elderly, the disabled, and people living in remote locations; reduced traffic congestion; greater compatibility of surface transportation with the environment; fewer traffic-related deaths and injuries; and a better-managed transportation system. ITS also offer a wide range of immediate and tangible benefits to the people who operate and use the transport system by adding reliability, stability, visibility, information and control.

### **Lessons Learned and Reflected in the Project Design**

9. **Responding to an evolving context.** The Bank's urban transport work in China has aimed to respond to the evolving needs of its clients: first with an emphasis on outfitting cities with necessary road infrastructure; then to deploying strategic public transport, NMT, and traffic management infrastructure; and now to promoting integrated mass transit and land-use development, comprehensive ITS solutions, and broad transport demand management (TDM) strategies. This project reflects the Bank's lessons learned from aiding cities in this natural progression. For a growing city such as Anlu, the aim is to lay down strong foundations that support the establishment of sustainable urban transport practices. For a metropolis such as Wuhan, which already has wide-ranging multimodal transport infrastructure, the goal is to catalyze new levels of urban efficiency through an innovative ITS platform.

10. **Integrated interventions.** Some of the Bank's early urban transport interventions in China, aimed at improving public transport, NMT, road safety, and traffic management, brought about limited benefits due to the scattered manner in which they were implemented. The lesson learned is that to prevent "benefit dilution," interventions should be integrated in a corridor or specific area of the city so as to capitalize on potential synergies and maximize impact. This lesson is explicitly reflected in the proposed integrated corridor management (ICM) interventions in Anlu. Similarly, the proposed ITS investments in Wuhan are justified by prior and ongoing investments in mass transit, traffic management, and road safety. The project aims to ensure that these different interventions work in unison to deliver tangible sector-wide benefits.

11. **Embedding flexibility in ITS.** ITS has been a central element of the Bank's urban transport work in China, starting with some of the first-generation projects, e.g., Shanghai, Guangzhou, Wuhan I, and Xi'an. The recurring challenge is to take into account the fast changes

in ITS technologies—new, better, cheaper software and hardware come out constantly—as well as the rapid expansion and increasing traffic of Chinese cities. The Bank’s experience suggests that a key to successful, sustainable ITS deployments is to embed flexibility wherever possible: avoiding “locking in” the system to a specific vendor or technology, providing modularity to system structures so as to facilitate expansion and required changes, and ensuring capacity and memory throughout the design, implementation and operation stages. ITS require continuous improvement and upgrades, as well as strong leadership to facilitate system integration and data sharing where needed. Emphasis on system “outputs” is also critical to demonstrate value. The project has considered different dimensions of ITS deployments, not only in China but also elsewhere in the region (Korea, Japan and Singapore), resulting in changes to public transport design, road safety, road networks, people and traffic-flow management, and pricing structures. The project has also considered and incorporated global trends in “open data” and the potential for engaging users in transport system monitoring and improvements. In Wuhan, there has been a concerted effort to focus design not only on hardware and software but also around big data capture and analytics.

12. **Ensuring counterpart funds.** Insufficient counterpart funds have been an issue for WSUTP due to the New Budget Law of 2014. The law stopped further municipal financing through instruments guaranteed by local governments, previously a common practice, and instead instituted market discipline. Fiscal analysis of Wuhan and Anlu resulted in adjustments to project scope aimed at ensuring the adequacy of fiscal revenue to support project implementation.

13. **Exposure to international examples of evolving Smart Cities.**<sup>25</sup> Two study tours, funded by the Energy Sector Management Assistance Program (ESMAP), to European and Asian cities exposed Bank staff and counterparts officials from Wuhan and Anlu to a range of best practices in Smart City approaches. Several key lessons learned were that: Smart Cities thrive with public participation and engagement, and classic “top-down” approaches need to be strengthened with “bottom-up” perspectives; governments need to have at least minimal technical and institutional capacity to be able to procure and manage performance-based contracts; open data are beneficial with consideration of privacy and security, and standardization and system interoperability are essential. Project design reflects these lessons. For example, the Project Implementation Unit (PIU) in Wuhan is the Wuhan Transport Development and Strategy Research Institute (WTDSRI), which has the most technical capacity in transportation data analysis and research. All other sub-components will also be implemented by agencies with the most technical capacity in their respective areas. Capacity-building activities designed under the project will focus on system implementation and operation. The Wuhan ITS part of the project promotes data integration and data format standardization, and also proposes a schedule to open data gradually with technical, privacy and security considerations.

14. **Capacity building.** The lesson learned about capacity building is that this crucial element of the Bank’s “added value” is needed to improve project design and implementation. Such activities need to be carried out throughout the project cycle. Capacity building has already

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<sup>25</sup> ESMAP (Energy Sector Management Assistance Program) is financing the activity “Learning from Best International Practice in Smart Transport and Energy Efficiency: Applications to WITDP and Beyond (P152139).”

been in progress and its results can be seen in the project scope, which is now much improved from the original concept. Considerable capacity-building has been included in the project's TA component, including plans to learn from ITS analytics. Training will be provided to increase the technical capacity of the PIUs in using, managing and maintaining the system.

### **Project Component Description**

15. The project components are described below.

16. **Component 1. Integrated Corridor and Road Safety Improvements in Anlu:**

- 1) Road network refunctioning through the carrying out of improvements to selected road infrastructure and construction of new road sections.
- 2) Carrying out improvements to non-motorized transport facilities, including junction channelization, pedestrian facilities, signs, markings and barriers, on selected existing roads in Anlu's downtown area.
- 3) Implementation of traffic management and road safety measures including, *inter alia*, the procurement and implementation of systems and related equipment such as a traffic command center, a traffic-signal control system, traffic monitoring and traffic enforcement cameras, bus-lane enforcement mechanisms, construction of a road safety center and implementation of road user education measures.

17. This component has been prompted by the decision to relocate National Route 316 from Taibai Avenue within the city's confines to a new route further east, thus bypassing the city. As a result, there is scope to refunction several existing roads so as to better cater to local traffic, with a focus on NMT in the old city areas and public transport (PT) on the main corridors. Not only will several roads, including Taibai Avenue, be re-engineered and cross-sections changed, but the proposals will also include enforcement and education measures. Key themes are improving safety and convenience for NMT (pedestrians and cyclists, including e-bikes), and capitalizing on ITS to reduce the need for costly and environmentally invasive road construction. Because the World Bank-supported project will complement Anlu's own investments, some project elements may evolve and some locations may change during project implementation. However, key elements, including improvements to Taibai Avenue, downtown NMT improvements, and ITS, remain the heart of the project, and any evolving new measures and/or locations must meet the project's guiding principles and development objectives. This road network refunctioning sub-component includes 20.59 km of road infrastructure improvements and 2.1 km of new road sections, i.e., a total of 22.69 km of integrated corridors.

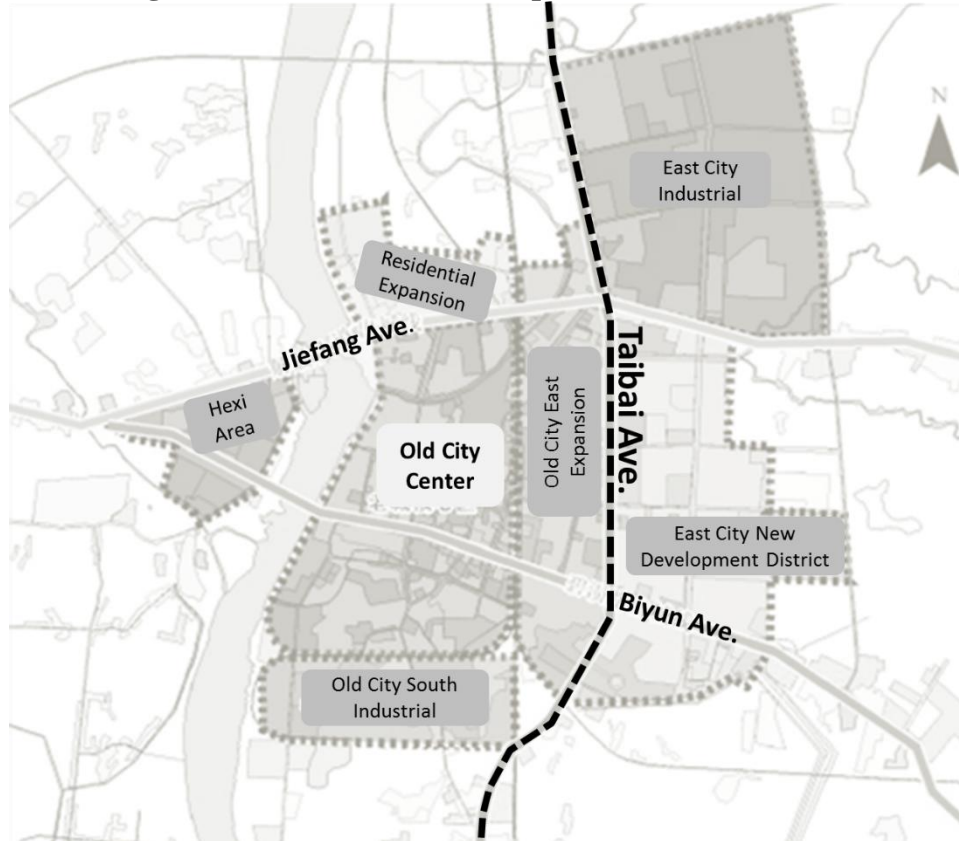
18. The sub-component on improvements to NMT facilities includes junction channelization, pedestrian facilities, signs, markings and barriers on existing roads in the downtown area within Handan Railway, Jiefang Avenue and Fuhe Avenue.

19. This component also involves the use of e-police enforcement cameras and closed-circuit television (CCTV) traffic monitoring cameras. Traffic cameras are essential for good traffic policing, enforcement, safety and incident response, and are standard practice worldwide. E-police cameras capture a vehicle's license plate number, process it either through an optical character recognition (OCR) application or manually, and send a penalty notice to the registered owner. CCTV cameras monitor traffic incidents and accidents so that the traffic police can respond. These systems depend on comprehensive and reliable driver and vehicle databases. In China, e-police enforcement cameras and CCTV monitoring cameras are used by the traffic

police under the Public Security Bureau. Their primary function is for traffic purposes, i.e., to enforce red-light violations, and increasingly for speeding violations.

20. Figure A2.1 illustrates the current urban spatial structure of Anlu, showing the old city area (where NMT facilities will be developed) and new development areas. Taibai Avenue is the north-south corridor marked by the dotted line.

**Figure A2.1. Current Urban Spatial Structure of Anlu**



21. The project places strong emphasis on road safety. ChinaRAP (based on the International Road Assessment Program [iRAP] methodology)<sup>26</sup> will be conducted before and after the implementation of road rehabilitation and reconstruction works in Anlu. For new roads in Anlu, a road safety audit will be conducted on preliminary and detailed designs. A ChinaRAP team (from the Highway Research Institute in the Ministry of Transport) will be deployed prior to the commencement of preliminary designs to survey the 20.59 km of existing roads included in the Anlu subproject. In addition to the surveys, which will rate the roads on a scale of one to five stars (one being the most unsafe and five being the safest) for different road-user types, the ChinaRAP team will also produce a “Safer Roads Investment Plan,” which will introduce road safety countermeasures. Based on the countermeasures proposed to increase the star rating (or

<sup>26</sup> The ChinaRAP surveys are an instrument to assess the safety of roads and thereby the relative risk to road users (disaggregated for cars, pedestrians, cyclists, and motorcyclists, as well as e-bike users, who are treated either as cyclists if they are not modified and travel at lower speeds, or as motorcyclists if they are modified to travel at speeds higher than 20 km/hr.).

relative) safety, the ChinaRAP team will also provide technical support to the engineers responsible for preliminary and detailed designs. For the 2.1 km of new road construction, a road safety audit (RSA) will be performed at the preliminary and detailed design stages as well as at pre-opening. The RSA will be conducted by a combined team of international and domestic engineers hired by the Bank. Based on the RSA's recommendations, the audit team will work with the design firm contracted by the Project Implementation Unit (PIU) to ensure that adequate road safety countermeasures are introduced prior to the tendering of construction packages.

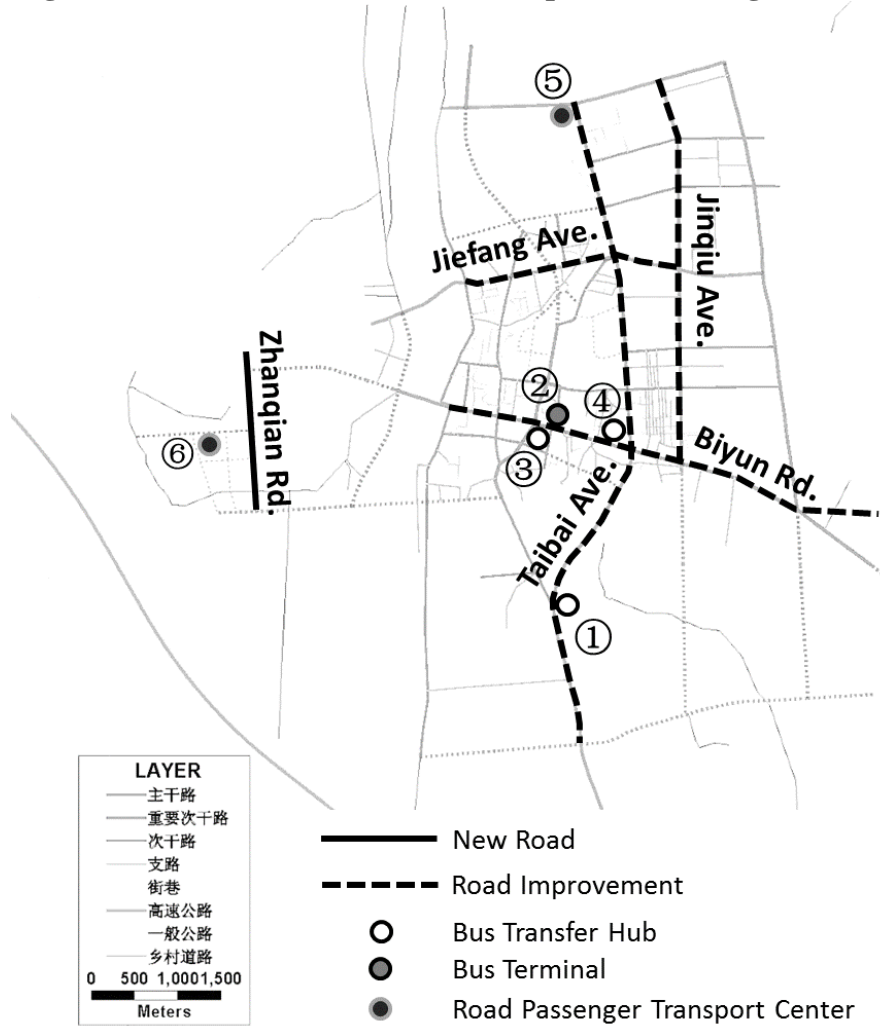
**22. Component 2. Public Transport Improvements in Anlu**

- 1) Construction and/or upgrading of six public transport interchanges, including: (a) three bus transfer stations; (b) one bus terminal; and (c) two bus transfer and road passenger transport centers.
- 2) Procurement of clean-energy buses.
- 3) Establishment of an intelligent public transport system including, *inter alia*, a public transport control center, onboard bus information systems, bus dispatching systems, telecommunications, and a smart card system.

