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People's Republic of China

World Bank Financed Jiangxi NO.2 Road Project

Rural Roads Improvement Program (RRIP)

ENVIRONMENTAL ACTION PLAN

(FIRST EDITION)

Jiangxi Provincial Communications Department
Taihe~Ganzhou Expressway Project Construction Office

December, 2000

People's Republic of China

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Contents

1. Foreword

The EAP of Rural Roads Improvement Program (RRIP) of the World Bank-Financed Jiangxi No.2 Highway Project is compiled on the basis of the EIA reports of the four RRIP components namely (1) Suichuan-Chezhiao Road (RRIP 1); (2) Yutian-Xinjiang Road (RRIP2); (3) Shashibu-Wangmudu Road (RRIP3); and.Tangjiang-Dongshan Road (RRIP4). The mitigation measures, monitoring and training plans have been discussed and have gained consensus among the departments of design, resettlement and environment, approved by both the Project Office and Jiangxi Provincial Expressways Administration Bureau.

The EAP for the four Rural Roads Improvement Program component is organized and implemented by the Jiangxi Provincial Communications Department. The Jiangxi Provincial Expressways Administration Bureau, the Tailhe-Ganzhou Expressway Project Office, and the Jiangxi Provincial Expressways Investment and Development Co. Ltd. are responsible for the environmental protection of the project during its design, construction and operation stages.

The preparation basis for this project is as follows:

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

(2) People's Republic of China Law on Water and Soil Conservation (June 29 1991);

(3) People's Republic of China Law on Land Management (Aug.29, 1998);

(4) People's Republic of China Law on Environmental Noise Pollution Control (Oct.29, 1996);

(5) People's Republic of China Law on Water Pollution Control (May 15, 1996);

(6) People's Republic of China Law on Atmospheric Pollution Control (Dec.29, 1995);

(7) People's Republic of China Law on Solid Waste Pollution Control (Oct.30, 1995);

(8) People's Republic of China Law on Cultural Relics Protection (19 Nov., 1982);

(9) People's Republic of china Law on Roads (July 3 1997);

(10) Environmental Protection and Management Regulation for Construction Projects [The State Council, C.253](Nov. 18., 1998);

(11) Environmental Protection and Management Measures for Transportation Construction Projects (The Ministry of Communications, C.(90)17);

(12) Notice on Strengthening Management over Environmental Impact Assessment of Construction Project Financed by International Financial Institution [(1993) No.324 document on Environmental Supervision, issued by China National Environmental Protection Agency etc.];

(13) World Bank Operation Handbook OP/BP/GP4.01 Environment Assessment (March 1999);

(14) Environmental Protection Regulations for Construction Projects in Jiangxi Province (April 29, 1995);

(15) *The Technical Guidelines for Environmental Impact Assessment*. (NEPA, HJ/T2.1~2.3-1993, HJ/T2.4-1995 , HJ/T19-1997);

(16) EIA Report(First Edition) of Suichuan-Chezhiao Road (RRIP 1)-Rural Roads Improvement Program (RRIP) of the World Bank-Financed Jiangxi No.2 Highway Project.(Jiangxi Provincial Environmental Protection Research Institute, December 2000)

(17) EIA Report(Second Edition) of Yutian-Xinjiang Road (RRIP2) -Rural Roads Improvement Program (RRIP) of the World Bank-Financed Jiangxi No.2 Highway Project.(Jiangxi Provincial Environmental Protection Research Institute, December 2000)

(18) EIA Report(Second Edition) of Shashibu-Wangmudu Road (RRIP3)-Rural Roads Improvement Program (RRIP) of the World Bank-Financed Jiangxi No.2 Highway Project.(Jiangxi Provincial Environmental Protection Research Institute, December 2000)

(19 EIA Report(Second Edition) of Tangjiang-Dongshan Road (RRIP4) -Rural Roads Improvement Program (RRIP) of the World Bank-Financed Jiangxi No.2 Highway Project.(Jiangxi Provincial Environmental Protection Research Institute, December 2000).

2. Major Environmental Impacts

(1) Ecological Environment (Including Water Environment and Soil Erosion)

The road construction will take up a total land area of 2435.49 mu, of which the land occupancy for the construction of RRIP1 will be 765.97mu, that of RRIP2 will be 606.26mu, that of RRIP3 being 601.5mu and that of RRIP4 will be 461.76mu.The acquisitioned land includes paddy land, dry land, pond, woodland, and wasteland. Construction of the four RRIP roads will cause some economic loss for agricultural fields and production, but will not produce significant impact on the pattern of land distribution.

Cutting of subgrade and filling of earth/stonework will damage the vegetation to some extent, threatening some small animals who live and habitat in it. But planting measures can restore or compensate for a part of the vegetation and can make the original animals to return.

Investigation shows that there is no wild life reservation area along the proposed highway, nor is there any precious and endangered species of animals and plants.

The road does not have large or medium-sized bridges, only will build 4 small bridges with a total length of 98m. The works quantity for bridges is small and with short construction period, so it can only exert a very slight impact on the water bodies along the road. Sewage produced from construction camps, if discharged carelessly, will cause adverse impact on the nearby water bodies.

The forecast shows that the soil erosion caused by the earth-borrowing and dumping in the construction of the road project will reach 2239.17t/a if there is no protection measures at all; but because the protection works and the main works will be simultaneously designed, constructed, completed and accepted, therefore the actual soil erosion will be far less than the forecasted value. In addition, implementation of road planting works will recover a part of the vegetation and reduce the soil erosion in slopes.

(2) Acoustic Environment

General construction noise such as that produced by hauling vehicles and construction machineries will have relatively large impact on people nearby the construction site (50m), particularly the construction noise at the night will impact the people's rest and sleep.

RRIP1: According to the forecasting, excess of standard limits will occur at the sensitive spots of Zhutian Hospital, Shanghai Yudian Hope Primary School, Nanjiang Hospital and Zuoan Middle School in the near term of operation. Simple noise isolation barriers(in combination with existing encirclement) and installation of noise isolation

windows will be adopted to mitigate the impact.

RRIP2:. According to the forecasting, excess of standard limits will occur at the sensitive spots of Hengling Central School, Shangwu Primary School and Xinjiang Middle School in the near term of operation. Simple noise isolation barriers(in combination with existing encirclement) will be adopted to mitigate the impact.

RRIP3: According to the forecasting, excess of standard limits will occur at the sensitive spots of Bushang and Wangmudu in the near term of operation. Simple noise isolation barriers(in combination with existing encirclement) and installation of noise isolation windows will be adopted to mitigate the impact.

RRIP4: According to the forecasting, excess of standard limits will occur at the sensitive spots of Tangjiangzhen, Laowuchang, Shangping, Tiantou, Laoshuzhui, Huangsha Middle School and Beitian Middle School in the near term of operation. Simple noise isolation barriers(in combination with existing encirclement) and installation of noise isolation windows will be adopted to mitigate the impact.

(3) Ambient Air Environment

According to forecasting and analysis, under stability D, NOx concentration in all sensitive locations can meet the standard limits.

(4) Water Environment

The main water pollution source is the sewage from the labor camp.

RRIP1~RRIP4: Through analyses, the road runoff will have no significant impact on water bodies.

(5) Excavation and Transportation of Construction Materials

Excavation and transportation of construction materials will exert negative impacts on the ecology, people's living quality and traffic safety along the road. But such impacts can be effectively controlled by enhancing environmental management during construction.

(6) Social Environment

Road construction will take up some lands and agricultural fields, its impact on agricultural economy can be reduced through adjusting the land rationalization and transforming the land utilization value.

3. Environmental Impact Mitigation Measures

3.1 Design Stage

3.1.1 Reasonable Alignment

In selecting the alignment, the designers, environmental assessment unit and the project owner have consulted and discussed, on the premise of reasonable alignment and low cost, have fully considered various environmental factors such as protection of farmland, school and residence, flood prevention, flood discharging, removal volume, urban development, source of building materials and location of quarry, and also have extensively solicited opinions from related experts, local governments, concerned departments and people from every circle. Based on these, the current alignment is formed.

3.1.2 Ecological recovery

Planting works were designed synchronically with the main body works. Plant species were optimized so to restore and compensate for the vegetation during design.

3.1.3 Water and Soil Conservation

Drainage and protection works were designed for subgrade, including intercepting ditch, side ditch, and slope, which can not only stabilize the subgrade, but also prevent soil erosion.

