From Beijing to Lhasa

China’s Railway Across the Roof of the World

A tribute to the world’s greatest railroad builders.

Author: Eddy Cheong
Challenges

Since the founding of the Republic of China by Dr. Sun Yat-sun in 1911, it has been China’s dream to have a national railway system connecting all provinces of the nation.

Tibet became the last province to remain unconnected owing to great and insurmountable obstacles. Since the 1950s, among the many challenges facing Chinese railway planners, the following were the most significant:

- Formidable mountain barriers
- Unstable permafrost & swampy wetlands
- A Fragile Ecosystem
Question:

How do you build a railway across these mountains to China’s most remote province, Tibet?

This is the legendary “Mother of Thousands of Mountains.” American writer Paul Theroux once prophesied that this “formidable mountain range that divides Tibet from the rest of China would guarantee that a train to Lhasa - which China has dreamed of since the 1950s – will never be built.”

About 85 percent of the entire rail track is located in the “Forbidden Zone.” This is also known as the “Death Zone” because of thin air, harsh and unpredictable weather, fierce sandstorms and high UV radiation. Annual average temp is minus zero. Temp drops to as low as -45 degree C. Average altitude of rail track here is 13,500 feet above sea level. The highest point is 16,700 feet making it the world's most elevated track.

When constructing the Fenghuo Mountain Tunnel - 16,000 ft above seal level – workers had to be equipped with oxygen cylinders. An oxygen-producing station to “feed” the tunnel was built. Seventeen such stations were built along the railway line equipped with high-pressure oxygen cabins for workers to recover.
There were 17,000 ft-high mountains to climb, 12 kilometre-wide valleys to bridge, hundreds of kilometres of perennial ice and slush that could never support tracks and trains. How could anyone tunnel through rock at -40C, or lay rails when the least exertion sends you gasping for oxygen in the thin air?
Unstable Permafrost

There is a total of 550 km of permafrost along the rail route. Permafrost is soft and wet soil in summer, hard and expanding in winter - a nightmare for all railroad engineers.

• The most viable solution is the building of stone embankments for the railroad foundation. In some places, engineers bury ventilation pipes in the ground to allow cold air to circulate underneath the rail-bed.

• In other spots, a pipe called a thermosiphon is sunk 15 feet into the ground and filled at the bottom with ammonia. The ammonia becomes gas at low temperatures, giving off a vapour that draws heat from the bottom of the tube and flushes it out the top.

• Building a bridge over the permafrost. This has the least impact on the area, but is also the most expensive. E.g., The 11.7km Qingshuihe Bridge is the world-longest bridge built on permafrost.

• A round-the-clock monitoring system has been installed to keep tab on the temperature change along the 550 km permafrost stretch of the route.
Environmental protection of fragile ecosystem:

Some RMB2.54 billion was invested by Chinese authorities in the environmental protection in the project.

• Protection of the ecological environment has been an essential concern in the design. The routes were selected so that they would keep away from the major habitats of wild animals. E.g. the original route was abandoned because it passed through the reserves of black-necked cranes. While in some other places like the section cutting through the Hohxil, Qumar and Soga nature reserves, the planners minimized disturbance to the nature reserves for endangered Tibetan antelope and wild ass by building 25 passageways for wild animals based on their migration habit.

• Reducing adverse impact on ecological environment to the minimum during rail construction.

• All the train cars are installed with environment-friendly toilets, wastewater deposit tanks and garbage treatment facilities to protect the environment along the route.
Beijing West – this is where our story begins
Beijing West Railway Station is the first leg of our train adventure to Lhasa.
Fellow traveller, Joey points to the sign that reads, “Beijing West to Lhasa.”
For environmental protection purposes, all trains entering China's Tibet province are equipped with garbage compacters and vacuum toilets. No garbage are allowed to be left behind after the trains leave. In this photo, you can see workers collecting toilet wastes from a train on the Qinghai-Tibet Railway utilizing vacuum flush technology at the station in Golmud.
The Qinghai-Tibet railway stretches for 1,956 kilometres from Xining, capital of Qinghai Province to Lhasa. It cost the Chinese Govt approx. USD4.1 billion and was completed in June 2006 – one year ahead of schedule.
Protection of the fragile environment is an important priority for China’s rail planners.
Joey enjoys the changing scenery outside her window.
Tibet is China's most remote province and has been part of China since the time of Emperor Kublai Khan. The Qinghai-Tibetan Plateau is the home of the chiru—Tibetan Antelope. Chiru is a highly protected animal in China. Four national protected areas have been set aside specifically to safeguard Tibetan Plateau wildlife species, including chiru populations and habitat: Chang Tang Nature Reserve, Xianza Nature, Kekexili National Reserve, and Arjin Shan Nature Reserve.