23. This component will help Anlu establish a modern public transport network that integrates urban and rural buses, rail and road transport by building six public transport interchanges, procuring clean-energy buses, and establishing an intelligent public transport system.



**Figure A2.2. Locations of Public Transport Interchanges (PTIs) in Anlu**



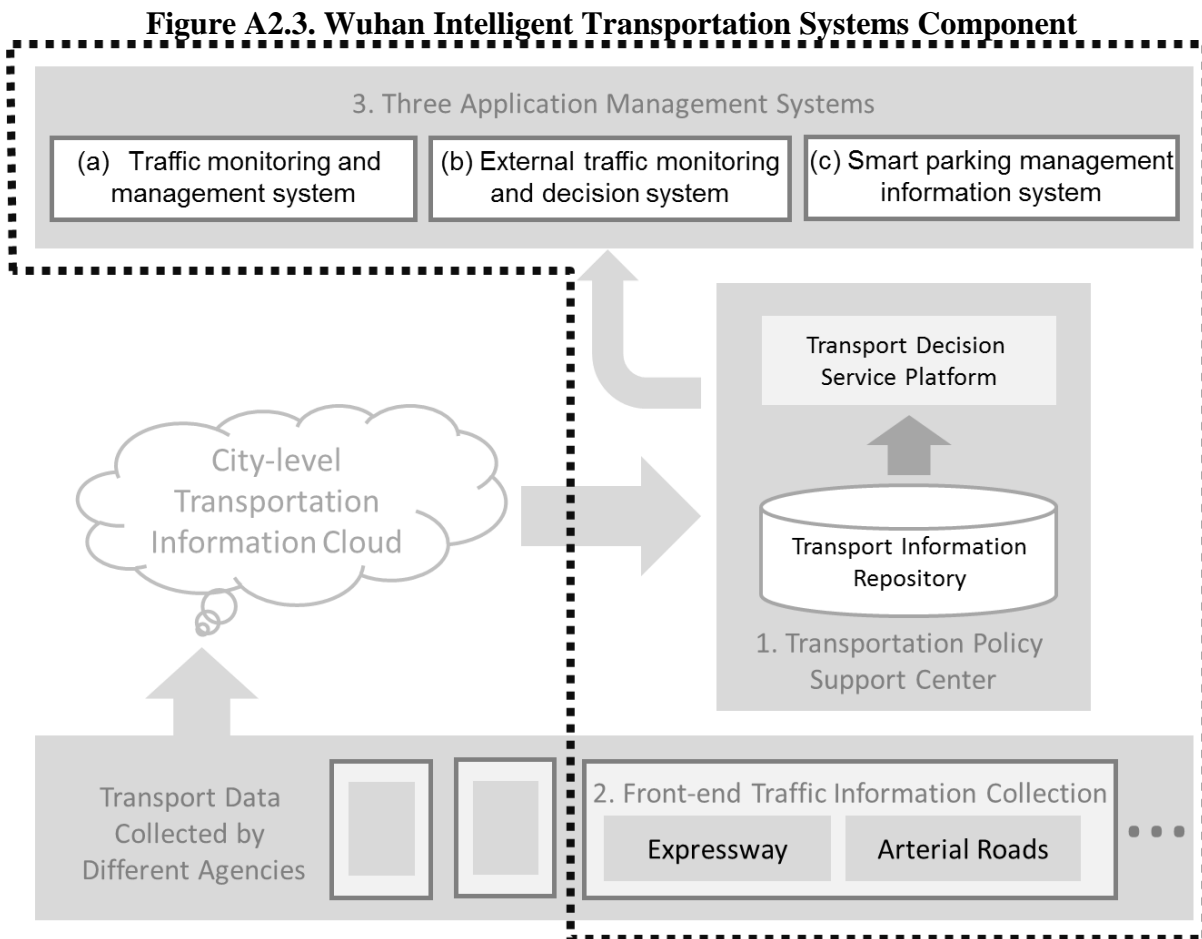
24. Locations of the six public transport interchanges are shown in Figure A2.2 above. Bus transfer hub ① is the Road Passenger Transport Center Station, serving inter-provincial long-distance buses. Bus terminal ② is the Anlu Railway Station Bus Terminal Hub, providing transfer for Handan Railway passengers to urban buses. Bus transfer hub ③ is the Short-Distance Station Hub, providing routes to nearby towns and villages. Bus Transfer Hub ④ is the Long-Distance Station Hub, serving longer routes to the rural area. Road Passenger Transport Center ⑤ is the Qi Li Qiao Road Passenger Transport Center Transfer Hub, an important hub for mid- and long-distance road transportation within the province as well as short-distance transportation for the rural area to connect to urban buses. Finally, ⑥ is the High-speed Rail Station Road Passenger Transport Center Bus Transfer Hub, connecting Hanshi High-speed Rail passengers to urban and rural buses.

25. It is estimated that 210 buses are needed in the short term (five years), including 130 eight-meter-long buses and 80 six-meter-long buses serving 8 urban trunk bus routes, 13 feeder bus routes, and 8 urban–rural bus routes. The current bus fleet in Anlu is old and only four buses will be within service life by 2019. Therefore, the project will procure around 210 clean-energy

buses (these may be compressed natural gas [CNG], liquefied natural gas [LNG], electric or hybrid).

26. The project will also help Anlu to establish an intelligent public transport system, including equipment procurement and installation for a public transport control and bus dispatching center, an onboard bus information system, a terminal monitoring and management system, electronic boards at bus stations, and a Smart Card system.

27. **Component 3. Intelligent Transport Systems for Wuhan.** Figure A2.3 below illustrates the design of the Wuhan Intelligent Transport System component. The dotted line shows the project boundary.



28. This component will support:

1. Setting up a **Transportation Policy Support Center**, comprising a city-level transport information repository and a transport decision service platform. This center aims to provide information and research support for government policy making. Specifically, it will:
  - (i) Set up the city-level transport information repository: a data center housed in WTDSRI, with raw and processed data feeds from the city-level transport information cloud, providing local data backup and data services for the two platforms hosted in the center. The repository set-up includes establishment of

the communication infrastructure, power and cooling facilities, procurement of servers, and necessary database software.

- (ii) Establish a transport decision service platform through a series of transportation impact evaluations, model simulations and data integration systems to analyze urban transportation issues, and to provide support for government policy making, e.g., transportation strategy, annual congestion management plans, traffic management policies, transit metropolis plan,<sup>27</sup> urban transportation plans, etc.

2. **Front-end Traffic Information Collection**, including:

- (i) Provision of equipment and systems on all expressways within the third ring road, including CCTV, e-police, high-definition city gateway vehicle monitoring system, traffic guidance, ramp metering, etc. for better traffic monitoring and management.
- (ii) Provision of equipment and systems on all arterial roads within the third ring road to collect traffic information for monitoring, enforcement, and real-time guidance for users.

3. **Three Application Management Systems** for related government agencies, including:

- (i) A traffic monitoring and management system for the Wuhan Traffic Management Bureau (WTMB or Traffic Police) to better operate and manage in-city traffic. This system includes functions of congestion monitoring, road condition monitoring, commanding and dispatching, traffic signal control, etc.
- (ii) An external traffic monitoring and decision system for the Wuhan Transportation Commission (WTC) to better operate and manage in- and out-of-city traffic. This system aims to integrate data from urban railways, waterways, intercity roads, airlines, and freight with data from urban buses, subways and taxis, so that all modes can be monitored and managed in a coordinated manner.
- (iii) A smart parking management information system for the Wuhan Parking Corporation (WPC). This system will be a citywide operation and management platform for parking, integrating step by step on-street, off-street, and public parking information in the city, and will develop the coding of parking spaces, real-time availability monitoring, hierarchy parking guidance, electronic payment, customized parking space search and booking services, etc. A pilot in Jiangnan District will also include the installation of detection and monitoring equipment for 3,000 roadside parking spaces and electronic payment equipment for 120 parking lots.

29. **Component 4. Technical Assistance and Project Management.** TA and capacity building are key threads running through all aspects of the project. TA will be provided not only by the Bank throughout the project cycle in terms of advice and guidance, but also in the

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<sup>27</sup> Wuhan was selected by the GoC to be one of the “Transit Metropolis” pilot cities.

development and appraisal of terms of reference (TORs) for technical assistance (TA) activities and studies, for access to grant funds for studies and study tours, and for the on-site review of technical designs and technical guidance.

- (a) **Anlu.** Provision of: (a) technical assistance support and training activities, including for Project related studies in areas concerning, *inter alia*, urban transport strategy and planning, road safety, parking, and non-motorized transport; and (b) Project implementation support, including monitoring and evaluation activities, as well as Project management-related training, capacity building, and study tours.
- (b) **Wuhan.** Provision of: (a) technical assistance support and training activities, including for Project related studies in areas concerning transportation-related big data analytics and applications, data standards and data sharing; (b) support for knowledge-sharing activities among the ITS regional community, including local governments, transport service providers, and the telecommunications, ICT and transport industries;<sup>28</sup> and (c) Project management-related training, capacity building, and study tours.

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<sup>28</sup> In Wuhan, the task team intends to mobilize a Bank-executed trust fund administered by the Global Road Safety Facility to develop a draft road safety plan for the city and in this way support the implementation of this project.

**Table A2.1-A. Project Cost and Financing Plan for Anlu**

| Component   | Total Cost         |                     | Financing Plan      |                            | % IBRD Financing |
|---|--------------------|---------------------|---------------------|----------------------------|------------------|
|   | Cost (RMB million) | Cost (US\$ million) | IBRD (US\$ million) | Counterpart (US\$ million) |                  |
| <b>Component 1. Integrated Corridor and Road Safety Improvements for Anlu</b> |                    |                     |                     |                            |                  |
| <b>Road Network Refunctioning</b>   | 474.14             | 74.02               | 45.44               | 28.58                      | 61.39            |
| Jiefang Avenue  | 63.88              | 9.97                | 7.82                | 2.15                       | 78.44            |
| Biyun Road  | 95.55              | 14.92               | 11.70               | 3.22                       | 78.42            |
| Taibai Avenue   | 22.31              | 3.48                | 2.73                | 0.75                       | 78.45            |
| Jinqiu Avenue   | 193.41             | 30.20               | 23.18               | 7.01                       | 76.75            |
| Zhanqian Road   | 98.99              | 15.45               | 0.00                | 15.45                      | 0.00             |
| <b>Non-Motorized Traffic Improvements</b>                                     | <b>36.45</b>       | <b>5.69</b>         | <b>4.46</b>         | <b>1.23</b>                | <b>78.38</b>     |
| <b>Road Safety Engineering</b>  | <b>12.20</b>       | <b>1.91</b>         | <b>1.29</b>         | <b>0.62</b>                | <b>67.54</b>     |
| <i>Subtotal for Component 1</i>   | <b>522.79</b>      | <b>81.62</b>        | <b>51.19</b>        | <b>30.43</b>               | <b>62.72</b>     |
| <b>Component 2. Public Transport Improvements for Anlu</b>                    |                    |                     |                     |                            |                  |
| Clean-fuel bus procurement  | 59.16              | 9.24                | 5.15                | 4.09                       | 55.74            |
| Bus transfer terminals/stations   | 137.22             | 21.42               | 9.38                | 12.04                      | 43.79            |
| Intelligent public transport system   | 19.21              | 3.01                | 2.22                | 0.79                       | 73.75            |
| <i>Subtotal for Component 2</i>   | <b>215.59</b>      | <b>33.67</b>        | <b>16.75</b>        | <b>16.92</b>               | <b>49.75</b>     |
| <b>Component 4. Technical Assistance for Anlu</b>                             |                    |                     |                     |                            |                  |
| Technical assistance  | 10.48              | 1.64                | 1.64                | 0.00                       | 100.00           |
| Trainings and study tours   | 1.65               | 0.25                | 0.25                | 0.00                       | 100.00           |
| <i>Subtotal for Component 4</i>   | <b>12.13</b>       | <b>1.89</b>         | <b>1.89</b>         | <b>0.00</b>                | <b>100.00</b>    |
| <b>Total Project Costs</b>  | 750.51             | 117.17              | 69.83               | 47.35                      | 59.59            |
| Land acquisition and resettlement   | 55.92              | 8.73                | 0.00                | 8.73                       | 0.00             |
| Interest during implementation  | 33.66              | 5.25                | 0.00                | 5.25                       | 0.00             |
| Front-end fee   | 1.12               | 0.17                | 0.17                | 0.00                       | 100.00           |
| <b>Total Financing Required</b>   | <b>841.21</b>      | <b>131.33</b>       | <b>70.00</b>        | <b>61.33</b>               | <b>53.30</b>     |