3.1.4 Water Pollution

(1) Drainage works were designed so to make the pavement runoff not enter into water body directly;

(2) Design of bridges and culverts and drainage ditches have considered the requirements for flood discharging and prevention, and will not damage local irrigation pattern.

(3) Canals and ponds that are occupied or separated by the subgrade have been rebuilt or newly built.

3.1.5 Noise Impact

According to the forecasting, mitigation measures such as installation of noise isolation windows and encirclement heightening will be adopted to mitigate the impact of noise on the sensitive spots in construction stage.

3.1.6 Ambient Air Pollution

Quarries , earth borrowing/dumping sites and mixing plants will be located 300m beyond residence, and the material hauling route will be reasonably designed so to avoid residences as far as possible and to avoid flying dust's impact on residents.

3.1.7 Cultural relics protection

Jiangxi Provincial Cultural Relics Bureau and Jiangxi Provincial Cultural Relics Protection Institute are entrusted to make surveillance along the road and submit the report (see the Investigation Report of Cultural Relics for the RRIP Components).

3.1.8 Resettlement

The design for this project has always emphasized to avoid towns, to avoid removal and land occupation. A hierarchy of resettlement offices will be set up to formulate the Resettlement Action Plan(RAP). The Institute of City and Population of Jiangxi Normal University is employed as an independent supervisor. Details refer to the RAP.

3.1.9 Public participation

In the alignment of the road, setting of interchanges, environmental protection, resettlement, we have consulted with along-the-road governments, concerned departments, non-governmental organizations, rural committees, collectives and even individuals to solicit their opinions so as to gain support from the public.

3.2 Construction stage

3.2.1 Ecological impact

(1) To enhance workers' awareness of environmental protection of natural resources and not to damage wild life and not to cut trees.

(2) Contractors should reasonably arrange occupied land, reduce temporary land occupation, shorten the use time , and reclaim the land timely.

(3) Earth borrowing and waste disposal shall be conducted in strict accordance with design requirements so to well protect and restore the surrounding environment. The top soil (30cm) of the acquired land shall be kept for reclaiming and compensation.

(4) Construction vehicles shall run in access roads, not in agricultural fields and woodlands.

3.2.2 Water and soil conservation

(1) Earth and stone works will avoid rainy season; reduce the area and number of construction sites as much as possible; construction should be made in designed site and the earth borrowing and waste area should not be made in designed site and the earth borrowing and waste area should not be enlarged casually so to reduce the exposed area of cutting.

(2)The various protection engineering works should be built concurrently with the major works, and cutting should be avoided in rainy season.

(3)Water drainage ditch and intercepting ditch should be built for the earth borrowing sites to reduce rainfall eroding force; the surface of the earth borrowing site should be flat as much as possible after the borrowing. In the process of dumping, the dumped earth should be arranged and compressed tightly layer by layer according to the height of the retaining wall to decrease the slope of earth surface

(4) Planting should be carried out in accordance with the design requirements.

To get the best effect, the side slope plantation should be completed one month in advance to the rainy season.

(5)Reclaiming and planting measures should be taken after completion of the borrowing and disposal sites. For the waste bank nearby the farmland, agricultural reclaiming should be considered

3.2.3 Water Pollution

(1) Wasted are prohibited to throw into water body so to prevent water pollution, riverbed compression and blocking;

(2) Waste oil of hauling vehicles and construction machines and solid waste with oil dirties should be collectively land-filled.

(3) Septic tank and garbage tank should be provided at temporary construction camps, which should be cleared timely. Construction materials shall be stored in places with rainfall prevention measures.

(4) Waste dregs arising out of the bridge pier construction should be transported to places designated jointly by the contractor, environmental and water conservancy departments, disposed of under the supervision of designated persons.

3.2.4 Noise pollution

(1) When the construction site is close to school, no construction work with heavy noise machines should be arranged at school time; when the construction site is close to densely populated residence, construction work with strong noise machines should not be arranged at nighttime. In case that the above construction work has to be proceeded, consultation must be made with the residents who may be impacted, or proper compensation must be paid. To reduce the noise pollution of construction machineries, mobile noise isolation can be used.

(2) To use construction machines with low noise level as much as possible. For construction machines with high noise level, temporary sound barrier should be adopted to mitigate the noise impact. The construction materials storage site and the mixing plant should be set at places over300m away from the acoustic sensitive locations.

(3) The construction operator's work time should be arranged in accordance with the labor hygiene standard, and personal protection measures such as wearing ear-plugs and helmets,

etc. should be provided to the operators.

(4) The access roads for the highway construction should be selected away from such sensitive locations as schools, residences and hospitals. When dense residences exist 50m within access road, night transportation of building materials is forbidden. For lorries transporting construction materials by the existing roads, the contractor should pay attention to the maintenance of the lorries and keep the noise produced at a minimum level.

3.2.5 Ambient Air Pollution

(1) The stabilized soil and bitumen mixing plants should be set up at the leeward side and 300m away from the sensitive locations of residences, hospitals and schools.

(2) Bulk construction materials transported by truck should be covered to prevent spillage as much as possible. The storage of the bulk construction materials should be covered and kept over 300m away from the school and village sensitive locations.

(3) Hauling roads and construction site, particularly the stabilized soil mixing plant, should be sprayed from time to time to prevent secondary dust flying.

3.2.6 Cultural relics protection

During construction, if underground cultural relics are found, then construction should stop and the supervisory engineer will protect the site, and concerned department will be notified to handle it.

3.2.7 Public participation

Complaint telephone number for environmental complain should be conspicuously marked at the construction camp. For complaint problems, the local environmental department shall be contacted and such problem should be settled within 48 hours.

3.2.8 Worker's health

(1) Septic tank and garbage tank shall be set up at construction camp, which are to be cleared by the contractor periodically so to prevent outbreak of disease. Drinking water that complies with hygiene standard shall be provided at the site.

(2) Contractors must adhere to labor protection regulations to provide helmets, earplugs and periodic physical examination to workers.

(3) Full-time health worker should be arranged by the contractor to provide medical guaranteeing for the construction workers, free condom should be available in each labour camp. the health worker should periodically deliver hygienic knowledge and education to the construction workers.

3.2.9 Traffic and transportation

(1) The construction of road sections should be reasonably organized. On duty system should be established to guarantee the smooth operation of traffic and traffic safety. Transportation of construction materials at rush hours should be avoided, the contractor is required to make a reasonable transportation plan.

(2) Access road should have proper width and quality, so as to ensure that both pedestrians and vehicles can travel safely even in bad climate conditions. Local public security and transportation management departments shall be well coordinated with to mobilize traffic jam and to handle traffic accident so as to ensure a smooth running.

The above measures to be taken during construction stage have been defined in the contracts signed with the contractors.

3.3 Operation stage

3.3.1 Ecological impact

(1) In order to maintain the dynamic balance of cultivated land, the project proponent should reclaim waste lands coordinating with the local administration departments for national land to compensate the lost cultivated land .

(2) To recover the damaged vegetation and ecology in time so to prevent denuded surface. A greening belt of some width should be set up at the two sides of the road.

(3) The culverts should be cleared in time to ensure a smooth running of water in the irrigation system.

3.3.2 Soil erosion

Further improve the soil & water conservation works, planting works, and land reclaiming works according to design requirements.

3.3.3 Noise pollution

It is suggested that no new schools, hospitals be built within 50m from the proposed road, no new residential districts be built within 20m from the road.

(1) Strengthen the road traffic management and road maintenance. Motor vehicles with high noise level exceeding standard limit should be banned to drive on the road. No-Tooting sign should be arranged in concentrated residential districts.

(2) Implementation of noise monitoring plan: supplementary noise mitigation measures will be adopted according to the monitored data and listed in the contractor's contract.

(3) Sensitive location protection

Before the implementation of noise mitigation measures, the acoustic design should be based on the road project design, and proper adjustment should made to the mitigation measures and technical indexes. Besides, the opinion of protection objectives should be solicited before the implementation, and if the mitigation measures are rejected by them, other measures should be considered. The mitigation measures for each noise-sensitive spot along the four roads are listed in Table 3.3-1.

