

**Jianshui Subproject of Urban Traffic Road  
Infrastructure Construction Project in South Central  
Cities of Honghe Prefecture, Yunnan Province**

**Environmental Management Plan**

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**Schedule:**

## Schedule 1 General Environmental Protection Measures of Project

### **Attached Figures:**

Attached Figure 1 Geographical Location Map of Project Area

Attached Figure 2 Location Schematic Drawing of Major Construction Contents of the Project

Attached Figure 3 Culture Relic Protection Units Affected by Project

Figure 4 Location Relationship Map of Environmental Protection Target 1 (Three Municipal Roads)

Figure 4 Location Relationship Map of Environmental Protection Target 2 (Bus Station at Railway Station)

Attached Figure 4 Location Relationship Map of Environmental Protection Target 3 (Zero Kilometer Bus Station, South Loop)

Attached Figure 5 Location Relationship Map of Project Relying Works and the County

# 1 Overview

The *Environmental Management Plan* (EMP) is prepared by Engineering Design & Research Institute of General Armaments Department for Jianshui Subproject of Urban Traffic Road Infrastructure Construction Project in South Central Cities of Honghe Prefecture, Yunnan Province, which is subsidized by Work Bank Loan. At the stage of project evaluation, the EMP will be reviewed and agreed by office of construction for Urban Traffic Project in Honghe Prefecture, Yunnan subsidized by Work Bank Loan and will be fully executed at the project implementation phase.

The EMP aims to propose measures and methods for eliminating, lessening or mitigating adverse impacts on environment, thus reducing negative environmental impact to an acceptable level.

To ensure the feasible and effective implementation of this EMP, expense budget for environmental protection measures is listed in the project estimation while various environmental mitigation measures are to be included in technical specification, bids and construction contracts for engineering procurement. Besides, environmental management trainings are carried out for project management and implementation personnel as well as supervision and construction unit, expenses of which, together with consult fee for executing the Plan, are included in total investment estimation of the project. Meanwhile, the owner of the project will employ experienced and qualified external environmental management plan consultant (EMC) to carry out external monitoring works independently, monitor the construction unit's conformance to bidding documents for performing various environmental protection measures. Furthermore, the consultant will monitor the validity and reasonableness of those measures proposed at the stage of project preparation to provide the owner with optimization suggestions for further strengthening environmental management during construction and operation period.

## 1.1 General Background

Nowadays, following the promotion and deepening of West Development Strategy, acceleration of industrial transfer both at home and abroad and under the background of quickened construction of significant "Bridgeheads" southwestward in Yunnan, the province has witnessed increasingly accelerated allocation of productive forces and quickened gather of resources and industries toward regional center. According to *Urban System Planning in Honghe Prefecture Region (2009-2030)*, served as the sub-center in

economic circle of south cities (Gezi-Kaiyuan-Mengzi-Jianshui) and the secondary city agglomeration of Gezi-Kaiyuan-Mengzi-Jianshui at southeast of Yunnan, Jianshui country is seated at secondary axis for town development along Mengzi-Shilin Pan-Asia Railway and is organic component of overall urban spatial structure of “One Center, Two Axes & Four Districts” in Honghe Prefecture.

At present, infrastructures of traffic road in Jianshui are insufficient. Together with economic development simultaneously, the traffic congestion is therefore caused. For the purpose of improving these infrastructures, a loan is applied by Jianshui to the World Bank for construction of urban traffic road infrastructure project. The project aims to improve the infrastructure condition in Jianshui, standardize urban traffic and thus promote the regional economy and society for realizing smooth and steady growth and social harmony.

Entrusted by the construction unit, Yunnan Design Institute prepared the *Feasibility Report for Jianshui Subproject of Urban Traffic Road Infrastructure Construction Project in South Central Cities of Honghe Prefecture, Yunnan Province Using World Bank Loan* in July, 2013. Moreover, Engineering Design & Research Institute of General Armaments Department, under entrustment of construction unit, has undertaken preparations for the EMP of the project.

## **1.2 Status Analysis**

### **1.2.1 Status of Road Works Area**

#### (1) Jianshui Avenue

Jianshui Avenue starts from Zero Kilometer Roundabout at north and ends at Chaoyang North Road, intersecting with Qingyun Road, Zhongling Road, Renhe Road, Yuxiu Road, Guangci Road, Yongzhen Road, Zeyuan Road, Qingyuan Road, Jinyin Street and Jianmin Road in succession north-southwardly. It's skeleton of Jianshui road network and traffic artery connecting new and old urban area. Focusing on external traffic together with internal traffic, the Avenue is capable of serving for large distance travelling within the county with “traffic” function superior to “access” function. Crossing with the main stem Renhe Road, the Avenue leads to office and living gathering place in new district. Crossing with the arterial Qingyuan Road, it towards the medical and educational gathering place in new district. Along the north section of the Avenue bearing urban traffic function of Jianshui, there are commercial, living and office places gathered while residence-based and business-supported development pattern is formed along its south section.

## (2) Chaoyang North Road

Chaoyang North Road serves as the trunk passing road in this ancient city, along which primary schools, middle schools and administrative land are distributed. Besides, since the ancient city is also the major commercial district, large scale business is densely gathered along Beizheng Street and the Road, the large attraction of which to traffic flow results in great traffic pressure on the Road.

## (3) Yinghui Road

Yinghui Road is one of main south-northward traffic and tourism roads in urban area of Jianshui, integrating functions of traffic collection & distribution and living services. It does not only collect traffic along its branches but also untwining access traffic from Jianshui Avenue and Chaoyang North Road (traffic flow from Tonghai-Jianshui Highway into Jianshui goes directly to the landmark of the ancient town of Jianshui - Chaoyangmen Entrance (east gate)). At present, both sides of the Road have dense buildings. Access traffic flow has large impact on the traffic flow of its main stem. Meanwhile, most bus lines are arranged on the Road which gathers abundant non-motor vehicles and pedestrian traffic, thus increasing the traffic complexity of the Road. In addition, according to the overall planning, Chaoyang North Road and Yinghui Road will connect Qingyuan Industrial Park, railway station cluster and the ancient town for strengthening traffic communication between central cluster, railway station cluster and Yangjie Industrial Park cluster.

### **1.2.2 Status of Bus Subproject Area**

#### (1) Bus station at railway station

The subproject is located at south area of railway station, within the scope of 300m from which has no residents. Quality of both ambient air and acoustic environment is sound according to the site survey. Railway station is seated at north of three corridors where is the commercial and financial center of Jianshui. Since the station attracts large traffic flow, vast parking and maintenance needs of public transport vehicle will be caused by those public transport passenger flow demands. Hence, construction of the first and the last stops and depots for public transport can satisfy the demands for bus operation and provide comfortable and satisfactory public transport service for passengers.

#### (2) Zero kilometer bus station

New zero kilometer bus station is to the east of existing zero kilometer bus station, which is adjacent to new public transport passenger station. The nearest village is



Xiaomaichang Village with distance of 95 m where the quality of both ambient air and acoustic environment is sound according to the site survey. Public transport passenger station is important hub for external traffic in Jianshui. The establishment of new public transport passenger station will bring large traffic flow in this area. Along with the intensified urban construction, the traffic, location and environmental conditions of Jianshui will be further improved. In order to facilitate the locals' public transport, the regional development condition will be improved to promote the healthy development of public transport industry. Besides, to improve the status that the bus depot infrastructure is badly lagged behind, the bus depot is required to be constructed to satisfy the demands for public transport vehicle maintenance, which will not only meet the needs of public transport operation but also mitigate the parking issue of bus and improve the public transport infrastructure.

### **1.2.3 Status of Road for Proposed South Loop**

As the southward extension of Jianshui's Industrial Avenue, the starting point of South Loop is connected with the Avenue to the north. The Avenue is currently the only main truck road connecting the old city with Yangjie Industrial Park. The Loop is ended to the west of south extension of Qingshan Road, which will be consolidated with G323 accessible to Shiping. The proposed South Loop is located at southwestern area of old city, surrounding the whole old city to the west and south. Scope of works of the Loop has been planned to south extension of Qingshan Road from as-built Huili Road, where are farmlands and villages currently with sound quality of both ambient air and acoustic environment.

## **1.3 EMP Objectives**

The EMP is developed for prediction of environmental impacts for proposal of targeted environmental mitigation measures which is easy to be implemented and specific to environmental impacts occurred during construction and operation of the project. Furthermore, it aims to determine measures and arrangements for environmental mitigation and management as well as organization construction implemented by the contractor, supervisor, operator and environmental management department of the project during construction and operation of the project to possibly remove or compensate the adverse social and environmental impacts imposed by the project and decrease it to an acceptable level. In details:

(1) Define the scope and degree of environmental impact during construction and operation of the project

Scope and degree of environmental impacts imposed by the project are analyzed according to site environment survey in combination with construction contents, characteristics and construction scheme, etc.

(2) Propose environmental mitigation measures

According to the degree and ways of influences imposed by the project construction on environment, specific environmental mitigation measures which is easy to be implemented are proposed to minimize the environmental impact of construction and operation of the project.

(3) Define environmental management obligations of contractor and operator

Environmental Protection Bureau of Jianshui, together with environmental impact assessment unit and design unit, will verify and confirm on site for detailed environmental protection objectives, propose effective mitigation measures and include them in engineering design as contractual liabilities of contractor and operator of the project construction.

(4) Operation guidance for environmental management

Environmental supervision during construction period and environmental monitoring plan during operation period proposed in the EMP is capable of ensuring the effective implementation of environmental mitigation measures, which will, as the environmental protection document, be provided to construction supervision unit, environmental surveillance unit and other relevant units during construction and operation period to explicitly determine responsibilities and functions of functional departments and management organizations and propose the channel and means of communication between various departments.

(5) Expenditure for guaranteeing environmental management actions

The EMP covers estimation for expenditures regarding environmental management, supervision and capacity construction thereof and description of expenditures sources to ensure the practical implementation of various environmental management actions, in which management expenses include wages, office and transport fee.

Function of the EMP lies in that avoidance and control of environmental impact during execution and operation of the project, based on which influence mitigation measures, monitoring measures, law's regulatory means and the aforementioned guarantee

measures to be implemented are proposed. With regards to each environmental management measure, the EMP specifies its technical connotation, investment estimation, implementation plan, function of governmental body, source of funds and monitoring scheme. To realize the elimination or mitigation objectives, methods involved in the environmental impact assessment report and EMP must be implemented.

## **1.4 EMP Design**

To describe environmental management, supervision and monitoring, etc. in details, the prepared EMP provides guidance for environment management during execution of the project, the action plan of which mainly compromises 6 parts as follows:

(1) Environmental impact and mitigation measures: engineering and management measures adopted for preventing or mitigating adverse environmental impacts imposed by the project with regards to main environmental impacts during construction and operation period.

(2) Environmental management system: set environmental management organization; determine contents and duties for environmental supervision management, and environmental supervision actions adopted for ensuring the synchronous execution of environmental protection measures and engineering construction.

(3) Environmental monitoring plan: in order to eliminate environmental pollution during construction and operation period, ensure the safe operation of engineering and improve the environmental conditions within engineering area, external monitoring is adopted for developing environment monitoring actions.

(4) Environmental management training plan: in order to ensure the implementation of environmental management plan, relevant management and environmental supervision personnel, full-time or part-time environmental management personnel, etc. are trained in terms of knowledge and skills in the course of project execution.

(5) Expenses and organization arrangement: certain fund supports shall be ensured and implemented by relevant organization to ensure the execution of EMP.

(6) Set of channel for public participation in the plan and complaints: formulate continuity public participation plan and set the public complaints channel.

## **2 Environmental Policies, Regulations and Executive Standards**

### **2.1 Relevant Laws and Regulations**

(1) *Environmental Protection Law of the People's Republic of China* (take effect since December 26, 1989);

(2) *Law of the People's Republic of China on Evaluation of Environmental Effects* (take effect since September 1, 2003);

(3) *Law of the People's Republic of China on Prevention and Control of Water Pollution* (take effect since June 1, 2008);

(4) *Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution* (take effect since September 1, 2000);

(5) *Law of the People's Republic of China on the Prevention and Control of Environmental Noise Pollution* (take effect since March 1, 1997);

(6) *Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste* (take effect since April 1, 2005);

(7) *Law of the People's Republic of China on Water and Soil Conservation* (take effect since March 1, 2011);

(8) *Land Administration Law of the People's Republic of China* (amended on August 28, 2004);

(9) *Law of the People's Republic of China on Urban and Rural Planning* (take effect since January 1, 2008);

(10) *Law of the People's Republic of China on Conserving Energy* (take effect since April 1, 2008);

(11) *Water Law of the People's Republic of China* (take effect since October 1, 2002);

(12) *Cultural Relics Protection Law of the People's Republic of China* (take effect since December 19, 2007);

(13) *Regulations for the Implementation of Cultural Relics Protection Law of the People's Republic of China* (take effect since July 1, 2003).

### **2.2 Relevant Regulations of the World Bank**

(1) Safety guarantee policies of the World Bank

(2) *General Guidelines for Environmental, Health, and Safety* issued by International Finance Corporation

## **2.3 Administrative Regulations and Normative Documents Released by the State Council**

(1) *Environmental Protection and Management Procedure of Construction Projects* (GHZ No. 003, June 1990);

(2) *Decisions of the State Council on Further Strengthening the Environmental Protection* (GF (1990) No.65, take effect since December 5, 1990);

(3) *Opinions of the State Council on Strengthening Major Environmental Protection Work* (GF [2011] No.35)

(4) *Decision of the State Council on Several Issues of Environmental Protection* (GF (1996) No.31, take effect since August 3, 1996);

(5) *Regulations on Environmental Protection Management for Construction Projects* (State Council [1998] No.253, take effect since November 29, 1998);

(6) *The National Plan for Ecological Environment Construction* (State Council GF [1998] No.36, take effect since November 7, 1998);

(7) *Several Opinions of the State Council on Speeding up the Development of Circular Economy* (GF [2005] No.22, September 8, 2005);

(8) *Decision of the State Council on Implementing the Scientific Concept of Development and Stepping up Environmental Protection* (State Council GF [2005] No.39, December 3, 2005);

(9) *Decision of the State Council on Strengthening Energy Conservation* (State Council GF [2006] No.28, August 6, 2006);

(10) *Notice of the State Council on Issuing Comprehensive Work Program of Energy Conservation and Emission Reduction* (GF (2007) No.15, June 3, 2007);

(11) HF [2003] No.94 *Notice on Issues Related to Environmental Noise in Environmental Impact Assessment for Construction Projects Such as Highways and Railways (including light rail)* issued by the National Environmental Protection Bureau (May 27, 2003);

(12) HJ [1993] No.324 *Notice on Strengthening Management of Environmental Impact Assessment for Construction Projects Using Internal Finance Corporation Loan* (June, 1993)

(13) HF [2004] No.64 *Notice on Strengthening Graded Review and Approval for Environmental Impact Assessment of Construction Projects* (December, 2004);

(14) No.5 [2003] Decree of Ministry of Transport of the People's Republic of China *Environmental Protection Management Methods for Traffic Construction Projects* (May 13, 2003).

## **2.4 Departmental Rules and Normative Documents**

(1) *Several Opinions on Strengthening Environmental Protection and Management of Construction Projects in China West Development* (State Environmental Protection Administration HF (2001) No.4, January 8, 2001);

(2) *Notice on Preventing Environmental Risks and Strengthening Environmental Impact Assessment Management* (HF (2005) No.152, December 26, 2005);

(3) *Guidance on Adjustment of Industrial Structure (Version 2011)* (Amendment);

(4) *Notice on Issuance of Temporary Methods of Public Consultation for EIA* (HF (2006) No.27, June 12, 2006);

(5) *Notice on Strengthening Environmental Protection Approval and Strictly Controlling the Newly-Commenced Projects* (HBH (2006) No.394, July 6, 2006);

(6) *Opinions on Further Strengthening Ecological Protection* (HF (2007) No.37, March 28, 2007);

(7) *Categorized Administrative List of Environmental Impact Assessment* (No.2 Decree of Ministry of Environmental Protection of the People's Republic of China, take effect since October 1, 2008).

## **2.5 Local Laws and Regulations and Normative Documents**

(1) *Surface Water Environmental Function Regionalization of Yunnan Province (review)*, YHKF [2001] No.613

(2) *Ambient Air Quality Function Regionalization of Yuan Province (review)*, October, 2005

(3) *Regulations on Environmental Protection and Management for Construction Projects of Yunnan Province*, No. 105 Decree of People's Government of Yunnan Province

(4) *Opinions of the State Council on Supporting Yunnan Province for Quickened Construction of Significant "Bridgeheads" Southwestward* (GF [2011] No.11)

(5) *Outline of the 12<sup>th</sup> Five-year Plan for National Economy and Social Development of Yunnan Province*

(6) *Outline of the 12<sup>th</sup> Five-year Plan for National Economy and Social Development*

*of Honghe Prefecture*

(7) *Outline of the 12<sup>th</sup> Five-year Plan for National Economy and Social Development of Jianshui County*

(8) *Urban System Planning in Honghe Prefecture Region (2010-2030)*

(9) *“12<sup>th</sup> Five-year” and Middle-long Term Planning for Comprehensive Traffic Transportation in Honghe Prefecture (2011-2030)*

(10) *Master Planning of South Central Cities of Yunnan Province (2004-2020)*

(11) *Revision of Master Planning of Jianshui County (2009-2030)*

(12) Government work reports of Jianshui County in recent years

(13) Regulations on conservation of historic cultural cities in Jianshui County, Honghe Hani & Yi Autonomous Prefecture

## **2.6 Technical Guidelines and Specifications**

(1) *Technical Guidelines for Environmental Impact Assessment-General Programme (HJT2.1-2011);*

(2) *Technical Guidelines for Environmental Impact Assessment-Surface Water Environment (HJ/T2.3-93);*

(3) *Technical Guidelines for Environmental Impact Assessment-Groundwater Environment (HJ610-2011);*

(4) *Technical Guidelines for Environmental Impact Assessment-Atmospheric Environment (HJ2.2-2008);*

(5) *Technical Guidelines for Environmental Impact Assessment-Acoustic Environment (HJ2.4-2009);*

(6) *Technical Guidelines for Environmental Impact Assessment-Ecological Impact (HJ19-2011);*

(7) *Technical Guidelines for Environmental Risk Assessment on Projects (HJ/T169-2004);*

(8) *Technical Specification for Comprehensive Control of Soil and Water Conservation (GB/T16543.1-2008);*

(9) *Technical Code on Soil and Water Conservation of Development and Construction Projects (GB50433-2008);*

(10) *Control Standards for Soil and Water Loss on Development and Construction Projects (GB50434-2008);*

## 2.7 Executive Standard

### 2.7.1 Environmental Quality Standard

#### 1. Ambient air

Before 2016, ambient air shall be as per class II standard of *Ambient Air Quality Standard* (GB3095-1996) and class II standard of *Ambient Air Quality Standard* (GB3095-2012) after 2016.

**Table 2.1-1 Ambient Air Quality Standard (Unit: mg/m<sup>3</sup>)**

Standard Name and Code	Pollutant Name	Hour Average	Daily Average	Annual Average
<i>Ambient Air Quality Standard</i> (GB3095-1996) class II	TSP	—	0.30	0.20
	PM <sub>10</sub>	—	0.15	0.10
	NO <sub>2</sub>	0.24	0.12	0.08
	SO <sub>2</sub>	0.5	0.15	0.06

**Table 2.1-2 Ambient Air Quality Standard Unit: μg/m<sup>3</sup>**

Pollutant Name		TSP	PM <sub>2.5</sub>	PM <sub>10</sub>	NO <sub>2</sub>	SO <sub>2</sub>
<i>Ambient Air Quality Standard</i> (GB3095-2012) class II	Annual Average Concentration	200	35	70	40	60
	Daily Average Concentration	300	75	150	80	150
	Hour Average	/	/	/	200	500

#### 2. Surface water

The rivers involved in this project are mainly Nanzhuang River, Shala River and Lujiang River, which shall be as per class III in *Environmental Quality Standard for Surface Water* (GB3838-2002).

**Table 2.1-3 Environmental Quality of Surface Water (Unit: mg/m<sup>3</sup>, except PH value)**

Standard Name and Code	pH	COD <sub>Cr</sub>	COD <sub>Mn</sub>	BOD <sub>5</sub>	NH <sub>3</sub> -N	Total Phosphorus	Petroleum
<i>Environmental Quality Standard for Surface Water</i> (GB3838-2002) class III	6~9	≤20	≤6	≤4	≤1.0	≤0.2	0.05

#### 3. Acoustic environment

Within the range of 30 ± 5m of the main road of the adjacent cities, class 4a standard in *Acoustic Environmental Quality Standard* (GB3096-2008) shall be executed, and class II of *Acoustic Environmental Quality Standard* (GB3096-2008) shall be executed for rest regions.

**Table 2.1-4 Acoustic Environmental Quality Standard (Unit: dB (A))**



Standard Name and Code	Time Period		Day	Night
	Functional zone category of acoustic environment			
<i>Acoustic Environmental Quality Standard</i> (GB3096-2008)	Class 2		60	50
	Class 4	Class 4a	70	55

### 2.7.2 Pollutant Emission Standard

#### 1. Waste gas

During construction, dust shall be as per fugitive emission limit in class II of *Integrated Emission Standard of Air Pollutants* (GB16297-1996), i.e., the maximum allowable particle matter emission concentration outside the boundary shall be no more than 1.0mg/m<sup>3</sup>

#### 2. Waste water

The waste water of zero kilometer bus junction station of the project shall be discharged to Jianshui County Sewage Treatment Plant for treatment after treated qualified, which shall be as per class III of *Integrated Wastewater Discharge Standard* (GB8978-1996) and class B of *Water Quality Standard of Urban Sewage Discharged into Sewer*.

The waste water of railway station bus junction station shall be discharged to Lujiang River after treated qualified, which shall be as per class I in *Integrated Wastewater Discharge Standard* (GB8978-1996).

**Table 2.1-5 Integrated Wastewater Discharge Standard (Unit: mg/L)**

Standard	PH	Chroma	SS	BOD <sub>5</sub>	COD	Ammonia Nitrogen
GB8978-1996 class I standard	6.0~9.0	50	70	30	100	15
GB8978-1996 class III standard	6.0~9.0	/	400	300	500	/

**Table 2.1-6 Water Quality Standard of Urban Sewage Discharged into Sewer (Unit: mg/L)**

Indexes	PH	SS	BOD <sub>5</sub>	COD	Ammonia Nitrogen	Volatile Phenol	Petroleum
Class B	6.5~9.5	400	350	500	45	1	20

#### 3. Noise

During construction, noise shall be as per *Emission Standard of Environment Noise*

for Boundary of Construction Site (GB12523-2011).

For noise in operation period, class 4 of *Emission Standard for Industrial Enterprises Noise at Boundary* shall be executed within the scope of  $30 \pm 5$  m adjacent to the railway and urban main road, class 2 standard shall be executed for the rest regions.

**Table 2.1-7 Emission Limit of Ambient Noise for Boundary of Construction Site**

(Unit: dB (A))

Time Period	Day	Night
Standard value	70	55

**Table 2.1-8 Emission Standard of Ambient Noise for Boundary of Industrial Enterprises (Unit: dB**

(A))

Standard Name and Code	Time Period	Day	Night
	Functional zone category of acoustic environment		
<i>Emission Standard for Industrial Enterprises Noise at Boundary</i> (GB12348-2008)	Class 2	60	50
	Class 4	70	60

#### 4. Solid waste

The general industrial solid wastes shall be as per *Standard for Pollution Control on Storage and Disposal Site for General Industrial Solid Wastes* (GB18599-2001).

The hazardous wastes such as oily rags and waste oil produced by the repair station within the bus junction station shall be as per *Standard for Pollution Control on Hazardous Waste Storage* (GB18597-2001).

## 2.8 Environmental Protection Objective

The environmental protection objective of the project is shown in Table 2.3-1 in details.

**Table 2.3-1 Environmental Protection Objective List**

Project Contents	Environmental Factors	Protection Objective	Distance (m)	Protection Level
Jianshui Avenue	Ambient air	Residential areas and shops within 500 m at both sides of roads	10~500	Before 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-1996) shall be adopted; after 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-2012) shall be adopted
		Jianshui People's Hospital	50	
		Jianshui Youth Activity Center	10	
		Honghe Trade and Tourism Technical School	10	
	Honghe Police Training School	20		
	Noise	Residential areas and shops within	10~200	Class II standard of

		200 m at both sides of roads		<i>Acoustic Environmental Quality Standard</i> (GB3096-2008)
		Jianshui People's Hospital	50	
		Jianshui Youth Activity Center	10	
		Honghe Trade and Tourism Technical School	10	
		Honghe Police Training School	20	
	Surface water	Guangci Lake	15	Class III of <i>Environmental Quality Standard for Surface Water</i> (GB3838-2002)
Chaoyang North Road	Ambient air	Residential areas and shops within 500 m at both sides of roads	10~500	Before 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-1996) shall be adopted; after 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-2012) shall be adopted
		Minhua Kindergarten	10	
		Jianmin Middle School	10	
		Jianshui No. 1 Middle School	10	
		Jianshui Authority Kindergarten	20	
	Noise	Residential areas and shops within 200 m at both sides of roads	10~200	Class II standard of <i>Acoustic Environmental Quality Standard</i> (GB3096-2008)
		Minhua Kindergarten	10	
		Jianmin Middle School	10	
		Jianshui No. 1 Middle School	10	
		Jianshui Authority Kindergarten	20	
Cultural relics protection unit	Chaoyang Building	30	National key cultural relics protection unit	
Yinghui Road	Ambient air	Residential areas and shops within 500 m at both sides of roads	10	Before 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-1996) shall be adopted; after 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-2012) shall be adopted
		Jianshui Union Hospital	10	
		Jianshui No. 2 Primary School	5	
		Tongji Hospital	10	
	Noise	Residential areas and shops within 200 m at both sides of roads	10~200	Class II standard of <i>Acoustic Environmental Quality Standard</i> (GB3096-2008)
		Jianshui Union Hospital	10	
		Jianshui No. 2 Primary School	8	
		Tongji Clinic	10	
	Cultural relics protection unit	Dongjing	1	Key cultural relics protection unit in Honghe Prefecture
	Railway station bus depot	Ambient air	4 retail families around railway station	150
Dafengjia Village			915	
Jinjizhai			340	
Railway station office			100	
Ciwu Village			1130	
Peide Village			1265	

				be adopted
	Noise	4 retail families around	150	Class II standard of <i>Acoustic Environmental Quality Standard</i> (GB3096-2008)
		Railway station office	100	
		Dafengjia Village	915	
		Jinjizhai	340	
Zero kilometer bus depot	Ambient air	Surrounding commercial tenants	150	Before 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-1996) shall be adopted; after 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-2012) shall be adopted
		Xiaomaichang Village	650	
Shagou Village		820		
	Noise	Surrounding commercial tenants	150	Class II standard of <i>Acoustic Environmental Quality Standard</i> (GB3096-2008)
		Xiaomaichang Village	650	
South loop	Ambient air	Xiaomaichang Village	2500	Before 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-1996) shall be adopted; after 2016, class II protection of <i>Ambient Air Quality Standard</i> (GB3095-2012) shall be adopted
		Yousuo	3000	
		Shaba	1400	
		Sujiaying	900	
		Honghe Integrative Medicine Hospital	300	
		Lingguan Temple	370	
		Hewan Village	160	
	Noise	Xiaomaichang Village	2500	Class II standard of <i>Acoustic Environmental Quality Standard</i> (GB3096-2008)
		Yousuo	3000	
		Shaba	1400	
		Sujiaying	900	
		Honghe Integrative Medicine Hospital	300	
		Lingguan Temple	370	
Hewan Village		160		
Surface water	Lujiang River	1	Class III of <i>Environmental Quality Standard for Surface Water</i> (GB3838-2002)	
	Shala River	1		
Cultural relics protection unit	Double Dragon Bridge	1600	National key cultural relics protection unit	

This project locates in Jianshui County, which is of long historical culture, it is a famous historical and cultural city, and there are many cultural relics and historic sites and key protection units within the region. In this project, 3 are listed in culture relic protection unit of environmental protection target, and through site survey of culture relic protection bureau, where, the relationship of protection and construction project of each cultural relic

protection unit and the protection scope thereof is shown in Table 2.3-2 in details (which has been confirmed by the culture relic protection bureau).