**Table A2.1-B. Project Cost and Financing Plan for Wuhan**

| Component  | Total Cost            |                         | Financing Plan         |                               |                     |
|--|-----------------------|-------------------------|------------------------|-------------------------------|---------------------|
|  | Cost<br>(RMB million) | Cost<br>(US\$ millions) | IBRD<br>(US\$ million) | Counterpart<br>(US\$ million) | % IBRD<br>Financing |
| <b>Component 3: Intelligent Transport System for Wuhan</b> |                       |                         |                        |                               |                     |
| Transport policy support center                            | 112.19                | 17.52                   | 10.04                  | 7.48                          | 57.31               |
| Front-end traffic information collection project           | 226.74                | 35.40                   | 25.69                  | 9.71                          | 72.57               |
| Three application management systems                       | 126.01                | 19.67                   | 12.50                  | 7.17                          | 63.55               |
| <b>Subtotal for Component 3</b>                            | <b>464.94</b>         | <b>72.59</b>            | <b>48.23</b>           | <b>24.36</b>                  | <b>66.44</b>        |
| <b>Component 4. Technical Assistance for Wuhan</b>         |                       |                         |                        |                               |                     |
| Technical assistance                                       | 11.30                 | 1.76                    | 1.41                   | 0.36                          | 80.11               |
| Trainings and study tours                                  | 1.50                  | 0.23                    | 0.23                   | -                             | 100.00              |
| <b>Subtotal for Component 4</b>                            | <b>12.80</b>          | <b>1.99</b>             | <b>1.64</b>            | <b>0.36</b>                   | <b>82.41</b>        |
| <b>Total project costs</b>                                 | <b>477.74</b>         | <b>74.58</b>            | <b>49.87</b>           | <b>24.72</b>                  | <b>66.87</b>        |
| <b>Interest during implementation</b>                      | 11.94                 | 1.87                    |                        | 1.86                          |                     |
| <b>Front-end fee</b>                                       | 0.8                   | 0.13                    | 0.13                   |                               | <b>100</b>          |
| <b>Total Financing Required</b>                            | <b>490.48</b>         | <b>76.58</b>            | <b>50.00</b>           | <b>26.58</b>                  | <b>65.29</b>        |

### Annex 3: Implementation Arrangements

Country: China

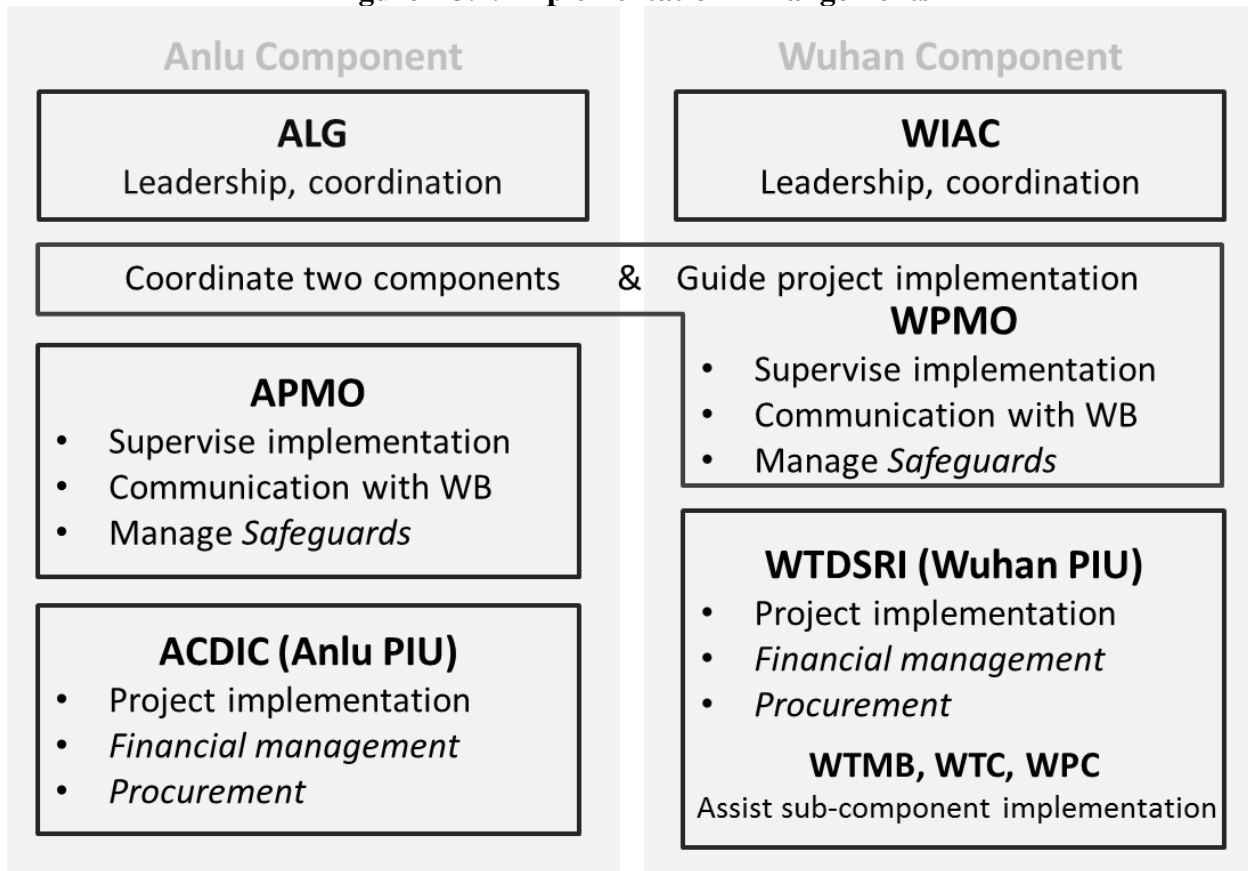
#### Wuhan Integrated Transport Development Project

#### Project Institutional and Implementation Arrangements

*Project administration mechanisms*

- Figure A3.1 summarizes the implementation arrangements for the project.

**Figure A3.1. Implementation Arrangements**



- Anlu.** Anlu City established a leading group for the “World Bank Loan–Urban Transport Infrastructure Project of Anlu City” in August 2013. The Anlu Leading Group (ALG) is chaired by the vice mayor in charge of city construction and agriculture. All directors of concerned agencies, - Municipal Development and Reform Bureau, Financial Bureau, Construction Bureau, Planning Bureau, Transport Bureau, National Land Resource Bureau, Environmental Protection Bureau, Supervision Bureau, Anlu Public Security Bureau, Management Committee of the Development Zone, Fucheng Office, Nancheng Office, Tangdi Town and Yandian Town - are members of the ALG.

3. Anlu Municipal Government (AMG) has established a Project Management Office or PMO (the Anlu Project Management Office, APMO) under ALG. APMO will ensure consistency of implementation with all relevant Bank policies and procedures, including the review and approval of Annual Work Plans,<sup>29</sup> revisions to the project budget and allocation of resources, coordination of fiduciary aspects, and continuity and better coordination among different implementing entities and related agencies. Anlu Construction Development and Investment Company, Ltd. (ACDIC) will serve as the Project Implementation Unit (PIU) for project activities in Anlu and will manage project activities on behalf of Anlu Construction Bureau.

4. **Wuhan.** The Wuhan “Internet+” Action Committee (WIAC) was established by the Wuhan Municipal Government (WMG) in July 2015 to provide overall leadership, strategic guidance and institutional coordination for all Smart Cities initiatives in Wuhan, including the Wuhan component of this project. WIAC, housed in the WMG’s Internet and Information Office, is headed by the municipal party secretary and the mayor as vice director. WIAC reviews, approves and coordinates the implementation of all Smart Cities projects in Wuhan. WPMO will report to WIAC with relevant project information when strategic guidance and coordination from WMG are necessary.

5. In 2003,<sup>30</sup> WMG established a PMO (the Wuhan Urban Construction Utilization of Foreign Investment Project Management Office, WPMO) in its Urban Construction Fund Management Office (WUCFM). WPMO will be the primary coordinating body for both Wuhan and Anlu, and will be responsible for communications with the Bank. WPMO will be entrusted with overall project management and, through its units, with coordinating and directing the implementation of procurement, contract management, resettlement, social and environmental safeguards, coordinating and assisting with loan disbursement requests, fiduciary compliance, evaluation, results monitoring, and reporting. It will ensure consistency of implementation with all relevant World Bank policies and procedures, including the review and approval of Annual Work Plans, revisions to the project budget and allocation of resources, coordination of fiduciary aspects, and continuity and better coordination among various implementing entities.

6. Wuhan Transport Development and Strategy Research Institute (WTDSRI), under Wuhan Planning Bureau, will act as the PIU for the Wuhan component. WTDSRI will be in charge of financial management and procurement for all Wuhan components, and will also be responsible for the implementation and operation of the Transportation Policy Support Center. Three related agencies will support WTDSRI during implementation and will then assume operational responsibility for the remaining sub-components. Wuhan Traffic Management Bureau (WTMB) will support WTDSRI during the implementation of the Front-end Traffic Information Collection Project (Sub-component 2), as well as the Traffic Monitoring and

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<sup>29</sup> The Annual Work Plans are due on January 15 (draft) and February 15 (final) of each year during implementation, starting in 2017. These dates match the budgeting calendar. The Bank will provide comments on the drafts. After effectiveness, estimated for September 2016, there will be a period of about four months for which the Procurement Plan will be the equivalent of the implementation plan. Subsequently, full Annual Work Plans are needed, summarizing the implementation progress of the Project for that year and the Project activities to be undertaken in the following calendar year, including the proposed annual budget for the Project.

<sup>30</sup> This PMO was originally in charge of the Wuhan Urban Transport Project (P069852) and is currently implementing the Wuhan Second Urban Transport Project (P112838).



Management System (Sub-component 3[a]). Wuhan Transportation Commission (WTC) will support the implementation of the External Traffic Monitoring and Decision System (Sub-component 3[b]). Wuhan Parking Corporation (WPC) will support the implementation of the Smart Parking Management Information System (Sub-component 3[c]). These related agencies—WTMB, WTC, WPC—were involved throughout project preparation and worked with WTDSRI and WPMO.

## **Financial Management (FM), Disbursements and Procurement**

### **Financial Management**

7. The FM capacity assessment of all implementing agencies identified the following key risks: (a) lack of knowledge and experience in managing Bank-financed projects by designated project FM staff of the PIUs who are new to Bank-financed operations; and (b) lack of efficient coordination in FM due to the dual implementing-agency arrangement. The following mitigation measures will be taken to address these risks: (a) preparation and distribution of a Financial Management Manual (FMM) to standardize project FM procedures; (b) close guidance by HPFB, with the assistance of consultants; and (c) provision of FM training, including extensive workshops for technical training and experience sharing. The residual FM risk is assessed as substantial.

8. Funding sources for the project include the World Bank loan and counterpart funds. The World Bank Loan Agreement will be signed by the World Bank and the People's Republic of China, represented by its Ministry of Finance (MOF), and the Subsidiary Loan Agreement will be entered into by MOF and Hubei Provincial Government, which will further on-lend loan proceeds to WMG and Anlu City Government. WMG will further on-lend loan proceeds to WTDSRI. WTDSRI and Anlu City Government will be the final debtors. Wuhan Municipal Finance Bureau (WMFB) and Anlu City Finance Bureau (ACFB) will provide budgetary counterpart funds for their respective components.

9. **Budgeting.** WTDSRI will prepare the annual construction and financing plan for the Wuhan component, to be reviewed by Wuhan Municipal Planning Bureau. The plan will be approved by WMFB and included in the annual construction plan and budget allocation. Counterpart funds will be appropriated to the project following general fiscal channels. The annual construction and financing plan for the Anlu part of the project will be prepared by ACDIC and will be jointly reviewed by ACFB and Anlu Construction Bureau. ACFB will formulate the financial budget for the approved plan and allocate funds to ACDIC on a monthly basis. The overall budget preparation and execution will use the Chinese government's normal system.

10. **Funds flow.** Hubei Provincial Finance Bureau (HPFB) will open and manage the designated account (DA) of the Bank loan. For the Wuhan component, payment requests will be prepared by WTDSRI and reviewed by WMFB prior to their submission to HPFB. Bank loan proceeds will be transferred from the DA to WMFB, and then paid to contractors. For the Anlu part of the project, payment requests will be prepared by ACDIC and reviewed by ACFB prior to their submission to HPFB. Bank loan proceeds will be transferred from the DA to ACFB, then to ACDIC, and finally paid to contractors. The detailed disbursement application and funds-flow arrangements are described in the project's FMM.

11. **Accounting and financial reporting.** The project’s administration, accounting and financial reporting will be established in accordance with Circular #13: “Accounting Regulations for World Bank-financed Projects” issued by MOF in January 2000. WTDSRI and ACDIC will manage, monitor and maintain project accounting records for the project activities for which they are responsible. Their accounting and financial reporting systems have been assessed as acceptable to the Bank. WTDSRI and ACDIC will also prepare individual financial statements for components implemented by them. Upon project start-up, both agencies will establish a separate account (cost center) for project activities within their existing computerized accounting systems, known as “Yongyou.” WPMO will use Excel worksheets to prepare consolidated project financial statements as well as unaudited semi-annual project financial statements. The latter will be provided to the Bank as part of semi-annual progress reports, no later than 60 days following each semester.

12. **Internal controls.** MOF has issued accounting policy, procedures and regulations which govern project internal controls that will be followed by the project. WTDSRI and ACDIC will also utilize their existing internal control procedures, including segregation of duties, review, approval, and accounting/reporting procedures, as well as the safeguarding of assets. The FMM will align FM and disbursement requirements among the implementing agencies.

13. **Audit.** Hubei Provincial Audit Office (HPAO) has been identified as the auditor for the project. The annual audit report on project financial statements will be issued by this office and will be due to the Bank within six months after the end of each calendar year (i.e., by June 30 of each year). The audit report and audited financial statements will be publicly available on the websites of the Bank and HPAO.

### Disbursements

14. Four disbursement methods are available for the project: (a) advance, (b) reimbursement, (c) direct payment, and (d) special commitment. The primary Bank disbursement method will be advances to a segregated US-dollar designated account (DA) opened at a commercial bank acceptable to the Bank. Supporting documents required for Bank disbursement under different disbursement methods are specified in the Disbursement Letter issued by the Bank. The Bank loan will disburse against eligible expenditures (taxes inclusive), as indicated in Table A3.1.

