

questions to be responded to by the firm submitting the application

Why do you think this project should receive an award? How does it demonstrate:

- innovation, quality, and professional excellence
- transparency and integrity in the management and project implementation
- sustainability and respect for the environment

In the past thirty years, China attracted worldwide attention upon its high economic growth, but such conflicts as land shortage, energy poverty, environmental pollution and low efficiency of investment during urban development became prominent increasingly. Although these conflicts can be relieved by constructing rail transit, they also caused rail transit to be unsustainable. In the twenty-first century, energy conservation, environment protection, economy and high efficiency became the goals of rail transit constructors. Therefore, we proceeded bold explorations and practices in the project of Shenzhen Metro Line 3 and found out the initial solutions that provided references for the industry.

1. Advanced technologies learned from other projects and developed by our own

1) Henggang double-layer rolling stock depot and comprehensive property have been developed.

Double-layer arrangement has been adopted for Henggang rolling stock depot. The under layer is for parking while the upper layer is for inspection and maintenance, and a comprehensive property was developed over the Metro line. The whole building is equivalent to adding a residential community like a tower forest onto a 23.9m high double-layer elevated structure, which integrates industry, commercial and residential and business supporting functions into one. There is no international precedent.

Due to the double-layer arrangement, the parking area and maintenance section are divided that is more convenient. The land use is reduced from the originally planned 28.28 hectare to 18.05 hectare, saving 36% of the land. Meanwhile, the

Transfer and around the Metro line has been carried out with gross land use of 19.68 hectare and overall floorage of 515,000 m². It is a development model of comprehensive property for rail transit. It is expected that the land revenue and development profit will exceed RMB 3.5 billion within 15 years.

2) Diversified urban rail transit junctions have been completed.

Futian junction, with overall floorage of about 270,000 m², is the first real underground transportation junction in China, where Guangzhou-Shenzhen-Hong Kong passenger dedicated line, 5 metro lines and many bus and taxi lines meet. The transfer complex of Laojie station is the first parallel transfer station with a same platform for top and bottom lines in the Mainland of China, with transfer passenger flow of 78,000 people per day; Buji junction, an important and comprehensive transportation junction in the east of Shenzhen and with an occupied area of only 4.88 hectare, has adopted the grade separation of elevated line (Metro Line 3), ground lines or spaces (Guangzhou-Shenzhen railway line, city square, bus lines) and underground lines (Metro Line 5).

3) Several engineering innovations have enriched the planning and construction technologies for rail transit projects in dense district of city.

Shield tunnel of top and bottom overlap with a minimum net diameter of about 1.6m is adopted for the adjacent sections of Laojie station, which passes through the buildings on the 998m-long stratum that is completely weathered and water permeable.

Under the conditions of non-stop operation, active pile foundation underpinning was performed for the continuous beam bridge and continuous rigid frame bridge of Guangzhou-Shenzhen railway with a maximum speed of 200km per hour that guaranteed the operational safety of railway.

Technologies of discharge and decompression, with higher technical level, were adopted for underground public parking lot with area of 36,000m² constructed simultaneously with Yitian station to reduce the engineering investment and accelerate the construction progress.

as the degraded mode of CBTC, has been adopted

and its performance is safe and reliable after 3-year operation carrying passengers.

Single-shaft tunnel ventilation system was adopted creatively for the underground station with one less shaft installed at each end in each station, compared to traditional bi-shaft tunnel ventilation system. In 13 underground stations for the whole line, 26 shafts and their corresponding noise resources are reduced so that land area of 520m² and investment of nearly RMB 50,000,000 are saved.

2. Laying emphasis on harmonious living environment, energy saving and environmental protection

1) A Half-open design with skylight has been adopted for the underground parking space of the city center park. Full utilization of natural ventilation and lighting fulfills the requirement of energy saving, fire-fighting and disaster relief. Meanwhile, the Park has been upgraded and rebuilt to meet the dual functional requirements of urban green land protection and metro parking arrangement.