**Table 2.3-2 Cultural Relic Protection Units Involved in the Project**

Sensitive Target	Relation with Project Location	Protection Level	Protection Scope
Chaoyang Building	Intersection of Chaoyang North Road and Yinghui Road	National key cultural relics protection unit	Within 30 m in east, west, south, north respectively
Dongjing	At the side of Yinghui Road, adjacent to Yinghui Road	Key cultural relics protection unit in Honghe Prefecture	East to 4 m, south to 1.5 m, west to 1.5 m, north to 1 m
Double Dragon Bridge	About 1600 m from the destination of south loop	National key cultural relics protection unit	Within 30 m in east, west, south, north respectively

## 3 Project Overview

### 3.1 Project Overview

According to the *Feasibility Report*, the major construction contents of Jianshui Subproject of Urban Traffic Project of World Bank Loan, Honghe Prefecture, Yunnan Province mainly include: improvement for three urban main roads in the core area (Jianshui Avenue, Chaoyang North Road, Yinghui Road); new construction of two bus junction stations, to improve the public traffic project; new construction of south loop, to improve urban road network, and the project contents and scale are shown in Table 3.1-1.

**Table 3.1-1 Construction Contents and Scale of Project**

Project Name		Construction Place	Construction Contents
Integrated traffic improvement project of core area	Jianshui Avenue	Zero kilometer roundabout to Chaoyang North Road	<ul style="list-style-type: none"> <li>① Construct and mark 4855 m marked line, two-way two bus lanes and two-way 4 social lanes, handrail is added between non-motor vehicle lane and motor vehicle lane for separation, and 410 signboards are added newly;</li> <li>② Perform canalization transformation for the 12 intersections with road, transform 25 pedestrian crossing facilities, add pedestrian crossing crosswalk line and second crossing facilities, 6 road humps are arranged on the intersected branch;</li> <li>③ Bus pavement is transformed to colored asphalt concrete pavement, and transform 29585 m<sup>2</sup> bus lane pavement;</li> <li>④ Remove the original 9 pairs of roadside harbor bus stations along the original road, newly build 2 harbor bus stations and 17 road side bus stations, and the platform length is 50 m;</li> <li>⑤ Transform 9 inspection wells, where, 8 sets are heighten, 1 set is lowered, transform 17 rainwater grates, and replace 35 m gutter inlet connections;</li> <li>⑥ Move 25 street lamps;</li> <li>⑦ Remove 7207 m<sup>2</sup> greenbelts, and newly add 3701 m<sup>2</sup> greenbelts.</li> </ul>
	Chaoyang North Road	East to Chaoyang Building, West to Jianshui Avenue	<ul style="list-style-type: none"> <li>① Construct and mark 23714 m marked line, two-way two bus lanes and two-way 2 social lanes, and the non-motor vehicle lane of east section of Chaoyang North Road is widened from 2 m to 4.5 m, and 92 signboards are added newly;</li> <li>② Perform transformation for the 7 intersections with road, transform 12 pedestrian crossing facilities, add pedestrian crossing crosswalk line, 7 road humps are arranged on the</li> </ul>

			<p>intersected branch;</p> <p>③ Bus pavement is transformed to colored asphalt concrete pavement, and transform 15979 m<sup>2</sup> bus lane pavement;</p> <p>④ Newly build 6 pairs of bus stations, which are mid-road type, and the platform length is 45 m;</p> <p>⑤ Transform 10 inspection wells, where, 2 sets are heighten, 8 set is lowered, transform 16 rainwater grates, and replace 32 m gutter inlet connections;</p> <p>⑥ Move 82 street lamps;</p> <p>⑦ Remove 3299 m<sup>2</sup> greenbelts, and newly add 1638 m<sup>2</sup> greenbelts.</p>
	Yinghui Road	North to zero kilometer, south to Chaoyang Building	<p>① Construct and mark 22435 m marked line, two-way two bus lanes and two-way 2 social lanes, 1 m isolation belt is added in the middle of road, in south section, transform one of the two lanes to reverse bus lane, and 8 signboards are added newly;</p> <p>② Perform transformation for the 5 intersections with road, transform 17 pedestrian crossing facilities, add pedestrian crossing crosswalk line and second crossing facilities; 7 road humps are arranged on the intersected branch;</p> <p>③ Bus lane pavement in north section is transformed to colored asphalt concrete pavement, and transform 11470 m<sup>2</sup> pavement;</p> <p>④ Remove the 2 roadside harbor bus stations along the original road in north section and other road side bus station, newly build 9 bus stations, which is mid-road type, and the platform length is about 45 m;</p> <p>⑤ Newly build 3 bus station in south section, and the platform length is about 36 m;</p> <p>Transform 1 set inspection well in north section, which is required to be heightened, transform 7 sets of rainwater grates, replace 10 m gutter inlet connection pipe, transform 2 set inspection wells in south section, which are required to be lowered, transform 22 sets of rainwater grates, replace 22 m gutter inlet connection pipe;</p> <p>⑥ Move 29 street lamps in north section, and remove 10 street lamps in south section;</p> <p>⑦ Remove 1625 m<sup>2</sup> greenbelts.</p>
Bus priority subproject	Zero kilometer bus junction station	North side of Huili Road	<p>It covers 25 acres, and the major construction contents include 1 stopping pad, 1 integrated office building, which is arranged with boarding zone and getting-off zone, serving 8 routes, and the parking capacity is 56 standard sets.</p> <p>There are no fueling facility in the station</p>
	Railway station bus junction	Southwest side of Jianshui railway station	<p>It covers 22.6 acres, and the major construction contents include 1 stopping pad, about 116 parking spaces, 1 integrated office building, 1</p>

	station		<p>maintenance plant, 1 car washing station, where, stopping pad covers 10760 m<sup>2</sup>, office building covers 1000 m<sup>2</sup>, maintenance plant covers 600 m<sup>2</sup>, car washing station covers 600 m<sup>2</sup>, serving 3 routes, and the parking capacity is 80 standard sets.</p> <p>There are no fueling facility in the station</p>
Urban road network improvement project	South loop	North from Huili Road, south to Qingshan Road	<p>The total length of the newly-built road is 6785.829 m, the width of red line is 27 m, the section from Fu'an Road to Huili Road of south loop is urban secondary main road, the design speed per hour is 50 km/h, the extending line from Fu'an Road to Qianshan Road is first-class highway, the design speed per hour is 80 km/h, and 17 bridges are arranged.</p>

## 3.2 Composition of Major Projects

### 3.2.1 Function Adjustment of Road Network and Transformation of Subproject

#### 3.2.1.1 General layout

(1) Jianshui Avenue: the original two-way six-lane is transformed to two-way two bus lanes and two-way 4 social lanes, handrail is added between non-motor vehicle lane and motor vehicle lane for separation, serving urban development at both sides, optimize the pedestrian crossing safety facilities, adjust the cross section composition of Jianshui Avenue, and design the intersection again. The major contents include: cross section adjustment, special lane construction, traffic control, traffic calming, mode transformation, and traffic safety design etc.

The road class of Jianshui Avenue is urban main road, the transformation starting point locates in zero kilometer roundabout, while the ending point locates in Chaoyang North Road, the construction marking line is 4855 m, which is not required to be widen. Implement construction of roadside colored asphalt bus lane, remove the original 9 pairs of roadside harbor bus stations along the original road, newly build 2 harbor bus stations and 17 road side bus stations, and the platform length is 50 m; improve pedestrian crossing environment, perform canalization transformation for the 12 intersections with road, transform 25 pedestrian crossing facilities, add pedestrian crossing crosswalk line and second crossing facilities, 6 road humps are arranged on the intersected branch, move 25 street lamps; transform 9 inspection wells, where, 8 sets are heighten, 1 set is lowered, transform 17 rainwater grates, and replace 35 m gutter inlet connections; remove 7207 m<sup>2</sup> greenbelts, and newly add 3701 m<sup>2</sup> greenbelts.



(2) Chaoyang North Road: the original two-way four-lane is transformed to two-way two bus lanes and two-way two social lanes, optimize the pedestrian crossing safety facilities, adjust the cross section composition of Jianshui Avenue, and design the intersection again. The major contents include: cross section adjustment, special lane construction, traffic control, traffic calming, mode transformation, and traffic safety design etc.

The road class of Chaoyang North Road is urban main road, the transformation starting point is from Chaoyang Building in the east, and to Jianshui Avenue in the west, the construction marking line is 23714 m, the non-motor vehicle lane of east section is widened from 2 m to 4.5 m, implement construction of roadside colored asphalt bus lane, newly build 6 pairs of bus stations, which are mid-road type, and the platform length is 45 m; improve pedestrian crossing environment, perform transformation for the 7 intersections with road, transform 12 pedestrian crossing facilities, add pedestrian crossing crosswalk line, 7 road humps are arranged on the intersected branch; move 82 street lamps; transform 10 inspection wells, where, 2 sets are heighten, 8 set is lowered, transform 16 rainwater grates, and replace 32 m gutter inlet connections; remove 3299 m<sup>2</sup> greenbelts, and newly add 1638 m<sup>2</sup> greenbelts.

(3) Yinghui Road: in north section, the original two-way four lanes are transformed to two-way two bus lanes and two-way 2 social lanes, 1 m isolation belt is added in the middle of road; in south section, one of the two lanes is transformed to reverse bus lane, optimize the pedestrian crossing safety facilities, adjust the cross section composition of Jianshui Avenue, and design the intersection again. The major contents include: cross section adjustment, special lane construction, traffic control, traffic calming, mode transformation, and traffic safety design etc.

Yinghui Road is an urban main road, the transformation starting point is from zero kilometer in the north, to Chaoyang Building in the south, the construction marking line is 22435 m, bus lane pavement in north section is transformed to colored asphalt concrete pavement, and transform 11470 m<sup>2</sup> pavement; in south section, additional pavement is not made for bus lane, the original stone pavement is used, remove the 2 roadside harbor bus stations along the original road in north section and other road side bus station, newly build 9 bus stations, which is mid-road type, and the platform length is about 45 m; newly build 3 bus station in south section, and the platform length is about 36 m; improve pedestrian crossing environment, perform transformation for the 5 intersections with road, transform

17 pedestrian crossing facilities, add pedestrian crossing crosswalk line and second crossing facilities; 7 road humps are arranged on the intersected branch; move 29 street lamps in north section, and remove 10 street lamps in south section; Remove 1625 m<sup>2</sup> greenbelts.

(4) South loop: The total length of the newly-built road is 6785.829 m, the width of red line is 27 m, the section from Fu'an Road to Huili Road of south loop is urban secondary main road, the design speed per hour is 50 km/h, the extending line from Fu'an Road to Qianshan Road is first-class highway, the design speed per hour is 80 km/h, and 17 bridges are arranged.

### **3.2.1.1 Subgrade and pavement**

#### **(1) Subgrade**

For subgrade designed elevation, besides considering guaranteeing foundation drying and drainage and ensuring subgrade strength and stability, the factors such as planning road network along the line, smooth access of site entrances and exits, construction convenience and unblocked drainage etc. shall also be considered.

##### **① General subgrade design**

Drainage ditch work shall be done well in subgrade construction, there shall be no ponding in construction plane surface, the fill subgrade is equipped with 2% to 4% drainage cross slope. When the ground cross fall of fill section is lower than 1:5, it can be filled directly, when the ground cross fall is greater than 1:5, steps shall be excavated firstly on the original ground, the width of steps shall be no less than 1.0 m, and 2% to 4% drainage cross slope shall be provided.

Gravel soil for backfilling shall be used for all backfilling earthwork of subgrade, if there is cultivated soil before backfilling, the cultivated soil must be cleared away, the design slope of excavated volume adopts 1:1, and the design slope of fill adopts 1:1.5. For fill subgrade, the coarse-grained soil such as gravel soil and sand soil etc. shall be preferentially used as filler. The roadbed compactness of road is greater than 0.96 (the depth is 0.0 to 0.8 m below the pavement underside), the embankment compactness of road is greater than 0.94 (the depth is 0.8 to 1.5 m below the pavement underside), the embankment compactness of road is greater than 0.93 (the depth is lower than 1.5 m below the pavement underside), the substrate compactness is greater than 0.98, and the subbase course compactness is greater than 0.97.

##### **② Special subgrade treatment**

Soft soil subgrade: for the section with sludge soft soil, use drainage dewatering to get rid of the sludge at the bottom of the pond, and fill 0.5 m to 1 m rubble, and lay gravel additional, and then lay soil and stone, backfill soil and stone after laying a layer of geogrid to the original ground, and then lay a layer of geogrid for treatment. For part of the small area soft foundation, it can use the method of throwing stones to packing sedimentation for treatment directly. For deep layer soft foundation, according to feature and distribution condition of software, adopt deep layer piling treatment.

Fill section subgrade: firstly, get rid of the tree root, turf, compost soil etc. of the fill surface, the subgrade filling shall be laid layer by layer, the layered thickness of uncompacted layer is no more than 30 cm, which shall be compacted uniformly. In fill section, if the original terrain is low-lying, or in the place that the underground water level is high, the embankment base shall be designed with drainage isolation cushion, the thickness of which is 0.5 m, which shall be filled with the gravel with good water permeability, and a layer of geomembrane shall be arranged on the top surface as inverted filter. For high filling section (greater than 3 m), a layer of geogrid is laid in 30 cm below the pavement structure, and a layer of geogrid is laid again 50 cm downward, and there are two layers of geogrids in all, to reinforce and stabilize the subgrade.

Excavation subgrade: within the road range, overexcavation shall be done for the expansive soil within 0.8 m range of cutting and roadbed, and fill with the filler meeting the requirements, and enhance drainage measures.

Subgrade filling and excavation boundary treatment: when excavation area is soil, the material with good water permeability shall be adopted preferentially, meanwhile, overexcavation backfilling and grinding shall be done for the soil within the range of 0.8 m of excavation road bed, and lay geogrids within the roadbed range at the filling and excavation junction, lay two layers, the width is 10 m, 2 to 3 m are extended to the excavation part, and the fill part is 7 to 8 m.

### ③ Jointing treatment of new and old subgrade

In order to reduce differential settlement at the joint of new and old road and postpone appearance of radiation cracks, 2 m scope of pavement structure at the joint is excavated in this design, which is paving at the same time with the widen part pavement, in paving, two layers of geogrids of 2 m wide will be paved on the road bed top surface and pavement substrate top surface, to make the new and old substrate connect together.

## (2) Pavement

For the pavement, according to the traffic volume and project using requirements, the natural conditions such as climate, water level, geology of the areas where the road locates, abide by the principle of adjusting measures to local conditions, selecting reasonable materials, and good for construction, confirm the design scheme of pavement structure, to make it be provided with good stability and meet the strength requirements of the code, to achieve the smooth, antislip and pavement drainage requirements. Combining with the implementation condition of Jianshui Road, this road shall be colored asphalt concrete pavement, and the structure layer is shown in Table 3.2-1.

**Table 3.2-1 Asphalt Pavement Structure Layer**

Motor Vehicle Road Surface Structure		Non-motor Vehicle Road Surface Structure		Sidewalk Structure	
4cm	Modified asphalt concrete (SBS-13)	4cm	Fine-grained asphalt concrete AC-13	Slurry seal 5cm	Bluestone sidewalk block
5cm	Medium-grained asphalt concrete (AC-20)	6cm	Medium-grained asphalt concrete AC-20	3cm	M10 cement mortar
7cm	Coarse-grained asphalt concrete (AC-25)	0.6cm	Slurry seal + prime coat asphalt	15cm	C20 plain concrete
0.6cm	Slurry seal + prime coat asphalt	25cm	5% cement stable layer	12cm	Graded broken stone
35cm	5% cement stable layer	15cm	Graded broken stone	30cm	Gravel soil
15cm	Graded broken stone	50cm	Gravel soil		
50cm	Gravel soil (gravel contents are more than 70%)				

### 3.2.1.2 Bus lane and bus station

(1) Jianshui Avenue: 29585 m<sup>2</sup> bus lanes are constructed with colored asphalt concrete, the bus stations are road 2 harbor bus stations and 17 road side bus stations, and the platform length is 50 m

(2) Chaoyang North Road: 15979 m<sup>2</sup> bus lanes are constructed with colored asphalt concrete, newly build 6 pairs of bus stations, which are mid-road type, and the platform length is 45 m

(3) Yinghui Road: Bus lane pavement in north section is transformed to colored asphalt concrete pavement, and transform 11470 m<sup>2</sup> pavement; in south section, additional pavement is not made for bus lane, the original stone pavement is used, remove the 2 roadside harbor bus stations along the original road in north section and other road side bus station, newly build 9 bus stations, which is mid-road type, and the platform length is about

45 m; newly build 3 bus station in south section, and the platform length is about 36 m

(4) Zero kilometer bus junction station: it is arranged with boarding zone and getting-off zone, serving 8 routes, and the parking capacity is 56 standard sets.

(5) Railway station bus junction station: serve 3 routes, and the parking capacity is 80 standard sets.

### **3.2.1.3 Barrier free design**

The barrier free design of this project shall meet the travel demands of visual disabilities and physical disabilities and weak elders, and children by using the road traffic facilities at the sidewalk of road section, entrance and exit of the units along the way, road intersection, pedestrian crossing facilities, bridge, bus station.

#### **(1) Barrier free design of road section**

The barrier free facilities of the road, pave travel sidewalk for the blind on the road section, to guide the visual disabilities to walk by using the touch of foot bottom. The travel sidewalk for the blind shall be paved continuously on the road section, the barrier free paving location is generally 0.25 to 0.3 m away from the greenbelt or plant pit of border tree, the width of the travel sidewalk for the blind is 0.3 m. Warning sidewalk for the blind shall be arranged at the turning point of the travel sidewalk for the blind. For the barriers which do exist, or the articles that may cause danger to visual disabilities, warning sidewalk for the blind fence shall be adopted, to remind the visual disabilities to go around. Meanwhile, sudden height difference and cross ridge shall not be equipped at sidewalk of the road section, to be convenient for the physical disabilities to use wheelchair for travelling. If there is height difference and cross ridge, use slope for transition, and the slope gradient shall meet the requirements of 1:20.

#### **(2) Barrier free design at the intersection**

For the sidewalk at road intersection, curb ramp shall be arranged at the curb position of the corresponding pedestrian crosswalk lines, where, the curb ramp gradient of single face is 1:20, the curb ramp gradient of three faces is 1:12. The ground of the roadway that higher than the gradient lower mouth shall be no more than 20 mm. The intersection pedestrian crosswalk line runs through both sides of the road, lower the height through the road and isolation belt, to meet travelling of wheelchairs. Warning sidewalk for the blind shall be arranged at the intersection, and the warning sidewalk for the blind is connected with the travel sidewalk for the blind of the sidewalk. Meanwhile, sound facilities are arranged, for the visual disabilities to confirm whether to pass the intersection.

### (3) Barrier free design of the entrances and exits along the way

In the places that there are fewer in and out of vehicles at the entrances and exits, and the width of entrances and exits is small, such as shops along the way, the three faces slope form entrances and exits for lowering the side stone is arranged, the travelling direction gradient on the sidewalk is 1:20, and the travel sidewalk for the blind are passed continuously. In the places that there are more in and out of vehicles at the entrances and exits, and the width of entrances and exits is large, such as shops along the way, the entrances and exits of intersection curb type is arranged, single face slope curb gradient is arranged at the curb of sidewalk, the gradient is 1:20, and warning sidewalk for the blind is arranged at the upper mouth of the ramp.

### (4) Barrier free design at bus station

At bus station, warning sidewalk for the blind and wheelchair ramp shall be arranged at the corresponding position of sidewalk, to be convenient for the visual disabilities and physical disabilities to wait for buses, get on and off bus. The warning sidewalk for the blind on sidewalk is connected with the traveling sidewalk for the blind, to warn that the sidewalk for the blind is arranged at the turning point of travel sidewalk for the blind, and a warning sidewalk for the blind of 4 m long is equipped at the side of the bus waiting station. The ramp gradient of wheelchair is 1:20.

## **3.2.1.4 Water supply and drainage works**

### (1) Water supply status

There is one water plant in Jianshui County currently, which locates in Sujiapo in the north part of the urban area, and it occupies about 4.4 hectares. The design scale is 40,000 tons/day, which is constructed in two stages, and the scale of the first stage is 20,000 tons/day, which has been put into operation. The water source is the Qingyun reservoir of Yuejin river system. The water production capacity of the water plant is 20,000 tons/day, the actual water supply scale is 19,200 tons/day, and the maximum daily water supply amount is 22,000 tons/day. The actual annual water supply amount is 5,765,400 tons/day, and the actual annual water consumption is 4,861,500 tons/day. The water consumption population in 2008 is about 116,000, and the maximum daily water consumption is about 190 L/person /day. The leakage rate of pipeline network is 8.36%.

Through several years' reconstruction, supplementation and improvement, the water supply pipe network in Jianshui urban area has formed complete urban water supply pipe network pattern at present. The water supply pipe network above DN 100 of Jianshui

County running-water Company is about 90 km.

Besides, there are more than 100 driven wells scattered in each unit, countryside and town in Jianshui dam district and it can extract underground water.

## (2) Water drainage status

Currently, rainwater and sewage confluence drainage system is used in Jianshui County, and a set of complete drainage system is established. Where, in north new area, it is drainage system of separate system. The terrain of Jianshui County is high in the west and low in the east, and high in the north and low in the south, the highest elevation is 1320 m, the lowest place outside east city is 1302 m, the height difference is 18 m, the drainage of existing rainwater is from west to east, and from north to south, in north side of the county, Shala River flows from west to east to the Lujiang river, in south side of the county, Lujiang River is from west to east, and then from south to northeast direction, and flow eastward to Nanpan river after joined with Shala River, the rainwater and sewage in the county is mainly drained with the two rivers.

## (3) Design scheme of water supply and drainage works

Water supply pipes and sewage pipelines are only laid in the section between Huili Road and Fu'an Road of the south loop, which is arranged along the northwest side of the road; the rainwater pipelines are arranged along two sides of the road in the whole section from Huili Road to Qingshan Road of south loop.

Water supply pipe layout: on north side, it is connected with the water supply pipe on Huili Road, on south side, it is connected with the water supply pipe on Fu'an Road, a loop water supply system is formed, the pipe diameter is DN 200 mm, and the pipe material is PE water supply pipe.

Rainwater pipe layout: as the road gradient is small, and there are undulated pavements, in order to avoid overlarge pipe diameter of rainwater pipeline, it is buried deeply, the rainwater pipeline is laid along the slope direction of road, which is drained section by section.

Sewage pipeline layout: the sewage pipeline in south of Shala River shall be laid along the northwest side of the road from south to north from the intersection of Fu'an Road and south loop, at least to south bank of Shala River to drain into sewage main pipe of Shala River, while the sewage pipeline in north of Shala River shall be laid along the northwest side of the road from north to south from the intersection of Huili Road and south loop, at least to north bank of Shala River to drain into sewage main pipe of Shala

River, and finally joined into the sewage treatment plant in north bank of Shala River. The sewage pipelines crossing the railway section shall adopt pipe jacking construction method. The pipe diameter of sewage pipeline is DN400 to DN500, and the pipe material shall adopt HDPE pipe.

### **3.2.1.5 Power and communication works**

#### (1) Power works

It is predicted with the electricity load that the comprehensive electricity consumption index per capita is as per 5500KWH/(person<sup>2</sup>a), and it is predicted that the electricity consumption amount at the specified future period is 13,750,000,000 kilowatt-hour, and the maximum load value is 250,000 kilowatt.

The cable laying method shall be determined according to the factors such as voltage class, final numbers, construction condition and initial investment etc., which can adopt the following methods according to different conditions:

A. Drainage pipe laying: it applies to the section with more cables, and heavy load such as motor vehicles etc.;

B. Groove laying: it applies to the channel that cannot embedded underground directly and without motor vehicles load;

C. Direct burial laying: it applies to the marginal zone of green zone and public building room;

D. Bridge laying: it applies to cable laying of basement

The power cable shall be laid on the road in pipe ditch method. The cross section dimension of power cable ditch shall be B<sup>3</sup> H=1.2m<sup>3</sup> 1.5m, cable sleeve direct burial type can be adopted at the road intersection, the vertical elevation requirements is confirmed, and earthing shall be controlled as per 0.7 m to 1.0 m.

#### (2) Communication works

While implementing municipal roads, according planning and actual project condition, communication pipelines can be provided for the pipelines required by various communication, broadcasting and TV and interconnection and interworking of each department. The communication pipelines are arranged under the sidewalk or green belt of road, referring to the construction experience of Yunnan weak current pipeline works, consider arranging the communication tube block group no less than 10 holes on the main road. The communication cable pipe on the road section is combined with the communication cable drainage requirements vertically, pavement evenness and be



convenient for pipe ditch overhaul, enough crossing pipe shall be reserved at road intersection and cross pipe can adopt communication cable sleeve direct burial type, the vertical elevation is determined according to the control elevation of the drainage pipe, comprehensively considering the vertical requirements of each pipeline, the earthing shall be controlled as per 0.7 to 1.0 m, to guarantee the communication using requirements at both sides of road.

### **3.2.1.6 Intelligent traffic system**

#### (1) Intelligent control system

a. Traffic signal control system: update 10 sets of semaphores at the intersection; newly provide 9 sets of semaphores at the intersection;

10 sets of pedestrian secondary crossing signal, vehicles and central software and hardware.

b. Electronic polices: 78 sets.

c. CCTV monitoring system: 23 sets.

#### (2) Construction of traffic management subsystem

1 set normal temperature road construction planning vehicle, 1 set hot melting road construction planning vehicle, 1 set hydraulic aerial cage, 1 set communication command vehicle, 2 sets of road wreckers, 1 set trailer type automatic road cone placing recycle equipment, and 1 set public traffic trailer.

#### (3) Accident data collection and analysis platform + traffic control center

Include management of data such as road basic data, traffic volume data, traffic enforcement data, traffic control data, public traffic data etc.

### **3.2.1.7 Demolition and greening works**

The road landscape design shall fully combine the surrounding land using function demands, and create the ecological form landscape environment blending of nature and artificial, with plant modeling and picture composition as the main manner. The greening works shall be with the evergreen plants as keynote, supplemented with specialty plants, to highlight the majestic, simple and natural modern new city landscape effect, and build the tree-lined road landscape with scenery along the road, and select the trees and grasses with strong adaptability, vigorous vitality and undeveloped root system to plant. The greening condition of each road is as follows:

(1) Jianshui Avenue: remove 7207 m<sup>2</sup> greenbelts, and newly add 3701 m<sup>2</sup> greenbelts.

(2) Chaoyang North Road: remove 3299 m<sup>2</sup> greenbelts, and newly add 1638 m<sup>2</sup> greenbelts.

(3) Yinghui Road: remove 1625 m<sup>2</sup> greenbelts.

### **3.2.1.8 Lighting works**

(1) Street lamp layout:

Street lamp lighting shall be arranged as per two sides, the street lamps are installed on the sidewalk at the roadside, the lamp post is 12 m high, and the spacing is 30 m. The lamps shall be LED lamp.

The designed average illumination of secondary main road is 15 LX, and the uniformity of illuminance is 0.35. The layout of lamps at the intersection shall be adjusted properly, to make the driver see clearly the intersection at the stopping sight distance.

(2) Street lamp power:

According to the road condition in the planning area, in order to guarantee the supply voltage quality of road lighting, road lighting shall be partition power supply method, supplied by the special loop of low-voltage busbar of the substation and distribution station of the adjacent road section of street lamps, the terminal voltage of the line shall be no less than 90% of the rated voltage.

(3) Street lamp power supply line laying:

Adopt electric wire through PE plastic pipe buried-pipe laying (crossing steel pipes are adopted when crossing roads).

Pipe burial requirements: the pipeline in sidewalk shall be excavated 50CM deep, and 30 CM wide, and the pipeline of car lane shall be excavated 80 CM deep and 30 CM wide; the PE pipe buried inside the sidewalk shall be covered with 20 CM C15 concrete.