**Table A3.1. Eligible expenditures**

| <b>Category</b>   | <b>Amount of the Loan Allocated (expressed in USD)</b> | <b>Percentage of Expenditures to be Financed (inclusive of Taxes)</b> |
|---|--|---|
| (1) Goods, works, non-consulting services, consultant services, training and workshops, and incremental operating costs under Parts A, B and D.1 of the project | 69,825,000   | 100%  |

|   |                    |   |
|---|--------------------|---|
| (2) Goods, non-consulting services, consultant services, training and workshops, and incremental operating costs under Parts C and D.2 of the project | 49,875,000         | 100%  |
| (3) Front-end fee   | 300,000            | Amount payable pursuant to Section 2.03 of this Agreement in accordance with Section 2.07 (b) of the General Conditions |
| (4) Interest rate cap or interest rate collar premium   | 0                  | Amount due pursuant to Section 2.08(c) of this Agreement  |
| <b>TOTAL AMOUNT</b>   | <b>120,000,000</b> |   |

15. **Retroactive financing.** Withdrawals up to an aggregate amount not to exceed US\$ 12 million equivalent may be made for payments for eligible expenditures incurred prior to the Loan Agreement signing date but on or after January 19, 2016

### **Procurement**

16. **Capacity.** WPMO has extensive experience with Bank procurement policies and requirements through the implementation of the WUTP and WSUTP. However, APMO and the PIUs in WTDSRI and ACDIC (which will have the main responsibility for procurement under their respective components) are new to Bank procurement policies and requirements. The main procurement risks are: (a) weak procurement capacity of the two PIUs, especially under Bank procurement policies and requirements; and (b) contract award recommendations made by BEC members (who will be randomly selected from an expert database) not being consistent with Bank procurement policies and requirements. To mitigate the above risks, the following measures will be taken: (a) a Procurement Management Manual has been prepared for the project and all officials with a role in procurement will be trained in its use; (b) WTDSRI and ACDIC will jointly hire a qualified procurement agent with experience in procurement of ICT in projects financed by the Bank (or other international financial institutions [IFIs]); (c) a training plan to provide ongoing training to PMO and PIU staff on Bank procurement policies and requirements will be agreed; and (d) ongoing training will be provided for all specialists in the expert database, and just-in-time training will be provided to BEC members prior to the submission of bids/proposals for strategic and large-value contracts. The project procurement risk is rated as substantial.

17. **Applicable guidelines.** Procurement will be carried out in accordance with: “Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers” dated January 2011 and revised July 2014; “Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers” dated January 2011 and revised July 2014; and the provisions stipulated in the Loan Agreement. National Competitive Bidding (NCB) will be carried out in accordance

with the Law on Tendering and Bidding of the People's Republic of China, promulgated by Order of the President of the People's Republic of China on August 30, 1999, subject to the modifications stipulated in the Legal Agreement.

18. **Procurement of works** will include road network refunctioning through road infrastructure improvement; upgraded road construction; non-motorized transport (NMT) improvements on existing roads; bus station and bus terminal construction, etc. Procurement will be conducted using the Bank's Standard Bidding Documents for all International Competitive Bidding (ICB) and National Model Bidding Documents agreed with or satisfactory to the Bank for all NCB.

19. **Procurement of goods** will include Intelligent Transport Systems (ITS) and relevant equipment for Wuhan and Anlu. Procurement will be carried out using the relevant Bank Standard Bidding Documents for all ICB and National Model Bidding Documents agreed with or satisfactory to the Bank for all NCB.

20. **Selection of consultants.** Consultants for various assignments will be hired under the project to strengthen institutional capacities. The Bank's Standard Request for Proposals will be used for all Quality- and Cost-Based Selection (QCBS) and Quality-Based Selection (QBS). Universities and research institutes may be included in shortlists as a source of consultants, provided that such consultants possess relevant qualifications and are not in a conflict-of-interest situation. In such cases, QBS or Selection Based on Consultants' Qualifications (CQS) for small assignments would be used if the shortlist also includes consulting firms that operate as commercial entities. The shortlist may comprise entirely of national consultants (firms registered or incorporated in the country) if the assignment is below US\$500,000.

21. **Training and workshops.** Plans for training and workshops will be developed by the two PMOs and included in the project's Annual Work Plan for Bank review. Except for training courses to be provided by the two PIUs, expenditures incurred in accordance with the approved plans for training and workshops organized by each PMO will be the basis for reimbursement. For training, workshops and study tours that will be organized by third-party service providers, the Bank Guidance Note on Planning, Budgeting, Implementing, Reporting and Accounting for Expenditures related to Training and Workshops in Bank-financed Projects in China and Mongolia will apply.

22. **Procurement Plan.** The PMOs have prepared a Procurement Plan, acceptable to the Bank, for the first 18 months of project implementation, dated December 8, 2015. It will be made available on the Bank's external website. The Procurement Plan will be updated annually or as required to reflect implementation needs and improvements in institutional capacity.

23. **Thresholds for Procurement Methods and Prior Review.** The indicative thresholds are shown in Table A3.2.

**Table A3.2. Thresholds for Procurement Methods and Prior Review**

| <b>Expenditure Category</b>                              | <b>Contract Value Threshold (US\$ thousands)</b> | <b>Procurement/Selection Method</b>  | <b>Prior Review Threshold (US\$ thousands)<sup>1/2/</sup></b>                         |
|--|--|--------------------------------------|---|
| 1. Goods and Non-Consulting Services                     | ≥10,000  | ICB                                  | All   |
|  | <10,000  | NCB                                  | First NCB contract, regardless of value, of each PIU and all contracts valued ≥1,000  |
|  | <100   | Shopping                             | First contract  |
|  | <3,000   | Framework Agreement                  | First contract, regardless of value, of each PIU and all contracts valued ≥1,000      |
|  | --   | Direct Contracting                   | All   |
| 2. Works, Supply and Installation of Plant and Equipment | ≥40,000  | ICB                                  | All   |
|  | <40,000  | NCB                                  | First NCB contract, regardless of value, of each PIU and all contracts valued ≥10,000 |
|  | <200   | Shopping                             | First contract  |
| 3. Consultant Services                                   | ≥300   | QCBS/QBS                             | The first contract for each selection method and all contracts valued ≥500            |
|  | <300   | CQS                                  | First contract  |
|  | --   | Individual Consultant                | Only in exceptional cases   |
|  | --   | Single-Source Selection (firm)       | ≥100  |
|  | --   | Single-Source Selection (individual) | ≥50   |

1/ All contracts to be financed through retroactive financing will be subject to prior review. A contract whose cost estimate was below the Bank's prior-review threshold is subject to prior review if the price of the lowest evaluated responsive bid (or, in the case of consulting services, the financial offer of the selected firm) exceeds such threshold at the bid/proposal evaluation stage.

2/ Procurement post review may be carried out by the Bank or its consultants/auditors.

24. **Advance contracting and retroactive financing.** The Procurement Plan sets forth the contracts that will be procured in advance, together with the relevant Bank review procedures. Retroactive financing for contracts signed prior to loan signing will be within the limits specified in the Loan Agreement.

## **Environmental and Social (including safeguards)**

### **Social**

25. The project has significant social benefits because it supports city development and provides better city infrastructure for citizens. The public consultation and participation process undertaken during project preparation enables the project to address the public's needs for local economic development and its engagement in the project development process.

26. **Land acquisition and resettlement.** The proposed urban transport infrastructure project in Anlu City will affect two villages and one urban community, and will require 12.24 ha of land, including 10.24 ha of collective land and 2 ha of state-owned land. Housing demolition will encompass 17,877 m<sup>2</sup>, including 5,229 m<sup>2</sup> of private housing and 12,648 m<sup>2</sup> of 13 shops. Housing demolition will affect and require the relocation of 44 households (181 people).

27. The resettlement action plan (RAP) prepared by the project entity provides details of resettlement policy principles and regulations to be followed, compensation rates and budget, mitigation measures to restore incomes whenever necessary, and institutional and monitoring arrangements. The RAP has been prepared in line with Bank requirements under OP 4.10 and is acceptable to the Bank. A resettlement policy framework (RPF) was prepared to address unanticipated land acquisition and resettlement/relocations.

28. **Indigenous Peoples.** A socioeconomic impact survey found that no ethnic minority communities are present in the project villages and urban community. As such, OP 4.10 on Indigenous Peoples is not triggered.

29. **Information dissemination.** All affected persons have been identified through the census survey. Wuhan PMO disclosed the RPF on the Wuhan municipal website on February 16, 2015, and a newer version on January 21, 2016 due to changes in project description. Anlu PMO disclosed the RAP and RPF on the Anlu municipal website on February 15 and June 15, 2015, respectively, and made them available for reading free of charge in the PMOs and branches of the resettlement offices. Relevant project information has been provided to the affected villages and urban community through newspaper reports, posters and public meetings. A resettlement information booklet, which provides details of compensation rates, social security policies, and other entitlement policies and grievance procedures, will be distributed to displaced persons prior to resettlement implementation.

30. **Participation and consultation.** The consulting institute and the project entity undertook public consultations during which Bank requirements on social safeguards were discussed. Focus-group discussions and key informant interviews were conducted to consult with potentially affected persons and obtain their views and preferences regarding resettlement impacts and mitigation measures, including land compensation, employment opportunities, training courses, social security programs, etc. These views and preferences were taken into account during RAP preparation, and the majority of potentially affected persons indicated that resettlement and rehabilitation measures planned under the RAP would address and mitigate any adverse impacts. The affected villages will play a key role in determining and implementing their livelihood restoration programs. For example, each village will determine how land compensation can best be used to improve, or at least restore, local income-earning potential.

31. **Institutional arrangements.** A resettlement office will be established and full-time staff in the PMO will be assigned to carry out resettlement implementation. Project entities will

establish procedures to supervise land compensation use and address any complaints associated with resettlement activities. An experienced institute, independent from the PMO, will be contracted to serve as the resettlement program's independent monitoring agency. Living standards of the people affected by the project will be evaluated over the course of project implementation. Monitoring results will be regularly reported twice a year and, if needed, remedial actions will be devised.

32. **Gender.** A gender impact analysis for the project was carried out. Concerns raised by stakeholders during this analysis included: (a) potential employment in the bus hub and where the village community would be converted into an urban citizen community; (b) availability of private career-development programs; (c) women's education programs; (d) provision of improvements to families living in relocated sites; (e) provision of educational and health-care facilities; (f) inclusion of community members in decision making on entitlements to resettlement schemes; and (g) enhancement of women's roles in their families' investments and the use of their compensation. These concerns have been incorporated in the RAP.

33. **Linked activities.** A 700-meter extension of Biyun Road, funded by local budget, has been identified as being linked to the Bank project-supported Biyun Road surface rehabilitation. The due-diligence review concluded that resettlement activities of this linked project were in accordance with Chinese land law, Hubei provincial administrative land management regulations, and local regulations.

34. **Information disclosure.** The Chinese versions of the RAP and RPF for Anlu were disclosed on the Anlu municipal website on February 15 and March 2, 2015, respectively. The Chinese version of the RPF for Wuhan dated December 2015 was disclosed on the Wuhan municipal website on January 21, 2016. The World Bank's InfoShop disclosed the English version of the RAP and RPF for Anlu on March 3, 2015 and of the RPF for Wuhan on January 20, 2016.

## **Environment**

35. Project activities in Wuhan do not involve civil works. Project components in Anlu City will have potential social and environmental impacts during construction, including dust and noise, transportation of bulk materials, disposal of waste materials and solid waste generated from demolished buildings, wastewater management, traffic disturbance and public safety concerns, disturbance to the daily life of nearby communities and businesses, etc. These impacts are temporary in nature and can be readily mitigated with sound planning and construction management. Potential adverse impacts during the operations stage mainly include road safety, air quality, noise impacts from upgraded roads, and waste management from bus terminals. In accordance with OP 4.01, the project is classified as environmental Category B.

36. An environmental impact assessment (EIA), a stand-alone environmental management plan (EMP), and an environmental assessment (EA) executive summary have been prepared for the project. These are in line with relevant national laws/regulations and guidelines, as well as with the Bank's safeguards policies and Environmental Health and Safety (EHS) general guidelines. The EIA addresses the potential adverse environmental and social impacts, based upon which a stand-alone EMP was developed. The EMP specifies the institutional arrangement for environmental management and supervision, mitigation measures, capacity training plan,

monitoring plan, and budget estimates for EMP implementation. It also includes a generic ECOPs for contractors, to be included in bidding documents and contracts.

37. **Institutional arrangements.** EMP implementation will be managed by Anlu PMO, which will assign dedicated staff to conduct overall management and liaison for EMP implementation. ACDIC will be directly responsible for EMP implementation. An environmental management unit will be established with dedicated environmental staff. EMP mitigation measures will be incorporated in bidding documents and in the contracts for civil works, and will be implemented by contractors. Contractors and supervision engineers will be required to assign qualified environmental staff to their teams to ensure effective EMP implementation. Anlu PMO will provide semi-annual environmental monitoring reports to the Bank during project implementation.

38. **Consultation.** Two rounds of public consultations were conducted in the project area, in accordance with national environmental and social policies as well as with Bank requirements. Consultations were conducted through a combination of opinion surveys and public meetings along the transport corridors and in the communities near the bus hubs. Information about the project, its potential environmental and social impacts, and planned mitigation measures were provided to the public during consultations. The public's main concerns include land acquisition and compensation, traffic and accessibility impact during construction, noise (particularly during night-time construction) and dust, traffic safety, etc. These concerns are addressed in the EIA. Necessary mitigation measures have been developed in the EMP and are reflected in the project design.

39. **Disclosure.** The EIA and the EMP were disclosed locally on the website of the Anlu City Government on March 19, 2015. They were disclosed in the Bank's InfoShop on April 15, 2015.