Table 3.3-1 Acoustic Environmental Protection Measures for Sensitive Spots

Road	Location	Measures	Remarks
RRIP1	Zhutian Hospital	Newly arranged encirclement(3m high, 20m long)	
	Shanghai Youdian Hope School	Heightening encirclement by 1m, 40m long	
	Nanjiang Hospital	Noise isolation window, 60m^2	
	Zuoan Middle School	Heightening encirclement by 1m, 200m long	
RRIP2	Hengling Central School	Resettlement of the second floor classroom	
	Shangwu Primary School	Heightening encirclement by 1m, 20m long	
	Xinjiang Middle School	Newly arranged encirclement(3m high, 40m long)	
RRIP3	Bushang	Noise isolation window, 100m^2	
	Wangmudu	Noise isolation window, 100m^2	
RRIP4	Tangjiang	Noise isolation window, 25m^2	
	Laowuchang	Noise isolation window, 25m^2	
	Shangping	Noise isolation window, 20m^2	
	Tiantou	Noise isolation window, 50m^2	
	Laoshuzui	Heightening encirclement by 1m, 30m long	
	Huangsha Middle School		
	Beitian Primary School	No implementation of measures recently	The school is 25m from the road and infront of it there exists a building of 3 floors

3.3.4 Ambient air pollution

(1) Greening and planting should be set up at both sides of the road, which is good to absorb the flying dust and to protect the ambient air quality.
(2) Ambient air monitoring plan should be implemented to decide supplementary environmental protection measures according to the monitored results.
3.3.5 Water pollution
The dust and sand on the side slope of subgrade and pavement, when rushed by rain water, will be carried into the drainage system and deposited , leading to blocking up of the drainage system. Therefore, periodical clearing of drainage system and side ditches will be quite necessary to ensure the smooth running .
After implementation of the above measures, the adverse impacts on this project can be reduced to an acceptable degree.

4 Environmental Management and Supervision

4.1 Environmental Management and Supervision Organizations

The environmental management and supervision organizations during construction and operation stages are diagrammed in Fig. 4.1-1 ~ Fig.4.1-5.

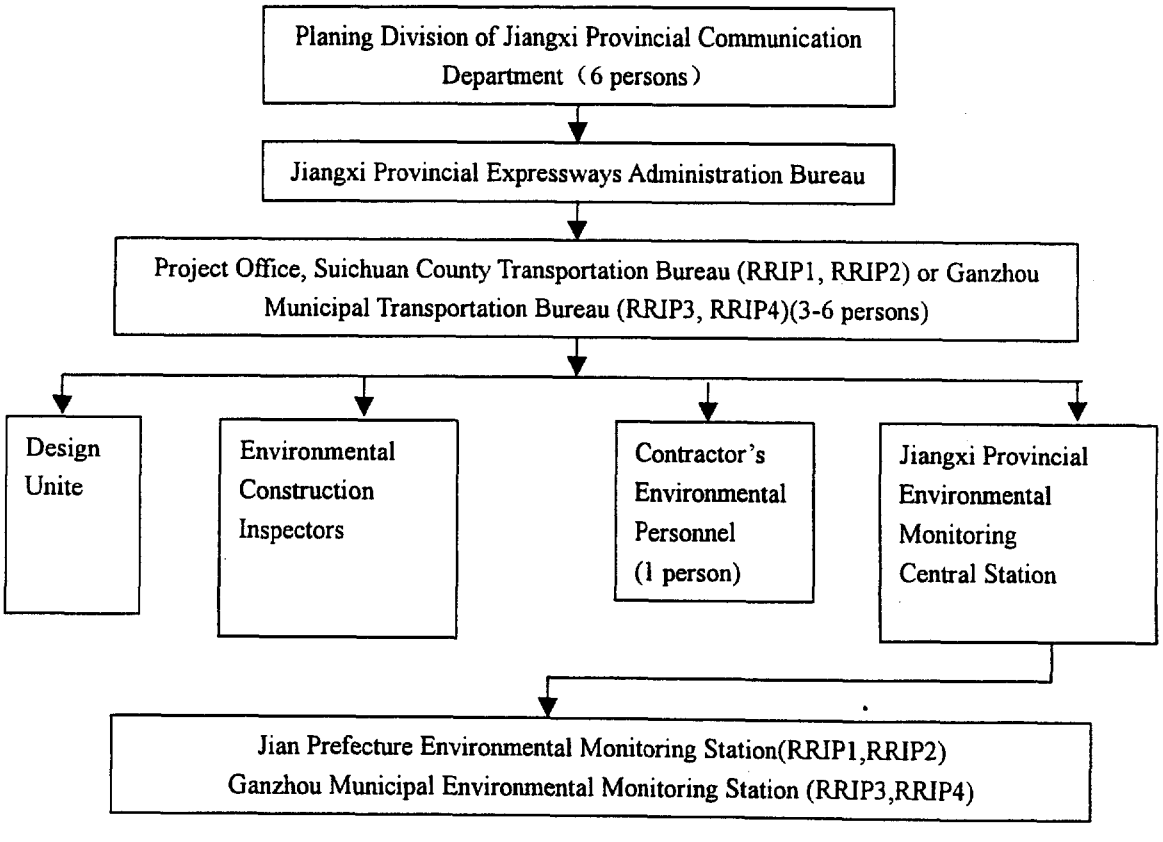


Fig.4.1-1 Environmental Management Organization in Construction Stage

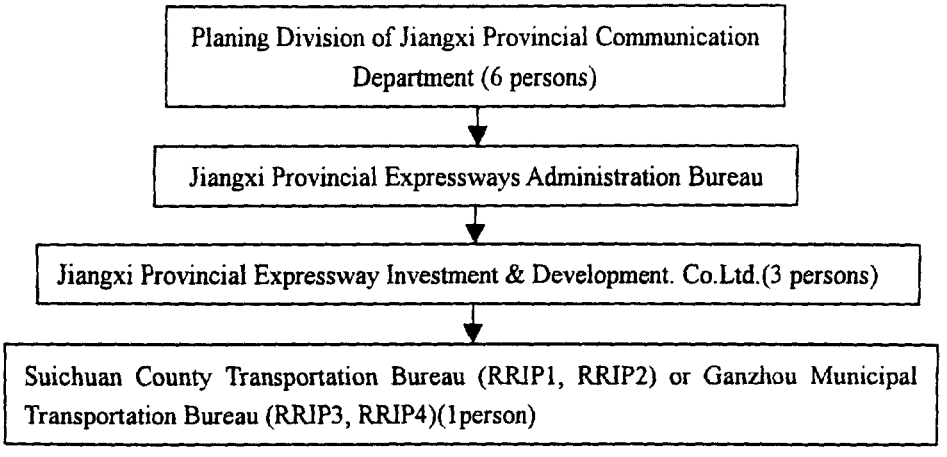


Fig.4.1-2 Environmental Management Organization in Operation Stage

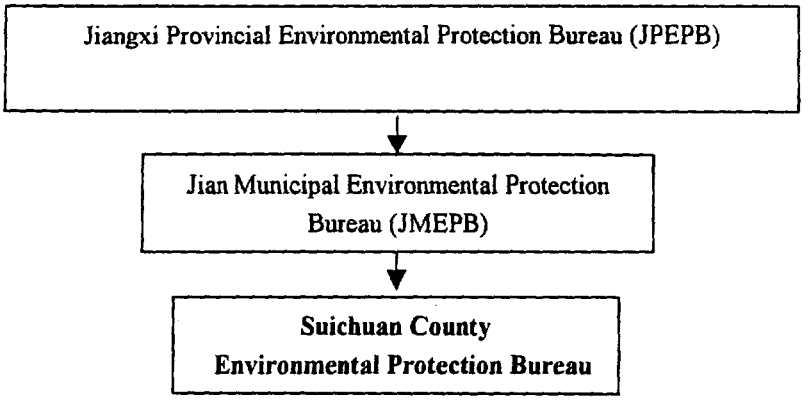


Fig4.1-3 Organization of Environmental Supervision(RRIP1,RRIP2)

