

Study on Engineering Technology of Ruili Lashio Highway between China and Myanmar

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Abstract: In recent years, one belt, one road initiative has been put in place by Yunnan Province, and the investment in transportation infrastructure has been intensified. One belt, one road, one of the six major international economic corridors, is an important measure to strengthen regional cooperation between China and South and Southeast Asian countries. Ruili Lashio section of China Myanmar highway is an important part of it. Therefore, an in-depth study on China Myanmar highway channel is carried out.

Keywords: China Myanmar highway, "One belt, one road", route, highway engineering

1. Introduction

The Silk Road Economic Belt and China's one belt, one road and the maritime Silk Road in twenty-first Century, are the new pattern and new mechanism that China has to take up to the profound changes in the global situation and promote the political mutual trust, economic integration and cultural inclusion of the countries along the "one belt and one road" initiative. One belt, one road, one of the six major international economic corridors, is an important measure to strengthen regional cooperation between China and South and Southeast Asian countries [1,2].

Bordering on China, Thailand, India, Bangladesh and Laos, Myanmar is the second largest country in Southeast Asia [3]. China has become one belt, one road, the one of the "one belt, one road" connecting the southeast route of South China Sea to Southeast Asia, the South East Asia and the Middle East. It is also an easy way to China's India ocean. It is of great significance in the process of "one belt and one road". Burma is a new land route. In recent years, Myanmar has always pursued the surrounding policy of "good neighborliness, security and prosperity", actively participated in the construction of Asian Expressway and trans Asian Railway, promoted the interconnection with surrounding regional infrastructure, and continuously deepened China Myanmar economic and trade cooperation.

As a Southwest Frontier Province, Yunnan has the regional advantage of shouldering the two oceans (Pacific Ocean and Indian Ocean) and connecting Southeast Asia and South Asia. Under the overlapping of one belt, one road is to build up an open window for China's Southeast

Asia radiation center and Yunnan. Yunnan is closely connected with Myanmar. There are six border states and cities in the territory, including Nujiang Prefecture, Baoshan City, Dehong Prefecture, Lincang City, Pu'er City and Shuangbanna Prefecture, bordering Myanmar. Five first-class ports, namely Houqiao, Ruili, buting, Qingshuihe and Daluo, and six second-class ports, namely Pianma, Zhangfeng, labang, Nansan, meng'a and Yonghe, are distributed along the 1997 km border line to engage in border trade with Myanmar. In 2018, the total trade volume between Yunnan and Myanmar reached US \$6.59 billion, accounting for 43.2% of the total trade volume between China and Myanmar. It is an important node and portal for China and Myanmar to realize economic and trade exchanges [4,5].

As an important province of China's border opening to the outside world, Yunnan, in order to implement the important instructions of general secretary chairman at the Forum on peripheral diplomatic work, should strengthen the important instructions on interconnection and interconnection with neighboring countries, and actively integrate and serve the national strategy [6]. One belt, one road, is to develop the transportation first mechanism in accordance with the development requirements of the comprehensive transportation development plan (2017-2030 years) for the South East Asia radiation center (the year of) and the development and opening plan of Yunnan province's border areas (2016 - 2030), and expand the strategic fulcrum of "one belt and one road" in the demonstration area of transport power, and expand the normal economic and trade exchanges between China and Myanmar. Deepen the interconnection of transportation infrastructure, better benefit the people of the two countries and contribute to the leapfrog social and economic development. We conducted in-depth research on the China Myanmar highway channel.

2. Significance of Transportation Infrastructure Interconnection

2.1. It is an Important Support for Consolidating and Developing China Myanmar Friendly Relations and Achieving Mutual Benefit and Win-Win Results

China and Myanmar are linked by mountains and rivers and borders. They have close historical and cultural ties and have been in friendly relations for a long time.

2020 marks the 70th anniversary of the establishment of diplomatic relations between China and Myanmar. China Myanmar relations have developed to the height of comprehensive strategic cooperative partnership, and the willingness of the two countries to strengthen cooperation has generally increased.

Accelerating the construction of transportation infrastructure interconnection between Yunnan and Myanmar is the material premise for comprehensively deepening the cooperation between China and Myanmar in politics, economy, security and people to people and cultural exchanges. Through transportation first guarantee, we can comprehensively drive the exchanges at all levels of society, jointly create an open, mutually beneficial and win-win situation in the new era, and effectively transform the complementary advantages of geography and economy into practical cooperation results, Deepen regional economic cooperation, take transportation infrastructure as the link, promote policy communication, smooth trade, currency circulation and people to people connection between the two countries, and further consolidate and develop China Myanmar friendly relations in a win-win mode.