## **Annex 4: Implementation Support Plan**

**Country: China**

### **Wuhan Integrated Transport Development Project**

#### **Strategy and Approach for Implementation Support**

1. The strategy and approach for implementation support were developed based on the nature of the project and key aspects of its risk profile, as identified through the Systematic Operations Risk-Rating Tool (SORT) process. The strategy is conceived as a flexible tool to deliver efficient, high-quality implementation support that is focused on the clients' needs and the project's technical challenges. The following risk categories have been rated as moderate or substantial: (a) Macroeconomic; (b) Sector Strategies and Policies; (c) Technical Design of Project or Program; (d) Institutional Capacity for Implementation and Sustainability; (e) Fiduciary; (f) Environment and Social; and (g) Stakeholders.

2. **Macroeconomic.** This risk reflects the potential impact of the overall economic slowdown in China and new fiscal rules on the provision of counterpart funds, especially for investment projects financed at the municipal level, as in this case for Wuhan and Anlu. Both Wuhan and Anlu plan to use fiscal revenue to meet their counterpart funding requirements, and a detailed fiscal impact analysis has been conducted. The requirement for counterpart funding during the construction and operation periods is relatively small for both cities and would not likely place serious pressure on the governments' fiscal expenditures. Moreover, Wuhan and Anlu have made a commitment that investments under the proposed project will be prioritized in their overall investment programs, and they will include the yearly funding requirements in their respective fiscal budgets during the five-year construction period. The Bank will monitor the timely provision of annual counterpart funds by both Wuhan and Anlu and address any issues in discussions with WIAC and ALG.

3. **Sector strategies and policies.** Wuhan and Anlu have established clear transport strategies that are aligned with the Project Development Objective (PDO). This risk considers each city's commitment and ability to implement these strategies in coherent, well-coordinated ways so as to maximize the project's impact. In Wuhan, for instance, the project comprises a number of Intelligent Transport Systems (ITS) initiatives to improve transport sector performance. Therefore, its success is associated with parallel transport sector initiatives, such as the expansion of the metro network and the improvement of bus services. In Anlu, conversely, the project entails some of the main transport interventions that the city will carry out in the next few years, and the challenge at hand is to ensure coordination with complementary transport, land-use and housing policies and regulations. Once again, the Project Leading Group (PLG) and Anlu Project Management Office (APMO) are seen as the key authorities in charge of ensuring coordination and informing the respective political leaders about key project issues. Timely training activities, including activities for high-ranking officials (for instance, the Leaders in Urban Transport Planning Program), will be scheduled throughout implementation to promote coordinated sectoral actions.

4. **Technical design of the project.** The Bank has broad experience with technical aspects of the project in Anlu, having worked in similar projects in other Chinese cities and in other countries. However, the project's technical aspects in Wuhan are more complicated, and the Bank's experience as a whole in implementing ITS/Smart City programs of this magnitude is rather limited. As part of project preparation, the Bank researched Smart City initiatives

worldwide and incorporated key lessons in the project's design. During project implementation, the Bank will work closely with WPMO, the design teams and related agencies to continue carrying out quality control and facilitate the adoption of best practices. To this end, the Bank will seek the assistance of expert consultants in the project's different aspects to support technical reviews and conduct training activities. The Bank will also continue to research on Smart Cities during implementation, and aims to go on one or more study tours with key officials from Wuhan to learn first-hand about best practices in Smart Cities.

5. **Institutional capacity for implementation and sustainability.** Institutional capacity risks differ in each city. In Anlu, the risk lies in the lack of experience and limited resources in APMO and other government agencies. The first mitigation strategy is the agreement that WPMO will provide support to APMO in learning Bank procedures during implementation, complemented by training activities and additional support provided by Bank staff. The Bank will also allocate resources (financial, Bank staff) to provide assistance in key technical aspects of project implementation, such as drafting terms of reference (TORs), evaluating proposals, quality control of designs and civil works, and other aspects. In Wuhan, the institutional challenge risk is to achieve the degree of integration and collaboration necessary at an institutional level for the proposed integrated intelligent transport platform to succeed. This risk will be mitigated during implementation (and even beforehand) through various efforts to bring different agencies together for Bank-sponsored training activities and workshops to collaborate on the development of solutions and uses of the platform.

6. **Fiduciary.** The main risk in financial management (FM) and procurement is that designated staff members in the implementing agencies lack experience in managing Bank-financed projects and policies. Additional risks identified include a potential lack of coordination due to the dual implementing-agency scheme, and potential delays in procurement due to unacceptable contract award recommendations. The planned mitigation measures include: preparation of FM and procurement manuals; implementation of training plans for continuous strengthening of PMO staff on related policies and practices; and hiring by PMOs of professionals with experience in Bank-financed projects. Periodic Bank missions will review the effectiveness of these risk management measures and compliance with Bank fiduciary policies. In particular, the Bank will: carry out procurement prior and post reviews, including timely issue of "no objections" where required; confirm that updated Procurement Plans are realistic; ensure that procurement related complaints are addressed promptly; review internal and external audit reports and follow-up on any issues identified.

7. **Environment and social.** The main source of risk is that the infrastructure investments planned in Anlu will require land acquisitions and resettlement. The risk mitigation strategy laid out in the Resettlement Action Plan (RAP) was developed by means of thorough consultation efforts, surveys and focus groups in the affected villages. The Bank will ensure compliance with Bank safeguard policies triggered through proper implementation of EMPs, ECOPs, and RAPs by the project agencies, consultants, and contractors. This would be achieved through periodic site visits, discussions with implementing agencies, consultants and contractors, and review of internal and external safeguard monitoring reports. In addition, the Bank would pay special attention to the proper implementation of agreed gender actions and to citizen engagement. The Bank will also pay particular attention to ensure that grievances (whether received under the project specific GRM or the Bank's GRS) are addressed in a timely manner.

8. **Stakeholders.** Risks involving stakeholders in both cities relate primarily to local

agencies' potential lack of interest in changing traditional practices and relinquishing control over key sectors or resources, and to institutional inertia to change the status quo, given that the interventions in both cities aim to bring about significant institutional changes. The first mitigating factor for this risk is that both city leaderships have placed high priority on the project's completion, and all related agencies have already been instructed to support it. The Bank's ability to communicate directly to city leaderships about key concerns, through the PLG and APMO, or by means of aides-mémoire and management letters, serves as an additional risk mitigation factor. Timely Bank-sponsored training activities and workshops will be carried out during implementation to facilitate change in a participatory and collaborative manner, rather than by imposition.

### **Implementation Support Plan**

9. Due to the project's characteristics and complexity, the level of technical support needed for implementation is considered substantial on sector policy, the technical side, and institutional capacity. The Bank will conduct two to three supervision missions per year (or more if needed), desk reviews, trainings, and field visits to follow up on project implementation. The Bank team will be supported by technical, FM, procurement, social and environmental consultants.

10. Detailed inputs from the Bank are indicated in the tables below.

| <b><i>Time</i></b>     | <b><i>Focus</i></b>   | <b><i>Skills Needed</i></b>                              | <b><i>Resource Estimate<br/>(SW: Staff Week)</i></b>              | <b><i>Partner Role</i></b> |
|------------------------|---|--|---|----------------------------|
| <i>First 12 months</i> | <i>Procurement support and training</i>                                   | <i>Procurement</i>                                       | <i>Procurement Specialist: 4 SW</i>                               |                            |
|                        | <i>Financial management support and training</i>                          | <i>Financial management</i>                              | <i>FM Specialist: 4 SW</i>  |                            |
|                        | <i>Safeguards implementation support</i>                                  | <i>Environmental and social safeguards</i>               | <i>Environmental Specialist: 3 SW<br/>Social Specialist: 5 SW</i> |                            |
|                        | <i>Project management, implementation support, supervision</i>            | <i>Project management<br/>Transport and ICT planning</i> | <i>TTL + Co-TTL: 12 SW<br/>Technical Support Team: 12 SW</i>      |                            |
|                        | <i>Integrated corridor development and engineering support</i>            | <i>Transport planning and engineering</i>                | <i>Technical Support Team: 12 SW</i>                              |                            |
|                        | <i>Smart City/ITS support</i>   | <i>Transport and ICT planning, ITS, Smart City</i>       | <i>Technical Support Team: 12 SW</i>                              |                            |
| <i>12–48 months</i>    | <i>Procurement reviews, implementation support</i>                        | <i>Procurement</i>                                       | <i>Procurement Specialist: 4 SW</i>                               |                            |
|                        | <i>Financial management reviews and audit reviews</i>                     | <i>Financial management</i>                              | <i>FM Specialist: 2 SW</i>  |                            |
|                        | <i>Safeguards reviews, performance assessment, implementation support</i> | <i>Environmental and social safeguards</i>               | <i>Environmental Specialist: 3 SW<br/>Social Specialist: 5 SW</i> |                            |
|                        | <i>Project management, implementation support, supervision</i>            | <i>Project management<br/>Transport and ICT planning</i> | <i>TTL + Co-TTL: 10 SW<br/>Technical support team: 10 SW</i>      |                            |
|                        | <i>Integrated corridor development and engineering support</i>            | <i>Transport planning and engineering</i>                | <i>Technical Support Team: 10 SW</i>                              |                            |
|                        | <i>Smart City/ITS support</i>   | <i>Transport and ICT planning, ITS, Smart City</i>       | <i>Technical Team: 10 SW</i>                                      |                            |

### Skills mix required

| <i>Skills Needed</i>                   | <i>Number of Staff Weeks</i>                | <i>Number of Trips</i>                                | <i>Comments</i>                |
|--|---|---|--------------------------------|
| <i>Procurement Specialist</i>          | <i>4 SW annually</i>                        | <i>2 per year</i>                                     | <i>Country Office-based</i>    |
| <i>Financial Management Specialist</i> | <i>4 SW annually</i>                        | <i>2 per year</i>                                     | <i>Country Office-based</i>    |
| <i>Environmental Specialist</i>        | <i>3 SW annually</i>                        | <i>2 per year</i>                                     | <i>Country Office-based</i>    |
| <i>Social Specialist</i>               | <i>5 SW annually</i>                        | <i>4 per year in first two years, then 2 per year</i> | <i>Country Office-based</i>    |
| <i>TTL</i>                             | <i>6 SW first year, then 4 SW annually</i>  | <i>3 in the first year, then 2 per year</i>           | <i>Headquarters (HQ)-based</i> |
| <i>Co-TTL</i>                          | <i>6 SW annually</i>                        | <i>3 per year</i>                                     | <i>Country Office-based</i>    |
| <i>Urban Transport Specialists</i>     | <i>12 SW first year, then 8 SW annually</i> | <i>3 in the first year, then 2 per year</i>           | <i>HQ/Country Office-based</i> |
| <i>ETCs/Transport Analysts</i>         | <i>12 SW first year, then 8 SW annually</i> | <i>3 in the first year, then 2 per year</i>           | <i>HQ/Country Office-based</i> |

## Annex 5: Economic Analysis

### Country: China

#### Wuhan Integrated Transport Development Project

1. **Economic analysis shows that the project is economically viable.** The incremental cost-benefit analysis (CBA) used to reach this conclusion is based on time savings and reductions in vehicle operating costs (VOC), as well as on efficiencies in public transport management in the Wuhan component.

2. **Public sector provision.** The use of public funds to finance this project is justified for the reasons discussed below:

- (a) **Urban road network improvement and extension, public transport prioritization, and non-motorized transport (NMT) infrastructure improvements in Anlu.** These can be considered public goods. Although it would be possible to implement congestion-charging policies for private vehicle users in future, the current features of the project's urban corridors make it costly to exclude non-payers from using these facilities in Anlu. Charging public transport and NMT users for infrastructure costs and the operation and maintenance (O&M) costs of infrastructure will be regressive and hurt the poor. In fact, car users do not fully pay for using roads and therefore receive a subsidy.
- (b) **Energy-efficient buses in Anlu.** Reduced emissions are positive externalities whose value cannot be captured by the private sector. Therefore, the private sector has no incentive to select an emission-saving technology. In addition, the cost of the technology makes it financially unsustainable to operate green-technology buses without a subsidy. Because bus operations are public in Anlu, rolling stock will be a public investment. Fares for public transport will cover—to the extent possible—the capital and O&M costs of buses.
- (c) **Road safety measures in Anlu.** Road safety measures in Anlu include equipment, infrastructure (public transport prioritization), and facilities to improve awareness and traffic enforcement. Road safety is a pure (non-excludable and non-rival) public good, because no users can be excluded from benefitting from these measures, and use by an additional user does not keep other users from benefitting from these measures.
- (d) **Public transport Smart Card system in Anlu.** The use of Smart Cards will contribute to fare integration and enable targeted subsidies for the poorest passengers in Anlu. To this end, the use of a single system is required. In addition, the system needs to be tailored to each city's needs and features. International experience shows that this can be done directly or through a concession. However, the public sector must control the design and provision of the service. In either case, the operation would be covered by public transport fares.
- (e) **Integration of Intelligent Transport Systems (ITS) in Wuhan.** The integration of ITS is framed under the provision of pure public goods, e.g., traffic enforcement, traffic management, or urban mobility planning, which must be provided by the public sector. In addition, the integration of these systems will increase efficiency in

the provision of these goods by preventing redundancies in equipment and systems. This intervention will ease the use of alternative sources of funding in the future. In Wuhan, project investments build on the foundation laid by the ongoing Wuhan Second Urban Transport Project (WSUTP, P112838),<sup>31</sup> and could set the stage for congestion charging. Congestion charging is, in general, a progressive policy because it recovers some of the negative costs that cars inflict on other road users, particularly public transport and NMT users.<sup>32</sup>

3. **Justification for Bank support.** The use of World Bank resources is justified as follows: the project's economic internal rate of return (EIRR) is over 12 percent, which is the conventional discount rate used in World Bank transport projects; the project's expected outcomes are aligned with two of the main areas of engagement of the Bank's Country Partnership Strategy (CPS) for China, i.e., supporting greener growth by promoting low-carbon urban transport and promoting more inclusive development by increasing access to social and economic opportunities; and the Bank's experience in previous projects is reflected in project design and implementation, in particular through innovations in various components. The added value of Bank participation varies with the components. The Bank's added value for the Anlu part of the project lies in the broad experience the Bank has accumulated in China and elsewhere in similar projects on sustainable urban development through a transport intervention. In Anlu, therefore, the aim is to nurture sustainable transport modes, such as walking, cycling, and public transport, and establishing them as a first-rate mobility option vis-à-vis the private car. For Wuhan, this is the third urban transport project financed by the Bank. Having supported the development of strategic road links, public transport infrastructure, and capacity building in the prior projects, this project places its focus on the application of a new generation of technologies and information systems to manage urban transport and related urban planning decisions under a Smart City framework.

