E4317 V2

The World Bank financed

Honghe Prefecture Urban Transport Project

in Yunnan Province

Environmental Management Plan

Yunnan Institute of Environmental Science
Mengzi Municipal Housing and Urban and Rural Construction Bureau
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1 General

This Environmental Management Plan (EMP) was prepared by Yunnan Institute of Environmental Science (YIES) for the World Bank financed Yunnan Honghe Prefecture Urban Transport Project (Mengzi City). During the project assessment, the EMP would be reviewed and approved by the World Bank financed Honghe Prefecture Urban Transport Project Office, and it will be implemented in project implementation phase.

The purpose of the EMP is to propose measures or methods to eliminate, reduce or mitigate adverse environmental impact, so that it can be reduced to an acceptable level.

To ensure an effective implementation of the EMP, in project preparation, the cost budget of the environmental protection measures were included in project cost estimate; the environmental mitigation measures were included in the technical specifications for procurement, bidding documents and implementation contracts; trainings on environmental management were provided to project management staff, project implementation staff, construction supervising consultant and contractors; and the costs on training and the implementation of the EMP were included in the overall project cost. In addition, the Client will select a qualified and experienced Environmental Monitoring Consultant (EMC) to conduct independent external monitoring. The EMC will monitor whether the contractor has implemented the environmental protection measures required in the tendering documents, assess the effectiveness of these measures, and propose suggestions for optimization of the environmental management during construction phase and operation phase.

1.1 Project Background

Mengzi City is the key area in urban development group in south Yunnan. Centered by Mengzi and supported with Gejiu and Kaiyuan, is the so-call “Meng-Ge-Kai” urban group. In construct ion of this urban group, as the junction of Kunming-Hekou economic belt and the capital city of the prefecture that connecting coastal economic corridor, Mengzi becomes the core of the “Meng-Ge-Kai” urban group and the development core area. It is the center of politics, economy and culture of Honghe Prefecture.

With the great historical opportunity coming with China's Development of the West Regions policy and the establishment of ASEAN Free Trade Area, Mengzi has shown its advantages on opening border, abundant resources and the "Development of the West Regions" policy. The city's fast development has made it hard for existing urban transport system to meet the increasing traffic flow demand. Honghe Prefecture Government and Mengzi Municipal Government has paid much attention to the perfection and construction of the urban transportation system and have been actively seeking for finance from Word Bank. Through the implementation of Urban Transport Project in Mengzi, the radiating capacity of the city's outbound transport system would be strengthened; the urban transport system could be constructed to be complete and sound; the city's development principle as "stretching towards south and west" would be effectively guided, and the project would provide better direct municipal road infrastructure construction in urban development so as to realize the integration of transportation system, operation and management. Based on this, a rational road network structure for transportation would be constructed to provide guarantee for the development of the city. .

Entrusted by the Implementation Agent, Kunming Design and Research Institute and Kunming Urban Transport Research Institute complied the *Feasibility Research Report of the World Bank Financed Honghe Prefecture Urban Transport Project in Yunnan Province—Mengzi City.* YIES was authorized by Project Implementation Agent to develop the EMP.

1.2 The EMP objective

The purpose of the EMP is to develop a set of technical feasible, financial sustainable and operable environmental measures that specifically identify measures and arrangements for contractors, supervisors, operators and environmental departments to take in project implementation to mitigate and manage the environment impact and building up institutional capacity to eliminate or compensate any adverse social and environmental impacts to an acceptable level. The specific objectives of EMP include:

（1）To identify environment management obligations of the contractors and

operators

Environment Protection Bureau, environment assessing unit and the designing organizations would conduct on-site check and identify environment protection targets, develop effective mitigation measures and include them into the designing and contractual obligations for contractors and operators.

（2）To working as environment management guidelines

The proposed environment monitoring plans in EMP to be implemented in construction and operation periods can guarantee the effectiveness of the mitigation measures. It would be provided to supervising units working in construction and operation periods, environment monitoring units and other related departments to be environment protection documents to clarify the responsibility and roles of the functional departments, managing organizations as well as providing channels and methods for communication among various departments.

（3）To guarantee fund for environment management actions.

The cost estimate on environment management, monitoring, supervising and capacity building proposed in EMP has made it clear for all financing sources to guarantee all environment management actions can be implemented.

1.3 The design of EMP

In order to elaborate the detailed content of environment management, supervision and monitoring, the proposed EMP would be the guidance for environment management throughout the project implementation. Its action plans mainly include the following 6 aspects:

（1）Environment Impact and Mitigation Measures: main environment impact made during the construction and operation periods and the implementing and managing measures to prevent or mitigate the adverse impact.

（2）Environment management system: setting up environment management organizations, clarifying monitoring and managing content and responsibilities and the supervising actions that guarantee implementation of environment protection measures in construction.

（3）Environment monitoring plans: in order to eliminate environment pollutions, guarantee safe engineering and improve the environment condition of the project

area, external monitoring method would be adopted.

（4）Environment management training plan: The plan is developed to provide knowledge and skill training for full-time and part-time management and environment supervising personnel working in project implementation to guarantee the fulfillment of the EMP.

（5）Cost and organization arrangement: the implementation of EMP needs financial support from corresponding organizations.

（6）Public consultation plan and complaint channels: to develop a sustainable public consultation plan and set up public complaint channels.

2 Environment Policies, Laws and Regulations

2.1 Related laws and regulations

（1）Law of the People's Republic of China on Environmental Protection, December 26, 1989;

（2）Law of the People's Republic of China on Appraising of Environmental Impacts, September 2003;

（3）Law of the Peoples Republic of China on the Prevention and Control of Water Pollution, February 2008;

（4）Law of the Peoples Republic of China on the Prevention and Control of Atmospheric Pollution, September 1, 2000;

（5）Law of the People's Republic of China on Prevention and Control of Pollution from Environmental Noise, October 29, 1996

（6）People's Republic of China Solid Waste Pollution Prevention Law, April 1, 2005;

（7）People's Republic of China Water and Soil Conservation Law, March 2011

（8）People's Republic of China Forest Law, April 29, 1998

（9）Land Administration Law of the People's Republic of China, August 29, 1998

（10）Highway Law of People's Republic of China, July 3, 1997

（11）Basic Farmland Protection Regulations, State Council Order No. 257 (January 1st, 1999)

（12）Construction Project Environmental Protection Management Regulations, State Council Order No.253, November 29, 1998

（13）Interim Measures on Public Participation in Environmental Impact Assessment, State Environmental Protection Administration, March 18, 2006

（14）Construction Project Environmental Impact Assessment Document Classification Approval Requirements, Ministry of Environmental Protection Decree No. 5, March 1, 2009

（15）Disclosure of Environmental Information (Trial), April 21, 2007

（16）Notice of Strengthening Environmental Impact Assessment Graded

Approval on Construction Projects, December 2, 2004

（17）Construction Project Environmental Impact Assessment Classification Catalogue (2007), Ministry of Environmental Protection Decree No. 2, October, 2008

（18）Transportation Construction Project Environmental Protection Administration, Ministry of Transportation Decree No. 5 of 2003, April 1st, 2003

（19）Urban Road Management Ordinance, October 1st, 1996

（20）People's Republic of China River Management Regulations, June 1988

（21）Regulations on Land Reclamation, November 8, 1998

（22）Urban Construction Waste Management Regulations, Ministry of Construction Decree No. 139, March 1, 2005

（23）Yunnan Construction Project Environmental Protection Regulations, October 22, 2001

（24）People's Republic of Water and Soil Conservation Law Implementation Measures in Yunnan, 1994

（25）Ministry of Environmental Protection General Office No. 70 “Notice on strengthening the supervision and management of environmental impact assessment of urban construction projects”, 2008

（26）Yunnan Provincial People's Government Order No. 109, Yunnan Urban Housing Demolition Management Regulations, June 1, 2002

（27）Ground Transportation Noise Pollution Control Technology Policy, Ministry of Environmental Protection, Environment and Development [2010] No. 7, January 11, 2010

（28）The State Environmental Protection Administration (EM [1993] 324), the notice on strengthening national financial institution loans construction project environmental impact assessment management, 2004

2.2 Technical Standards

（1）Technical Guidelines of Environmental Impact Assessment – General (HJ/T2.1-2011);

（2）Technical Guidelines of Environmental Impact Assessment – Ambient Air

Environment (HJ/T2.2-2008);

（3）Technical Guidelines of Environmental Impact Assessment – Surface Water Environment (HJ/T2.3-93);

（4）Technical Guidelines of Environmental Impact Assessment – Sound Environment (HJ/T2.4-2009）

（5）Technical Guidelines of Environmental Impact Assessment – Ecological Environment (HJ/T19-2011）

（6）Technical Guidelines of Environmental Impact Assessment – Groundwater Environment, HJ 610-2011

（7）Technical Guidelines of Environmental Impact Assessment – Environmental Risk, HJ/T169-2004

（8）Specifications for Environmental Impact Assessment of Highway Projects, JTG B03-2006

（9）Design Code of Highway Environmental Protection, JTG B04-2010

（10）Interim Measures on Public Participation in Environmental Impact Assessment, ED No. 28, 2006 of the State Environmental Protection Administration

（11）Soil and Water Conservation Specification (GB/T16453.1-16453.6-1996), Ministry of Water Resources

（12）Surface Water Quality Standards (GB3838-2002);

（13）Groundwater quality standards (GB/T14848-93);

（14）Ambient Air Quality Standard (GB3095-2012)

（15）Acoustic Environmental Quality Standards (GB3096-2008)

（16）Integrated Wastewater Discharge Standard (GB8978-1996)

（17）Irrigation Water Quality Standards (GB5048-2005)

（18）Air Pollutant Emission Standards (GB16297-1996)

（19）Construction Site Environmental Noise Emission Standards (GB12523-2011)

2.3 World Bank Safeguard Policy

Based on construction nature, engineering layout and on-site investigation, the

policies triggered are:

（1）OP4.01 environment assessment (applicable): the proposed Mengzi Urban Transport Construction Project need to conduct environment assessment according to requirements from both World Bank and national standard to guarantee that the project would not cause environment issues and would be sustainable. The assessment would help with the decision making.

（2）OP4.12 BP 4.12 Involuntary Resettlement (applicable): the proposed project involves house demolition and resettlement, as per required by World Bank, Hohai University has been recruited to develop Social Impact Assessment Report and Resettlement Plan.

（3）BP17.50 Information Disclosure (applicable): In order to facilitate effective communication among the borrower, project affected people and NGOs, all World Bank financed projects should conduct public consultation and should provide related information before public participation. The environmental documents need to be publicly disclosed nationally and the English version of the documents shall be published on World Bank website.

（4）OP 4.04 natural habitat and OP 4.10 ethnic group policies (not applicable): Through on-site investigation, the foundings show that the project would not trigger these two policies.

（5）OP4.11 Physical Cultural Resources: the project would involve 2 tombs, the detailed resettlement measures could be found in Resettlement Plan.

2.4 Relevant Technical Documents

（1）Power of Attorney (Mengzi Housing and Urban and Rural Construction Bureau, December 2012)

（2）Feasibility Report for application of World Bank Financed Yunnan Honghe Prefecture Urban Transport Project – Mengzi City by Kunming Planning and Design Institute and Kunming Urban Transport Research Institute, August, 2013.

（3）Mengzi Comprehensive Urban Transportation System Planning (2011-2030) by Kunming Planning and Design Institute, August 2012

（4）Mengzi City Master Plan (revision) by Urban Planning and Design Institute of Hubei Province, January 2005.

（5）Honghe Prefecture Surface Water Function Zone Classification Reviewing Technical Reports, Honghe Prefecture Environment Protection Bureau, February 2011.

3 Project Overview

3.1 Project Overview

According to the feasibility report, the project includes road network functional adjustment and transformation, integrated urban road corridor management, public transport prioritization, improvement of safe schooltransportation and institutional development. The detailed content and scale can be found in Table 3.1-1, and the locations are in Figure 3.

Table 3.1-1 Content and Scale of Construction

Subcomponent	Scale
1 network functional adjustment and transformation	Honghe Avenue: the length for functional adjustment is 9.3 km; the width of the red line would be 60m. The road class is main road, the road function is transportation. It would be constructed with bus lanes with colored asphalt concrete for 65100 m^2, 16 pairs of roadside bus stops, and it would break down the existing road and transform it to be greening belts.
	Jinhua Road: to connect the existing Jinhua Road with Zhaozhong Road with 1.31 km new road, the width of the road red line would be 32m. The road class is main road; the road function is transportation and living with 3 pairs of quasi harbor-shaped bus stops, 2197 m^2 of greening belt and 90 street lights.
	Zhaozhong Road: To extend the existing Zhaozhong Road and connect it with Lianda Road with 0.77km extension, the width of the road red line would be 30m. The road class is secondary main road. The road function is transportation and living with 1 pair of quasi harbor-shaped bus stops, 2220m of greening belt and 260 street lights.
	Xuefu Road: newly construct 4.01km road. The width of the road red line would be 36m; The road class is main trunk road. The road function is transportation, with 8 pairs of quasi harbor-shaped bus stops, 14580m of greening belt and 90 street lights.
	To build 16 pairs of bus stops on existing Honghe Avenue on separating greening belt between motor lanes and non-motor lanes. 58 safety islands would be built on large intersections. Combining with central greening belts, secondary waiting area crossing the street would be set up. Jinhua Road, Zhaozhong Road and Xuefu Road would set turning lanes to channel the traffic.
	Install 6009m of water supply pipe, 12596m of rainwater pipe and 11948m of sewage pipe as well as power and communication lines on existing Jinhua Road, Zhaozhong Road and Xuefu Road.
	To set up intelligent transportation and traffic safety systems on the above 4 roads.
2 integrated urban road corridor management	To pave 110286 m^2 bus lane and build up 28.5 pairs of bus stops.
	On 36 signal intersections on Tianma Road, Yinhe Road and Beijing Road, combined with signalized intersection settings, traffic video surveillance systems, traffic flow information collection systems, traffic signal control system, automatic monitoring and recording system traffic violations would be emplaced.
	Two types of traffic purification and speed management facilities as pedistrian cross-street platform and deceleration zones would be set along the road.
	Construct 53400 m^2 greening belt and demolish 14370 m^2 greening belt along Tianma Road and Yinhe Road.

Subcomponent	Scale
3 public transport prioritization	To construct a united transportation of railways and highways central bus station (terminal station, parking lot) in Wenlan Datiepu that takes an area of 25000 m^2. In 2020, the number of night parking buses would be 78, 120 parking spaces is planned, together with it, there are also a comprehensive office building, a garage, a car wash and a gas station.
	To construct a passenger central bus station (terminal station, parking lot) that takes an area of 32000 m^2. In 2020, its night parking number would reach 118 with 164 parking spaces for buses together with a comprehensive office building, a garage, a car wash and a gas station.
	To construct a Comprehensive bus station (terminal station, parking lot) in Yuguopu with 84 bus parking spaces and a comprehensive office building, a garage, a car wash and a gas station.
	To construct a terminal bus station on east side of South Beijing Road that takes 4500 m^2 with 2 bus stops and 16 parking spaces.
	To construct a terminal bus station on northwest side of the Civic Center that takes 2500 m^2 with 3 bus stops and 10 parking lots
	To establish Intelligent electronic bus ticketing system, intelligent transportation scheduling system, bus video surveillance system, public transportation information service system multi-system integration intelligent transportation system.
4 improvement of safe transportation to schools	To improve public school transportation safety, develop the special school bus system construction and operation plan, improve traffic safety around school districts, provide school traffic safety promotion and education and establish school traffic safety enforcement systems
5 institutional development	Parking strategy and planning, Traffic calming studies and model building, traffic model structures and database development, Mengzi Municipal intelligent transportation systems research and implementation plan, Bus lane operations and management study tour, trainings, intelligent transportation system visit and training, Integrated transport hub construction visit and training, school bus operation visit and training, Walking and bicycle traffic system construction visit and training, Road safety and accident analysis technology training and public promotion and education.

3.2 Main Project Components

3.2.1 Network functional adjustment and transformation

3.2.1.1 Overall arrangements

（1） Honghe Avenue: Honghe Avenue would be adjusted from original designed and constructed class 1 (326 National Road) two-way eight-lane road to be an urban trunk road, serving for development of urban development on both sides, optimize pedestrian crossing safety facilities, limit the number of social lanes and construct bus lanes within the scope of the existing road width, adjust the avenue cross section composition and redesign intersections. The main content would include cross section adjustment, dedicated lane construction, traffic

controlling, traffic calming, intersection transformation and transportation safety design.

Honghe Avenue is trunk road, the transformation works starts from No.1 Road in Industrial Zone and ends on Xin'ansuo intersection, with a total length of 9.3m. The width of the road red line is 60m, which does not need to be widened. The colored asphalt roadside bus lanes would be paved and separated with social vehicles by greening belt. Fenghuang Road - Yinhe Road, a comparatively developed section with large number of electrombile trips has been selected for pilot electrombile experimental lane. The experimental section is 2.4 km. On bus stations, the electrombile lane would be canceled and combined with bicycle lanes. Upon leaving the bus station, electrombile lanes would be recovered as a separate one. The avenue would set up 15 signal control intersections with an average spacing of approximately 620m. On signal control intersections, traffic video surveillance systems, electronic police, traffic information collection system, traffic signal control system would also be equipped. Pedestrian crossing environment would be improved with the setting up of 23 intersection pedestrian crossings, 8 road pedestrian crossings with average spacing of 300 m. Traffic facilities like yellow flashing lights, electronic surveillance and signs like "Please take the sidewalk", "Watch Out for Pedestrians" would be set up on pedestrian crossings. Integrated with intersection controlling forms and intervals between intersections along Honghe Avenue, traffic purification and speed management devices would be set. In most cases, they would be speeding bumps and dimensional pedestrian zebra stripes.

（2）Jinhua Road: Between the new and old town in Wenlan District, because of the existing military land, there is no direct access connecting the two parts. The project would construct a north-south road as a supplementing east-west section so as to provide a more accessible route for urban traffic.

The newly constructed Jinhua Road would be an extension of the existing North Jinhua Road. It starts from intersection on Xingsheng Road, passes Tianma Road and ends on Zhaozhong Road. The 1.30 km section forms 4 cross intersections and 2 T-shaped crossings with 6 roads in the old town. The planned width of road red lines is 32 m. The road would be constructed as standard two-way four-lane trunk road. Considering the impact on existing buildings along the both sides of the

road, geometry and openings, its designed speed would be 40km/h. Three circular curves would be set along the road with radius of 500m and 400m.

（3）Zhaozhong Road: Now, there is no linking on east-west direction between the new and old town in northeast part of Wenlan district. A 30m wide extension of Zhaozhong Road would be build to connect the existing feeding roads to fill the missing east-west section so as to improve the accessibility of the urban road network.

It is proposed to construct a 770m long missing section between Zhaozhong Road and Lianda Road and form a T-shaped crossing and 1 intersection with West Renmin Road and Jinhua Road. The section's width of road red line would be 30m and it would serve as an east-west secondary main road on northeast part of Wenlan District linking the new and old town. The section would be constructed in two-way four-lane standard with design speed of 40km/h.

（4）Xuefu Road: To construct a new transporting road to the east of Honghe University campus and to take measures to transform the function of the existing Xuefu Road so as to integrate it into the campus transportation system.

The new road starts from Guanyin Bridge to the intersection connecting with Honghe Avenue, with a total length of 3km/4.1km and 36m width of road red line. The road class would be main road in two-way four-lane standard with designed speed of 40km/h. Along the road, the section would form 3 T-shaped crossings and 8 intersections with 11 roads, with a total length of 3.99km and 36m width of road red line. It would serve as the main access that links Honghe University with the new and old town. Along the section, three circular curves and two turning points would be set. The biggest circular curve radius would be 1000m and the smallest would be 800m.

3.2.1.2 Roadbed and Pavement

（1） Roadbed

In addition to consider the roadbed design elevation to ensure basic drying and drainage need, the strength and stability of the roadbed, there is also consideration for planning road network along the roads, smoothing access to land openings, keeping construction convenient, drainage flow and others

① General roadbed design

In construction of the roadbed, much attention should be paid to drainage. It would have no ponding on construction surface and the embankment constructed with 2% -4% drainage cross slope. When the transverse slope of the filled section is smaller than 1:5, direct filling can be conducted. When it is bigger than 1:5, terraces should be dug on the original ground with width no less than 1.0m, and then construct a 2% -4% drainage cross slope.

The backfilling of the roadbed should be gravel. If there is cultivated soil before backfilling, clean it first. The designed slope excavation is 1:1 and the filling slope is 1:1.5. The filling subgrade prefers good graded gravel soils, sandy soil and other granular soil to be filler. Road bed compaction is bigger than 0.96 (0.0-0.8m underground below the bottom surface of the pavement), road embankment compaction is more then 0.94 (0.8-1.5m underground below the bottom surface of the pavement), the road embankment compaction is more then 0.93 (less than 1.5m underground below the bottom surface of the pavement), the base layer compaction is more than 0.98, and the subbase layer compaction is more than 0.97.

②Special roadbed processing

Soft soil subgrade: for sections with sludge and soft soil, first drain and dewatering the part, cleasen the silt pond and fill it with 0.5m-1m slice rocks, then put soil-rock mixture to the level of the original ground and finally lay a layer of geogrid. For small area with soft ground, the approach of throwing stones to packing sedimentation can be directly used. For deep soft ground, deep piling would be applied according to the characteristics and distribution of soft soil.

Roadbed in fill section: first cleanse the tree roots, sod and humus soil; then the paved embankment should be stratified, the thickness of loose lay should not exceed 30cm, then compact it uniformly. In fill section, if the original ground is low-lying or with high underground water level, the embankment base shall be designed with drain isolation cushion layer with 0.5m of good water permeability gravels and geomembrane as a filter layer on top. In high fill section (over 3m), a layer of geogrid should be laid 30cm under the pavement structure, another layer of geogrid 50 cm under the first one. Totally, there are two layers of geogrid to reinforce the stability of embankment.

Roadbed in Excavation section: within the road, expansive soil on cutting and roadbed within 0.8m wide area should be overexcavated and then fill with required fillings and strengthen the drainage measures.

Subgrade border processing: When excavation area is soil, it should be reclaimed with materials with good water permeability and at the same time, within 0.8m of excavation, conduct overexcavation, backfilliing and compaction on the soil and put two layers of 10m wide geogrid at the junction of road bed, extend it to 2-3 meters of the excavated part and 7-8m of the filling part.

③Splicing treatment of the new and old roadbed

To reduce uneven settlement between the new and old road and postpone the appearance of radiating cracks, it is designed to excavate pavement structure within 2m splicing area to pave it together. 2 layers of 2m wide geogrid would be put separately on top and bottom surface of the roadbed to make the new and old roadbed together as a whole.

（2）Pavement

The pavement of the road should be based on the requirement of the traffic and use as well as the natural conditions like climate, water level and geology, following the principle of adjusting measures to local conditions, reasonable selecting materials and good for construction, to identify a proper designing plan for pavement structure to enable it with a good stability and strength to meet the specifications and meet the requirement of smoothness, skid resistance and drainage. Based on the implementation of roads in Mengzi, the road would use colored asphalt concrete pavement, the detailed structures can be found in Table 3.2-1.

Table 3.2-1 Asphalt-Surfaced Road Structural Layers

Motor lane Pavement Structure		Non-motor vehicle lanes Pavement Structure		Sidewalk Structure	
4cm	Modified asphalt concrete（SBS-13）	4cm	Fine grained asphalt concrete AC-13	5cm	Bluestone pavement
5cm	Medium-grained asphalt concrete（AC-20）	6cm	Medium-grained asphalt concrete AC-20	3cm	M10 cement-sand mix
7cm	Coarse asphalt concrete（AC-25）	0.6cm	slurry seal + asphalt priming	15cm	C20 plain concrete
0.6cm	slurry seal + asphalt priming	25cm	5% Cement stabilized layer	12cm	Graded gravel
35cm	5% cement stabilized	15cm	Graded gravel	30cm	gravelly soil

	macadam				
15cm	Graded gravel	50cm	gravelly soil		
50cm	gravelly soil (Gravel content over 70%)				

Honghe Avenue has been built as asphalt pavement, it is in very good condition, so new pavement unnecessary. The designing of the rest roads are:

① Jinhua Road: to construct 29657m^2 bicycle lane, 12615 m^2 sidewalk, with 72854m^3 of subgrade excavation and 51104m^3 of fill.

② Zhaozhong Road: to construct 10914.8m^2 motor lane, 2338.8 m^2 sidewalk and 2338.8m^2 non-motor lane with 26039.6m^3 of subgrade excavation.

③Xuefu Road: to construct 65300m^2 bicycle lane, 31048 m^2 sidewalk and 32800m^2 non-motor lane with 90686m^3 of subgrade excavation and 33511m^3 of fill.

3.2.1.3 Road Transect and Vertical Sections

（1） Honghe Avenue: keeping the existing transect form and to set one motor lane into roadside bus lane. The detailed transect design is: 3.5 m（sidewalk）+4.0 m（bicycle lane）+3.0 m（greening belt）+4.0 m（bus lane）+11.5m（Social vehicle lane）+8.0m（greening belt）+11.5m（Social lane）+4.0m（bus lane）+3.0m（greening belt）+4.0m（bicycle lane）+3.5m（sidewalk）=60.0m

（2） Jinhua Road: keeping the existing transect form: 4.5m（sidewalk）+10.5m（roadway）+2.0m（greening belt）+10.5m（roadway）+4.5m（sidewalk）=32m

Table 3.2-2 Jinhua Road Vertical Section Index

Road class	Designed speed（km/h）	Width of the road red lines（m）	length（km）	grade change point（个）	maximum longitudinal grade（%）	minimum longitudinal gradient（%）	maximum radius of vertical curve（m）	minimum radius of vertical curve（m）
Main road	40	32	1.303	2	4.189	0.1	8000	2000

（3） Zhaozhong Road: 3.0m（sidewalk）+3.0m（non-motor lane）+2.0m

（greening belt）+14.0m（motor lane）+2.0m（greening belt）+3.0m（non-motor lane）+3.0m（sidewalk）=30m。

Table 3.2-3 : Zhaozhong Road Vertical Section Index

Road class	Designed speed（km/h）	Width of the road red lines（m）	length（km）	grade change point（个）	maximum longitudinal grade（%）	minimum longitudinal gradient（%）	maximum radius of vertical curve（m）	minimum radius of vertical curve（m）
Main road	40	30	0.77	--	0.312	0.312	--	--

（4） Xuefu Road: 4.0m（sidewalk）+4.0 m（non-motor lane）+8.0 m（motor lane）+4.0 m（greening belt）+8.0 m（motor lane）+4.0m（non-motor lane）+4.0m（sidewalk）=36m

Table 3.2-4 Xuefu Road Vertical Section Index

Road class	Designed speed（km/h）	Width of the road red lines（m）	length（km）	grade change point（个）	maximum longitudinal grade（%）	minimum longitudinal gradient（%）	maximum radius of vertical curve（m）	minimum radius of vertical curve（m）	Designed speed（km/h）
Main road	主干道	40	36	3.99	5	1.655	0.295	6000	5000

3.2.1.4 Road Intersection Engineering

（1）Honghe Avenue: the intersections on the avenue are generally signalized, bus stops are set on exit ways on greening belt that separate the motor lane and non-motor lanes. In big intersections, safety islands would be constructed to form a secondary waiting area c ombining with central greening belt for crossing the street. Intersection would be equipped with lights, electronic police, electronic monitoring, vehicle detectors and other electronic equipments and complete booth, markings and signage and other transportation facilities. Typical intersections includes Honghe Avenue-Beijing Road, Honghe Avenue- Fenghuang Road, Honghe Avenue-Yinhe Road, Honghe Avenue-No.1 intersection in Industrial Zone, Honghe Avenue-Jinhua Road.

（2）Jinhua Road, Zhaozhong Road and Xuefu Road: In order to meet the traffic demand, under the pre-condition that intersection within the road red lines and can be widened, turning lanes can be set according to the volume and directions so as to channel the traffic. When safety island is bigger than 1.5m, when it is bigger than 3m, a physical island should be constructed; otherwise, it would be a marked island area. Based on the characteristics of the 4 roads and their current condition, in intersections, central or roadside greening belt can be transformed to extra lanes. The length of its broadening section would be 50-60m and the length of the transition section would be 30-40m. The new entering lane in road intersections would be 3.0-3.25m and the exit would be 3.25-3.5m. The distance between bus stops would be 500-800m. Bus stops would be constructed on the downstream side of the intersection in a harbor-shape, 50m away from the stop line of the entering lane on the opposite direction.

3.2.1.5 Bus lane and Bus Stations

（1）Honghe Avenue: 65100m^2 colored asphalt concrete bus lanes, 16 pairs of road side bus stops on the existing greening belt between motor lane and non-motor lane with 65m long and 3.0m wide.

（2）3 pairs of quasi harbor-shaped bus stop would be constructed on Jinhua Road, 1 pair of quasi harbor-shaped bus stop would be constructed on Zhaozhong Road and 8 pairs of quasi harbor-shaped bus stop on Xuedfu Road. The length of the bus stop would be decided according to the traffic volume.

3.2.1.6 Barrier Free Design

The barrier free design of the project would meet the need of eyesight and limb disabled people as well as old people and children’s need for travelling by road transport facilities. It would be constructed on sidewalk, opening along the road, intersections, pedestrian crossing facilities, bridges and bus stops.

（1）Road barrier-free design

Barrier-free facilities include paving blind tracks on sidewalks to guide the eyesight disabled people to walk following their feet tactility. The blind tracks would be paved

continuously along roads with width of 0.3m, and 0.25-0.3m away from greening belt or street tree pits. Warning blind tracks would be paved on turnings. For physical obstacles and objects that may hazard the safety of the eyesight disabled people, warning blind tracks would be paved around them so as to remind people to go around. Meanwhile, no sudden discrepancy in elevation and transverse ridge should be found on sidewalk to keep it accessible for limb disabled people to travel on wheelchairs. If the discrepancy in elevation and transverse ridge is inevitable, slope transition should be built in comply with the gradient requirement of 1:20.

（2）Intersection barrier-free design

Curb ramp should be built on curb connecting zebra crossing on intersections. The slope gradient should be 1:20 on single side slope kerb ramp and 1:12 on triple sides slope kerb ramp with the exit ramp roadway above the ground less than 20mm. Intersection crosswalk lines on both sides of the road would reduce the height when passing through roads and isolation belt to make it accessible for wheelchairs. Warning blind tracks would be paved on intersections with connection of the walking blind tracks. Audio facilities would also be equipped to help the eyesight disabled people to cross the intersection safely.

（3）Barrier-free design for entrance and exit opening along the road

In shops along the road with the opening having less vehicle passing through and its width is narrow, three-sides-slope down side stone entrances should be built with 1:20 gradient of the sidewalk slope in walking direction to make it possible for blind tracks to go through continuously. The road opening with more vehicles passing through and the width of the opening is big, Intersection kerb type gateway can be built with single side slope kerb ramp on curb of the sidewalk in 1:20 gradient. Warning blind tracks would be paved on the area of the opening.

（4）Bus stop barrier-free design

On junction of the bus stop and sidewalk, warning blind tracks and wheelchair ramp should be built to help the disabled people to get on and off the bus. On Turing point along the sidewalk, warning blind tracks should be paved and connected to the walking tracks. In bus stop, the warning blind tracks should be paved for 4m along the side of the bus stop. The gradient of the wheelchair ramp should be 1:20.

3.2.1.7 Water supply and drainage works

Honghe Avenue would not involve any works on water supply and drainage. Jinhua Road, Zhaozhong Road and Xuefu Road drainage pipeline works would use reinforced concrete pipe with flexible interface; for pipes that smaller then d500, High-density polyethylene (HDPE) corrugated pipe would be used. On west side or north side outside the road red line of Jinhua and Zhaozhong Road, DN400 water supplying pipes would be laid. On west side or north side outside the road red line of Xuefu Road, DN200 water supplying pipes would be laid.

（1）Rainwater pipe network settings

Rainwater pipes on Jinhua Road would be laid along the sidewalks 1.5m away from road curb stones on both sides. The section K0+000~ K0+600 is high in north and low in south, 120m of d600 rainwater pipe would be laid along it to collect the nearby rainwater and drain it through the pipe conjunct with north rainwater pipe in intersection of Xingsheng Road and the starting point of Jinhua Road and finally discharge it go into Nanhu Lake. K0+680~the road end section is high in south and low in north, 2629m of d1000 rainwater pipe would be laid to collect the nearby rainwater and drain it to the end of the road and finally let out to Lijiang River.

The rainwater pipe of Zhaozhong Road would be laid along both sides of the road in greening belts, 1.5m away from the curb stones. 60m of d600 rainwater pipe would collect the nearby rainwater and connect to the 1389m long d1000 rainwater pipe under Jinhua Road in west-east direction and finally drain the water into Lijiang River.

The rainwater pipe of Xuefu Road would be laid along both sides of the sidewalks, 1.5m away from the curb stones. The pipe would collect rain water from south to north along the road and drain it into Lijiang River in 2 sections. The existing channel at Guanyin Bridge and the starting point of the proposed road can collect the near rainwater and drain it into Lijiang River. It can also combines with the rainwater pipe under connecting roads and drain the water collected from far distance into Lijiang River.