Despite legal protection of the highest order, the population of chiru is continually on the decline and today the species is extremely endangered. Poaching is the main threat. It is being slaughtered illegally for its wool which is known in the international market as "shahtoosh" or "king of wool." Due to remoteness however, these nature reserves are incapable of effectively protecting the chiru or its habitat.

Shahtoosh is considered to be one of the finest animal fibres in the world and shahtoosh shawls and scarves have become high fashion status symbols in the West, selling for as much as $10,000 each. Wool is smuggled from Tibet mainly to Kashmir where it is woven into an extremely fine fabric from which the shawls and scarves are woven. Although the chiru is protected in China, it is still legal to weave shahtoosh in India.
Western cuisine is available on the menu.
Service on the train is excellent. Friendly staff provides daily refreshments of fruits, snacks and drinks with a smile.
Passengers do not suffer high altitude sickness because the carriages are all fully air-conditioned and pressurised like an airplane. Oxygen masks are also available in your sleeping cabins as well as throughout the train corridors and washrooms if ever required.
Pretty scenery and wholesome hot meals are available on your menu.
Targeting environmental issues of the Tibet Plateau high-altitude eco-system, authorities budgeted some 8% of the total construction cost - at least RMB2.54 billion (US$180 million) - for ecological conservation, the biggest amount of all China's railway construction projects. Since most livestock and wild-life are free-grazing, the railroad has been elevated in most places. If not, it utilizes fencing and tunnels cut under the tracks.
Kunlun Mountain Tunnels
Building a bridge over the permafrost. This has the least impact on the area, but is also the most expensive. The 11.7km Qingshuihe Bridge is the world-longest bridge built on permafrost.
Animals graze peacefully – oblivious to our passing train.
Wherever possible, the rail line is elevated to allow passage to migratory species (e.g., wild antelopes) and to minimize any other adverse impact on the natural environment.
Timeless beauty of Lake Namtso
The train ascends to an altitude above 5,000 meters – more than 16,000 feet.
The total length of Qingzang railway is 1,956 km. The line includes the Tanggula Pass, at 5,072 m (16,640 feet) above sea level, the world's highest rail track. The 1,338 m Fenghuoshan tunnel is the highest rail tunnel in the world, at 4,905 m above sea level. The 3,345-m Yangbajing tunnel is the longest tunnel on the line.
Stopping by to take a photo with a glacier as the backdrop
Our train passes glaciers and snow-capped mountains on the way to Lhasa.
Right from the start, related departments of railway design and construction paid close attention to environment protection. Measures included setting aside of passage ways for migrating Tibetan antelopes.
Other wild life such as bears and wild donkeys have now successfully adapted to the presence of the rail line.
Yaks grazing peacefully as train hurtles past.
Bewitching beauty of blue Yamdrok Lake
Our train passes by Patola Monastery on the way to Lhasa Railway Station
With the opening of the Qinghai-Tibet Railway and the new Nyingchi airport, tourists flood into Tibet and the numbers exceeded 4 million last year, an increase of 60 percent.
Lhasa Rail Station Lobby
Lhasa Railway Station
Lhasa Station - looking more like a 1st-Class airport terminal than a railway station.

According to my local Tibetan Tourist guide when I was in Lhasa, she told me that Tibet's economy has never been self-sufficient enough to give its people a meaningful life. Every year, Tibet suffers from a perennial budget shortfall and therefore, relies heavily and wholly on federal funding from the central Govt. Thanks to Beijing, development and prosperity has finally arrived in this remote Chinese province. I saw miles after miles of impressive roads, expressways, bridges, railways and other top-notch infrastructure.

The Central Govt poured more than USD$4 billion into the construction of this railway system alone – the most costly in the world.
Tibet is China’s most remote province. It has been part of China since the Yuan Dynasty (1279 – 1368 AD). The Nationalist Kuomintang Govt under Chiang Kai-Shek was too poor to look after itself - let alone a distant mountainous province such as Tibet. Contrary to western propaganda however, Tibet under the Dalai Lama was a slave society where the privilege lamas owned everything. Tibetans were indoctrinated by Lama Buddhism to accept their lives as servants and slaves to the powerful and wealthy lamas who lived a life of luxury. Chairman Mao changed all that when he established effective control and administration after he defeated Chiang and proclaimed the founding of the People’s Republic of China in October, 1949.

With the covert backing of the CIA, the Dalai Lama fled to India in 1950 with a handful of followers. The Dalai Lama has publicly admitted that till today, he is still under the payroll and patronage of the Americans. The US puppet lives in self-exile in India today where his group of die-hard supporters continue to receive arms, training and funding from the US Administration.
A new bridge across the Tsangpo river to the railway station
Checking into our hotel at Lhasa
Lhasa River Bridge connects downtown Lhasa with the new railway station.

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E. Cheong
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