2.2. Opening Up New National Transportation Channels

In recent years, with the accelerating process of economic globalization and the rapid development of China's economy, China has become the largest commodity trading country in the world. At the same time, the total consumption of energy and resources has increased rapidly, and the dependence on foreign trade import is higher and higher. China's existing foreign transport channels are mainly concentrated in the eastern coast, mainly by sea. The mode of transport is relatively single, which is greatly affected by the world political pattern and climate disasters. It is urgent to open up a new channel for foreign trade.

"One belt, one road" is one belt, one road and the other is to realize interconnection between Yunnan and Burma. Taking advantage of the existing internal and external land transportation facilities at the border port, and in combination with the Nujiang Salween River, Ruili River, enowaddy River and other international channels, we have jointly built a number of major land water intermodal channels between China and Myanmar, combined with the China Myanmar international routes, built a regional comprehensive three-dimensional transportation network, accelerated China's integration into the Asian comprehensive transportation network, and can effectively radiate South Asia, Southeast Asia and the Middle East, One belt, one road, is a fast track to India ocean.

2.3 Effective ways to achieve coordinated development among regions and promote economic integration

Myanmar borders Southeast Asia and East Asian countries to the East, South Asian countries to the West and the bay of Bengal to the south. It is an important land hub connecting South Asia, East Asia, Southeast Asia and the bay of Bengal, with important geographical and

geographical advantages. At the same time, Yunnan has a relatively complete social and economic system. Compared with the surrounding countries, some industries have obvious competitive advantages, and there is also a certain demand for foreign trade. It needs to carry out industrial transfer and complementarity with the surrounding countries.

In the context of global regional cooperation and integration, improve the interconnection level of transportation infrastructure and traffic service capacity between Yunnan and Myanmar, actively integrate into the construction of Bangladesh China India Myanmar economic corridor, and boost investment and economic and trade cooperation among important node cities on the corridor, which will help Myanmar transform its geographical advantages into economic advantages, Create a more open economic development and investment environment to drive the development of the national economy; On the other hand, it will help Yunnan to open up domestic and international markets, gather bilateral production factors, realize the outward transfer of advantageous industries and excess capacity, introduce foreign characteristic means of production and transfer inland, so as to drive a new round of economic growth. The combination of the two is conducive to building a cross-border industrial chain with complementary advantages and reasonable division of labor, promoting industrial cooperation and economic integration, realizing coordinated development among regions and promoting the process of economic integration.

3. Research on Highway Engineering Technology

3.1. Current Situation of Road Network

The China Myanmar Ruili Lashio highway is located in the Haiphong Hanoi Yuechi Laojie Hekou Kunming Ruili Muse Lashio Mandalay (AH14) channel of the Asian highway network, and also in the Fangchenggang Kunming Dali Ruili Mandalay channel (R4) of the northern economic corridor of the Greater Mekong subregion, At the same time, it is also an important channel connecting the second East-West economic corridor of GMS (Greater Mekong) subregional cooperation. At present, AH14 road in Myanmar is Myanmar National Highway NH3. The current road grade is low, especially the winding mountain roads in mountainous areas, which are substandard roads. The pavement is seriously damaged, the bridge facilities are old and beyond their service life, and the bearing capacity is limited.

3.2. Technical Standard

According to the function of the project, road network planning and its role in Myanmar's economic development, combined with the successful signing of the China Myanmar transportation agreement, the opening of all sections of China Myanmar highway, the sustained, rapid and steady development of Myanmar's national economy, the timely development of Kyaukpyu port and economic development Zone, and the optimistic condition of maintaining the current situation of local

roads along Myanmar, the predicted value of traffic volume in the last year is designed, Taking full account of the comprehensive transportation system, short-term demand and long-term development of the project area, it is recommended that the main line of the route be constructed according to the standard of four lane expressway, with a design speed of 80 km/h and a subgrade width of 25.5m.

3.3. Construction scale

The recommended route has a total length of 241.1km, is constructed according to the expressway standard, and the subgrade is 25.5m wide.

Subgrade Earthwork: the total Subgrade Earthwork of the whole line is 38150.67 thousand cubic meters, including 9082.030 thousand cubic meters of excavated earthwork, 17427.97 thousand cubic meters of excavated earthwork and 11640.66 thousand square meters of filled earthwork. The average Subgrade Earthwork per kilometer is 197.28 thousand cubic meters. The protection and drainage works are 10934.294 thousand cubic meters, 61.232 thousand square meters of prestressed anchor cable slope protection, 30.408 thousand square meters of anchor frame beam slope protection, 80.69 thousand square meters of SNS active anti falling net slope protection, 962.262 thousand square meters of cast-in-situ concrete arch grid grass slope protection, 2277.051 thousand square meters of mortar rubble arch grid grass slope protection, and 75.141 thousand square meters of three-dimensional network grass slope protection. Special subgrade treatment 35.19 km.

