World Bank-financed Jiangxi Poyang Lake Basin and Ecological Economic Zone Small Town Development Demonstration Project

Environmental Codes of Practice

For

Bridge and Culvert

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1. Preface

World Bank-financed Jiangxi Poyang Lake Basin and Ecological Economic Zone Small Town Development Demonstration Project is a demonstration project of Jiangxi Province, which aims to promote the harmonious development of ecological protection and urban construction, to improve urban and rural infrastructure, and to accelerate the urban and rural integration of the province by introducing international experiences with loan project as carrier, and according to Chinese urbanization development strategy as well as the urbanization demand of Jiangxi Poyang Lake Basin and Ecological Economic Zone. This annex includes the specific environmental impact analysis and corresponding Environmental Codes of Practice for the bridge and culvert subproject; and together with the Environmental Codes of Practice for Small Civil Works (Annex 1.1), it forms complete Environmental Codes of Practice for bridge and culvert subprojects. The geographic location is shown in Attached Figure 1. In preparing this ECOP, we made reference to Detailed Rules of Jiangxi Province on Safe Construction, EHS Guidelines, operational policies and safeguard polices of the World Bank and other materials.

2. Main Contents of Construction

The main construction contents of bridge and culvert in the participating counties are shown in Table 1-1.
## Table 1-1  Schedule of Main Construction Contents of Bridge and Culvert