（2）Sewer network settings

Sewer line under Jinhua Road was laid on sidewalks of the both sides of the road 3-4m away from the curb stones. It collects the waste water along the road into the

sewerage conduit and finally drains it off to the sewage treatment works.

Sewer line under Zhaozhong Road would be laid under greening belt on both sides of the road, 3-4m away from the curb stones. 1382 meters of d500 sewer line would collects the waste water along the road into the sewerage conduit and finally drain it off to the sewage treatment works.

Sewer line under Xuefu Road was laid on sidewalks of the both sides of the road 3-4m away from the curb stones. The line would collect the waste water from south to north along the road into the sewerage conduit and finally drain it off to the sewage treatment works.

（3）Water supply network settings

For the convenience of near and far sites along the road, DN100 water interfaces have been reserved on both sides of the road according to the existing buildings and planned buildings. The Water pipes would be laid in a depth of 1.0 meter and could be bending downside when cross with other pipes. in order to make it safe to use the pipe and easy to check and maintain, air evacuation valves would be installed on high places of the pipe and sluice valve installed on low points. Because the construction of urban area is very fast, in order to avoid damage from external load impact, the laying depth can be added. Fire hydrants should be set on every 100-120 meters and try to set them in area close to intersections.

3.2.1.8 Power and communication works

（1）Electrical Power Engineering

The power line is laid underground using the power cables in cable ducts. On Jinhua Road, the power cable ducts would be buried on east side or hemi-side of the road in 7 ∅ 160UPVC pipes and 1 ∅110-7 holes plum tube; on Zhaozhong Road, the power cable ducts would be buried on east side or hemi-side of the road in 12 ∅160UPVC pipes and 1 ∅110-7 holes plum tube; in Xuefu Road, the power cable ducts would be buried on east side or hemi-side of the road in 7∅160UPVC pipes and 1∅110-7 holes plum tube.

（2）Communication engineering

Telecommunications conduit pipes would be polyethylene plastic porous plum pipes, 0.7 meter under the ground outside one red line of the road, the telecom tube would be PVC110-16 holes.

3.2.1.9 Road intelligent transportation and traffic safety engineering

（1）In Honghe Avenue: 50400 meters of Φ75 HDPE transportation pipeline，18800 meters of 2x10mm^2 traffic cable，17560 meters of 3x1.5mm^2 traffic cable，3760 meters of 5x1.5mm^2 traffic cable，20100 meters of D100 steel tube and 18800 meters of 48 core optical fiber would be laid; 32 pieces of bus stop electronic information boards, 64 sets of E-police, 64 sets of electronic surveillance, 74 sets of pedestrian signal lights, 38 sets of yellow flashing lights, 58 sets of motor vehicle signals, 62 sets of vehicle detector, 12 watch boxes would be equipped and 26900m^2 traffic lines, 480 pieces of traffic signs,4931m fences separating the motor lanes and non-motor lanes and 265m of central fences would be installed.

（2）In Jinhua Road, 9297 meters of Φ75 HDPE transportation pipeline, 1785 meters of 2x10mm^2 traffic cable, 1562 meters of 3x1.5mm^2 traffic cable, 385 meters of 5x1.5mm^2 traffic cable, 1325 meters of 20 core optical fiber would be laid; 8 sets of E-police, 5 sets of electronic surveillance, 20 sets of pedestrian signal lights, 2 sets of yellow flashing lights, 16 sets of motor vehicle signals, 16 sets of vehicle detectors, 5 watch boxes would be equipped; 10210 meters of traffic lines and 16 pieces of traffic signs would be installed.

（3）In Zhaozhong Road, 7250 meters of Φ75 HDPE transportation pipeline, 1525 meters of 2x10mm^2 traffic cable, 1235 meters of 3x1.5mm^2 traffic cable, 305 meters of 5x1.5mm^2 traffic cable, 1325 meters of 8 core optical fiber would be laid; 4 sets of E-police, 2 sets of electronic surveillance, 16 sets of pedestrian signal lights, 2 sets of yellow flashing lights, 7 sets of motor vehicle signals, 6 sets of vehicle detectors, 2 watch boxes would be equipped; 3120 meters of traffic lines and 8 pieces of traffic signs would be installed.

（3）Xuefu Road: 20050 meters of Φ75 HDPE transportation pipeline, 7852 meters of 2x10mm^2 traffic cable, 7315meters of 3x1.5mm^2 traffic cable, 1525 meters of 5x1.5mm^2 traffic cable, 18800 meters of 32 core optical fiber would be laid; 32 sets of E-police, 16 sets of electronic surveillance, 40 sets of pedestrian signal lights, 29 sets of motor vehicle signals, 38 sets of vehicle detectors, 9 watch boxes would be equipped; 31040 meters of traffic lines and 60 pieces of traffic

signs would be installed.

3.2.1.10 Landscape greening works

Roads land landscape design would fully integrate functional requirements of the surrounding land and create an ecological environment with natural and artificial landscape. The main method would be plants shaping and composition. Greening engineering is fundamental use evergreen plants, combining with special plants to create a profound, concise and natural landscape and make it a scene on each road. The vegetations selected would be adaptable, full of vitality trees and grass that do not have big root systems. The landscape engineering of each road would be:

（1） Honghe Avenue: break down the existing part of the road to transform it into 10836m^2 greening belt

（2） Jinhua Road: to construct 2197 m^2 greening belt and plant 680 local trees on sidewalk every 4 meters.

（3） Zhaozhong Road: to construct 2220 m^2 greening belt and plant 192 local trees on sidewalk every 4 meters.

（4） Xuefu Road: to construct 14580 m^2 greening belt and plant 1942 local trees on sidewalk every 4 meters.

3.2.1.11 Illuminating works

Honghe Avenue would not have illuminating works. For the rest of the three roads, the street lights would be bilateral symmetry arranged. Two-armed High light efficiency High pressure sodium lamp poles with 10-meter height and 1.5-meter overhang length. The light source would use 150w high pressure sodium lamp. The distance between the poles would be around 35 meters. Jinhua Road and Xuefu Road are main roads, the average illumination in the whole sections is designed as 20Lx, and the uniformity ratio of luminance would be 0.35. When laying the lighting circuit, all low voltage line would wear PE plastic pipe and the circuit would be buried underground no less than 0.5m; when the circuit goes through motor lanes, it should be no less than 0.7 m underground in steel tube. The illumination control would be municipal network control or microcomputer clock controller clock control

according to the actual situation.

Street lamp set spacing is 30 meters on every road. Jinhua Road would set 90 street lamps, Zhaozhong Road would set 26 and Xuefu Road would set 260 street lamps.

3.2.2 Integrated urban road corridor management

3.2.2.1 General arrangement

The project has selected 4 roads as the integrated urban road corridor, the Honghe Avenue, Tianma Road, Beijing Road and Yinhe Road. For the 4 roads, related transport facility design, transportation management plans have been made to cope with its functional transformation. Comprehensive supporting facilities construction would be conducted on the 4 roads to provide public transport prioritized, motorized and bus accessible traffic to relieve the blocking caused by wide breadth of road, safety problems caused by lacking of pedestrian crossing facilities and undercondition situation caused by in convenient bus stop and realize the goal of guiding urban development with the comprehensive traffic corridor. The detailed content of construction includes: bus lane setting plan, layout and form of bus stop, intersection channelization and modification, planning and design of electric vehicle lanes, retrofit design of the corridor of opening along the street, planning and design of pedestrian crossings, traffic purification and deceleration facilities and the intelligent transportation system design. Among these, The corridor management has been finished in component of road network function adjustment and transformation.

3.2.2.2 Road sectional design

（1）Tianma Road and Yinhe Road: 4.0m（sidewalk）+4.0 m（non-motor lane）+6.0m（greening belt）+14.5 m（bus lane）+8.0m（greening belt）+14.5m（bus lane）+6.0m（greening belt）+4.0m（non-motor lane）+4.0m（sidewalk）=65.0m

（2）Beijing Road: 4.5m（sidewalk）+4.0 m（non-motor lane）+11.5 m（bus lane）+8.0m（greening belt）+11.5m（bus lane）+4.0m（non-motor lane）+4.5m（sidewalk）=48.0m

3.2.2.3 Bus lanes and bus station layout

（1）Tianma Road: 40761m^2 colored asphalt concrete bus lanes, in-road bus stop with 500m-800m stop spacing. Considering the road class of Tianma Road and the separation distance, 8.5 pairs of bus stops would be built with 65m of length and 3.0m of width.

（2）Yinhe Road: 30525m^2 colored asphalt concrete bus lanes, in-road bus stop with 500m-800m stop spacing. Considering the road class of Tianma Road and the separation distance, 11 pairs of bus stops would be built with 65m of length and 3.0m of width.

（3）Beijing Road: 39000m^2 colored asphalt concrete bus lanes, in-road bus stop with 500m-800m stop spacing. Considering the class of the roads connecting Tianma Road and the separation distance, 9 pairs of bus stops would be built with 65m of length and 3.0m of width. Affected by separation distance of intersections on Beijing Road and the land use on both sides of it, the bus stops in north of the southern circulating line would have a relatively small spacing distance, and those in south of the line would be bigger, basically meet the specification requirement of average 600m.

3.2.2.4 Intersection controlling Pattern

（1）Tianma Road: 12 signal-controlled intersections with average spacing of 520m would be equipped with traffic video surveillance systems, traffic flow information collection systems, traffic signal control system, automatic monitoring and recording system traffic violations.

①Intersections that connect main roads and secondary main roads are generally signal-controlled with bus stops on exiting lane. Greening belt in the middle of the road would be cut small to keep the width of the intersections (number of lanes). Together with bus stops, pedestrian crossing facilities and intelligent traffic control system would be equipped, working together with channelization islands to provide two-step crossing for pedestrian so as to guarantee their safety.

②In intersections that Tianma Road connects Fenghuang Road and Yinhe Road, the rotary islands would be cancelled and reconstructed into cross road

intersections to optimize channelized design and signal control.

③ Intersections that Tianma Road connects with feeding roads are generally designed as right-in and right-out to guarantee the main unobstructed as well as providing secondary main road safe pedestrian crossing facilities.

（2）Yinhe Road: 12 signal-controlled intersections with 500m average spacing equipped with traffic video surveillance systems, traffic flow information collection systems, traffic signal control system, automatic monitoring and recording system traffic violations.

① Intersections that Yinhe Road connects with main and secondary main roads are generally signal-controlled with bus stops on exiting lane. Greening belt in the middle of the road would be cut small to keep the width of the intersections (number of lanes). Together with bus stops, pedestrian crossing facilities and intelligent traffic control system would be equipped, working together with channelization islands to provide a two-step crossing for pedestrian so as to guarantee their safety.

② Intersections that Yinhe Road connects with feeding roads are generally designed as right-in and right-out to guarantee the main unobstructed as well as providing secondary main road safe pedestrian crossing facilities. Integrated with this kind of intersections, when the cross intersection is over 200m, turning lanes would be set in 100 meters area around the intersection with pedestrian crossing facilities.

（3）Beijing Road: 12 signal-controlled intersections with 500m average spacing equipped with traffic video surveillance systems, traffic flow information collection systems, traffic signal control system, automatic monitoring and recording system traffic violations.

① Intersections that Beijing Road connects with main and secondary main roads are generally signal-controlled with bus stops on exiting lane. Greening belt in the middle of the road would be cut small to keep the width of the intersections (number of lanes). Together with bus stops, pedestrian crossing facilities and intelligent traffic control system would be equipped, working together with channelization islands to provide two-step crossing for pedestrian so as to guarantee their safety. The typical intersections of this kind are Beijing Road

–Tianma Road intersection and Beijing Road -Honghe Avenue.

② Intersections that Beijing Road connects with feeding roads are generally designed as right-in and right-out to guarantee the main unobstructed as well as providing secondary main road safe pedestrian crossing facilities. Integrated with this kind of intersections, when the cross intersection is over 200m, turning lanes would be set 100 meters around the intersection with pedestrian crossing facilities.

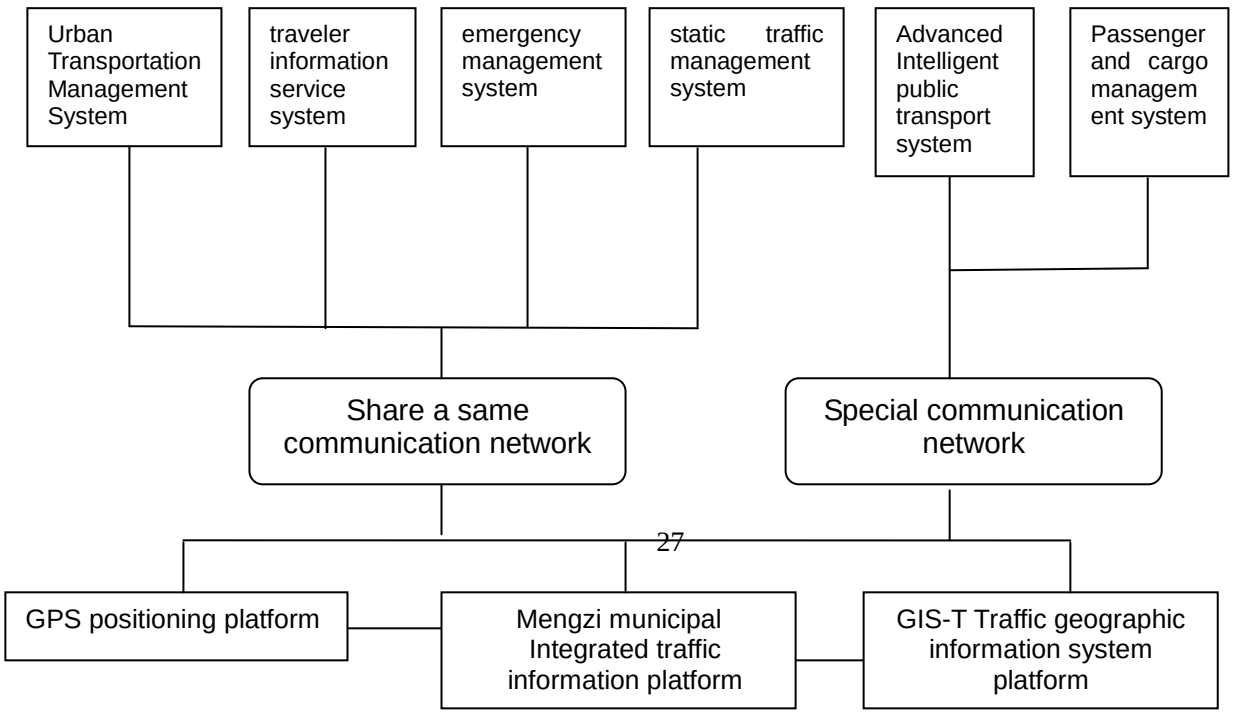
3.2.2.5 Traffic purification and speed management facilities

Integrated with controlling form and separation distance of the intersections along Tianma Road, Yinhe Road and Beijing Road, traffic purification and speed management facilities would be equipped, which is mainly divided into two kinds, the pedestrian crossing lift and the deceleration strip. The pedestrian crossings lifts are mainly set up on intersections connect with secondary roads and feeding roads; deceleration strips are set on entrance of the Tianma cross intersection and necessary road sections.

3.2.2.6 Road Intelligent Transportation and traffic safety works

With the guidance of the state ITS Structure and combining with advanced ITS planning and construction experiences of the similar cities in China and other countries as well as the condition of Mengzi City, Mengzi ITS structure and application system have been made. Please see chart 3.2-1:

Chart 3.2-1 : General Structure of ITS system of Mengzi City



（1） Tianma Road: 6266m Φ75 HDPE transportation pipeline, 13000m of 2x10mm^2 traffic cable, 12143m of 3x1.5mm^2 traffic cable, 2600m of 5x1.5mm^2 traffic cable, 3564m of D100 steel tube, 13000m of 48-core optical fiber would be laid; 17 pieces of bus stop electronic information boards, 44 sets of E-police, 44 sets of electronic surveillance, 9 sets of bidirectional pedestrian signal lights, 70 sets of single-directional pedestrian signal lights, 37 sets of yellow flashing lights, 51 sets of motor vehicle signals, 44 sets of vehicle detector, 11 watch boxes would be equipped and 12655m^2 traffic lines, 399 pieces of traffic signs would be installed.

（2） Yinhe Road: 26300m Φ75 HDPE transportation pipeline, 9800m of 2x10mm^2 traffic cable, 9560m of 3x1.5mm^2 traffic cable, 2210m of 5x1.5mm^2 traffic cable, 12050m of D100 steel tube, 9800m of 48-core optical fiber would be laid; 19 pieces of bus stop electronic information boards, 41 sets of E-police, 16 sets of electronic surveillance, 41 sets of pedestrian signal lights, 6 sets of yellow flashing lights, 40 sets of motor vehicle signals, 44 sets of vehicle detector, 12 watch boxes would be equipped and 15860m^2 traffic lines, 282 pieces of traffic signs would be installed.

（3） Beijing Road: 33400m of Φ75 HDPE transportation pipeline, 12600m of 2x10mm^2 traffic cable, 12600m of 3x1.5mm^2 traffic cable, 2900m of 5x1.5mm^2 traffic cable, 3762m of D100 steel tube, 12600m of 48-core optical fiber would be laid; 18 pieces of bus stop electronic information boards, 38 sets of E-police, 24 sets of electronic surveillance, 110 sets of pedestrian signal lights, 15 sets of yellow flashing lights, 55 sets of motor vehicle signals, 54 sets of vehicle detector, 14 watch boxes would be equipped and 14500m^2 traffic lines, 410 pieces of traffic signs would be installed.

3.2.2.7 Removal and greening

Tianma Road would construct 9085 m^2 of greening belt, remove the greening belt and transform it into11285m^2 traffic lanes; Yinhe Road would construct 3315 m^2 of greening belt, remove the greening belt and transform it into 3085m^2 traffic lanes; Beijing Road would construct 41000 m^2 of greening belt.

3.2.3 Public transport prioritization

3.2.3.1 Bus terminal infrastructure construction

The project is proposed to construct 3 parking and maintenance sites and 5 terminal stations. The 3 parking and maintenance sites are Wenlan Datiepu United Transportation of Railway and Highway Bus station, Comprehensive Bus station in Passenger Transport Center and Yuguopu Bus station. The 5 terminal stations are located in East Mengzi Railway Station, North Extension of Beijing Road, west to the North Mengzi Railway Station, east side of South Extension of Beijing Road, and northwest side to the municipal center. Among them, three terminal stations and three parking and maintenance sites, the United Transportation of Railways and Highways Bus station, Comprehensive Bus station in Passenger Terminal Station and Yuguopu Bus station are doub-located, so the terminal stations would be constructed inside the parking and maintenance sites

Table 3.2-5 Proposed Parking and maintenance site and Terminal Stations in Mengzi

Name	Type	floor space (m^2)	Number of Serving lines in 2020	Number of night parking vehicles in 2020
Wenlan Datiepu United Transportation of Railway and Highway Bus station	Parking and maintenance site, terminal station	25000	12	78
Comprehensive Bus station in Passenger Transport Center	Parking and maintenance site, terminal station	32000	10	118
Yuguopu Bus Station	Parking and maintenance site, terminal	20000	4	64

	station			
Terminal Station in east side of South Extension Beijing Road	terminal station	4500	4	N/A
Terminal station northwest side to the municipal center	terminal station	2500	5	N/A

（1） Wenlan Datiepu United Central Bus and Railway Station

Wenlan Datiepu United Central Bus and Railway Station is located in the north of Mengzi Railway Station. It is planned to take a total land area of 2.5 hectares. Terminal of 12 city operating lines would be set in it, which are including No. 6, 8, 17, 12, 15, 16, 19, 23, 24, 25, 27 and 28. To 2020, the public transit network has planned to meet the need for parking of 78 buses. Its internal design makes it possible for about 120 buses, not only meet the parking demand but also keep the space for future development.

Recently, in United Transportation of Railway and Highway Bus station, the number of the buses in need of maintenance is little, it is about 59 every month. Averagely, 2 buses need maintenance every day. However, considering the future development, medium maintenance factory could be built inside of the parking and maintenance site. Each maintenance factory can keep 3 200m^2(20m*10m) bus positions, which allows 6 buses to be maintained every day.

Bus station inside adopts one-way moving streamline organization. Gas station, car wash and garage are located near the entrance so that buses can use them once they enter in. Bus stopping area and passenger dropping area is separated and the bus would drive along a single direction to avoid conflict with pedestrians. The planned bus terminal station would have 120 parking spaces for buses, taking 13112 m^2; the comprehensive office building would take 1000 m^2 floor area with 6 floors and would make its building area be 6000 m^2; the garage would take 600 m^2; the car wash would take 600 m^2; and the gas station would take 800 m^2.

（2）Comprehensive Bus Station in Passenger Transport Center

The Comprehensive Bus station in Passenger Transport Center is located in east side of the North Extension of Beijing Road. It is proposed to take a total land area

of 3.2 hectares. The starting and terminal of 10 city operating lines would be set in it, which are No.1, 7, 4, 13, 11-18 merged line, 2,3,12, 26 and 28. To 2020, the public transit network has planned to meet the need for parking of 118 buses. Its internal design makes it possible for parking about 164 buses, not only meet the parking demand for 118 buses, but also keep spaces for future development.

The number of the buses in the Comprehensive Bus Station in Passenger Transport Center in need of maintenance is little, it is about 76 every month. Averagely, 2-3 buses would need maintenance every day. The proposed maintenance factory could keep 3 200m^2(20m*10m) bus positions, which allows 6 buses to be maintained every day.

The planned Comprehensive Bus station in Passenger Transport Center would take 17445m^2 for 164 parking spaces for buses; the proposed comprehensive office building would take 1000 m^2 floor area; the garage would take 600 m^2; the car wash would take 600 m^2; and the gas station would take 800 m^2.

（3）Yuguopu Bus Station

Yuguopu Bus Station is located in northwest of Yuguopu District in Mengzi City. It is proposed to take a total land area of 2.0 hectares. The starting and terminal of 4 city operating lines would be set in it, which are No.20, 21, 22 and 23. It can meet the need for night parking of 84 buses and the need to park 64 buses in 2020.

Recently, in Yuguopu Bus Station, the number of the buses in need of maintenance is little, it is about 67 every month. Averagely, 2 buses would need maintenance every day. The proposed maintenance factory could keep 3 200m^2(20m*10m) bus positions, which allows 6 buses to be maintained every day.

The planned Yuguopu Bus Station would take 9500m^2 for 84 parking spaces for buses; the proposed comprehensive office building would take 1050 m^2 floor area with 6 floors that make its building area be 6200 m^2; the garage would take 600 m^2; the car wash would take 600 m^2; and the gas station would take 800 m^2.

（4）Terminal station in east side of South Extension of Beijing Road

This Terminal Station is located in east side of South Extension of Beijing Road. The land surround it is planned as residential land. In phase 4, it would arrange the operation of 4 city lines, which are No.5, 6, 7 and 9, totally 29 buses.

It takes 4500 m^2 with 2 bus stops inside. The bus stops would be 5m wide and 40m long, allowing 3 buses to stop at the same time. The control center and drivers

Lounge would take 525 m^2. The parking space for bus would be 15 m*4m. The bus parking lot would be 960 m^2 for 16 buses. It would provide temporary parking for 4 bus lines and no night parking.

（5）The Terminal Station northwest side to the municipal center

The Terminal Station is located in northwest side to the municipal center. In phase 4, it would arrange the operation of 5 city lines, which are No.5, 6, 7 and 9, totally 28 buses.

It takes 2500 m^2 with 3 bus stops inside. The control center would take 290 m^2. The parking space for bus would be 15 m*4m. The bus parking lot would be 600 m^2 for 10 buses. It would provide temporary parking for 5 bus lines and no night parking.

3.2.3.2 Intelligent transport system construction

Base on the social and economic development tendency and demand for transportation in Mengzi City, in accordance with the direction of the intelligent transport system in China, the intelligent transport system's functional structure plan has been developed according to the principle of combining practicability and advancement. The plan is fully reflecting the business and functional demand of intelligent transport system in Mengzi, which would finally developed to be an integration of multi intelligent transport systems including electronic bus ticketing system, intelligent transportation scheduling system, bus video surveillance system and public transportation information service system.

（1）Electronic bus ticketing system

The system can provide traffic card accessible for multi-interfaces, IC card basic data source for establishing basic data on passenger travel characteristics. The system is mainly including functions like IC card management, self-serving payment service, traffic management, driver attendance and passenger flow statistics, which can all be exchanged with data center so as to make it easy for management as well as providing data support for operation and development of the public traffic system.

There are 90 buses in Mengzi City. 55 more new buses would be added into the system and totally 145 IC card systems are needed. The city's bus passenger volume is 25000 person-times. If counted as 2 times of bus taking by one person a

day, it is 12500 people. In order to guarantee 70% of the passengers can have the IC card, which is 8750 and 20% of the surplus amount, totally 10500 pieces of IC cards are needed; together with transfer junctions, 3 prepaid terminals, 3 recharge counters (including service windows) in bus company and 1 set of electronic ticket management system would be installed.

（2）Intelligent bus dispatch system

The actual condition of the existing intelligent bus dispatch system is found far behind meeting the actual dispatch demand. The project is considering redeveloping the dispatch system and integrating functions on planning scheduling, real-time scheduling, GIS display and real-time positioning and communication, data management and statistical analysis.

Planning and scheduling includes work of developing on daily bus operating and departure time-table, personnel and everyday vehicle shift and waybill and other planned work scheduling and management. Real-time scheduling is mainly working on actual dispatching during the daily bus operation, including monitoring on operation of every bus, keeping departure and returning record, real-time communication, emergency dispatching and voice broadcasting and displaying to guarantee operation on schedule and so as to ensure the quality of service; GIS display is including public transport vehicle monitoring GIS map displaying and the real-time displaying and monitoring on driving logic diagrams so that the dispatching personnel may know the location of each bus on the way and inform the drivers to make adjustment to avoid bunching and overtaking; the data management and statistical analysis is including management and statistic analysis all basic data in operation of bus scheduling, like operational data management, safety data management, attendance data management and others.

The project would equip 145 sets of intelligent vehicle scheduling car-carried terminals, 1 set of hardware equipment and 1 software system.

（3）Intelligent bus information service system

Bus information service system is mainly divided into 5 levels as data source, communication and information safety, business support, data mining and data application. The bus information data mining would use data preprocessing and mining technique to analyze and handle the real-time collected bus information to get statistics on passenger travel behavior, bus operation, road traffic operation

status and bus operating status. The data would provide basis and information for decision-making and to meet the bus company's daily business reqirement on basic data. The latest bus operation data received can be provided to the public through visual interfaces so as to provide real-time bus information service to meet the need from passengers and buses.

The project would work with urban corridor informatization construction and equip the 4 corridors with 89 sets of electronic bus-stop board. Based on the need of actual designing, the board can be LED and video displayed electronic board or just LED displayed electronic board. The center would install a set of central hardware and software system.

（4）Bus Video Surveillance System

The front-end system monitors the situation in bus, on bus stops, and any accident in bus as well as managing bus arrive and departure through vehicle-mounted video and bus stop video surveillance. The real-time monitoring information would upload to the supervising center through optical network and providing it with data about the bus stops and buses. All image information collected by bus video surveillance can help with bus real-time operation information display and control. The administrator would conduct real-time monitoring and browsing on situation in buses and bus stops through computer screens and send signals to the front-end video monitoring equipments to conduct control on these equipments.

In existing and proposed 4 bus stations, 4 sets of video monitoring systems would be installed, including 4 cameras (with holders) and 1 set of monitoring hardware equipments and software in each of the stations. 145 sets of video monitoring equipments would be installed in buses, each with 6 cameras and 1 Video storage device on front, back, front door, back door, carriage and coin box.

3.2.4 Safe transportation to schools

3.2.4.1 Plan for improving safe school transportation through public transportation

（1） Adjust the bus operating lines and stops

When trying to keep the existing bus operation, the project would fully consider the current and recent demand for school transportation through public

transportation, combining with the long-term plan for Mengzi bus lines and stops as well as the layout of schools, bus-transit hubs and travel characteristics, the Mengzi bus operation lines and stops would made the following adjustments:

① Adjust No.6 bus to meet the demand of transportation for No.4 Primary School, No. 3 Middle School, No.2 Primary School and No.3 Primary School.

②Adjust No.3 bus to serve for No.1 Primary School.

（2）Government subsidies

There is no high school in towns and townships of Mengzi City. The city is concentrated with high quality secondary high schools with many of the students coming from owns and townships. For student boarders in main urban area, the government would provide subsidies to schools to be disbursed partly for students' transportation cost; instead of paying to transport companies. The disburse voucher would be the ticket getton from the cars taken by students.

（3）Improve bus facilities

In bus, an area for students would be set with two-point seat belts on seats. The driver would use three-point safety belt. The student seats would be in special color with eye-catching signs to differentiate them from the common ones. Range and time for using student area should be set clear (only in opening and discloure school hours) as well as the requirement for users (primary school students or children under a certain height). Check the bus for any places that need to be wrapped. The bus for school transportation should be at least equipped with a space and holder for first aid kit.

3.2.4.2 School bus system construction and the operation plan

（1）Bus fares for special school bus

Consider the distance for students to go and from school is usually with 5kms, the special school bus line would adopt single-ticket system. The suggested bus fare would be 1 Yuan/time.

（2）The school bus lines and operation plan

The picking and dropping stops of the school bus would try to use the existing bus stops to reduce the walking distance and road crossing chances. Considering the operation efficiency, bus stop layout should be optimized to

reduce unnecessary stops. The project has identified 40 bus stops for picking and dropping students from No.4 Primary School.

（3）Operation Plan

Among 12 school buses, the total operating time for each bus is around 65-75 minutes. Most of the buses would drive for three shifts (4 buses), 5 of them would drive for 2 shifts. Only 1 bus need to drive for 4 shifts with a total driving time of 72 minutes.

（4）Special school bus line facilities safety improvement plan

The special school bus stop should include: fence line, safety fence (cement concrete), platform awning, seats and complete marks and lines.

（5）special school bus operation regulating system construction plan

Satellite positioning technology, wireless communication technology and computer Internet technology, real-time monitoring and unified dispatch on school buses can be installed to improve the modern school bus safety guarantee capacity that centered with monitoring, dispatching and management. The system would include functions of vehicle real-time monitoring, replaying of historical running data, snapshot, remote monitoring, vehicle control， alarm management, reports and statistics and vehicle environment management.

（6）special school bus operation mechanism

The project is planned to instruct and facilitate school bus and public transportation enterprises in Mengzi to establish traffic safety management system to improve the transportation safety.

3.2.4.3 Traffic safety improving plan for areas around schools

To conduct standardized management for parking on roads within 100 meters range around schools. For places with parking conditions, temporary parking spaces would be marked (during school opening and disclosure time). For places with no parking conditions, forbid logoes should be put around. In entrance of schools and roads with many students, speeding bump would be installed to reduce speed effectively. The speeding bumps would be installed near all school entrances and exits to show that speed should be limited at any time in these areas. Complete

and improve school line marks and add auxiliary illustrating signs when necessary. To make changes in schools with special school bus, and set up parking signs for school bus on both ends of its reserved parking space as well as marking lines. In areas with one-way traffic planning, the signs and marking lines should be transformed with special separating devices between motor lane and non-motor lanes; 4 safety islands would be constructed and channelized big intersections with right turn lanes and to construct overpasses, install pavement segregation fences, sidewalks and to reconstruct functions of the school gates.

3.2.4.4 School Transportation safety promotion and education plan

The project is aiming at promoting transport safety within the project area. The proposed activities are listed in Table 3.2-6

Table 3.2-6 : Technical consultation and services

No.	Technical consultation and services	Supporting improving plan
1	School transportation safety development planning consultation	Develop Mengzi School transportation safety development strategy and planning, the road safety guarantee plan and students' safe transportation management mechanism and emergency plans for school transportation accidents
2	Special school bus operating mechanism and study on subsidy policies	Study and develop chartered vehicle transportation service for boarder students and subsidy policy and mechanism for special school buses
3	Student transportation safety education and promotion	To organize a series of activities for transportation safety promotion, education and awareness raising
4	Training for school bus drivers	To provide knowledge, skill, awareness and professional ethical trainings for drivers of school bus, chartered vehicles and general buses
5	TOT training for trainers on driver training	TOT training for trainers on driver training to equip them with necessary knowledge and skills
6	Special school bus caretaker training	To provide knowledge, skill, awareness and professional ethical trainings for school bus caretakers
7	Training material development for school bus drivers	To develop training materials for drivers of school bus, chartered vehicles and general buses
8	Safety management system construction consultation for companies providing school bus services	According to ISO39001, the Road Traffic Safety Management System, help the companies providing school bus services to establish transportation safety management system to realize sustainable safety improvement for school transportation.
9	Study and developing enforcing mechanism on school transportation	To Study and developing related regulations to guarantee safe school transportation as well as to provide enforcement basis

No.	Technical consultation and services	Supporting improving plan
	safety	
10	Subproject evaluations and consultation	To conduct investigation after the implementation of the subproject and evaluate the project effect

3.2.4.5 School transportation safety Enforcement system construction plan

（1） Stationary traffic law enforcement system

To set stationary traffic law enforcement system （E-police）in areas surrounding schools, intersection law enforcement system in big intersections near schools, road section system in school access roads and to set stationary traffic law enforcement system in areas before school gate to handle overtime parking in temporary parking area and disorder parking in front of school gates.