Bridge and culvert works: 3 super major bridges with a length of 3700m; 92 major bridges (34530m); 1520m / 20 medium bridges; 17 small bridges 510m long; 790 culverts.

Pavement works: 2217.5 thousand square meters of cement concrete pavement are provided for the whole line.

Tunnel engineering: three tunnels with a total length of 3730m are set along the whole highway section, including two long tunnels with a length of 3160m and one medium tunnel with a length of 570m.

Intersection project: one interchange is set along the whole line, that is, the interchange in the east of Nongdao. There are 15 level crossings, 10 passageways and 25 pedestrian overpasses.

Traffic engineering and facilities along the line: set up 1 maintenance management office, 6 toll stations, 3 maintenance areas, 2 tunnel management offices, and 3 tunnel management and tunnel power distribution rooms.

3.4. Route Direction and Main Control Points

The recommended scheme adopts the expressway construction scheme, with a design speed of 80km / h and a subgrade width of 25.5m.

The route starts from the east of Nongdao town and connects with K15 of Nongdao connecting line (extension line of Longrui Expressway). The route is laid to the southeast, passes through Shousha in China,

crosses the border into Myanmar at ak3 + 750, passes through nawng KAW in the East, AK6 + 400 crosses Ruili River, passes through ho paw and win Nam, reaches the foot of the mountain and enters the Nam paw valley, The route runs south along the river valley and reaches the corridor of Myanmar NH3 highway through kawngka. A short chain of 2800m is set at ak28 + 200, i.e. ak28 + 200 = ak31 + 000. The route continues to be laid southward along the corridor where Myanmar NH3 highway is located, passing through the east of man hawng, kawng wing, man HSA and Na HPAI. The route slowly rises through Nam hpak Ka, Pang Lao, Nam HKAI and man IWE. The route rises along the mountain development line, and a 1530m long tunnel is set at ak75 + 830 to cross the mountain ridge, After leaving the tunnel, the route descends to Kutkai and continues to be laid to the south. After passing through man nawng, the route detours and crosses the mountain ridge into Lashio and reaches theinni. After circling from the southeast of dengni, the route continues to be laid to the south along the corridor where Myanmar NH3 highway is located, passing through Mong Li, Pang hpak, Nam Tun In order to overcome the height difference, a 1630m long tunnel is set at ak152 + 430 in the east of mangmu to pass through the mountain ridge. The route continues to route southwest to Lashio through panghong. The route continues to route along the foot of the mountain in the west of Lashio, bypasses the urban area of Lashio, and continues to layout southwest through naungmawn, Na Lang and San Lau, After that, the route passes through Kong THA in the west, sets up an extra large bridge at ak229 + 200, crosses Nam Tu C, and then reaches hispaw

The route bypasses the main urban area along the north of Xibu and reaches the foot of the mountain in the west of Xibu. The route is routed along the foot of the mountain to ak243 + 900, which is the end point of Ruili Lashio (Xibu). Ending point ak243 + 900 = starting point K0 + 000 of Lashio (SIB) Mandalay section. The total length of the route is 241.1km.

Main control points: long Dao East, Nam paw, Nam hpak Ka, Kutkai, theinni, Lashio, Nam Tu and Hispaw.

4. Conclusions

The implementation of one belt, one road to Lashio (Hsipaw), will help improve the Asian highway network, open up the highway transportation corridor between China and Burma economic corridor, and realize the "land by road" initiative, which will facilitate the economic and trade exchanges between countries in the region and promote mutually beneficial development of all countries. According to the overall strategic deployment of the state, Yunnan provincial Party committee and Yunnan provincial government on development and opening to the outside world, in accordance with the principle of balanced development and key breakthrough, fully consider the maturity of the preliminary work of the project and the strength of national support, take into account the needs and willingness of local development, and comprehensively study and formulate the implementation plan in

combination with the needs of channel construction in different stages. Among them, in the near future, it is mainly to open up the expressway trunk line and railway channel from the hinterland of Yunnan Province to the border area (northern Myanmar), so as to form a rapid traffic link between the hinterland and the border economic belt; In the medium term, it is mainly to open up the secondary highway sub trunk line and railway channel from northern Myanmar to northeast India, so as to form a rapid transportation link between China, Myanmar and India; In the long term, it is mainly to speed up and upgrade various transportation modes such as roads, railways and aviation in the China Myanmar India channel, further improve the service capacity and level of the channel, and realize "interconnection, co construction and sharing" at a higher level.

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