#### **Cost-Benefit Analysis (CBA) Methodology and Assumptions**

4. Three economic analysis models - one for the project components implemented in each city (Anlu and Wuhan), and one for the entire project – were used to analyze the project. Expected benefits from the project and the economic evaluation methodology are similar in Anlu and Wuhan, although the interventions are different in the two cities. While the expected outputs are different, the outcomes sought are similar: reduced travel times, lower VOC, reduced emissions, and increased road safety. In Wuhan, the project will also lower the cost of transport data management.

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<sup>31</sup> See Wuhan Comprehensive Transport Planning and Design Co. Ltd., Singapore CSE-ITS PTE Ltd. 2013. "Traffic Congestion Charging Feasibility Study." Opening Report.

<sup>32</sup> Overall, the benefits of congestion charging in particular, and of increasing the cost of car use in general, outweigh the negative costs. For example, lower-middle-class car users could lose from a congestion charging scheme, and the revenue raised from the charge could be used to compensate them through investments in public transport. Gender considerations also enter into congestion pricing schemes because women who drive cars tend to have a different travel pattern from that of men because of more child- and household-related trips. See: World Bank. 2013. "Turning the Right Corner: Ensuring Development through a Low-Carbon Transport Sector." See also: World Bank, 2002. "Cities on the Move: a World Bank Urban Transport Strategy Review." See also: World Bank. 2010. "Mainstreaming Gender in Road Transport: Operational Guidance for World Bank Staff." The World Bank, Transport Sector Board.

5. The analysis in both cities is in line with national regulations,<sup>33</sup> as well as with Bank requirements under OP 10.00. The analysis compares likely outcomes with and without the project. Shadow prices are used to calculate the economic value of costs and benefits by eliminating taxes, subsidies and other factors that distort the value to society as a whole.

6. In Anlu, the impact of upgraded road-section construction is estimated in the traffic model, using the TransCAD road-network edit module. Improvement of intersections is reflected in the model as an improvement in intersections' traffic capacity. The public transport component—new vehicles, Smart Cards, and infrastructure—increases the number of trips and the speed of public transport modes. Improvements in NMT infrastructure are reflected as improvements not only in the operating efficiency of non-motorized modes, but also in the traffic capacity of intervened road sections, because they prevent conflicts with general traffic. Road safety improvements are expected to reduce traffic accidents.

7. In Wuhan, ITS benefits are achieved through interim outcomes. Associated benefits stem mainly from improved data sharing among public agencies and increased data availability to the public (interim outcomes), as reflected in better decision making that leads to benefits (final outcome). Table A5.1 below summarizes expected benefits by sub-components.

8. Impacts on traffic and the use of public transport in Wuhan were estimated based on international, domestic and other relevant experience. Traffic estimates for a previously designed pilot with a reduced scope compared to the proposed project are used conservatively here. Potential savings generated by avoiding system redundancies and improving efficient management of information were also estimated. In terms of impacts on traffic, by 2020 the Wuhan component is expected to: (a) cause an increase of 2.6 and 5.7 percent, respectively, in the modal share of bus and metro; (b) reduce the modal share participation of private cars by 5 percent; and (c) increase average speed on highways and regular roads by 6.8 and 6.2 percent, respectively. For purposes of benefit calculations, traffic estimates corresponding to a section of the total area affected by the project have been used. This section was designed as a demonstration project for the integrated transportation information system, which will now be extended to the entire third ring road.

9. **Discount rate.** This analysis applies a conventional 12 percent discount rate for Bank-funded transport projects as a rationing device for Bank funds. China applies an 8 percent discount rate for the national economic evaluation of projects. The use of the conventional rate thus makes the analysis stricter on the benefits required to achieve economic viability. This is consistent with World Bank and other development partners' practice,<sup>34</sup> and reflects the larger opportunity cost of the use of scarce World Bank lending resources.<sup>35</sup>

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<sup>33</sup> "Economic Evaluation Method and Parameters of Construction Projects" (2006), No. 1325. Issued by the National Development and Reform Commission. Ministry of Construction.

<sup>34</sup> For example, the World Bank's Wuhan Second Urban Transport Project (P112838), or the Asian Development Bank's (ADB) Xi'an Urban Road Network Improvement Project (RRP PRC 43032).

<sup>35</sup> There are ongoing discussions about lowering this rate to 5 percent for Cost-Benefit Analyses conducted at the World Bank.



**Table A5.1. Interim Outcomes in Wuhan**

| Project output   | Interim outcomes   |
|--|--|
| Transportation Policy Support Center and intelligent comprehensive traffic management system | <p>Improved city transport planning and management capacity through better information quality, management and analysis.</p> <p>Improved city capacity to implement demand management measures.</p> <p>Improved capacity of city response to unexpected events impacting transport.</p> <p>Collected and shared information from and with transport-related departments in the city, and partially with transport-related industries.</p> <p>Expressway traffic information service demonstration project enabled.</p> <p>Information collected and shared with the public.</p> <p>Users informed about traffic conditions making better decisions.</p> <p>Improved public transport operation planning and management.</p> <p>Improved efficiency in public transport provision through the implementation of Information Communication (IC) cards.</p> |
| Integrated transportation information system   | <p>Users informed about traffic conditions making better decisions.</p> <p>Improved intersection signaling.</p> <p>Improved traffic data collection, allowing for better transport planning and management.</p> <p>Improved capacity to detect and react to unexpected events impacting traffic conditions.</p> <p>Improved traffic enforcement and safety through the implementation of e-police systems.</p>   |
| Smart parking management information system  | <p>Users better informed with real-time information about parking, enabling more efficient parking through implemented intelligent parking system.</p> <p>Integrated data collection from traffic cameras, allowing better real-time information and enhancing reaction to unexpected events.</p> <p>Users better informed through adaptive light-emitting diode (LED) traffic signals.</p> <p>Better-informed public transport users making better decisions because of the implementation of real-time information boards in bus stations, including real-time position and estimated time of arrival.</p> <p>Energy-efficient transport options for users through the implementation of bicycle- and electric car-sharing system in the area.</p>   |

Source: Based on data from the Feasibility Study Report prepared by Wuhan PMO.

10. **Time value.** Time value has been estimated independently for Anlu and Wuhan, using acceptable methodologies. In both cities, the analysis uses salaries and household income to estimate the values of work and leisure trips. The analysis assumes that travelers using different modes have different values of time related to their salary or household income. It also includes special consideration for school trips. The final result generally follows the methodology proposed by Gwilliam (1997) to estimate time values.<sup>36</sup> Table A5.2 below shows some of the results obtained.

<sup>36</sup> In the absence of a leisure-time value estimated using revealed or stated preferences, Gwilliam suggests using 30 percent of household income per hour. See “The Value of Time in Economic Evaluation of Transport Projects,” Transport OT-5. World Bank. Washington DC.

**Table A5.2. Time Values in Anlu and Wuhan in 2012  
(US\$/hour)**

|                       | Wuhan |        |         | Anlu |        |         |
|-----------------------|-------|--------|---------|------|--------|---------|
|                       | Work  | School | Leisure | Work | School | Leisure |
| Non-motorized vehicle | N.A.  | N.A.   | N.A.    | 1.85 | 0.23   | 0.46    |
| Car                   | 14    | 2.2    | 4.5     | 7.93 | 1      | 1.99    |
| Taxi                  | 9.3   | 1.5    | 3.0     | 5.29 | 0.66   | 1.33    |
| Bus                   | 4.7   | 0.7    | 1.5     | 2.64 | 0.33   | 0.66    |

Source: Estimates in Feasibility Study Report prepared by Anlu PMO and Wuhan PMO.

11. **Population and economic growth.** Anlu’s population is expected to increase by an average of 0.6 percent per year during the life of the project, from 642,500 in 2012 to 675,900 in 2020 and 731,200 in 2030. Gross domestic product (GDP) growth in Anlu would be equivalent to 8.7 percent per year until 2020, and would decelerate to the equivalent to 6.5 percent per year in 2020–2030. As a result, annual GDP per capita would increase from about US\$3,200 in 2012 to US\$5,900 in 2020 and US\$10,000 in 2030. The Anlu integrated corridor and road safety improvement component would benefit 172,200 habitants (around 85,000 female) living in the downtown area, while the public transport component would benefit Anlu’s total population of 642,500, including those living in rural areas.

12. Wuhan’s population totaled 8.22 million in 2013 and is expected to reach 11.8 million by 2020. This is equivalent to an average annual growth of two percent, which is explained by the control of natural growth and internal migration patterns. Wuhan’s GDP is estimated to have moderate growth, and to have increased by about five percent in the last two years. GDP per capita is around US\$14,500. The Wuhan ITS component would benefit the 4.7 million (around 2.2 million female) residents living in the downtown area; the traffic management demonstration project would benefit 882,000 motor vehicles running within the third ring road; and the public transport information demonstration project would directly benefit 310,000 bus riders per day within Wuhan’s first ring road.

13. **Motorization.** Anlu is entering a stage of rapid motorization as its GDP per capita has reached US\$3,500. Private-car trips currently correspond to less than eight percent of the total, and nearly 75 percent of the modal split is composed of pedestrian (32.5 percent) and other non-motorized trips (36.7 percent), including e-bikes. Private-car trips are estimated to reach 11 and 22 percent of total trips by 2020 and 2030, respectively.

14. Motorization rates in Wuhan are expected to maintain high growth rates. In 2013, there were about 1.52 million motor vehicles in Wuhan. This is expected to grow by more than 10 percent per year, reaching 3.3 million motor vehicles by 2020. Nevertheless, Wuhan is already making efforts to promote public transport. Without the project, the modal share of private vehicles is expected to decrease from the current 21 percent to 20 percent. The project will multiply this effect.

### **Economic Benefits and Costs in Anlu**

15. In Anlu, implementation of the integrated corridors and improvements in road safety and public transport will result in fewer accidents, lower congestion, and shorter trips. These outcomes will in turn be reflected in faster travel, reduced VOC, less noise, and lower transport-related emissions. For the purposes of estimating the EIRR and NPV for Anlu, only time savings and VOC reduction benefits were monetized, because they are estimated to represent over 95 percent of total benefits.

16. Time savings account for over 80 percent of total benefits, due to increased average speed and lower average length of trips, depending on the mode. Faster trips stem mainly from increased speed for public transport modes and reduced average trip distance for private cars. Average speed of buses is expected to increase more than 20 percent by 2020, with no significant changes in the average length of trips. By 2030, however, bus trips would be faster relative to the without-project situation due to an expected reduction of more than 20 percent in average length. With regard to private cars, a 2 km/hour reduction in speed is expected by 2020 due to the project. However, net time savings in private vehicle trips will be achieved through a reduction of more than 30 percent in the average length of trips by 2020, and more than 40 percent in 2030. Table A5.4 below summarizes the expected average time savings per trip mode in 2020 and 2030.

**Table A5.4. Average Trip Time by Mode in Anlu  
(Minutes)**

| Year        | 2020     |              |           | 2025     |              |           | 2030     |              |           |
|-------------|----------|--------------|-----------|----------|--------------|-----------|----------|--------------|-----------|
|             | Baseline | With Project | Savings % | Baseline | With Project | Savings % | Baseline | With Project | Savings % |
| NMT         | 18.46    | 17.77        | 3.9       | 18.67    | 18.11        | 3.1       | 18.89    | 18.46        | 2.3       |
| Bus         | 26.64    | 21.84        | 22.0      | 26.13    | 22.2         | 17.7      | 25.63    | 22.55        | 13.7      |
| Taxi        | 20.21    | 18.51        | 9.2       | 20.77    | 19.27        | 7.8       | 21.35    | 20.07        | 6.4       |
| Private car | 21.58    | 19.85        | 8.7       | 22.62    | 21.12        | 7.1       | 23.72    | 22.47        | 5.6       |

Source: Estimates in Feasibility Study Report prepared by Anlu PMO.

17. In view of the time values estimated for the analysis and the transport projections, time savings will grow in absolute and relative terms during the life of the project. As shown in Table A5.5 below, time savings will represent 85.5 percent of total benefits by 2020 and will decrease to 81.8 percent by 2030. In absolute terms, they will increase from US\$17.06 million in 2020 to US\$28.77 million after a decade.

18. VOC reduction is the second-largest source of project benefits. Similar to time savings, the length of trips and average speed, in addition to a reduction of total vehicle kilometers compared to the baseline, explain this benefit. As shown in Table A5.5 below, VOC savings in 2020 are estimated to be US\$2.9 million, or 14.5 percent of total benefits. During the project, VOC savings will grow more than time-saving benefits. In 2030, the project will generate US\$6.38 million in VOC savings, which will be equivalent to 18.2 percent of total benefits.

**Table A5.5. Summary of Benefits in Anlu**

| Anlu's Incremental Economic Benefits | 2020         |       | 2025         |       | 2030         |       |
|--------------------------------------|--------------|-------|--------------|-------|--------------|-------|
|                                      | US\$ million | %     | US\$ million | %     | US\$ million | %     |
| Time savings                         | 17.06        | 85.5  | 21.78        | 82.5  | 28.77        | 81.8  |
| VOC                                  | 2.9          | 14.5  | 4.63         | 17.5  | 6.38         | 18.2  |
| Total                                | 19.96        | 100.0 | 26.4         | 100.0 | 35.16        | 100.0 |

19. The economic costs of the Anlu part of the project are calculated by adjusting investment and O&M costs with shadow prices; the average shadow-price factor for labor cost is 0.85. The economic cost of the initial investment is US\$115.11 million. The discounted cost of O&M over the life of the project is US\$15.31 million, which includes the replacement of equipment in 2035. The discounted salvage value totals US\$2.91 million, and is considered a negative cost.

|                                    |                   |
|------------------------------------|-------------------|
| <b>Anlu's Total Economic Costs</b> | <b>US\$115.11</b> |
| Construction cost                  | US\$102.12        |
| O&M                                | US\$15.31         |
| Residual value                     | (US\$2.91)        |

### **Economic Benefits and Costs in Wuhan**

20. The Wuhan-based ITS component will achieve benefits by enabling the government to conduct better traffic planning and management and users to make better-informed decisions. Similar to the Anlu part of the project, it will result in fewer accidents, reduced congestion and shorter trips, which will be reflected in faster travel, reduced VOC, less noise, and lower transport-related emissions. In addition to these benefits, this component will also improve efficiency in public transport management by avoiding system redundancies and improving efficient management of information.