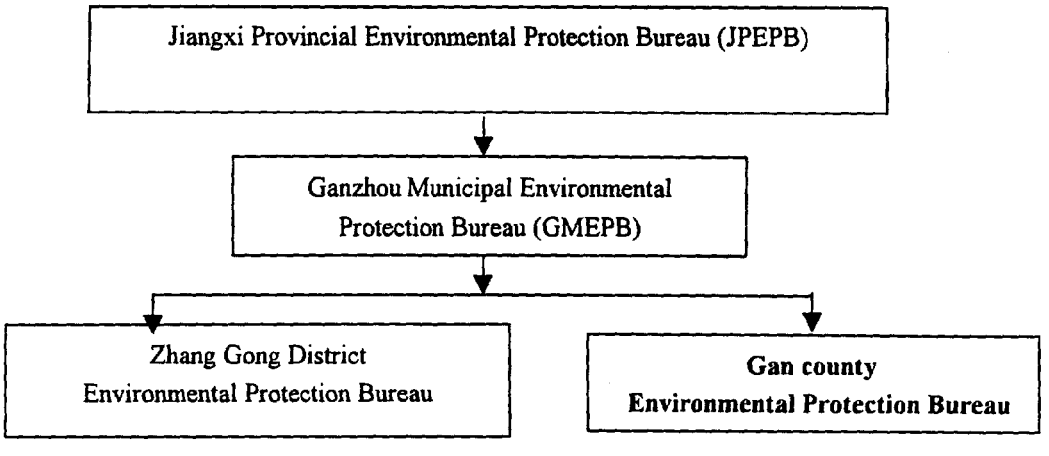


Fig4.1-4 Organization of Environmental Supervision(RRIP3)

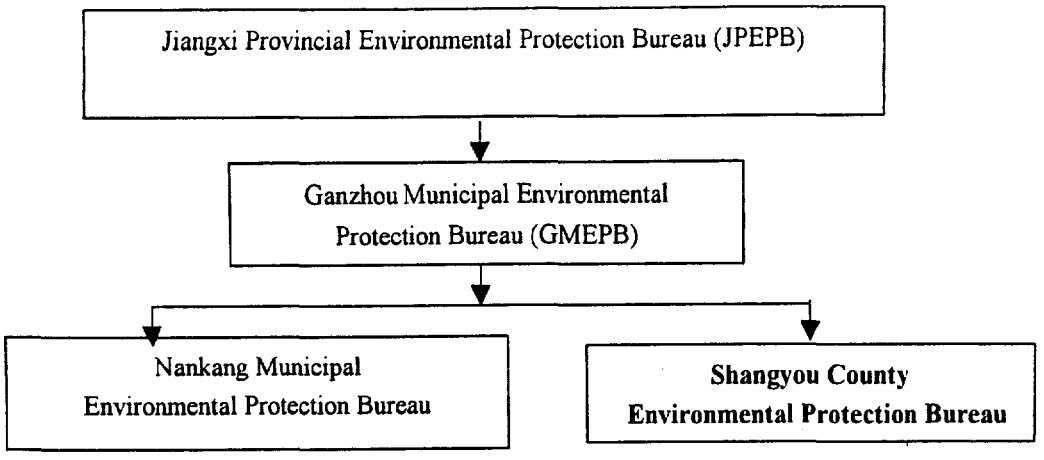


Fig4.1-4 Organization of Environmental Supervision(RRIP4)

The Plan Division of The Jiangxi Provincial Communications Department (JPCD) is responsible for the environmental management within the communication industry in the province, including the formulation of environmental protection measures and rules, the provincial environmental protection plan and the supervision of the implementation of it.

The Expressway Project Office of JPCD, together with Jiangxi Provincial Expressway Investment & Development. Co.Ltd.(3 persons) ,the Project Office of this project and local transportation bureaus (3-6 persons including one environmental expert) is the executive organization of this project. Its main duties are to solve the environmental issues brought about by the project in construction and operation stages such as the environmental management and the resettlement work , the supervision of the implementation of the environmental protection measures and the coordination of the contract signing between ECI and the local environmental monitoring units, the supervision and inspection of the implementation of the environmental monitoring plan, and the reporting of the monitoring reports and implementation status.

JPEPB is responsible for the environmental management and supervision in the whole province, which are subject to management and supervision of local EPBs.

4.2 Environmental Management Plan

The environmental management plan for this proposed project is listed in Table 4.2-1.

Table4.2-1 Environmental Management Plan for the Project

Potential negative impact	Mitigation measures	Organ for action	Organ in Charge*
I. Planning & design stage 1. Reduced flood discharge capacity 2. Removal and compulsory resettlement for the project land acquisition 3. Loss of land resource 4. Acquisition and damage to the irrigation facility 5. Erosion on soil lower than subgrade caused by cutoff trench or weep drain 6. Pollution from pavement run-off	1. Thoughtful design 2. Formulate and implement the proper resettlement plan & compensations policy 3. Minimum farmland occupation 4. Restore the Occupied irrigation facility and set up culverts 5. Increase water outlets number to avoid small waterfall, pave stone or concrete on washing surface 6. Don't directly discharge pavement runoff into water body or irrigation system	Design unit Resettlement Office Design Unit Design unit Design unit Design unit	JPCD, JPEAB, Local government
II. Construction stage 1. increase of river deposits caused by erosion in construction site, new road cutting and construction as well as the wastes 2. Soil and water pollution by the oil/machine oil/fuel/paint coming from construction machines 3. Dust, noise and air pollution in construction site 4. Underground cultural relics discovered during construction 5. Terrain surface broken at the cutting/filling and quarry sites 6. Disturbance to the utility facilities (power/telecommunication) 7. Impact on existing road traffic 8. Sewage and solid wastes at construction sites 9. Possible disease outbreak among the local people and workers 10. Temporary germ (mosquito) breeding place such as dead pond 11. Impact on the land caused by large earth/stone works	1. Protect the sensitive surface with fiber cover and plants as soon as possible 2. collect reclaimed lubricant and avoid accidental spillover by proper operation 3. Spray water periodically on temporary roads, install muffler in equipment and maintain it 4. Stop construction if there is cultural relics discovered and inform the competent authority 5. Proper treatment of the damaged ground in harmony with the terrain and environment 6. Sign an agreement with the utility agency, notification goes before relocation to minimize the impact 7. Strengthen traffic management at possible traffic conflict places 8. Proper toilet and dustbins, enhance environmental management 9. Periodic health check, handle it properly. 10. Necessary action shall be taken to prevent virus breeding place 11. Collectively store topsoil, level the ground after construction as soon as possible and reclaim the topsoil, minimize the time of temporary land occupation	Contractors	JPCD, JPEAB , Project Office
III. Operation stage 1. Vehicle emission and traffic noise 2. Continuous soil erosion 3. Pollution from parement-off	1. Noise and air monitoring be made at sensitive locations with possible excess during operation, and measures may be taken according to the results 2. Careful main tenance/planting/add protection works 3. Run-off not directly discharged into farmland irrigation system/water body	JPEAB	JPCD, JPEAB

Note: JPCD-Jianxi Provincial Communications Department

JPEAB-Jiangxi Provincial Expressway Administration Bureau

4.3 Supervising Organizations

The environmental supervision plan is shown in Table 4.3-1.

Table 4.3-1 Environment Supervision Plan

Stage	Organization	Supervision contents	Supervision objectives
FS Stage	National Environmental Protection Agency (NEPA), Jiangxi Provincial Environmental Protection Bureau(JPEPB) The World Bank	1. Review TOR 2. Review EIA 3. Review EAP draft	1. Guarantee a complete environmental assessment, and appropriate subject identification, emphasize the key points. 2. Make sure it reflects the possible, significant potential problems which might be produced by this project 3.Guarantee a concrete practicable action plan of mitigation measures
Design & Construction Stage	World Bank, NEPA, JPEPB	1. Review the preliminary design protection and EAP	1. Strictly execute three simultaneousness and EAP
	World Bank, NEPA	2. Check if the EP investment is in place	2. Secure sufficient EP investment in place
	JPEPB, municipal and county EPBs	3. Inspect the appropriateness of material yard, and lime-earth mixing site	3. Ascertain these sites in compliance with environment protection requirements
		4. Inspect dust and noise pollution control, decide on construction time	4. Minimize the impacts on surrounding environment by construction, enforce applicable regulations and laws governing environmental protection
		5. Inspect the pilling and loading/unloading of hazardous substances, inspect whether the discharge of air pollutants meet the requirements	5. Minimize the impacts on surrounding environment by construction, enforce applicable regulations and laws governing environmental protection
		6. Inspect the discharge and treatment of daily sewage and waste machine oil in construction site	6. Guarantee the surface and underground water uncontaminated
	JPEPB	7. Reclaim and handle earth borrowing sites and waste disposing sites	7.Guarantee the landscape and land resources not seriously damaged
		8. Inspect the "three simultaneousness" of EP facilities, finalize the completion date	8. Guarantee the "three simultaneousness"
	JPEPB	9. Inspect whether the environment protection facilities meet standard	9. Examine and Accept the environmental protection facilities
	NEPA, JPEPB, Jiangxi Provincial Cultural Relics Bureau(JPCRB)	10. Inspect whether there are underground cultural relics.	10. Protect cultural relics