（2）Mobile traffic law enforcement system

Set up mobile traffic law enforcement system. In order to keep the enforcement in school opening and disclosure hours, 1 set of mobile traffic law enforcement platform would be set up in area near schools, 20 mobile traffic law enforcement system terminals and 3 sets of vehicular mobile traffic law enforcement system terminals.

（3） vehicular mobile traffic law enforcement system on buses for school transportation

To install vehicular mobile traffic law enforcement system on buses for school transportation, conduct vehicle design for vehicular system and install surveillance video.

（4） Visual remote traffic command system in road section for school transportation

The visual remote traffic command system in road section for school transportation should be equipped with functions of real-time monitoring and remote audio transmission and playing.

3.2.5 Institutional development subproject

The institutional development is including the following contents:

Table 3.2-7 Institutional development Content

Content	Implementing body	Cost（CNY, 10000）
Parking lot strategy and planning	Municipal government and Housing Construction Bureau	60
Traffic calming research and demonstration	Housing Construction Bureau	150
Traffic model building and database development	Housing Construction Bureau	90
Research and implementing plan of Mengzi intelligent transportation system	Traffic Police	120
Study tour and training on operation and management of bus lanes	Related departments	120
Study tour and training on intelligent transportation system	Related departments	200
Study tour and training on construction of comprehensive transport hub	Related departments	100
Study tour and training on operation of school buses	Related departments	120
Study tour and training on Walking and bicycle traffic system construction	Related departments	100
Study tour and training on Road safety and accident analysis technology	Related departments	150
Public promotion and education	Related departments	150

3.3 Area required for the project

According to the principal part of the project design data, the project would take an area of 53.72hm^2, including 29.62hm^2 new land acquisition, occupying 24.10hm^2 of original road and greening belt area. The area taken by the project includes paddy field, terraced field, garden plot, construction land, land for transportation, road greening belts and other land (bare excavation area). The detailed land acquisition are 0.58 hm^2 paddy field, 2.7 hm^2 terraced field, 18.45 hm^2 garden plot, 6.23 hm^2 construction land, 3.73 hm^2 of land for transportation, 2.11 hm^2 road greening belts and 0.62 hm^2 other land. Please see Table 3.3-1 for detailed information:

Table 3.3 -1: The Type s and Area of Land Acquired for Engineerings

subregion		Type and Area of the Land（hm^2）								Nature of occupation
		paddy field	terraced field	garden plot	construction land	land for transportation	road greening belt	other	小计	
M1 sub project	Honghe Avenue					1.39	1.82		3.21	Permanent
	Jinhua Road (break through)				3.98	0.71			4.69	Permanent
	Zhaozhong Road (break through)				2.01	0.33			2.34	Permanent

	Xuefu Road（new construction）		0.58		12.75	0.24	1.30	0.29	0.62	15.78	Permanent
	Sub-total		0.58		12.75	6.23	3.73	2.11	0.62	26.02	Permanent
M2 sub project	Tianma Road						4.03	1.13		5.16	
	Yinhe Road						3.28	0.31		3.59	
	Beijing Road						8.18			8.18	
	Sub-total						15.49	1.44		16.93	
M3 sub project	Comprehensive bus station	Wenlan Datiepu United Transportation of Railways and Highways Bus station			2.50					2.50	Permanent
		The Comprehensive Bus station in Passenger Terminal Station			3.20					3.20	Permanent
		Yuguopu Bus station		2.00						2.00	Permanent
		Sub-total		2.00	5.70					7.70	Permanent
	Bus terminals	Terminal 1		0.45						0.45	Permanent
		Terminal 2		0.25						0.25	Permanent
		Sub-total		0.70						0.70	
	Total			2.70	5.70					8.40	
Construction path area					0.82	0.29	0.13			1.24	temporary
Temporary soil piling area					0.75					0.75	temporary
Temporary construction area					0.24	0.16	0.21			0.61	temporary
Total			0.58	2.70	18.45	6.23	19.22	3.55	0.62	51.35	

Note: Construction path area, temporary soil piling area and temporary construction area are included within the permanent occupies land areas, so the land would not be counted repeatedly.

4 Major Environmental Impacts

4.1 Environment Protection Targets

4.1.1 Ecological Environment Protection Targets

It was confirmed in the field investigation that there is no ecological sensitive sites in the assessment scope, such as the nature reserve, the famous landscape and scenery, the forest, the cultural heritage protection unit, or the basic farmland.

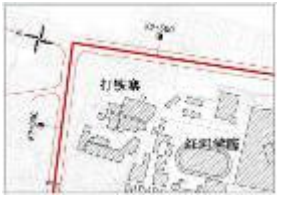
4.1.2 Noise Protection and Ambient Air Targets

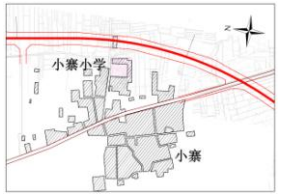
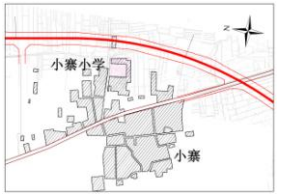
The protection targets for noise and ambient air pollution are listed in the following Tables. The Tables of 4.1-1to 4.1-3 are for Xuefu Road, Jinhua Road and Zhaozhong Road, and Table 4.1-4 is for the central bus station and terminal.

4.1.3 Water Environment Protection Targets

The water environment protection targets are the west side of Honghe Avenue, main canal on the south side of Beijing Road, the irrigation ditch along Xuefu Road, and the Guanyinqiao River of Shala River branch which passes through Xuefu Road as well as the Lijiang River besides Xuefu Road.

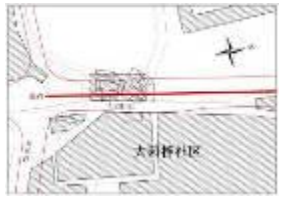
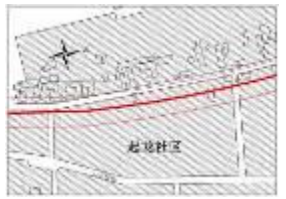
Table 4.1-1 Noise Protection and Ambient Air Targets （Xuefu Road）

No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
1	Dongcun	K0+000-K0+800	Both sides	20，0	Y	Left, 5 households; Right, 14 households	1-3 stories houses of brick and concrete structure face the road. Most of the first floor are shops. The village is on the right side of the road and most of the houses on the left are temporary.	Social activities noise and traffic noise		
2	Datiezhai	K1+940-k2+110	Right side	50，0	Y	4 households	1-3 stories houses of brick and concrete structure. There are dry land and orchard around the village.	Social activities noise		

No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
3	East part of Honghe College	K2+580-K2+350	Right side	100，0	Y	——	Two 6 stories buildings of girl's dorm, one 5 storyies teaching building and one 3 storyies Yazhuang hotel face the road. There are walls surrounding.	Social activities noise		
4	Xiaozhai	K3+180-K3+540	Right side	80，0	Y	6 households	1-2 stories houses of brick and concrete structure. The road passes through the farmland behind the village.	Social activities noise		
5	Xiaozhai Primary School	K3+280-K3+310	Right side	42，0	Y	——	There are 18 teachers and around 340 students vary from grade one to six as well as kindergarten. No	Social activities noise		

No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
							student lives in school. One 3 stories building faces the road on sideway, and another 3 stories building is back to the road.			

Table 4.1-2 Acoustic Environment and Ambient Air Protection Targets （Jinhua Road）

No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
1	Dayuanzi	K0+000-K0+300	Both sides	18，0	Y	15 households	There are houses of 1-6 stories with scattered residence. It is the village in the city.	Social activities noise and village road noise		
2	Qilong No.7 and No. 8 Team	K0+300-K0+620	Both sides	19，0	Y	About 36 households	There are houses of 3-5 stories with scattered residence. Most of them have 3 stories. It is the village in the city.	Social activities noise and village road noise		
3	Qunxing Kindergart-en	K0+280	Right side	70，0	N	——	There are 14 teachers and 150 students. It is day care and there are one 1 story building of classrooms and	Social activities noise		

No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
							one 2 stories teaching building.			
4	Wenxin Kindergart-en	K0+260	Right side	55，0	N	——	There are 10 teachers and 130 students. It is day care and there are one 1 story building of classrooms and one 2 stories teaching building.	Social activities noise		
5	Yufeng Hotel	K0+590-K0+620	Left side	22，0	Y	——	This is a 7 stories hotel (shops at first floor) with around 50 rooms. There are 22 rooms facing the road.	Social activities noise and Tianma Road noise		

No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
6	Jiulong Hotel	K0+670	Left side	37，0	Y	——	This is a 6 stories hotel (shops at first floor) with around 60 rooms. There are 8 rooms facing the road.	Social activities noise and Tianma Road noise		
7	Honghe Aixin Hospital	K0+725	Left side	20，0	Y	——	The private hospital has one 5 stories building of rooms with 20 beds and 8 medical workers. It is rented and the side facing the road has 11 windows. They are closed at night.	Social activities noise and Tianma Road noise		

No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
8	Junhao Commerci-al Center	K0+660-K0+760	Right side	125，0	N	About 72 households	Four buildings of 5 stories. The first floor are shops and there are twenty windows facing the road.	Social activities noise and Tianma Road noise		
9	Jinhemiao Kindergar-ten	K0+830	Left side	97，0	N	——	Two buildings of 2 stories with 12 teachers and over 150 students.	Social activities noise		
10	Dormitory of Electric Power Company	K0+860-K1+890	Left side	50，0	N	About 16 households	There is a 4 stories building which has certain angle with the road.	Social activities noise		

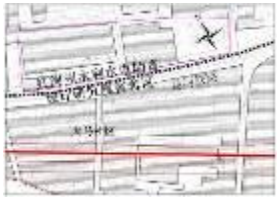
No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
11	Lianzufang Community(Gongren Community)	K0+930-K0+970	Left side	25，0	N	About 44 households	There are two 7 stories buildings facing the road on sideway. Another three buildings are behind.	Social activities noise		
12	Dormitory of Transportation Administration	K0+090-K1+000	Left side	35，0	N	About 10 households	There are two buildings in L shape, one has 5 stories and the other has 6 stories.	Social activities noise		
13	Armed Police Hospital	K1+090-K1+120	Left side	20，0	Y	About 30 households	3 stories family dormitory building, garage, Chinese and Western Medicine Clinic and shops face the road with the family dormitory building at the back. Another 3	Social activities noise		

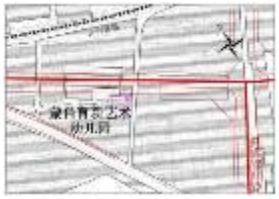
No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
							stories building is the armed hospital. The side facing the road has 18 windows and 3-meter-high wall.			
14	Qilong No.9, 10, 11 Teams	K0+800-K1+120	Both sides	18，0	Y	About 20 households	2-3 stories houses with scattered residence. It belongs to Nanhu Community	Social activities noise		
15	*Mengzi No. 3 Primary School	K1+160-K1+220	Right side	30，0	Y	——	Two teaching buildings, one is 5 stories that is parallel to the road, the other is 4 stories and has a certain angle with the road. Outside the school is the 6 stories dorm of	Social activities noise		

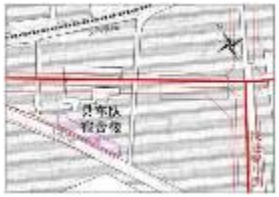
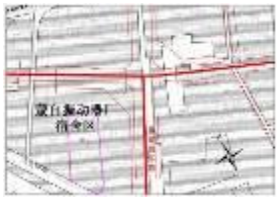
No.	Name of the sensitive sites	Stake No.	Locati-on	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
							109 teachers. The 2076 students don’t live in school and there is no night class.			

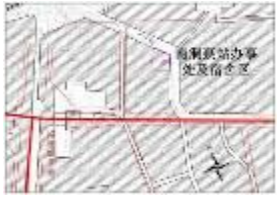
Table 4.1-3 Noise Protection and Ambient Air Targets （Zhaozhong Road）

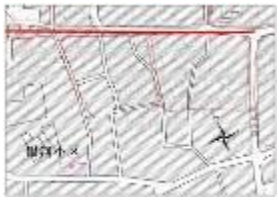
No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph

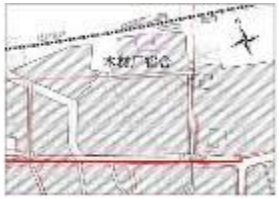
No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
1	Dormitory of Towel Factory	K0+050-K0+080	Left side	50，0	N	About 35 households	There is one bungalow and one 2 stories building next to the road.	Kunhe railroad noise and social activities noise		
2	*Tianma Community	K0+000-K0+160	Both sides	18，0	Y	About 30 households	Mostly are private houses of 1-4 stories	Social activities noise		
3	Dormitory of Honghe Investigation Design and Research Institute of Water Conservancy and Hydroelectric Power	K0+090-K0+230	Left side	70，0	N	About 156 households	There are six 7 stories buildings which are parallel to the road with surrounding walls outside.	Kunhe railroad noise and social activities noise		

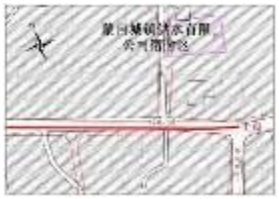
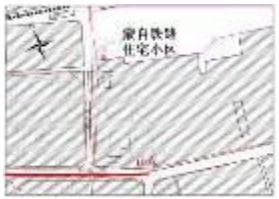
No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
4	Dormitory of Mengzi Water Supply Company	K0+260-K0+310	Left side	135，0	N	About 16 households	There is a 4 stories building which is parallel to the road and the dorm has been sold out to individual.	Kunhe railroad noise and social activities noise		
5	* No.2 Dormitory of Sinopec Mengzi Company	K0+170-K0+230	Right side	16，0	Y	About 40 households	There is a building of 5 stories next to the road.	Social activities noise		
6	Mengzi Yuxin Arts Kindergarten	K0+230-K0+250	Right side	24，0	N	——	There is a comprehensive building of 3 stories with seven classes and 30 to 40 students in each.	Social activities noise		

No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
7	* Dormitory of County Vehicle Team	K0+170-K0+240	Right side	35，0	N	About 100 households	There is a building of 6 stories and the first floor are shops.	Social activities noise		
8	* Dormitory of Mengzi Vibrator Factory	K0+300-K0+330	Right side	44，0	N	About 85 households	There is a building of 7 stories and two buildings of 5 stories.	Social activities noise		
9	Hongyan Community	K0+380-K0+550	Left side	18，0	Y	About 25 households	Mostly are private houses of 1-3 stories	Social activities noise		

No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
10	Dormitory of Shoe Factory	K0+420-K0+440	Left side	46，0	N	About 6 households	There are three buildings, one is 5 stories, one is six stories and the last one is 3 stories. The one facing the road on sideway is 6 stories.	Social activities noise		
11	Dormitory of Geological Investigation Team	K0+490-K0+510	Left side	60，0	N	About 4 households	There is a 4 stories building facing the road.	Social activities noise		
12	Office and Dormitory of Nandong Pump Station	K0+520-K0+540	Left side	60，0	N	About 30 households	There is a 5 stories building which is parallel to the road, and one building of 2 stories at the back row.	Social activities noise		

No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
13	Dormitory of Construction Company	K0+530-K0+550	Right side	160，0	N	About 30 households	There is a building of 5 stories which has a certain angle with the road.	Social activities noise		
14	*Yinhe Community	K0+480-K0+520	Right side	187，0	N	About 72 households	Three buildings of 6 stories are far from the planned road but are close to mid People’s Road	Social activities noise and Renmingzhonglu Road noise		
15	*Yueyatang Community	K0+560-K0+640	路右 Right side	18，0	Y	About 30 households	Mostly are private houses of 1-3 stories	Social activities noise		

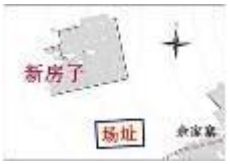
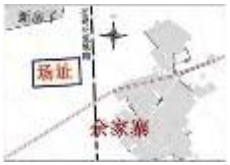
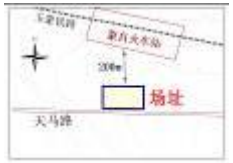
No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
16	Dormitory of Food Bureau	K0+640-K0+700	Left side	165，0	N	About 4 households	There are a 4 stories building facing the road on sideway, one 5-story building and one three-story building within the range of demolition.	Social activities noise and Renmingzhonglu Road noise		
17	Dormitory of Mengzi No.3 Middle School	K0+640-k0+670	Right side	18，0	Y	About 5 households	There is a 5 stories building facing the road on sideway, with one building of 3 stories at back row.	Social activities noise		
18	Dormitory of Timber Mill	K0+630-K0+700	Left side	155，0	N	About 16 households	There is a 4 stories building which is parallel to the road.	Kunhe railroad noise and social activities noise		

No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
19	Dormitory of Real Estate Company	K0+710-K0+720	Left side	60，0	N	About 5 households	There is a 5 stories building facing the road on sideway.	Social activities noise		
20	Dormitory of Mengzi Urban Water Supply Company	K0+730-K0+750	Left side	75，0	N	About 25 households	There is a 5 stories building that is basically parallel to the road, with some buildings of 2-6 stories at back row.	Social activities noise		
21	Mengzi Railway Community	K0+779	Left side	120，0	N	About 36 households	There is a 6 stories building facing the road, with three buildings of 6 stories at back row.	Social activities noise		

No.	Name of the sensitive sites	Stake No.	Location	Closest distance and elevation difference （m） away from the road central line	First-row along the roadside after demolition （Y/N）	Number of the households on first –row of the roadside	Note	Existing noise source	Layout	Photograph
22	Jindoudou Kindergarten	K0+779	Left side	25，0	Y	——	It is a 2 stories teaching building with 14 teachers and 150 students. No dorm for day care.	Social activities noise		
23	Dormitory of Local Products Company	K0+760-K0+770	Right side	130，0	N	About 5 households	There is a 5 stories building facing the road on sideway, and the first floor are shops	Social activities noise and West Ring Road noise		

Note: sensitive sites with * are within the assessment scope of both Jinhua Road and Zhaozhong Road, so here all are included into the table of Zhaozhong Road sensitive sites and the overlapping impact of noise from both roads are taken into consideration at the same time. As for if they will face the road after demolition, it needs estimation based on onsite investigation, and should be subject to real situation.

Table4.1-4 Noise Protection and Ambient Air Targets （Central bus station and Terminal）

Road Name	Name of the sensitive sites	Orientation	Distance a （m） away from the border line	Note	Existing noise source	Layout	Photograph
Wenlan Datiepu United Bus-Railway Central Station (parking & maintenance site, terminal)	Xinfangzi	North	165	The village locates to the north of parking lot and mainly are houses of 1-3 stories	Social activities noise, traffic noise and railroad constructure noise		
	Yujiazhai	East	160	The village locates to the east of parking lot and mainly are houses of 1-2 stories			
Central Bus Station (parking & maintenance site, terminal)	Luyingcun	Northwest	30	The village locates to the southeast of parking lot and mainly are houses of 1-3 stories	Social activities noise and traffic noise		
Yuguopu Central Bus Station (parking & maintenance site, terminal)	——	——	——	No residential area within 200 meters	Social activities noise		

Terminal at the east side of south extension of Beijing Road	Shuigoucun	Southwest	30	The village locates to the northeast of station yard and mainly are houses of 1-3 stories	Social activities noise and traffic noise		
Terminal at the northwest of Municipal Administrative Center	——	——	——	No residential area within 200 meters	Social activities noise		

4.2 Analysis of Construction Environment Impact

During the Project preparation phase, analysis of environment impact and its pollutant are listed in the Table 4.2-1.

Table 4.2-1 Analyses of Environment Impacts and its Pollutants

Project Components	Contents	Impacts	Pollutant	Impacts on the environment
New road (Xuefu Road, Jinhua Road and Zhaozhong Road)	Land acquisition and resettlement	Building demolishing	Construction waste, noise and TSP	The land acquisition and resettlement will consequently cause damage to the land use structure; the noise, flying dust and construction waste will affect the environment and urban landscape as well as urban sanitation.
	Road construction	Site leveling, excavation and conducting filling	Spoil soil, waste and TSP	The dust and spoil soil from site leveling, excavation and conducting filling, will consequently cause damage to urban landscape. It is necessary to take proper treatment measures to prevent soil erosion.
		Machine operation	Noise, TSP, dust and SS	The machine operation will cause noise and dust. It is necessary to take proper treatment measures to prevent water pollution.
		Construction material transportation	CO, NO_X, noise, TSP	The construction material transportation will cause dust, cement, clay and sand, which will cause damage to the local environment.
		Asphalt made, mixed, and paved	Asphalt fume, benzopyrene (a)	The asphalt fume and benzopyrene (a) from asphalt made, mixed, and paved, will cause damage to the environment.
		Construction workers	Domestic wastewater, domestic solid wastes	The domestic wastewater and solid from construction workers will cause damage to the urban environment and water environment.
	Operation	Vehicular traffic	CO, NO_X, noise	The CO, NO_X and noise from traffic, will cause damage to the

Project Components	Contents	Impacts	Pollutant	Impacts on the environment
				environment; the noise will affect the sensitive sites.
		Road surface runoff	COD,BOD_5,TP、TN, oil	The road surface runoff will cause damage to the water environment.
		_____	_____	After construction, the traffic, economic and social environment will be improved.
Honghe Avenue，Bus Corridor （Tinama Road, Yinhe Road, Beijing Road）	Construction	It is the same affection as above that site leveling, excavation and conducting filling, machine operation, paving asphalt and construction workers.		
	Operation	Public transportation	Domestic solid wastes	The bus station will consequently cause domestic solid wastes and affect the unban environment.
Bus priority	Land acquisition and resettlement, site leveling, infrastructure, construction	It is the same affection as above that site leveling, excavation and conducting filling, machine operation, paving asphalt and construction workers.		
	Operation	It is the same affection as above that vehicular traffic and road surface runoff.		
		Basic services operation	Solid waste，wastewater，ambient air, noise	The waste will cause damage to the local and unban environment;
Construction for improving school traffic safety	Repairing road	It is the same affection as above that site leveling, excavation and conducting filling, machine operation, paving asphalt and construction workers.		
	Purchasing school buses and safety devices	_____	_____	The traffic to school and social environment will be improved.
Institutional development	Capacity building	_____	_____	The traffic, economic and social environment will be improved.

4.3 Ecological Environment

（1）It was confirmed in the field investigation that there is no ecological sensitive sites in the assessment scope, such as the nature reserve, the landscape and famous scenery and water source. The project will acquire 29.62hm^2 of land for farmland, garden, constructive and transport land, which will not change the land structure, and little effect the land utilization.

(2) In the project, there is human−caused disturbance to some extent，where the vegetation types are mainly occupied by farmland and orchards. Farmland and orchards are locally common artificial vegetation, of which biodiversity is not enormous. Therefore, the construction of the project will not result in any vegetation types in the region disappearing, nor will the local vegetation ecosystem produce adversely affects to the local vegetation ecosystem stability conditions.

(3) In the project, plant species in the evaluation region are mainly dry land crops, pomegranate, loquat fruit and a small part of the tree species without national and provincial protection of plants or plant specific to the region or distribution of ancient trees as well as famous wood; Wildlife within the region are mainly living species associated with people with fewer quantities and species. There are no national and provincial protected species, rare and endangered species and endemic species, also not involved in animal migration routes. Hence, although the project will result in the reduction of animals and plants individuals in the land occupied in a certain range of time and space, but it will not have a significant impact on the species diversity, which is less effective on the animals and plants.

(4) During the project construction, it needs removal of part of house buildings and destroy of some landscape elements, which has undermined the local area landscape to some extent; during construction it needs foundation excavation, earthwork, stacking of construction materials or randomly parking and placing of temporary buildings or machinery, which will affect the environment and urban landscape as well as urban sanitation; the noise, flying dust, ambient air, construction waste and drainage water during construction will pollute the surrounding environment and bring some damage to the urban landscape. The above effects all take place during construction phase, which will gradually disappear in the end of the phase.

(5) After the completion of the project, native trees will be used in newly established and modified roads so as to enhance the proportion of afforestation. The rational allocation of green belts can play a role of protecting pavements, reducing soil erosion, traffic dust and traffic noise, regulating and improving microclimate of roads and other integrated environment efficiency, thereby improving the environment along the landscape so as to beautify the city.

4.4 The Impacts of Water Environment

4.4.1 Construction Phase

The wastewaters are mainly from the domestic wastewater of the construction workers, the cleansing water of the construction machineries or vehicles, and the wastewater of construction.

(1) During construction, relying on the Mengzi City, the living camp site is not established in the construction area, but there are a small amount of personnel on duty (about 5 to 10 people), which will produce a small amount of domestic wastewater of with the concentration of main pollutants are: BOD5167mg/L、CODcr350mg/L、SS250mg/L、NH3-N25 mg/L、phosphate 5 mg/L. Calculated as 100L per person per day with wastewater discharge accounting for 80%, the maximum of domestic wastewater is about 0.8m^3/d. The amount of discharged domestic wastewater is not huge, and the dust from construction sites after temporary treatment of simple sedimentation tank will not be discharged. There is little effect on the surface water environment.

（2）The construction wastewaters are mainly from the wastewater for cement mixing, and the wastewater for machines or vehicles cleansing and maintenance. The process water of concrete manufacturing is mainly for cleansing of sand material and for cement mixing. The wastewater has high turbidity and high sand content. The water of concrete manufacturing and the waste is 34m^3/d. The washing of machineries and vehicles will produce a large amount of wastewater with high sand content, which is 9 m^3/d. According to similar project experiences, the major pollutants for construction wastewater are COD (50-80mg/L), oil (1.0-2.0mg/L), and SS (150-200mg/L). These wastewaters can cause water pollution; therefore they not be allowed to discharge to the water bodies along the roads directly. The construction wastewater will be recycled after oil separation and sedimentation processes. They are not allowed to discharge into the rivers.

4.4.2 Operation Phase

During the operation phase, the wastewaters are mainly from the domestic wastewater of the staff members and other people, the oil containing wastewater of the vehicles maintenance, the Gas Station, and the road runoff.

（1）Wastewater from Central Bus Station and Terminal

The output, treatment measures and discharge destination of Interchange, initiating stations and terminal are shown in Table 4.4-1.

Table 4.4-1: Output, Treatment Measures and Discharge Destination of Interchange, Initiating Stations and Terminal

No.	Name	Type of wastewater	Output（t/a）	Treatment measures and discharge destination
1	Wenlan Datiepu United Central Bus-Railway Station (incl. terminal)	Domestic wastewater	10.62	The oil containing wastewater will be discharged into the municipal wastewater pipe network with domestic wastewater after oil separation pretreatment and enter the Mengzi City Treatment Plant for processing.
		Oil containing wastewater	1.2	
2	Central Bus Station (incl. terminal)	Domestic wastewater	11.26	
		Oil containing wastewater	1.2	
3	Yuguopu Central Bus Station (incl. terminal)	Domestic wastewater	8.71	1 small set of sewer treatment is configured inside the station, which can reuse after treatment and reach the standard.
		Oil containing wastewater	1.2	
4	Terminal at the northwest of Mengzi Municipal Administrative Center	Domestic wastewater	2.33	Be discharged into the municipal wastewater pipe network and enter the Mengzi City Wastewater Treatment Plant for processing.
5	Terminal at the east side of south extension of Beijing Road	Domestic wastewater	2.74	1 small set of sewer treatment is configured inside the station, which can reuse after treatment and reach the standard.

Wastewater treatment plant of Mengzi City is located in Lijiang River beside Shilupu and put into production and operation in January 2005. It covers 40 acres and adopts ICEAS technology, which has obtained the EIA approval. The designed processing capacity of the first stage of project is 20k tons/day, with the maximum processing capacity of 28,000 tons / day, which will be discharged in accordance with the national level B standard. After put into operation, various types of equipment are run in good condition, of which treatment process and technical parameters all meet the design requirements. The engineering project of second phase adopting ICEAS technology is 20k tons/day. Currently the construction process has been completed, while the machinery and equipment are waiting for installation. The treated effluent will be discharged in accordance with the national level B standard.

（2）The wastewater from the roads during operation phase is mainly composed of the rain water, whose major pollutants include the SS and the COD. The rainwater from some sections of Jinhua Road pipes into the South Lake through storm sewer, while the rainwater from other sections of Jinhua Road, Zhaozhong Road and Xuefu Road pipes into Lijiang River through storm sewer. According to the analogy estimation, the discharge intensity and the annual load of COD are relatively small. They are within the self-purification capacity of the water body. Therefore the road runoff will not cause significant impact on the water environment. The road should be promptly cleaned to minimize rainwater pollution.

（3）The roads to be constructed in the project are mainly urban roads that do not be allowed transportation of hazardous chemical. Therefore there is no risk of water pollution caused by accidents of vehicles loaded with hazardous or poisonous substances.

4.5 The Impacts of Acoustic Environment

4.5.1 Foundation Excavation of Construction Phase

According to the Emission Standard of Environment Noise for Construction Site (GB12523-2011), the environment noises for the construction site are respectively at 70 dB daytime and 55db at night. The prediction results showed that: noise of construction machinery more than 50m away in the daytime （≥50m）can meet the requirements of 70dB (A) standard limits; while machinery noise in the night time during construction more than 280m away （≥50m）can meet the requirements of 50dB (A) standard limits. Thus, the impact of construction machinery noise on construction sites around the 50m-wide environmental is larger, especially serious of nighttime during construction period.

Jinhua Road, Zhaozhong Road and Xuefu Road in this project are all newly constructed roads, especially Jinhua Road and Zhaozhong Road located in the densely populated regions in Mengzi. Most residential areas are close to the roads, which are distributed within the 16-200m ranges on both sides of the new highway centerline. Therefore, the machinery noise during construction will cause impact of various degrees, which should take effective measures to reduce the impact of the construction period.

4.5.2 Operation Phase

（1）The Prediction Results of the Traffic Noise at the Sensitive Sites

Zhaozhong Road: 17 sensitive sites reach the standard during operation while 7 sensitive sites are over standard, where Tianma Community is 0.7 dB over standard during nighttime in the forward period; the Second Dormitory of Sinopec's Mengzi Company is 0.6 dB over standard during nighttime in the mid period; Mengzi Yuxin Arts Preschool is 0.4 dB over standard during nighttime in the mid period; Hongyan Community is 0.9 dB over standard during nighttime in the forward period; Yuyatang Community is 0.1 dB over standard during nighttime in the forward period; the Dormitory of No.3 Mengzi Middle School is 0.8 dB over standard during nighttime in the forward period; No.3 Mengzi Primary School is 0.2-5.1 dB during nighttime in the forward period.

Xuefu Road: 4 sensitive sites reach the standard during operation while 1 sensitive site is over standard. The over standard site is Dongcun, which is 0.5 dB over standard during nighttime in the forward period.

Jinhua Road: 9 sensitive sites reach the standard during operation while 6 sensitive sites are over standard (Dayuanzi, Yufeng Hotel, Honghe Caring Hospital, Armed Police Hospital, No.9, 10, 11 Qilong Community, No.3 Mengzi Primary School). In which Daziyuan is 0.4 dB over standard during nighttime in the forward period; Yufeng 0.4-1.5 dB; Honghe Caring Hospital is 0.3-7.8 dB over standard during nighttime in the mid and forward period; Armed Police Hospital is 1.0 dB over standard during nighttime in the forward period; the No.9, 10, 11 Qilong Community is 1.1-2.3 dB over standard during nighttime in the mid and forward period; the 0.2-5.1 dB over standard during nighttime in the mid and forward period.

（2）The Prediction Results of the Traffic Noise near the Bus Corridor

According to the feasibility study report, after implementation of bus corridors project, the designed average daily traffic volume is increased to some extent compared with the current traffic volume. According to the relevant literature predictions, in case of equal distance of road, the noise of observation point near the bus stop is increased by 2dB than the noise of the observation site away from bus stop. Therefore, after the creation of bus corridors, the sensitive sites near the bus stop will increase. Noise of sensitive sites near the bus stop will be greater than

before construction. At the same time, because of the smooth flow of road traffic, the traffic noise is decreased in a certain extent compared with the idle state. In addition, with the convenience of transit service continues to improve, more and more citizens will be attracted to choose to travel by bus.

（3）The Prediction Results of Central Bus Station and Terminal

The project has set up 5 interchange, initiating stations and terminal, of which the evaluation scope of Initiating Station and terminal in the northwest of the Municipal Administrative Center and Yuguopu Interchange does not involve sensitive sites. Wenlan Datiepu Railway-highway Combined Transport Interchange is about 160m away from the nearest sensitive site. After sound insulation and geometrical spreading model, the impact of Interchange is small on sensitive sites. The Interchange of terminal station and Initiating Stations and Terminal south towards east from Beijing Road both involve 1 sensitive site. The nearest distance of Interchange is 30m away from the Luyingcun. There are 10 operating lines set in the Interchange, and a demand of 118 cars parking. The large traffic flow will bring certain noise impact on Luyingcun. The nearest distance of Initiating Stations and Terminal south towards east from Beijing Road is 30m away from Shuigoucun, which has 4 operating lines with 29 buses. Since there are no overnight parking in the Initiating Stations and Terminal, there will be less impact on the Shuigoucun.