### **3.2.1.9 Overall layout**

The road engineering construction of this subproject specifically includes: Jianshui Avenue, Chaoyang North Road, and Yinghui Road. The works such as the corresponding traffic engineering facilities design, traffic management planning etc. aiming at these three urban roads to carry out coordination function transformation and improvement and promotion. Comprehensive supporting facilities construction will be implemented on these three roads, to provide public traffic priority, provide convenience and accessibility of motor and bus, and relieve blocking to the urban areas caused by wide road breadth, and the traffic safety problems brought about by lacking of pedestrian crossing facilities and the public traffic operation conditions insufficiency caused by no convenient bus parking

station, to realize the purpose of leading urban development with comprehensive corridor. It mainly includes the construction contents on several aspects: arrangement scheme of bus lane, layout and setting form of bus station, canalization and transformation of intersection, planning and design of electromobile lane, transformation design of entrances and exits along the streets and corridor, planning and design of pedestrian crossing, traffic purification and deceleration facilities and intelligent traffic system design. Where, the corridor management of Honghe Avenue has been completed in road network function adjustment and subproject transformation.

### **3.3 Relying Works**

#### **3.3.1 Jianshui sewage treatment plant**

Jianshui sewage treatment plant was put into operation officially on December 6, 2011. It locates in Zhoujiazhuang in the east of the county, which is 3.5 kilometers away from the county, the floor area of the factory site is more than 60 acres, after putting into operation, the daily urban sewage treatment amount is 25,000 m<sup>3</sup> recently, and the daily sewage treatment amount will be 50,000 m<sup>3</sup> in the future. For the sewage after treatment, the effluent drainage standard shall be as per B standard of class I of *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918—2002). The sewage treatment plant handled the environmental evaluation procedures in 2008, and obtained the environmental approval, and passed environmental protection completion acceptance in May 2012, and the external drainage water shall meet the B standard of class I of GB18918—2002.

#### **3.3.2 Jianshui refuse landfill**

Jianshui refuse landfill locates in Laomama Mountain, Xihu Village, Jianshui County, and the engineering construction scale is 200 tons daily refuse treatment, which mainly serves the planning built-up area of the county. The service population is 136,900, and the coverage region areas is 16km<sup>2</sup>, which is built in 2006, handled environmental evaluation procedures in the early stage, and built up and put into operation in 2008, and passed environmental protection completion and acceptance.

#### **3.3.3 Fangmapping muck**

Fangmapping muck is a new muck planned by Jianshui Urban and Rural Construction

Bureau, which locates in east part of Jianshui County, about 6 km away from the urban areas, it is planned to pile construction waste and abandoned earthwork of the County. It is a discarded quarry previously, which occupies 36 hectares, and the planning waste slag piling height is 22 m, and the maximum slag is 7,800,000 m<sup>3</sup>.

The Fangmapping muck shall select the address in strict accordance with its address selection requirements, as shown in Table 3.3-1. Other measures are shown in Attachment I.

**Table 3.3-1 Reasonability Analysis for Address Selection of Fangmapping Muck**

Address Selection Requirements		Reasonability for Address Selection of Fangmapping Muck
Not to be selected	To be selected	
<ul style="list-style-type: none"> <li>•Basic farmland or other farmlands, paddy field and industrial crops land               <ul style="list-style-type: none"> <li>• House site</li> <li>• Forest land</li> </ul> </li> <li>•Lands within 200 m range of riverway land</li> <li>Lands within the sensitive area scope such as scenic spots, water conservation district, forest park etc.               <ul style="list-style-type: none"> <li>• Low-lying land or paddy field</li> </ul> </li> <li>• Lands with good vegetation coverage</li> <li>• Collapse and landslide danger area               <ul style="list-style-type: none"> <li>• Debris flow susceptible area</li> <li>• Lands for special use</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Wasteland</li> <li>• Abandoned land</li> <li>• Other inferior lands               <ul style="list-style-type: none"> <li>• Col terrain or low-laying terrain areas</li> </ul> </li> </ul>	<p>The project shall not occupy basic farmland, paddy field and industrial crops land, house site, forest land, or riverway, and scenic spots and water conservation districts etc. shall not be involved within the address selection scope, and the address selection scope has not found the geological disasters such as collapse and landslide etc.; the address selection of the project is abandoned quarry, the terrain is col, the surrounding lands is not suitable for planting crops and vegetation etc., then, the address selection is reasonable</p>

## 4 Project Environmental Impact

### 4.1 Environmental Impact Analysis of Engineering Construction

Aiming at the implementation steps of each construction project, the impact on environment and major pollutants shall be analyzed, as shown in Table 4.1-1.

**Table 4.1-1 Analysis Table for Impact on Environment by Proposed Project and Pollutants Generated**

Main Construction Contents	Implementation Steps	Steps with Influences	Major Pollutants	Impact on Environment	Mitigation Measures	Implementation Party
Jianshui Avenue, Chaoyang North Road, Yinghui Road	Road Construction	Site leveling, excavation and backfilling	Spoil, waste slag, TSP	Excavation and backfilling in construction process may generate dusts, piling of spoil may occupy urban lands, which may influence urban landscape, even disturb the earth surface, if the measures are not proper, it may cause water and soil loss within certain range.	The abandoned earthwork part is used for backfilling, the rest part will be transported to the Fangmaping muck appointed by urban construction department for piling; all the construction pavements are hardened, before construction, water the construction pavement, then the dust generated in construction process will be less.	Construction preparation: contractor  Environmental protection measures in construction period: contractor
		Mechanical operation	Noise, TSP, dust, SS	The mechanical noise and dusts generated in operation of various construction machineries such as large excavator, drilling machine, pile driver, and road roller etc.	The construction noise will be attenuated through the green belts at both sides of the road and obstruction of building, which has slight influence to the surrounding; Through watering and dust fall, the influence of dusts generated in mechanical operation is small.	Environmental protection measures in operation period: Jianshui Construction Bureau
		Material transporta	CO、NO <sub>x</sub> 、噪声、TSP	Noise, tail gas and dust generated in	The materials shall be covered with	

Main Construction Contents	Implementation Steps	Steps with Influences	Major Pollutants	Impact on Environment	Mitigation Measures	Implementation Party
		tion	CO, NO <sub>x</sub> , noise, TSP	vehicle operation of material transportation, dusts may be generated when cement, clay and dinas are scattered during loading, unloading and transportation process, which may influence the air quality of regional environment.	tarpaulin in transportation process and cleaning work of transporting vehicles shall be done; The vehicles shall slow down when getting through villages, and it is prohibited honking.	
		Asphalt stewing, mixing, paving	Asphalt fume	In pavement construction, the asphalt fume generated in asphalt stewing, mixing, paving process may influence the air quality of the regional environment.	The using amount is small, it shall be covered with tarpaulin in transportation process, the diffusing capacity of asphalt is small, and asphalt fume may not generated after asphalt concrete is cold, so the environment impact is temporary.	
		Activities of construction personnel	Household garbage	If the household garbage generated by the construction personnel is not treated properly, it may influence the urban landscape	The household garbage is based on the surrounding trash can and dust bin, which will be transported to refuse landfill regularly by the sanitation department for secure landfill.	
	Works Operation	Vehicle traffic	CO, NO <sub>x</sub> , noise, dust	Improvement of road make traffic volume increase, and the pollutant materials such as CO, NO <sub>x</sub> etc. in automobile exhaust may also increase atmosphere pollution load along the way; the traffic noise generated by	After diffusion and absorption of surrounding green belt, the impact on environment by automobile exhaust is not large. In operational period, through sweeping of pavement, and water the road in	

Main Construction Contents	Implementation Steps	Steps with Influences	Major Pollutants	Impact on Environment	Mitigation Measures	Implementation Party
				various vehicles may have different degrees of influence on the sensitive points at both sides.	strong wind weather, dusts are not easy to generate on pavement. The ordinary vehicle noise is in 80 dB (A), through blocking of surrounding green belt and buildings, it can meet class 4 standard within 30 m range of road, and meet class 2 standard beyond 30 m.	
		_____	_____	After completion of works, the traffic capacity will be improved, to improve the traffic environment, promote economic development, and influence the social environment.		
South loop	Land requisition and demolishing	Housing demolition	Construction waste, noise, TSP	Land requisition and demolishing will make the regional land using structure change; the noise, dusts and large amount of construction waste generated in demolishing may influence the regional environment quality, urban landscape and daily life.	The demolishing work is arranged during the day, and it is prohibited constructing at night; Arrange the construction site reasonably; Watering and dust fall to reduce dust influence; The construction waste shall be transported to Fangmaping muck appointed by urban construction department for piling.	
	Works construction	The major pollutants generated in site leveling, works excavation, expansion and backfilling, mechanical operation, material transportation, asphalt paving, and activities of construction			The prevention measures for major pollutants generated in site	

Main Construction Contents	Implementation Steps	Steps with Influences	Major Pollutants	Impact on Environment	Mitigation Measures	Implementation Party
		personnel and environment impact are the same as above.			leveling, works excavation, expansion and backfilling, mechanical operation, material transportation, asphalt paving, and activities of construction personnel are the same as above.	
	Works Operation	Major pollutions of vehicle traffic and environment impact are the same as above.			The prevention measures for major pollutions of vehicle traffic are the same as above.	
Bus priority subproject	Site leveling, foundation construction, main construction, land requisition and demolishing	The major pollutants generated in site leveling, excavation, backfilling, mechanical operation, material transportation, asphalt paving, and activities of construction personnel and environment impact are the same as above.			The prevention measures for major pollutants generated in site leveling, excavation, backfilling, mechanical operation, material transportation, asphalt paving, and activities of construction personnel are the same as above.	
	Works Operation	The pollutants generated in vehicle traffic and impact are the same as above.			The prevention measures of major pollutants generated in vehicle traffic are the same as above.	
		Foundation service facilities operation		Impact of solid waste, waste water, waste gas, noise on surrounding environment	For the details, see Part 5 Mitigation Measures for Environmental Impact	

## 4.2 Ecological Environmental Impact

In project construction process, it is required to demolish part of the housing construction, damage the original landscape factors, and damage the partial regional



landscape to some extent; in construction process, piling of foundation excavation, earthwork and building materials and disordered parking of temporary buildings and mechanical equipment may influence urban sanitation environment and urban landscape; the noise, dust, waste gas and construction waste generated by construction machineries and temporary work shed and the construction drainage may cause pollution to the surrounding environment, which may bring about certain damage to the urban landscape. The above influences are happened during the construction period, as the end of the construction period, the influence may disappear.

After completion of the project, use the native tree to enhance greening proportion of the newly-built and transformed roads, reasonable configuration of green belt may protect the pavement, reduce water and soil loss, reduce traffic dust and traffic noise, regulate and improve the comprehensive environmental benefits such as road micorclimate etc., further improve the landscape environment along the way, and play a role in beautifying the city.

## **4.3 Water Environmental Impact**

### **4.3.1 Construction Period**

#### **(1) Road construction works**

The sewage sources during construction period of the project are mainly domestic sewage of construction personnel and construction waste water.

① The construction personnel are from the villages around the county, the domestic sewage are mainly the cleaning waste water for washing hands, based on the surrounding public facilities, the sewage generated will be drained to the municipal sewage conduit and entered the sewage treatment plant for treatment, which shall not be drained directly, thus, it has no influence to surface water.

② The construction production waste water mainly include a small amount of alkaline waste water generated in concrete mixing, and oily wastewater generated in cleaning and maintenance of construction machineries and vehicles. The wastewater of concrete mixing system is about 34m<sup>3</sup>/d, which are mainly sand, stone impurities cleaning and concrete production, the wastewater are muddy with larger amount of sediment. The mechanical equipment and transportation vehicles put into operation in project construction will generate flushing sewage during maintenance, the generation amount is about 9 m<sup>3</sup>/d, and the sediment content is high. According to survey of construction wastewater in similar project, the flushing and drainage water quality of construction mechanical vehicles is

COD 50~80mg/L, petroleum 1.0~2.0mg/L, SS150~200mg/L. Direct drainage of construction wastewater may pollute the water body along the way, it is prohibited to drain directly into the water body along the way, and the construction wastewater shall be recycled after oil separation sedimentation treatment.

## **(2) Bus priority subproject**

The wastewater in construction period is mainly construction wastewater, foundation ditch gushing, overland runoff and domestic sewage. During construction process, construction camps is not arranged, based on the surrounding villages, and the domestic sewage is mainly washing sewage. One wastewater collection pond and one grit chamber shall be arranged during the construction period. Construction wastewater and domestic sewage will be collected in the collection pond, supernatant liquid will be used for watering workyard to reduce dust after sediment and substratum silt will be considered as earth to dispose. The grit chamber will collect water bursting from foundation ditch and overland runoff, supernatant liquid will be used for construction after sediment and substratum silt will be considered as earth to dispose. The wastewater shall be recycled during the construction period, which shall not be drained outside, and have slight impact on surface water.

### **4.3.2 Operation Period**

The wastewater generated in project operation period is mainly from the domestic sewage generated by the staffs in bus station, floating population and ancillary facilities, and the oily wastewater of comprehensive car yard vehicle overhaul, meanwhile, road rainwater will also generate certain wastewater.

#### **(1) Wastewater of bus station**

After the bus station at railway station project is completed, there are about 100 staff at station, and about 1000 passengers will be received every day, then the generation amount of sewage is about 16 m<sup>3</sup>/d. Car washing station and maintenance station shall be arranged in the station, 100 vehicles must be cleaned every day, then the car washing water is 5m<sup>3</sup>/d. The mess hall oily wastewater in domestic sewage of the project will be drained to septic tank for treatment after disposal through oil separator. Other domestic sewage shall also be drained to septic tank for treatment, and wastewater from car washer shall be treated through oil separator. In this project, one new buried sewage treatment station is built, its treatment scale is 25 m<sup>3</sup>/d, the domestic sewage and wastewater from car washer

after pretreatment will enter the self-built sewage treatment station for treatment, and then be drained to Lujiang River after meeting class I standard of *Integrated Wastewater Discharge Standard* (GB8978-1996). The water quality of Lujiang River is good currently, the environment capacity is larger, and the wastewater drained is less, it is predicted that the water quality change of Lujiang River is not large after accepting the treated wastewater, after self-cleaning capacity of water body, there is no impact on Lujiang River basically. Therefore, draining of wastewater at railway station after meeting the standards may have little impact on Lujiang River.

After zero kilometer bus station project is completed, there are about 100 staffs, and about 1800 passengers will be received every day, then the generation amount of sewage is about 22.4 m<sup>3</sup>/d. The mess hall oily wastewater in domestic sewage of the project will be drained to septic tank for treatment after disposal through oil separator. Other domestic sewage shall also be drained to septic tank for treatment. The treated sewage will be drained to Huili Road municipal sewage pipe network, and entered Jianshui sewage treatment plant for treatment.

Generation amount of wastewater at bus station, treatment measures and drainage destination are shown in Table 4.3-1.

**Table 4.3-1 Table for Generation Amount of Wastewater at Bus Station, Treatment Measures and Drainage Destination**

SN	Name	Sewage and Wastewater Type	Generation Amount (m <sup>3</sup> /d)	Treatment Measures and Drainage Destination
1	Bus station at railway station	Domestic sewage	16	In this project, one new buried sewage treatment station is built, its treatment scale is 25 m <sup>3</sup> /d, the domestic sewage and wastewater from car washer after pretreatment will enter the self-built sewage treatment station for treatment,
		Oily wastewater		
		Wastewater from car washer	5	
2	Zero kilometer bus station	Domestic sewage	22.4	The mess hall oily wastewater in domestic sewage will be drained to septic tank for treatment after disposal through oil separator. Other domestic sewage shall also be drained to septic tank for treatment. The treated sewage will be drained to Huili Road municipal sewage pipe network, and entered Jianshui sewage treatment plant for treatment.
		Oily wastewater		

Jianshui sewage treatment plant was put into operation officially on December 6, 2011. It locates in Zhoujiazhuang in the east of the county, which is 3.5 kilometers away from the

county, the floor area of the factory site is more than 60 acres, after putting into operation, the daily urban sewage treatment amount is 25,000 m<sup>3</sup> recently, and the daily sewage treatment amount will be 50,000 m<sup>3</sup> in the future. For the sewage after treatment, the effluent drainage standard shall be as per B standard of class I of *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918—2002). The sewage treatment plant handled the environmental evaluation procedures in 2008, and obtained the environmental approval, and passed environmental protection completion acceptance in May 2012, and the external drainage water shall meet the B standard of class I of GB18918—2002. The sewage pipe network around the project is complete, and operation of Jianshui sewage plant is normal, the effluent water quality can meet the standard, and the treatment capacity is 25,000 m<sup>3</sup>/d recently, and the wastewater amount generated in this project is relatively small, and the sewage in the project can be drained to sewage treatment plant for treatment.

(2) After the road works of the project is completed, the wastewater in Operation period is mainly rainwater, and the major pollutant factors of rainwater are SS and COD. The road rainwater will be drained to the rainwater pipeline, according to the analogous estimation, the emission intensity of COD and annual pollutant load in normal condition during operation period will be relatively small, the pollutants influence can be eliminated basically relying on the purification performance of the water body itself, therefore, after the project is completed, the road rainwater may not has obvious impact on water environment in normal condition. However, the pavement shall be cleaned timely, to minimize rainwater pollutant load in the initial period.

(3) The project is urban road, it is not allowed to transport dangerous chemical within the road scope, and thus, the project does not exist risks of vehicle traffic accident risks due to loading of poisonous and hazardous substance which may pollute the water body basically. The newly-built road of the project does not cross surface water body, thus, the risks of transporting hazardous substance which may pollute water body is very small.

## **4.4 Acoustic Environmental Impact**

### **4.4.1 Construction Period**

#### **(1) Integrated transportation improvement subproject for core area**

##### **① Jianshui Avenue**

The equipment adopted in construction of the project is mainly pavement cutter, road

roller, and transportation vehicles etc., using of equipment is less, and it is used discontinuously. Perform noise prediction with construction noise of 90 dB (A) at 2 m of construction pavement, about 5 dB (A) can be reduced through the green belts at both sides of road and building noise, which can meet class 4 standard at 12 m, and can meet class 2 standard at 36 m.

The clinic and inpatient department of Jianshui Peoples' Hospital and roads are separated with parking lot and green belt, the distance is far more than 50 m, thus, the construction noise has no impact on hospital. The Youth Activity Center and roads are separated with large green belt, and the noise generated may have little impact after blocked by greening and buildings. Only street lamp transformation is done for Trade and Tourism Technical School and Honghe Police Training School, no mechanical equipment is adopted during construction process, and the impact of noise is small.

#### ②Chaoyang North Road

The equipment adopted in construction of the project is mainly pavement cutter, road roller, and transportation vehicles etc., using of equipment is less, and it is used discontinuously. Perform noise prediction with construction noise of 90 dB (A) at 2 m of construction pavement, about 5 dB (A) can be reduced through the green belts at both sides of road and building noise, which can meet class 4 standard at 12 m, and can meet class 2 standard at 36 m.

Only street lamp transformation is done around Minhua kindergarten, no mechanical equipment is adopted during construction process, the construction noise in this road section is small, and the noise impact on kindergarten after absorption of surrounding green belt and building is smaller. Jianmin Middle School is near the road, but the teaching areas and dormitory areas are far away from the roads, and for the office areas nearer to the road, holiday construction is adopted in construction, so it has small impact on school. Only a pedestrian crossing and green belt are separated between the dormitory of Jianshui No. 1 Middle School and roads, it may affect the first row of buildings adjacent to roads, holiday construction is adopted in construction, so the impact on school is small. The authority kindergarten is about 20 m away from the road, but the distance to the teaching areas, and dormitory areas are farther, which is more than 40 m, thus, project construction may have no impact on normal teaching and noon break.

#### ③Yinghui Road

The equipment adopted in construction of the project is mainly pavement cutter, road

roller, and transportation vehicles etc., using of equipment is less, and it is used discontinuously. Perform noise prediction with construction noise of 90 dB (A) at 2 m of construction pavement, about 5 dB (A) can be reduced through the green belts at both sides of road and building noise, which can meet class 4 standard at 12 m, and can meet class 2 standard at 36 m.

Road transformation is not done on the pavement where No. 1 Primary School locates, it only involves street lamps transformation and signboard added, no mechanical equipment is used during construction process, and the construction noise has no impact. Tongji Hospital and Union Hospital locates in the north section of Yinghui Road, adjacent to roads, and the construction noise still can generate certain impact through absorption of green belt and blocking of surrounding buildings, the influence scope is about 36 m near the road.

## **(2) Bus priority subproject**

### **① Bus station at railway station**

The noise during construction period is mainly divided into construction noise and construction vehicle noise. The construction machineries are mainly bulldozer, pile driver and excavator etc., its mechanical noise source is about 80 dB (A), which is predicted with the overlay value of various construction equipment noise source of 90 dB (A), at about 122 m outside the construction site, it can meet *Emission Standard of Environment Noise for Boundary of Construction Site*, there is no resident within 300 m scope around the construction site, the impact on environment by construction noise is small. In vehicle transportation process, certain impact may be generated for the residents along the road, as the passing time is transient, the vehicles shall slow down and be no honking when getting through the villages, the impact on villages is not large, and the impacting time is transient.

### **② Zero kilometer bus station**

The noise during construction period is mainly divided into construction noise and construction vehicle noise. The construction machineries are mainly bulldozer, pile driver and excavator etc., its mechanical noise source is about 80 dB (A), which is predicted with the overlay value of various construction equipment noise source of 90 dB (A), at about 122 m outside the construction site, it can meet *Emission Standard of Environment Noise for Boundary of Construction Site*, the nearest village around the construction site is Xiaomaichang Village, it is about 95 m away from the nearest residents, it will affect the surrounding 16 shops and residents during construction process. During construction,

through arrangement of construction barrier, adopting low noise equipment, strict control of construction time, adding with no construction at night, and the construction period is transient, the noise during construction period may be reduced greatly to the acceptable scope. In vehicle transportation process, certain impact may be generated for the residents along the road, as the passing time is transient, the vehicles shall slow down and be no honking when getting through the villages, the impact on villages is not large, and the impacting time is transient.

### **(3) South loop subproject**

Noise during construction process is mainly construction equipment noise and transportation vehicle noise. The mechanical equipment used during construction process in the project is more, the continuous and large intensity noise source are loader, land leveler, road roller, bulldozer and generator unit etc. In project construction, housing demolition will be done for part of buildings of residents of 37 household and Integrative Medicine Hospital, there are residents around the demolition family, and the construction noise may have great impact on them. As the demolition process is temporary, the demolition work is arranged during the day, and notifies the residents around the demolition house in advance to minimum the noise impact.

During construction process, several equipment are constructed at the same time, noise prediction shall be done with the overlay sound source of 100 dB (A) at 2 m of several equipment, when measures are not taken, the noise value outside 64 m shall meet the daytime standard limit in *Emission Standard of Ambient Noise for Boundary of Construction*, and the value outside 356 m at night shall meet the standard. As the project is not constructed at night, the impact of project construction on residents, hospitals and shops within 64 m along the road is large.

During construction period, large amount of transportation vehicles will be used, the noise radiation intensity of these transportation vehicles, especially the heavy load vehicles, are high, which may generate large disturbance to the surrounding environment of construction site, construction road and existing road that the vehicles passing through frequently.

During project construction process, arrange the construction site reasonably, and arrange the site far away from the places of residential areas, low noise equipment shall be selected to the greatest extent in construction, control the time strictly, prohibit construction at night, after adopting measures, impact on the areas along the construction

line may be reduced. As the construction period is short, once the construction activities end, the construction noise will also disappear.

#### **4.4.2 Operation Period**

##### **(1) Integrated transportation improvement subproject for core area**

###### **① Jianshui Avenue**

The noise in the project is mainly vehicle noise, the ordinary vehicle noise is 80 dB (A), through blocking of the surrounding green belt and buildings, it can meet class 4 standard within 30 m of the road, and meet class 2 standard beyond 30 m. The distance between the clinic and inpatient department of Jianshui Peoples' Hospital and road is more than 50 m, so the impact of vehicle noise is small. The Youth Palace and the two schools are near the road, vehicle noise may affect the adjacent 30 m scope of the road.

###### **② Chaoyang North Road**

The noise in the project is mainly vehicle noise, the ordinary vehicle noise is 80 dB (A), through blocking of the surrounding green belt and buildings, it can meet class 4 standard within 30 m of the road, and meet class 2 standard beyond 30 m. The distance between Jianmin Middle School, teaching areas and dormitory areas of authority kindergarten and the road is more than 30 m, the noise impact is small. Minhua kindergarten and the dormitory areas of Jianshui No. 1 Middle School is nearer to the road, vehicle noise may affect the adjacent 30 m scope of the road.

###### **③ Yinghui Road**

The noise in the project is mainly vehicle noise, the ordinary vehicle noise is 80 dB (A), through blocking of the surrounding green belt and buildings, it can meet class 4 standard within 30 m of the road, and meet class 2 standard beyond 30 m. No. 2 Primary School, Tongji Hospital and Union Hospital are near the road, vehicle noise may affect the adjacent 30 m scope of the road.

##### **(2) Bus priority subproject**

###### **① Bus station at railway station**

During Operation period, the noise is mainly vehicle operation noise and the noise generated when repairing vehicles. Where, the operation noise is only generated when approaching or getting out of the construction site, the time is transient, and there are no residents 300 m around, so the noise impact on environment is less. The maintenance vehicles are not more every day, the noise generated is discontinuous, perform prediction



with the noise of 80 dB (A) at 2 m from the sound source, about 8 dB (A) may be reduced through blocking of buildings and absorption of ground and air, after 25 m, the noise can meet class II standard. There are no residents within 300 m, so the impact on environment is less

②Zero kilometer bus station

During operation period, the noise is mainly vehicle operation noise. Where, the operation noise is only generated when approaching or getting out of the construction site, the time is transient, so the noise impact on environment is less.

**(3) South loop subproject**

During operation period, the noise is mainly vehicle noise. The newly-built south loop shall be as per class 4a standard within the range of 30±5m, and class 2 shall be executed outside the range of 30±5m, where, Honghe Integrative Medicine Hospital as per class 2 standard. Perform prediction with the vehicle noise of 85dB(A) 2 m away from the sound source, in the condition not considering the building shield, the places 50 m away from the center line of the road can meet the requirements of class 4 standard, and the places 110 m away from the center line of the road can meet the requirements of class 2 standard. The road gets through Xiaomaichang Village, Shaba Village, Sujiaying, Lingguan Temple, Honghe Integrative Medicine Hospital and Hewan Village, the noise of the above relation points exceed the standard within the range of 110 m away from the road, which may affect residents of about 160 households.

**4.5 Impact of Ambient Air**

**4.5.1 Construction Period**

**(1) Integrated transportation improvement subproject for core area**

①Jianshui Avenue

Exhaust gases during the construction process are mainly construction dust emission, dust emission from transport vehicle, waste gas from construction machinery and asphalt fume. Dust during the construction mainly results from intersection reconstruction, demolition of bus stop and removal of green belt. The project has small quantities with short construction time and it is only provided with a temporary work yard that is not arranged in concrete mixing plant. Construction pavement is hardened and watered before construction so that small dust emission will be generated during the construction process. There are a few transport vehicles during the construction process and vehicles for construction are covered with tarpaulins during transportation of materials at slow speed as

a result of small dust emission. Mechanical equipment used for the project is a few and they are not used at the same time for long time so that they release small quantity of exhaust gas that does not greatly influence the environment after diffusion. Small quantity of commercial asphalt concrete are used for road reconstruction and they are covered with tarpaulins during transportation so that there is a small diffusing capacity of asphalt fume and there is no more asphalt fume after the asphalt concrete cools with influencing environment for short time. In conclusion, exhaust gas during the construction period does not have great impact on environment after application of measures.

Concerned places, including Jianshui People's Hospital, Youth Activity Center, Honghe Trade and Tourism Technical School and Honghe Police Training School, are separated from the construction road by green belt and enclosure and no workyard is arranged around them so that dust emission and exhaust gas slightly influence them.

#### ②Chaoyang North Road

Exhaust gases during the construction process are mainly construction dust emission, dust emission from transport vehicle, waste gas from construction machinery and asphalt fume. Dust during the construction mainly results from intersection reconstruction, demolition of bus stop and removal of green belt. The project has small quantities with short construction time and it is only provided with temporary work yard that is not arranged in concrete mixing plant. Construction pavement is hardened and is watered before construction so that small dust emission is generated during the construction process. There are a few transport vehicles during the construction process and vehicles for construction are covered with tarpaulins during transportation of materials at slow speed as a result of small dust emission. Mechanical equipment used for the project is a few and they are not used at the same time for long time so that they release small quantity of exhaust gas that does not greatly influence the environment after diffusion. Small quantity of commercial asphalt concrete are used for road reconstruction and they are covered with tarpaulins during transportation so that there is a small diffusing capacity of asphalt fume and there is no more asphalt fume after the asphalt concrete cools with influencing environment for short time. In conclusion, exhaust gas during the construction period does not have great impact on environment after application of measures.