Operation Stage	JPEPB	1. Inspect the implemen-tation of EAP in operation stage 2. verify the implemen-tation of monitoring plan 3. Verify the necessity to take further Ep measures for unforeseen environmental problem	1. Finalize the EPA 2.Finalize the monitoring plan 3. Protect the environment, minimize the environmental impact during operation phase
	JPEPB, Local EPBs	4. Inspect whether the environmental quality of sensitive location meet relevant standard 5. Inspect whether the sewage in living and servicing areas meet discharge standards	4. Enforce environment management, safeguard people health 5. Guarantee the sewage disposal meet the standard
	JPEPB Public security and fire fighting department	6. Intensify supervision over unexpected accidents to eliminate risk. Set forth in advance an emergency handling program so as to eliminate leakage of dangerous substances in case it happens	6. Eliminate accidental risks, avoid accidental spill of hazardous substances

5 Environmental Monitoring Plan

5.1 Objective

The objective of formulating environmental monitoring plan is to supervise the implementation of all mitigation measures, to modify the EAP appropriately according to monitored results, to justify the implementation time and implementation proposal of environmental protection measures. The formulating philosophy is that monitoring is conducted according to predicted major environmental impacts at different periods.

5.2 Monitoring Implementer

According to the jurisdiction zoning of the area along the highway, it is suggested that Jian Municipal Environmental Monitoring Station; Ganzhou Municipal Environmental Monitoring Station be entrusted the monitoring task of RRIP3 and RRIP4.

5.3 Monitoring Items Based on the analyses and prediction, the monitoring items are: determined as follows:

1) The monitoring items during construction stage

①Air monitoring item: TSP

②Acoustic environment monitoring item: Construction noise

③ Water environmental monitoring item: Ph, COD_{cr}, SS, oil

2) The monitoring items during operation stage

①Air monitoring item : NOx

②Acoustic environment monitoring item : traffic noise;

5.4 Environmental Monitoring Plan

5.4.1 Environmental Monitoring Plan of RRIP1

The environmental monitoring plan of RRIP1 is developed as shown in Table 5.1-1~ Table 5.1-3.

Table 5.1-1 **Air Monitoring Plan**

Stage	Monitoring site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Implementer	Departments in charge	Supervisory Department
construction stage	earth/ash mixing site; borrowing/dumping sites: residential areas and sensitive spots along temporary road	TSP	2 times/month or random inspection monitoring	1 day	JMEMS	Engineering Construction Supervision(ECS) Corp. or Project Proponent	JMEPB
Operation stage	Chaoling	NOx	2 times/year	5day		JMHAB	

Table 5.1-2 **Noise Monitoring Plan**

Stage	Monitoring Site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Sampling Time	Implementer	Departments in charge	Supervisory Department
Construction stage	Construction site with large residential area or school within 150m	Noise	once/month	1 day	Once/Day; Once/night	JMEMS	Engineering Construction Supervision(ECS) Corp.or Project Proponent	JMEPB
Operation stage	Xizhuang,Chaoling, Nanjiang Hospital, Zuoan Middle School, Tanghu, Gaoping, Shanghai Youdian Hope School,Zhutian Hospital		4 times/year	1 day	Once/day Once/night		JMHAB	

Table5.1-3 **Water Monitoring Plan**

Stage	Monitoring site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Implementer	Departments in charge	Supervisory Department
construction stage	50m downstream from Chaoling Bridge	pH, COD_{cr}, SS, oil	2 times/year(once in average water-level season and once drought season respectively).	2 day	JMEMS	Engineering Construction Supervision(ECS) Corp. or Project Proponent	Local EPB

5.4.2 Environmental Monitoring Plan of RRIP2

The environmental monitoring plan of RRIP2 is developed as shown in Table 5.1-4~ Table 5.1-6.

Table 5.1-4 **Air Monitoring Plan**

Stage	Monitoring site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Implementer	Departments in charge	Supervisory Department
construction stage	earth/ash mixing site; borrowing/dumping sites: residential areas and sensitive spots along temporary road	TSP	2 times/month or random inspection monitoring	1 day	JMEMS	Engineering Construction Supervision(ECS) Corp. or Project Proponent	JMEPB
Operation stage	Hengling Central School	NOx	2 times/year	3day		JMHAB	

Table 5.1-5 Noise Monitoring Plan

Stage	Monitoring Site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Sampling Time	Implementer	Departments in charge	Supervisory Department
Construction stage	Construction site with large residential area or school within 150m	Noise	once/month	1 day	Once/Day; Once/night	JMEMS	Engineering Construction Supervision(ECS) Corp.or Project Proponent	JMEPB
Operation stage	Yutian Town Panxi Hengling Central School Jiaohu Village Shangwan Primary School Yaqian Duanwei Village Xinjiang Secondary School		4 times/year	1 day	Once/day Once/night		JMHAB	

Table5.1-6 Water Monitoring Plan

Stage	Monitoring Site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Implementer	Departments in charge	Supervisory Department
construction stage	50m downstream from Yaqian Bridge	pH, COD_{cr}, SS, oil	2 times/year(once in average water-level season and once drought season respectively).	2 day	JMEMS	Engineering Construction Supervision(ECS) Corp. or Project Proponent	Local EPB

5.4.3 Environmental Monitoring Plan of RRIP3

The environmental monitoring plan of RRIP3 is developed as shown in Table 5.1-7~ Table 5.1-8.

Table 5.1-7 Air Monitoring Plan

Stage	Monitoring site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Implementer	Departments in charge	Supervisory Department
construction stage	earth/ash mixing site; borrowing/dumping sites: residential areas and sensitive spots along temporary road	TSP	2 times/month or random inspection monitoring	1 day	GMEMS	Engineering Construction Supervision(ECS) Corp. or Project Proponent	GMEPB
Operation stage	Shashibu	NOx	2 times/year	5day		GMHAB	

Table 5.1-8 Noise Monitoring Plan

Stage	Monitoring Site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Sampling Time	Implementer	Departments in charge	Supervisory Department
Construction stage	Construction site with large residential area or school within 150m	Noise	once/month	1 day	Once/Day; Once/night	GMEMS	Engineering Construction Supervision(ECS) Corp.or Project Proponent	GMEPB
Operation stage	Shashizhen,Longbu,Niuedong,Xinxingwei,Fengshubu,Wangmudu		4 times/year	1 day	Once/day Once/night		GMHAB	

5.4.4 Environmental Monitoring Plan of RRIP4

The environmental monitoring plan of RRIP4 is developed as shown in Table 5.1-9~

Table 5.1-11.

Table 5.1-9 Air Monitoring Plan

Stage	Monitoring site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Implementer	Departments in charge	Supervisory Department
construction stage	earth/ash mixing site; borrowing/dumping sites: residential areas and sensitive spots along temporary road	TSP	2 times/month or random inspection monitoring	1 day	GMEMS	Engineering Construction Supervision(ECS) Corp. or Project Proprietor	GMEPB
Operation stage	Huangsha Middle School of Huangpu Towship	NOx	2 times/year	3day		GMHAB	

Table5.1-10 Noise Monitoring Plan

Stage	Monitoring Site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Sampling Time	Implementer	Departments in charge	Supervisory Department
Construction stage	Construction site with large residential area or school within 150m	Noise	once/month	1 day	Once/Day; Once/night	GMEMS	Engineering Construction Supervision(ECS) Corp.or Project Proponent	GMEPB
Operation Stage	Pingtian Village, Tangjiang Town, Laowuchang, Shangping, Tiantou, Laoshuzhui, Huangsha Middle school, Beitian promary school		4 times/year	1 day	Once/day Once/night		GMHAB	

Table 5.1-11 Water Monitoring Plan

Stage	Monitoring Site	Monitoring Item	Monitoring Frequency	Monitoring Duration	Sampling Time	Implementer	Departments in charge	Supervisory Department
Construction stage	Longhua Bridge , down stream 50m	CODcr、PH、SS、oil	2 times/year once in the mean water-level season, once in drought season)	2 days	Once in morning, once in afternoon	GMEMS	Engineering Construction Supervision(ECS) Corp.or Project Proprietor	Local EPB

5.5 Monitoring Budget and Monitoring Report System

The monitoring costs for RRIP1,RRIP2, RRIP3 and RRIP4 in construction stage are 1,5000 , 10000, 12000 and 12000RMB yuan/year respectively; the costs in operation stage are 10000, 6000, 6000 and 6000 RMB yuan/year respectively. Upon the fulfillment of monitoring task each time, the monitoring implementer should prepare the Monitoring Report, which should be submitted to the related administration departments from bottom to top.