<table>
<thead>
<tr>
<th>No.</th>
<th>Location</th>
<th>Subproject</th>
<th>Overview</th>
<th>Bridge and Culvert</th>
<th>Culvert</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gongqingcheng City</td>
<td>Wusi Avenue - Junshan Avenue Subproject</td>
<td>The subproject construction covers the section from Wusi Avenue to Junshan Avenue (namely from Yucun Village to the edge of Jiangyi Town, Gongqingcheng). The subproject extends from Fazhan Avenue to the edge of Jiangyi Town, and passes by Shuangqiao Village of Ganlu Town, as well as Aiguo Village, Hetang Village, Honglin Village, and Yuejin Village, etc. of Jiangyi Town. The road is around 8.3Km in total, and the road surface is 24m wide. Designed into two ways and four lanes, and with concrete pavement, the road is an urban secondary artery, and the vehicle speed is designed to be 40km/h.</td>
<td>Two medium bridges, the stakes in the centre of the bridge culverts are numbered as K1+180 and K3+435 respectively, and the total length is 40m (20m each). At the upside, one-span 20m pre-stressed concrete hollow slab (post-tensioned) is adopted, and the net width of the bridge surface is 2 x 16.2 (twin decks); and at the downside, U-shaped land pier is adopted to expand the foundation.</td>
<td>The subproject would build 7 culverts, including 3 pipe culverts and 4 slab culverts.</td>
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<td>2</td>
<td>Gongqingcheng City</td>
<td>Gongqingcheng - Suijadang Township Highway Subproject</td>
<td>The starting point K0+000 is connected with Boyang River Bridge, and the end point K7+914.909 extends to Suijiangdang Town Government. Covering a total length of 7.915Km, the road is a grade-two highway, with designed vehicle speed 60km/h, roadbed width of 12m, driveway width of 2x3.5m, and cement concrete pavement.</td>
<td>The subproject involves one 140m great bridge and one 50m medium bridge, and the net width of bridge surface is 12m. Here, pre-stressed concrete hollow slab is adopted for the upper structure of the bridge culvert, while gravity or column pier is adopted for the lower structure.</td>
<td>The subproject would build 2 culverts, including reinforced concrete pipe culvert and slab culvert.</td>
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<td>3</td>
<td>Gongqingcheng City</td>
<td>Gongqingcheng City - Zequan Township Road Subproject</td>
<td>The starting point K0+000 is connected with Gong’an Avenue, and the end point K8+053.506 is connected with Gaoyiaqiao. Covering a total length of 8.054Km, the road is a grade-two highway, with designed vehicle speed 60km/h, roadbed width of 12m, driveway width of 2x3.5m, and cement concrete pavement.</td>
<td>The subproject involves one 100m great bridge and one 50m small bridge, and the net width of bridge surface is 12m. Here, pre-stressed concrete hollow slab is adopted for the upper structure of the bridge culvert, while gravity or column pier is adopted for the lower structure.</td>
<td>The subproject would build 6 culverts, including reinforced concrete pipe culvert and slab culvert.</td>
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<tr>
<td>No.</td>
<td>County</td>
<td>Project Description</td>
<td>Details</td>
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<td>4</td>
<td>Jiujiang</td>
<td><strong>Jiujiang County Urban Infrastructure Construction Demonstration – Yuanming Avenue Extension Subproject</strong>&lt;br&gt;The subproject starts from the intersection of Yuanming Avenue and North Chaisang Road of Jiujiang County, and ends at Shuangrui Road of Jiujiang County. Covering a total length of 1.898km, the project is an urban trunk road of grade III, which is designed into two ways and four lanes, with designed vehicle speed of 40km/h, red line width of 36m, and asphalt concrete pavement.</td>
<td>The subproject involves one bridge culvert, which strides over Sand River; and at the place where the bridge is, the river is around 25m wide. Constructed with 2X16m pre-stressed hollow slab beams, the bridge culvert is 39.08m long in total, and its width is 29m (net width) + 2 X 3.5m footway. For the lower structure, column piers and buried rib platform are adopted; and for the foundation, bored piles are adopted.</td>
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<td>5</td>
<td>Jiujiang</td>
<td><strong>Jiujiang County Urban Infrastructure Construction Demonstration – Integrated Urban Flood Management Subproject</strong>&lt;br&gt;BOQ of river channel dredging is 8.91×10⁴ m³; a river bank landscape road with the length of 5.800m and 2.8km-long earth dike would be built; rainwater and wastewater interception pipes would be laid under sidewalks, including 5.8km of rainwater pipes and 3.8km of rainwater pipes.</td>
<td>Reconstruction of Yangjiamen Bridge with net width of 50m.</td>
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<td>6</td>
<td>Yifeng</td>
<td><strong>Yifeng County Yuanming Bridge and Yuanming Bridge to National Highway 320 Link Road Subproject</strong>&lt;br&gt;Road: urban main road of 3km long and 40m wide.</td>
<td>1. Bridge and culvert: The bridge is 156m long and 25m wide.&lt;br&gt;2. Six culverts to be built.</td>
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<td>7</td>
<td>Yifeng</td>
<td><strong>Yifeng County Town South Main Road Subproject</strong>&lt;br&gt;Road: urban main road of 4.399km long and 32m wide.</td>
<td>1. One bridge of 20m long and 32m wide;&lt;br&gt;2. Eight culverts</td>
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<td>8</td>
<td>Nanfeng</td>
<td><strong>Nanfeng County Nanfeng Bridge Construction Subproject</strong>&lt;br&gt;</td>
<td>The bridge is 296m long in total (excluding approach bridge); and the total width of bridge surface is 28m, including driveway width of 2 X 11.5m, and footway width of 2 X 2.5m. The bridge scheme is of continuous pre-stressed concrete box girder +</td>
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<td>No.</td>
<td>Location</td>
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<td>9</td>
<td>Nanfeng County</td>
<td>Nanfeng County Hedong New District Xingnong Avenue Subproject Road to be built is a Class III secondary urban main road with the total length of 4.767km; road width is 32m for standard sections and 38m for expanded sections at crossroads.</td>
<td>1. Bridge: 28m long and 32m wide; 2. 1 culvert.</td>
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<td>10</td>
<td>Dexing City</td>
<td>Dexing City Nanmen New District Urban Main Road Improvement Subproject The subproject is located in the south of Nanmen New District of Dexing City, and the southeast of the central urban area. The road starts from the stake K3+620 of phase-one project of Fenghuang Avenue in the west, and is connected to Fenghuang Bridge and extends to Shangrao-Dexing Highway in the east. Being around 627.433m in total (the phase-one project of Fenghuang Avenue was designed to be 3620m), and with red line width of 30m, asphalt concrete pavement, and designed vehicle speed of 40km/h, the road is a Class III urban main road.</td>
<td>Dexing Fenghuang Bridge stretches over Binhe Avenue and Jishui River. The bridge culvert is connected with Shangrao-Dexing Highway in the east, and with Fenghuang Avenue in the west (Fenghuang Avenue is an urban trunk road in the very south of the road network planned for Nanmen New District of Dexing, and the roadway is arranged to be of 2.5m footway + 10m driveway + 5m central separation belt + 10m driveway + 2.5m footway). Fenghuang Bridge is 187m long, and the bridge surface, 30m wide, is designed into dual ways and four lanes, and adopts 6x30m pre-stressed continuous beam. 1 culvert of 42m long</td>
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<td>11</td>
<td>Dexing City</td>
<td>The highway engineering from Dexing-Shangrao Expressway to Dexing Station of Hefei-Fuzhou Express Railway Located at Longtoushan Town, Dexing City, the subproject starts from the connecting exit of Xindong Line (S203) K29+500 and Nanxi, passes by Shangcheng, hoggery, Longtoushan market town, and Nuanshui, and ends at the entrance of the Dexing Station Plaza of Hefei-Fuzhou Express Railway. Covering a length of 5.59741Km in total; the road is a landscape hybrid cable supported bridge. The bridge culvert under the subproject stretches over Yijiang River, is connected with East Jiedu Avenue in the east and with Daqiao Road in the west, and is constructed at 30m in the upstream of the old Nanfeng Bridge.</td>
<td>The bridge involves one 636.06m great bridge stretching over the tunnel approach bridge at the south branch of Jishui River, one 54.06m medium bridge at the south branch K2+440.00 of Jishui River, one 74.06m medium bridge in Hejia, and one 24.06m small bridge in Nuanshui. 17 culverts and passageways</td>
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<td>Class II road. Road base width is 12m and 20m, respectively at different sections; the road surface is of cement concrete structure; and the designed vehicle speed is 80km/h.</td>
<td>The project involves the construction of 4 bridges, which are 112m long in total. Where, Shangjiaokou Bridge (K6+214) 1x16m is of pre-stressed hollow slab bridge, which is 23m long, and adopts U-shaped land pier and expanded foundation; Yaojia medium bridge (K7+445) 2x13m is of pre-stressed hollow slab bridge, which is 33m long, and adopts column pier, U-shaped land pier, and expanded foundation; Lingxixiang Bridge (K13+493) 2x13m is of pre-stressed hollow slab bridge, which is 33m long, and adopts column pier, U-shaped land pier and expanded foundation; Wangtu bridge (K14+010) 1x16m is of pre-stressed hollow slab bridge, which is 23m long, and adopts column pier, U-shaped land pier and expanded foundation.</td>
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<td>12</td>
<td>Hengfeng County</td>
<td>The subproject is in west-east direction, and runs through Hengfeng County. It starts from Yaojia Town Government, passes by Maopingzhou, Baishaling, Hengfeng County seat, Xiayaokou, Shangyaokou, Jiudu, Miaojiaodi, Liujiang Village, and Lingxigang, and ends at Gangbian Town. Covering a length of 16.439Km in total, and with roadbed width of 7.5m, cement concrete pavement, and designed vehicle speed of 30km/h, the road is a grade-III highway.</td>
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<td>Yaojia-Gangbian Highway Reconstruction Subproject</td>
<td>The project sets up 48 culverts, including D=1.0m pipe culvert, D=1.5m pipe culvert, and reinforced concrete slab culvert.</td>
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3. Key Points of Design