Concerned places, including Minhua Kindergarten, Jianmin Middle School and Authority Kindergarten, are separated from the construction road by sidewalk and green belt and no workyard is arranged around the concerned places so that dust emission and

exhaust gas slightly influence them.

### ③Yinghui Road

Exhaust gases during the construction process are mainly construction dust emission, dust emission from transport vehicle, waste gas from construction machinery and asphalt fume. Dust during the construction mainly results from intersection reconstruction, demolition of bus stop and removal of green belt. The project has small quantities with short construction time and it is only provided with a temporary work yard that is not arranged in concrete mixing plant. Construction pavement is hardened and watered before construction so that small dust emission is generated during the construction process. There are a few transport vehicles during the construction process and vehicles for construction are covered with tarpaulins during transportation of materials at slow speed as a result of small dust emission. Mechanical equipment used for the project is a few and they are not used at the same time for long time so that they release small quantity of exhaust gas that does not greatly influence the environment after diffusion. Small quantity of commercial asphalt concrete are used for road reconstruction and they are covered with tarpaulins during transportation so that there is a small diffusing capacity of asphalt fume and there is no more asphalt fume after the asphalt concrete cools with influencing environment for short time. In conclusion, exhaust gas during the construction period does not have great impact on environment after application of measures.

Road in the area at which Jianshui No. 2 Primary School is located will not be reconstructed only with movement of street lamps and addition of sign boards as a result of small dust emission and no impact on the school. Tongji Hospital and Union Hospital are separated from the construction road by sidewalk and green belt and no workyard is arranged around the concerned places so that dust emission and exhaust gas slightly influence them.

### **(2) Bus priority subproject**

Exhaust gases during the construction period are mainly dust emission and oil-fired exhaust gas. The dust emission is generated during construction of structures, placement of foundation, load and unload of vehicle transport and transportation of civil engineering materials while that exhaust gas is from construction machinery. Exhaust gas due to construction can influence the scope of 150 m around the workyard. Dust emission capacity due to construction will be reduced with slight impact on environment through reasonable arrangement of workyard, covering earthwork and building materials with

tarpaulins while piling them, and watering the workyard for reduction of dust.

### **(3) South loop subproject**

Exhaust gases during the construction period are mainly dust emission and oil-fired exhaust gas. The dust emission is mainly from demolition and construction of houses. Houses to be removed for the project are partially civil structure and partially brick-concrete structure, of which, removal of civil-structure houses will generate a lot of dust and barriers shall be arranged around the houses to be removed during the process with on-site spray. Dust can be completely settled after several hours and has limited time of influencing surroundings and will be disappear as the removal work is finished as well as impact on environment because demolition process is short. Materials of construction shall be stored well during the construction process, materials which can easily produce dust shall be piled up far away from residential area and be covered with tarpaulins and measures such as watering for reduction of dust shall be adopted during the construction process with a result of construction dust slightly influencing environment.

Construction equipment are scattered and not intensively used so that oil-fired exhaust gas during the construction process does not have great impact on the environment after diffusion.

Asphalt concrete shall be used for the whole south loop and asphalt shall not be processed and mixed in the workyard during road surfacing. During the construction process, asphalt fume mainly results from transportation of asphalt and road surfacing and therefore covering with tarpaulins in transit will reduce diffusion of asphalt fume, with short process of paving and amount of exhaust gas will reduce after asphalt cools. As the construction period comes to the end, exhaust gas due to construction will not influence on environment anymore.

## **4.5.2 Operation Period**

### **(1) Integrated transportation improvement subproject for core area**

Exhaust gases in the operation period after completion of road works are mainly vehicle exhaust and dust emission. Traffic flow does not greatly change after reconstruction of road and consequently vehicle exhaust does not increase a lot and will not intensify pollution of surroundings. Vehicle exhaust does not greatly influence the environment due to diffusion and absorption by ambient green belt. It is not easy to raise dust on the road because the road is swept during the operation period and watered in

windy days.

## **(2) Bus priority subproject**

### **① Bus station at railway station**

Exhaust gases in the operation period are mainly vehicle exhaust, dust due to vehicle travel and malodorous gas from sewage treatment station. There are 3 lines of bus at the bus station and buses create small quantity of exhaust gas at the same time because buses of different lines do not come in and go away at the same time and the exhaust gas influences the environment slightly after air diffusion. Floor of bus station shall be cleaned every day and watered in windy days and vehicles run at slow speed at the time of coming in and going out of the station so that there is only small quantity of dust. Sewage treatment station for the project shall be arranged under the ground and consequently the malodorous gas cannot diffuse easily and has slight influence on the environment. In conclusion, exhaust gases in the operation period have slight influence on the environment.

### **② Zero kilometer bus station**

Exhaust gases in the operation period are mainly vehicle exhaust, dust due to vehicle travel and malodorous gas from sewage treatment station. There are 8 lines of bus at the bus station and buses create small quantity of exhaust gas at the same time because buses of different lines do not come in and go away at the same time and the exhaust gas influences the environment slightly after air diffusion. Floor of bus station is cleaned every day and watered in windy days and vehicles runs at slow speed at the time of coming in and going out of the station so that there is only small quantity of dust. Sewage treatment station for the project is arranged under the ground and consequently the malodorous gas cannot diffuse easily and has slight influence on the environment. In conclusion, exhaust gases in the operation period have slight influence on the environment.

## **(3) South loop subproject**

Exhaust gases in the operation period are mainly vehicle exhaust and dust. Emission of vehicle exhaust will influence air quality of surroundings and vehicles cannot leave factory after they pass through inspection and therefore their emission meets the emission standards for vehicles. Vehicle exhaust diffuses randomly and the emitted exhaust diffuses in the atmosphere and is absorbed by the green belt along the road as a result of slight influence on the environment. Sanitation workers are arranged to clean the south loop and the road is watered during dry weather so that it is difficult to raise dust on the road surface during the operation period and extremely small quantity of dust can slightly influence the

environment.

## **4.6 Impact of Solid Wastes**

### **4.6.1 Construction Period**

#### **(1) Integrated transportation improvement subproject for core area**

##### **①Jianshui Avenue**

Solid wastes caused by the project are mainly muck, earthwork and household garbage of constructors. Muck results from pavement reconstruction and demolition of station while earthwork results from removal of green belt. Muck output is 5917 m<sup>3</sup> and the generated muck is piled on the temporary construction road and transported to the Fangmapping Muck Yard specified by the urban construction department at the same day. Earth from removal of green belt is 2882.8 m<sup>3</sup>, of which 1480.4 m<sup>3</sup> will be used as earthing for newly added green belt in the later period, and the rest will be transported to Fangmapping Muck Yard to pile up. The household garbage shall be stored in the surrounding trash cans and dustbins and will be transported by the sanitation department at regular intervals to refuse landfill for secure landfill. After being processed properly, solid wastes have slight influence on the environment.

##### **②Chaoyang North Road**

Solid wastes caused by the project are mainly muck, earthwork and household garbage of constructors. Muck results from pavement reconstruction and demolition of station while earthwork results from removal of green belt. Muck output is 3195.6 m<sup>3</sup> and the generated muck is piled on the temporary construction road and transported to the Fangmapping Muck Yard at the same day. Earth from removal of green belt is 1319.6 m<sup>3</sup>, of which 655.2 m<sup>3</sup> will be used as earthing for newly added green belt in the later period, and the rest will be transported to Fangmapping Muck Yard to pile up. The household garbage shall be stored in the surrounding trash cans and dustbins and will be transported by the sanitation department at regular intervals to refuse landfill for secure landfill. After being processed properly, solid wastes have slight influence on the environment.

##### **③Yinghui Road**

Solid wastes caused by the project are mainly muck, earthwork and household garbage of constructors. Muck results from pavement reconstruction and demolition of station while earthwork results from removal of green belt. Muck output is 2294 m<sup>3</sup> and the generated muck is piled on the temporary construction road and transported to the

Fangmapping Muck Yard to pile up at the same day. Earth from removal of green belt is 650 m<sup>3</sup>, which is piled on the temporary construction road and transported to the Fangmapping Muck Yard to pile up that very day. The household garbage shall be stored in the surrounding trash cans and dustbins and will be transported by the sanitation department at regular intervals to refuse landfill for secure landfill. After being processed properly, solid wastes have slight influence on the environment.

## **(2) Bus priority subproject**

### **① Bus station at railway station**

Solid wastes during the construction period are mainly earthwork, building wastes and household garbage of constructors. Output of earthwork is 6040 m<sup>3</sup>, of which, 2416 m<sup>3</sup> is used for backfill and the rest spoil of 3624 m<sup>3</sup> shall be transported to the Fangmapping Muck Yard specified by the urban construction department to pile up. Building wastes created during the construction period are discarded bricks, tiles, steels, woods and aluminium alloy and they shall be collected according to classification and recycled to the greatest extent after the collection and those which cannot be used again shall be transported to slag dump for landfill. Temporary garbage collection stations shall be arranged during the construction period and household garbage shall be transported to the landfill for secure landfill after centralized collection. Solid wastes during the construction period have slight influence on the environment after being processed properly.

### **② Zero kilometer bus station**

Solid wastes during the construction period are mainly earthwork, building wastes and household garbage of constructors. Output of earthwork is 6670 m<sup>3</sup>, of which, 2668 m<sup>3</sup> is used for backfill and the rest spoil of 4002 m<sup>3</sup> shall be transported to the Fangmapping Muck Yard specified by the urban construction department to pile up. Building wastes created during the construction period are discarded bricks, tiles, steels, woods and aluminium alloy and they shall be collected according to classification and recycled to the greatest extent after the collection and those which cannot be used again shall be transported to slag dump for landfill. Temporary garbage collection stations shall be arranged during the construction period and household garbage shall be transported to the landfill for secure landfill after centralized collection. Solid wastes during the construction period have slight influence on the environment after being processed properly.

## **(3) South loop subproject**

Solid wastes caused by the project are mainly muck, earthwork and household

garbage of constructors. The amount of excavated earthwork during construction of the project is 374133 m<sup>3</sup> with amount of fill of 6675552 m<sup>3</sup> (including plain soil of 466232 m<sup>3</sup> and soil with 60% stone content of 201320 m<sup>3</sup>), amount of fill is more than the amount of cut for the project and earth excavated during the construction process will be totally backfilled without any muck. Insufficient fill shall be allocated and transported from Fangmapping Muck Yard by the urban construction department. Slab-block stones of 183232 m<sup>3</sup> and broken stone of 42948 m<sup>3</sup> required by the project shall be purchased from quarry. Building wastes from house demolition are about 11838 m<sup>3</sup> and the generated building wastes shall be transported by muck transport vehicles organized timely to Fangmapping Muck Yard to pile up and shall be allocated and transported together by the construction department. Output of household garbage of constructors is about 100 kg/d, a temporary garbage collecting pool is arranged at the workyard and the household garbage shall be transported away every half month after centralized collection and transported to Jianshui refuse landfill for secure landfill. Solid wastes during the construction period have slight influence on the environment after being processed.



**Table 4.5-1 Balance Analysis Table for Earthwork of the Project**

SN	Project Name		Sources	Amount of Cut (m <sup>3</sup> )	Amount of Backfill (m <sup>3</sup> )	Destination of Backfill	Amount of Discarded Earth (m <sup>3</sup> )	Destination of Discarded Earth (m <sup>3</sup> )
1	Integrated transportation improvement subproject for core area	Jianshui Avenue	Reconstruction of pavement Demolition of station	Muck: 5917	0		5917	Fangmapping Muck Yard
			Demolition of green belt	Earthwork: 2882.8 m <sup>3</sup>	1480.4	Used as earthing for newly added green belt in the later period	1402.4	
		Chaoyang North Road	Reconstruction of pavement Demolition of station	Muck: 3195.6	0			
			Demolition of green belt	Earthwork: 1319.6	655.2	Used as earthing for Newly added green belt in the later period	664.4	
		Yinghui Road	Reconstruction of pavement Demolition of station	Muck: 2294	0			
			Demolition of green belt	Earthwork: 650	0		650	
2	Bus priority subproject	Bus station at railway station	Excavation of site	Earthwork: 6040	2416	Backfill of site	3624	
		Zero kilometer bus	Excavation of site	Earthwork: 6670	2668	Backfill of	4002	

		station				site		
3	South loop subproject		Excavation of site	Earthwork: 374133	374133	Backfill of site	0	

Notes: (1) Earthwork quantity in the table is nature square meter;

(2) Earthwork excavated for construction access is included in excavation of road subgrade;

(3) Formulas for balance computation of earthwork in the table: amount of cut – amount of fill = amount of discarded earthwork + amount of surface soil temporarily stored.

#### **4.6.2 Operation Period**

##### **(1) Integrated transportation improvement subproject for core area**

###### **①Jianshui Avenue**

Solid wastes of the road during the operation period are mainly garbage created by pedestrians and muck of road maintenance and annual amount of muck is about 200 m<sup>3</sup>. The generated muck shall be transported to the muck yard specified by the urban construction department to pile up. Household garbage created by pedestrians shall be collected in the trash cans at both sides of the road and shall be transported to the landfill by the sanitation department at regular intervals for secure landfill. Solid wastes have slight influence on the environment after being processed properly.

###### **②Chaoyang North Road**

Solid wastes of the road during the operation period are mainly garbage created by pedestrians and muck of road maintenance and annual amount of muck is about 180 m<sup>3</sup>. The generated muck shall be transported to Fangmapping Muck Yard to pile up. Household garbage created by pedestrians shall be collected in the trash cans at both sides of the road and shall be transported to the landfill by the sanitation department at regular intervals for secure landfill. Solid wastes have slight influence on the environment after being processed properly.

###### **③Yinghui Road**

Solid wastes of the road during the operation period are mainly garbage created by pedestrians and muck of road maintenance and annual amount of muck is about 160 m<sup>3</sup>. The generated muck shall be transported to Fangmapping Muck Yard to pile up. Household garbage created by pedestrians shall be collected in the trash cans at both sides of the road and shall be transported to the landfill by the sanitation department at regular intervals for secure landfill. Solid wastes have slight influence on the environment after being processed properly.

##### **(2) Bus priority subproject**

###### **①Bus station at railway station**

Solid wastes during the operation period of the project are mainly household garbage, hazardous wastes due to car repairing and sludge from sewage station. Amount of the household garbage is 200 kg/d, trash cans and garbage chambers are arranged on site and garbage shall be transported to refuse landfill at regular intervals for secure landfill after

collection. For hazardous wastes such as discarded cotton yarn and duster cloth generated during the process of vehicle repair, one workshop for disposal of hazardous wastes shall be arranged at Parking & Maintenance Yard and the hazardous wastes shall be delivered to a unit with qualification for disposal of hazardous wastes to dispose after being collected. Sludge output of sewage treatment station is 38.3 t/a and it mainly results from domestic sewage, which contains organic matter, plentiful nitrogen, phosphor, potassium and microelements to be common hazardous waste. Sanitation department shall be entrusted to draw out the sewage treatment station quarterly, and after being drawn out and dehydrated, sludge shall be transported to refuse landfill for secure landfill. Solid wastes have slight influence on the environment after being processed properly.

#### ②Zero kilometer bus station

Solid wastes during the operation period of the project are mainly household garbage and sludge from sewage station. Amount of the household garbage is 280 kg/d and trash cans and garbage chambers are arranged on site and garbage shall be transported to refuse landfill at regular intervals for secure landfill after collection. Sludge output of sewage treatment station is 40.88 t/a, sanitation department shall be entrusted to draw out the sewage treatment station quarterly, and after being drawn out and dehydrated, sludge shall be transported to refuse landfill for secure landfill. Solid wastes have slight influence on the environment after being processed properly.

#### (3) South loop subproject

Solid wastes during the operation period of South Loop are mainly garbage created by pedestrians passing by and muck of road maintenance. Persons shall be specially assigned to sweep South Loop and garbage shall be transported to the nearest waste transfer station and included in other urban household garbage for disposal. Amount of muck generated during the process of road maintenance is about 260 m<sup>3</sup>/a and the muck shall be timely transported by vehicles for road maintenance to piling point of Fangmapping Muck Yard specified by urban construction department.

### **4.7 Impacts on Cultural Relics and Historic Sites**

Culture relic protection sites involved in the project are Chaoying Building, Dongjing and Double Dragon Bridge. Chaoyang Building is located at the intersection of Yinghui Road and Chaoyang North Road and no road reconstruction and demolition and new construction of station is planned at surroundings but only movement of street lamp and arrangement of warning boards will be done. Dongjing is located at south section of

Yinghui Road and only movement of street lamp and arrangement of warning boards will be required for the section. Double Dragon Bridge is located about 1600 m at west of intersection of South Loop and Extension of Qingshan Road.

(1) Chaoyang Building

Project construction's main impacts on Chaoyang Building are construction dust and mechanical vibration. No other activity will be done in section within range of 50 m around Chaoyang Building except movement of street lamp and arrangement of warning board. Few dust results from construction activity and no usage of large machinery will not damage buildings due to vibration. Other construction sections are far away from Chanoyang Building and the workyard shall be watered so that small amount of dust nearly has no impact on Chanoyang Building after diffusion. Therefore, project construction has a few impacts on Chanoyang Building.

(2) Dongjing

Project construction's main impacts on Dongjing are construction dust and mechanical vibration. Dongjing is located at south section of Yinghui Road, close to the road, and no other activity will be done in section within range of 50 m around Chaoyang Building except movement of street lamp and arrangement of warning board. And the section is slabstone road, no machinery will be used and road is watered during construction process so that a few dust raises and has slight impact on Dongjing. There is no vibration because of usage of no machinery.

(3) Double Dragon Bridge

Double Dragon Bridge is about 1600 m apart from the end of workyard of South Loop. Dust due to excavation and smooth of land during the construction might have impact on Double Dragon Bridge. Workyard will be watered to reduce dust during the construction and earthwork will be covered with tarpaulins during piling of earth so that it can effectively control dust output. Construction dust basically has no impact on Double Dragon Bridge because it is far away from Double Dragon Bridge and Double Dragon Bridge locates at upwind direction of the workyard.

Large machinery will be used in the construction process and machine work contains vibration but the mechanical vibration has no impact on Double Dragon Bridge because it is far away from Double Dragon Bridge and separated by farmland, road and green belt.

#### **4.8 Impacts on Agricultural Production**

Land occupied by South Loop is mainly farmland and project construction will cross

river and agricultural irrigation canals so that construction might cut off river and agricultural irrigation canals, thus influencing agricultural irrigation. Bridges and culverts will be arranged when South Loop crosses cross river and agricultural irrigation canals. No cofferdam will be constructed for river when bridges will be built on Shala River and Lujiang River and prestressed hollow bridge or T bridge will be built without any damage to riverway and impact on direction and flow of river so that it will not influence irrigation of farmland at downstream.

For construction of South Loop, bridges and culverts shall be constructed for agricultural irrigation canals and bridge floors shall be built in accordance with width and current of agricultural irrigation canals. It is unnecessary to block agricultural irrigation canals during the construction due to its small width and its channel shall be reinforced first in order to avoid impact on current caused by blocked channel due to collapse of river bank during the construction process. Agricultural irrigation canals will not be filled and blocked off during the construction so that it will not lead to no water in downstream and not influence irrigation of downstream farmland.

#### **4.9 Impacts on Railway**

South Loop passes through Yousuo section of Ge-Bi-Shi Railway. Ge-Bi-Shi railway is currently under off-the-line condition without any training. South Loop and the railway is level crossing. As required by Kunmin Railways Bureau, the construction shall not damage the railway and not influence railway. No workyard and temporary muck yard shall be arranged within railway safety protection area (namely 15 m from railway line) during the construction process. Warning boards shall be set up on both sides of railway line and both sides of railway shall not be excavated during the construction process so that the railway will not be damaged during the construction period.

Barrier wood shall be set up at cross of South Loop and railway and railroad grade crossing watched over by person shall be arranged after operation of Ge-Bi-Shi Railway in order to lay down the barrier wood before trains passing and forbid any vehicle and pedestrian passing by. Operation of South Loop will not influence normal operation of the railway.

#### **4.10 Impacts on Environmental Risk**

Based on analysis, environmental risks of the project are mainly polluted air and surface cause by leakage of hazardous chemicals during transportation. It is not permitted to transport hazardous chemicals on three urban roads reconstructed by the project and

newly built South Loop and therefore the project hardly has any environmental risk caused by traffic accident of vehicle loading poisonous and hazardous substance. However, during road transportation, if it is not strictly managed, travel of any transport vehicle with hazardous chemicals, misoperation by staff of transportation or other factor may lead to traffic accident such as crash or turnover so as to pollute environment. If any volatile hazardous chemical leaks, it will pollute air of the whole county and threaten lives of residents because there are many residents around urban road and South Loop. In case road crosses water area and hazardous chemical flows in riverway, it will lead to water pollution, which will not only influence aquatic flora and fauna but also significantly impact farmland. Traffic accident hardly happens after establishment of the proposed road, however such small probability event is possible and in case of any, it will harmfully influence environment and seriously affect surrounding residents.

#### **4.11 Social Impact**

The project construction has both positive and negative influences on society.

##### **4.11.1 Positive Impacts**

Project construction's positive influences on society are as follows:

(1) Reconstruction of three urban roads will make the urban road more beautiful and harmonious and meet requirements for urban planning.

(2) Warning boards will be set up at original dangerous crossings with speed bump arranged at dangerous sections and additional passageway for pedestrian passing streets and therefore three urban roads will be safer and more convenient after reconstruction.

(3) Establishment of two bus junction stations improves condition of buses parking disorderly and becomes convenient for passengers so as to improve comprehensive ability of urban traffic.

(4) Establishment of South Loop relieves urban traffic pressure.

(5) Project construction requires a large number of human and material resources and provides job opportunities for surrounding residents meanwhile it requires a lot of goods and materials and accordingly drive development of local economy.

##### **4.11.2 Negative Impacts**

###### **(1) Traffic impact**

Three roads to be reconstructed are urban main roads and there are schools and hospitals along three roads with large traffic flow and passenger flow. Occupation of lanes during the construction process will make roads narrow which results in slow travelling of

vehicles and then traffic jam and the project construction will cause inconvenience for pedestrians and vehicles, especially at crossing where schools and hospitals locate.

South Loop will pass through several villages and current roads, original traffic will be cut off during the construction process and additionally, a large number of vehicles will run on the roads during the construction process, which will cause traffic jam in several villages such as Xiaomaichang, Lingguan Temple, Shaba Village and Hewan Village and cause inconvenience for villagers.

### **(2) Commercial impact**

Three roads to be reconstructed are urban main roads and there are many shops and hotels in surrounding. Affected by the construction, passenger flow will reduce, which will influence business of shops and hotels. Additionally, exhaust gas and noise during the construction process will influence the surrounding shops.

### **(3) Social stability**

Farmland, forest land and pond are imposed and occupied for the project construction, meanwhile it involves demolition of existing houses and in addition, the project construction will influence business of surrounding shops. All of the above have a strong impact on residents' fundamental interests and if they are not solved properly, it can lead to group incident and then influence social stability.

Bus junction station and South Loop will impose and occupy land, of which bus junction station at zero kilometer will impose and occupy land of 10 mu with bus junction station at railway station of 15 mu, collectively-owned land of 303.94 mu and state-owned land of 2.43 mu for South Loop, rural residences to be removed of 8456 m<sup>2</sup> and buildings on state-owned land of 600 m<sup>2</sup>. The project construction will permanently influence 416 households with 1584 persons. For the affected population, 391 households with 1486 persons are affected by land acquisition, 37 households with 148 persons are influenced by rural house demolition and 12 households with 50 persons are impacted by both factors.





## **5 Mitigation Measures for Environmental Impact**

For potential influence of the project, measures shall be adopted to reinforce positive effect and slow adverse effect. Mitigation measures described in the section mainly aim at adverse effect occurred by the project design and implementation. Before commencement of construction, contractor shall develop detailed plans which aim at measures to be implemented for environmental protection of subdivisional works and construction site of workyards. Such requirement will be also included in bidding document of contractor.

Contractor shall ensure that required mitigation measures are fully implemented during the construction period of the project. Environmental management plan External Monitoring Company (EMC) employed by the owner will supervise aggregate performance of environmental protection and obligations and responsibilities of contractors and also report discovered problems to the project management office so as to take necessary actions.

### **5.1 Mitigation Measures for Environmental Impact at Design Stage**

#### **(1) Integrated transportation improvement subproject for core area**

##### **① Jianshui Avenue**

1. Coordination of appearance of proposed bust station with surrounding buildings shall be considered in the design scheme.

2. Marks of no whistle and speed bumps shall be arranged at crossings of Jianshui People's Hospital, Youth Activity Center, Honghe Trade and Tourism Technical School and Honghe Police Training School.

3. Form of construction work shall be designed according to traffic flow of Jianshui Avenue in order to avoid traffic jam during the construction period.

##### **② Chaoyang North Road**

1. Coordination of appearance of proposed bust station with surrounding buildings shall be considered in the design scheme.

2. Marks of no whistle and speed bumps shall be arranged at crossings of Minhua Kindergarten, Jianmin Middle School, Jianshui No. 1 Middle School and Authority Kindergarten.

3. Form of construction work shall be designed according to traffic flow of Chaoyang North Road in order to avoid traffic jam during the construction period.

##### **③ Yinghui Road**

1. Since two cultural relics protection units of Chaoyang Building and Dongjing are on Yinghui Road and south section of Yinghui Road is slabstone road, reconstruction project shall not be designed within range of two cultural relics protection units during the design process.

2. Coordination of appearance of proposed bust station with surrounding buildings shall be considered in the design scheme.

3. Marks of no whistle and speed bumps shall be arranged at crossings of Jianshui No. 2 Primary School, Tongji Hospital and Union Hospital;

4. Form of construction work shall be designed according to traffic flow of Yinghui Road in order to avoid traffic jam during the construction period and damage to historic buildings.

### **(2) Bus priority subproject**

1. Workyard shall be properly arranged and kept away from residential areas and rivers to the greatest extent and minimum farmland shall be occupied.

2. Reasonable form of construction work shall be selected in accordance with workyard and surroundings.

3. Trash cans shall be set up on site to collect solid wastes which will be transported by the sanitation department to refuse landfill for landfill.

4. One wastewater collection pond and one grit chamber shall be arranged during the construction period. Construction wastewater and domestic sewage will be collected in the collection pond, supernatant liquid will be used for watering workyard to reduce dust after sediment and substratum silt will be considered as earth to dispose. The grit chamber will collect water bursting from foundation ditch and overland runoff, supernatant liquid will be used for construction after sediment and substratum silt will be considered as earth to dispose.

### **(3) South loop subproject**

a. Field survey shall be conducted in the project area at early stage of road design in order to know land utilization within the project area, and with route design, an important principle of occupying cultivated land, greenbelt and resources of water area as few as possible shall be considered for design to work out two routes at least so as to select the one which occupies less land to reduce impact on farmland.

b. Houses shall be occupied as few as possible for road design.

c. Cultural relics and historic sites and cultural relics unit within the area shall be

investigated before design, it shall consult Cultural Relics Protection Bureau and integrate opinions of Cultural Relics Protection Bureau in the design.

## **5.2 Mitigation Measures for Water Environmental Impact**

### **5.2.1 Construction Period**

#### **(1) Integrated transportation improvement subproject for core area**

a. Reconstruction of inspection wells and inflow grates shall be completed first during the construction period in order to avoid leaves, pericarp and waste paper flowing into rainwater pipe with rainwater during the construction period.

b. It shall strictly manage constructors and prohibit random discharge of sewage of constructors.

c. Generated muck shall be covered.

#### **(2) Bus priority subproject**

a. Drainage ditch shall be built in the workyard and 1 grit chamber shall be arranged at low-lying place of the workyard in order to collect water bursting from underground due to foundation excavation and rainwater.

b. One sewage collection pond shall be arranged in the workyard to collect domestic sewage of constructors and wastewater from washing construction equipment.

c. Construction excavation shall be conducted in rainy season in order to avoid that surface water is polluted by muddy sewage due to rainwater in rainy season, meanwhile earthwork and building materials storing temporarily in the workyard shall be necessarily covered to avoid being washed away by rainwater, and building materials shall be stored in warehouse.

d. Strengthen the education of environmental awareness of constructors, strictly control quality of domestic sewage and prevent randomly discharging domestic sewage.