4.6 The Impacts of Ambient Air

4.6.1 Construction Phase

（1）In a windy occasion, the mixing of construction material will produce TSP pollution. According to the monitoring data of similar projects, the TSP concentrations at 50m, and 100m distances downwind from the mixing stations are 8.90 mg/m³, 1.65 mg/m³. At the 150 m distance downwind from the mixing stations, the TSP concentration will be below 0.3 mg/m3, the limit stipulated by the Class II standard of Environmental Air Quality Standards (GB3095-2012). The TSP produced in other processes can be contained within the distances of 50-200 meters from the construction sites. Outside of this range, the TSP concentration can meet the Class II standard of Environmental Air Quality Standards (GB3095-2012).

（2）The loading/unloading and the transportation of construction materials can also produce TSP pollution. According to the monitoring data of similar projects, the TSP concentrations at 50m, 100m, and 150m distances downwind from the transportation routes are 11.652 mg/m³, 9.694 mg/m³, and 5.093 mg/m³, respectively, all meeting the Class II standard of the Class II standard of Environmental Air Quality Standards (GB3095-2012).

4.6.2 Operation Phase

（1）According to the analogy results of Tinama Road south extension at Mengzi City, the NO_2 and the CO concentrations are both meet the Class II standard of the standard requirements of Environmental Air Quality Standards (GB3095-2012).

2）The traffic flow will not change significantly after the upgrading as the red line width will not change. The bus speed will increase significantly. However, as the traffic move smoothly, the pollutants from the exhaust gas will decrease. In addition, the updated bus service will provide more convenience for the local travel and will attract more and more people to adopt the public transportation. The exhaust gas will be reduced. For the bus stations and the interchange, the normal operation will not cause significant impact on the ambient air environment.

（3）After the gas station construction, the exhaust gas is mainly originated from two substances: non-methane hydrocarbon (NMHC) which is from the loss of large and small tank breathing and oil spewing fluid; and the tail gas of the vehicles at the gas station. Because there are underground storage tanks and self–sealing nozzle, together with the recovery system, the air pollutant, NMHC, will be discharged. The exhaust pipe is no less than 4 meters in the ground, and the volume is no less than 25g/m^3, which are both in compliance with the standard requirements of the Gas Station Air Pollutant Emission Standards (GB20952-2007). The boundary NMHC volume is below the limit required ≤4.0mg/m^3 by the Air Pollutant Emission Standards (GB16297-1996), which will not affect the sensitive sites.

4.7 The Impacts of Solid Waste

4.7.1 Construction Phase

The solid waste mainly comes from the earth works, the building demolishing, and the domestic solid wastes.

According to the engineering design, it is estimated that the excavation volume will be 290,500 m³, the fill volume will be 184,000 m³, in which 41,300 m³ from internal transportation, and 50,100 m³ are borrowed (from the river bridge construction project). The waste earth volume will be 156,600 m³, including permanently abandoned 131,500 m³ (all for building demolition waste, removal of existing roads and green belts), temporarily abandoning 25,100 m³ (all for stripping topsoil, temporarily stacked in Xuefu roadbed within five topsoil temporary yards, for post-road green casing). Since the Mengzi municipal government is responsible for the organization and implementation of project resettlement work, the 131,500 m^3 permanent spoil produced will be transported to the designated residue site in accordance with the relevant provisions. The construction units are committed to strictly follow the relevant provisions of construction waste disposal, sign contracts with the qualified processing units in the next stage which expressly indicating that no residue can be abandoned randomly, legal and reasonable disposal of residue. The construction waste transport and processing units are responsible for the soil and water conservation projects outside the construction region. The residue disposal and deployment will be recorded by the local water administrative department as a basis for acceptance. The situation of earthwork which flows is shown in Table. 4.7-1, while earthwork balance calculations are shown in Table. 4.7-1.

There are about 150 people in the construction site during the peak of construction, with generating about 0.15 domestic wastes every day; the domestic waste will be sent to the Mengzi sanitary landfill for disposal.

During the construction phase, solid waste will be linearly distributed along the roads. If not well stored or handled, it could damage the vegetation along the roads, clog the irrigation ditches. If the solid waste is stored for too long, it could also cause flying dust on windy days, and cause impact to local residents. Therefore,

construction management should be strengthened to clean up the solid waste promptly to reduce or prevent the above-mentioned impacts.

The domestic waste such as the food residue, the plastic packaging, the waste cells, can cause adverse impact on the city appearance and cause environmental pollution if not well handled. In addition, if the domestic waste is not well managed, it can attract rodents and mosquitoes, which can also pose a threat to the workers' health. The domestic waste will also produce highly concentrated leachate, which can cause further pollution to the soil and the water. When the domestic waste contains waste cells, it can cause contamination of heavy metals, making the pollution even worse. The solid wastes that cannot be recycled will be sent to the Mengzi sanitary landfill for disposal.

The Mengzi sanitary landfill is located in Chenjiazhai, southwest of Mengzi City. It was put into operation in June 2007, covering about 10.5 hectares with a designed service life is 15 years. The total capacity of landfill site is about 1.48 million cubic meters with an effective storage capacity of about 1.28 million cubic meters and daily waste processing of 200 tons. It adopts semi-aerobic landfill treatment process, which has obtained the EIA approval. Since put into trial operation, various types of equipment are running in good conditions, and the processing technical parameters all meet the design requirements.

Table 4.7-1 Equilibrium Analysis of the Earth Works (10,000 m^3)

No.	Project			Excavation			Conducting filling and recycling	In		Out		Borrow		Waste	
				Top soil cut off	Excavation	Sub total		Quantity	Source	Quantity	For	Quantity	Source	Top/spoil soil Quantity	For
1	Demolition construction waste	Adjusting road and network (M1)	Honghe Avenue		0.98	0.98								0.98	
			Jinhua Road		6.32	6.32								6.32	Specified spoil field
			Zhaozhong Road		4.49	4.49								4.49	Specified spoil field
			Xuefu Road		0.27	0.27								0.27	Specified spoil field
			Subtotal		12.06	12.06								12.06	Specified spoil field
		Comprehensive Urban roads and corridor management (M2)	Tianma Road		0.81	0.81								0.81	Specified spoil field
			Yinhe Road		0.28	0.28								0.28	Specified spoil field
			Subtotal		1.09	1.09								1.09	Specified spoil field

		Total		13.15	13.15								13.15	Specified spoil field
2	Adjusting road and network (M1)	Jinhua Road		4.29	4.29	2.11			2.18	Xuefu Road				
		Zhaozhong Road		2.60	2.60	0.65			1.95	Xuefu Road				
		Xuefu Road	2.51	1.35	3.86	10.49	4.13	Jinhua Road, Xuefu Road			5.01	Changhetianqiao Project	2.51	Temporary topsoil dump site
		Subtotal	2.51	8.24	10.75	13.25	4.13		4.13		5.01		2.51	
3	Bus priority (M3)	Central bus station	Wenlan Datiepu United Central Bus-Railway Station		0.51	0.51	0.51							
			Central bus station		0.65	0.65	0.65							
			Yuguopu Central Bus Station		0.43	0.43	0.43							
			Subtotal		1.59	1.59	1.59							
		Terminal	terminal at the east side of south extension of Beijing Road		0.21	0.21	0.21							

			terminal at the northwest of Municipal Administrative Center		0.17	0.17	0.17								
			Subtotal		3.56	3.56	3.56								
		Total			5.15	5.15	5.15								
Total				2.51	26.54	29.05	18.40	4.13		4.13		5.01		15.66	

Note:
(1) The earth-rock quantity calculation in tables refers to earthwork volume under natural condition;
(2) Construction detour excavation earthwork is included in roadway excavation;
(3) Earthwork balance is calculated as follows: excavated volume - the amount of fill earthwork = obsolete earthwork quantity + topsoil temporary storage volume.

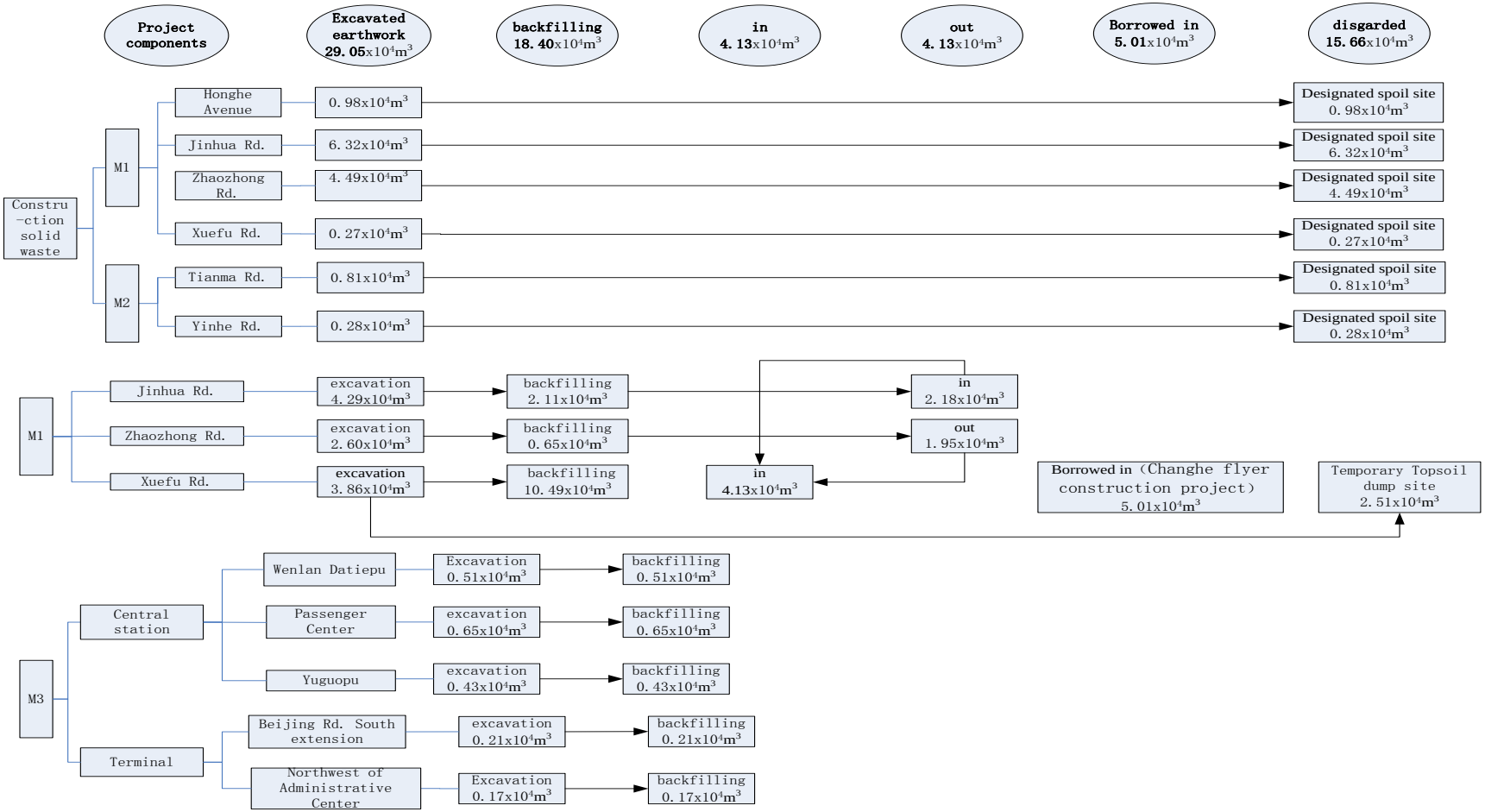


Table 4.7-1 Flow Chart of the Earth Works (10,000 m^3)

4.7.2 Operation Phase

（1）Urban Roads

During the operation phase the solid wastes are mainly from the domestic waste produced by the pedestrian along the roads. In not properly handled, the solid waste can have an adverse impact on the landscape and the public hygiene, and can also pollute the air and pose a threat to public health. During the operation phase, the solid waste will be handled by the municipal solid waste management system. It will be sorted and collected using the garbage bins placed on both sides of the roads. The solid wastes that cannot be recycled will be sent to the Mengzi sanitary landfill for disposal.

（2）Central Bus Station and Terminal

Domestic Solid Waste: The domestic solid wastes are from the staff members and the transferring passengers in the Central Bus Station and Terminal. During the operation phase, the domestic solid waste will be collected at designated location within the Interchange. At the same time, the district sanitation department will regularly clean up the solid waste and send it to the Mengzi sanitary landfill for treatment. With these measures taken, the solid waste during operational stage will not have a significant impact on local environment.

Waste oil: The waste oil from the central station’s maintenance workshop is hazardous waste, and the volume of waste oil volume during operational stage is 20t/a. The waste oil will be handled by a qualified contractor in Yunnan province, Kunming Hazardous Waste Disposal Center l, after being collected by the construction unit. Therefore the waste oil will not cause significant impact on the environment.

4.8 Accidental Risk

4.8.1 Substances Risk Identification

In the project, the oil depot at each car park is diesel. According to directory listed in Annex A.1 of HJ/T169-2004, the hazardous, flammable and explosive substances that involved in the oil depot are mainly gasoline and diesel. Hazard identifications are shown in Table 4.8-1.

Table 4.8-1 Hazard Identifications of the Hazardous, Flammable and Explosive Substances

Name	Features	Annex A.1identification result	Explosion group /class	Fire hazard class
Diesel	1. LC50: None 2. The boiling point (℃): 282-338, flash point: 38 ℃ 3. Cause explosion with combustion of fire and high-heat.	1. Low toxic substance 2. Flammable substance 3. Explosive substance	T3/IIA	乙 B or 丙 A

Physicochemical properties and hazardous characteristics of diesel are as follows:

Diesel:

English name: Diesel oil; Diesel fuel

(1) Physical and Chemical Properties

Relative density (water = 1): 0.84 to 0.9

Appearance and character: Light yellow to brown liquid, slightly viscous.

Toxicity: This product has a stimulating effect on the skin and mucous membranes. Skin contact can cause contact dermatitis diesel, oily acne. Inhalation of diesel droplets can cause aspiration pneumonia.

Stability: Stable.

The main purpose: as fuel of diesel engine.

(2) Explosive Properties

Flash Point: ≮65 ℃ignition point: 350 ~ 380 ℃

Fire Hazard Class: B A or B C

Explosion group / class: T3/IIA

In case of fire, heat or contact with oxidants combustion caused a risk of explosion. In case of high heat, internal pressure within container will be increased, with the risk of cracking and explosion.

(3) Diesel Toxic Hazards

Diesel has a stimulating effect on the skin and mucous membranes can stimulate the respiratory tract, skin irritation, central nervous system depression. Skin contact: Causes irritation, blisters, and symptoms of drunkenness. Human inhalation may cause irritation, nausea, vomiting, difficulty breathing, headache,

symptoms of drunkenness, confusion, with blue skin, coma. Ingestion will cause nausea, vomiting, difficulty breathing, symptoms of drunkenness, lung congestion. Skin contact can cause contact dermatitis diesel, oily acne. Inhalation of diesel droplets can cause aspiration pneumonia.

Emergency plan:

Skin contact: Remove contaminated clothing, thoroughly washed with soap and water.

Eye contact: immediately open upper and lower eyelids, wash with flow water or normal saline for at least 15min. go to a doctor.

Inhalation: rapidly escape from the site to fresh air, keep-breathing smooth, warm and at rest. Give oxygen therapy for difficulty breathing. When stop breathing, give artificial respiration. Go to a doctor.

Ingestion: Mouthwash immediately, drink enough water, and get gastric lavage as soon as possible. Go to a doctor. It is 3^{th} class of Substance Hazard Classification (flammable liquid).

4.8.2 Environmental Risk Impact Analysis

According to the analysis, the project involves 3 gas stations as followings, Wenlan Datiepu Railway-highway Combined Transport Interchange, Passenger Hub Interchange and Yuguopu Interchange. The main accident risk in this project is explosion risk at interchange gas station. The gas station technical parameters are shown in Table 4.8-2.

Table 4.8-2 The Gas Station Technical Parameters

Name	Total driving distance per day (km)	Maximum fuel consumption of bus (m^3/km)	Total fuel consumption each month （m^3）	Total volume of design oil tank （m^3）
Wenlan Datiepu Railway-highway Combined Transport Interchange	11695	$2.8*10^{-4}$	98.238	110
Passenger Hub Interchange	14121.9	$2.8*10^{-4}$	118.624	120
Yuguopu Interchange	575.9	$2.8*10^{-4}$	48	55

According to Construction Project Environmental Risk Assessment Technical Guidelines (HJ/T169-2004), the environmental risk assessment grade is divided. The factors are based on the evaluation of the project's physical hazard, functional

unit major hazard determination result, and environmental sensitivity as well as other factors. The project mainly stores diesel and decided according to the risk guidelines of flammable substance name and critical mass determination in Table 3 of Appendix A1. Therefore, according to Table 4.8-3, the production and storage sites of this project are both significant hazards.

Table 4.8-3 Flammable Substances Stock and Critical Mass Comparison

Name of substance	Critical mass（ton）		Actual storage capacity（ton）		
	Production site	Storage site	Wenlan Datiepu	Initiating station and terminal at Beijing Road south extension	Yuguopu Interchange
Gasoline	2	20	82.5	90	41.2

Note: As diesel is involved in this project while where no diesel in guideline, so this project will be implemented with gasoline reference, oil density is calculated according to 0.75

After hazardous substance identification and analysis of the production process, according to requirements of Construction Project Environmental Risk Assessment Technical Guidelines (HJ / T 169-2004) and Major Hazard Identification (GB18218-2000), the identification of major hazard is based on substances dangerous characteristics and quantity. The diesel storage capacity in this project is over than the critical mass that set forth in standard (GB18218-2000), which is referred to as major hazard.

According to the table 4.8-4, major hazard source is present in the storage place of the project. The project risk assessment will be assessed as per the first level.

Table 4.8-4 Level of Assessment (Grade I , Grade II)

	Highly toxic hazardous substance	General toxic hazardous substance	Combustible and inflammable hazardous substance	Explosive hazardous substance
Major hazard resource	1^{st}	2^{nd}	1^{st}	1^{st}
Non-major hazard resource	2^{nd}	2^{nd}	2^{nd}	2^{nd}
Areas sensitive to the environment	1^{st}	1^{st}	1^{st}	1^{st}

(1) The project involves gas station, the environmental risk of which has uncertainty. The main risks may occur at the gas station include leakage, explosion,

and fire. The primary causes are defects of pipes and oil storage tank, weld failure, unqualified foundation works, corrosive pipes, rule-breaking operation, natural disaster, and other factors. In case of occurrence of aforesaid accidents, the buildings will be destroyed, and the personal security will be endangered. The ambient air be polluted as well.

(2) Analysis of environmental risk: the project belongs to petrochemical industry. Larger potential fire and explosion risks are present in petrochemical system of storage and transportation. From the statistical analysis of 100 Extra Serious Accidents from the Worldwide Petrochemical Enterprises in Recent 30 Years, we can see that the tank field accident happened 16 times, accounting for 16% of total accidents, the oil carrier accident was met 6 times, holding 6% of total accidents and the

Based on the investigation of petrochemical enterprises of the same kind, it is indicated that in a variety of pollutant accidents occurred during recent 10 years, equipment and pipes leakage takes the lead, sharing 52% of the total accidents, accidents caused by man-made factors for improper operation and other factors hold 21% and accidents incurred by the failure of pollution treatment system account for 15% with other accidents holding 12%.

In addition, analysis of storage tank accidents indicates that the probability of tremendous accidents is less than one over ten thousand including fire explosion of storage system, and is declining with the advancement of hazard prevention technology level in recent years.

(3) Analysis of fire-protection distance: the rationality of fire-protection distance is analyzed in accordance with the scale, plane design, and sensitive spots distributed in the ambient environment. For the grading of gas station and fire-protection distance of gas station architecture in diverse grades, see the table 4.8-5 and 4.8-6.

Table 4.8-5 Grading of Gas Station

Grade	Oil tank volume (m^3)	
	Total volume	Single tank volume
Grade1	120<V≤180	≤50
Grade 2	60<V≤120	≤50
Grade 3	≤60	≤50

Note: V stands for the total volume of oil tank; diesel tank volume can be reduced by half and calculated into the total volume of oil tank.

From the view of the construction scale of the project, the project is in the range of grade 3 gas station.

Table 4.8-6 Fire-protection Distance (m) of oil Tank, Oiling Machine, Orifice of Breather Pipe, Buildings, and Structures Outside of the Station

Project level		Underground storage gasoline tank			Orifice of breather pipe	Oiling machine
		Grade 1 station	Grade 2 station	Grade 3 station		
Important public buildings		50	50	50	50	50
Protection class of civil buildings	Class 1	30	25	18	18	18
	Class 2	25	20	16	16	16
	Class 3	16	12	10	10	10
Urban road	Express way, trunk road	10	8	8	8	6
	Sub-arterial road, feeding road	8	6	6	6	5

The project involves diesel station. For the diesel tank and its orifice of breather pipe and diesel-refilling machine, the distance in the table can be cut 30%.

According to the on-site investigation, sensitive sites distribution of the project are listed in the table 4.8-7.

Table 4.8-7 Sensitive Sites of the Gas Station (within 2.5km)

Interchange	Location	Orientation	Distance（m）
Yuguopu Central Bus Station	Guanshengzhuang	Southwest	2370
	Yuguoxinzhai	Southwest	1920
	Yuguopu Town	East	1600
	Yuguopu	Southeast	830
	GUcheng	Southeast	1250
	Miaozuxinzhai	Northeast	1930
Wenlan Datiepu United Central Bus-Railway Station	Xinfangzi	North	165
	Yujiazhai	East	160
	Weixincun	Southwest	465
	Weijiazhai	Northwest	860
	Heinitian	Northwest	1140
	Panzhihua	Northeast	1360
	Beizhuang	Northwest	1950
	Beiyao	West	1870

	Tianfang	Southwest	1560
	Dongcun	Southwest	1580
	Dujiacun	Southwest	1060
	Luolongzhuang	Southeast	1240
	Huituzhai	South	1640
	Duodale	North	1720
	BUyitou	East	1610
Central Bus Station	Luyingcun	Southeast	30
	Mazhantian	Northwest	425
	Jiangjiazhai	North	800
	Gaojiacun	North	1380
	Matouzhai	Northeast	1410
	Silipu	Northwest	1690
	Tuguancun	Southwest	950
	Tuguancun Primary School	Southwest	1140
	Honghe Agricultural School	Southwest	1085
	Bainiuchang Community	Southwest	920
	Hujiazhai	East	1000
	Lijiazhai	Northeast	2410
	Mengzi Huayiny School	Southeast	760
	Mengzi City	South	940

The table above tells that the sensitive spot nearest to the gas station under the project is Luyingcun, belonging to the class 3 building, which is located at the southeast to Passenger Hub Interchange and is apart from 30m. It can meet the provisions stipulated in *Code for Design and Construction of Automobile Gasoline and Gas Filling*（GB50156-2002）

The gas station under the project mainly deals with diesel, which has inflammable, explosive, and toxic characteristic. In the course of identification of the major hazard resource, inflammable and explosive substances are identified as the major hazard resource. This kind of substance will trigger burning and explosive risk when contacted with open fire, high heat or oxidizing agent. In case of high heat, internal pressure of a container will be enlarged. Cracking and explosion risks can be generated. The burning or explosion of oil depots at the gas station will cause quite heavily consequences, damaging casualties and property loss. Besides, leakage and burning of large amounts of refined oil will give rise to serious pollution to the environmental air, surface water and soil environment, in particular the pollution to the surface water and soil for a considerable time. The contaminated water body and all kinds of creatures and plants will be going to die and it will take ten years

and even hundreds of years for them to be entirely purified and recovered their original functions. This assessment process focuses on analysis of diesel explosion consequences.

4.8.3 Risk Computation and Results of Risk Assessment

Diffusion of hazardous substances will not lead to the death of surrounding populations after the gas station under the project is met with fire according to the risk computation. As the risk consequence value is 0, so the risk computation value is 0.

The environmental impact assessment report indicates the surrounding populations will get less influence after explosion and will not die. Hence, the risk computation value is 0. However, on-site staff and firefighters will be led to death after the accident, so occurrence of the explosion accident rate is less than 10^{-5}/a compared with the similar accident.

Through referring to related information, we know the risk computation value is 8.33×10^{-5}/a in the petrochemical industry. It can be seen the possible maximum risk value is less than 10^{-5}/a under the condition of hazardous substances diffusing after the oil tank explodes and fire disaster occurs. Therefore, the risk of the project is acceptable.

The accidental risk occurred in gas station is acceptable, analogical to the statistical information of American lethal rate of industrial accident and American injured risk rate, death toll in 1980s in China.

4.9 Social Impact

（1）Positive Impacts

This project can help improve the urban road network and facilitate the development of the transportation hub; it can improve the urban development and ensure the sustainable development; and it can facilitate the economic development, improve the investment environment and improve the living condition in Mengzi City.

（2）Adverse Impacts

The project will occupy the land of local residents and causing loss to local farmers. Therefore it is necessary to include the local residents suffering loss into

the social security system and ensure their normal life and work. In addition, preference should be given to these people suffering loss for employment placement. The project will have certain impact of the traffic safety. After its completed, the traffic flow will increase, brings in more traffic safety risk to the area.

（3）Coordination Analysis of Overall Planning of Mengzi City

Overall Planning of Mengzi City (version in 2004) is a planning approved by the People's Government of Honghe, enjoying legal benefits. At the design stage, the project has taken the coordination with Mengzi City into account. After analysis, the Initiating station and terminal at the east of Beijing Road south extension, occupied the land used for culture and entertainment, while the Initiating station and terminal in the northwest of Mengzi Municipal Administrative Center occupied the land used for administrative office, which is discrepant with the function of land planning. Other construction content conforms to the Overall Planning of Mengzi City. The construction content of the project coincides with the development ideas of Overall Planning of Mengzi City and the project is a specific one to implement Overall Planning of Mengzi City. As a whole, the project is coordinated with Overall Planning of Mengzi City.

5 Impact Mitigation Measures

Proper measures should be taken to enhance the positive impacts and mitigate the adverse impacts. The mitigation measures discussed in this section are focusing on the adverse impacts during the project design phase and implementation phase.
The contractor should prepare detailed and site specific implementation plans for environmental protection measures prior to construction commencement. This will also be required in the bid of the contractor.
The Contractor should make sure all mitigation measures are taken accordingly.
The EMC will supervise the overall environmental performance and the contractor's duties and obligations, and report to the PMO all findings so that necessary action can be taken promptly.

5.1 Design Phase

5.1.1 Accoustic Environment

In site selection, the design insitute should try the best to keep the site of the central bus transport station away from Luying Village, and to keep the bus termial at the southern extension of Beijing Road away from Shuigou Village.

5.1.2 Environmental Risk Prevention

The following risk prevention measures should be taken for the gasoline stations at the three central bus transport station:

--- During the design stage, the project implementation unit should locate the gasoline station based on the comments of Safety Supervision Bureau and Fire Brigade, in order to meet the safety, fire control and environmental requirements.

---The design institure should apply strict technical standards when designing the petrol station. The structures need to be the secondary fire resistance, and stand with the earthquake intensity of 8 degrees. The framework need to be designed as the quarternary structure for earthquake resistance. The capacity of the fundamental structures to resist the earthquake need to be increased to make sure that the oil tank and pipelines will not leak under the attack of the average natural disasters.

5.2 Construction Phase

The construction activities will cause different impacts on the environment along the roads, especially near the sensitive sites. The contractors are responsible for protecting the environment and mitigating the adverse impacts. The mitigation measures during construction phase will be incorporated into the bidding documents and contracts to ensure that effective environmental protection measures are implemented to protect the environment, and to protect the safety of workers and the local residents.

5.2.1 Water Environment

When the construction site is close to the water environmental protection targets, such as Xigan Channel, the irrigation channels and Lijiang River along Xuefu Road and Guanyiqiao River across Xuefu Road, the contractor should take the following measures:

(1) The discharge of the wastewater need to be well planned and designed, and the domestic wastewater and production wastewater from the construction work should be treated for recycling. It is forbidden to be discharged randomly to pollute the environment.

（2）Management Measures

--- The contractor should conduct water environment protection education at the construction sites and camps to allow the workers understand the importance of protecting water environment. The contractor should strengthen the construction management and supervision, enforce regular mechanical inspection to avoid oil spill that might pollute the water bodies.

--- The construction materials such as asphalt, oil and chemicals should not be stored near the water body and these storage places should be equipped with canvas as temporary cover. Other measures should be taken to avoid the clogging of trenches by earth or construction materials.

--- The wastes, no matter they are domestic waste, construction waste or maintenance waste, should be sorted and recycled (usable material such as paper, wood, metal and glass materials). These waste that could not be recycled should be sent to sanitation utilities for treatment.

5.2.2 Soil Conservation Measures

The soil conservation measures of this project include engineering measures, biological measures and some temporary measures. Before the construction work starts, the project implementation unit should organize the soil environment investigation in the construction site, and develop the scientific conservation and recovery measures, in order to prevent the soil erosion and degradation during the construction.

The temporary measures are: temporary fencing and covering, temporary ditches, sedimentation tank;

The biological measures include the vegetation recovery and landscape greening.

The engineering measures include topsoil stripping and recovery, drainage facilities.

Table 5.2-1 shows the soil conservation system of the project.

Table 5.2-1 : Systematic Soil Conservation Measures

Zoning		Type of Measures	Prevention and Conservation Measure
1	Network functional adjustment and renovation sub-component zone	engineering	Topsoil stripping and refill, separate drainage pipelines along both sides of road base
		Biological	Landscape greening of road
		Temporary	Fencing of road base under excavation and backfilling, drainage ditch, covering, vehicle cleansing pond
2	Integrated urban road corridor management sub-component zone	Temporary	Covering
3	Public transport first sub-component zone	engineering	Topsoil stripping and refill, rainwater drainage pipeline, wastewater drainage pipeline
		Biological	Landscape greening
		Temporary	Drainage ditch, covering, sedimentation tank
4	Construction access road zone	Temporary	Drainage ditch
5	Temporary dumping site zone	Temporary	Fencing, drainage ditch, covering
6	Temporary construction site zone	Temporary	Drainage ditch, covering

Based on the project scale, the topographic characteristics and the operational plan of the construction, the amount of the engineering work for different zones is estimated.

(1) Functional adjustment and renovation of road network zone: 19400m^3 of topsoil stripping and refilling; greening area of 2.98hm^2 for the road landscape, planting 2814 trees along both sides of the road; temporary fencing and demolition:3570m; temporary drainage ditches on both sides of the road base: 12.18km; temporary covering: 18600m^2 and four vehicle cleansing ponds.

(2) Integrated urban road corridor management zone: temporary covering: 2810m^2.

(3) Public transport first sub-component zone: 1600m^3 of topsoil stripping and refilling; greening area of 0.58hm^2 for the road landscape; temporary drainage ditches: 850m; temporary covering: 800m^2 and five sedimentation tanks.

(4) construction access road zone: temporary drainage ditches: 1485m.

(5) Temporary dumping site zone: temporary fencing and demolition:280m; temporary drainage ditches: 520m; rainwater-proof cover on the dump site: 3800m^2.

(6) Temporary construction site zone: temporary drainage ditches: 305m; temporary covering: 1960m^2.

5.3 Operation Phase

5.3.1 Water Environment

The sources of water environment pollution are mainly the oil-containing wastewater from vehicle cleansing and maintenance at the central bus stations and the terminals, and their domestic wastewater from the working staff and the passengers, and the road surface runoff.

(1) Central bus station and terminals:

For the central station (including terminal) for both bus and railway transport at Datiepu of Wenlan Township, and the bus transport central station (including terminal) , their oil-containing wastewater will be discharged into the urban sewer network after screening and sedimentation for oil pretreatment, and finally enters into Mengzi Municipal Wastewater Treatment Plant. The domestic wastewater from the bus terminals at the northwest of Mengzi Municipal Administrative Center will be discharged into the urban sewer netowrk and treated at Mengzi Municipal Wastewater Treatment Plant. For the domestic wastewater from Yuguopu central bus station (including terminal), its domestic wastewater and the oil-containing wastewater will be treated in-situ by the wastewater treatment facilities for recycling; and it is the same case for the domestic wastewater from the terminal at the east side of south extension of Beijing Road.

(2) Road

According to the engineering design, the separate sewer network will be constructed for collecting the stormwater and wastewater at the new Jinhu, Zhaozhong and Xufu roads. Timely road-sweeping is needed to minimize the initial stormwater pollution load.

5.3.2 Acoustic Environment

The highway traffic noise control measures mainly include the road alignment adjustment, greenbelt, resettlement, sound block, sound insulation window, and changing the function of the first row of house adjacent to the road, and so on. The noise on the sensitive points along the roads has been monitored for the new part of Zhaozhong, Xuefu and Jinhua roads. The prediction shows that the noise at these points would exceed the standards to different degrees. To minimize the noise impact and improve the acoustic environment, the following measures are suggested.

There are many variants in the noise prediction model, and the model is based on the experience. The amount of the transport used is different from the actual amount at the operational phase. The calculation results are of some error. Furthermore, the incident noise source (e.g. horning) at the urban roads would lead to the variation of the noise at the points. Therefore, it is important to monitor the noise at these sensitive points during the trial operational phase, and do the adjustment accordingly. Where the noise level is above the required standards, the measures should be taken to reduce the noise. In this report, the sound block measures are not proposed for the specific protected targets. But these measures need to be taken when the monitoring results exceed the limits, and vice versa. The fund should be reserved for the sound block measures during the operational phase within the relevant budget.