According to general requirements of the Environmental Codes of Practice, and aiming at the characteristics of bridge and culvert subproject, the design unit shall focus on the following key points at each stage of design:

(1) The bridge shall be located in the downstream of local water intake without destroying the natural status of river or compressing river;

(2) The design shall comprehensively consider the linear horizontal, vertical and transverse sections and drainage systems, and avoid water and soil erosion arising from high filling and deep excavation.

(3) As concerning interim land occupation for the engineering (construction and production area, construction camp, and construction pavement, etc.), the designer shall give full consideration to avoiding sensitive points at the line selection and site selection stage of construction drawing design, reduce the impacts of interim land occupation on surrounding resident points, try to reduce the occupation of farmland, and relieve the destruction of existing landscape and vegetation.

(4) In terms of earthwork design, the designer shall optimize the balance of earthwork. That’s to say, in design, the designer shall avoid deep excavation, and try to ensure the balance of excavation and filling.

(5) The construction scheme formulated shall, according to the climatic characteristics of the project place, reasonably arrange the construction period, get done with flood control and drainage in rainy season, avoid construction of piers in river during flood season, and take measures to prevention and control the erosion of exposed roadbed after excavation and filling due to the scouring of rain water.

(6) In terms of the construction of water-passing structures, the water-passing structures like bridge and culvert, etc. shall meet the demand of flood carrying and drainage, and the water shall be guided with drainage ditch, and shall be treated and drained collectively, in order to relieve the impacts on agricultural land and farmland; the waste water from construction of bridge and culvert shall be designed to collect for treatment, and shall not impact the quality of the water body over which the bridge and culvert stride.

