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

Chongqing-Lichuan Railway starts from Chongqing and ends at Lichuan, Hubei, via Changshou, Fuling, Fengdu and Shizhu and is a part of ChuanHan Railway planned in “Nation-building Strategy” of Dr. Sun Yat-sen in 1919. No railway in China can be paid more attention to by the Government and the people along the line Chongqing-Lichuan Railway. Although it is not the longest railway in the world, it is indeed a railway that the Chinese people have dreamed of building since the beginning of last century. Though it is not the fastest railway, it is a “quick way” leading the underdeveloped area to get rid of poverty and become better off. Though it is not the most difficult in the world, it tops the world in several aspects.

The project lasted for 11 years from engineering consulting in 2002 to completion in 2013. Breakthroughs in technology have been made in “Route Selection Scheme for Disaster Alleviation in the Kast Area”, “Railway Bridge with High Pier and Long Span in the Dangerous Mountain Area” and “Backfill Reclamation Work in Xienanxi Valley in Fengdu County”. The project won a national consulting achievement prize, created seven world records and registered 26 patents in China.

1. Conquered technical difficulties, realized important innovations and created several world records

1) Making breakthrough in the disaster reduction techniques of route selection in high-pressure and water-rich karst area.

The line passes four 78km-long, high-pressure and water-rich, highly karst-developed zones with their cores being the strip-shaped middle and lower mountain anticlines of soluble rocks such as limestone, dolomite limestone. The features and patterns of developed and water-rich karst have been grasped through analyzing causes for the disaster cases and risks encountered in the construction of
the previous projects in the adjacent areas. Based on the technological path and method of disaster reduction and route selection and the highly karst-developed area and the distribution rule of underground water were obtained by taking comprehensive exploration measures, the design strategies were determined as “Raising the route level, selecting a route passing through the safe belt of underground karst water and seepage zone, making it as close to existing works as possible, providing advance geology forecast to the construction and adopting necessary grouting to plug water. The possible disaster risk section and disaster type on the line were analyzed and deduced, and then deep geological radar and drill were used on such sections for initial verification and judgment. After optimizing the route selection for many times, the economically feasible design schemes with controllable less risks were selected, which reduced the disasters. The prominent disasters of water burst and soil gushing, surface water loss and environment degradation during tunnel construction in high-pressure water-rich karst-developed area. The evaluation on the disasters and risks caused by these four 78km sections were verified during the construction, which meant breakthrough was made in the disaster reduction techniques of route selection and created a record of “zero accident and zero casualty” during the tunnel construction in highly-developed karst area.

2) The innovative technologies to build high-pier and large-span railway bridges in the dangerous mountain area have remarkable effects.

The line passes across the Yangtze River and its several branches and several deep valleys. According to the characteristics of topography and geology, a complete set of design and construction method featuring high-pier and long-span bridge was adopted. It is the first time to use the “A-type” and “Herringbone-type” high-pier and long-span structures in the railway bridges. Caijiagou Super Major Bridge is a rigid frame-continuous composite concrete railway bridge with the highest “A-type” pier of 139m in the world. Xinqiao super-major bridge is a rigid frame-continuous composite bridge with the longest continuity in the world, of which the main span is 52m+7×96m+52m rigid frame continuous composite and four main piers are higher than 100m (the highest one up to 116m). Hanjiatuo Super Major Bridge across Yangtze River is a steel truss cable-stayed double-line railway bridge with the longest...
span and the lightest mass and the maximum design speed (200km/h) in the world, of which the main span is 432 m, the steel weight per linear meter is only 19.4t and the dead load per linear meter is only 39.4t. To build the bridges with high pier and long span in the dangerous mountain area, 5 world records were made and 12 inventions were patented, which has promoted the progress of construction technology for the high-pier and long-span railway bridge and formed a complete set of key construction technology for superhigh bridge pier.

3) Technical difficulty of backfill reclamation works in Xienanxi valley in Fengdu County has been conquered through adopting innovative technologies.