5.6 Environmental Standard Limits

For the monitored results, the environmental standard limits listed from Table 5.1-12 to Table 5.1-15 are

refereed to decide whether to take remedial measures.

Table 5.1-12 Criteria for the Assessment of Water Environment

Unit: mg/L (except for the assessment of pH)

Item	pH	COD_{Cr}	Oil	SS	Note
GHZB 1-1999 Grade III Limits	6.5—8.5	< 20	<0.05	<155	*Grade I of the Water Quality Standard for Cropland Irrigation (GB5084-92)* will be adopted for the assessment of SS.
GB 8978-1999 Grade I Limits	6~9	100	5	70	

Table 5.1-13 The Limits of Noise Value For Construction Site Border (GB12523-90)

Unit: Leq (dB)

Construction Period	Major Noise Sources	Limit of Noise value	
		Daytime	Night
Earth & Stone Work	Bulldozer, excavator, loader, and so on	75	55
piling	Pile driver of various kind	85	Forbidden
construction	Concrete mixer and vibrator, electric saw	70	55
decoration	Crane, Lift	65	55

Table 5.1-14 The Limits of Noise For Operation Period(abstract)

Unit: Leq(dB)

Index	**Daytime**	**Night**
Class IV of GB 3096-93	**70**	**55**
Class I of GB 3096-93	55	45

Table 5.1-15 Assessment Standard for Air Quality(Abstract)

Unit: mg/ m³

pollutant		TSP	NOx
Concentration limits In Grade II of GB 3095-1996	Day mean	0.30	0.10
	Hour mean	-	0.15

6. Implementation Progress and Cost Estimation

6.1 Implementation Progress

The implementation progress of major environmental protection measures is shown in Table 6.1-1~ Table 6.1-4.

Table 6.1-1 Implementation Progress of Main Environmental Protection Measures for RRIP1

Item \ Time	2003				2004				2005			
	1	2	3	4	1	2	3	4	1	2	3	4
Land acquisition and resettlement												
Installation of noise isolation window												
Greening												
Environmentalmonitoring												
Environmental construction inspector training												
Contractor's environmental personnel training												
Environmental protection management personnel training												
Environmental protection and management in construction stage												

Table 6.1-2 Implementation Progress of Main Environmental Protection Measures for RRIP2

Item \ Time	2001				2002				2003			
	1	2	3	4	1	2	3	4	1	2	3	4
Land acquisition and resettlement												
Installation of noise isolation window												
Greening												
Environmentalmonitoring												
Environmental construction inspector training												
Contractor's environmental personnel training												
Environmental protection management personnel training												
Environmental protection and management in construction stage												

Table 6.1-3 Implementation Progress of Main Environmental Protection Measures for RRIP3

Item \ Time	2001				2002				2003			
	1	2	3	4	1	2	3	4	1	2	3	4
Land acquisition and resettlement												
Installation of noise isolation window												
Greening												
Environmental monitoring												
Environmental construction inspector training												
Contractor's environmental personnel training												
Environmental protection management personnel training												
Environmental protection and management in construction stage												

Table 6.1-4 Implementation Progress of Main Environmental Protection Measures for RRIP4

Item \ Time	2001				2002				2003			
	1	2	3	4	1	2	3	4	1	2	3	4
Land acquisition and resettlement												
Installation of noise isolation window												
Greening												
Environmentalmonitoring												
Environmental construction inspector training												
Contractor's environmental personnel training												
Environmental protection management personnel training												
Environmental protection and management in construction stage												

6.2 The investment estimate

The investment estimate for the environmental protection is listed in Table 6.2-1~ Table 6.2-4.

Table 6.2-1 **The Investment of The Environmental Protection For RRIP1**

Number	Items	Amount	Unit Price	Total(in 10000RMB yuan)	Note
1	Side slope Greening and Grade Crossing Beautification	79.0km	20,000RMB yuan/km	158	
2	Construction Monitoring	3 Years	15000RMB yuan /year	4.5	
3	Operation Monitoring	3 Years	10000RMB yuan /year	3	
4	Heightening of Encirclement or Installation of Noise Isolation Window	4210 m	200RMB yuan /1meter-section	84.2	Implementation Depending on the Actual Monitoring
5	Installation of simple noise isolation barrier, designed and arranged in combination with the encirclement	$300m^2$	200	6	
6	The Environmental Protection Cost in Construction			10	
7	Reclamation of Temporarily-Used Land			45	
8	Plan of Environmental Training	10 persons	5000 RMB yuan per capita	5	Detailed in Table7-1 of EAP
9	Other Unexpected Cost			15.85	
10	Total			331.55	

Table6.2-2 The Investment of The Environmental Protection For RRIP2

Number	Items	Amount	Unit Price	Total(in 10000RMB yuan)	Note
1	Side slope Greening and Grade Crossing Beautification	45.845km	20,000RMB yuan/km	91.69	
2	Construction Monitoring	3 Years	10000RMB yuan /year	3	
3	Operation Monitoring	3 Years	6000RMB yuan /year	1.8	
4	Heightening of Encirclement or Installation of Noise Isolation Window	10310 m	200RMB yuan /1meter-section	206.2	Implementation Depending on the Actual Monitoring
5	Installation of simple noise isolation barrier, designed and arranged in combination with the encirclement	140m^2	200 RMB yuan/m^2	2.8	
6	The Environmental Protection Cost in Construction			10	
7	Reclamation of Temporarily-Used Land			35	
8	Plan of Environmental Training	10 persons	5000 RMB yuan per capita	5	Detailed in Table7-1 of EAP
9	Other Unexpected Cost			17.77	
10	Total			373.26	

Table 6.2-3 The Investment of The Environmental Protection for RRIP3

Number	Items	Amount	Unit Price	Total(in 10000RMB yuan)	Note
1	Side slope Greening and Grade Crossing Beautification	26.251.km	25,000RMB yuan/km	65.63	
2	Construction Monitoring	2 Years	8000RMB yuan /year	1.6	
3	Operation Monitoring	3 Years	5000RMB yuan /year	1.5	
4	Heightening of Encirclement or Installation of Noise Isolation Window	2200meters	200RMB yuan /1meter-section	44	Implementation Depending on the actual Monitoring
5	The Environmental Protection Cost in Construction			5	
6	Reclamation of Temporarily-Used Land			30	
7	Plan of Environmental Training	10 persons	5000 RMB yuan/1 person	5	Detailed in Table 7-1 of EPA
8	Other Unexpected Cost			7.63	
9	Total			160.36	

Table 6.2-4 **The Investment of The Environmental Protection For The Proposed Project**

Number	Items	Amount	Unit Price	Total(in 10000RMB yuan)	Note
1	Side slope Greening and Grade Crossing Beautification	28.717 km	15000 RMB yuan/km	43.08	
2	Monitoring in Construction	2 Years	12000RMB yuan /year	2.4	
3	Monitoring in Operation Stage	3 Years	6000RMB yuan /year	1.8	
4	Heightening of Encirclement/additional noise –proof windows	4625 m	200RMB yuan /meter-section	92.5	Depending on the Actual Monitoring
5	The Environmental Protection Cost in Construction			5	
6	Reclamation of Temporarily-Used Land			35	
7	Plan of Environmental Training	10 persons	5000 RMB yuan per capita	5	Detailed in Table7-1 of EAP
8	Other Unexpected Cost			9.24	
9	Total			194.02	