(7) In terms of construction organization, the design unit shall focus on the protection of sensitive objects like residents, etc. surrounding the bridge and culvert, and shall bring forward feasible pollution prevention & control measures in design, in order to relieve the interference on sensitive objectives.

4. Environmental Codes of Practice in Construction Period
4.1 Construction Site Management

The environmental impacts produced from construction site is heavy and extensive, but has certain timeliness, and will disappear along with the completion of construction.

(1) Special Equipment
Strengthen the maintenance and examination of all hoisting equipment, electrical appliances, conveyors, girder erecting equipment, high-voltage circuits, and pressure vessels, etc., ensure that they are always in good operating status and have perfect safety devices, improve the periodic examination by special personnel on each part of the system, and do work strictly according to operating procedures.

(2) Aloft Work
During aloft work, a safety net shall be set up, and operator shall use uniform signal, flag signal, gesture and whistle, etc. to contact the ground, shall tie the safety belt firmly, and shall wear safety helmet, in order to ensure the safety of personnel and structures. Here, the safety net shall be kept sound, shall be of standard specification, namely at least 3m in width, at least 6m in length, and at most 100mm in mesh, and shall be woven of vinylon, chinlon or nylon, etc. Each net shall bear an impact load of at least 1600N. Before doing aloft work, operator shall accept and pass physical examination and technical assessment. Scaffolds shall be built up firmly and stably, and upper-level construction machines and tools shall be set up solidly. Overlapped work is strictly forbidden here.

(3) Construction of Bored Piles
During construction of bored piles, operator shall level up and stabilize the frame, and prevent it from relocation or down-punching; also, the operator shall use hawser cable to stretch-draw the top end of drilling cramp symmetrically, and anchor it firmly. During punching of impact drill, non-operators shall not access the scope of punching area. When testing the holes drilled or making slurry out of holes, the operator shall put the drill head at a safe place.

(4) Construction of Pier and Abutment
- Preparation for Construction
  
a. Get familiar with drawings first, determine the slip scheme according to the structural characteristics of structures, inform the formwork manufacturer of relevant sizes and shape of pier, and order a corresponding quantity of formworks.
b. Find out the composition of formwork, and get familiar with the assembling, dismounting and utilization of formwork. Carry out trial slip, inspect various kinds of performance, and assemble the formwork formally for use after determining that it is qualified.
c. Determine the material, quantity and location of climbing rod.

d. Slip-form construction is a comprehensive process. So, it’s necessary to make detailed construction organization plan, formulate reliable quality assurance measures, and set up perfect safety assurance system, in order to guarantee continuous operation and construction.

e. Start the construction of pier body after the tie beam of pile foundation is completed and passes supervisor’s acceptance.

- Processing and Installation of Reinforced Steel Bar

The surface of the reinforced steel bar for construction shall be clean, and shall be cleared off oil stain, paint peel, and rust, etc. before use. The reinforced steel bar shall be straight, and free of local bending; shall be processed and formed strictly according to the sizes mentioned in drawings in reinforced steel bar canopy, stacked by classification, and transported with platform vehicle to construction site for binding and installation.

Reinforced steel bar shall be installed according to drawing; and meanwhile, in case the location of the pier anchoring bar conflicts with that of platform bearing bar during installation, it is available to adjust the location of platform bearing bar properly. Lap welding shall be adopted for reinforced steel bar, and it is proper to execute dual-side welding. The lapping length shall be at least 5d and 10d in case of dual-side welding and single-side welding respectively (d indicates the diameter of the welded reinforced steel bar); meanwhile, the joints shall be arranged in a staggered way, the quantity of joints on a same section shall not exceed 50% of total joints, and the operation shall be conducted strictly according to construction specifications. The intersection of reinforced steel bars shall be bound firmly with iron wire, and if necessary, may be spot-welded solidly. In order to ensure the thickness of protective layer, cement heel block shall be added to reinforced steel bars; meanwhile, the heel block and reinforced steel bars shall be bound firmly and arranged in a staggered way.

After being installed, reinforced steel bars shall be subject to operator’s self-examination prior to being submitted to supervisory engineer for check and acceptance; after passing the acceptance, the reinforced steel bars may step into the next working procedure.