Chongqing-Lichuan Railway passes through Xienanxi valley in the planning Fengdu New County. In order to save urban land, the 32m-high bridge across the valley in the preliminary plan was changed to the high embankment, on which an open cut tunnel was built and then 120 hectare of land was reclaimed through backfill. The embankment backfill technology in the project has conquered many technical difficulties such as heavy backfill load, deep foundation and strict settlement control, etc. The new type of double-deck concrete open cut lining structure system is the pioneer in China which can effectively control temperature cracking caused by hydration heat. The design scheme for open cut tunnel won Gold Award in the 3rd Global Competition/ Exhibition on Systematic Innovation and 5 inventions have been patented in China.

4) Demonstrative significance in environmental protection and soil and water conservation:

The railway passes along the upper and middle reaches of Three Gorges Reservoir Area where the natural environment is good. Measures such as Passing through Karst Area to Decrease the Surface Water Loss from the Karst Tunnel, Detouring Natural Reserve Areas, Tunnel's Entry Early and Exit Late, More Bridge in Embankment Section, Less Excavation in Side Slope, etc. were adopted in the project. The length of bridge and tunnel accounts for 81% of the whole line. This Project was the first one to establish an environmental management system consisting of design, consultation, building, construction, engineering supervision and environmental regulation in China and a green design system, which established a linkage.
mechanism linking the railway construction with the urban construction along the line and successfully reused the railway spoils to reclaim the valleys in urban planning region. It realized the harmonious coexistence between engineering construction, environmental protection, water and soil conservation and urban construction along the line and finally created a “multi-win” situation, the comprehensive benefits exceeds 160 million dollars.

2. Adhering to the transparency and integrity requirements specified in FIDIC in the whole process

1) FIDIC ideas have been reflected and demonstrated in the whole project, including the consulting services, the bidding process and the purchase. The consulting services was contracted through the competitive bidding in a transparent and efficient way so that the consultants can provide the owner with professional services, objective and unprejudiced advices to defend the interests of the owner.

2) Overall process audit was adopted to ensure the rational use of fund. All engineers have maintained the integrity honor and dignity of their profession.

3. Remarkable social, economic and environmental benefits

The construction of Chongqing-Lichuan Railway, which offers nearly 5,000 jobs each year directly and ten thousand jobs indirectly during its 5-year building, increases the income of the people in the mountainous area along the line by a hundred million Yuan.

34.65 million people along the line directly and 173.31 million people in Hubei Province and Chongqing Municipality indirectly benefit from the line since its completion. The Chongqing-Lichuan Railway has been promoting the exchange between minorities such as Tujia people, Miao people along the line and the outside world and the culture of the minorities.

The line has changed the travel and freight transport and reduced the dependence on road transportation, which remarkably reduced the oil fuel usage. About 73,000 tons fossil fuel and 245,000 tons of carbon emission are reduced compared with road transportation each year, hence reducing the environmental pollution. Coal, petroleum products and fuel gas can enter the mountainous areas by an economical, rapid and convenient way, changing the energy structure of
mountainous areas, reducing and eliminating the consumption of firewood, which is in favor of the protection and recovery of forest vegetation.

The passenger volume of the railway amounts to 4.8 million person-time since its operation one year ago; the transportation “engine” has significant driving effect on local economy, which is promoting the economic and social development in Chongqing and Hubei Province. Specifically speaking, the Gross national product of Chongqing grows from 82.2 billion dollars in 2008 to 280.1 billion dollars in 2014, increasing by 15% in average annually, with the per capita disposable income growing from 2533 dollars in 2008 to 4053 dollars in 2014. The Railway leads to the eruptible development of characteristic tourist industry in underdeveloped minority areas, with increasing number of tourists to and Lichuan City. The tourist income in Shizhu County grew from 19.35 million dollars in 2008 to 0.42 billion dollars in 2014 and that grew from 21.85 million in 2008 to 0.422 billion dollars in 2014 in Lichuan City. The per capita GNP of Shizhu County, a state-level poverty-stricken county, grew from 1475 dollars in 2008 to 4890 dollars in 2014. People’s livelihood in these former revolutionary base areas has been greatly improved; and people in the remote mountainous areas have quickened their pace to well-off lives, which contribute a lot to the cause of eliminating poverty 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.