7. Ability Development and EP Training Plan

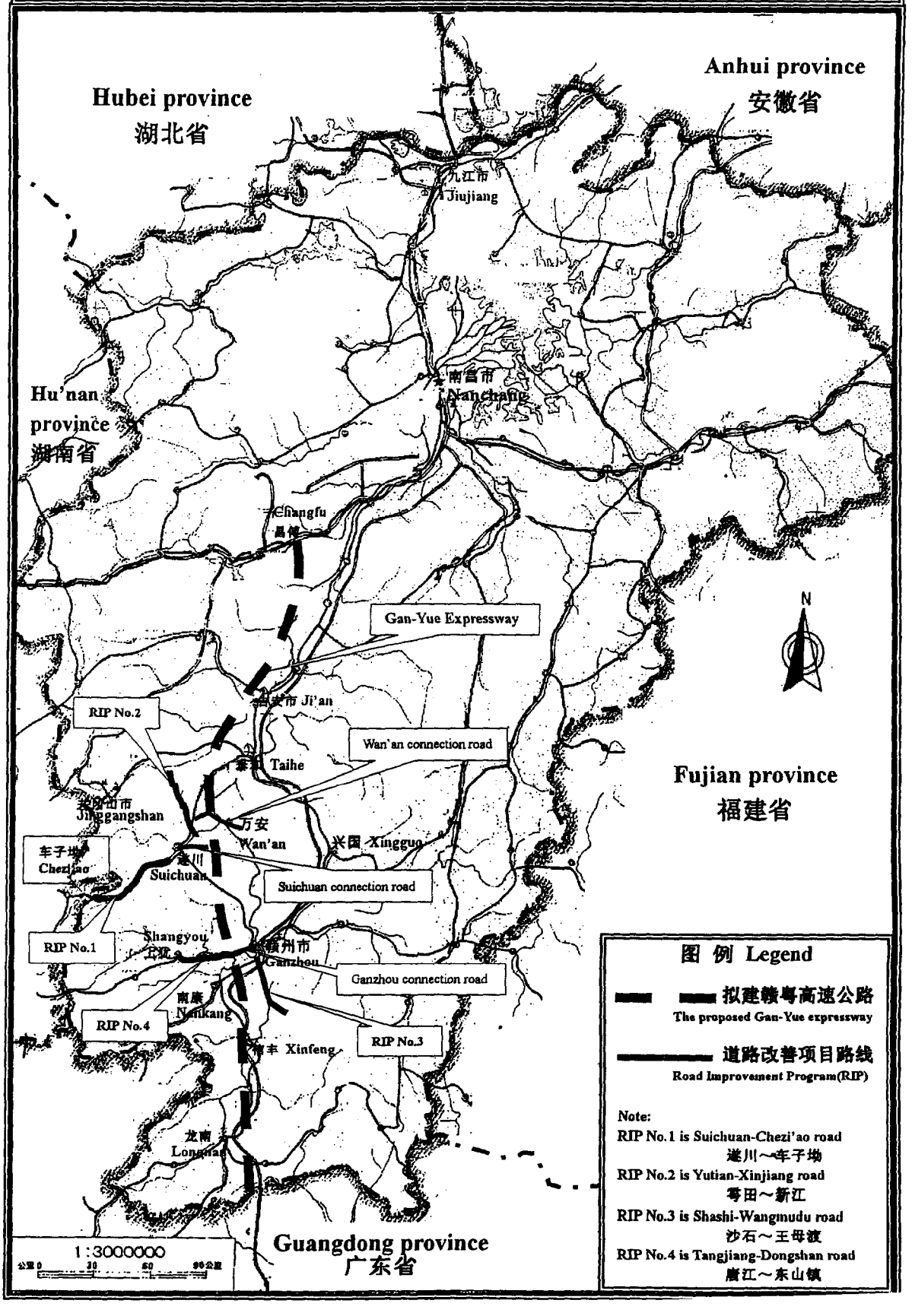
To strengthen the management ability of the project management organizations, the plan of environmental training for related personnel has been formulated and detailed in Table 7-1.

Table 7-1 Environmental Protection Training Plan

NO	Trainee	Contents	Time	Place	Scope	Cost (10.000yuan)	Remark
1	EP supervising engineer	National laws and standards on environmental protection, major environmental concerns for this project, operation of environmental monitoring instrument such as noise monitors	Within 2 months before construction	Nanchang	20 persons, 15 days	10.0	5 persons and 25000yuan for each RRIP component
2	Contractor's EP person	National laws and standards on environmental protection, major environmental concerns for this project, concerns for this project, cautions and measures in construction, EP person's duties	Within 2 months before construction	Nanchang	20 Persons 15 days	10.0	5 persons and 25000yuan for each RRIP component

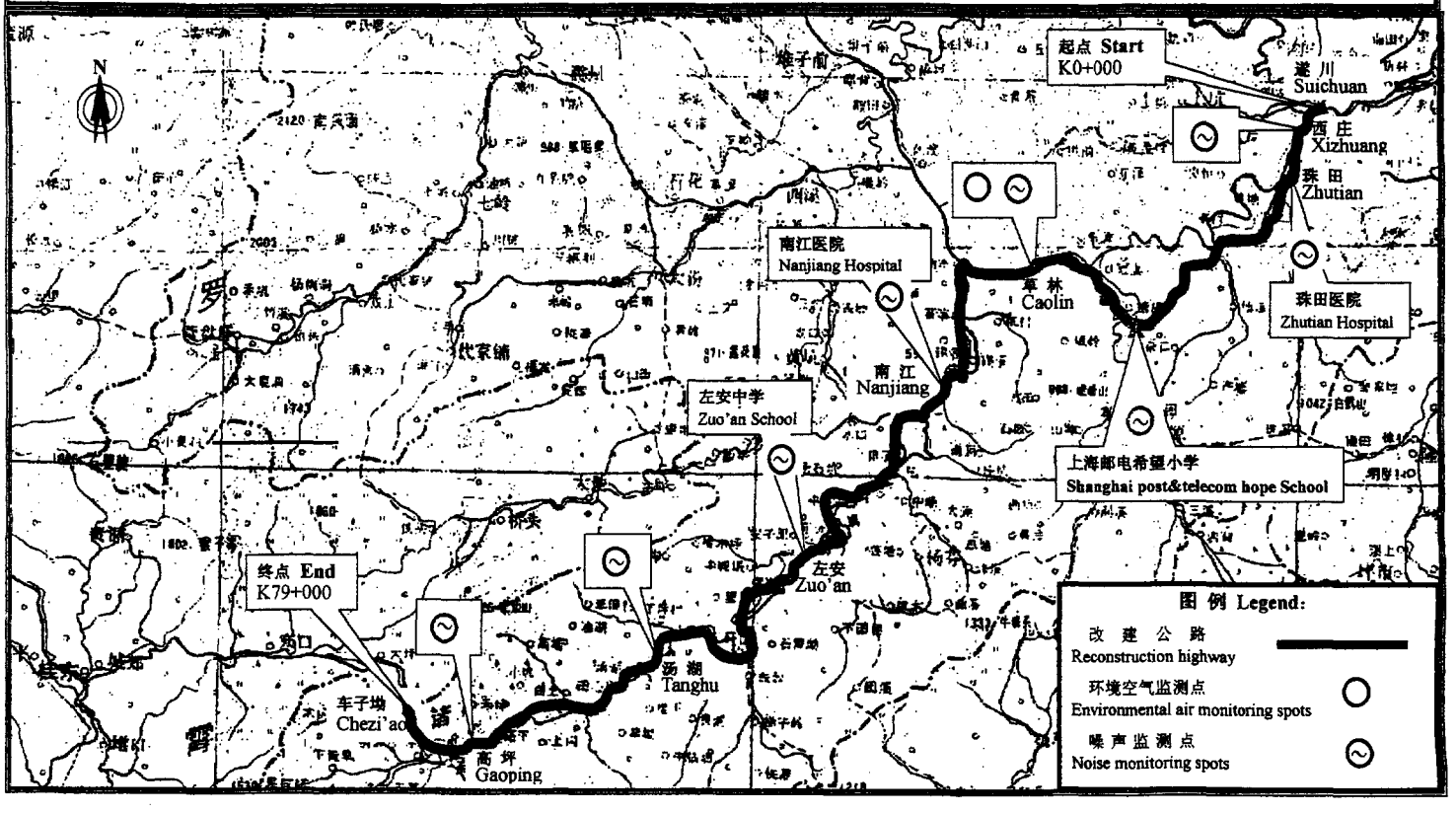
附图一　世行贷款江西二号公路相关道路改善项目路线地理位置图

Attached Fig 1. Geographical position of Linking Road Improvement Program (RIP) of Jiangxi No. 2 Highway Project with Loans from the World Bank