- Slip-form Installation

Slip-form is installed under pier body. Since slip-form is relatively tall, it’s necessary to build up a 4m high bracket under the pier body in advance, make slip-form climb to a certain height, and then install interior and exterior hanging baskets. The slip-form installation process is as follows:
Jack stand --- Pen --- Internal formwork --- Operating platform --- Jack --- Climbing rod --- Staff gauge or water level meter --- Hydraulic operating cabinet --- Interior and exterior suspension brackets.

Concrete Placing and Formwork Slip
Primary placing and slip --- Simultaneous placing and slip --- Stop of slip --- Final placing

Main notes: a. Before installation of reinforcing steel bar and formwork, operator shall build up scaffold platform, baluster and staircase; during artificial conveying and binding of reinforced steel bars, workers shall cooperate with each other and execute synchronous operation. Also, build up springboard or scaffolds, and never walk on the reinforced steel bars already installed.

b. After proper location of formwork, fix it with brace, etc. immediately, in order to prevent it from toppling over and hurting people. When a crane is used to lift formworks, operator shall adopt a crowbar, etc. to move the bottom of formworks. After each section of formwork is set upright, operator shall install the connector and upper & lower stirrups, and prepare internal supports prior to suspension of work, in order to guarantee stability.

c. During setting formworks upright, the operators installing formworks shall tie their safety belt at a solid place; and when threading drawing bars, operators shall echo with each other.

d. Before hoisting of formworks, operator shall ensure that, formworks are connected firmly, internal supports, drawing bars, and stirrups are tightened, and the hoisting point is correct and solid. During hoisting, operator shall fasten the rope, listen to signal command, and surely avoid excessive load.

e. Before a concrete vibrator is used, operator shall examine the grounding device and rubber-skinned wire on the shell of the vibrator; the connection of the wire end and vibrator; the place for relocation of vibrator, and the ON/OFF of power switch during discontinuous work; and shall ensure that, every item is qualified.

f. Operator shall set up a forbidden zone to dismantle formworks according to regulated procedures. In case of solid crossing operation of various works, operators shall never do work in a same vertical direction.

(5) During construction, surely keep the construction site away from water body, and never drain waste water into water body directly, or dump solid wastes into water body.
4.2 Surface Water Environment Quality Management

4.2.1 Analysis of Impacts on Surface Water Environment Quality

The impacts on the surface water environment during the construction of bridge and culvert includes the following:

(1) Construction camp, building materials storage yard, and domestic sewage will possibly pollute multiple water bodies.

(2) Construction under bridge will induce local disturbance at the bottom of river and the increase of sestons like loam, etc. in local water bodies.

(3) The oil leakage of mechanical equipment for construction of bridge and culvert, and residual oil during machinery maintenance will possibly bring oil pollution to water bodies.

(4) During construction of bridge and culvert, in case the construction materials stacked nearby water bodies enter into water bodies due to improper keeping or rain-water scouring, etc., they will bring pollutions to water bodies.

4.2.2 Management Measures for Surface Water Environment Quality

(1) Carry out the construction of bridge and culvert during low water season, try to shorten the construction time, and reduce the disturbance against water bodies;

(2) The construction of bridge and culvert is the main source of pollutions to water environment during construction period, so it is necessary to standardize the process of bridge and culvert construction. Piers for the main bridge shall be constructed with steel sheet cylinder cofferdam, and the bridge approach in shoal area shall be constructed with soil bag cofferdam, in order to reduce the pollutions to water environment during construction period. After completion of construction, the interim cofferdams in construction area shall be cleared off in time, in order to avoid affecting flood drainage;

(3) During the construction of bridge and culvert, the machines and ships adopted for construction must be examined strictly, in order to avoid leakage of oil products. It is forbidden to discharge sewage, garbage, and oil-stained water in cabin into water bodies, but instead, they shall be collected and then treated together with the pollutants at the worksite of bridge.

(4) The construction camp and building materials storage yard, etc. shall be arranged possibly far away from surface water bodies like wetland, etc. For the common building materials which are stacked nearby water bodies temporarily upon the
demand of engineering construction, it is a must to cover them, and to set up an enclosure surrounding them if necessary.

(5) Construction personnel’s domestic sewage shall be disposed by local urban environmental sanitation department.

(6) Construction personnel’s domestic garbage shall never be thrown away at random or poured into water bodies along the line, but must be collected and treated periodically by environmental protection department.