#### **(3) South loop subproject**

a. Avoid house demolition on rainy days.

b. No materials storage yard and waste disposal area shall be arranged within range of 200 m from Shala River, Lujing River and agricultural irrigation canals.

c. Rain gutters shall be built on both sides of the construction road and one grit chamber with capacity of 4 m<sup>3</sup> shall be built every 500 m to be 26 grit chambers in total. Rainwater can flow into the grit chamber via rain gutters on both sides and then will be discharged to nearby agricultural irrigation canals and river after sedimentation treatment.

d. One wastewater collection pond with capacity of 6 m<sup>3</sup> shall be built in the workyard, washing equipment and vehicles must be washed in the workyard and the water from it

shall be collected in the collection pond and be reused after sedimentation treatment.

e. No oil storage tank will be arranged in the workyard and fueling of the construction equipment shall depend on gasoline station in order to avoid pollution of surface water due to leakage of gasoline.

f. One sewage collection pond shall be arranged in the workyard with capacity of 2m<sup>3</sup> to collect sewage from constructors washing hands.

g. Strengthen the education of environmental awareness of constructors, strictly control quality of domestic sewage and prevent randomly discharging domestic sewage.

### **5.2.2 Operation Period**

#### **(1) Integrated transportation improvement subproject for core area**

a. Management of freight transportation on road shall be enhanced, vehicles carrying hazardous article is prohibited to enter, and in case of leakage of any hazardous liquid, emergency plan shall be timely adopted in order to prevent the hazardous liquid flowing into water body.

b. Road shall be cleaned in time to reduce initial rainwater pollution load to the greatest extent and rain pipes at both sides of road shall be maintained at regular intervals in order to keep drainage system smooth.

#### **(2) Bus priority subproject**

##### **① Bus station at railway station**

a. One oil separator with capacity of 5 m<sup>3</sup> shall be provided to process oily wastewater from mess hall.

b. Septic tank shall be built under office building and public toilet with total capacity of 30 m<sup>3</sup>.

c. One oil separator with capacity of 5 m<sup>3</sup> shall be provided respectively for car washing station and Parking & Maintenance Yard and wastewater from car washer will flow into the oil separator via drainage pipes for pretreatment.

d. One sewage treatment station with capacity of 25 m<sup>3</sup> shall be newly built.

e. One accident pool with capacity of 25 m<sup>3</sup> shall be built for processing wastewater in case of any accident in the sewage treatment station.

f. Drainage pipes shall be maintained at regular intervals in order to keep drainage system smooth.

##### **② Zero kilometer bus station**

a. One oil separator with capacity of 5 m<sup>3</sup> shall be provided to process oily wastewater

from mess hall.

b. Septic tank shall be built under office building and public toilet with total capacity of 30 m<sup>3</sup>.

c. Drainage pipes shall be maintained at regular intervals in order to keep drainage system smooth.

### **(3) South loop subproject**

a. Management of freight transportation on road shall be enhanced, vehicles carrying hazardous article is prohibited to enter, and in case of leakage of any hazardous liquid, emergency plan shall be timely adopted in order to prevent the hazardous liquid flowing into water body.

b. Road shall be cleaned in time to reduce initial rainwater pollution load to the greatest extent and rain pipes at both sides of road shall be maintained at regular intervals in order to keep drainage system smooth.

## **5.3 Mitigation Measures for Acoustic Environmental Impact**

### **5.3.1 Construction Period**

#### **(1) Integrated transportation improvement subproject for core area**

##### **① Jianshui Avenue**

a. Construction unit shall try to choose equipment of low noise for selection of construction equipment;

b. Construction time shall be reasonably arranged and controlled between 07:00 to 12:00 and 14:00 to 22:00 in the daytime and construction at night is prohibited;

c. For road close to schools, construction time shall be arranged on vacation and construction during schooltime and lunch break is prohibited.

##### **② Chaoyang North Road**

a. Construction unit shall try to choose equipment of low noise for selection of construction equipment;

b. Construction time shall be reasonably arranged and controlled between 07:00 to 12:00 and 14:00 to 22:00 in the daytime and construction at night is prohibited;

c. For construction of section where Jianmin Middle School and Jianshui No. 1 Middle School locate, construction time shall be arranged on vacation or weekends and construction during schooltime and lunch break is prohibited.

##### **③ Yinghui Road**

a. Construction unit shall try to choose equipment of low noise for selection of

construction equipment;

b. Construction time shall be reasonably arranged and controlled between 07:00 to 12:00 and 14:00 to 22:00 in the daytime and construction at night is prohibited.

**(2) Bus priority subproject**

a. Workyard shall be properly arranged and equipment generating loud noise shall be set up at the side far away from villages.

b. Equipment of low noise shall be selected during the construction process and equipment generating loud noise shall be equipped with acoustic damper.

c. Strictly control construction time and prohibit construction at night.

d. Management of transport vehicles shall be enhanced, vehicle shall be organized for transportation in accordance with regulations, and transport corridor shall be properly specified. Transport vehicles shall slow down when passing workyard and villages and whistle is prohibited.

e. Constructors accessing strong noise must wear personal noise-control appliances such as anti-noise helmet, earmuff and earplug; constructors shall be reasonably either assigned to operate construction machinery with strong nosier by turns in order to reduce time for accessing strong noise or do works alternately with strong noise and low noise.

f. Time for earthwork shall be arranged intensively to the greatest extent in order to reduce time of impact; improve work efficiency and speed up construction schedule in order to reduce construction' impact on surroundings.

**(3) South loop subproject**

a. Relocation household and resident around it shall be informed before demolition, demolition shall be arranged in the daytime and avoid lunch break and construction at night is prohibited.

b. Equipment of low noise shall be selected during the construction process and mechanical equipment shall be maintained at regular intervals in order to avoid loud noise due to abnormality of equipment.

c. Workyard shall be properly arranged and equipment generating loud noise shall be set up at the side far away from concerned places. For settlement section close to lines, construction unit and representatives of resident shall negotiate operating time of large machinery and publicly show in advance and equipment generating loud noise shall be installed with shock pad and acoustic damper.

d. Management of transport vehicles shall be enhanced, vehicle shall be organized for

transportation in accordance with regulations, and transport corridor shall be properly specified. Transport vehicles shall slow down when passing workyard and villages and whistle is prohibited.

e. Constructors accessing strong noise must wear personal noise-control appliances such as anti-noise helmet, earmuff and earplug; constructors shall be reasonably either assigned to operate construction machinery with strong noise by turns in order to reduce time for accessing strong noise or do works alternately with strong noise and low noise.

f. Time for earthwork shall be arranged intensively to the greatest extent in order to reduce time of impact; improve work efficiency and speed up construction schedule

### **5.3.2 Operation Period**

#### **(1) Integrated transportation improvement subproject for core area**

##### **①Jianshui Avenue**

a. Enhance vehicle management and prohibit large vehicles entering Jianshui Avenue; and prohibit vehicle, whose acoustic damper is dismantled and installed with subwoofer, entering Jianshui Avenue;

b. Marks of no whistle and speed limit signs shall be arranged at 100 m front and back of hospitals, Youth Palace and schools;

c. In case of examination places for quiz, senior high school entrance examination and college entrance examination, roads shall be closed according to time during period of examinations.

##### **②Chaoyang North Road**

a. Enhance vehicle management and prohibit large vehicles entering Chaoyang North Road; and prohibit vehicle, whose acoustic damper is dismantled and installed with subwoofer, entering Chaoyang North Road;

b. Marks of no whistle and speed limit signs shall be arranged at 100 m front and back of schools;

c. In case of examination places for quiz, senior high school entrance examination and college entrance examination, roads shall be closed according to time during period of examinations.

##### **③Yinghui Road**

a. Enhance vehicle management and prohibit large vehicles entering Yinghui Road; and prohibit vehicle, whose acoustic damper is dismantled but installed with subwoofer, entering Yinghui Road;



b. Marks of no whistle and speed limit signs shall be arranged at 100 m front and back of No. 2 Primary School, Tongji Hospital and Union Hospital;

c. In case of examination places for quiz, senior high school entrance examination and college entrance examination, roads shall be closed according to time during period of examinations.

**(2) Bus priority subproject**

a. Buses shall slow down at time of going in and out and whistle is prohibited.

b. Buses shall be maintained at regular intervals in order to prevent louder noise due to fault of buses.

c. Green belt combining arbors and shrubs is planted around bus station to damp noise.

**(3) South loop subproject**

a. Green belt shall be planted at both sides of roads, it shall widen the green belt on both sides of road passing through Xiaomaichang Village, Shaba Village, Sujiaying, Lingguan Temple, Honghe Integrative Medicine Hospital and Hewan Village and the green belt shall be composed by arbors, shrubs and turfs.

b. Enhance traffic management, strictly manage and control whistle of vehicles, set up marks of no whistle at 200 m in front of villages, limit speed of vehicles, and control illegally converted vehicles of strong noise in order to prevent noise disturbing residents.

c. Acoustic barrier high 3 m shall be set up at back of green belt at west of Integrative Medicine Hospital close to South Loop in order to reduce noise impact on the hospital.

**5.4 Mitigation Measures for Atmospheric Environmental Impact**

**5.4.1 Construction Period**

**(1) Integrated transportation improvement subproject for core area**

a. Road which will be excavated and green belt to be removed shall be watered to reduce dust;

b. Earth and building waste shall be covered with tarpaulins;

c. Transport vehicles for materials and waste muck shall be covered with tarpaulins;

d. Asphalt concrete shall be covered with tarpaulins in transit;

e. Construction section shall be cleaned after completion of the construction;

f. Avoid construction during windy weather.

**(2) Bus priority subproject**

a. Workyard shall be properly arranged and material storage yard and surface soil

storage yard shall be arranged at local downwind direction.

b. Commercial concrete shall be selected for construction, concrete shall not be mixed in the workyard and construction barriers shall be set up for workyard.

c. Enhance management and maintenance of construction machinery, improve service efficiency of mechanical equipment, reduce construction period and reduce exhaust emission of machinery driven by fuel in order to reduce its adverse effect to the minimum.

d. Vehicle body shall be cleaned when transport vehicles are driven away from operation point; and prohibit vehicle with overload and speeding in order to prevent reentrainment of dust in transit.

e. Cement and other fine-grain bulk materials used during the construction process shall be stored in warehouse or sealed for storage, air storage shall be avoided and powders such as scattered cement shall be swept timely. Vehicles carrying materials which can easily generate dust shall be covered with tarpaulins, building materials shall be loaded and unloaded with care and height for load and unload shall be as low as possible; storage site for materials in bulk with dust shall be covered with canvas or plastic cloth or provided with simple material shelf when it is dry and windy.

f. Bare ground in the construction site shall be watered at regular intervals for dust suppression in order to reduce reentrainment of dust's impact on air quality of regional environment. With principle of keeping site and road away from dust, frequency of watering shall be determined in accordance with specific weather and vehicle flow, 2 to 3 times / hour under general condition and 1 time / hour under dry season.

### **(3) South loop subproject**

a. Construction barriers shall be set up for house demolition and houses to be removed shall be watered properly.

b. Workyard shall be properly arranged, building materials and waste muck shall be covered with tarpaulins for piling up, garbage and muck from house demolition shall be transported away 3 days after the demolition and measures of covering or solidification shall be adopted for those stored together.

c. Construction with large amount of dust shall avoid on windy days and workyard shall be watered to reduce dust.

d. Vehicles carrying garbage, muck and gravels shall be closed; those vehicles must be washed when it is driving away from workyard without mud, leakage or scattering on the way.

e. Commercial asphalt concrete shall be selected and asphalt concrete shall not be processed and produced in the workyard. Asphalt concrete shall be covered with tarpaulins during transportation process.

f. Strictly control transport vehicles and prohibit overload and speeding.

#### **5.4.2 Operation Period**

##### **(1) Integrated transportation improvement subproject for core area**

a. Clean-keeping personnel shall be specially assigned to clean and maintain. One watering cart shall be provided for watering urban road when it is dry and windy in order to control output of dust.

b. Enhance control of vehicles, prohibit vehicle overload and vehicles carrying cargo, especially muck, must be covered with tarpaulins or baffles.

c. Enhance greening both sides of road.

##### **(2) Bus priority subproject**

a. Enhance greening the site;

b. Full-time staff shall be assigned to clear the site and keep it clean;

c. Sewage treatment station shall be embedded to reduce diffusion of stink.

##### **(3) South loop subproject**

a. Clean-keeping personnel shall be specially assigned to clean and maintain. One watering cart shall be provided to reduce output of dust.

b. Enhance control of vehicles, prohibit vehicle overload and vehicles carrying cargo, especially muck, must be covered with tarpaulins or baffles.

c. Enhance greening both sides of road and widen green belt along section of Honghe Integrative Medicine Hospital.

### **5.5 Mitigation Measures for Solid Waste Environmental Impact**

#### **5.5.1 Construction Period**

##### **(1) Integrated transportation improvement subproject for core area**

a. Temporary muck-piling point shall be arranged in the workyard and tarpaulin shall spread beneath the muck-piling point in order to prevent silt on rainy days flowing and making road dirt;

b. Muck stored for temporary shall be watered to avoid dust;

c. Vehicles for transporting muck shall be arranged to transport muck and earth every day, vehicle overload is prohibited in transit and vehicles must be covered with tarpaulins to prevent scattering of muck;

d. Muck and earth shall be transported to the specified muck yard for piling in

accordance with regulations and random dumping is prohibited;

e. Household garbage shall be put into dustbin as required and random throwing is prohibited.

f. It is prohibited to set up temporary muck yard with 200 m of 4 concerned places on Jianshui Avenue, 4 concerned places on Chaoyang North Road and 3 concerned places on Yinghui Road.

### **(2) Bus priority subproject**

a. One temporary waste disposal area shall be set up in the workyard for piling up earthwork and building waste for backfilling, the stored earth shall be covered with tarpaulins and timely used for backfill the site, and the rest earth shall be transported to Fangmapping Muck Yard for piling up.

b. Material stockyard shall be reasonably arranged and materials shall be covered with tarpaulins during piling.

c. One temporary household garbage collection pond shall be built to collect household garbage of constructors and the collected garbage shall be transported to refuse landfill for secure landfill. And the temporary household garbage collection pond shall be removed after completion of construction and the site shall be disinfected.

d. Muck transport route shall be planned and muck transport vehicles must run according the planned route. Transport vehicles must be closed and covered by rule with clean appearance without overload and they shall not spill, scatter, leak and carry building waste earth to pollute road.

### **(3) South loop subproject**

a. Garbage and muck during demolition shall be transported away within 3 days after house demolition and measures of covering must be adopted for those stored for temporary.

b. Two temporary earth storage sites shall be set up on the construction road for storing earthwork for backfill and the stored earthwork shall be covered with tarpaulins to avoid water and soil erosion on rainy days.

c. For arrangement of temporary storage site for surface soil, its location shall be within the range of land acquired for the project and farmland, river or agricultural irrigation canals, which are not acquired, shall not be occupied.

e. Muck transportation shall be done strictly according to the specified transport route and transport vehicles must be closed and covered by rule with clean appearance without

overload and they shall not spill, scatter, leak and carry building waste earth to pollute road.

f. One household garbage collection pond shall be built at the workyard to collect household garbage and garbage shall be transported away every half month and the pond shall be disinfected.

g. Garbage collection pond shall be removed and disinfected after completion of construction.

### **5.5.2 Operation Period**

#### **(1) Integrated transportation improvement subproject for core area**

a. Classified dustbins shall be arranged on both sides of road and meanwhile sanitation department shall be entrusted to clean road, at least once every day.

b. Road maintenance team shall be arranged to repair timely in case of any damage to road. Muck from road repairing and cleaning shall be transported with road maintenance vehicles to the storage site specified by urban construction department without dumping randomly. Waste material from maintenance of road network shall be recycled, those which can be recycled shall be recycled and those which cannot shall be transported to the specified site for storage without dumping randomly.

#### **(2) Bus priority subproject**

a. Trash cans shall be arranged on site according to passenger flow, one garbage pond shall be arranged on site and garbage shall be transported at regular intervals to landfill.

b. Temporary storage room for hazardous and waste substance shall be arranged in Parking & Maintenance Yard and those collected shall be submitted to unit with qualification to dispose.

#### **(3) South loop subproject**

a. Sanitation workers are arranged to clean road at least once every day.

b. Road maintenance team shall be arranged to repair timely in case of any damage to road. Muck from road repairing and cleaning shall be transported with road maintenance vehicles to the storage site specified by urban construction department without dumping randomly.

c. Enhance control of vehicles, prohibit vehicle overload and vehicles carrying cargo, especially muck, must be covered with tarpaulins or baffles.

## **5.6 Mitigation Measures for Impacts on Cultural Relics and Historic Sites**

In order to reduce the impact on the cultural relics and historic sites, and protect the

cultural relics well, the following measures will be taken in this project according to the opinions on the project construction by Cultural Relic Management Institute of Jiashui County: 1. Do not use the mechanical equipment with high power as far as possible during the construction, so as to prevent threatening the safety of landmark or damaging them directly; 2. The proposed bus stop platform shall be harmonious with the style and features of surrounding cultural relics and historic building in the building style, color and volume etc.

#### (1) Chaoyang Building

1. The workyard at the west section of Chaoyang West Road and the workyard at the south section of Yinghui Road shall be arranged at the road section far away from the Chaoyang Building, and the mechanical equipment with low power shall be selected as far as possible during the construction.

2. The temporary slagging yard is set at the place 200m far away from the Chaoyang Building, the muck generated during the construction shall be covered with tarpaulin, and the construction road section shall be watered to reduce the dust, so as to prevent the dust flying, causing the flying dust covering the Chaoyang Building.

3. After the completion of construction, related person will be taken to sweep the Chaoyang Building and its protection scope.

4. Strengthen the education on the constructor, the propaganda and supervision work, and the constructors are forbidden to destroy the Chaoyang Building deliberately.

#### (2) Dongjing

1. The workyard at the south section of Yinghui Road shall be arranged at the road far away from the Dongjing, and no mechanical equipment shall be used in the construction of construction at the south section of road.

2. When the construction at the road surrounding the Dongjing is started, it is required to enclose the surrounding road of Dongjing, and the well mouth shall be covered with tarpulin, so as to prevent the pollution of well water due to the construction flying dust falling into the well.

3. The construction road section shall be watered to reduce the dust, prevent the dust flying, making the flying dust falling into the Dongjing.

4. After the completion of construction, related person will be arranged to sweep the Dongjing and its protection scope.

5. Strengthen the education on the constructor, the propaganda and supervision work,

and the constructors are forbidden to destroy the Dongjing deliberately.

(3) Double dragon bridge

1. It is required to reasonably arrange the workyard, and arrange the temporary slag yard at the road section far away from the double dragon bridge; the earthwork shall covered with tarpaulin during the construction, so as to reduce the quantity of flying dust.

2. During the construction of extension section of Qingshan Road and South Loop, it is required to select the equipment with low noise as far as possible.

3. The construction road section shall be watered to reduce the flying dust, and it is required to avoid the construction in the strong wind.

4. The construction material and much shall not be transported through the double dragon bridge.

The construction scheme revolving the cultural relics in this project shall be determined after consulting the related cultural relics protection department. Before the construction side enters into the site, it is required to make the site investigation and prepare the detailed construction site environmental management plan.

## **5.7 Mitigation Measures for Impacts on Agricultural Production**

In order to reduce the impacts on the farm irrigation system by the construction of South loop, the following measures will be taken:

1. The prefabricated part will be used in the design of the bridges and culverts, so as to reduce the impacts on the rivers and downstream water body during the construction.

2. The construction period of bridge and culvert will be arranged in the dry season, so as to prevent the impacts on the drainage of rain water in the construction during rainy season.

3. Before the construction, it is required to reinforce the river channel and agricultural irrigation ditch, so as to prevent the river bank collapsing during the construction, clogging the river channel, cutting off some river channel and influencing the agricultural irrigation.

4. During the construction, when the river is covered and destroyed, if it is necessary to bury the concealed conduit or newly build the temporary channel, it is required to ensure that the construction will not influence the irrigation of downstream farmland.

5. Norm the temporary slag dump, and the slag shall be far away from the river channel; and it is forbidden to pile slag the slag within 10 m of the river bank and to dump the slag into the river channel.

6. Cement and other giga-light fine particle bulk material shall be stored in the storage or covered tightly, and it is required to prevent the loss and spreading and flying during the transportation, and it is required to unload the material in the storage and water for wetting to reduce the dust flying, preventing the flying dust falling into the water body and polluting the river.

7. The wastewater collection sump will be set on the workyard; the construction wastewater will be reused through sedimentation treatment, without draining out, and it is forbidden to drain the wastewater into the water body directly.

8. It is required to notify the farmer of the construction time, so as to make the farmers have time to arrange the irrigation, and it is required to hang the signboard to remind the local villager in the construction danger zone, device and material.

## **5.8 Mitigation Measures for Impacts on Railway**

The following measures will be taken to reduce the impacts on the railway by the project:

1. Before the construction, it is required to communicate with railway management department and design the construction scheme according to the construction requirements of railway part, and conduct the construction according to the construction scheme.

2. It is forbidden to set the workyard, stocking yard and temporary waste disposal area in the safety protection area of railway line, so as to prevent the impact on the railway operation by the construction.

3. It is required to set the obvious construction marking pattern at the crossing part of south loop and railway.

4. During the construction, it is forbidden to excavate soil at the two sides of railway.

5. During the construction, it is required to arrange specially-assigned person to guard the railway, in case there are train in operation, the construction shall be stopped half an hour before the train pass by, and it is required to clear the surrounding construction site, so as to ensure that the operation of train will not be influenced.

6. After the train passed, it is required to arrange specially-assigned person to guard at the crossing, and place a roadway gate before the train passes, so as to forbid any motor vehicle and pedestrian pass by.

## **5.9 Mitigation Measures for Impact of Environment Risk**

In order to prevent the air pollution, surface water accident caused by the leakage



incurred during the transportation of hazardous chemical, and reduce the impacts on the environment, it is required to take the following measures:

1. The hazardous chemicals are not allowed to be transported in the road range of this project. In case of any special condition, it is really necessary to transport the hazardous chemicals through the these roads, it is required to report to the local public security and environment protection department in advance, and put forward the transportation risk plan of hazardous materials. The public security will arrange the running time and the section passing by this road section for this special transportation; and the public security may carry out the traffic control if necessary. The transportation vehicle must strictly follow the related specifications in *Regulation of Automobile Transportation of Dangerous Goods* (JT617-2004).

2. Strengthen the traffic control along the line, and set the necessary speed limit and road geometry marks, and conduct the traffic safety inspection at irregular intervals, so as to reduce the traffic accidents.

3. Set the accident emergency team, conduct the emergency exercise at regular intervals, and prepare the traffic accident environment emergency plan, in case of any accidents causing the environment pollution, it is required to organize the emergency team to rescue, start the emergency plan, and notify the Environmental Protection Bureau, so as to prevent the expanding of accidents, and reduce the impaction on the environment.

## **5.10 Mitigation Measures for Social Impact**

### **5.10.1 Measures for Traffic Impacts**

In order to mitigate the traffic jam during the construction period, the following measures will be taken:

1. Establish the construction scheme and construction time before the construction, and notify the surrounding mass of the construction plan of project in the manner of notification, announcement and paper before the construction, so as to ensure that the mass may select the proper trip mode and trip route during the construction.

2. Reasonably arrange the construction time, avoiding the conduct the construction during the rush hours and time before and after the school.

3. Reserve the access road for the pedestrian at schools, hospital road cross and other road cross with large population.

4. In case the existing roads are damaged during the construction of south loop,

influencing the going in and out of villager, it is required to build the temporary road, and recover it after the construction is completed.

Measures for the traffic influence during the operation of road

The safe facilities (pedestrian crossing, warning board and speed bump) used to cross the street shall be designed for the villager/village in the road design section.

### **5.10.2 Measures for Business Impact**

In order to reduce the impacts on the commerce along the line during the construction, it is required to coordinate with the shop and hotel that may be influenced before the construction, and make reasonable compensation, so as to avoid the dispute incurring during the construction.

### **5.10.3 Measures for Social Stability**

The farmland, forest land and pool will be acquired during the construction of this project, and the demolition of existing house are involved in this project, and the construction of project will influence the business of surrounding shops, which will seriously influence the fundamental interests of mass. According to the *Migration Settlements Plan* of project, it is required to make monetary indemnity for the farmers who are influenced by the land acquisition, and return the return proportion of 3% of the land area acquired to the farmer whose land are acquired. For resident whose house are removed, the family whose house are removed are willing to build the new house at another place according to the settlement willing investigation of family influenced and the advisory opinion of public. For the resident removed, the government will approve the new house site to the household for newly building the house, allocate 0.3 mu house site to each household according to the policy of “one house for one household”; the floor space of design building is 200 square meter, and the household removed can build the one floor or 2 floors building according to the actual demands and self-economic conditions. And during the arrange for relocation household, the project office will coordinate with the related units to assist in handling the related procedures of land using and house building, and entrust eh contractor with qualification to specifically implement the “three supplies and one leveling” of the new house site, and the related fees will be included in the immigration capital budget of this project, and the household removed will not bear the fees mentioned above. Except those reasonable water meters, ammeters and digital TV

set-top box and other equipment costs shall be borne by the household removed, they will not bear the initial assembly fees of water meter, ammeter and cable television, and will not bear the handing fees of various procedures during the rebuilding placement.

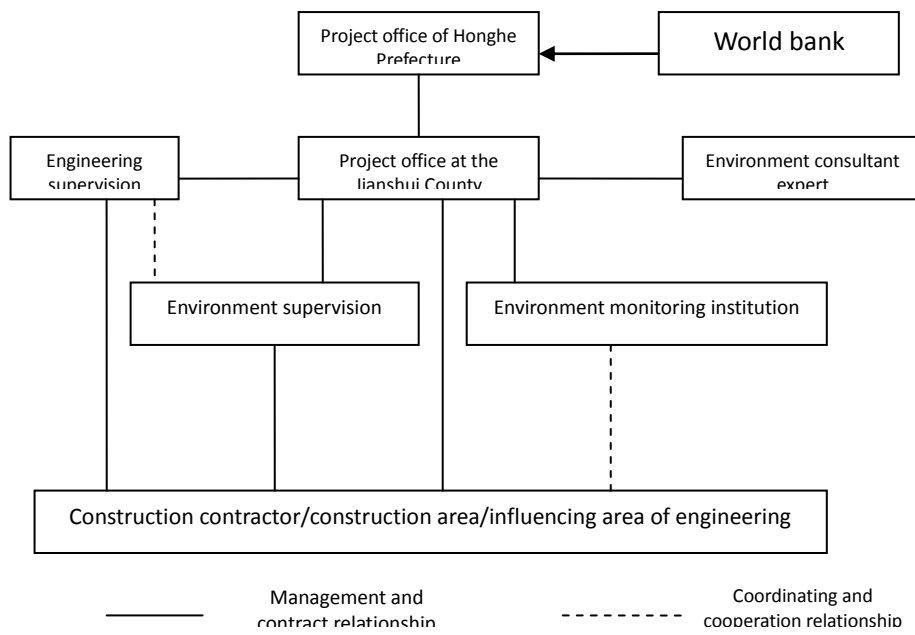
It is required to make the house removal agreement at the early stage of project construction; conduct the compensation work, arrange the resident involved before the removing of house, notify the resident in advance before the houses are removed, and then remove the house under the condition of ensuring the safety of resident. Coordinate with the shop and hotels etc. influenced before the construction, make reasonable compensation, so as to minimize the influence on the resident and society.