(1) the speed limit sign should be set up at the following road sections: where Xuefu Road passes the east of Honghe College, Xiaozhai Primary School; where Jinhua Road passes Qunxing Kindergarten, Wenxin Kindergarten, Honghe Aixin Hospital, Jinhemiao Kindergarten, Armed Police Military Hospital, No.3 Mengzi Elementary School; where Zhaozhong Road passes Yuxin Arts Kingdergarten, Jindoudou Kindergarten.

(2) Measures for sensitive points

According to the noise prediction results of the sensitive points, the measures are proposed for the points where the noise level is above the standards during the mid-term operational phase.

Table 5.3-1 Noise Prevention and Control Measures for Major Sensitive Points

Road	Seq. Nr.	Sensitive Point	Executive Standard (Grade)	Mid-term maxim. Exceeds day/night（dB）	Measures	Public opinion
Zhaozhong	1	Tianma Community	4a	Night exceeds 2.3dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	The statistics of the public opinion shows that: 93.33% of the public support the transport management improvement and horning ban; 91.11% of them support the road greening and speed limit around the school; 80% support sound insulation window and functional change of the first-row house adjacent to the road; noise monitoring during the pilot phase and fund reserve get 77.78% support; and resettlement gets 46.67%.
	2	No.2 Dormitory of Mengzi Company of Sinopec	4a	Night exceeds 3.4dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	3	Yuxin Arts Kindergarten	2	Night exceeds 2.7dB（A）	1. road greening; 2. improve transport management, horning ban; 3.speed limit where passes by the school area; 4. noise monitoring during pilot operational phase and fund reserve;	
	4	Dormitory of Mengzi Vibrator Factory	2	Night exceeds 1.1dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	5	Hongyan Community	4a	Night exceeds 2.6dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	6	Yueyatang Community	4a	Night exceeds 1.7 dB（A）	1、road greening; 2、improve transport management, horning ban;	

Road	Seq. Nr.	Sensitive Point	Executive Standard (Grade)	Mid-term maxim. Exceeds day/night（dB）	Measures	Public opinion
					3、noise monitoring during pilot operational phase and fund reserve;	
	7	Dormitory of No.3 Junior High School of Mengzi	4a	Night exceeds 2.5dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
Xuefu	1	Dongcun Village	4a	Night exceeds 2.2dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	2	Xiaozhai Elementary School	2	Night exceeds 1.1dB（A）	1. road greening; 2. improve transport management, horning ban; 3.speed limit where passes by the school area; 4. noise monitoring during pilot operational phase and fund reserve;	
Jinhua	1	Dayuanzi	4a	Night exceeds 2.6dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	2	Qilong 7^{th} and 8^{th} Team	4a	Night exceeds 1.8dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	3	Yufeng Hotel	4a	Night exceeds 3.6dB	1、road greening;	

Road	Seq. Nr.	Sensitive Point	Executive Standard (Grade)	Mid-term maxim. Exceeds day/night（dB）	Measures	Public opinion
				（A）	2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	4	Honghe Aixin Hospital	2	Daytime exceeds 2.2 dB（A），Night exceeds 10 dB（A）	1. improve transport management, horning ban; 2.speed limit where passes by the hospital area; 3. noise monitoring during pilot operational phase and fund reserve;	
	5	Lianzufang Community	4a	Night exceeds 0.5dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	6	Armed Police Military Hospital	2	Daytime exceeds 0.4 dB（A），Night exceeds 8.4 dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	7	Qilong 9th, 10th and 11th Team	4a	Night exceeds 4.7dB（A）	1、road greening; 2、improve transport management, horning ban; 3、noise monitoring during pilot operational phase and fund reserve;	
	8	No.3 Elementary School of Mengzi	2	Night exceeds 7.3dB（A）	1. road greening; 2. improve transport management, horning ban; 3.speed limit where passes by the school area; 4. noise monitoring during pilot operational phase and fund reserve;	

5.3.3 Solid Waste

(1) Urban Roads

During the operation phase the solid waste on the roads is mainly from the domestic waste produced by the pedestrian. It will be handled by the municipal solid waste management system. The solid waste will be sorted and collected using the garbage bins placed on both sides of the roads. The solid wastes that cannot be recycled will be sent to the Mengzi Urban Domestic Solid Waste Disposal Site.

(2) Central Bus Station and Terminal

During the operation phase the domestic solid wastes are collected at the designated location of the central stations and terminals. The sanitation department will regularly cleans up the waste and send to the Mengzi Urban Domestic Solid Waste Disposal Site.

The waste oil from the maintenance workshop of the central stations will be considered as hazardous solid waste (HW08 waste mineral oil). These measures need be taken:

1) During the process of maintenance, prevent oil spills and collect the waste oil. The workshop should have covers for anti-seepage and oil absorbing materials on the ground;
2) Contain the waste oil in steel drums, steel cans or plastic containers. The containers should be labeled clearly with description of the nature and hazard of the contents, volume, loading date, and the identification marks of hazardous waste;
3) Adopt the “five-copy” policy for the transfer of hazardous waste to ensure safe transfer and to avoid illegal transfer and disposal. This policy will help the monitoring of hazardous waste, preventing the pollution incidents of hazardous waste, and ensuring the hazardous waste be handled by Kunming Municipal Hazardous Waste Treatment and Disposal Center, where it is recycled and treated for reuse.
4) The waste oil can also be collected in particular bucket and sent to the qualified waste oil processing factory for recycling.

5.3.4 Accident Risk Prevention

The prevention measures need to be taken for the petrol stations:

（1）the environmental emergency protocol need to be developed.

（2）strict execution of the prevention requirements of fire, explosion, lightening strike and poison.

（3）establish and improve the safety and environment management system, as well as the efficient safe production institution, ensuring fast, efficient and safe handling of the accident.

（4）set up warning signs like “NO FIRE” on the oil containers and at the petrol station entrance.

（5）put up the sign of “NO CELLPHONE” at the petrol station.

5.3.5 Environmental Emergency Response

The following emergency response measures need to be taken at the petrol station during the operational period:

（1）When the leakage happens, immediately evacuate the people in the pollution area to the safe place, without non-staff entrance, cut the power supply, wear the fire gears. Stop leakage in case of safety. Use active carbon or other inert materials to absorb the spillage, and put them in the dry and clean container with lid, then transport it to the waste disposal site. In case of mass leakage, contain the spillage with fencing, and followed by collection, transportation, recycling or non-hazardous treatment.

（2）call “119” when there is a fire in the storage area.

（3）When there is fire on the floor of the storage area and in the ditches, immediately use the fire equipment, foam and dry powder to put it off at the initial stage for preventing the fire expansion.

（4）When the pipeline connected to the oil tank, the valve, instrument connection and welded joint catch fire, the above-mentioned methods should be taken immediately, together with other measures like high-pressure stoppage, unloading material and half-open. If the pressure is very high, then use the sea weed to block the pressure and then putting off fire. If the temperature is high, use the wet sea weed, and cool it off with fire water to prevent reburn.

（5）When the breather valve on the tank top, the sampling mouth and the floating roof tank seal catch fire, use the cotton coat, felt and sea weed to put fire off in a closed and asphyxial environment; or use the powder and foam extinguisher. If there is a sound inside, and there is no smoke or the smoke is yellow or blue, the explosion is likely, the immediate evacuation must be taken. The high-pressure fire equipment need to be used for long-distance fire control. If there is fixed fire facilities, use them when there is fire.

（6）when the oil tank catches fire, the flame is stable in torch shaped, and when part of the tank top is damaged leading to the damage of the fixed or half-fixed fire facilities, the hooked foam fire gun should be used, and to keep the burning tank and the adjacent tanks cooling off.

（7）if there is large area of burning in the storage area, firstly to restrain the fire from expansion, and to eliminate the explosive tankers, equipment and containers. Put off fire in segments with proper distribution of the fire control force. The experience shows that the flowing flame at the lower ditch should be controlled first. Then, use the fencing and channeling methods, and to intercept fire with foam gun or water gun, then put off the fire scrambling on the floor, and lastly put off the tanker fire with strong force.

6 Environmental Management System

6.1 Organizations and Responsibilities

A successful EMP will need active involvement from all parties including the environmental protection bureaus (EPBs) of various levels of governments, the client (i.e., Project Management Office (PMO) or project owner), the Contractors environmental team (CET),the Construction Supervision Engineer (CSE), and the Environmental Monitoring Consultant (EMC).

In order to achieve a satisfactory outcome of the EMP, the client will appoint a Construction Supervising Engineer (CSE) to conduct environmental supervision. In addition, the client will also use either domestic funding or a portion of the WB loan to procure an experienced and qualified EMC. The EMC will conduct independent external monitoring of the implementation of the EMP, and regularly conduct site inspection and necessary environmental monitoring. The Terms of References (TORs) for the EMC are included in the Appendix A.

The EMP organization structure for project construction and operation, and its working scheme are shown in Figure 6-1-1 and Figure 6-1-2.

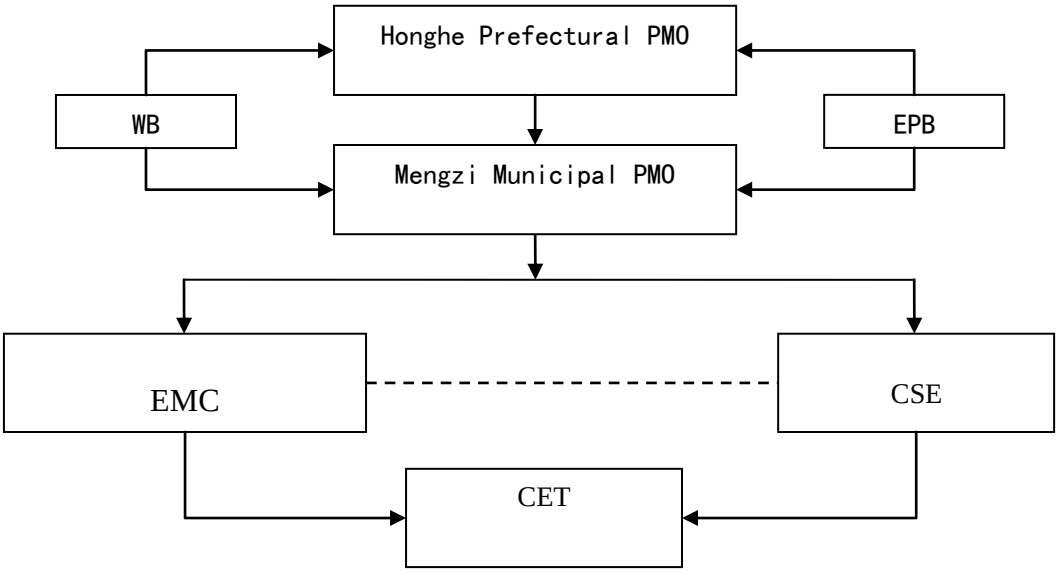


Figure 6.1-1: EMP Organization Chart for Construction Phase

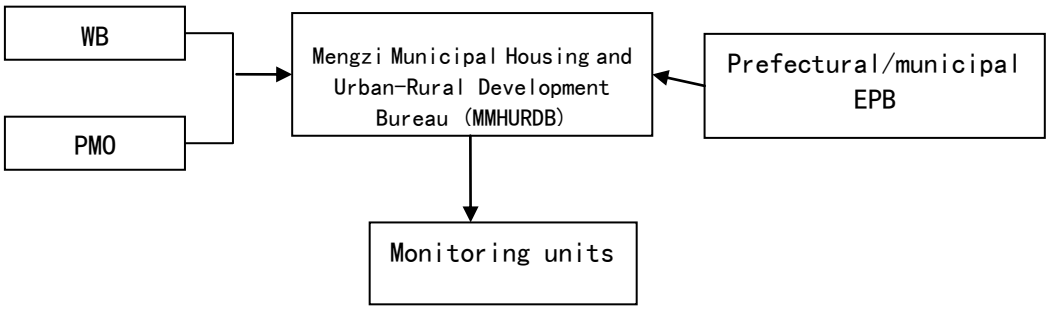


Figure 6.1-2: EMP Organization Chart for Operational Phase

The Institutional arrangement and responsibilities are listed in the Table 6.1-1.

Table 6.1-1 EMP Institutional Arrangement and Responsibilities

Phase	Stakeholder	Environmental Responsibilities
Project preparati-on	YEPB	Review and approve EIA report
	HEPB	Issue the letter of applicable standards; assist the PMO to prepare for the EIA.
	MEPB	assist the PMO to prepare for the EIA
	PCO at Honghe and Mengzi DRC	Provide guidance, supervision and coordination. Provide overall organization
	PMO at Honghe and Mengzi HURDB	Organize the implementation of the EMP. Include the mitigation measures into the technical specifications of the bidding documents
Construct-ion	PMO	1. Provide guidance, supervision and coordination; 2. submit to WB the progress report for the EMP implementation
	CET	1. The implementation of the EMP and other environmental protection measures; 2. Organize the trainings for the construction workers.
	CSE	1. Provide daily supervision and ensure the implementation of environmental protection measures; 2. In the monthly report, record the implementation status of the environmental protection measures and issues remaining.
	EMC	1. Provide training to contractors, and the IAs 2. Conduct regular site inspection and sampling of water, ambient air, noise if necessary. Verify the daily log of the CSE. Verify the effectiveness of the mitigation measures proposed in the EIA.

Phase	Stakeholder	Environmental Responsibilities
	HEPB, MEPB	Inspect the environmental management status.
Operation	PMO and IA	Same as the construction phase.
	Public Utilities Bureau at Honghe and Mengzi	1. The implementation of the EMP and other environmental protection measures; 2. The operation of environmental protection facilities.
	EPB at Honghe and Mengzi	1、Organize the 3-simultaneousness acceptance test of the environmental protection facilities 2、Inspect the environmental management during operation phase.
	Qualified monitoring unit	monitoring and accidents monitoring during peration phase
	Urban and Rural Planning Bureau at Honghe and Mengzi	Control the development of new sensitive sites along the roads.

6.1.1 Environmental Protection Institutions

As the regulatory agency, the various levels of EPBs will make the environmental regulations and the policies, and the guideline to the project construction and operation activities, as well as be responsible for enforcement the laws, regulations, standards and environmental practices of all organizations within their respective jurisdictions.

The Ministry of Environment Protection (MEP) which is the top regulatory agency in China, will guide the Yunnan EPB to enforce all the relevant regulations implementation; The provincial EPB will review and approve the EIA report, and will guide the prefectural and municipal EPB in the overall environmental management. HEPB or MEPB will be directly responsible for the supervision and implementation of the laws and regulations.

YEPB is the provincial environmental supervision and administration agency, its roles and responsibilities in the project are:

(1) Supervise the implementation of EMP;

(2) Enforce applicable laws, regulations and standards;

(3) Coordinate the environmental protection effort between departments concerned;

(4) Check and supervise the construction, completion and operation of environment facilities;

(5) Guide the prefectural and municipal EPBs to carry out environmental

management.

The roles and responsibilities of HEPB and MEPB are as following:

(1) Supervise the construction unit to implement EMP and enforce applicable regulations and standard;

(2) Coordinate the environmental protection effort between departments concerned;

(3) Check and supervise the construction, completion and operation of environment facilities thin their jurisdiction scope.

6.1.2 Project Management Office

At the prefectural and municipal level, the Project Leading Group headed by the deputy governor of the government is respectively established under the Honghe Prefectural Government and Mengzi Municipal Government, to be responsible for the overall project decision making and coordination. The two PCOs are established respectively under the Honghe prefectural and Mengzi municipal DRC to coordinate with relevant agencies, and with the WB and the provincial agencies during the project preparation and execution.

The PMOs at the prefectural and municipal levels are ultimately responsible for the environmental performance during construction phase and operation phase. They are an executive body under the PCOs, responsible for day to day management of all aspects of project preparation and construction. As such, they are also responsible for the relative WB safeguard work, but not limited to, the following five specific responsibilities:

(1) Select an experienced and qualified Environmental Assessment (EA) Consultant to prepare the EIA including the supporting and supervision of the consultant to complete the EIA report and the EMP to meet the regulatory and World Bank safeguard requirements and receive approval from the regulatory agency for the project and clearance of the safeguard documents from the World Bank;

(2) Ensure the interactions between the EA Consultant and project FSR consultant for integrating mitigation measures and other environmental considerations and programs and requirements into project design with the necessary budgetary support as may be needed;

(3) Ultimate supervisor for mitigation and other environmental protection measures during project construction, including incorporation of environmental requirements into construction contracts, organizing training for the contractors, construction supervision and local PMOs, enforcing other environmental management programs and conducting periodical inspection of the construction sites;

(4) Engage and supervise environmental monitoring programs, receive and review the supervision record of the CSE, the monitoring reports of the EMC and the CET, review the contractor's environmental performance and timely initiate necessary remedial actions as may be needed in response to the monitoring report findings and/or recommendations, including any emergency, accidental situations and chance finds during construction;

(5) Consult and/or communicate to the local communities, project affected people, regulatory agencies, the World Bank and other stakeholders during the project preparation and construction to ensure them the full knowledge of the project progress, potential issues and mitigation actions, as well as to listen and respond to their concerns, suggestions and demands for environmental and community protection.

6.1.3 Contractor's Environmental Team

During the construction phase, the contractor is a key player in the environmental management, the pollution control and the impact mitigation. The contractor should know its environmental responsibilities and obligations. The responsibilities of the Contractor and its environmental team (CET) include but are not limited to:

(1) Strictly follow the EMP requirement and implement the listed measures as the mitigation measures proposed in the EIA report will also be included in the tendering documents and contracts.

(2) Proactively perform its environmental responsibilities and keep environmental performance record (daily or weekly). The records will be submitted to the CSE and reviewed by the PMO and the CSE. The CET should also conduct self-check and modification as necessary.

(3) Comply with relevant environmental legislative requirements;

(4) Work within the scope of contractual requirements and other tender

conditions;

(5) Each contractor will have at least 1 full time environmental personnel to work with the EMC for mitigation implementation, site inspection and any corrective actions instructed by the client and / or EMC

(6) Suspend construction activities that can bring in adverse impacts upon receiving instructions from the client / EMC. Propose and carry out corrective actions and implement alternative construction method, if required, in order to minimize the environmental impact

(7) Communicate and coordinate with the local communities; establish information sign to provide information regarding the construction activities, durations, and contract name and contact information, so that the public can voice out their concerns and complaints.

(8) Prior to the construction commencement, all contractors should participate mandatory training. The topics mainly include:

1. National and local laws and regulations;
2. EIA report;
3. Environmental mitigation measures;
4. Cultural Heritage Resource assessment and protection
5. Emergency Plan
6. Environmental monitoring methods and requirements, and reporting procedure;
7. Long term public consultation and response;
8. Environmental protection obligations.

6.1.4 Construction Supervision Engineer

A Construction Supervision Engineers (CSE) is responsible for overseeing the construction works of the project and monitors other works and activities undertaken by the Contractor(s) for ensuring compliance with the specification and contractual requirements. The responsibilities of the CSE include:

(1) Review construction organization design to ensure compliance with project engineering design and the EMP with regard to environmental protection and impact mitigation. The construction may only be ordered to start after the review is completed and CSE is satisfied with the environmental arrangement;

(2) Provide assistance to the CET and EMC as necessary in the implementation of the environmental monitoring and supervising program;

(3) Regularly monitor the performance of the Contractor's environmental staff, verifying monitoring methodologies and results. In case the CSE considers that the Contractor" s environment staff fails to discharge duties or fails to comply with the contractual requirements, instruct the Contractor(s) to replace the Contractor's environment staff;

(4) Instruct the contractors to take corrective actions within the CSE determined timeframe. If there is breach of contract or strong public complaints on contractor environmental performance, the CSE will order contractor to correct, change or stop the work, reporting to relevant agencies and the Client at the same time;

(5) Supervise the Contractor" s activities and ensure that the requirements in the EMP and contract specifications are fully complied with;

(6) Instruct the Contractor(s) to take actions to reduce impacts and follow the required EMP procedures in case of non-compliance / discrepancies identified. The monthy payment will not be issued until the CSE consider the issues resolved;

(7) If the contractor discovered cultural relics by chance, the CSE will order site protection and report to the relevant authorities and the Client;

(8) Adhere to the procedures for carrying out complaint investigation.

6.2 Compliance with legal and contractual requirements of Environmental Supervision

The contractor(s) should prepare detailed and site-specific environmental protection implementation plan in the bid. The plan and other contractual requirements on environmental protection and pollution control should comply with relevant laws and regulations.

All the construction work plans must be submitted by the Contractor(s) to the CSE for approval, and also be reviewed by the CSE to verify whether sufficient environmental protection and pollution control measures have been included. The Contractor(s) will regularly copy relevant documents including the updated Work Progress Reports and the updated Works Program to the CSE so that the verifying work can be carried out. The site daily record will also be available for the CSE's inspection upon his/her request.

The CSE will advise the Contractor(s) of any non-compliance with the

contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. The Contractor(s) should respond accordingly, otherwise the CSE will not issue the construction order.

The CSE will closely supervise the construction activities through site inspections and the CESC will carry out daily site walks and visual inspections to identify areas of potential environmental problems and advise the Contractor(s) to take immediately remedial preventive actions. The area of inspection will cover both the construction areas and the environment outside the site area that could be affected, directly or indirectly, by the site activities.

The CSE will organize regular joint site environmental inspections (for example, weekly inspections). The inspection will be joined by the CET and the PMO. The CSE will keep a log-book of each and every circumstance or change of circumstances which may affect the environmental impact assessment non-compliance with the recommendations of the EMP or the project contract. The log-book will be kept readily available for inspection by all parties including the Contractor(s) and the EMC.

The CSE will make reference to the following information/documents in the inspection:

1) The Contractor’s environmental performance, EMP program, waste reduction, hazardous waste management and implementation of the required mitigation measures;
2) Good practices and general environmental mitigation measures provided in this EMP;
3) Compliance with the EMP requirements, contractual specifications and PRC legislation;
4) Protection to the sensitive locations and control mechanism of the restricted areas;
5) The Contractor’s construction methodologies and condition of construction site;
6) Individual works methodology proposals which will include proposal on associated pollution control measures;
7) Works progress and program;

8) The adequacy and efficiency of the Contractor's pollution control measures / treatment facilities for minimizing environmental impacts, Landscaping and soil erosion controls;
9) Location, management and pollution control at the waste / material storage areas, borrower pits and access roads; and
10) Previous site inspection findings and results.

The Contractor(s) will update all relevant information of the construction contract for the CSE to carry out the site inspections. In the event of non-compliance / discrepancy and / or exceedance of the environmental quality criteria, corrective actions required for the Contractor(s) will be documented. The Contractor(s) will follow the procedures and time-frame as stipulated by the CSE in the environmental site inspection, and report any remedial measures subsequent to the site inspections.

Weekly (or monthly) meeting will be organized after the inspection during which the Contractor(s) will report the progress of implementation of remedial actions identified in the previous inspections. Findings from the current inspection and the required improvements / remedial actions will be discussed. Minutes of meeting will be prepared by the environmental management team and distributed to all participants. The Contractor(s) will be required to implement the required measures within an agreed time.

6.2.1 Penalty System

In the compliance framework, if non-compliance with environmental regulations are identified by CSE during the site supervision, contractors will be given a grace period to correct the non-compliance activities (i.e. two weeks). If the contractor performs the corrective actions within the grace period, penalties can be exempted. However, if the Contractor(s) fails to successfully make the necessary corrections within the grace period, they will pay the cost for a third party to fix the damages.

6.2.2 Environmental Complaints

Complaints will be referred to the CSE for complaint investigation procedures. The CSE will undertake the following procedures upon receipt of complaint:

1) Log complaint and date of receipt onto the complaint database and inform the CSE immediately;

2) investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
3) If a complaint is valid and due to works, identify mitigation measures;
4) If the complaint is transferred from the EPB, submit the interim report to EPB on status of the complaint investigation and follow-up action within the time frame assigned by EPB;
5) Undertake additional monitoring and verify the situation if necessary as well as review that any valid reason for complaint does not recur;
6) Report the investigation results and the subsequent actions to the source of complaint for responding to complainant (If the source of complaint is EPB, the results will be reported within the time frame assigned by EPB); and
7) Recording the complaint, investigation, the subsequent actions and the results in the monthly EMP reports.

During the complaint investigation, the Contractor(s) should cooperate with the CSE and provide all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor(s) will promptly carry out the mitigation. The CSE will ensure that the measures have been carried out by the Contractor(s).

6.2.3 Environmental Monitoring Consultant

The Environmental Monitoring Consultant (EMC) for EMP will represent the client to supervise whether the contractor are following the EMP requirements. The EMC will report to the client directly. The EMC will be selected through a competitive bidding process to conduct the independent monitoring assignment. The selected EMC will have at least 5 years of experience in similar projects and consulting services, and be familiar with relevant laws and regulations. The EMC will familiar itself with the project through documents review, including the EMP. The monitoring staff of the EMC should have relevant licenses issued by the ministry of environmental protection (MEP) and be familiar with the environmental issues related to urban roads and public transportation interchange. The roles and responsibilities of the EMC include:

(1) Review on behalf of the Client if the construction organization design meets the requirements of EIA and EMP particularly with regard to the site

environmental management and impact mitigation measures required;

(2) Monitor and inspect site environmental management system of the contractors and CSE and personnel including their performance, experience, and handling of site environmental issues. EMC has the right to recommend to the Client to change contractor and/or CSE environmental personnel if they feel necessary;

(3) Conduct daily inspection of the EMP implementation by the contractors and CSE as they may apply;

(4) Inspect and determine the effectiveness of impact mitigation measures and report to the Client periodically of the observations;

(5) Once environment emergency occurs, the EMC must participate in the coordination and treatment process

(6) Monitor contractor environmental performance and if find any breach of contract and/or violation of EMP requirements, order temporary stop of work and make recommendations to the Client on further corrective and/or punitive actions;

(7) Provide the semi-annual and annual consultancy reports to the client;

(8) As maybe be requested by the client, participate in environmental inspection organized by the WB or other relevant agencies;

(9) Once an environmental pollution accident occurs in the contract terms, conduct independent investigation and report to the client as requested by the client;

(10) As may be requested by the client, assist the client and the CSE to handle the investigation and assessment of the environmental complaints received.

6.3 Information Management of Environmental Management

6.3.1 Information Exchange

It is required in EMP that communication be made among PMOs, the contractor(s) and CSE, and within these organizations themselves. The relevant information should be publicized to the public.

The internal information exchange could be carried out in different ways like meetings, internal newsletter. The formal meeting must be held monthly, and the records of the

discussions be kept. The communication with the outside should be done once in a half year or yearly. The information exchanged with the supporting agencies should be recorded in memoire and archived.

6.3.2 Record-Keeping

For the effective environmental management system, a sound record-keeping system must be established to keep the following information:

(1) legal and regulatory requirements;

(2) administrative permits and licenses;

(3) environmental reports and EMP report;

(4) training;

(5) activities of checking, calibration and maintenance;

(6) monitoring data;

(7) effectiveness of curative and preventative measures;

(8) information of stakeholders; complaints and its resolution process and results. All this information need to be controlled, including marking, collecting, cataloguing, archiving, storing, management, maintenance, retrieving, storing period and handling.

6.3.3 Reporting

The contractor(s), EMC, CSE and the project office should make a report about the project progress, execution of EMP and the environmental monitoring results to the relative agencies or departments during the project implementation. The running situation and the monitoring data of the related landfill and wastewater treatment plants should also be recorded and reported.

(1) CSE makes a monthly record of the execution of EMP, and provides a weekly and monthly report to the project office. The information about the execution of the environmental protection measures, environmental monitoring and the monitoring data should be included in the reports.

(2) The quarterly report should be provided by the contractor to the project office, and copied to the prefectural EPB, which includes the information about the project progress and execution of EMP.

(3) The monitoring agency provides timely monitoring report to the contractor and CSE when the assigned monitoring tasks are done.

(4) The contractor(s) should provide the environmental monitoring report to the MEPB and HEPB, as well as the project office(s). The project office at the prefectural level submits the monthly, quarterly and annual reports to the HEPB and the relevant departments, even to the World Bank when necessary.

(5) When there is a violation of the environmental protection laws, CSE and the project office(s) should immediately report it to the local administrative department responsible for the environmental protection, and to the higher responsible departments when needed.

(6) The EMP execution report submitted to the World Bank every half year could cover the following contents:

1、the project progress；

2、the status of execution of environmental measures, environmental monitoring and its results;

3、implementation of training program(s);

4、the incidence of public complaints or not; if there is, what they complain about and how it resolved and the public satisfaction about it;

5、executive plan of EMP for the next half year.

7 External Environmental Monitoring

7.1 Purpose of Monitoring

According to the project requirements, an environment monitoring consultant (EMC) will be selected by the client during the project implementation phase. The EMC will periodically go to the construction site to collect all the indicators at sensitive sites (including the water, air, noise, etc). Such indicators will be submitted to the client and CSE as the reference to judge the performance of complying with the environment regulation. It is essential to design the monitoring program and monitoring frequency appropriately to be able to demonstrate both the overall performance of the project works as well as the short-term impact due to construction activities.

More specifically, as the integral and critical part of the EMP, the environment monitoring program has the following objectives:

(1) Confirm the impacts forecasted in the EIA;
(2) Determine the actual extent of impact;
(3) Evaluate the effectiveness of the mitigation measures implemented on site; and
(4) Identify and justify the additional mitigation measures against unexpected impact as may be necessary during project implementation and operation.

7.2 Environmental Monitoring Agency

The environmental monitoring during the construction and operation phases will be carried out by the qualified monitoring agency entrusted by the contractor. The agency should be certified by the national environmental quality monitoring certification unit, and it should be well-equipped and of good technical qualifications.

The sensitive sites with possible significant pollutions will be selected as the monitoring locations based on the results of the environmental impacts predictions. The environmental qualities at these locations will be monitored during the construction phase and the operation phase. The selected items to be monitored include the noise, ambient air and surface water. The monitoring indicators are

identified based on the typical pollution factors of the Project. The analytical methods will be selected from relevant methods in the Technical Specifications of Environmental Monitoring issued by the National Environmental Protection Agency. The national standards identified in the EIA process will be selected as the applicable standards.

7.3 Detailed Environmental Monitoring Requirements

Table 7.3-1: Environmental Monitoring Plan

Phase		Monitoring Point		Pollutants	Frequency		duration
Constr-uction	Ambient Air	Concret mixing station, lime mixing station, Honghe College, No.3 Mengzi Elementary School, No.4 Mengzi Elementary School, Yuguopu village		TSP、PM_{10}	quarterly （more at the construction peak）		3-4 replicates each time
	Noise	Zhaozh-ong Road	Tianma Community, No.2 Dormitory of Mengzi Company of Sinopec, Yuxin Arts Kindergarten, Dormitory of County Vehicle Team, Dormitory of Vibrator Factory, Hongyan Community, Dormitory of Shoe Factory, Yueyatang Community, Dormitory of No. 3 Mengzi Junior School, Jindoudou Kindergarten	L_{Aeq}	Yearly, two days a time （more at the construction peak）		One time for each daytime and night
		Xuefu Road	Dongcun Village, Datie Village, Xiaozhai Elementary School	L_{Aeq}			
		Jinhua Road	Dayuanzi, Qilong 7th and 8th Team, Yufeng Hotel, Jiulong Hotel, Honghe Aixin Hospital, Lianzufang Community, Dormitory of Transport Administration Office, Armed Police Military Hospital, Qilong 9th, 10th and 11th Team, No.3 Elementary School of Mengzi	L_{Aeq}			
		Termin-al and central station	Luying Village, Shuigou Village	L_{Aeq}			
	Water Environment	Lijiang River, Guanyinqiao River (branch of Shala River), Xigan Water Channel		COD_{Mn} oil SS	Once for each cross-section at consturction peak		Two days a time
Operati-on	Ambient Air	Honghe College, No.3 Mengzi Elementary School, No.4 Mengzi Elementary School, Yuguopu village		CO、NO_x	Quarterly; if in compliance, yearly from the second year	One day	Continuous 18 hours
	Noise	Zhaozh-	Tianma Community, No.2 Dormitory of Mengzi Company of	L_{Aeq}	Quarterly; if in		One time

Phase		Monitoring Point		Pollutants	Frequency	duration
		ong Road	Sinopec, Yuxin Arts Kindergarten, Dormitory of County Vehicle Team, Dormitory of Vibrator Factory, Hongyan Community, Dormitory of Shoe Factory, Yueyatang Community, Dormitory of No. 3 Mengzi Junior School, Jindoudou Kindergarten		compliance, yearly from the second year	for each daytime and night
		Xuefu Road	Dongcun Village, Datie Village, Xiaozhai Elementary School	L_{Aeq}		
		Jinhua Road	Dayuanzi, Qilong 7th and 8th Team, Yufeng Hotel, Jiulong Hotel, Honghe Aixin Hospital, Lianzufang Community, Dormitory of Transport Administration Office, Armed Police Military Hospital, Qilong 9th, 10th and 11th Team, No.3 Elementary School of Mengzi	L_{Aeq}		
		Termin-al and central station	Luying Village, Shuigou Village	LAeq		
	wastewater	Outlet of wastewater treatment facilities at Yuguopu Central Station and the terminal at south extension of Beijing Road		pH 、COD 、NH_3-N 、BOD_5 、oil	Quarterly; if in compliance, yearly from the second year	

In addition, contractors and supervision engineers will carry out the monitoring program on the daily or as needed basis: Monitoring of the noise level at the sensitive receptor by portable monitoring kit; the monitoring will take place during the heavy construction activities, such as excavation, piling, power generation, material transportation and night time construction, if any and will be conducted near villages, schools, and other sensitive receptors along the project alignment.