(7) Waste oil and other solid wastes produced from construction shall never be poured or thrown into water bodies, or stacked nearby water bodies, but shall be cleared off and transported to specified place or treated according to related regulations in time.

4.3 Risk Prevention and Control Measures

The main risk during the construction of bridge and culvert is the safety in flood season. The major preventive measures are as follows:

(1) Determine the drainage direction according to the construction plan and the master plan of drainage, as well as the natural landform, dig the gutter according to the regulated gradient, and connect the drainage facility with the municipal pipeline network, in order to ensure smooth drainage.

(2) Ensure the expedite state of road, harden the road surface according to actual situations and make it higher and arched according to requirements, and set up drainage ditch.

(3) As concerning the protection of raw materials, finished products and semi-finished products, examine materials warehouse comprehensively and periodically, maintain it in time, ensure solid footing of wall and good drainage in surrounding areas, and prevent leakage of rainwater. Also, take corresponding rainproof measures for storage of steel products, etc., and ensure the quality safety of materials.

(4) Strengthen safety examination, in order to discover problems in time.

(5) Execute frequent examination on the main body of bridge structure, scaffolds, power supply for construction, hoister, formwork supporting system, rainproof shed of each small machine, as well as interim facilities and safety sign board, in order to discover and eliminate problems, and repair the damaged places in time.

(6) The materials moistened by rainwater shall be treated prior to use.

(7) In case of rainstorm, stop outdoor construction, and working personnel shall move
to a safe place; and in case the air temperature is over 40°C, stop outdoor work.

(8) Strengthen the training and education on various types of personnel, reinforce the learning of common sense about safe construction in summer, and raise self-protection ability and emergency reaction ability.

4.4 Administrative Measures for Dangerous Wastes and Flammable & Explosive Articles

The bridge engineering construction involves the storage and transport, etc. Of some dangerous wastes (such as waste diesel oil, waste engine oil, waste lubricant, and waste paint) and flammable and explosive articles (such as diesel oil and engine oil), and improper treatment will bring heavy impacts on the environment.

(1) Administrative Measures for Storage of Dangerous Wastes and Flammable & Explosive Articles

① When diesel oil, engine oil, lubricant, and paint, etc. are sent to construction site, the receiver shall check carefully whether the packing is sound and whether there is leakage, and shall refuse the goods if any leakage is discovered;

② For the dangerous wastes and flammable & explosive articles stored in construction and production areas, there shall be special storage venues for them, and also, it is necessary to set up warning signs, to execute anti-leakage treatment of the ground, and to prepare materials for emergency treatment like adsorption bags/ sand/ sawdust, etc.;

③ Dangerous wastes and flammable & explosive articles shall be labeled;

④ Diesel oil, engine oil, lubricant and paint, etc. shall be stored according to the requirements of storage certificate on storage type and data, etc.;

⑤ During the maintenance of machines and equipment, etc., waste diesel oil, waste engine oil, and waste lubricant, etc. shall be collected and stored with special containers, and shall be cleared off and transported to Gansu Dangerous Wastes Treatment and Disposal Center periodically.

(2) Administrative Measures for Prevention of Fire Disaster

① Implement the laws, rules and regulations promulgated by the country and government on fire safety management in earnest, and observe the work standards formulated by the enterprise;

② Execute the fire use examination and approval system strictly, and never use fire
without permit;

3 Execute the measures for management of flammable and explosive articles strictly, and take effective measures to ensure safety;

5 Strengthen the education on safety in electricity use, and never connect electric circuits at random;

5 Rescue measures on the scene of fire and accidents
A: Once a fire occurs, it is necessary to organize fire fighting according to the emergency preplan for fire accident on the spot. The personnel entering into the scene must use related protective articles; unrelated personnel shall not enter into the scene of accident;
B: Identify the cause of fire, and select proper fire extinguisher;
C: Once the fire is exterminated, dispatch special personnel to monitor the scene, in order to prevent resurgence, and if necessary, extend the time of fire fighting;
D: Clean up the scene of fire accident in time, and dispose the materials and articles burnt.

6 Prepare corresponding type of fire extinguisher at the storage venues of diesel oil, engine oil, lubricant, and paint, etc.

(3) Fire Safety in Storage and Use of Paint

Propagandize the safety in fire fighting.