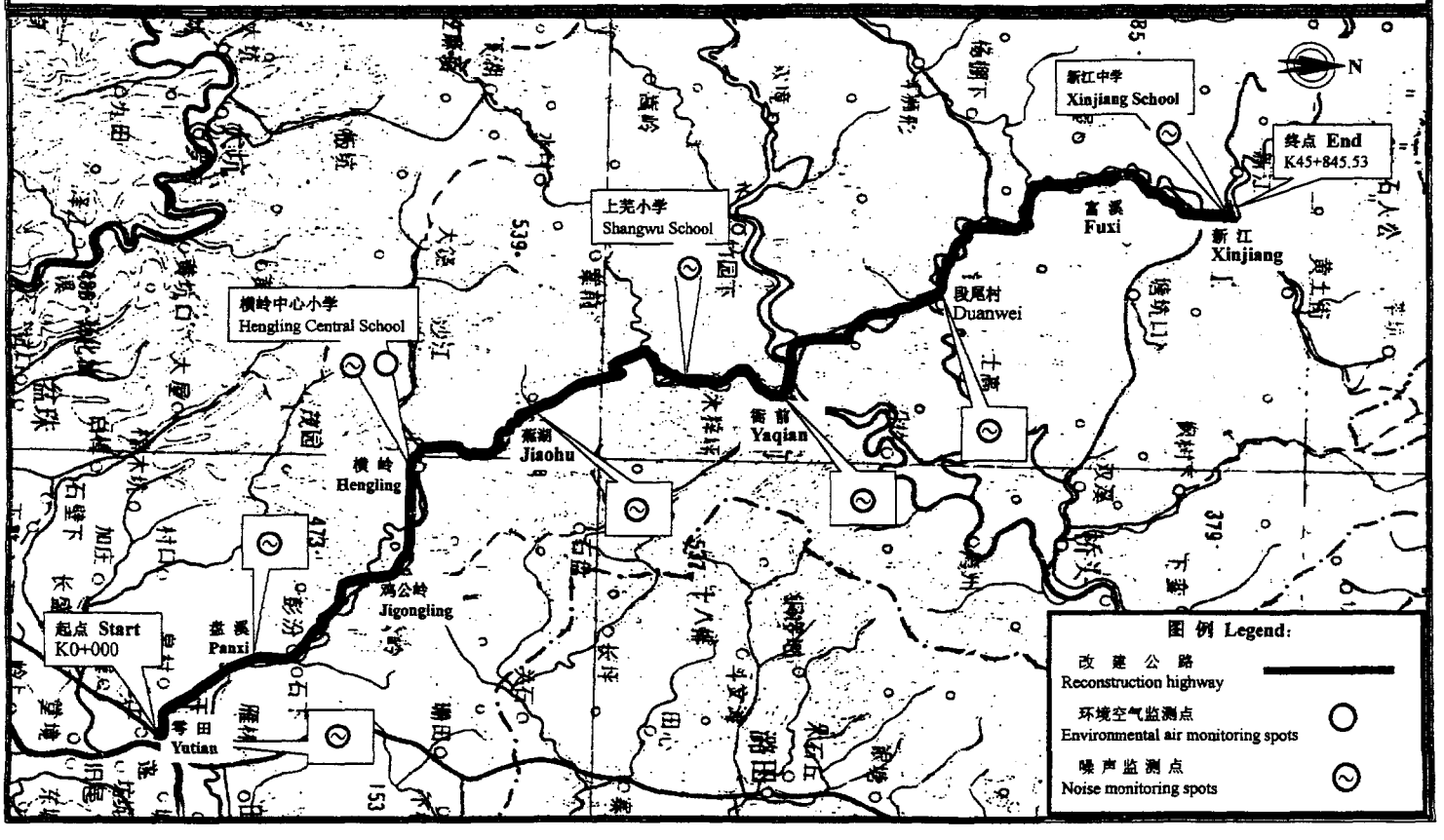
附图二：路线走向及沿线环境监测布点示意图(RIP1 遂川～车子坳)

Attached Fig2: Route Alignment and Environmental Monitoring Spots Distribution (RIP1 Suichuan~Chezi'ao)



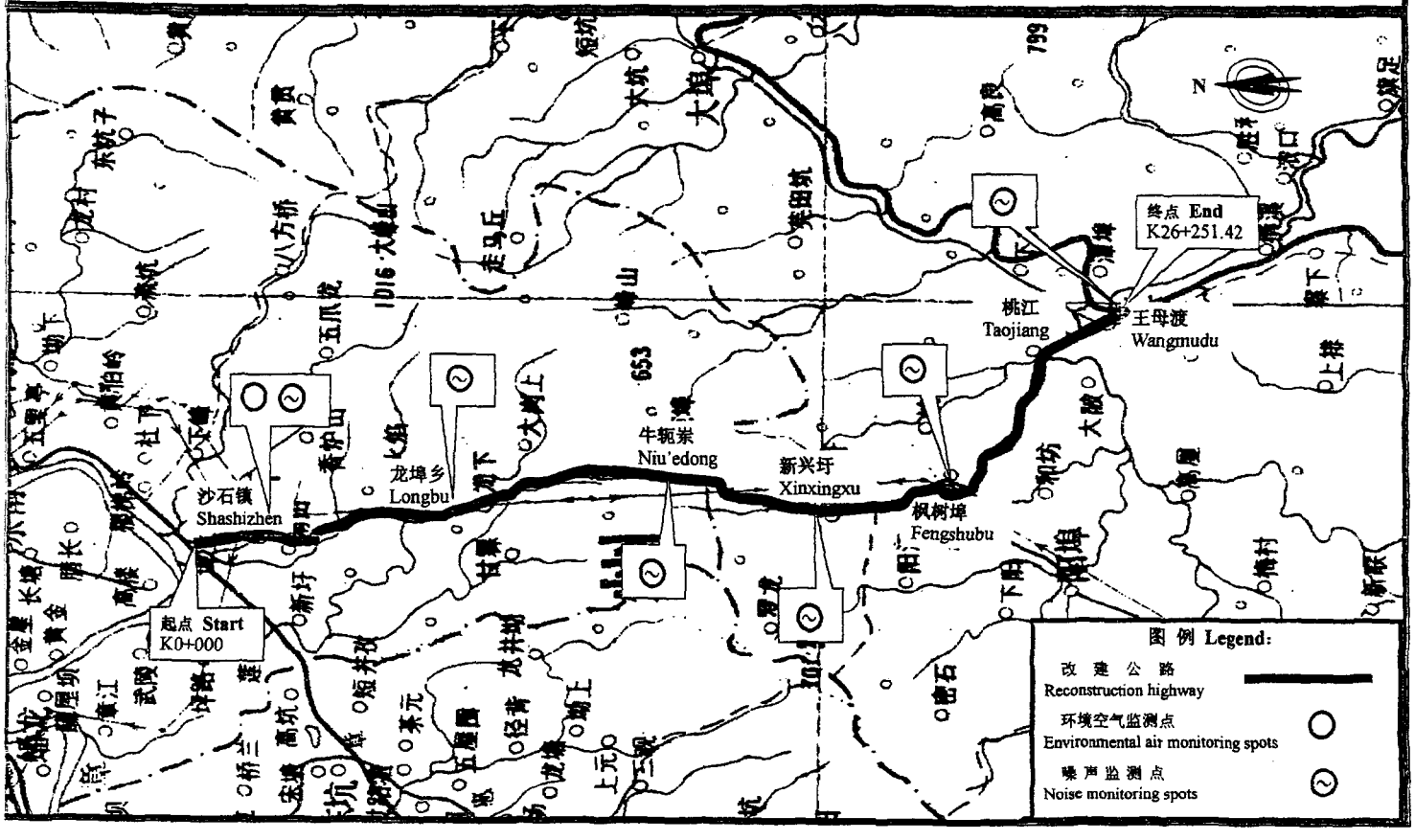
附图二：路线走向及沿线环境监测布点示意图(RIP2 雩田～新江)

Attached Fig2: Route Alignment and Environmental Monitoring Spots Distribution (RIP2 Yutian~Xinjiang)



附图二：路线走向及沿线环境监测布点示意图(RIP3 沙石埠～王母渡)

Attached Fig2: Route Alignment and Environmental Monitoring Spots Distribution (RIP3 Shashibu～Wangmudu)



附图二：路线走向及沿线环境监测布点示意图(RIP4 唐江镇～东山镇)

Attached Fig2: Route Alignment and Environmental Monitoring Spots Distribution (RIP4 Tangjiangzhen～Dongshanzhen)