## **6 Environmental Management System**

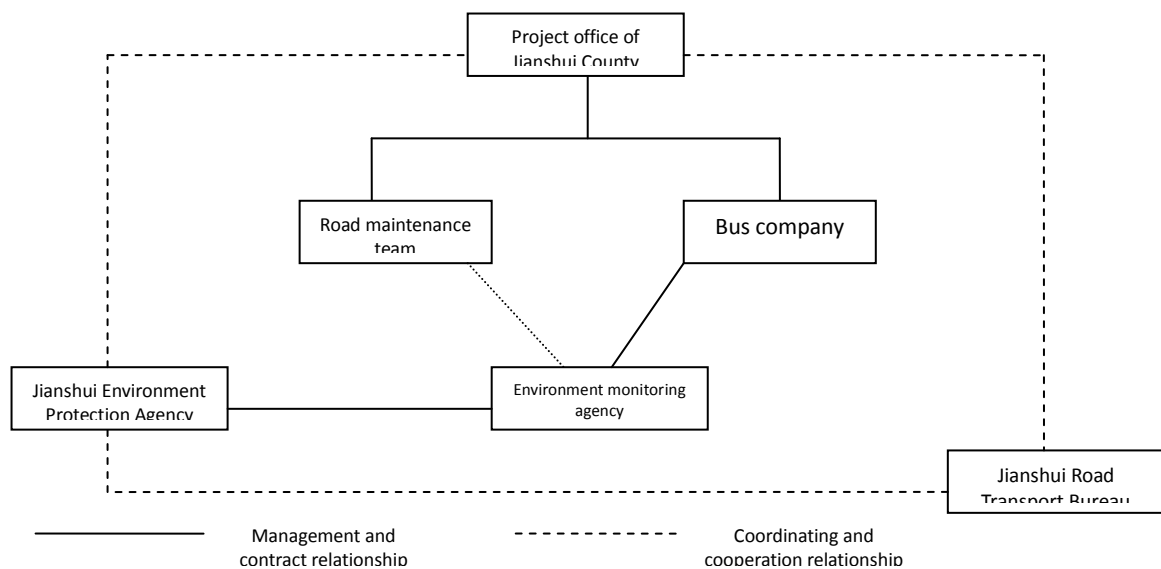
### **6.1 Environmental Management Organization and Responsibilities**

The effective implementation of *Environmental Management Plan* needs the participating of the related party of project, including the environment protective competent administrative department of environment protection board (EPB) at all levels; the project sponsor, i.e. the project management office (hereinafter “project owner” or “project office”); the contractor, i.e. the construction unit (CET); the construction supervision unit employed by the owner and the environmental management plan external monitoring consultant (EMC) entrusted by the owner.

In order to realize the target of environmental management plan, the project owner will entrust the construction supervision unit to arrange specially-assigned person who are responsible for the environment supervision during the construction period; in addition, the project owner will utilize the owned funds or the world bank loan organization capability to establish the sub-item funds, and employ the environmental management plan external monitoring consultant (EMC) with qualification and experience to develop the external monitoring work of environmental management plan implementation, conduct the periodical and pointed construction site inspection and necessary environment monitoring. The work outline of environmental management plan external monitoring consultant (EMC) is detailed in Annex A. The environmental management system of environmental management plan implementation during the project construction and operation is detailed in Figures 6.1-1 and 6.1-2.



**Figure 6.1-1 Environmental Management System (construction period)**



**Figure 6.1-2 Environmental Management System (operation period)**

In the environmental management system of this project, some are the internal agency of project, while others are the external agency of project (the consulting service agency employed outside). These agencies form the complete environmental management system of project together, but they are responsible for the different work contents, with different responsibilities range.

The main environment responsibilities of related main parties of the different stage of project and the person arrangement are detailed in Tables 6.1-1 and 6.1-2.

**Table 6.1-1 Organization of Environmental Management System (construction period)**

Type of Organization	Name of Organization	Tasks of Organization
Management Organization	Project office of Honghe Prefecture	Responsible for the coordination and management of subproject of Jianshui and subject of Mengzi
	Project office of Jianshui Country	Responsible for the implementation and management of Jianshui subproject, implement the implementation work of environmental management plan, including the engineering environmental management, environment monitoring and supervision etc., supervise, inspect and report the implementation of environmental management plan. The various environment mitigation measures will be incorporated into the technical specification, bidding document and construction contract of engineering purchase.
Supervisory Organization	Environment Protection Agency in Prefecture and County	Government administrative and supervisory authorities
Implementation Organization	Contractor	Implementation body, implementing the environment protection measures during the construction period
Consulting Service Organization	Environment consultant expert	Entrusted by the project environmental management organization, implement the environment review, consultation and technical support etc.
	Environment supervision	Entrusted by the project environmental management organization, conduct the environment supervision management of contractor
	Engineering supervision	Control the investment, construction period and quality of engineering construction; carry out the safety management and engineering construction contract management; coordinate the working relationship with related unit
	Environment monitoring organization	Entrusted by the project environmental management organization, responsible for the professional environment monitoring tasks

**Table 6.1-2 Organization of Environmental Management System (operation period)**

Type of Organization	Name of Organization	Tasks of Organization
Management Organization	Project office of Jianshui Country	Responsible for the management of Jianshui subproject, and the communication and coordination with local environment protection department and transport department
Supervisory Organization	Environment Protection Agency in Jianshui Country	Supervise and inspect the emission condition of “three wastes and one noise” during the operation of Jianshui subproject
	Road Transport	Road transportation management

	Bureau in Jianshui Country	
Implementation Organization	Road contractor (road maintenance team)	Implementation organization, implement the environment protection measures during the Operation period
	Bus station contractor (bus company)	
Consulting Service Organization	Environment monitoring organization	Entrusted by the project implementation organization, responsible for the professional environment monitoring tasks

## 6.2 Environmental Management Plan

### 6.2.1 Environmental Management Plan during Construction Period

(1) Establish the construction contract with the construction unit, in which the construction range, construction ways and construction rewards and punishments management method shall be specified, in case the construction side fails to follow the contract agreement during the construction, the construction side shall bear the responsibility for the environment pollution accident, environment dispute and cultural relics damages etc. incurred, solve the environment problems and make compensation according to related requirements.

(2) Before the construction team stations, it is required to conduct the environment protection and civilized construction education, propose requirements for the construction unit, establish the corresponding environment protection measures, and supervise the construction unit, access the environment protection measures taken by the construction unit; in case the construction unit fails to conduct the construction according to the construction scheme, the construction shall be stopped for regulation.

(3) Arrange the site environment inspector who is responsible for monitoring and inspect the piling as well as loading and unloading of materials at all the workyard, watering on the workyard, the dust prevention measures and cleaning condition of vehicle during the transportation.

(4) Periodical inspection, urge the construction unit to dispose the construction waste, collect and treat the construction waste residues and domestic garbage according to related requirements.

(5) After the project is completed, it is required to inspect the environment restoration of construction site thoroughly.

### **6.2.2 Environmental Management Plan during Operation Period**

(1) The transportation vehicle must strictly follow the related specifications in *Regulation of Automobile Transportation of Dangerous Goods (JT617-2004)*. The full-time staff will be arranged to inspect the transportation road, and it is forbidden to transport the toxic and harmful chemical through the south loop and other city road. Once discovered, it is required to investigate and handle immediately.

(2) Organize the road maintenance team to patrol on the transformed and newly built road, in case of any pavement damage, organize the related person to repair immediately.

(3) Strengthen the road greening, and keep the pavement clean.

(4) The full time cleaner will be arranged to clean the bus junction station and the parking & maintenance yard.

(5) The oil separator, septic tank, sewage treatment station and other environment protection measures are set at the bus junction station.

(6) Strengthen the management on the bus.

(7) Set the professional traffic accident rescue team, in case of any traffic accidents, carry out the rescue immediately.

### **6.3 Laws and Contract Requirements of Site Environment Monitoring**

The contractor will establish detailed environment protection implementation plan specifically aiming at the various sites in the bidding documents according to the requirements of environmental management plan. The clause about the environment protection in this plan and the construction contract shall be in accordance with requirements of national related environment protection laws and regulations and requirements of this environmental management plan.

The construction organization plan of contractor shall be submitted to CSE for approval, and CSE will inspect whether the plan contain the enough environment protection measures and pollution control measures. The contractor will submit the engineering progress report, updated engineering pan and other related documents to CSE, so as to ensure that the inspection work of CSE will be conducted smoothly. The site log shall be recorded according to requirements of CSE, and shall be submitted to CES at any time for approval.

In case the reviewed documents contain the contents that do not conform to the requirements on the environment protection and pollution prevention in the contract and



laws and regulations, CSE will put forward the clear correction opinions to the contractor, and the contractor must make correction immediately, otherwise the CSE will not issue the construction permits.

The CSE will determine the possible potential environment problems through the periodical on-site inspection and supervising the construction activities, and put forward the timely mitigation (preventative) measures to the contractor. The inspection area include the construction area and the area influenced outside the construction area directly or indirectly by the project construction.

The routine periodical on-site inspection (such as weekly or monthly) will be organized by the CSE, and the CSE and PMO will attend in the inspection. The CSE shall record the change in environment incurred in the project construction and the environment resumption condition of contractor in the work log, and this work log may influence the noncompliance of environmental influences assessment and *Environmental Influence Plan* or the suggestion of project contract. This work log shall be provided to contractor, *Environmental Influence Plan* implementation and external monitoring consultant and all other related person for consulting.

The following information shall be involved during the guidance and inspection by the CSE:

(1) Environment performance of contractor, implementation condition of environment protection implementation plan, waste reducing, hazardous waste management and other required mitigation measures;

(2) The specific requirements in Chapter V of this *Environmental Management Plan*;

(3) Conform to the requirements of environmental management plan, regulations in the contract and related laws, regulations, technical standards and codes of People's Republic of China;

(4) Protection of sensitive areas and management mechanism of the limited area;

(5) Construction method of contractor and conditions of construction

(6) Construction scheme of the single work including the suggestion of related pollution control measures.

(7) Work development and construction procedure;

(8) The sufficiency and efficiency of contractor's pollution control measures (treatment facilities) minimizing the environmental influence;

(9) Position and management of waste, material storage area, borrow earth and

construction access road as well as the pollution control measures;

(10) Problems and results found in the previous site inspection.

The contractor shall provide all the information related to updated construction contract by the CSE to the CSE to carry out the site inspection. The inspection results and suggestion on the optimization of related environment protection measures will be submitted to the contractor for modifying. In case of any nonperformance, disjunction condition or exceeding the environment quality standard, the contractor shall take the correction measures according to requirements in the documents. The contractor will implement according to the procedure and time specified by the CSE, and report the following any remedial measures.

Organize one meeting after each weekly (monthly) inspection, and the contractor shall report the implementation condition of correction measures determined in the previous inspection during the meeting. The confirmed investigation results and the required improvement measures will be discussed in current inspection time. The meeting minutes will be distributed to all the attendees and the contractor shall implement the necessary measures in the agreed time.

### **6.3.1 Punishment System**

According to the contract, in case the CSE finds the behavior nonconforming to the environment regulations during the site supervision, the contractor shall make the correction during the specified time (such as 2 weeks). If the contractor completes the correction within the specified time, he can be free from punishment. In case the contractor fails to make necessary correction within the specified time, he shall pay fess to the third party to let the third party make the correction measures instead of him.

### **6.3.2 Environment Complaint**

In case any environment complaints are received during the construction, CSE will start the complaining investigation procedures. The CSE will carry out the following procedures according to complaining received:

(1) Enter the complaints and the received date into the database, and notify the contractor;

(2) Investigates the complaining and determine its effectiveness, and evaluate whether the source of this problem is from the engineering activities;

(3) In case the complaint is effective, and is caused by the engineering activities, the

mitigation measures will be established, and notify the contractor;

(4) In case the complaint is transferred from the Environmental Protection Bureau, it is required to submit the temporary report of complaining investigation to the Environmental Protection Bureau which will take the next actions within the specified time;

(5) Develop the further inspection, verify the condition, and take effective measures to ensure no recurrence of such complaining.

(6) Report the investigation result and take actions for the complainant according to the complaining (in case the complaint is from the Environmental Protection Bureau, the result will be reported within the time specified by the Environmental Protection Bureau);

(7) Record the complaint, investigation, following-up action and results reported in monthly environmental management plan.

During the investigation of complaint, the contractor will coordinate with the CSE, provide all the necessary information to help completing this investigation. In case the mitigation measures are determined in the investigation, the contractor shall implement such measures immediately. The CSE will ensure that the contractor will implement such measures.

### **6.3.3 External Monitoring Consultant (EMC) of Environmental Management Plan**

The external monitoring consultant (EMC) of environmental management plan is responsible for the monitoring whether the contractor conforms to the requirements of Environmental Management Plan on behalf of the owner; reporting related work to the owner directly, responsible for the owner. The owner employs the qualified consulting unit with qualification to carry out the environmental management plan external monitoring work through the competitive purchase procedure. The employed EMC shall have at least 5 years' experience in such similar projects, consulting service, be familiar with related environment laws, regulations, technical standards, specifications and codes. The employed consultant shall get familiar with his work through looking up related reports, including the *Environmental Management Plan*; the monitoring person shall have related certificates issued by the environmental management department, be familiar with environment problem, protection demands and experience during the construction of city road, bus junction station and other facilities, conduct the environment monitoring of urban transportation project. The main responsibilities of external monitoring consultant (EMC)

of environmental management plan are shown as follows:

(1) Entrusted by the owner to review whether the construction organization design conform to requirements of *Environmental Management Plan* approved, especially the requirements on the site environmental management and mitigation impacts;

(2) Monitor and inspect the site environmental management system of contractor and the environment performance and experience as well as the ability of treating the site environment problem of the construction supervisor; in necessary, the EMC has the right to suggest the owner changing the contractor, supervisor and full time environmental management person.

(3) Carry out the routine inspection for the implementation condition of *Environmental Management Plan* by the contractor and the construction supervision unit;

(4) Review the effectiveness of environment protection measures in the *Environmental Management Plan*, inspect and confirm the effectiveness of mitigation impaction measurers, and provide the consulting report to the owner periodically;

(5) In case of any emergency environment events, the EMC shall participate in the coordination and treatment.

(6) Supervise the environment protection behavior of contractor, in case any behavior nonconforming to the requirements of contract or the *Environmental Management Plan*, stop the work and provide the correction measures and punishment suggestions to the owner if necessary.

(7) Submit the semester and annual consulting report to the owner on time;

(8) Participate in the environment inspection of world bank project group or other related departments according to requirements of owner;

(9) During the execution of contract, in case of any environment pollution accidents, investigate and provide the independent report to the owner according to requirements of owner;

(10) Assist in the owner and construction supervision unit to investigate and evaluate the environment complaining according to requirements of owner.

## **6.4 Information Management of Environmental Management Plan**

### **6.4.1 Information Exchange**

According to environmental management, it is required to conduct the necessary information exchange among the different departments and posts of organization project

office, contractor and construction supervision unit, and it is required to report the related information to external part (related party and social public etc.).

The internal information exchange can be conducted in the manner of meeting and internal brief report etc., but there shall be at least 1 formal meeting, with all the information exchanged recorded and filed. External exchange information shall be conducted once at least half a year, and the information exchanged with cooperation unit shall be summarized and filed.

#### **6.4.2 Recording Mechanism**

For the effective operation of environmental management system, the organization must establish a perfect record system, with the records of the following aspect kept:

- (1) Laws and regulations requirements;
- (2) Administrative licensing;
- (3) Environment factors, related environmental influence documents and EMP report;
- (4) Training records;
- (5) Records of inspection, verification and maintenance
- (6) Monitoring data;
- (7) Effectiveness of corrective and preventive measures;

(8) Information of related party: complaining and treatment flow, result and record, in addition to, it is required to control the above mentioned various records, including identification, cataloguing, filing, storage, management, maintenance, inquiring, storage life and disposal etc. of the records.

#### **6.4.3 Reporting Mechanism**

The contractor, external monitoring unit, environment supervision engineer and project office shall record the development condition, EMP implementation condition, environment monitoring results etc. of the project and report to the related departments during the implementation of project. The operation condition and monitoring records of refuse landfill, sewage treatment plant and waste disposal area involved in the engineering shall be known and collected at regular intervals. Related requirements shall be incorporated into the monitoring plan. The following contents mainly include:

- (1) The project environment monitoring engineer will record the implementation condition of EMP monthly, and submit the weekly and monthly report to the project owner and project office, and the weekly and monthly report shall include the implementation

condition of environment protection measures, development condition of environment monitoring and the monitoring data.

(2) The development of project by the contractor and the operator as well as the implementation of EMP shall be recorded in details by seasonally, and the seasonal report shall be reported to project office in time, and report the seasonal report to the state Environmental Protection Bureau.

(3) After completing the entrusted monitoring tasks, the monitoring unit will submit the monitoring report to the contractor (operator) and environment supervision engineer;

(4) The contractor shall submit the environment monitoring report of project to Jianshui County, Honghe Prefecture Environmental Protection Bureau, Jianshui project office and Honghe Prefecture project office in time. Honghe Prefecture project office shall submit the implementation progress of progress, monthly, seasonally and yearly report of effects to Honghe Prefecture Environmental Protection Bureau and related units in time, and provide to the World Bank if necessary.

(5) In case there are special illegal issues about environmental protection, the environmental supervision engineer and the project office will report to the local environmental protection competent administrative department, and report to the superior by levels if necessary.

(6) Submit the EMP implementation report of project to the World Bank every half a year, with the following contents included in the EMP implementation report:

1. Development condition of project;
2. Implementation condition of project environmental protection measures, development condition of environment monitoring and the main monitoring results;
3. Implementation condition of training plan;
4. Whether there is public complaining, if any, the main contents of complaining, solutions and public satisfaction;
5. EMP implementation plan of the next half year.

## **7 Environmental Management Plan External Monitoring**

### **7.1 Purpose of Monitoring**

According to project requirements, the owner will entrust an environmental management plan external monitoring consultant (EMC) at the proposed implementation stage. This EMC will go to the work yard to collect all the indexes of the environmental sensitive point (including water, air and voice etc.) at regular intervals. These indexes will be submitted to the owner and the environmental monitoring company of owner, as the reference basis for judging whether the environmental regulations are followed. The proper design monitoring plan and the monitoring frequency are necessary, which can demonstrate the overall performance of project engineering and the shortening influence caused by the construction activities.

More specifically, as the necessary and important part of EMP, the environmental monitoring plan shall include the following aspects:

- (1) Confirm the adverse impacts forecasted in EIA;
- (2) Confirm the actual influence scope;
- (3) Evaluate the effectiveness of mitigation measures on the site;
- (4) Identify and adjust the additional mitigation measures take for the burst influence, these measures may be necessary during the construction and operation of project.

### **7.2 Environmental Monitoring Organization and Responsibilities**

The main work of environmental monitoring of the proposed engineering is to entrust the unit with monitoring qualification to monitor at regular intervals, try best to carry out the monitoring quality guarantee work. The main responsibilities of the environmental monitoring organization are shown as follows:

- (1) Establish the strict and feasible environmental monitoring pan and quality guarantee system;
- (2) Regularly monitor the source of project exhaust gas, waste water and noise;
- (3) Regularly (seasonally and yearly) analyze the monitoring data comprehensively, grasp the control condition of pollution source and environmental quality condition, so as to provide the pollution prevention basis for the decision-making section.

## **7.3 Detailed Environmental Monitoring Requirements**



**Table Environmental Monitoring Scheme (operation period)**

Project	Monitoring Items	Monitoring Factors	Monitoring Points	Monitoring Frequency	Monitoring Unit
Santian City Main Road (Jianshui Avenue, Chaoyang North Road, Yinghui Road)	Ambient air	PM <sub>10</sub> 、TSP、SO <sub>2</sub> 、NO <sub>x</sub>	Set two points on each road	Quarterly, in case of no phenomenon of exceeding the standard, once a year from the second year	Environmental monitoring organization
	Noise	Leq (A)	School and hospital and the near residential area on each road	Once per month during the first operation year; the frequency of the second year depends on the monitoring condition of the first year, in case of no phenomenon of exceeding the standard, the frequency will be at least 2 times each year, and once a year afterwards, monitoring the day and night value at each time	Environmental monitoring organization
Zero Kilometer Bus Junction Station	Ambient air	PM <sub>10</sub> 、TSP、SO <sub>2</sub> 、NO <sub>x</sub>	1 point in the bus junction station	Quarterly, in case of no phenomenon of exceeding the standard, once a year from the second year	Environmental monitoring organization
	Noise	Leq (A)	Bus junction station boundary of bus junction station, 2 monitoring points at the east, south, west and north of boundary	Once per month during the first operation year; the frequency of the second year depends on the monitoring condition of the first year, in case of no phenomenon of exceeding the standard, the frequency will be at least 2 times each year, and once a year afterwards, monitoring the day and night value at each time	Environmental monitoring organization
	Waste water	PH, SS, BOD <sub>5</sub> , COD <sub>Cr</sub> , NH <sub>3</sub> -N and petroleum	Main outlet of station waste water	Once per month during the first operation year, in case of no phenomenon of exceeding the standard, twice per year afterwards	Environmental monitoring organization
Railway Station Bus Junction Station	Ambient air	PM <sub>10</sub> 、TSP、SO <sub>2</sub> 、NO <sub>x</sub>	1 point in bus junction station	Quarterly, in case of no phenomenon of exceeding the standard, once a year from the second year	Environmental monitoring organization
	Noise	Leq (A)	Bus junction station boundary of bus junction	Once per month during the first operation year; the frequency of the	Environmental monitoring organization

			station, 2 monitoring points at the east, south, west and north of boundary	second year depends on the monitoring condition of the first year, in case of no phenomenon of exceeding the standard, the frequency will be at least 2 times each year, and once a year afterwards, monitoring the day and night value at each time	
	Waste water	BOD <sub>5</sub> , COD <sub>Cr</sub> , NH <sub>3</sub> -N and petroleum	Water outlet of waste water treatment station and main outlet of station waste water	Once per month during the first operation year, in case of no phenomenon of exceeding the standard, twice per year afterwards	Environmental monitoring organization
South Loop	Ambient air	PM <sub>10</sub> , TSP, SO <sub>2</sub> , NO <sub>x</sub>	Villages along the road	Quarterly, in case of no phenomenon of exceeding the standard, once a year from the second year	Environmental monitoring organization
	Noise	Leq (A)	6 points, the roads nearby the Xiaomaichang Village, Shaba Village, Sujiaying, Lingguanmiao, Honghe Integrative Medicine Hospital and the Hewan Village	Once per month during the first operation year; the frequency of the second year depends on the monitoring condition of the first year, in case of no phenomenon of exceeding the standard, the frequency will be at least 2 times each year, and once a year afterwards, monitoring the day and night value at each time	Environmental monitoring organization

In addition, the contractor and supervision engineer will implement the monitoring plan every day, or implement according to the basic requirements: monitor the noise level of environmental sensitive point with portable monitoring equipment; monitor during the heavy construction activities, such as excavation, piling, power generating, material transportation and night construction, monitor the noise level along the line and noise level of the surrounding place of environmental sensitive point construction site.

Visually inspect to confirm whether the water quality of received water is influenced by the construction activities, such as turbidity, smell, color, dead fish, etc.

The result will be incorporated into the formal written report, and will be submitted to EMC and PMO for review monthly separately. In case of any accidents influence, the construction unit will report to EMC and PMO immediately.

## **7.4 Monitoring Equipment and Records**

The equipment and testing method adopted by the construction unit and supervision unit in the monitoring shall conform to related regulations and environmental quality standard, and the equipment is calibrated before the site measurement. All the calibration record shall be submit to the EMV. EMC will keep all the site record, report, approval, statutory documents, certificate and related environment problems of permit or license.

If necessary, any change in the monitoring equipment and method shall be approved by EMC in advance. During the site monitoring and inquiry, it is required to record data at any possible place for easy access. Records that shall be kept in EMC office of various sites are specified in Table 7.4-1.

**Table 7.4-1 Typical Environment Record Kept at Construction Stage**

Types	Records
Overall	1) Environment training records (such as attendance record of discussing meeting of environment awareness training); 2) Environment license/permits 3) Site log and site inspection record 4) Environment work log, complaining work log and environment quality limit exceeding notice letter; 5) Construction procedures and schedule; 6) Equipment maintenance/repairing record 7) Contact with interested party of environment problems and other parties 8) Meeting minutes
Noise Control	1) Update the current list of electromechanical equipment on site; 2) In case any environment sensitive points are influenced, it is required to conduct the periodical inspection and provide the detailed data of inspection results;
Water Pollution Control	1) Drainage plan of construction site 2) Record the quantity of collected abandon expansion mud and/or reused, repaired and treated drilling mud; 3) Record the maintenance and clearing of sediment and petroleum/greasy; 4) Record the sanitary wastewater treatment (without connecting to the existing wastewater main pipe) 5) Final emission quality of wastewater and record in the pollutant concentration;
Solid Waste Management	1) Backup the waste transportation vehicle in the environment management plan and related valid documents of waste collector; 2) Record the quantity of reused and regenerate waste; 3) Record the quantity of site active materials which are transferred from the nonreactivity waste (if any); 4) Record of waste disposal.
Atmosphere	1) Drainage plan of construction site 2) Transportation line and scheme of building material; 3) Mitigation measures of air effects, such as watering; 4) Monitoring results of air quality.
Ecological Resources	Record the position of sensitive ecological resources and related protection plan
Storage of Hazardous Goods	1) Storage map of hazardous goods; 2) List of hazardous goods and consumption records;
Storage of Chemicals	1) Drawing of facilities used to storage the chemicals 2) Safety data sheet of all the used and storage chemical materials 3) Chemicals list and consumption records
Environment Emergency Response	Emergency accidents report

## 8 Environmental Management Plan

### 8.1 Training Requirements

The main objective of environment competence construction is the environment manager and environment supervisor, and the training on them is one part of the technical supporting of project. In order to ensure the smooth and effective implementation of environmental management plan, it is required to conduct the training on environmental management plan and other knowledge and skills for the owner's construction unit, operation unit, contractor, engineering supervisor, local project office and worker of related party of local project office, and conduct different training aiming at different posts.

### 8.2 Training Contents and Appropriation Budget

#### (1) Environment manager and environment supervision engineer

The training will be organized by the project office, which will be conducted for the environmental management full-time person and environmental supervision engineer of project office by the environmental technical expert.

#### (2) Contractor and builder

The contractor and builder can be organized through the construction contractor of project office; the training can be developed by the environment management expert or the enterprise environment management full-time staff trained at the project site before the implementation of works specifically.

#### (3) Operator

Organize the person through the project office or the owner to develop the training before the operation of engineering, and the training can be conducted by the environmental manager or expert or the enterprise environment management full-time staff trained.

Training content, person, schedule and appropriation budget are detailed in Table 8.2-1.

**Table 8.2-1 List of Organization Strengthening Items**

Content	Person	Training Content	Number of Person	Time	Date (Year)	Expense (ten thousand Yuan)
Envir	Person of project	Environmental	3	5 days	Year	2

Content	Person	Training Content	Number of Person	Time	Date (Year)	Expense (ten thousand Yuan)
Environmental Management	coordination office and manager of related departments	management advanced experience and best practice during the construction period			2013	
	Person of the project management office and the owner unit, as well as the professional person of operation unit	Environment management technique method during the construction period	5	7 days	Year 2014	2
Environmental Protection	Environmental worker of construction unit	Environmental basic theories and monitoring method, monitoring report and post training Once a year Environmental management plan Environmental monitoring report and emergency plan	5	Irregularly scheduled	Year 2014 to 2015	3
Supervision	Environment protection supervisor, environmental management person of construction party	Environmental protection laws and regulations, construction planning, environmental monitoring norm and planning, environmental ambient monitoring and control technique, noise monitoring and control technique	5	Irregularly scheduled	Year 2014 to 2015	3
Total						10

## **9 Estimation of Environmental Management Expenses and Sources of Funds**

Expenses related to environment protection of this project cover the following three parts:

(1) Expenses listed in the engineering, including the water saving work and drainage works;

(2) Expenses incurred by implementation of the *Construction Environmental Management Regulations* by the contractor and carried out various construction environmental protection measures;

(3) Environmental management expenses, including the environment monitoring, environmental management organization, environmental consultants, training and environment protection measures fees etc.

The expense incurred by implementation of the *Construction Environmental Management Regulations* by the contractor will be included in the total price of contractor project by the contractor, which will not be listed in this plan separately

## 9.1 Estimation of Environmental Investment

The environmental management fee of this project is RMB 8,788,000 Yuan, and the expenses estimation is detailed in Table 9.1-1.