2) Caopu main substation is arranged under the enclosure ground of the interchange ramp and the ground is afforested. Isolation space formed by the surrounding roads is fully used and advanced equipment like gas insulating transformer has been adopted to minimize the impact from environmentally sensitive facilities on the nearby residents. This method has brought the value of municipal common land into full play and become a significant guideline for the site selection of the main substations.

3) The design philosophy of unified structural form with natural ventilation has been adopted for the elevated station to increase the construction efficiency and reduce the investment and maintenance cost of the project. 3:1:1 ratio of length-width-height has been adopted for the elevated bridge to realize the best balance of technical economy and landscape. In the meantime, the vibration and noise have been effectively isolated with multiple and comprehensive measures like rolling stock, track, bridge and sound barrier. On the highly urbanized Shenzhen development axis, the 24.83km long elevated bridges and ground lines have been



3. The principles of transparency and integrity have been maintained

1) The competitive tendering with transparency, fairness and high efficiency has been adopted for project consultation service; taking intensive survey, meticulous design, first-rate service, scientific management, technical innovation, continual improvement as quality policy, China Railway Eryuan Engineering Group Co. Ltd. (CREEC for short) has provided professional, objective and fair services of survey and design technologies.

2) World-class consultation appraisal agencies like PB Asia, Atkins, Mass Transit Railway, MTR have been invited to evaluate and demonstrate the technological achievements so that rationality, reliability, transparency and publicity of technology can be realized.

3) In the whole process of project, namely, planning, survey, design, tendering, construction and procurement, CREEC has maintained the professional ethics of consulting engineers, guaranteed the publicity and transparency of information, provides the best technical services for the owner and maintains the owner's interests.

4) The total settlement amount of the project investment are RMB 15.459 billion, saving RMB 1.181 billion compared to the planned investment. The use of project funds is standardized and reasonable..

4. Providing society with impetus of sustainable development

After 8 years of construction, this Metro, 41.7km long with 30 stations completed on the eastern development axis of Shengzhen, has brought obvious social and economic benefits.

1) Covering a land area of about 50sq. km along the line, this Metro serves about 4 million residents, with the land value enhanced by 150% after completion, and meanwhile it provides jobs for 2500 persons directly.

2) The transit time between Shenzhen core district and Longgang subcentral district has been shortened to 45minutes, forming a sharp contrast to more than 2

f metro has promoted the renovation of roads along and around the line. The car speed on ground in the elevated section is increased to 50~60km/h from 20~30 km/ h before.

3) By the end of 2014, with the average daily passenger volume of 560,000, the total passenger volume had accumulated to 620 million, among which, the total passenger volume was over 20 million during the 2011 Summer Universiade.

4) In 2014, excluding the train traction power supply, the electricity consumption of the equipment of this line was 63,800,000kWh, which saved 19,800,000 kWh power utilization (about 35% energy is saved per kilometer of main track) and saved operating cost of RMB 17million compared with the Metro Line2 (about 36km long with 29 stations) opened and put into use during that period. By the end of 2014, the total income of tickets had reached about RMB 2 billion and the balance of 140 million had been achieved.

Shenzhen Metro Line 3 has obtained the Prize of Chinese National Science-technical Progress, Zhan Tianyou Grand Prize for Civil Engineering Award, the Prize of Chinese National High Quality Project and other prizes, which is a paragon of energy saving and environment protection, economy and high efficiency, sustainable development for rail transit in China..

What services did the member firm provide to the project? Please describe briefly.

China Railway Eryuan Engineering Group Co., Ltd., the firm submitting this application, was the general contractor of the project, who provided overall technical consulting service on survey and design, and assisted the owner in performing construction tendering, procuring equipment, cooperating with construction contractors, performing system joint commissioning, and conducting acceptance inspection upon completion and trial operation.

Please use additional pages as needed. Maximum 5 pages per project.