21. For purposes of appraising the project's economic viability, only improvements in a section of the city are estimated, and potential benefits from different measures are only partially taken into account. In this evaluation benefits are conservatively estimated based on an analysis conducted for a pilot designed to implement the same measures in a smaller area. The current scope of the integrated transportation information system will affect the entire third ring road. In addition, the intervention will improve traffic management citywide. Time savings are the largest source of benefits in the Wuhan component. The analysis assumes a general increase in speed of 5.3 percent for private cars and buses. Given the time value, the project would generate an average of US\$28.75 million each year, which when discounted would total US\$113.2 million over the life of the project.

22. VOC reduction is also the second-largest source of benefits in the Wuhan component in terms of increased speed, reduction in average travel length, and modal shift from private vehicles to public transport. VOC benefits have been computed taking into account only the reduction in costs per kilometer, which underestimate overall VOC reduction. The estimated

average annual savings are US\$12.12 million, with a discounted value of US\$47.74 million over the life of the project.

23. **Efficiency gains in transport management.** The analysis distinguishes two main types of savings: (a) savings from transport surveys that are no longer necessary; and (b) savings from the reduction in redundant intelligent transport facilities. The project is expected to save RMB10.8 million in implementing transport surveys manually every five years, and the savings from the reduction in redundant intelligent transport facilities are estimated to be RMB0.5 million each year. The discounted benefits of these two sources total US\$2.43 million.

### Summary of Economic Benefits and Costs

24. The EIRR of the Anlu part of the project is 14.16 percent; the net present value (NPV) at a 12 percent discount rate is US\$23.79 million. The EIRR of the Wuhan component is 17.86 percent, the NPV at a 12 percent discount rate is US\$63 million. The combination of the two analyses yields the analysis for the project as a whole and demonstrates that it is economically viable. The combined CBA shows an NPV of US\$88.37 million at a 12 percent discount rate and an EIRR of 16.06 percent. Table A5.3 below summarizes the results of the economic analysis.

**Table A5.3. Summary Results of Cost-Benefit Analysis (CBA)**

|                                    | <b>Total for Project</b> | <b>Anlu Component</b> | <b>Wuhan Component</b> |
|------------------------------------|--------------------------|-----------------------|------------------------|
| Total benefits (NPV, US\$ million) | \$301.32                 | \$137.96              | \$163.36               |
| Total costs (NPV, US\$ million)    | \$212.95                 | \$114.17              | \$98.78                |
| NPV at 12% (US\$ million)          | \$88.37                  | \$23.79               | \$64.58                |
| EIRR (%)                           | 16.06%                   | 14.16%                | 18.15%                 |

25. Sensitivity analysis illustrates that the economic viability is sound. “Switching values<sup>37</sup>” for cost overrun percentage and decreased benefits reflect the threshold values of these parameters which make the NPV negative. For costs, the switching value is an overrun of 41.43 percent and for benefits it is a reduction of 29.18 percent. A combined analysis shows that if benefits are up to 10 percent lower than expected and cost overruns are up to 20 percent higher, the project would still be economically profitable. Table A5.4 below shows the impacts on the EIRR of combined cost overruns with decreased benefits. Any result under 12 percent indicates that the corresponding combination of cost overrun and decrease in benefits leads to a project that is not economically profitable, i.e., a negative NPV.

**Table A5.4. Results of Sensitivity Analysis  
(EIRR Percentages Under Different Scenarios)**

| <b>Cost overrun</b>       |    |    |     |     |     |
|---------------------------|----|----|-----|-----|-----|
| <b>Decreased benefits</b> | 0% | 5% | 20% | 30% | 60% |

<sup>37</sup> Switching value is the value of the variable at which the project investment decision is changed. Usually is defined as percentage change from the base case. Source:

<http://www.adb.org/sites/default/files/page/149401/sensitivity-risk-analysis-feb2011.pdf>

|     |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|
| 0%  | 16.06 | 15.46 | 13.88 | 12.96 | 10.65 |
| 5%  | 15.43 | 14.85 | 13.28 | 12.37 | 10.10 |
| 10% | 14.78 | 14.21 | 12.67 | 11.77 | 9.52  |
| 22% | 13.41 | 12.85 | 11.35 | 10.48 | 8.29  |
| 60% | 6.03  | 5.55  | 4.24  | 3.47  | 1.50  |

## Annex 6: Fiscal Assessment

### Country: China

#### Wuhan Integrated Transport Development Project

1. The IBRD loan will be on-lent by MOF to DOF, and then by DOF to Anlu City (US\$70 million) and to Wuhan City (US\$ 50 million) on the same lending terms. The Governments of Anlu City and Wuhan City will be responsible for counterpart funding and debt service. Financial assessments of both cities were conducted to assess: (a) fiscal impact of the proposed project; (b) availability of counterpart funds during project implementation; and (iii) debt-service capacity. The assessment concludes that the requirement for debt service and counterpart funding during the construction is relatively small and would likely not place serious pressure on the governments' fiscal expenditure. In addition, funding requirements for O&M of project assets are also relatively low. Therefore, both cities have the fiscal capacity to undertake the project.

#### Financial Assessment of the Anlu Part of the Project

##### A. Socioeconomic Development of Anlu City

2. Gross domestic product (GDP) in Anlu grew from RMB7.51 billion in 2009 to RMB15.95 billion in 2014, at an average annual growth rate of 16.3 percent. According to Anlu Government, GDP is expected to grow at an average of about 12 percent per year from 2015 to 2020. The rural population is expected to continue to decrease at an average of 3.7 percent per year and the urban population is expected to increase at an average of 5 percent per year from 2015 to 2020. Table A6.1 presents the main indicators of Anlu City's socio-economic development in the past six years as well as the forecast growth for the 2015–2020 period.

**Table A6.1. Main Socio-economic Development Indicators for Anlu**

| Category                           | Unit                | Historical |        |        |        |        |        | Forecasted Average Growth Rate % (2015–2020) |
|------------------------------------|---------------------|------------|--------|--------|--------|--------|--------|--|
|                                    |                     | 2009       | 2010   | 2011   | 2012   | 2013   | 2014   |  |
| Population                         | 10,000              | 63.0       | 63.5   | 63.4   | 63.3   | 62.5   | 62.3   | -0.3   |
| Urban population                   | 10,000              | 21.5       | 21.6   | 26.1   | 28.8   | 29.5   | 30.0   | 5.1  |
| Rural population                   | 10,000              | 41.5       | 39.8   | 37.3   | 34.5   | 33.0   | 32.3   | -3.7   |
| GDP                                | RMB/<br>100 million | 75.1       | 92.5   | 108.0  | 125.3  | 144.8  | 159.5  |  |
| GDP growth rate                    | %                   | 15.1       | 23.3   | 14.0   | 13.0   | 10.8   | 10.4   | 11.7   |
| GDP per capita                     | RMB/person          | 13,416     | 6,434  | 19,305 | 21,869 | 25,100 | 25,623 | 9.2  |
| Urban per capita disposable income | RMB/person          | 12,084     | 13,299 | 15,312 | 17,372 | 19,264 | 23,050 | 11.6   |

Source: Anlu PMO

##### B. Government Fiscal Status

3. **Local Fiscal Revenue.** Sources of local fiscal revenue can be classified into two categories: (i) fiscal revenue, including tax and non-tax revenue; and (ii) non-fiscal revenue, including land-use rights, gains from investments, and other non-fiscal revenue. Local fiscal revenue increased from RMB425 million in 2009 to RMB1.865 billion in 2014, at an average

annual growth rate of 41 percent. Fiscal revenue increased from RMB221 million in 2009 to RMB875 million in 2014, at an average annual growth rate of 32 percent. In 2012 fiscal revenue decreased substantially because of land issues. It is expected that local fiscal revenue will increase by about 26 percent per year from 2015 to 2020.

4. **Upper-government Subsidies.** Anlu City receives capital and operating subsidies to meet its needs for infrastructure development and operating expenses. In 2009, the Anlu Government received about 72 percent of its disposable funds from provincial government subsidies, but by 2014 subsidies accounted for only 51 percent of disposable funds. Total subsidies are expected to increase by an average of 8 percent per year from 2015 to 2020.

5. **Local Fiscal Expenditure.** Local fiscal expenditure has increased significantly, from RMB1.44 billion in 2009 to RMB3.41 billion in 2014, i.e., an average of 20 percent per year. From 2009 to 2014, infrastructure expenditure accounted for about 10 to 30 percent of total fiscal expenditure, and transport expenditure accounted for about 2.7 to 4.2 percent. Annual road maintenance in Anlu City received an average of about 2.6 percent of total transport expenditure in the past six years. As the county continues to grow, it is planning to invest more in transportation and maintenance in the coming years. Transportation expenditures are expected to increase by about 19 percent per year from 2015 to 2020. The maintenance fund will increase further, by about 70 percent per year, from 2015 to 2020.

6. Table A6.2 presents the statistics of Anlu City's government fiscal revenue and expenditure for 2009–2014, and the average growth rate from 2015 to 2022.



**Table A6.2. Government Fiscal Revenue and Expenditure of Anlu City  
(2009–2022)**

|   | Unit    | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | Forecasted Average Growth Rate % (2015–2020) |
|---|---------|-------|-------|-------|-------|-------|-------|--|
| <b>A. Total Fiscal Revenue</b>                        | RMB mil | 1,495 | 2,048 | 3,160 | 3,101 | 3,475 | 3,825 | 13   |
| <b>Local fiscal revenue</b>                           | RMB mil | 425   | 721   | 1,498 | 1,289 | 1,716 | 1,865 | 26   |
| <b>Annual growth rate of local fiscal revenue</b>     | %       |       | 70    | 108   | -14   | 33    | 9     |  |
| Fiscal revenue  | RMB mil | 221   | 280   | 416   | 560   | 729   | 875   | 24   |
| Tax revenue   | RMB mil | 130   | 171   | 294   | 413   | 514   | 625   | 27   |
| Non-tax revenue                                       | RMB mil | 91    | 109   | 122   | 147   | 215   | 250   | 19   |
| Non-fiscal revenue                                    | RMB mil | 204   | 441   | 1,082 | 729   | 987   | 990   | 64   |
| Land-use right  | RMB mil | 35    | 236   | 829   | 434   | 632   | 576   | 66   |
| Gain from investments                                 | RMB mil | 107   | 142   | 189   | 227   | 287   | 338   | 19   |
| Other non-fiscal revenue                              | RMB mil | 63    | 64    | 64    | 68    | 67    | 76    | 40   |
| <b>Upper-government subsidies</b>                     | RMB mil | 1,070 | 1,327 | 1,662 | 1,811 | 1,759 | 1,961 | 8  |
| <b>Annual growth rate of government subsidies</b>     | %       |       | 24    | 25    | 9     | -3    | 11    |  |
| Capital subsidies                                     | RMB mil | 539   | 767   | 1,067 | 1,108 | 1,194 | 1,350 | 13   |
| Operating subsidies                                   | RMB mil | 531   | 560   | 595   | 703   | 564   | 611   | 2  |
| <b>B. Total Fiscal Expenditure</b>                    | RMB mil | 1,444 | 1,950 | 2,946 | 2,770 | 3,021 | 3,413 | 12   |
| <b>Annual growth rate of total fiscal expenditure</b> | %       |       | 35    | 51    | -6    | 9     | 13    |  |
| Infrastructure investment                             | RMB mil | 282   | 570   | 529   | 841   | 313   | 455   | 13   |
| Transportation  | RMB mil | 61    | 52    | 83    | 73    | 104   | 130   | 19   |
| Maintenance   |         | 5.4   | 1.0   | 2.0   | 0.3   | 1.2   | n/a   | 70   |
| Other capital expenditures                            | RMB mil | 85    | 81    | 750   | 165   | 682   | 602   | 146  |
| Other current expenditures                            | RMB mil | 1,016 | 1,246 | 1,584 | 1,690 | 1,922 | 2,226 | 12   |

Source: Anlu Finance Bureau

### C. Government Indebtedness

7. Anlu Government has borrowed substantial amounts of debt to finance rapid urban and rural development in the last several years. In 2014, it borrowed about RMB1.04 billion in new loans. According to data provided by the project governments, accumulated government debt balances at the end of 2014 were RMB2.75 billion. Although these loans have supported rapid infrastructure development in Anlu City, they have also placed some pressure in terms of loan repayment. Annual debt service to total fiscal revenue (including government transfers) in 2014 was 0.02 (Table A6.3). If the outstanding debt is compared to GDP, the indebtedness level was 0.17 in 2014. Therefore, the Anlu Government plans to borrow less in the coming years.

**Table A6.3. Annual debt service to total fiscal revenue (2009–2014) for Anlu**

|                                       | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---------------------------------------|------|------|------|------|------|------|
| <b>Debt service to fiscal revenue</b> | 0.07 | 0.02 | 0.01 | 0.03 | 0.04 | 0.02 |
| <b>Outstanding debt to GDP</b>        | 0.14 | 0.14 | 0.13 | 0.11 | 0.12 | 0.17 |

Source: Anlu Finance Bureau

### D. Project Counterpart Fund Requirement

8. Project cost of the Anlu part of the proposed project is estimated at RMB841 million. About 51 percent of the total project cost will be financed by the IBRD loan (US\$70 million) and the remaining 49 percent will be financed by fiscal revenue. The source of counterpart funding was decided in consideration of the New Budget Law, which limits local governments' ability to borrow from commercial banks and use the proceeds to finance a large part of their counterpart obligations.