**Table 9.1-1 Estimation List of Environmental Management Expenses of this Project Unit:**

**Ten Thousand Yuan**

Environmental Protection Measures					Treatment Efficiency	Investment (ten thousand Yuan)
Part I Environment Monitoring					/	
Environmental Supervision during the construction period					/	25
Environmental Acceptance and Monitoring at the Completion of Project					/	60
Part II Environmental Consulting					/	30
Part III Environmental Training					/	10
Part IV Environmental Management Organization					/	50
Part V Environmental Protection Measures					/	
Reconstruction of Urban Road	Construction period	Exhaust gas	Flying dust	Cover with tarpaulin	Reduce the quantity of flying dust	0.5
		Noise	Mechanical noise	Shock pad	Reduce the noise	0.5
		Ecological	Water and soil conservation	Plant the greenbelts	/	20
	[Operation period]	Exhaust gas	Flying dust	Watering cart	Reduce the quantity of flying dust	5
		Solid waste	Pedestrian domestic garbage	Set the waste container	Collect the pedestrian domestic garbage	10
Zero Kilometer Bus Junction Station	Construction period	Exhaust gas	Flying dust	Cover with tarpaulin and set the enclosure	Reduce the quantity of flying dust	1.2
		Waste water	Rainy water	Rainy water drainage	Reuse the rainy water	1.0



Environmental Protection Measures					Treatment Efficiency	Investment (ten thousand Yuan)
				ditch and one grits chamber		
			Construction on wastewater and domestic wastewater	1 sewage collecting tank	Reuse after sedimentation, without draining out	0.4
		Noise	Mechanical noise	Shock pad and earplug and helmet	The noise at the boundary is up to Class 2 standard of <i>Emission Standard for Industrial Enterprises Noise at Boundary</i> (GB12348-2011)	3
		Solid waste	Slag and domestic garbage	Transport and dispose	Reasonable treatment of solid waste	3
		Ecological	Water slagging maintaining	Cover the temporary waste earthwork piled, protection and side slope protection etc.	Reduce the water loss and soil erosion	40
Operation period	Exhaust gas	Exhaust gas including oil from the mess hall	1 set of fume scrubber	Medium standard of <i>Emission Standard of Cooking Fume</i> (GB18483-200	0.4	

Environmental Protection Measures					Treatment Efficiency	Investment (ten thousand Yuan)
					1)	
		Waste water	Domestic sewage	2 septic tank and 1 oil separator	As per class III in <i>Integrated Wastewater Discharge Standard</i> (GB8978-1996) and Class B in <i>Discharge Standard for Municipal Sewerage System</i> (CJ343-2010)	2
		Noise	Vehicle noise	Speed limit and forbidden singing board	Reduce noise	0.5
		Solid waste	Domestic garbage	Dustbin and garbage pool	Collect at appointed place and clear at regular intervals	1
Railway Station Bus Junction Station	Construction period	Exhaust gas	Flying dust	Cover with tarpaulin and set the enclosure	Reduce the quantity of flying dust	1.2
		Waste water	Rainy water	Rainy water drainage ditch and one grits chamber	Reuse the rainy water	1.0
			Construction wastewater and domestic wastewater	1 sewage collecting tank	Reuse after sedimentation, without draining out	0.4

Environmental Protection Measures					Treatment Efficiency	Investment (ten thousand Yuan)
		Noise	Mechanical noise	Shock pad and earplug and helmet	The noise at the boundary is up to class 2 in <i>Emission Standard for Industrial Enterprises Noise at Boundary</i> (GB12348-2011)	3
		Solid waste	Slag and domestic	Transport and dispose	Reasonable treatment of solid waste	3
		Ecological	Water and soil conservation	Cover the temporary waste earthwork piled, protection and side slope protection etc.	Reduce the water loss and soil erosion	40
	Operation period	Exhaust gas	Exhaust gas including oil from the mess hall	1 set of fume scrubber	Medium standard of <i>Emission Standard of Cooking Fume</i> (GB18483-2001)	0.4
		Waste water	Waste water from vehicle cleaning and machine maintenance	1 oil separator	As per class III in <i>Integrated Wastewater Discharge Standard</i> (GB8978-1996) and class B in <i>Discharge Standard for</i>	0.5

Environmental Protection Measures					Treatment Efficiency	Investment (ten thousand Yuan)
					Municipal Sewerage System (CJ343-2010)	
					Domestic waste water	1 oil separator, 2 septic tanks, 1 sewage treatment station and 1 accident pool
		Noise	Vehicle noise	Speed limit and forbidden singing board	Reduce the noise	0.5
		Solid waste	Domestic garbage	Dustbin and garbage pool	Collect at appointed place and clear at regular intervals	1
South Loop	Construction period	Exhaust gas	Flying dust	Construction enclosure	Reduce the quantity of exhaust gas generated	10
		Noise	Mechanical noise	Shock pad and silencer	Reduce the quantity of noise generated	6
		Waste water	Rainy water and domestic sewage	26 rainy water ditches and 26 grit chambers	Reuse after sedimentation treatment	20.8
			Construction waste water	1 sedimentation tank		0.5
Solid waste	Slag and domestic	Set temporary	Collect the domestic	20		

Environmental Protection Measures					Treatment Efficiency	Investment (ten thousand Yuan)
			garbage	domestic collective pool, slagging transportation and disposal	garbage at appointed place, and clear at regular intervals; clear the slag	
		Ecological	Water and soil conservation	Cover the temporary waste earthwork piled, protection and side slope protection etc.	Reduce the water loss and soil erosion	120
	Operation period	Noise	Noise	Set the greenbelt at the concerned places, and set the acoustic shielding screen at Honghe Integrative Medicine Hospital	Reduce the noise transmission	60
		Solid waste	Pedestrian domestic garbage	Sweeping and clearing	After collected, the pedestrian domestic garbage will be transported to the landfill for filling	12
		Ecological		Plant greening	/	300

Environmental Protection Measures	Treatment Efficiency	Investment (ten thousand Yuan)
Part VI Reserved Environmental Protection Expense in the Operation period	Reduce the noise transmission	40
Total Investment of Environmental Protection	/	939.8.8

## **10 Information Disclosure, Public Participation and Dispute Complaint Channel**

This project involves land requisition and housing demolishing. In order to strengthen the communication between each party of construction project and the public, and make the public understand the construction project more comprehensively, taking the comments and suggestions of the public especially the public in the surrounding region of construction area to this project is helpful to find the potential environmental problem in the construction project so as to modify and perfect the design scheme and realize the unification of environmental benefit, social benefit and economic benefit eventually. Therefore, this project makes public consultation.

Social investigation method is mainly adopted to perform public participation this time. Social organization and the comments and suggestions of the public on Jianshui County proposed urban traffic plan are surveyed by means of information bulletin, public opinion consultation meeting, and interview and questionnaire survey.

### **10.1 Consultation object and range**

There are questionnaires of 80 copies in this project in total. In order to make the public participation can reflect the opinions of the public to the construction of this project objectively, to make the public participation have adequate representative and emphasis, the consultation object of this project involves related government department, Cultural Relics Protection Department (Jianshui County Cultural Relics Administration) as well as the nearby social organization and the masses that may be affected.

There are six social organizations surveyed, which are Jianshui County Cultural Relics Administration, Jianshui County People's Government, Jianshui County Water Affair Station, Jianshui County Land Resources Bureau, Jianshui County Forestry Bureau, Jianshui County Agricultural Bureau. There are 74 copies of questionnaires from the mass surveyed. The masses range surveyed includes residents, shops,

schools and hospitals at Jianshui Avenue, Chaoyang North Road and along both sides of Yinghui Road; the resident nearby the bus junction station and Bus Parking and Maintenance Yard (Dafengjia village, Xiaozhongsuo, Ciwu Village) as well as the villagers along the line of South loop (Xiaomaichang, Shaba Village, Hongmiao Village, Hewan Village).

## **10.2 Consultation mode**

Public consultation of this project adopts on-site consultation, on-site publicity, internet publicity as well as newspaper publicity.

### **10.2.1 On-site consultation**

This project consulted the commercial tenants and residents near the Jianshui Avenue, Chaoyang North Road, and Yinghui Road, as well as the villagers in Ciwu Village, Xiaomaichang, Yousuo Village, Shaba Village, Hongmiao Village, and Hewan Village on site on August 5, 2013 with a number of 80 in total upon the compilation of first draft of environmental management plan. During the consultation, the Construction Unit provided environmental management plan (first draft) for the masses to consult to answer the questions listed in the questionnaire after consulting the environmental management plan. The contents surveyed are as follows:

1. Are you satisfied with the local environment?
2. Do you think the site selection of this project is reasonable?
3. What do you think of the effect of taking measures of environmental management plan during construction of this project on the environment?
4. What do you think of the effect of taking measures of environmental management plan during the operation of this project on the environment?
5. Are you satisfied with the environmental management plan of this project? If not, please put forward your valuable opinions.
6. Are you in favor of the construction of this project? If not, please explain reasons.





**On-site Questionnaire Survey (Jianshui Avenue)**



**On-site Questionnaire Survey (Yinghui Road)**

### **10.2.2 On-site publicity**

Project environmental management plan (first draft) was posted on publicity within the affected areas of this project (Jianshui Avenue, Chaoyang North Road, Yinghui Road and Ciwu Village, Xiaomaichang, Yousuo Village, Shaba village,

Hongmiao Village, Hewan Village) on August 28, 2013 after modified, and environmental management plan was provided for the group office of relevant village for the villagers to consult, and the online consultation and download method of environmental management plan was published.



**On-site Publicity (Hongmiao Community)**



**On-site Publicity (Shaba Village)**

### 10.2.3 Online publicity

In order to make the masses understand the project construction situation, project

environmental management plan (first draft) was published on the internet on August 28, 2013 after modified, and the environmental management plan was provided for the masses to consult and download. Publicity and download website is <http://xxgk.yn.gov.cn> and <http://ynja.com.cn>.



### Online Publicity

#### 10.2.4 Newspaper publicity

In order to make the masses understand the project construction situation and ask for more advice, environmental management plan was published on newspaper in September 18, 2013 at *Jianshui newsletter* after the completion of compilation. The main contents were basic information for project construction, consultation mode, place, suggestion feedback site of environmental management plan.



Newspaper publicity

### 10.3 Results of consultation and publicity

#### 10.3.1 Result of on-site consultation

(1) There were 80 copies consultation questionnaires issued, which are all retrieved with retrieve rate of 100%.

(2) The statistics of on-site consultation survey result are as follows:

1. 98% of the masses think the local environmental quality is good, but 2% think it is ordinary.

2. 88% of the masses think the site selection is reasonable, but 12% think it is not reasonable.

3. 11% of the masses think taking the measures of environmental management plan during the construction of this project has great effect on the environment, but 34% think the effect is ordinary, 55% think the effect is less.

4. 17% of the masses think taking the measures of environmental management plan during the operation of this project has great effect on the environment, but 83% think it has small effect on the environment.

5. 100% of the masses are satisfied with the environmental management plan.

6. 100% of the masses surveyed are in favor of the construction of this project.

(3) After consulting the environmental management plan, the masses surveyed are all in favor of the construction of this project. The opinions of this project construction are as follows:

1. In strict accordance with the measures of environmental management plan to construct to reduce the effect on the environment.

2. Give certain economic compensation for the shops affected.

3. Strengthen the negotiation and communication with relocatees, complete inhabitant resettlement and compensation well.

(4) Jianshui County Cultural Relics Administration presented *The Handling Suggestion on the Involved Construction Control Range of Culture Relic Protection Unit in the Implementation of Comprehensive Traffic Improvement Project of World Bank in Our County* with the following opinions on the project construction:

1. The mechanical equipment with high power shall not be used during construction in order to avoid the security threat or direct damage to the historical and cultural relics;

2. The proposed bus station must have architectural prototype, color, and mass coordinating with the style and features of surrounding historical and cultural relics.

### **10.3.2 Result of on-site publicity**

On-site publicity has a period of 15 days. No public opinions in the form of telephone, fax, e-mail, and letter were received during publicity.

### **10.3.3 Result of online publicity**

No public opinions in the form of telephone, fax, e-mail, and letter were received during online publicity.

### **10.3.3 Result of newspaper publicity**

This project was announced in the newspaper on 18 September 2013. No public opinions in the form of telephone, fax, e-mail, and letter were received during publicity.

### **10.4 Continuity public participation plan**

(1) Within three years after construction period and operation period, each environmental sensitive objective shall be re-surveyed at random once a quarter, and public participation on-site survey meeting shall be held in the region with more environmental sensitive objective once a year.

(2) Satisfaction degree shall be evaluated and the relevant opinions shall be analyzed, and environmental mitigation measures shall be improved as necessary according to the result of quarterly survey and annual survey.

### **10.5 Dispute complaint channel**

#### **(1) Establishment and composition of complaint organization**

In order to better guarantee the legal right of those affected, a complaint mechanism will be established to provide a complaint way being convenient, transparent, and fair and effective for those affected, therefore environmental impact complaint acceptance leading group of this project is established, which is led by related personnel of Jianshui County Environmental Protection Bureau and constitutes personnel from Project Office, Zhaishui County Environmental Monitoring Station, Environmental Impact Assessment Unit, and Construction Supervision Unit and Owner Unit. Environmental impact complaint acceptance leading group sets up complaint acceptance office which is located at Jianshui County Environmental Protection Bureau, meanwhile, the Owner Unit and construction supervision office sets complaint acceptance point. The daily complaint shall be collected and collated by the complaint acceptance office, which shall put forward handling suggestion after negotiating with related responsible organization.

#### **(2) Complaint procedures**

Complaint acceptance leading group and office will start to handle the complaints within one week after the commencement of works, and put the private telephone lines for complaint and complaint mailbox into operation. The specific

complaint procedures are as follows:

When those affected think their rights involving any aspects of environmental protection has been violated, they can go to complaint acceptance office set by Owner Unit to complain in writing or oral. Owner will negotiate with the complainants within one week according to complaint condition, and record the complaint and handling in detail, and report to complaint acceptance leading group regularly.

When the complaints cannot be settled through negotiation, the complainants can complain to the Environmental Protection Bureau complaint acceptance office in writing or oral, member in complaint acceptance office will record in detail and collate; acceptance office will put forward handling suggestion within two weeks after negotiating with related responsible unit.

If the complainants are not satisfied with the opinions of complaint acceptance office, they can complain to Jianshui County Environmental Protection Bureau in writing within one week after the receipt of handling suggestion, and Environmental Protection Bureau will put forward handling suggestion within three weeks.

If the complainants are still not satisfied with the handling suggestion of Environmental Protection Bureau, they can file a lawsuit in the local People's Court according to the *Civil Procedure Law of the People's Republic of China*, and the local People's Court will try the case and make a ruling.

**Schedule 1 General Environmental Protection Measures of Project**

Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	General Environmental Protection Measures during Construction Period	General Environmental Protection Measures during Operation Period	Executing Units
Integrated Traffic Improvement Project of Core Area	Jianshui Avenue Chaoyang North Road Yinghui Road	Function adjustment, bus lane, roadside bus station, harbor bus station, greenbelts, street lamp, water supply network, rainy water and sewage network, electric power and communication line, intelligent transportation and traffic safety system	<p><b>Construction preparation:</b> It is required to carry out various preparatory, invest various contents involved in engineering, such as road, power supply and communication etc. in details, and carry out the various emergency preparatory work, so as to ensure the normal state of social activities.</p>	<p><b>Overall environmental protection measures of construction:</b>                      --Establish the detailed construction management plan, and confirm the protection objectives.                      --Set the bulletin board at the entrance of construction site, writing the contractor, construction supervision unit, construction period and hotline number of local environmental protection bureau and the name of contact person, try to obtain the understanding and consideration of mass influenced by the temporary interface caused the construction project, meanwhile provide convenience for mass influenced who found the violation operation of construction unit for contacting with related departments;                      --In case there are old tree and famous wood species shall be removed during the construction, it is required to handle the transplanted permits according to related regulations of old tree and famous wood species and organize the construction.                      --In case of any cultural relics are found during the construction, it is required to stop the construction, protect the site and report to the administrative department of cultural relics. In case the cultural relics are found or it is doubt that there may be cultural relics during the excavation or construction of this project, the construction unit shall follow the requirements of <i>Law of the People's Republic of China on the Protection of Cultural Relics (2007.12.29)</i>, in the construction engineering or the agricultural production, in case any unit or individual finds cultural relics, they shall protect the site immediately, immediately report to the local cultural relics administrative department; and the cultural relics administrative department shall arrive at the site within twenty four hours after receiving the notice without any special condition, and shall put forward the disposal opinion. The cultural relics administrative department may submit for applying to the local government to notify the public security bureau to protect the site; in case some important cultural relics are found, it is required to immediately report to the State Council Cultural Relics Administrative Department, which shall put forward the disposal opinion within fifteen days after receiving the report.                      In case the cultural relics are found or it is doubt that there may be cultural relics during the construction, the construction unit shall:                      ① Stop the construction at the place where the cultural relics is found, and notice the person of county project office;                      ② Delimit the historic site or area found;                      ③ Protect the moveable objects in the place found to prevent missing and damaging; appoint the specialized person as far as possible, so as to guarantee that there are person to guard at night till the local cultural relics bureau take charges;                      --Prepare and implement the traffic dispersion scheme, and appoint specialized person to dredge the traffic at the busy roads during the rush hours;                      --Minimize the impacts on public service, commerce and household etc. as much as possible; in case these influences are inevitable, it is required to notice the residents, commercial tenant in time, and shorten the influencing time as far as possible;                      --Establish the effective appeal mechanism, and the contractor and the owner shall be welcome by the specially-assigned person.  <b>Environmental air protection measures:</b>                      Set the construction enclosure; water to reduce dust; strengthen the management of piling yard; control the</p>	<p><b>Environmental air protection measures</b>                      --The new car with new license plate shall strictly follow the emission standard                      --Strengthen the detection and maintenance of vehicles, so as to prevent motor vehicle with its emission of tail gas pollution exceeds the standard passing;                      --Strengthen the traffic management, so as to guarantee the smooth traffic;                      --Extensively promote the electric and petroleum liquid gas and other clean fuels                      --Avoid add the sensitive points at the two sides of road                      --Strengthen the maintenance of greenbelt at two sides of road  <b>Ecological environmental protection measures:</b>                      Strengthen the management and maintenance of</p>	<p>Construction preparation: contractor                      Environmental protection measures during construction period: contractor                      Environmental protection measures during construction period: construction unit and management unit</p>



Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	General Environmental Protection Measures during Construction Period	General Environmental Protection Measures during Operation Period	Executing Units
				<p>emission of harmful gas; the earth transporting truck and building material transporting truck shall be covered with tarpulin, covered or taking other falling preventive measures according to the regulations, the loading shall not be too much, guaranteeing that there will be no falling during the transportation; the road transportation shall be swept and watered at regular intervals, so as to reduce the reentrainment of dust, and all the construction lot shall be provided with one sprinkler at least; (road construction) the sealed asphalt mixing equipment with smoke prevention and dust control device is recommended to use; after the construction, it is required to clear the site of asphalt mixing station, with the waste generated recovered for burning by the asphalt supplier or transported to the place appointed by the local environmental protection bureau to dispose, it is forbidden to fill them on the site, using them as the filling material of site restoring.</p> <p><b>Water environmental protection measures:</b></p> <p>--During the construction, the construction unit shall strictly organize the construction, be strict with the construction scope, occupy less water area as far as possible, guarantee that the engineering is conducted within the red line as far as possible, realizing the civilized construction. Meanwhile, the construct unit shall organize and design the wastewater drainage, and it is forbidden to drainage and randomly, polluting the environment.</p> <p>-- Domestic sewage: the domestic sewage of constructor and watch man shall be settled in the simple sedimentation tank and then be used for the dust reducing at workyard.</p> <p>--Construction wastewater: the construction wastewater can be reused after being settled through oil separation, it is forbidden to drain into the water. The sedimentation tank shall be set at the front platform of mixer at the construction site as well as the cleaning place of concrete pump and transport vehicles, with the wastewater reused after secondary sedimentation or used to water for reducing dust;</p> <p>--The oil plants, chemical solvent and other articles at the construction site shall be storage at the special storehouse, and the ground shall be conducted with anti-seepage treatment. The discarded oil plants and chemical solvent shall be treated centralized, shall not dumped randomly.</p> <p>--Management measures: develop the water environment protection education on the construction site to allow all the constructors understand the importance of water environment protection.</p> <p><b>Acoustic environmental protection measures:</b></p> <p>--Conduct the organization of construction vehicle and management of construction site. Carry out the civilized construction, and it is required to monitor the noise during the construction period. Control the traveling speed of bulldozer, excavator, road roller and other mechanical equipment, the speed of vehicle transporting the material shall be controlled (with the speed no more than 8 kilometer); and it is forbidden to whistle; reasonably arrange the transportation of construction, slow the speed when passing by the village and school, and it is forbidden to whistle.</p> <p>--Strengthen the noise monitoring. The noise at the boundary of construction site shall be monitored and recorded according to requirements of <i>Emission Standard of Environment Noise for Boundary of Construction Site</i> (GB12523-2011); the noise emission shall not exceed the national standard, and it is required to adopt the temporary noise barrier to reduce the noise influence during the construction period accruing to the noise monitoring result.</p> <p>--Reasonably determine the construction boundary of engineering according to the requirements of <i>Emission Standard of Environment Noise for Boundary of Construction Site</i>. The going in and out of construction transportation vehicle shall be at one side of place far away from residential area and school etc. The equipment with strong noise on the construction site shall be set at the side far away from the residential area.</p>	<p>greening tree species, increasing the survival rate.</p>	

Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	<p align="center"><b>General Environmental Protection Measures during Construction Period</b></p>	General Environmental Protection Measures during Operation Period	Executing Units
				<p>--The construction unit shall select the construction equipment and transportation vehicle conforming to related national standard, the construction equipment and technology with low noise shall be selected as far as possible, and the fixed mechanical equipment with serious vibration shall be provided with vibration reduction base, and it is required to strengthen the maintenance of various construction equipment, and keep it operate well, so as to reduce the noise resource basically.</p> <p>--If suffering the serious construction noise for long time, many diseases may be induced and cause the noise induced deafness. In order to protect the health of constructor, the construction unit shall reasonably arrange worker to operate the construction machinery with strong radiation and strong noise in turn, reducing the time of contacting with strong noise, or arranging the work with strong noise and low noise. For the constructor who is close to the strong radiation and strong noise resource, besides wear the protective earplug, helmet or other labor protection equipment, it is also required to reduce the working hours.</p> <p>--Reasonably arrange the construction time, it is forbidden to conduct the construction between 22:00 and 06:00. For those construction place that shall be constructed continuously, the construction unit shall contact with local environmental protection department, apply for the construction license at night according to related regulations, and announce at the same time to obtain the supporting of the public farthest.</p> <p>--The construction unit is required to indicate the complaints hotline along the construction line, for the complaint problems, the construction unit shall contact with the local environment protection department, so as to dispose various environment disputes.</p> <p><b>Treatment measures of solid waste:</b></p> <p>--During the construction, the solid wastes main include the spoil generated during the engineering construction, construction waste and domestic garbage of constructor. In order to further properly treat the solid waste generated during the construction of engineering, the principle of “reducing quantity, reclamation and harmless” during the construction of engineering.</p> <p>--It is forbidden to discard any solid waste to the agricultural irrigation ditch.</p> <p>--Reuse the solid waste resource. The solid waste in this engineering shall be reused and covered as far as possible; the complete brick and rebar in the building rubbish shall be recovered; the building rubbishes shall be sorted and then be smashed, with the useful waste residue made into mortar used for building the road; deploy and utilize the excavated earthwork and rockwork, so as to reduce the spoil (slag) generated in the engineering construction farthest.</p> <p>-- In case there are city and countryside president settlement, it is required to pile and transport the solid waste well; the temporary piling yard shall be covered with plastic film or grass mat, with the cut-off ditch set at the surroundings, so as to prevent the water loss and soil erosion, and the site shall be at the place far away from the agricultural irrigation ditch.</p> <p>-- The domestic garbage generated by the site constructor at the construction rush hour shall be stored intensively, and shall be cleared and transported to Jianshui municipal solid waste treatment plant. The garbage generated during the removal shall be cleared and transported to appointed building garbage landfill for disposal.</p> <p>--It is required to reduce the solid waste generated during the construction as far as possible. After the completion of construction, the solid waste generated during the construction shall be cleared completely. Due to that the distribution of solid waste generated during the construction is in a linear distribution, in case they are not piled properly or disposed timely, the ecological environment along the line will be damaged directly, therefore, it is required to strengthen the construction management, clear, transport and dispose the solid waste</p>		

Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	General Environmental Protection Measures during Construction Period	General Environmental Protection Measures during Operation Period	Executing Units
				<p>immediately, so as to reduce and prevent the influence of solid waste.</p> <p><b>Ecological environment protection measures:</b></p> <p>--The temporary workyard shall be cleared after the completion of construction, the construction waste shall be cleared in timely, and it is required to restore the original status of the surroundings, without any pollution and damaging. Land exposed due to vegetation are damaged in the construction shall be restored and used after the completion, so as to shorten the adverse impacts on the landscape in this region.</p> <p>--Strictly follow the various protection measures proposed in the water and soil conservation plan, so as to prevent the slag generated during the construction of project flowing into the river, influencing the survival of aquatic organism.</p> <p>--Get strict with the construction organization and construction management, and it is forbidden to occupy land beyond the plan, and it is required to set the enclosure for the construction area before the construction.</p> <p>--Reasonably deploy the excavation and filling of earthwork, the protection measures shall be taken at the piling place of spoil, and it is required to excavate and fill the earthwork during the rainfall season, so as to prevent the rainy water wash, causing the water loss and soil erosion, polluting the water and blocking the drainage pipe.</p> <p>--Select and plant the tree adapting to the city ecological environment, with features of long tree ages, less plant diseases and insect pests, strong ability against the fume and wind damage etc., greening the road.</p> <p>--Transplant the arbor in the greenbelt removed.</p> <p>--In case of any protection objects are found during the construction, it is required to report to the competent department immediately, and protect by removing.</p> <p>--Start the construction by sections orderly, avoiding the mess of landscape along the line, and it is ok to set the barrier as the enclosure, so as to reduce the pollution of landscape.</p> <p>--Strengthen the management on constructor during the construction period, widely promote the environment protection measures to constructor, and it is forbidden to damage and tread the orchard and farmland near the project area.</p> <p>--It is forbidden to occupy land beyond the plan, and prevent the vehicle or the mechanical equipment damaging the vegetation outside the construction area.</p> <p>--Increase the animal protection awareness of constructor, and minimize the adverse effects on the animal caused by the habitat destruction.</p> <p>--In order to reduce the disturbance to the wildlife due to engineering construction, it is required to plan the construction way and time, and avoid the noise influence at the morning, nights and noon.</p> <p>--After the completion of construction, the temporary land occupied shall be leveled as early as possible, and it is required to restore the vegetation and farmland.</p> <p><b>Waste disposal area environment implementation charter:</b></p> <p>1) In case of any waste disposal generated, it is required to consider to use them on the site or transport to other lot of project for using firstly, or use for the restoring of vegetation of borrow area, it is required to avoid setting the spoil yard separately, which can eliminate the environmental influence by the borrow area basically.</p> <p>(2) If these waste disposal cannot be used, it is required to investigate whether there are appointed building waste disposal area in local place firstly, if any, it is required to handle the clearing procedures for the slag, and then transport to the appoint place.</p> <p>(3) The waste disposal area shall be compacted by layers, which is useful to control the production of flying dust.</p> <p>(4) Water to reduce the dust, so as to reduce the flying dust pollution caused by the exposure of earth surface.</p>		

Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	General Environmental Protection Measures during Construction Period	General Environmental Protection Measures during Operation Period	Executing Units
				<p>(5) In order to prevent the water loss and soil erosion, it is required to set the cut-off ditch and drainage ditch at the slag yard, so as to prevent the sediment lost during the construction period and Operation Period draining into the surface water directly along with the runoff of drainage ditch.</p> <p>(6) Before the waste slag enters into the yard, it is required to excavate the top for using in the land rehabilitation, and the top soil shall be temporarily piled at the flat area in the yard, and shall be blocked with soil in bags temporarily. The surrounding place shall be set the temporary drainage ditch and sand setting measures, and shall be covered with dust screen, which will be used for the ecological restoration of waste slag after the completion of construction.</p> <p>(7) Follow the principle of concise and easy maintenance, adopt the greening type of combination of arbor and bush, forming the plant community landscape and restore the natural ecology of spoil (slag) yard, reducing the water loss and soil erosion.</p> <p>(8) It is forbidden to pile and discard the spoil randomly.</p> <p><b>Construction road environment implementation charter:</b></p> <p>(1) Utilize the county, town and village road as the construction road as far as possible, and transform the town and village road at the same time.</p> <p>(2) If it is necessary to newly build the construction road, it is required to reduce the high filling and depth excavation as far as possible, protect the water and soil, so as to reduce the water loss and soil erosion and ecological damage; during the building of construction road, it is require to harden the construction road. In case there are overload vehicle pass by, the load-bearing tile recycled may be used; the common aisle can be paved with permeable brick recycled.</p> <p>(3) Before the new construction road is built, it is required to peel the top soil, which shall be piled at the flat area in the yard, and shall be blocked with soil in bags temporarily. The surrounding place shall be set the temporary drainage ditch and sand setting measures, and shall be covered with dust screen, which will be used for the ecological restoration of construction road after the completion of construction.</p> <p>(4) The construction road shall be combined with the construction camp as far as possible, so as to reduce the quantity of construction road.</p> <p>(5) The construction road shall be maintained and swept every day, and the road section where the dust is generated shall be watered to prevent the dust.</p> <p>(6) Reduce the impact on the environment by controlling the speed, no horn, and forbidden transportation from 12:00 to 14:00 in day and from 22:00 to 6:00 at nights.</p> <p>(7) Before the completion of construction, the ecological restoration shall be conducted for the newly built construction road, restoring to the statues before the construction at least.</p> <p>(8) The local road occupied and damaged shall be removed or protected after the completion of construction, and it is required to restore the pavement and greenbelt, pay the local government some compensation cost, so as to maintain the legitimate interest of local government and resident.</p> <p><b>Construction traffic organization palnning:</b></p> <p>Proper construction scheme shall be developed during the construction period of the project and semi-range construction scheme shall be adopted. Warning boards shall be arranged at the construction section and 2 traffic wardens shall be assigned to control traffic and reduce road construction' adverse impact on traffic capacity along the road. Meanwhile, construction shall avoid full-width construction which can impact traffic capacity; and in case of section where it is necessary to conduct full-width construction, temporary road shall be paved in advance before commencement of the construction.</p> <p><b>Safely problem of construction:</b></p> <p>Construction unit shall be responsible for protecting workyard and everybody around it in order to avoid personal injury and property loss due to construction. Construction unit shall be responsible for observing national and local safety requirements and adopting any necessary measures to avoid accident. Specific measures are shown as follows:</p>		

Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	<p align="center"><b>General Environmental Protection Measures during Construction Period</b></p>	General Environmental Protection Measures during Operation Period	Executing Units
				<p>1) Passenger security labels shall be carefully and clearly posted on the construction transportation road and entrance and exit of the construction site;</p> <p>2) Traffic safety person shall be assigned to lead traffic at beginning and ending of schooltime;</p> <p>3) Enough traffic warning boards (including painting signs, sign gantry and markers), road signs and guard handrails shall be set up to ensure passenger safety at the construction stage;</p> <p>4) Building workers shall be trained about safety before commencement of the construction;</p> <p>5) Provide building workers personal protective equipment and clothes (goggles, gloves, masks, dust guard and helmet) and force building workers to use them;</p> <p>6) Each construction site shall be provided with safety information notice board; warning marks shall be put up in chemicals warehouse;</p> <p>7) All workers are required to know safety information about all kinds of materials and it shall explain constructors that usage of all kinds of materials might bring risk to them and their family, specially for those who are pregnant or plan to be pregnant and encourage workers to share the relevant information;</p> <p>8) It shall make sure that materials containing asbestine or other toxic materials are processed by workers who have specially training;</p> <p>9) In case of heavy rain or other emergency, it shall suspend the construction;</p> <p>10) Electrical equipment and mechanical equipment shall be able to bear seismic impact at certain level.</p> <p>11) ensure completeness of all the buildings within the workyard; temporary buildings shall be structurally reliable and safe enough to withstand impact from severe weather of the location, have proper light and be able to isolate partial dust and noise;</p> <p>12) Construction unists shall make sure that they can provide satisfactory first aid. The workyard shall be provided with proper first-aid appliances; written emergency procedures shall be provided for remote places so that patients can be taken care of until they are transferred to appropriate medical institutions;</p> <p>13) All the new constructors shall have occupational health and safety training and they shall be told basic working rules, physical protection rules and how to prevent other employees being wounded;</p> <p>14) Correct sign boards shall be suspended at dangerous zones (such as switching room and compressor room), installations, materials, safety measures and emergency exit;</p> <p>15) If workers' hands and arms are affected by vibration because of using manual tools and electric tool or their whole bodies are affected by vibration because they stand or sit on the surface of vibrating equipment, the vibration shall be controlled through selection of equipment, installation of anti-vibration pad or vibration damper and limitation of exposure duration;</p> <p>16) Clamping danger shall be solved when designing machine so as to make sure projection of machinery will not hurt human body under normal operations;</p> <p>17) Warning boards shall be put on all the energized electric actuator and electric wires; check all the wires, cables and manual electric tools for any damage or exporsed wire, determine maximum allowable working voltage of manual tools according o manufacturer's recommendation; all the electric equipment which are used under humid (or might be humid) environment shall be doubly insulated / connected to ground;</p> <p>18) It shall provide all the operators participating in weld or anyone assisting weld appropriate appliances to protect eyes (for example welding goggles and / or mask);</p> <p>19) Protective barriers (it shall be provided with one rod in the middle and baffles around it) shall be installed at the edge of fragile and dangerous areas, and meanwhile constructors shall use anti-falling devices (including safety belt and distance limit lanyard);</p> <p>20) Construction units shall determine and provide personal protection appliances appropriate for constructors so that they sufficiently protect workers themselves, other workers and occasional visitors and shall not bring ennecessary inconvenience to users;</p> <p>22) Health eduction shall be conducted to constructors, for example, carry out information communication strategy, enhance face-to-face consultation work, solve systematic problems which influence individual behaviors, encourage individual to use safeguard procedures and avoid infect disease to others by using</p>		

Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	General Environmental Protection Measures during Construction Period	General Environmental Protection Measures during Operation Period	Executing Units
				<p>condom; in addition, encourage to use anophelifuge, clothes and mosquito net to prevent natural dissemination disease via mosquito bite.</p> <p><b>Social impacts:</b> In order to reduce adverse impact on society, construction units shall do as follows: 1) Timely inform information such as construction plan, environmental impact state, information of construction road, information of temporary bus routes, explosion and demolition announcement; 2) Limit construction at night; if it is necessary to construct at night, it shall reasonably arrange construction at night and inform residents who will be influenced in advance so that they can adopt necessary precautions. 3) If public facilities (e.g. water pipes, electricity, telephone, bus routes) cannot work properly due to construction, it shall inform people through posting announcement at least five days in advance at construction points, bus station and areas to be influenced.</p> <p><b>Cultural relics protection:</b> During the construction period, in case of discovering or suspecting any possible cultural relics and historic sites, construction units shall immediately protect the site, report to local Cultural Relics Protection Bureau for dealing with and cannot regain construction until Cultural Relics Protection Bureau deals with it in accordance with <i>Cultural Relics Protection Law of the People's Republic of China</i> (December 29, 2007) and requirements of World Bank's policy on physical cultural resources. In case of discovering or suspecting any cultural relics and historic sites during the construction period, construction units shall: (1) Immediately stop construction at the construction position where cultural relic is discovered and protect the site; (2) Contractor shall timely report to police and cultural relic management authorities for certification and dealing with; (3) Once experts define they are truly cultural relic, it shall delimit scope of protection at once; (4) If cultural relics might be damaged because of urgent construction period or any natural risk, it shall conduct salvage excavation; (5) Salvage excavation of cultural relics must be carried out by professionals with special-purpose equipment and constructor shall not excavate without authorization; (6) If any cultural relic is determined as significant discovery, the project shall demonstrate whether it is necessary to choose other place.</p> <p><b>Cumulative impact mitigation measures of the construction projects in the same period</b> --Enhance coordination among construction units of works, arrange routes and times of construction machineries and transport vehicles, ensure smooth and normal operation of existing roads close the project and minimize traffic accident. --Manage construction of sensitive sections, set up marks of caution and speed limit at sensitive sections, guide traffic if necessary and ensure safe trip of surrounding residents. --Construction units of works shall enhance management of transport vehicles, transport vehicles carrying earth and building materials shall be covered with tarpaulins, overcanopy or the anti-scattering measures, and roads shall be cleared and watered at regular intervals to reduce reentrainment of dust. --Properly arrange routes for transport vehicles and keep away from settlements as far as possible; slow down and do not whistle when passing by settlements and schools to reduce noise pollution.</p>		
Bus priority subproject	Bus station at railway	Parking & maintenance yard, parking, integrated office, bus station, parking, intelligent public traffic system	<b>Construction preparation (ditto)</b>	<p><b>Land requisition and demolishing:</b> --The construction unit shall carry out land requisition work. --The project demolishing and resettlement shall be arranged by the construction unit uniformly, compensate certain amount of land acquisition fees and demolishing compensation fees to the demolished residents according to the related compensation policies.</p>	<b>Ambient air protective measures:</b> -- The registered new cars shall execute strict emission	Land requisition and demolishing: Construction

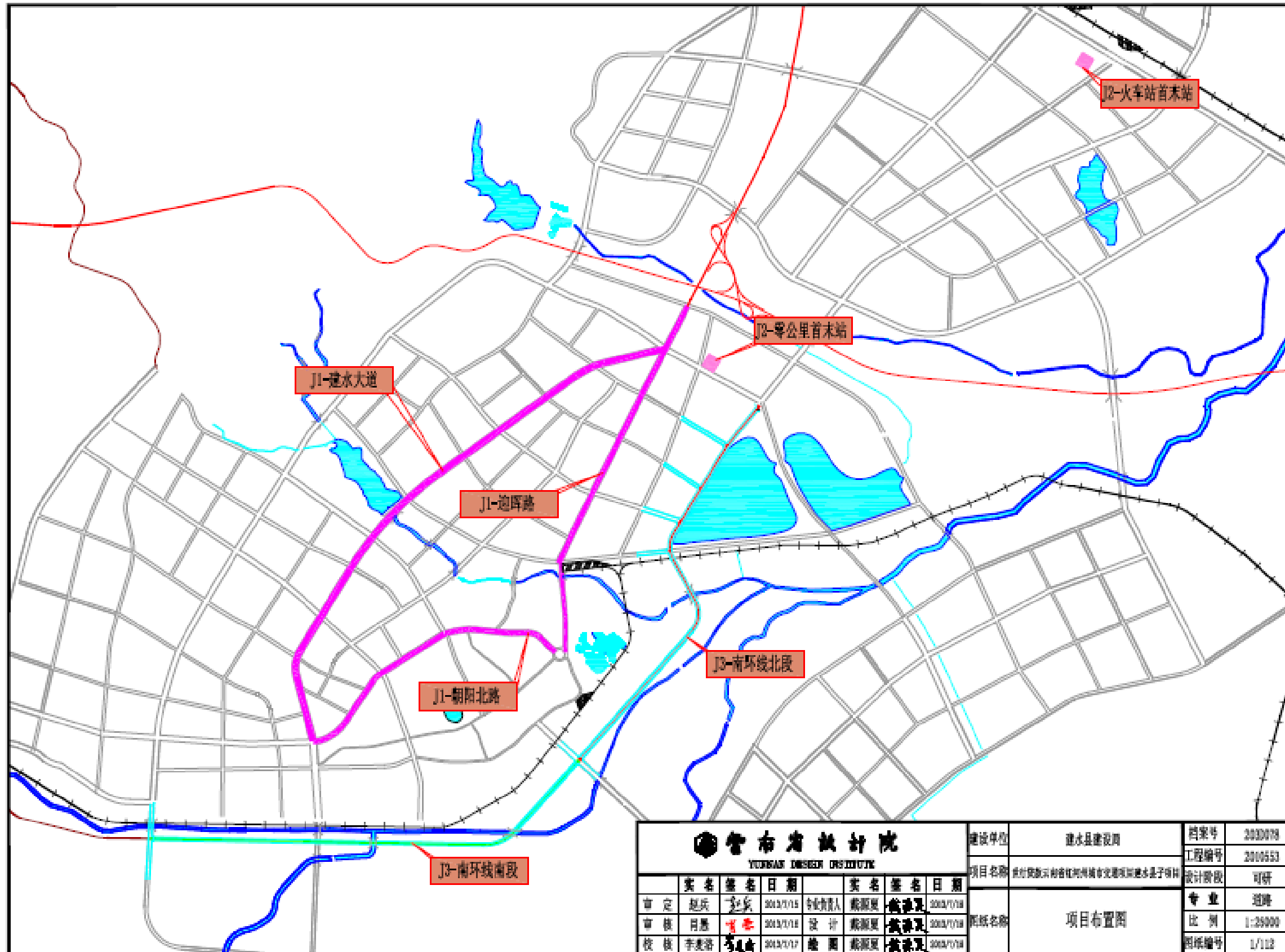
Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	General Environmental Protection Measures during Construction Period	General Environmental Protection Measures during Operation Period	Executing Units
	station  Zero kilometer bus station			<p>--Fully ask for the opinions of the local government and affected masses, for the issues closely related to the affected masses such as compensation method, standard and implementation method, consensus shall be reached through full negotiation. When performing land acquisition to the peasants of the affected villages, groups and agricultural households, land adjustment and resettlement of surplus labor force shall be done within the original village and group range to the greatest extent. It is suggested to prepare the specific resettlement scheme after reaching consensus, to reduce the possible adverse impact.</p> <p>-- The construction unit shall enhance propaganda, to publicize the related construction land acquisition, demolition and resettlement policies etc., let the residents along the road of the project further understand the importance of project construction, and make the general public support the project construction further.</p> <p><b>Construction overall environmental protection measures, ambient air protection measures, water environment protection measures, acoustic environmental protection measures, solid waste treatment measures, ecological environment protection measures, waste disposal area environment implementation charter, construction road environment implementation charter, construction traffic organization and planning, construction safety problems, social influence, cultural relic protection, cumulative impact mitigation measures of the construction projects in the same period (ditto).</b></p>	<p>standards; -- Enhance detection and maintenance of the vehicles in use, and prohibit the motor vehicles emits excessive tail gas pollutants to go through; -- Enhance traffic management, to guarantee smooth of road traffic; -- Vigorously promote the clean fuels such as electricity and liquefied petroleum gas etc.;</p> <p>-- Enhance maintenance of green belts in the station.</p> <p><b>Ecological environment protective measures (ditto)</b></p>	<p>unit Construction preparation: contractor Environmental protection measures during construction period: contractor Environmental protection measures during operational period: construction unit, management unit</p>
South loop subproject	Main Construction, land requisition and demolishing	Road and infrastructure construction	<b>Construction preparation (ditto)</b>	<p><b>Housing demolition:</b> During the construction period of demolishing the existing buildings, the construction unit shall take adequate measures to protect the workers and the public from damaging by the falling gravel and slag gravel. These measures include: 1) Leave an appointed waste drop zone or discharge chute, to make the wastes dump from the upward safely; 2) Control the process of saw cutting, chisel digging, grinding, sanding and cutting etc., and use the reasonable anchoring method to lead dropping of waste stones; 3) Keep the transportation process clean, to avoid waste materials sliding caused by excessive loading of vehicles, which may pollute the pavement and atmosphere; 4) At the edge of the scaffold in lifting work, temporary dropping protection measures such as handrail and toe board, shall be taken, to prevent waste materials dropping; 5) When performing blasting works near crowd settlements and other buildings, all the personnel within the areas may be affected shall be evacuated, use blasting mat or other deflection method to reduce influence of slungshot and splashing as much as possible; 6) Provide all the workers with the protective equipment such as safety glasses, edge shield, face mask and safety shoe etc.</p>		

Types of Subproject	Composition of Main Project	Main Work Content	General Environmental Protection Measures at Design Stage/Project Preparation Stage	General Environmental Protection Measures during Construction Period	General Environmental Protection Measures during Operation Period	Executing Units
				<b>Construction overall environmental protection measures, ambient air protection measures, water environment protection measures, acoustic environmental protection measures, solid waste treatment measures, ecological environment protection measures, waste disposal area environment implementation charter, construction road environment implementation charter, construction traffic organization and planning, construction safety problems, social influence, cultural relic protection, cumulative impact mitigation measures of the construction projects in the same period (ditto).</b>		

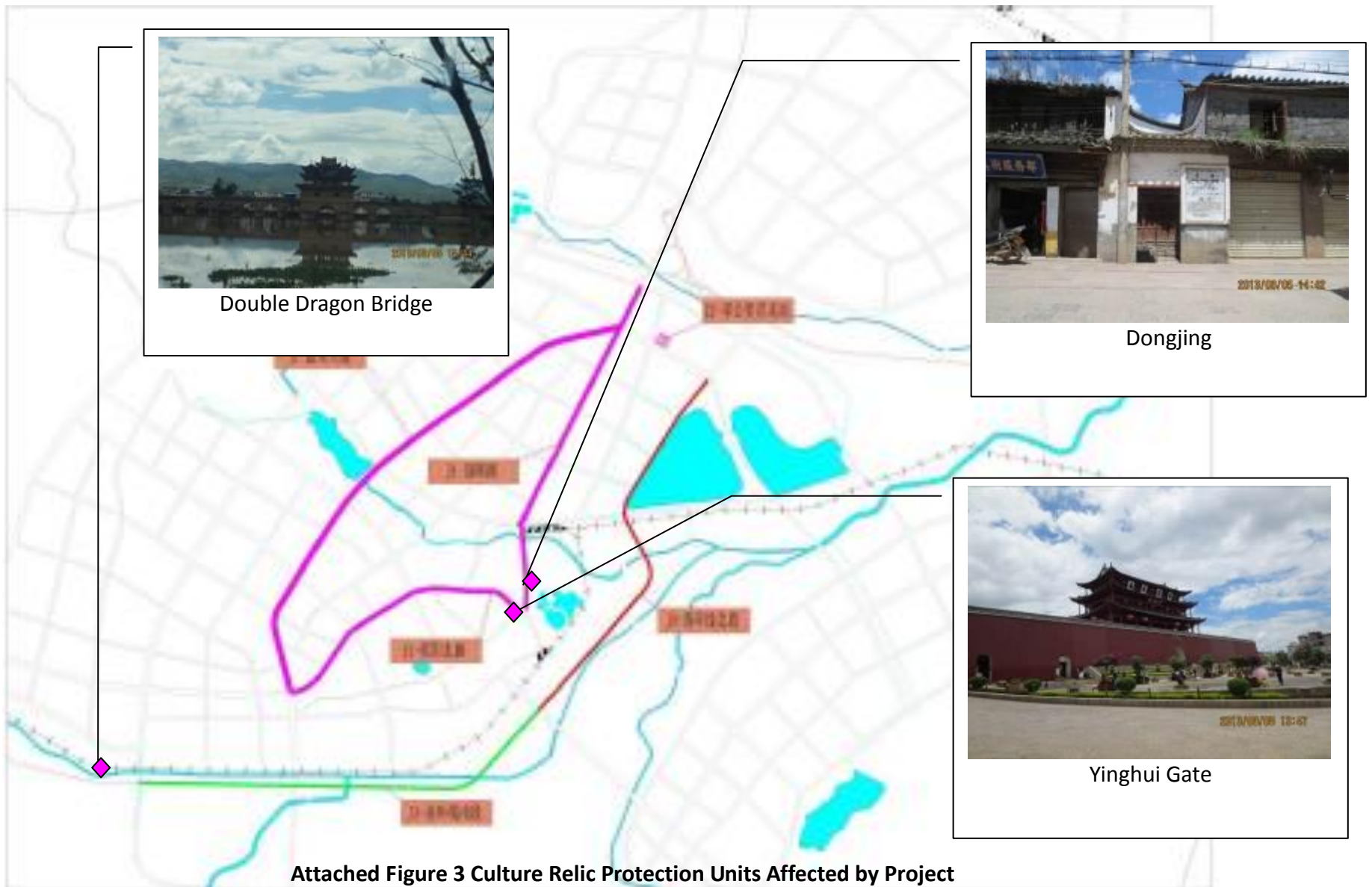




Attached Figure 1 Geographical Location Map of Project Area



Attached Figure 2 Location Schematic Drawing of Major Construction Contents of the Project

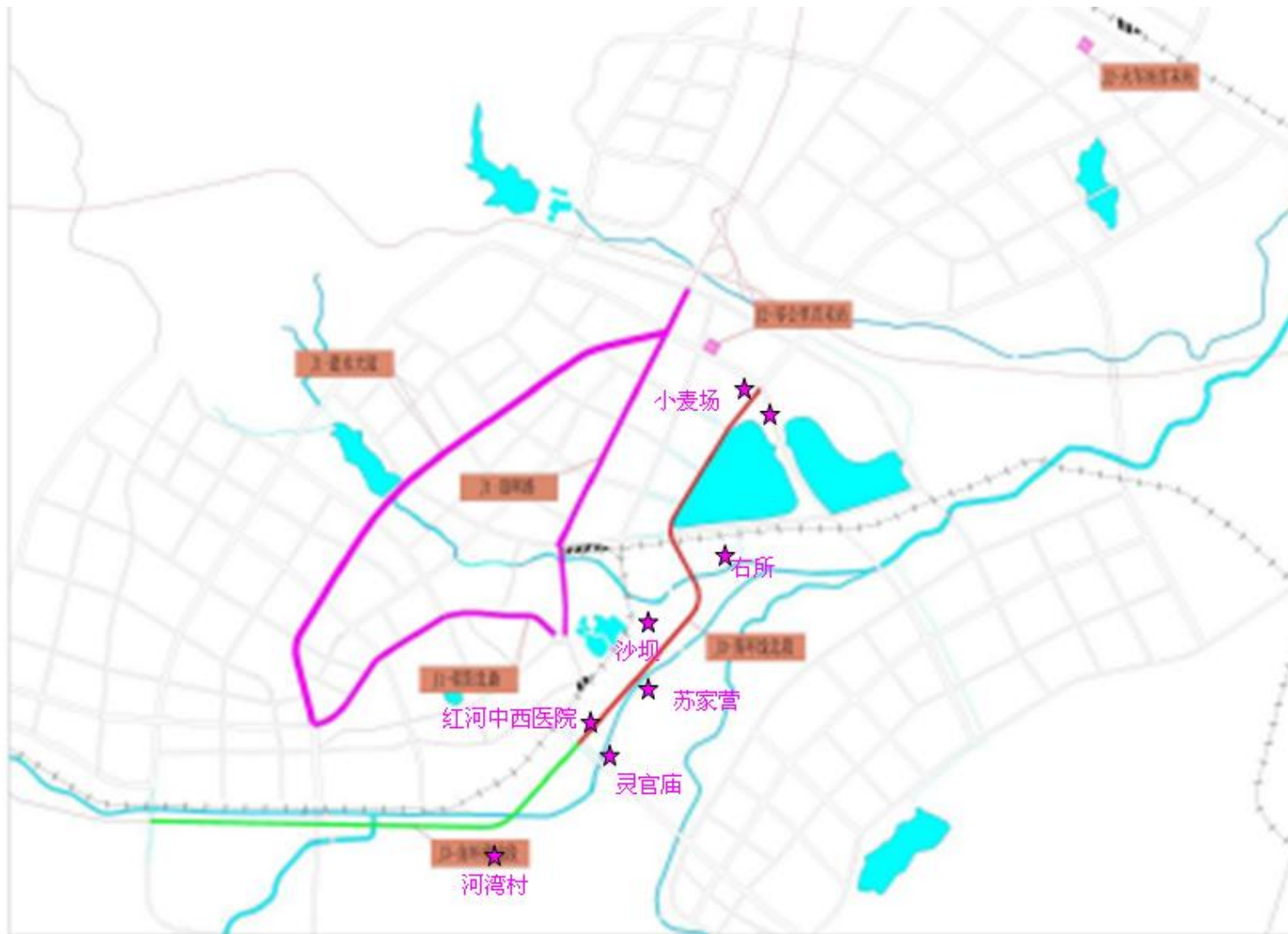


Attached Figure 3 Culture Relic Protection Units Affected by Project



图4 环境保护目标位置关系图 1（三条市政道路）

Figure 4 Location Relationship Map of Environmental Protection Target 1 (Three Municipal Roads)

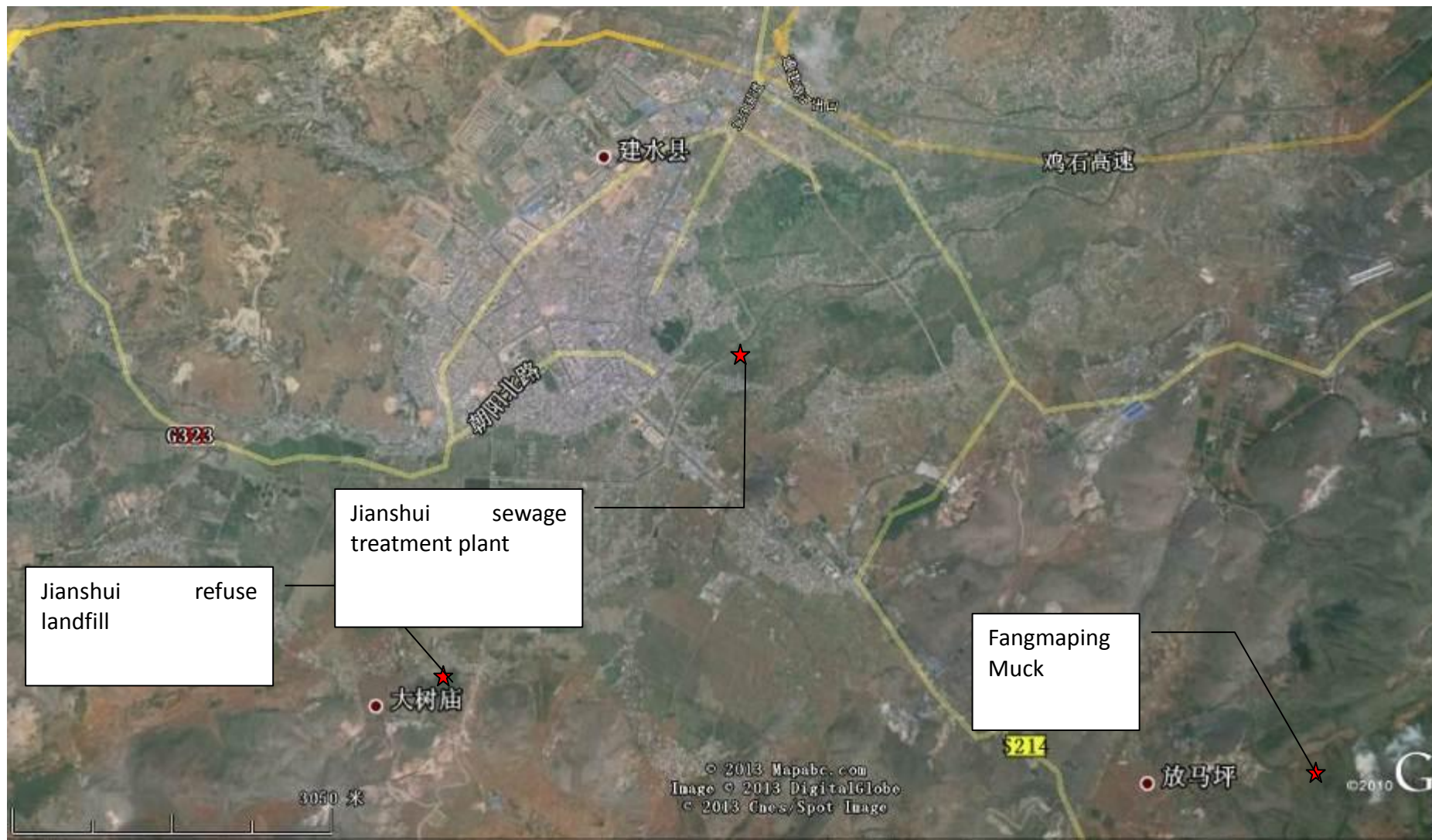


Attached Figure 4 Location Relationship Map of Environmental Protection Target 2 (Zero Kilometer Bus Station, South Loop)



图 4 环境保护目标位置关系图 3 (火车站公交车站)

Figure 4 Location Relationship Map of Environmental Protection Target 3 (Bus Station at Railway Station)



Attached Figure 5 Location Relationship Map of Project Relying Works and the County