Visual inspection to check the water quality in the receiving rivers affected by the construction activity, such as turbid, smell, color, fish kills, etc. particular at the area close to Lijiang River, Guanyinqiao River and Xigan Water Channel.

The results will be included in formal written reports separately and submitted for review by EMC and PMO on monthly basis. In case of unexpected impact occurs, the construction team will report immediately to the EMC and the PMO.

7.4 Monitoring Equipment and Records

The equipment and test methods to be adopted for the monitoring works by construction team and supervision team will comply with the requirements stipulated in the relevant environmental quality standards. The monitoring equipment will be calibrated regularly and calibration of equipment is required prior to the on-site measurement. All the calibration records and monitoring results will be submitting to the EMC. The EMC will keep copies of all site records, reports, approvals, statutory documents, certificates, licenses or permits in relation to environmental matters for recording purposes.

Any changes to the monitoring equipment and monitoring methodology must be prior approved by the EMC. Records will be kept on site where possible for each project activity for easy access during site supervision or enquiries. Table 7.4-1 sets out the records that will be maintained by the EMC in each respective activity site office below.

Table 7.4-1 Typcial Environmental Records

Category	Records
General	1. Environmental training records (e.g. attendance records for environmental awareness training); ⊏ 2. Environmental permits / licenses; 3. Site daily record and site inspection records; 4. Environmental log-book, complaint log-book and environmental quality limits exceedances notification forms; 5. Construction program and schedule; 6. Equipment maintenance / repair records; 7. Correspondence with concerned parties and other parties in relation to environmental matters; 8. Meeting minutes
Noise Control	1. Updated list of Powered Mechanical Equipment currently on-site; 2. Detailed information regarding the regular inspection and the findings for any environmental sensitive receivers may be affected.
Water Pollution Control	1. Plans of construction site drainage; 2. Records of quantities of collected spent bentonitic slurries and/or drilling mud for reuse, reconditioning and disposal; 3. Records of maintenance and cleaning schedules for sediment and oil/grease traps; 4. Records of toilet sewage disposal (where connection to existing sewer main is not undertaken); 5. Records of the wastewater final discharge quantity and the pollutants concentration.
Solid Waste Management	1. Copies of relevant valid licenses as provided by the employed waste haulers and waste collectors; 2. Records of quantities of reused and recycled waste; 3. records of the quantities of the inert solid waste being transformed into active matters(if there is any); 4. Waste disposal records.
Ambient Air	1. Site drainage plan 2. Route and the program of the construction material transportation; 3. Mitigation measures on the atmosphere effect such as sprinkling; 4. The monitoring results of the air quality.
Ecological Resources	1. Records of sensitive ecological resources locations and associated protection plan
Dangerous Goods (DG) Storage	1. Drawings of DG stores; 2. Log of DG inventories and consumption.
Chemical Goods Storage	1. Chemical Storage ⊏ Drawings of chemical storage facilities; 2. MSDS form of chemicals in use or in storage;

Category	Records
	3. Log of chemical inventories and consumption.
Environmental Emergency	1. Emergency incident reports

8 Environment Training Plan

8.1 Training Requirement

Environment capacity building is mainly target on environment management level and environment supervisors. The traininig for them is one part of the project technical component. In order to guarantee smooth and effective implementation of EMP, trainings should be provided to PMO, operating units, contractors, construction supervisiors, local project offices and other related staff on environment management related knowledge and skills and different trainings should be provided to people in different positions.

8.2 Training Content and budget

（1）Environment management personnel and environment supervising engineers

The PMO would organize environment management personnel and environment supervising engineers to revecive the training provided by environment experts one year before the project implementation.

（2）contractors and construction workers

The PMO would work through contractors to organize the trainees to provide training on site by environment expert or trained environment management personnel before the implementation of the project.

（3）Operators

PMO and PLA would organize people to take training on project site before the operation. The trainers can be environment expert or trained environment management personnel

Detailed training content, trainees, schedule and budget can be found in Table 8.2-1.

Table 8.2-1 Institution Development Activities

type	Aspect	Trainee	Training contect	No. of trainees	Time period	Date（year）	budget (10000CNY)
oversea	Environment management	PMO Related management personnel	Advanced environment management experience and best practice in construction period	6	10 days	2013	16
		PMO, PLA, professionals from operating units	environment management technique and methods in construction period	20	14 days	2014	40
domestic	Environment protection	Environment protection staff in construction units	Environment basic theories and monitoring methods and reports, on-job training and Annual training on Environmental Management Plan, Environmental monitoring methods and reports and contingency planing	10～20 people	4 days/times	2014-2015	8.5
	supervision	Environment supervising engineers, environment management personnel from construction party	Environment protection laws and regulations, construction plan, environment monitoring principles and	5～10 people	5 days/times	2014 -2015	5.5

type	Aspect	Trainee	Training contect	No. of trainees	Time period	Date（year）	budget (10000CNY)
			plans, Ambient air monitoring and control technology, Noise monitoring and control technology				
Total							**70**

9 Environmental Management Cost Estimation and Fund Sources

The cost estimate for environmental management includes all the costs for the environmental protection facilities, monitoring, training and the external monitoring consultant. All the costs are included in the overall project cost.

9.1 Cost Estimate for Environmental Protection

The total project cost is approximately 1.3943677 billion CNY. The environmental protection investment includes the cost of environmental protection facilities, equipment, and monitoring. The estimated capital investment for the environmental protection measures proposed in this EIA report is 38.4508 million CNY, or 2.76% of total project cost. In the capital investment, 26.0758 million CNY is listed in the engineering cost, and the other 12.375 is additional cost. The summary of the environmental protection investment is shown in the Table 9.1-1.

Table 9.1-1 Cost Estimate for Environmental Protection

	Measures			Performance	Quantity	Cost (10,000 RMB)	Notes
	Part I Environmental Monitoring						
	Construction Phase					20	Additional based on EIA
	Completion acceptance test and monitoring					60	Additional based on EIA
	Part II Environmental Protection Measures						
Construction Phase	Wastewater	Domestic Wastewater	Temporary septic tanks	The wastewaters are not allowed to discharge into Lijiang River, Guanyinqiao River (Shala River branch) and Xiganqu River. No impact on the water environment	4 sets	4	Additional based on EIA
		Construction Wastewater	The oil-separation tank	The wastewaters are not allowed to discharge into Lijiang River, Guanyinqiao River (Shala River branch) and Xiganqu River. No impact on the water environment	4 sets	4	Additional based on EIA
	Ambient air	Flying dust	The contractors are equipped with small	The impact of dust is reduced	Self prepared	10	Included in the engineering cost

	Measures			Performance	Quantity	Cost (10,000 RMB)	Notes
			watering vehicles to quench the flying dust on the roads and the working area.				
	Noise	Construction Noise	Sound block facilities will be installed if there is residential area in proximity.	The boundary noise level is below the noise limit required by the Noise Limit of Industry Sites GB12523-2011	3 roads	30	Included in the engineering cost
	Solid waste	Domestic waste	Garbage bins are placed at the construction camp to collect the domestic waste. It will be timely transported to the sanitary landfill for further treatment.	Garbage is timely transported off site. The construction site is clean.	4places	4	Included in the engineering cost
		Permanent waste (construction waste, waster of present	The Permanent wastes are timely transported to the	Recycle if possible. No random pile allowed preventing environmental	131,500 m^3	131.5	Additional based on EIA

	Measures			Performance	Quantity	Cost (10,000 RMB)	Notes
		roads and the demolished green belts)	landfill.	impact.			
	Biological protection	Soil Erosion	Soil erosion control and biological restoration are implemented (the temporary storage will be covered, the slope is protected) to effective control the soil erosion.	Soil erosion is controlled		769.25	5.1052 million included in the engineering cost and 2.5873 million additional based on the EIA
	Social	People	Public notices and press releases. Sign board on the construction sites.		3 places	3	Included in the engineering cost
Operation Phase	Wastewater	Wenlan Datiepu United Central Bus-Railway Station (incl. terminal), Central Bus Station (incl. terminal)	The oil-separation tank	Class III Standard of the Comprehensive Wastewater Discharge Standards (GB8978-1996)	2 sets	6	Additional based on EIA

	Measures			Performance	Quantity	Cost (10,000 RMB)	Notes
		Yuguopu Central Bus Station (incl. terminal), Terminal at the east side of south extension of Beijing Road	The domestic wastewater is treated in the septic tanks to comply with the acceptance standard of the sewer network and then sent to No. 4 WWTP for further treatment.	Meets the Standard of the Reuse of Urban Reclaimed Wastewater and Quality of Potable Water (GB/T18920-2002)	2 sets	10	Additional based on EIA
	Ambient Air	Exhaust gas	The speed limit and no honking signs are installed，and its expenses are in the budget.	The level can be reduced to below the limit stipulated in the GB3096-2012	3 roads, central station, terminal	/	
	Noise	Protection of the noise sensitive sites	The speed limit and no honking signs are installed，and its expenses are in the budget.	The level can be reduced to below the limit stipulated in the GB3096-2008	3 roads, central station, terminal	800	Additional based on EIA
			Assorted trash bins	The garbage is promptly		20	Additional based

	Measures			Performance	Quantity	Cost (10,000 RMB)	Notes
	Solid Waste	Domestic waste	are placed along the roads and in the Interchange to collect and timely transport out the domestic waste.	transported out to keep the area clean.			on EIA
		Waste oil	The waste oil is handled by qualified contractors (Kunming Water Proof Material Company Limited) for recycling and treatment.	The waste oil is effectively handled with no impact on the environment	40t	12	Additional based on EIA
	生态 Ecology	Landscape	Landscaping will be provided for the central belt and the green belts on both sides.	The landscaping area meets the requirement of the design.	86093m^2	1791.33	Included in the engineering cost
	Part III Environmental Management						
	Training of environmental management staff during construction phase					70	Additional based on EIA

	Measures	Performance	Quantity	Cost (10,000 RMB)	Notes
	EMP EMC cost			100	Additional based on EIA
	Total cost for Environmental protection			3845.08	

9.2 Operational Cost for Environmental Protection Facilitie

The operational cost for the first 3 years of operation is included in the WB loan project. The future operational cost is included in the budget for the operational company. Therefore only 3 years of operational cost is discussed in this section. The total amount is 1,080,000 CNY. The details are listed in the Table 9.2-1

Table 9.2-1 Operational Cost for the Environmental Protection Facilities

No.	Item	Cost (10,000 CNY)	Notes
1	Monitoring cost	9	
2	Energy cost	2	
3	Maintenance	20	Bridge runoff collection, sewer treatment, solid waste collection, etc.
4	Labor	5	
Subtotal		36	
Total (3 years)		108	3 years

10 Information Disclosure, Public Participation and Dispute & Complaints

During the public participation work of the project, the social investigation, information announcement, public opinion consultation, interviews and questionnaire are used to find out the public opinion about the project.

In the public participation, there are two major groups involved, that is the individuals and the organizations. Both are affected to different degrees by the project. There are 57 organizations affected, which includes 21 environmental sensitive organizations, 4 township governments, 14 communities, 11 administrative villages and 7 project-related municipal government departments.

10.1 Information Disclosure

10.1.1 The First Announcement

According to the Provisional Regulation of Public Participation in Environmental Impact Assessment issued by the Ministry of Environment Protection and the relative requirements of the World Bank, the EIA working unit has made the public know about the information through internet, media and announcements, which includes the project introduction, the related engineerings, possible environmental impacts, the EIA procedures and its contents, the main issues for the public comments, the names and contact numbers of the PIA and EIA unit.

With the coordination and support of the PIA, the announcements were posted in the 21 township governments, communities and administrative villages during the later December of 2012. The urban communities included are Chunguang, Yinhe, Tianma, Yueyatang, Yuhuangge, Guangming, Luyin, Shuanghe, Hongzhu, Nanhu, Qunle, Kanghui, Yihai and Yong’an. The townships are Wenlan, Xin’ansuo and Yuguopu. The rural communities are Jiangjia Village, Yujia Village, Hong Village and Qilong Village.

10.1.2 The Second Announcement

When the draft EIA and EMP reports were finished, the second announcement was made again through the internet, news media and notices to inform the public about the proposed environmental and social measures to alleviate the negative impacts. The short version of the EIA report and the whole EMP report were also posted. The public was also told how to get the two reports for more information.

The EIA unit posted the second EIA announcement at the official website of Yunnan Institute of Environmental Science. The link is http://www.yies.org.cn/ShowContent.aspx?id=138&tempLink=ggcy. (See also Figure 11)

In mid August of 2015, the project notices were posted in the project-affected 15 urban communities and 4 administrative villages. The urban communities are Guangming, Kanghui, Luyin, Qingyun, Chunguang, Qunle, Yihai, Yong'an, Yuhuangge, Yueyatang, Hongzhu, Hongyan, Nanhu, Yinhe, Tianma and Shuanghe. The administrative villages are Guanyin, Dongcun, Luying and Shuigou.

In the meantime, the two hard copies of EMP were also provided to each of these communities and administrative villages for further public inquiy. On September 30 of 2013, the whole document of EMP was published by the Project Implementation Unit at the website of Mengzi Municipal Government (http://ynxxgk.yn.gov.cn/M1/Index.aspx?int_DepartmentID=1549), please see Figure 12. The notification of the website disclosure of the EMP report was also published at the local official newspaper called "Mengzi" on October 1 of 2013.

10.2 Public Opinion Consultation

10.2.1 The First Consultation Meeting

For the Jinhua Road, Zhaozhong Road, New Xuefu Road and the Road to the new train station, which involves a huge amount of demolition and resettlement, a particular public consultation meeting was carried out in the morning of December 9 of 2012 at Hongyan Resident's Committee.

There were 60 people participating in the meeting, coming from Hongyan, Tianma, Yueyatang and Yuhuangge communities where the impact is big. The meeting was

facilitated by the EIA unit. The PIA made a general introduction about the project. The questionnaire investigation was followed by a free discussion. Both PIA and EIA unit answered the questions raised by the participants, such as their living place was to be demolished or not, the compensation standards and ways and so on. When they heard about the low interest rate of the World Bank loan, the participants agreed to take the Bank loan for the road construction.

10.2.2 The Second Consultation Meeting

Based on the comments made by the Bank's Mid-Term Appraisal Mission, the EIA unit held the second public opinion consultation meeting in the afternoon of August 13 of 2013. The aim of this meeting was to inform the public of the different environmental remedies proposed in EMP. In view of the project nature and the engineering characteristics, the focus of the meeting was on the measures to reduce the noise impact.

The 21 participants mainly came from the five urban communities which were affected by the relative big traffic noise. They were Tianma, Yueyatang, Hongzhu, Yuhuangge and Hongyan. The representatives from several environmental sensitive points like No. 3 Mengzi Elementary School, the Dormitory of Vibrator Factory and Yufeng Restaurant were also present at the meeting.

Firstly, the EIA unit made a general introduction about the project, EMP, the environmental acoustic functional zoning of the project-affected area, and the noise-relief measures. It was followed by the question and answer session. It was noticed that most representatives were concerned about when the construction started, and the noise induced during the construction. They agreed with the measures proposed in EMP to reduce the noise impact.

When asked about the sound insulation windows, the representatives from the Dormitory of Vibrator Factory showed a different opinion from the others. They thought their houses were very old, the installation of such windows would not work well in such old buildings. They were more for the measures in traffic management.

In addition, the representatives from the hotel and restaurant considered that the noise

was always there, not only because of the project. At the other hand, the project would improve the current road and traffic conditions. It would bring more customers for the operators like them, thus it was good for the business. They also agreed the different environmental measures proposed in EMP for the construction and operation phases.

Because the noise during the operation phase lasts longer than that of the construction phase, the questionnaire investigation was particularly conducted to find out the public opinions about its noise-reducing measures. Please see the next Chapter for the details.

Table 10.2-1 summarizes the contents of the two consultation meetings.

Table 10.2-1: Public Opinion Consultation

Date/Time	Place	Materials presented	Participants	Main public comments and opinions	Response of EIA unit
Morning, December 9, 2012	Hongyan Resident's Committee	General project introduction, financing of the project	60 people from Hongyan, Tianma, Yueyatang, Yuhuangge communities	1. 98% of the participants support the project; 2. for house demolition, 77% of them prefer the economic compensation and resettlement at the original location. 3. only 28% agreed with the resettlement at different places; 4. for the land acquired, 88% of them prefer cash compensation; 5. the construction dust, inconvenient transport, noise are the mostly concerned issues. 6. agreed with measures like more traffic signs during the construction, fencing, dust control by watering, night shift control; 7. air an noise are the two major public concerns during the operation phase. 8. more than half participants prefer traffic management and road maintenance to the physical noise control measures.	For comments 2－4： Choose the satisfying ways of resettlement and compensation in the resettlement plan. For comments 5－8： Propose the corresponding measures in EMP for dust and noise control, particularly the measures mentioned in Point 6. To respect the public opinion, put more focus on the traffic management and road maintenance, and the relative sustainable management measures.
Morning, August 13, 2013	Tianma Resident's Committee	EMP	21 people from Tianma, Yueyatangt, Hongzhu, Yuhuangge and Hongyan communities.	1. traffic management measures are preferred; 2. install sound insulation windows based on the actual house conditions; 3. good control of construction time to prevent from affecting the daily living and working of the people around.	These comments and suggestions will be addressed in EMP.

10.3 Questionnaire Investigation

Two questionnaire investigations were carried out during the EIA process. One was in September of 2012, the other was in August of 2013. There were 158 individual questionnaires and 35 organizational questionnaires distributed in the first investigation. 50 individual questionnaires were distributed in the second investigation.

Each investigation work and its statistical results are discussed separately in the following chapters.

10.3.1 First Questionnaire Investigation

158 individual questionnaires were distributed and 152 were returned in this investigation. The return ratio was 96%. The purpose of this investigation was to find out the knowledge and support of the public to the project, their concerned environmental issues and preferred measures, as well as their opinion about the land acquisition and resettlement.

（1）Information of the Interviewees

88% of the interviewees were Han people, 3% of Hui Minority and 2% of Yi Minority. The project-affected communities were dominant with Han. 59 people were male and 93 for female. There was a high participation of women in the investigation. The age structure showed that nearly half of the participants were at the age range of 36-50. 21% of the participants were at the range of 21-35, 11% at the age of over 61. 47% of the participants were free-lance, and 29% were working in the enterprises or administrative agencies. 72% of the participants has got the junior high school education and higher.

（2）Basic Public Attitude to Project

The statistical results showed that half of the interviewees knew about the project before the investigation, and the other half did not know before. After the project introduction during the investigation, 98% of the participants supported the project, and only 2% of them showed their indifference to the project. Therefore the project gets a substantial public support.

（3）Public Opinion about Current Traffic Situation

Except for 13% of the participants, the rest of them were not satisfied with the current traffic situation. 32% of them thought it even worse. The issues concerned

included the traffic congestion, mixed lane of pedestrians and vehicle, no bus lane, insufficient bus transport, poor traffic management and blurred traffic signs. The other issues like improper bus route, poor management of engineering vehicles and lack of bus stop harbor were also mentioned.

（4）Public Expectation to Project

The statistical results showed that over 60% of the participants believed the project would improve the convenience of the citizen's go-outs and the traffic conditions. 35% of them thought the local economy would be improved after the project, and 46% mentioned the rise of employment. Generally said, the public was more confident with the traffic improvement than the economic growth as far as the project was concerned.

（5）Public Comments on Land Acquisition and Resettlement

When asked how to compensate for the impact of house demolition, 75% of the participants agreed economic compensation and 69% for the resettlement at the original location. Only 26% agreed the relocation.

For the acquired land, 76% of the participants agreed with cash compensation, 51% for land relocation and 40% for getting the new employment opportunities.

（6）Public Opinion about Project Impact at Different Phases

The construction dust, inconvenient and congested traffic and noise were major concerns of the public, with 73% for the dust and traffic inconveniences, and 60% for the congestion and noise. They thought most traffic signs be posted during the construction, together with other measures like fencing, watering dust and night shift control.

For the operation phase, the air and noise are the two most concerned issues. More than half of the participants thought that enhancing traffic management be the main way to control the negative environmental impact. The measures preferred were greening belt, speed limit sign and horning ban. The sound insulation windows and other sound barriers were supported by only 20-30% of the public.

10.3.2 The Second Questionnaire Investigation

50 individual questionnaires were distributed and 45 were returned in this investigation. The return ratio was 90%. The purpose of this investigation was to find out the public opinion about the proposed noise reduction measures for the operation phase, particularly those who were heavily affected by the noise.

The participants came from the five urban communities (Tianma, Yueyatang, Hongyan, Hongzhu and Yuhuangge) and the two administrative villages (Guanyin and Dongcun). They are all located near Jinhua Road, Zhaozhong Road, Xuefu Road or the parking and maintenance site, where most acoustic environmental sensitive points are located.

（1）Information of the Interviewees

Among the 45 participants, the male and female participants accounted for half and half. More than half the participants were aged between 31-50. 67% of the participants were Han people, the rest was Yi and Zhuang minorities. But Guanyin Administrative Village is dominated by the Yi people.

（2）Public Opinion about Road-Related Noise Control

The following road-related noise control measures are proposed in EMP. The questionnaire results showed that more than 86% of the participants agreed with these measures. Table 10.3-1 shows the ranking of these measures based on the public support ratio.

Table 10.3-1: Road-Related Noise Control Measures with Public Support

Ranking Order	Measure	Support（%）
1	Enhance road maintenance, keep the road surface smooth	95.56
2	Stregthen vehicle management, ensure the vehicles on road are in good conditions	91.11
3	Build greening belts along the road sides, to reduce the noise impact and improve the ecological conditions of the roads	86.67
4	Horning ban in the urban center, use “No Horning” signs, speed limit signs where passing by the school	86.67

（3）Public Opinion about Noise Control at Sensitive Points

The participants were agreed with the proposed noise control measures in EMP, though with some disparity in some particular measures. Table 10.3-2 shows the statistical results of the public opinion about those measures.

Table 10.3-2: Public Opinion about Noise Control at Sensitive Points

Ranking Order	Measure	Support（%）
1	Enhance traffic management, horning ban in certain road sections	93.33
2	Road greening	91.11
3	Speed limit sign when passing by schools	91.11
4	Sound insulation windows	80.00
5	Change the function of the first-row houses along the road	80.00

6	Noise monitoring during the pilot operation phase, and reserve fund for this purpose	77.78
7	Resettlement	46.67

From the above, we could see that the public opinion differed greatly on the issue of resettlement. This is because the villagers in Guanyin Administrative Village did not want to move away from their land. But we found that the villagers' life and agricultural production were affected by the Honghe Steel & Iron Factory. They told that their drinking water was polluted and the lead content in human body was rising. The government planned to relocate the villagers, irrespective of the project.

The investigation results show again that the public paid more attention and gave big support to the traffic management measures. They thought once these management measures were effectively implemented, the other measures would be disposable, like noise monitoring.

（4）Other Public Opinion

Table 10.3-3 shows the other opinions mentioned by the public during the second investigation.

Table 10.3-3: Other Public Comments about Noise Control

No.	Comments	Notes
1.	Control construction time, enhance the management of night traffic on motor vehicles	Construction phase
2.	Control construction time, enhance road and vehicle management	
3.	Construction will affect the normal life of the surrounding residents, suggest to control construction time	
4.	Control construction time	
5.	Control night shift for construction, shorten the construction period as much as possible.	
6.	Most important is to enhance traffic management	Traffic management
7.	The type of vehicles allowed to drive on roads.	
8.	The type of vehicles allowed to drive on roads, and the flow of vehicle	
9.	Tractors and big trucks should not be allowed in city, because they make more damage on roads.	
10.	Enhance vehicle management	
11.	Enhance management of the heavy-loaded trucks	
12.	The key is to keep the road surface smooth.	Road surface
13.	horning and noise of shopping center during the operation phase.	Concerned sources of noise
14.	horning and loudspeaks of shops	
15.	Running and horning noises of vehicles	
16.	Vehicle noise and dust	
17.	Horning noise	
18.	Promote public transport with increased public transport	Public and green transport first
19.	Increase bus shifts, reduce private car transport	
20.	Recommend to implement public transport system with bus and bicycles	
21.	Adherence to the traffic regulations	Public awareness

22.	Improve public awareness	
23.	Co-development with stock dividends	Suggestions made by Guanyin Villagers
24.	Proper planning to the actual situation	
25.	Solve the local human resources problem	
26.	Reasonable development	
27.	Greening belt is not imperative, in case of frequent change and repeated establishment	
28.	For old houses, sound insulation windows not proper	
29.	people are in happy mood with widened road and less noise.	

10.4 Sustained Public Participation

（1）During the construction phase and the first three years of the operation phase, one random investigation should be made quarterly at each sensitive points. The annual public consultation meeting needs to be held once a year at the concentrated area of the sensitive points.

（2）According to the quarterly and yearly investigation results, the public satisfaction is evaluated and analyzed. The environmental remedies should be proposed in response when needed.

10.5 Channels for Dispute & Complaints

（1）Establishment of Complaint Unit

In order to protect the legal rights of the affected population, a complaint scheme will be established to provide a convenient, transparent, fair and effective way of complaints. It is proposed to set up an environmental complaints leading group. The leader is the staff from MEPB, and the members are from the project office(s), Mengzi Environmental Monitoring Station, EIA unit, the construction supervision agency and the PIA. One complaint office is established under the leading group for receiving and processing the complaints. The office could be at the MEPB, while the complaint points could be also set up at the PIA office and the construction supervision office. The Complaint Office is responsible for collecting the complaints, and giving the resolution suggestions based on the negotiation with the relative agencies.

（2）Complaint procedures

The Complaint Leading Group and Office need to open the hotline and mail box for receiving the complaints after one week of the construction start. The detailed procedures are as follows:

When the affected person's right is thought to be violated, he or she could go to the Complaint Office with written or oral presentation. The PIA would resolve with the person within one week, and keep the detailed records of processing the complaint, and report to the Leading Group.

When the negotiation fails, the complainer could continue to present it to the Complaint Office in written or oral form. The Office should keep detailed records. After communication and negotiation with the relative agencies, the Office provides the resolution within two weeks.

If the complainer is not satisfied with the proposed resolution by the Office, he or she could make a complaint to MEPB in written or oral form within one month. The MEPB should give the resolution suggestion within three weeks.

If the complainer is not satisfied with the resolution of MEPB, he or she could go to the lawsuit according to the Civil Lawsuit Code of China.

Attached Table 1: General Environmental Protection Measures for the Project

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
Adjusting road and network (Sub-project M1)	Honghe Avenue	Adjusting road, bus corridor, roadside bus stop, green belts, intelligent traffic management system and safe traffic system.	**Preparing:** Complete the preparations prior to the commencement of construction works, including carefully investigating the project related information such as the road, power supply, telecommunications, coordinating with relevant entities to confirm the preparing relevant emergency plan to ensure the regular social activities are not disturbed.	**The general measures:** Develop a detailed construction management plan and confirm Protection Targets. - During project construction period, a reasonable construction program should be developed. A demi construction program should be adopted to set warning signs in the construction road. Arrange two traffic management staff to divert traffic so as to reduce the adverse effects of road construction on traffic capacity along the road. At the same time, the construction should avoid impact of full road construction on traffic; before the full road construction, temporary access roads should be established in advance. - A bulletin board should be set up in the entrance to the construction site, marking the contractor, construction supervision unit, duration and hotline of local environmental protection bureau as well as name of contact. Try to get understanding and consideration of people for the temporary interference due to project construction, also convenient for affected people to contact the departments concerned if any irregularities operations of construction unit are found. --Prepare and implement the traffic management plan. Designate personnel to assist the traffic diversion during peak hours at busy roads near the construction site. --Minimize the impact on utilities services. If the impact is inevitable, the local residents should be notified and the interruption duration should be shorted as much as possible. --An effective complaints addressing mechanism should be established with the contractor and the client both designate personnel to handle the complaints. **Social impact mitigation measures:** In order to reduce the adverse effects of social life during construction, the construction unit should: - Timely inform the building construction plans, environmental impact statements, construction detour information, temporary information on bus routes, blasting, demolition announcements and other information to the public; - Limit construction behaviors at night; if constructing at night is necessary, ensure the reasonable and detailed management and notify people of affected communities in order to take the necessary precautions. - If public facilities (such as water, electricity, telephone, bus routes) cannot work properly due to the construction, people should be informed by notice in the construction site, bus station and affected area five days in advance. **Protection of cultural relics:** --If there are ancient trees or precious trees that have to be	**Measures for air protections:** --Request the vehicles with new registrations to follow the strict emission standards. --Strengthen the maintenance of vehicles and prevent the vehicles with excessive emission from being used. --Strengthening the traffic management to maintain smooth traffic. --Promote the clean fuel such as the natural gas. --Avoid developing new sensitive sites along the roads --Enhance the maintenance of the roadside landscaping. **Ecological measures:** Contain green belts with hoardings to avoid the vegetation damage outside the site by the vehicles and machines.	Preparing construction; Contractor; Contractor's measures in construction and operation phase; Company; Management;

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				relocated, relevant regulations should be followed to apply for the permit and to arrange the relocation of the trees. During the construction, if cultural relics are found, the construction should be temporarily suspended promptly. The site should be protected while the culture heritage management authorities should be notified. --If the contractor discovered cultural relics by chance, the CSE will order site protection and report to the relevant authorities and the Client. Construction units should follow the requirements of "Cultural Relics Protection Law of the People's Republic of China (2007.12.29)", during construction or agricultural production, if any units or individuals discover cultural relics, the scene should be protected immediately and report to the local cultural relic administrative departments. In the absence of exceptional circumstances, the cultural relic administrative department should reach the scene within 24 hours after receiving the report and put forward opinions within seven days. The cultural relic administrative department may report to the local People's Government to inform the public security organs to help protect the site; if important cultural relics are discovered, it should immediately report to the Cultural Relics Administrative Department of the State Council, whom should put forward opinions within 15 days after receiving the report. If cultural relics and historic sites are discovered or suspected to de discover during the construction, the construction unit should: ? Stop construction activities in the found place and inform the county project officer; ꕤ Divide the discovered site or area; ꕤ Protect the movable objects in discovered site from missing or being damaged; try to assign a dedicated person in charge, and ensure there are people guarding at night until the responsible local cultural relic bureau take over. **The security performance of construction:** Responsibilities of construction include protecting the construction site and each individual in the surrounding area, so as to avoid the impact of construction on bodies and properties. The construction unit is responsible for compliance with national and local safety regulations and takes any necessary measures to avoid accidents, including: - Carefully and clearly set up pedestrian safety signs in the construction road and site entrance. - During School Commuting, arrange traffic diverting personnel near schools to guide traffic; - Set up a sufficient number of traffic warning signs (including drawings paint, frames, markers, etc.), road signs, guardrails, to ensure the safety of pedestrians during construction;		

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				- Hazardous areas (distribution room, compressor room, etc.), equipment, materials, safety measures, emergency exits and so shall hang correct signs; - Carry out safety training for construction workers prior to the start of construction; - The construction unit should provide adequate hygiene facilities (toilets and wash area) for workers on construction site. The sanitary facilities should also provide adequate hot and cold water, soap and drying machines, etc. - Ensure the integrity of all buildings within the construction site; temporary buildings should be structurally safe and reliable, able to appropriately withstand the against bad weather in local area; also there is adequate light which can isolate a part of dust and noise; - Ensure that the construction site, warehouse, manufacturing asphalt plant and workshop are set in the appropriate places, make sure that it is not in the 500-meter scope of residential areas; the asphalt manufacturing location should be 100m away from residential areas; at the same time, the layout scheme shall obtain the consent of the engineer responsible for the project; - Ensure that the construction land, warehouses, diesel and asphalt storage place as well as asphalt manufacturing apparatus are not set within 500m of the river, also avoid pollutants into the river during transporting, and especially avoid leakage through the land or surface water during the rainy season. Recycle the lubricant, dig trenches near the site and set up sedimentation tank or sump tank at the entrance; - Safety information bulletin should be set in each site; set up warning mark in the chemical storage warehouse; - Require all workers to be aware of safety information for all materials. Explain to construction workers about the potential risks for them and their families using various materials, especially for families pregnant or planning a pregnancy, and encourage workers to share relevant information; - Place warning signs in all energized electrical devices and wires; check all wires, cables, hand power tools to see if there are broken or exposed wires, and determine the maximum operating voltage in accordance with the manufacturer's recommendations; conduct double insulated/ground handling for all electrical equipment in moisture (or possibly wet) environments; - Eliminate clamping dangerous in machine design, ensure that the protrusion part of machine does not cause harm to people under normal operating conditions; Provide adequate eye protection equipment (such as welding goggles and / or face shield) for all those who participate in or assist in facilitate welding operations;		