Provide/ execute necessary education/ assessment on the common sense of fire fighting and the system of job responsibility for fire prevention for/ against painters and personnel operating and keeping flammable & explosive chemicals; make them comprehensively understand the components, performance and fire danger of paint and various diluents, command the methods for safe keeping and use, and pass relevant exams before operation. The personnel violating rules and disciplines and failing to correct their behaviors after being educated time after time shall be removed from corresponding post, and this is the basis for fire safety.

Create good conditions for safe storage of paint.
Use non-combustible materials to build paint warehouse; set up the warehouse far away from open fire operation points, high-voltage lines and construction engineering; dispatch special personnel to take charge of the warehouse; and take proper measures like fire protection, explosion protection, ventilation, and cooling down, etc. to prevent barrel expansion and splashing accidents. Warehouse keeper shall be responsible for the safety of paint warehouse, and ventilate the warehouse at regular time.
Prevent fire in construction.
On-site construction personnel shall know well about the construction environment, and be able to put out a fire effectively after occurrence of the fire immediately, in order to prevent explosion. During use of paint, working personnel shall avoid beating, collision, impulsion, and friction, etc., in order to prevent sparkle and combustion. At construction site, working personnel shall maintain good ventilation, and prevent the steam concentration of flammable liquid in the air from being excessively high and reaching the lower limit of explosion. Painters shall wear anti-static clothes during work. Also, sufficient fire extinguishers shall be prepared to put out a fire immediately after its occurrence.

At construction site, there shall be various striking fire protection signs, and nobody shall smoke or bring match, lighter and other kindlings into construction site.

Various electric equipment shall be anti-explosive, like lights, motors, and electric switches, etc.

The stained cotton silk and clout, etc. used to wipe off paint shall be stored in closed barrel containing clear water collectively and properly, in order to avoid fire.

5. Traffic Management in Operation Period

The preventive measures for the dangerous wastes and flammable & explosive articles to be transported include:

(1) Classifying and separating dangerous article transportation units in warehouse;

(2) Package and package test;

(3) Hanging labels and signs to the packages containing dangerous articles;

(4) Conveying and fixing the containers containing dangerous article transportation units;

(5) Hanging labels and sign boards to transportation units;

(6) Transportation documents (such as bill of lading);
Appendix 1  Check List of Environmental Protection at Construction Site

World Bank-financed Jiangxi Poyang Lake Basin No.:  
and Ecological Economic Zone Small Town Date:  
Development Demonstration Project

Notes for filling out the table: This table is a general checklist for inspection of environmental protection during construction period of the “World Bank-financed Jiangxi Poyang Lake Basin and Ecological Economic Zone Small Town Development Demonstration Project”, and may be added or adjusted properly if necessary according to concrete sub-projects, local environmental status and relevant environmental protection measures.

Subproject name:                      Contract No. And subproject location:  
Name of project construction site:                          
Current construction stage:                                
Date of environmental protection inspection:                     Concrete time:  
Weather of inspection day:                                   
Environment inspector:                                      

<table>
<thead>
<tr>
<th>Inspection item</th>
<th>Inspection result(“√”)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Whether the construction organization planning of the engineering project presents effective measures for preventing and controlling atmosphere, water and soil, and noise pollutions, and improving environmental sanitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2 Whether the system of environmental protection, environmental sanitation management and examination for construction site has been established</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 Whether there are records about environmental protection and environmental sanitation management &amp; examination of the construction site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4 Whether necessary protective articles are provided and effective occupational disease prevention measures are adopted for operating personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5 Whether physical examination and training are provided periodically for personnel dealing with jobs with the danger of occupational diseases (relevant physical examination certificate and training record are required here)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.6 Whether dietary hygiene is ensured and measures for sunstroke prevention and cooling down, fighting colds by staying warm, preventing gas poisoning, and epidemic prevention, etc. are adopted for working personnel by combining with seasonal characteristics.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspection item</td>
<td>Inspection result (&quot;√&quot;)</td>
<td>Remark</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>1.7</strong> Whether the education, training and assessment on operating personnel at construction site include the laws and rules on environmental protection and environmental sanitation, etc. (relevant records, etc. are required here)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specified in detail)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **2.1** Whether proper measures are adopted to eliminate the hidden troubles for safety discovered in time | | |
| **2.2** Whether dangerous articles and explosive articles are used according to operating procedures. | | |
| **2.3** Whether all hoisting equipment, electrical appliances, conveyors, girder erecting equipment, high-voltage circuits, and pressure vessels, etc. are subject to strengthened maintenance and examination to ensure that they are always in good operating status and have perfect safety devices; whether the periodic examination by special personnel on each part of the system is improved, and whether the work is done strictly according to operating procedures. | | |
| **2.4** Whether the body frame is leveled up to maintain stability during the construction of bored piles; whether persons other than working personnel enter into the punching area during the work of impact drill; and whether the drilling head is put at a safe place during test of drilled holes or coming-out of slurry from holes. | | |
| **2.5** During construction, pay attention to whether the construction site is too close to water bodies, whether waste water is drained into water bodies directly, and whether solid wastes are poured into water bodies. | | |
| Others (specified in detail) | | |