9. Annual project funding requirements are calculated based on the year-by-year investment plan. These requirements are then compared with expected fiscal revenue and total infrastructure investment from 2015 to 2020 (Table A6.4). The total requirement for government funding will be relatively small: only about 2 percent of total fiscal revenue during that period. The proposed project will be a major infrastructure investment in Anlu City, and will account for about 14 percent of total infrastructure investment during that period.

**Table A6.4. Project Funding Requirements in Anlu)**

| Item  | Unit    | 2015  | 2016  | 2017  | 2018  | 2019  | 2020   |
|---|---------|-------|-------|-------|-------|-------|--------|
| <b>Year-by-year investment plan</b>                             | %       | -     | 45    | 33    | 20    | 2     | 0      |
| <b>Project investment</b>                                       | RMB mil | -     | 382   | 274   | 170   | 15    | -      |
| <b>IBRD loan</b>  | RMB mil | -     | 270   | 175   | 4     | -     | -      |
| <b>Counterpart funding</b>                                      | RMB mil | -     | 112   | 99    | 166   | 15    | -      |
| <b>Total fiscal revenue, including subsidies</b>                | RMB mil | 4,466 | 5,244 | 6,193 | 7,352 | 8,776 | 10,527 |
| <b>Total infrastructure investment</b>                          | RMB mil | 670   | 767   | 879   | 1,008 | 1,157 | 1,327  |
| <b>Project expenditure/total fiscal revenue</b>                 | %       | 0.37  | 7.69  | 3.15  | 2.92  | 0.14  | -      |
| <b>Total project investment/total infrastructure investment</b> | %       | 2.50  | 52.52 | 22.15 | 21.29 | 1.04  | -      |

10. Government expenditure for operating and maintaining assets created under the project has also been analyzed. Table A6.5 presents year-by-year O&M costs as a percentage of overall annual transport investment between 2021 and 2030. In 2030, when the first major maintenance takes place, the O&M cost of project assets would account for about 5.1 percent of transport construction and maintenance funding available for that year. Total government expenditure for the O&M of project assets and loan repayment for each year would account for only about 0.1 percent of total fiscal revenue between 2021 and 2030.

**Table A6.5. O&M Cost as a Percentage of Overall Annual Transport Investment in Anlu**

|  | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|--|------|------|------|------|------|------|------|------|------|------|
| O&M compared to transport investment (%) | 4.2  | 4.0  | 3.8  | 3.7  | 3.5  | 3.3  | 3.2  | 3.0  | 2.9  | 5.1  |

## Financial Assessment of Wuhan Part of the Project

### E. Socioeconomic Development of Wuhan City

11. Wuhan Municipality has experienced rapid socio-economic development in recent years. GDP in Wuhan increased from RMB462 billion in 2009 to RMB1.01 trillion in 2014, with an average annual growth rate of 17 percent. Wuhan Municipality forecasts that its GDP will increase on average by about 10.5 percent per year from 2015 to 2020. Similar to other provinces in China, Wuhan's rural population is expected to continue to decrease at an average of 4.8 percent per year from 2015 to 2020. Its urban population is expected to increase at an average of 1.9 percent per year. Table A6.6 presents the main indicators of the Wuhan Municipality's socioeconomic development in the past six years as well as the forecasted growth rate for the 2015–2020 period.

**Table A6.6. Main Socio-economic Development Indicators for Wuhan**

| Category                           | Unit        | Historical |        |        |        |        |        | Forecasted Average Growth Rate % (2015–2020) |
|------------------------------------|-------------|------------|--------|--------|--------|--------|--------|--|
|                                    |             | 2009       | 2010   | 2011   | 2012   | 2013   | 2014   |  |
| Population                         | 10,000      | 910        | 978    | 1,002  | 1,012  | 1,022  | 1,048  | 2.3  |
| Urban population                   | 10,000      | 541        | 541    | 547    | 555    | 556    | 564    | 1.9  |
| Rural population                   | 10,000      | 293        | 290    | 274    | 265    | 266    | 253    | -4.8   |
| GDP                                | RMB/billion | 462        | 557    | 676    | 800    | 905    | 1,010  |  |
| GDP growth rate                    | %           | 13.7       | 14.7   | 12.5   | 11.4   | 10.0   | 9.7    | 10.5   |
| GDP per capita                     | RMB/person  | 51,144     | 58,961 | 68,315 | 79,482 | 89,000 | 98,527 | 6.7  |
| Urban per capita disposable income | RMB/person  | 18,385     | 20,806 | 21,810 | 23,738 | 29,821 | N.A.   | 5.6  |

Source: Wuhan PMO

### F. Government Fiscal Status

12. **Fiscal Revenue.** Wuhan's fiscal revenue also increased at a diminishing rate in the past six years. Sources of local fiscal revenue are: (a) fiscal revenue, including tax and non-tax revenue; and (b) non-fiscal revenue, including land-use rights (Table A6.7). Local fiscal revenue increased from RMB61.26 billion in 2009 to RMB181.53 billion in 2014, at an average annual growth rate of 25 percent. Fiscal revenue increased from RMB75.56 billion in 2009 to RMB203.47 billion in 2014, at an average annual growth rate of 23 percent. Because the city is planning to stabilize after reaching its peak in 2015, local fiscal revenue is expected to grow by about 9 percent per year from 2015 to 2020.

13. **Upper-government Transfers/subsidies.** Upper-government transfers/subsidies constitute another important source of Wuhan's disposable funds. In 2009, the Wuhan Municipality received about 18 percent of its disposable funds from central and provincial government subsidies, but by 2014 subsidies accounted for only 11 percent of disposable funds. Total subsidies are expected to increase by an average of 5 percent per year from 2015 to 2020.

14. **Local Fiscal Expenditure.** Except in 2012, local fiscal expenditure increased significantly, from RMB65.51 billion in 2009 to RMB117.99 billion in 2014. From 2009 to 2014,

infrastructure expenditure accounted for about 11 to 20 percent of total fiscal expenditure (Table A6.7). Transport expenditures accounted for about 0.6 to 5 percent of total fiscal expenditure. Total fiscal expenditure is expected to increase by about 21 percent per year from 2015 to 2020. The municipality is expected to invest about 21 percent per year in transportation from 2015 to 2020. Wuhan Municipality reported a difference between total fiscal revenue and total fiscal expenditures each year as a handover to upper government.

**Table A6.7. Government Fiscal Revenue and Expenditure of Wuhan City  
(2009–2022)**

|   | Unit            | 2009         | 2010          | 2011          | 2012          | 2013          | 2014          | Forecasted<br>Average<br>Growth Rate<br>%<br>(2015-2020)* |
|---|-----------------|--------------|---------------|---------------|---------------|---------------|---------------|---|
| <b>A. Total Fiscal Revenue</b>                              | <b>RMB bill</b> | <b>74.56</b> | <b>106.71</b> | <b>140.84</b> | <b>160.92</b> | <b>191.21</b> | <b>203.47</b> | <b>8</b>  |
| <b>Local fiscal revenue</b>                                 | RMB bill        | <b>61.26</b> | <b>90.48</b>  | <b>119.43</b> | <b>139.78</b> | <b>168.43</b> | <b>181.53</b> | <b>9</b>  |
| <b>Annual growth rate of fiscal revenue</b>                 | %               |              | <b>48</b>     | <b>32</b>     | <b>17</b>     | <b>20</b>     | <b>8</b>      |   |
| Fiscal revenue  | RMB bill        | 39.32        | 48.09         | 67.33         | 82.86         | 97.85         | 110.10        | 13  |
| Tax revenue   | RMB bill        | 32.50        | 39.72         | 54.77         | 66.67         | 79.35         | 90.68         | 11  |
| Non-tax revenue   | RMB bill        | 6.82         | 8.37          | 12.56         | 16.19         | 18.50         | 19.42         | 19  |
| Non-fiscal revenue  | RMB bill        | 21.94        | 42.39         | 52.10         | 56.92         | 70.58         | 71.43         | 3   |
| Land-use right  | RMB bill        | 19.96        | 39.71         | 47.70         | 51.89         | 65.10         | 64.26         | 3   |
| Other non-fiscal revenue                                    | RMB bill        | 1.98         | 2.68          | 4.40          | 5.03          | 5.48          | 7.17          | 5   |
| <b>Upper-government transfers/subsidies</b>                 | <b>RMB bill</b> | <b>13.30</b> | <b>16.23</b>  | <b>21.41</b>  | <b>21.14</b>  | 22.78         | 21.94         | 5   |
| <b>Annual growth rate of government transfers/subsidies</b> | %               |              | <b>22</b>     | <b>32</b>     | <b>-1</b>     | <b>8</b>      | <b>-4</b>     |   |
| <b>B. Total Fiscal Expenditure</b>                          | RMB bill        | <b>65.51</b> | <b>99.00</b>  | <b>127.84</b> | <b>88.56</b>  | <b>112.29</b> | <b>117.99</b> | <b>21</b>   |
| <b>Annual growth rate of total fiscal expenditure</b>       | %               |              | <b>51</b>     | <b>29</b>     | <b>-31</b>    | <b>27</b>     | <b>5</b>      |   |
| Infrastructure investment                                   | RMB bill        | 9.42         | 12.30         | 14.19         | 18.03         | 21.34         | 23.11         | 21  |
| Transportation  | RMB bill        | 0.37         | 1.32          | 3.43          | 4.33          | 4.59          | 5.15          | 21  |
| Urban and rural expenditures                                | RMB bill        | 19.87        | 32.98         | 40.61         | 42.49         | 56.20         | 64.81         |   |
| Other expenditures**  | RMB bill        | 35.85        | 52.41         | 69.60         | 23.71         | 30.17         | 24.92         | 21  |

Source: Wuhan Finance Bureau

\*Forecasted average growth rates (2015–2020) are based on historical average and GDP growth rate, and on Wuhan's five year investment plan.

\*\* Includes O&M cost

## G. Government Indebtedness

15. To support the city's rapid urban and rural development needs, Wuhan Government has borrowed substantial amounts from international financial institutions (IFIs) and domestic banks

in the past few years. In 2014, Wuhan Government borrowed about RMB77.5 billion in new loans. According to data provided by the project governments, the accumulated government debt balances at the end of 2014 were RMB214 billion. Although these loans have supported rapid infrastructure development in Wuhan City, they have also placed some pressure on the local governments' flexibility to provide resources for an intended purpose without compromising the sustainability of their financial position or the stability of the economy. Annual debt service to total fiscal revenue (which can be budgeted by local governments) in 2014 was 0.33 (Table A6.8). If the outstanding debt is compared to GDP, the indebtedness level was 0.21 in 2014. Accumulated debt to total fiscal revenue (including government transfers) in 2014 was 1.05. To support its continued development agenda, Wuhan Municipality plans to borrow a large amount from 2015 to 2020 to invest in the following areas: ecology and environment; infrastructure; manufacturing industry; modern service industry; agriculture and water; and social development.

**Table A6.8. Annual Debt Service to Total Fiscal Revenue for Wuhan**

| Indicator                      | Year |      |      |      |      |      |
|--------------------------------|------|------|------|------|------|------|
|                                | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Debt service to fiscal revenue | 0.15 | 0.14 | 0.39 | 0.35 | 0.19 | 0.33 |
| Outstanding debt to GDP        | 0.27 | 0.26 | 0.22 | 0.20 | 0.22 | 0.21 |

## H. Project Counterpart Funding Requirement

15. Project cost of the Wuhan part of the proposed project is estimated at RMB529.26 million. About 58 percent of the total project cost will be financed by the IBRD loan (US\$50 million) and the remaining 42 percent will be financed by Wuhan Government's fiscal revenue. The source of counterpart funding was decided in consideration of the New Budget Law, which limits local governments' ability to borrow from commercial banks and use the proceeds to finance a large part of their counterpart obligations.

16. Annual project funding requirements are calculated based on the year-by-year investment plan. These requirements are then compared with expected fiscal revenue and total infrastructure investment from 2016 to 2020 (Table A6.9). The total requirement for government funding will be insignificant: only 0.04 percent of total fiscal revenue during that period. The proposed project will be an important investment in Wuhan City, and will account for about 0.17 percent of total infrastructure investment during that period.

**Table A6.9. Project Funding Requirements in Wuhan**

|   | Unit     | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|----------|------|------|------|------|------|
| Year-by-year investment plan              | %        | 28   | 65   | 6    | 1    | -    |
| Project investment                        | RMB mil  | 128  | 303  | 52   | 13   | -    |
| IBRD loan                                 | RMB mil  | 91   | 209  | 19   | 1    | -    |
| Counterpart funding                       | RMB mil  | 36   | 91   | 32   | 12   | -    |
| Total fiscal revenue, including subsidies | RMB bill | 234  | 253  | 275  | 300  | 329  |
| Total infrastructure investment           | RMB bill |      |      |      |      | 87   |

|  |   |      |      |      |      |      |
|--|---|------|------|------|------|------|
|  |   | 41   | 49   | 59   | 72   |      |
| Project investment/total fiscal revenue                  | % | 0.1  | 0.11 | 0.01 | 0.00 | 0.00 |
| Total project investment/total infrastructure investment | % | 0.53 | 0.58 | 0.04 | 0.00 | 0.00 |

17. Government expenditures for operating and maintaining assets created under the project in Wuhan have also been analyzed. Table A6.10 presents year-by-year O&M costs as a percentage of overall annual transport investments between 2021 and 2030 in Wuhan. When the first major maintenance takes place in 2024, O&M costs of project assets would account for about 0.1 percent of transport construction and maintenance funding available for the year. Total government expenditure for O&M of project assets and loan repayment for each year would account for only about 0.01 percent of total fiscal revenue between 2021 and 2030.

**Table A6.10. O&M Costs as a Percentage of Overall Annual Transport Investment in Wuhan**

|  | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|--|------|------|------|------|------|------|------|------|------|------|
| O&M compared to transport investment % | 0.10 | 0.08 | 0.07 | 0.1  | 0.1  | 0.1  | 0.1  | 0.1  | 0.1  | 0.6  |