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				- Install protective railings in hazardous areas with fragile edges (with a rod in the middle and the surrounding bezel); at the same time, the construction workers shall use fall prevention devices (including seat belts and distance limitations lanyard); - Construction units shall identify and provide appropriate personal protective equipment for construction workers (goggles, gloves, masks, dust cover, helmet, etc.), so as to fully protect workers, other workers, occasional visitors without causing unnecessary inconvenience to the users; - The construction unit shall establish reports and record occupational accidents and diseases as well as procedures and systems of dangerous situation and accidents; - Carry out health education for construction workers, such as communication strategy of information implementation, enhance face to face consultation to resolve systemic issues affecting individual behaviors, encourage individuals to take protective measures like using condoms avoid the spread of the disease to others; Moreover, encourage to use insect repellent, clothing, mosquito nets and other barrier methods to prevent transmitted diseases by mosquito bites. - Construction unit should ensure to provide first aid measures meeting the requirements. The construction site shall be equipped with appropriate first aid equipment; remote locations should have written notice of emergency procedures, so as to keep the patient until being transferred to the appropriate medical institution; . The worker's hands and arms are subjected to vibration due to the use of hand tools, or their bodies are subjected to vibration due to standing or sitting on the vibrating surface, it should be controlled through equipment selection, installation of damping pad or vibration reducing device, as well as limiting exposure time. - Occupational health and safety training should be taken on all new construction workers, introduce the basic construction site work rules, personal protection rules and how to prevent from injuring other employees to them. - Ensure that specially trained workers process the asbestos-containing materials or other toxic materials. - When encountered heavy rain or other emergency situations, the construction should be suspended; - Electrical and mechanical equipment should be able to withstand a certain level of impact of the earthquake. **Safety precautions for demolition of the existing buildings:** During the period of demolishing the existing buildings, the construction unit shall take adequate measures to protect workers and the public from injury by falling rubbles or gravels. These measures include:		

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				- Set aside a specific waste collecting area or discharge chute, to safely receive the waste dumped down; - Control the saw cutting, digging, grinding, sanding, cutting and other processes, and adopt reasonable anchoring ways to guide the dropping gravels; - Keep clean in transportation and avoid excessive load of vehicles from dropping and polluting the road and the atmosphere; - Adopt temporary anti-dropping protective measures on edge of scaffoldings in lifting work, such as railings and toe board, to prevent the waste drops; - Evacuate all people in the affected area and use blasting mats and other deflection ways if blasting work is conducted in crowded areas and nearby buildings, to minimize the influence of slung shots and spitting; - Provide safety mirror, shield, masks, helmets, safety shoes and other protective equipment to all workers. **The safety and environmental management system of spoil soil and field：** (1) Requirements on selecting the waste disposal sites - The sites should be selected in wasteland, derelict land, poor land, col or low-lying areas, rather than basic farmland or other kinds of farmlands, paddy fields and other economic crops fields; homesteads; forest land; within the scope of 200m away from the river way land; scenic areas, water conservation areas, forest parks and other sensitive areas; depression or paddy field; land with good vegetation coverage; collapse and landslide danger zone; susceptible area of debris flow; and land for special use. (2) Environmental protection procedures for the waste disposal sites - For the digging soil produced, if any, firstly consider using it in situ or transporting to other section of the project, or reusing it for vegetation restoration in the borrow grounds. Try to avoid setting up borrow ground separately, to fundamentally eliminate the environmental impact brought about by the borrow grounds. - When the digging soil produced can't be reused, firstly investigate if there is any specified building residue disposal areas in the local place, if any, conduct residue clearing formalities by the regulations, and transport it to specified disposal area. - The waste disposal area should be compacted by layers, to effectively inhibit the generation of dust. - Adopt water spraying to inhibit the dust generation, and reduce flowing dust pollution from surface exposure. - To prevent water loss and soil erosion, set intercepting and drainage ditches in the waste disposal area, avoid the lapsed sediment drained with the drainage ditch runoff directly discharging		

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				into the surface water and affecting water quality in the construction and operation periods. - Before entering into the waste disposal area, the topsoil should be excavated and used for land reclamation, the surface soil should be temporary piled up in the relatively flat place within the site, and temporarily blocked by soil bags, with temporary drainage ditches and settling measures adopted in the peripheral area, covered by dust-proof nets, which will be used for ecological restoration after construction of the waste disposal area is completed. - Follow the principle of simple and easy maintenance, form phytocoenosium landscape by combining grass and shrubs greening, restore the natural ecology of the waste disposal area and reduce water loss and soil erosion. - Strictly prohibit huddling and abandoning of the waste soil. **Environmental protection procedures for the quarry and the borrow ground:** According to the requirements on site selection of the quarry and the borrow ground, and the environmental impact, the quarry and the borrow ground should meet the following requirements: - Exploit the ashlar nearby and make full use of the soil of the project itself and the best use of the existing legal quarries and borrow pits in the local place, to reduce the impact of ashlar exploitation and earth taking on the ecological environment. - Build rainwater ditches in ashlar exploitation, and try to avoid the water loss, soil erosion, landslide, debris flow and other geological disasters while mining in rainy season. - Deep excavation should be avoided during the construction, try to maintain balance between excavation and filling, if borrowing is required, coordinate and use the waste soil of other projects within the project area, avoid setting up borrow ground separately, to fundamentally eliminate the environmental impact of the borrow ground. - Quarrying and soil taking in the construction should be centralized, to reduce the number of quarries and borrow grounds. - Adopt water spraying to inhibit the dust generation, and reduce flowing dust pollution from earth excavation. - To prevent water loss and soil erosion, set intercepting and drainage ditches in the quarry and the borrow ground, avoid the lapsed sediment drained with the drainage ditch runoff directly discharging into the surface water and affecting water quality. - In the excavation work, the topsoil should be preserved for land reclamation, the surface soil should be temporary piled up in the relatively flat place within the site, and temporarily blocked by soil bags, with temporary drainage ditches and settling measures		

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				adopted in the peripheral area, covered by dust-proof nets, which will be used for ecological restoration after construction of the borrow ground is completed. - Follow the principle of simple and easy maintenance, form phytocoenosium landscape by combining grass and shrubs greening, restore the natureral ecology of the quarry and the borrow ground and reduce water loss and soil erosion. - Strictly control the construction time, if there is any settlement and other sensitive targets within the scope of noise influence, prohibit conducting quarrying and soil taking in 12:00-14:00 and 22:00-6:00. **The safety and environmental management system of the access road:** (1) Requirements on selecting the constructional detours: - The constructional detours should be selected from the county, township and village roads, wasteland, derelict land, and other poor lands, rather than basic farmland or other kinds of farmlands, paddy fields and other economic crops fields; homesteads; forest land; within the scope of 200m away from the river way land; scenic areas, water conservation areas, forest parks and other sensitive areas; depression or paddy field; land with good vegetational coverage; collapse and landslide danger zone; susceptible area of debris flow; and land for special use. (2) Environmental protection procedures for the constructional detours - Make full use of the existing county, township and village roads as the constructional detours, and transform the township and village roads. - If it required to build new constructional detour, try to minimize high filling and deep digging, well maintain soil and water conservation, reduce water loss and soil erosion and ecological destruction; the new constructional detours should be hardened, and those for overloading vehicles can be processed by reusable load-bearing bricks (components), and the general detours should use the reusable permeable bricks. - Before constructing the new constructional detours, topsoil should be stripped and temporarily piled up in the relatively flat place within the site, and temporarily blocked by soil bags, with temporary drainage ditches and settling measures adopted in the peripheral area, covered by dust-proof nets, which will be used for ecological restoration after construction of the borrow ground is completed. - The constructional detours should be connected with the construction camp roads as far as possible, to reduce the number of detours. - The constructional detours should be regularly maintained and cleaned every day, and sprinkle water in the dusty sections.		

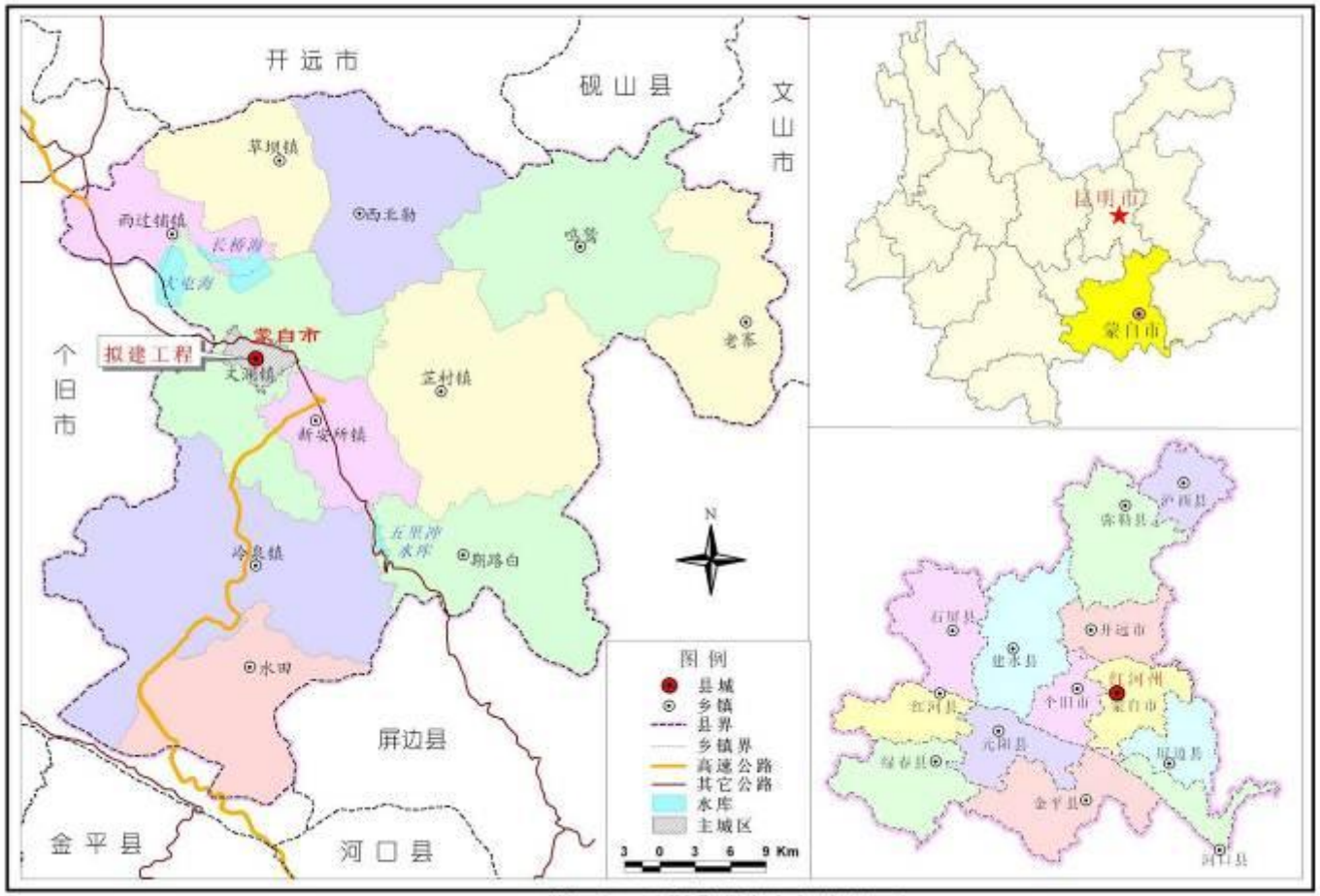
Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				- The speed of vehicles passing by shall be controlled and the use of horn shall be prohibited, and transportation and other measures are also prohibited in 12:00-14:00and 22:00-6:00 to reduce the noise impact on the environment. - Ecological restoration should be made on the constructional detours before the construction is completed, at least restoring to the state before construction. - Transform or protect the local road, if any road is occupied or destroyed, it should be restored and greened, with certain compensation paid for the local government, to maintain the legitimate interests of the local government and residents. **Protecting measures of ambient air:** Contain the construction site using boundary fence (hoarding); Keep water spraying as necessary to quench the dust; strengthen the storing site management; Control the hazardous gas emission; Route and the program of the construction material transportation; The vehicles transporting earth or construction materials should not overload, and should either be covered by canopy or by other measures to avoid the spilling. The roads are cleaned and watered regularly to avoid resuspending of the dust. Each road construction contract should have a water vehicle; Asphalt mixing machines with sealed container and equipped with dust quenching devices should be used. When the construction is completed, the site cleaning of the mixing station should be conducted promptly. The waste should be recycled by the asphalt supplier or be sent to designated place by the local EPB. It is not allowed to use as filling material. **Protecting measures of water environment:** --The contractors should arrange the construction activities properly and ensure the construction activities will be kept within the red lines. At the same time, the contractor should make arrangement of wastewater discharge to avoid environmental pollution; --Oil separation and sedimentation tanks should be installed on construction sites. The construction wastewaters will be recycled after oil separation and sedimentation processes. They are especially forbidden to be discharged into the rivers The temporary toilets on the construction sites should have anti-leakage treatment; --The slurry from bridge construction should be treated. The recommended steps are (1) prepare the mud tank before drilling; (2) during the drilling, use the mud to carry the sand and rocks into the mud tank for sedimentation; (3) reuse the settled mud; (4) clean the mud tank regularly; and (5) the waste mud should be transported to designated location instead of being disposed randomly; -- Management measures: The contractor should conduct water environment protection education at the construction sites and camps to allow the workers understand the importance of protecting water environment;		

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				Protecting measures of sound environment: --Strengthen the vehicles arrangement and site management. Conduct civilized construction and noise supervision. The speed of bulldozer, excavator, and roller should be controlled within 8 km/hour on the construction site. The transportation of construction materials should be reasonably arranged. When the vehicles are passing by the villages or schools, they should reduce the speed and avoid honking. The construction management near schools and villages should be strengthened by preparing feasible construction plans. The supervision unit should be equipped with sufficient amount of noise detecting devices to monitor the noise level at the residential areas that are near the construction sites and to ensure that they are not impacted by the excessive noise level; --Strengthen the noise monitoring. Implement noise reduction measures according to the Noise Limits of Construction Sites (GB12523-2011). Conduct testing of the boundary noise and make sure it does not exceed the noise limit required by the national standards. -- According to the requirements of Emission standard for *industrial* enterprises noise at boundary, the boundary of the construction site should be reasonably identified; the entrances for construction and transportation vehicles should be arranged away from sensitive sites such as the residential area and schools. So also is the high-noise machine. Noise reduction measures might also need to be taken, such as containing; --Make reasonable arrangement for construction schedule and locations. For the construction near sensitive sites, do not allow the operation of high-noise machines at night times. The high-noise work area should be arranged away from sensitive sites. If necessary, temporary sound block facilities should be established, or temporary hoardings should be established to substitute the sound block facility. For the earth works, multiple equipment should be arraigned to operate simultaneously to shorten the operating time. Avoid nighttime construction. When night time construction is necessary, adjust the light direction of the lighting equipment to avoid disturbance to local residents, while fulfilling the lighting demand of the construction site; **Solid Waste:** -- The solid wastes mainly include the spoils, the construction waste and the domestic waste from the workers; -- The solid wastes are not allowed to be disposed in the area of waters and riverbanks; --The solid waste should be recycled as much as possible. The intact bricks and steel bars in the construction waste should be reclaimed. The other solid waste can be made into mortar for road construction		

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				after being sorted and smashed. The excavated soil should be used for filling by balancing the earthworks within the subproject or in the region and reduce the spoils; -- As there are concentrated residential areas and the water bodies along the roads, the temporary storage and transport of solid waste should be reasonably arranged. The temporary storage sites should be covered by plastic or straw pad and surrounded by intercepting trench to avoid soil erosion. The sites should be distant from rivers; --Minimize the waste production during construction. When the construction is completed, the waste should be cleaned up completely. The solid waste produced during construction is linearly distributed along the roads, and it will impact the ecological environment directly if not properly stored or treated. Therefore construction management should be strengthened to remove the waste in a timely manner to mitigate or to prevent the solid waste impact; **Ecological environment:** For plants and vegetation Participate in the trainings on vegetation organized by the PMO/IA. Contain the construction site with hoardings to avoid the vegetation damage outside the site by the vehicles and machines. Reserve the top soils from the farmlands for site restoration and landscaping use. Restore the vegetation immediately after the construction. Do not allow the use of herbicide and pesticide that are forbidden to e use. If key protection target is identified during construction, promptly report to local authorities for protection. For wildlife Participate the trainings on environmental management organized by the PMO/IA. Improve the wildlife protection and no-hunting awareness of the construction worker. Do not hunt wildlife. In order to reduce the disturbance of the wildlife from the construction noise, the construction method and schedule should be well prepared and reviewed to avoid the noise impact especially during the twilight period and the noontime. The habitat should be restored after the project is completed to reduce the adverse impact on wildlife caused by the habitat damage. For aquatic habitat Arrange bridge foundation construction during dry seasons and avoid rainy seasons. The wastewater should not be allowed to discharge into rivers. After the construction is completed, the ecological environment		

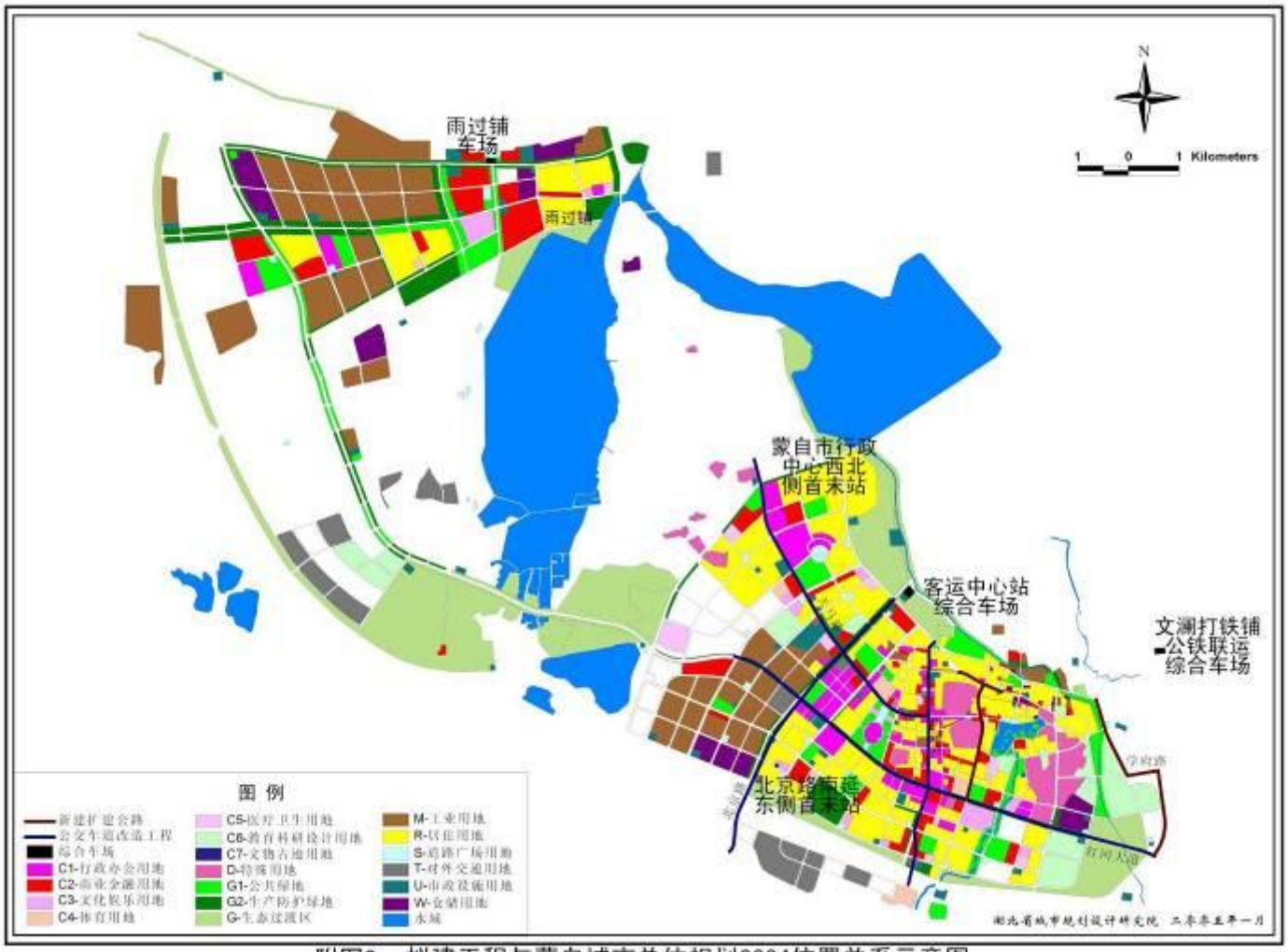
Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
				should be restored. **Mitigation measures of accumulated impacts:** --Strengthen the coordination among different contractors in the arrangement of the traveling routes and schedule of construction vehicles to make sure the traffic on the existing roads near the construction sites are smooth and to reduce the number of traffic accidents; -- Enhance the construction management near sensitive sites. Setup warning signs and speed limit signs. Conduct traffic diversion if necessary to ensure the safety of local residents; --The contractors should strengthen its management on transportation vehicles. The vehicles loaded with earth or other construction materials should either be covered by canopy or by other measures to avoid the spilling. The roads should be cleaned and watered regularly to avoid resuspending of the dust;		
	Xuefu Road, JInhua Road, Zhaozhong Road	Bus Corridor; The bus station; Green belts; Water supply; Power grid ； Lights; Bus stop; Intelligent Transport System (ITS)	Optimization Road; Mitigation measures for affected people in land acquisition; During the land acquisition, the national and provincial regulations on the compensation for land acquisition should be strictly followed to ensure that the interests of the affected people are protected. Preparing Construction:(the same as above) **Water environment protection：** The wastewater will be discharged into the city sewer network and be transported to the municipal wastewater treatment plant.	The general measures of construction phase; Protecting measures of ambient air; Water environment；Sound environment; Solid Waste；Ecological Environment; Mitigation measures of accumulated impacts; (the same as above)	Protecting measures of ambient air, Ecological Environment (the same as above)	The land acquisition and resettlement need; Company; Optimization road; Design Company; Preparing construction; Contractor; Contractor’s measures in construction and operation phase; Company; Management;
Urban roads and corridor (Sub-project M2)	Tianma Road, Yinhe Road,Beijing Road	Bus Corridor; The bus station; Automatic	Preparing Construction:(the same as above)	The general measures of construction phase; Protecting measures of ambient air; Water environment；Sound environment; Solid Waste；Ecological Environment; Mitigation measures of accumulated impacts; (the same as above)	Protecting measures of ambient air, Ecological Environment (the same as above)	Preparing construction; Contractor; Contractor’s

Sub-project	Composition	Contents	Measures in preparing	Measures in Construction Phase	Measures in Operation Phase	Company
		monitoring and recording system; Pavement; Reducing the speed taking; Green belts;				measures in construction and operation phase; Company; Management;
Bus priority (sub-project M3)	Wenlan Datiepu Railway-high way Combined Transport Interchange; Passenger Hub Interchange; Yuguopu Interchange; Initiating station and terminus at the east of Beijing Road south extension;	Interchange; Initiating station and terminus; Management lot; Parking; Office; Vehicle cleaning; Bus stop; Intelligent Transport System (ITS)	Preparing Construction: (the same as above)	The land acquisition and resettlement need; (the same as above) The general measures of construction phase; Protecting measures of ambient air; Water environment；Sound environment; Solid Waste；Ecological Environment; Mitigation measures of accumulated impacts; (the same as above)	**Protecting measures of ambient air:** Request the vehicles with new registrations to follow the strict emission standards. Strengthen the maintenance of vehicles and prevent the vehicles with excessive emission from being used. Strengthening the traffic management to maintain smooth traffic. Promote the clean fuel such as the natural gas. Avoid developing new sensitive sites along the roads Enhance the maintenance of the roadside landscaping. Ecological Environment (the same as above)	The land acquisition and resettlement need; Company; Optimization road; Design Company; Contractor; Preparing construction; Contractor's measures in construction and operation phase; Company; The management;
Sub-project M4 of construction for improving school traffic safety	School bus priority project; Bus school bus safety; Traffic safety system;	The traffic to school project；Bus; School Bus; Parking near school; Safety devices;	Preparing Construction:(the same as above)	The general measures of construction phase; Protecting measures of ambient air; Water environment；Sound environment; Solid Waste；Ecological Environment; Mitigation measures of accumulated impacts; (the same as above)		Preparing construction; Contractor; Contractor's measures in construction phase; Company;



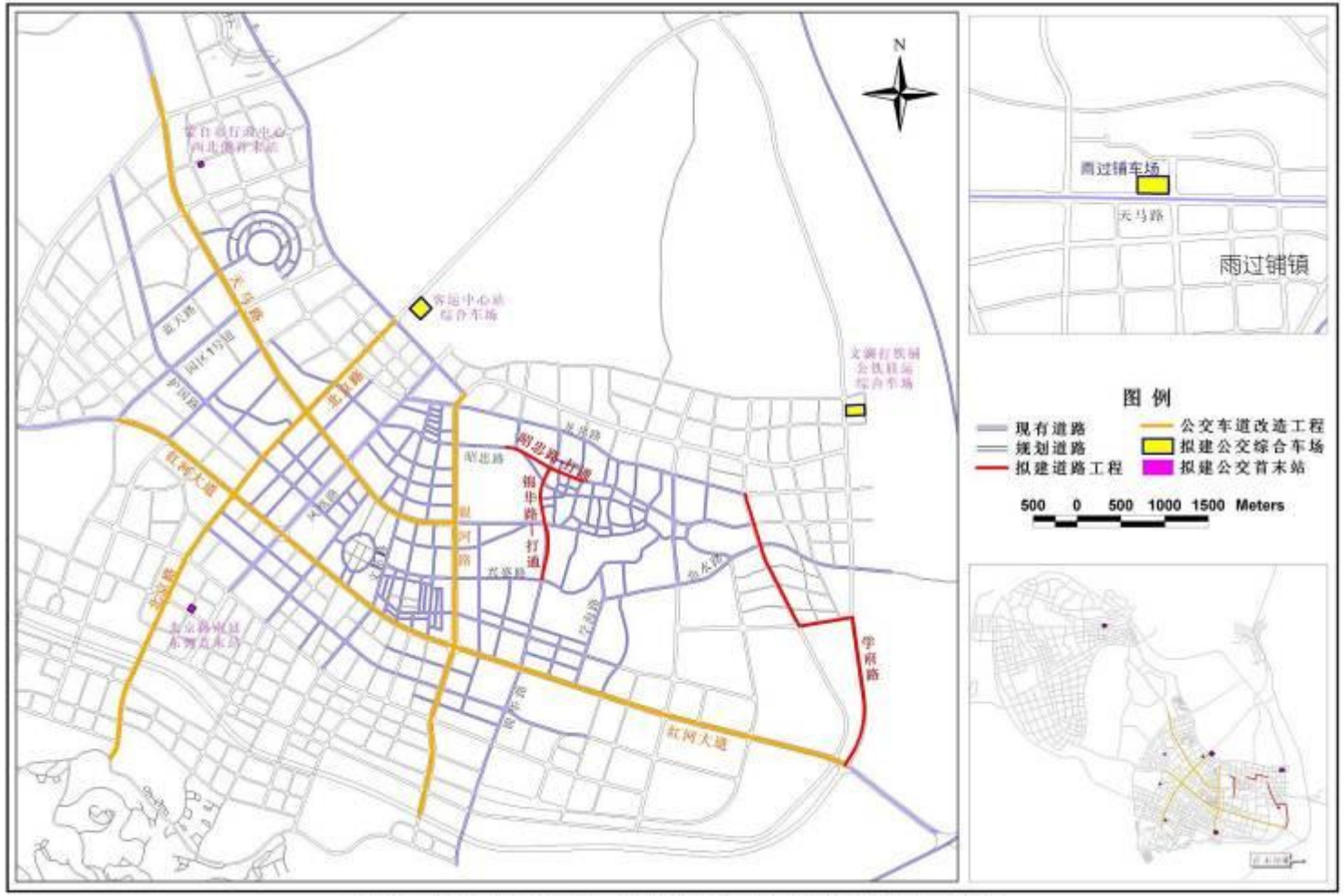
附图1　项目区域地理位置图

Figure 1: Geographic Location of Project Area



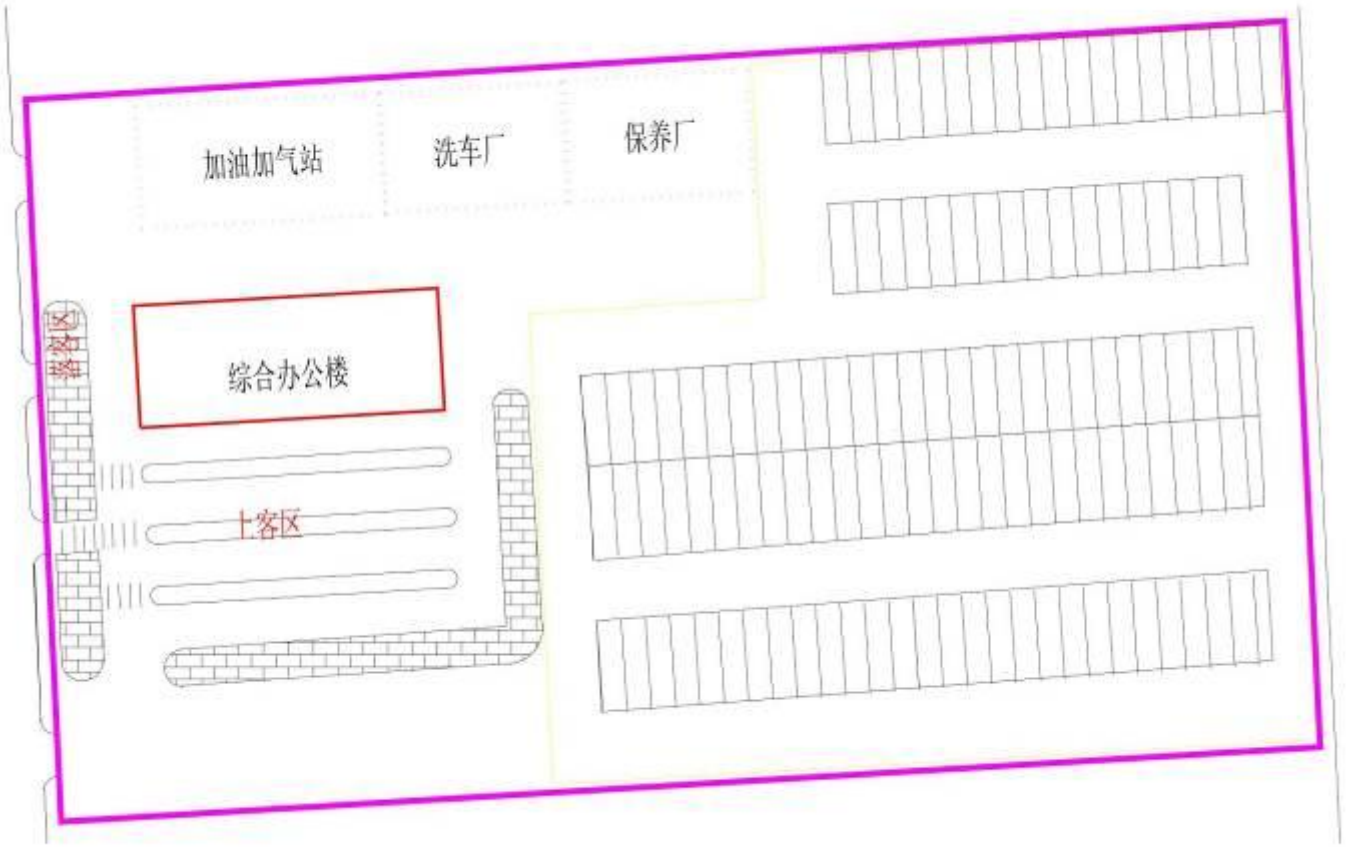
附图2　拟建工程与蒙自城市总体规划2004位置关系示意图

Figure 2: Location Relationship of Proposed Project and Mengzi Municipal Urban Masterplan (2004)



附图3 拟建项目布局及与蒙自市城市交通路网规划关系示意图

Figure 3: Relationship of Proposed Project Layout and Mengzi Municipal Urban Transport Road Network Plan