| **3.1** Whether the construction of bridge and culvert is conducted in low water period, and whether the construction time is shortened at the largest degree to reduce the disturbance on water bodies. | | |
| **3.2** Whether the process for construction of bridge and culvert is standardized, namely the piers for the main bridge are constructed with steel sheet cylinder cofferdam, and the bridge approach in shoal area is constructed with soil bag cofferdam, in order to reduce the pollutions to water environment during construction period; whether the interim cofferdams in construction area are cleared off in time after completion of construction, in order to avoid affecting flood drainage. | | |
### Inspection result

<table>
<thead>
<tr>
<th>Inspection item</th>
<th>Inspection result (&quot;√&quot;)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Not involved</td>
</tr>
</tbody>
</table>

3.3 Whether the machines and ships adopted for construction are examined strictly during the construction of bridge and culvert, in order to avoid leakage of oil products; whether the sewage, garbage, and oil-stained water in cabin are thrown into water bodies, or collected and then treated together with the pollutants at the worksite of bridge.

(1) Determine the drainage direction according to the construction plan and the master plan of drainage, as well as the natural landform, dig the gutter according to the regulated gradient, and connect the drainage facility with the municipal pipeline network, in order to ensure smooth drainage.

(2) Ensure the expedite state of road, harden the road surface according to actual situations and make it higher and arched according to requirements, and set up drainage ditch.

(3) As concerning the protection of raw materials, finished products and semi-finished products, examine materials warehouse comprehensibly and periodically, maintain it in time, ensure solid footing of wall and good drainage in surrounding areas, and prevent leakage of rainwater. Also, take corresponding rainproof measures for storage of steel products, etc., and ensure the quality safety of materials.

(4) Strengthen safety examination, in order to discover problems in time.

(5) Execute frequent examination on the main body of bridge structure, scaffolds, power supply for construction, hoister, formwork supporting system, rainproof shed of each small machine, as well as interim facilities and safety sign board, in order to discover and eliminate problems, and repair the damaged places in time.

(6) The materials moistened by rainwater shall be treated prior to use.

(7) In case of rainstorm, stop outdoor construction, and working personnel shall move to a safe place; and in case the air temperature is over 40℃, stop outdoor work.

(8) Strengthen the training and education on various types of personnel, reinforce the learning of common sense about safe construction in summer, and raise self-protection ability and emergency reaction ability.

Others (specified in detail)

5.1 Whether dangerous article transportation units are classified and separated in warehouse;

5.2 Whether the package is tested;
<table>
<thead>
<tr>
<th>Inspection item</th>
<th>Inspection result(“√”)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3 Whether labels and signs are hung to the packages containing dangerous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>articles;</td>
<td></td>
<td></td>
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<tr>
<td>5.4 Whether the containers containing dangerous article transportation units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>are conveyed and fixed;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 Whether labels and sign boards are hung to transportation units;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.6 Whether there are transportation documents (such as bill of lading);</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Others (specified in detail)

Signature of on-site inspector: __________ Signature of the person in charge of environmental supervision: __________

NOTES: ① In “Remark” column, it is available to fill out the problems discovered, to describe the noncompliance, and to bring forward suggestions on rectification and prevention, etc.;

② In case the measures are discovered in on-site examination to be disqualified or have some points to be improved, the environmental supervisor shall issue the “Environmental Rectification Notice” to contractor immediately, and record the serial number of the “Environmental Rectification Notice” in remark column. The contractor’s rectification shall be recorded in detail separately.
Map 1  Project Location Map

Location Diagram of Counties Involved in the World Bank-financed Jiangxi Poyang Lake Basin and Ecological Economic Zone Small Town Development Demonstration Project