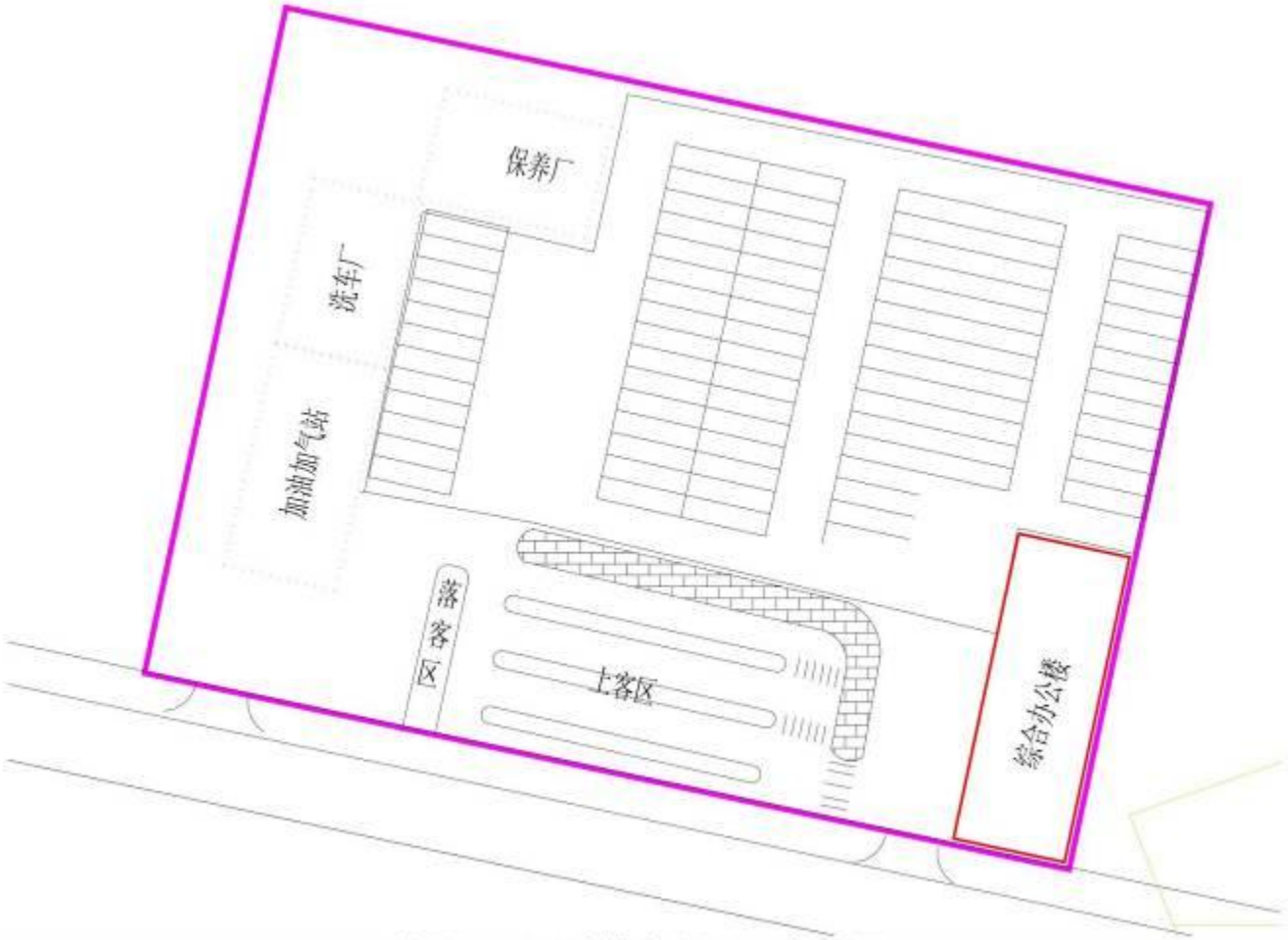


附图4-1 文澜打铁铺公铁联运综合车场平面布局图

Figure 4-1: Layout of Wenlan Datiepu Combined Central Bus-Railway Station

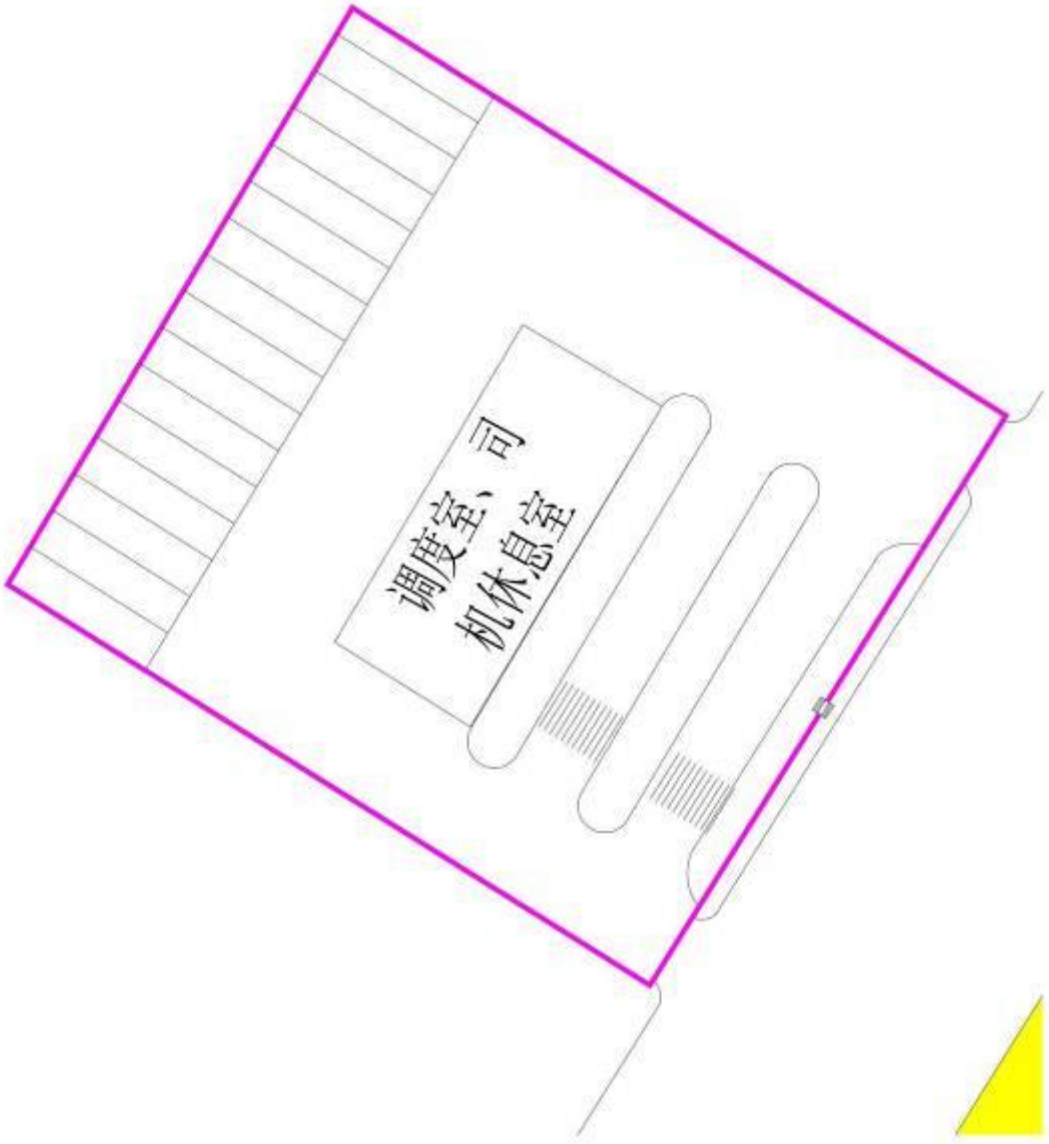
附图4-2 客运中心站综合车场平面布局图

Figure 4-2: Layout of Central Bus Station for Passengers



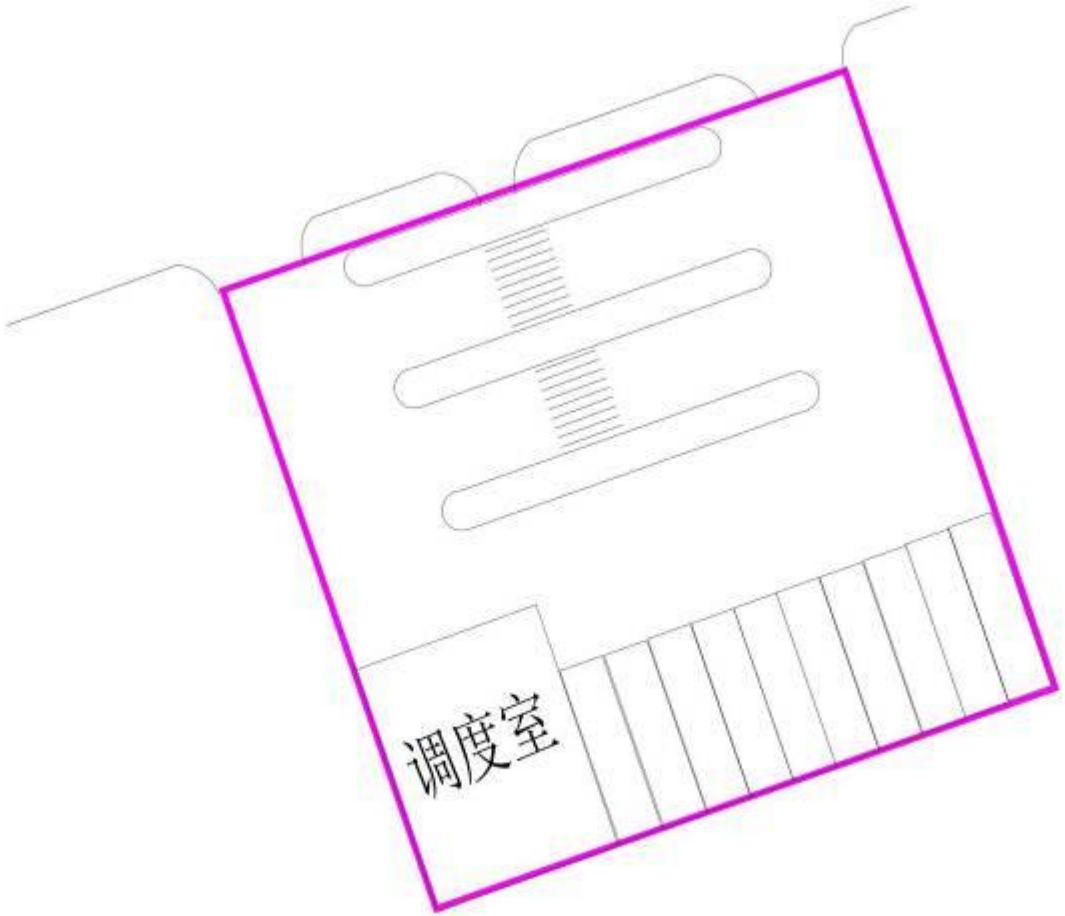
附图4-3 雨过铺车场平面布局图

Figure 4-3: Layout of Yuguopu Central Bus Station



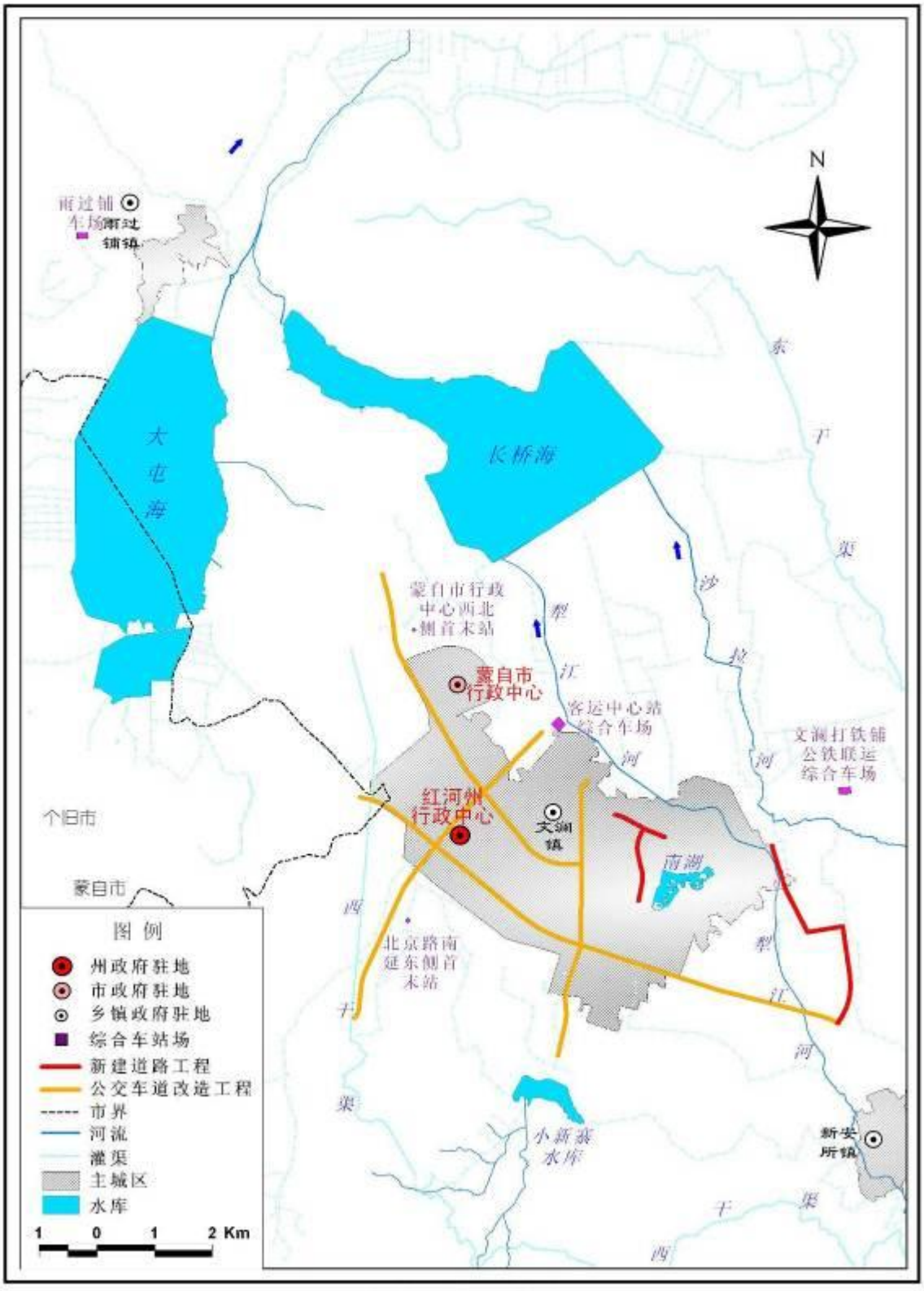
附图4-4 北京路南延东侧首末站平面布局图

Figure 4-4: Layout of Terminal at the East Side of Beijing Road South Extension



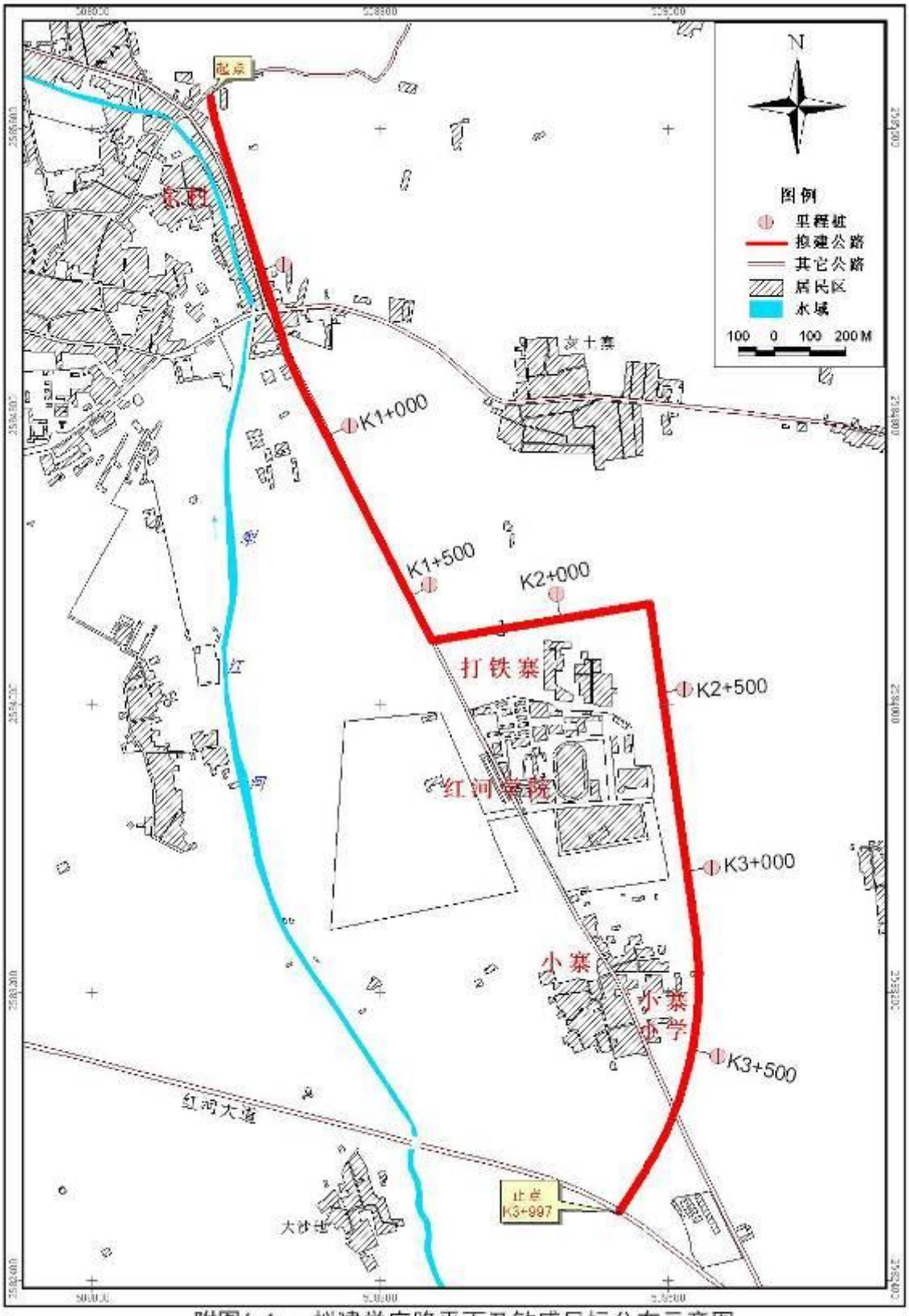
附图4-5 蒙自市行政中心西北侧首末站平面布局图

Figure 4-5: Layout of Terminal at the Northwest of Mengzi Administrative Center



附图5 项目区水系图

Figure 5: River System in Project Area

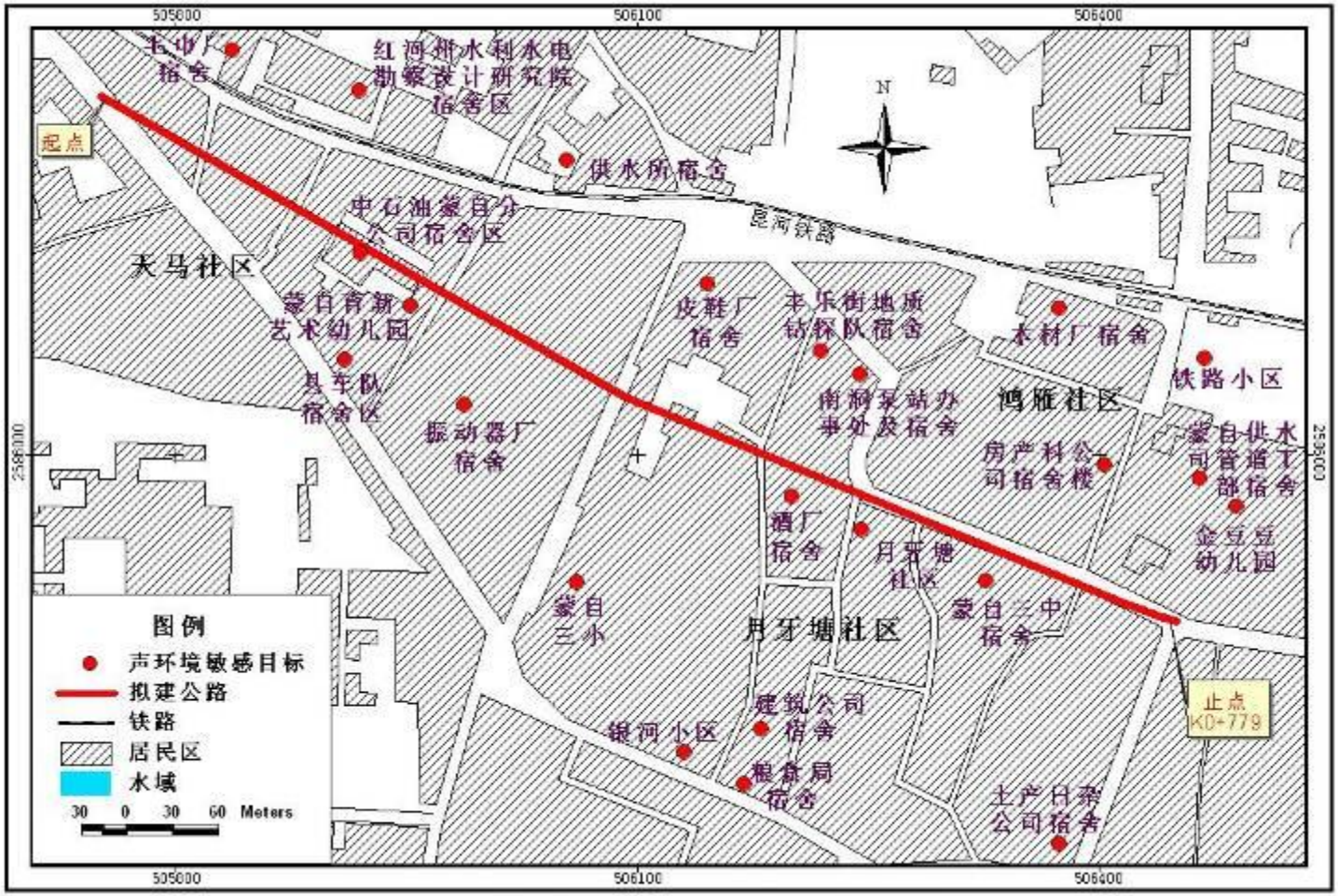


附图6-1　拟建学府路平面及敏感目标分布示意图

Figure 6-1: Layout of Proposed Xuefu Road and Distribution of Sensitive Points

附图6-2　拟建锦华路平面及敏感目标分布示意图

Figure 6-2: Layout of Proposed Jinhua Road and Distribution of Sensitive Points



附图6-3　拟建昭忠路平面及敏感目标分布示意图

Figure 6-3: Layout of Proposed Zhaozhong Road and Distribution of Sensitive Points

Figure 7: The First Announcement

Figure 8: The First Public Opinion Consultation Meeting and Questionnaire Investigation

Figure 9: The Second Announcement

Figure 10: The Second Public Opinion Consultation Meeting and Questionnaire Investigation

世行贷款云南省红河州城市交通项目（蒙自市）环境影响评价第二次信息公示

根据中华人民共和国国家环境保护总局2006年2月14日发布的《环境影响评价公众参与暂行办法》（环发[2006]28号）规定，现将世行贷款云南省红河州城市交通项目（蒙自市）环境影响评价的有关信息予以第二次公告，公示内容如下：

一、项目名称：世行贷款云南省红河州城市交通项目（蒙自市）

二、项目概况

世行贷款云南省红河州城市交通项目（蒙自市）拟通过优化功能化的道路层次和发展公共交通以及在综合通廊内区的道路安装措施以提高居民人民日常出行的可达性、安全性、平等性和效率。项目总投资约135385.06万元，其中拟申请世界银行贷款10000万美元。项目包含以下几个部分：

（一）路网功能调整和改造。目标是通过城市机动道路网络的一些缺陷以实现功能化的道路层次并优化其他道路的功能。

1. 红河大道，路网功能调整道路长度9.3km，道路红线宽80m，道路等级为主干道，道路功能为交通性；采用彩色沥青混凝土建设公交专用道65100m²，设路边式公交站点16对，破除现状道路并恢复为绿化带10636m²。

2. 锦华路，将现状锦华路延通至旧志路，道路长度1.31km，道路红线宽32m，道路等级为主干道，道路功能为交通性、生活性，设置3对港湾式公交停靠站，建设绿化带2197 m²，设置路灯90盏。

3. 旧志路，将现状旧志路延长，并与联大路接通，道路长度0.77km，道路红线宽30m，道路等级为次干道，道路功能为交通性、生活性，设置1对港湾式公交停靠站，建设绿化带2220m，设置路灯260盏。

4. 学府路，新建长约 4.01km道路，道路红线宽36m，道路等级为主干道，道路功能为交通性，设置8对港湾式公交停靠站，建设绿化带14580m，设置路灯960盏。

5. 红河大道出口道设置公交站台，站台设置在机非分隔绿化带上，面积较大的交叉口设置安全岛，结合中央绿化带设置二次过街等待区。锦华路、旧志路和学府路设置转向专用车道，以提化交通。

6. 锦华路、旧志路、学府路设置给水管网、雨污管网及电力和通信线路。

7. 四条道路设置智能交通及交通安全系统。

（二）综合城市道路走廊管理子项目。通过实施一系列综合措施，使公共交通优先，加强非机动车交通和公共交通联系的可达性，并在道路上增加安全的行人交叉路口，减少机动车公交车站造成的隔离。

1. 大马路、银河路、北京路建设约110286m²的公交专用道及28.5对站台。

2. 大马路、银河路、北京路38个信号路口结合信号控制交叉口设置，市级交通控制监视系统、交通流信息采集系统、交通信号控制系统、交通违法行为自动监测记录系统。

3. 道路沿线设置行人过街地点与绿带带两侧交通净化及车道管理设施。

4. 建设53400 m²绿化带，大马路、银河路拆除绿化并铺补路面14370m²。

（三）公交优先子项目。目标是促进公共交通服务和设施，以协助城镇机动化率。它是道路综合管理和改进学校交通安全项目的组成部分。

1. 文澜打铁巷公轨联运综合车场（首末站、停保场），占地面积为25000m²，2020 年规划夜间停车数为70辆，规划公共汽车停车位约120个，综合办公楼、修理厂、洗车场、加油站各1个。

2. 客运中心站综合车场（首末站、停保场），占地面积为32000m²，2020 年规划夜间停车数为116辆，规划公共汽车停车位约164个，综合办公楼、修理厂、洗车场、加油站各1个。

3. 雨过铺综合场站（首末站、停保场），占地面积为20000m²，2020 年规划夜间停车数为64辆，规划公共汽车停车位约84个，综合办公楼、修理厂、洗车场、加油站各1个。

4. 北京路南延东侧首末站，占地面积为4500m²，内设2个公交站台，10个停车位。

5. 市政中心西北侧首末站，占地面积为2500m²，内设3个公交站台，10个停车位。

6. 构建智能公交电子售票系统、智能公交调度系统、公交视频监控系统、公交信息服务系统多系统集成的智能公交系统。

（四）改善道学安全子项目。将在示范区内系统地解决安全问题，包括提供安全的车辆、建设安全路线和学校环境，加强机构组织能力和提高执法能力，重点向弱势人口提供学校交通服务，使他们也能接受学校教育。

1. 文澜片区核心城区的“示范道学区”建设。

2. 文澜片区（商业区）和平坝（郊区和农村）之间的“道学示范走廊”建设。

（五）机构加强子项目。需要包括技术支持、停车场战略学习、步行和电动自行车研究、交通事故数据分析研究、不同类型的培训、学习考察团等内容。

三、项目可能产生的主要环境不利影响

施工期路基开挖、房屋拆迁及改变土地利用类型、水土流失等对沿线城市生态环境不利影响。施工过程中产生的生产废水和生活污水可能对沿线水域造成污染；施工期扬尘、路面铺筑中产生的环境空气污染及营运期汽车尾气对环境空气质量的影响；施工噪声和营运期交通噪声对道路沿线声环境质量的污染影响；施工产生的建筑垃圾和施工人员生活垃圾等固体废弃物对沿线居民的影响；占地拆迁给沿线居民生产生活及其他保护目标带来的不利影响等。

四、拟采取的主要环境保护措施

为使建设项目在建设期间对周围环境影响降到最低程度，提出设施施工围挡、洒水降尘、加强排放场的管理、控制有害气体排放、运输车辆的封盖措施等环境空气不利影响减缓措施。工程施工期间加强生活污水和施工废水的处理和有组织排放，同时加强对施工人员的环保意识教育等。为减缓声环境污染，提出合理控制工程车辆车速、合理安排施工物料运输车辆，特别区域禁止鸣笛、合理安排施工时间等措施。另外，还提出了生态环境、水土保持方面的保护措施。

针对运营阶段的不利环境影响，提出了环境空气、水环境、声环境、固体废物和环境风险方面的减缓措施。如：综合车场和公交首末站的含油废水应排入市政污水管网并进行污水处理，项目新建道路锦华路、旧志路和学府路将配套建设雨污管网，实行雨污分流。营运期的固体废弃物应纳入城市垃圾处理系统，在道路两侧和车场内设垃圾箱，并实行分类收集，及时清运，不能利用的垃圾集中运往蒙自城市生活垃圾处理场集中处置。交通噪声防治措施主要有种植绿化带、路还、声屏障、围墙、隔声窗、改变临路第一排房屋的使用功能等。

五、环境影响评价结论要点

拟建城市交通项目在施工期和营运期将不可避免地对道路沿线两侧一定范围的生态环境、水环境、声环境、环境空气、社会环境、景观环境等产生一定的负面影响。在工程建设单位认真实施本报告书所提出的各项环境保护对策措施及环境管理、监理和监测要求的情况下，拟建项目的建设从环境保护方面论证是可行的。

六、公众提出意见、查阅简本的期限和方式

本公告发布后15个工作日内，公众有何意见或建议，可以通过电话、信件、电子邮件及传真等形式反馈给建设单位或评价单位。如需要报告书简本请于2013年8月30日前以电话联系索取。

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蒙自市住房和城乡建设局
2013年8月

Figure 11: The Second Information Disclosure at Website

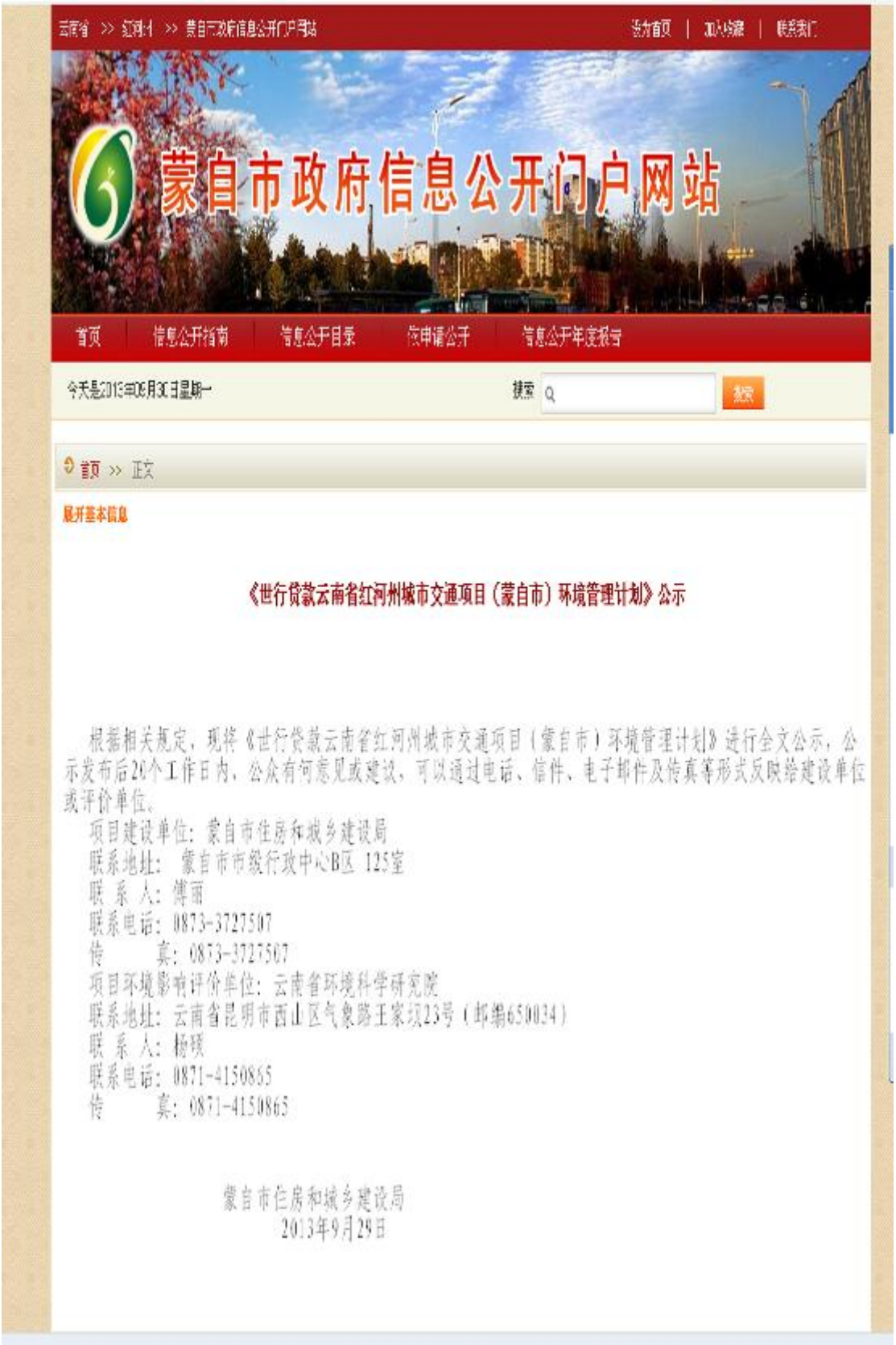

Figure 12： Disclosure of EMP on Website

州效能暨查考核组到我市督查工作

蒙自市举办2013年新任村"两委"干部培训班

华莎到文澜镇高家寨村委会检查指导"美丽家园"建设项目

州发改委到我市调研2013年州重点项目建设

蒙自市在两节期间开展"文明节俭用餐知识进店"宣传活动

简明新闻

(世行贷款云南省红河州城市交通项目(蒙自市)环境管理计划)公示供公告

Figure 13： Notification of EMP Disclosure