



International Journal of Current Research and Academic Review

ISSN: 2347-3215 Volume-2 Number 2 (February-2014) pp.167-172

www.ijcrar.com



Rail link project – A case study on Jammu-Udhampur-Srinagar-Baramulla

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KEYWORDS

Jammu;
Kashmir;
Rail link;
Single track

A B S T R A C T

Transportation would be a key facilitator to sustainable economic growth. In India, in particular, transportation has been noted to be a critical infrastructure required for economic growth. A well-oiled transportation infrastructure expands the productive capacity of a nation, both by increasing mobilization of available resources and by enhancing the productivity of these resources. The paper includes a case study covering the major aspects of transportation. The planning and design of the rail alignment crossing deep valleys with steep unstable slopes is a daunting task. The curved rail alignment along with severe seismicity of area poses unique challenges while deciding upon bridge configurations. The paper highlights the various techniques of construction of the railway line in the deep valleys of Jammu and Kashmir. The report thus includes the entire details of the “Jammu-Udhampur-Srinagar-Baramulla rail link project.”

Introduction

Kashmir valley is known as paradise on the earth and it is the crown of India's geographical map too. The valley has remained the centre of spiritual learning and creativity. Kashmir has long been separated from India by a lack of suitable transport routes. The state is largely mountainous where accessibility has been a challenge all along. The area also sparks many political debates, as Kashmiri's are not sure what they want and outside forces interfere with progress. Currently, the only way to reach

the area is by a hairpin-road journey. The only road link between Jammu and Kashmir is through a 350 km long national highway 1-A, passing through Shivalik and Pir Panjal mountain ranges of the Himalayas. The vehicular movement on this road is badly affected during rains and snow. The Indian railways has put forward an opportunity for the people to travel between Jammu and Kashmir by planning to construct the 345 km railway route from Jammu to Baramulla, also known as

Jammu-Udhampur-Srinagar-Baramulla Rail Link project. (JUSBRL)

The 345 km extension of the Indian Railway network will allow a 900 km journey direct from Delhi to Srinagar, the capital of Jammu and Kashmir. Constructing the railway route to this isolated region had involved significant engineering challenges. The project involves 228 km of access roads, 911 bridges. The 1,315 m long and 359 m high Chenab Rail Bridge is also under construction on the route which has become a marvel to the world. The route also involves 129 km length of tunnels which includes the major Pir – Panjal tunnel which is 11.215 km long and after completion. It will allow trains to run at a speed of 100km/hr.

Project profile

The oval valley of Kashmir is longitudinal. It is about 1700 meter above sea level. There is a high wall of mountains round the valley. These rise to a height of 5500 meter above sea level. The only outlet of the valley is Baramulla where the Jhelum flows out through a narrow-gorge. Lime stones and shells are common. The rock layers have many fossils. Near Yarkand to the extreme north, shells have been found showing that the region was under sea in the geological past. To the south and west of the valley there are karewa formations which are lake-laid clays and shales. These are lacustrine deposits and appear like flat mounds on the margin of high mountains. Below these karewas is spread the alluvium of the Jhelum. The highest karewa is near the Pir Panjal. It is 3800 meter above sea level and more than 2100 meter above the level of Jhelum.

The entire drainage of Kashmir valley and its surrounding areas has only this outlet. In

the north, Kashmir has many volcanic rock formations. These are mostly stratified and several thousand meter thick. There are many layers of sedimentary rocks which are found in Liddar valley, Baramulla, district and Banihal Verinag section of the Pir Panjal range.

Observation details

The Jammu – Udhampur – Katra – Quazigund-Baramulla Railway line is the biggest project in the construction of a mountain railway since independence. From Jammu to Baramulla, length of the new rail line is 345 km. It passes through the young Himalayas, tectonic thrusts and faults and lies in seismic zone – V. The work on Jammu-Udhampur section (53 Km) has been completed and opened to public by Honorable Prime Minister in April 2005. The length from Udhampur to Baramulla is 292 km and has been divided into three sections

The Jammu Udhampur-Srinagar-Baramulla-Rail Link (JUSBRL) project is perhaps the most important and also the most challenging project taken up by the Indian Railways since Independence. The Udhampur – Katra leg and Qazigund - Baramulla leg is opened to public. The remaining Katra - Qazigund leg is still under construction. The strategic importance of the project to the State of Jammu and Kashmir and to the nation as a whole cannot be over-stated, and this has been recognized as such by no less than the Honorable Prime Minister, when he declared this to be a project of ‘National Importance’. This project is expected to bring about socio-economic development of the State of Jammu and Kashmir through enhanced connectivity within the region and with rest of the country. The project

Fig.1 Satellite image of rail route in J & K



(Source: Google earth) Leg 1: Udhampur - Katra (25 km)

Table.1 Detail of Station, Bridge, Tunnel between Udhampur – Katra

| Station | Distance between stations (km) | Latitude | Longitude | Altitude above MSL(ft) | No of bridges | Tunnel length | Highest bridge | Longest tunnel | Track Detail |
|-----------|--------------------------------|---------------|--------------|------------------------|---------------|---------------|----------------|----------------|--------------|
| Udhampur | | 32°55'8.15"N | 75°7'52.58"E | 2421 | 38 | - | 90 m | 3.15 km | Single track |
| | 9 | | | | | | | | |
| Chakarwah | | 32°56'31.78"N | 75°4'57.59"E | 1025 | | | | | |
| | 16 | | | | | | | | |
| Katra | | 32.98°N | 74.95°E | 2474 | | | | | |

(Source: www.nr.indianrailways.gov.in)

Fig.2 Map showing railway link in J & K

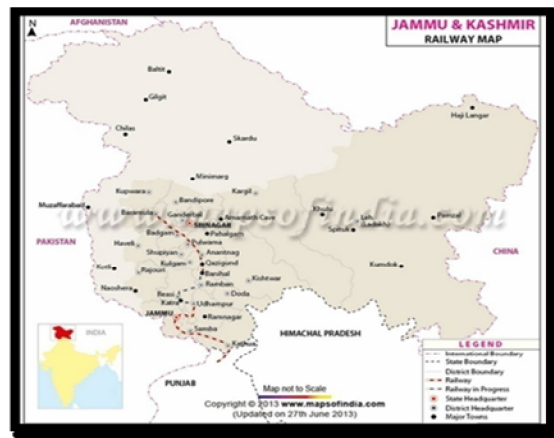


Fig.3 Train running between Baramulla to Banihal



(Source: www.timesofindia.indiatimes.com)

(Source: www.mapofindia.com)

Leg 2 : Katra – Quazigund (148 km)

Table.2 Detail of Station, Bridge, and Tunnel between Katra – Quazigund

| Station | Distance between stations (km) | Latitude | Longitude | Altitude above MSL (ft) | No of bridges | Tunnel length | Highest bridge | Longest tunnel | Track detail |
|--------------|--------------------------------|---------------|---------------|-------------------------|---------------|---------------|----------------------|------------------------|--------------|
| Katra | 130 | 32.98°N | 74.95°E | 2474 | 62 | 18.32 | Chenab bridge (359m) | pir panjal (11.215 km) | Single track |
| Reasi | | 33°5'59.23"N | 74°55'15.16"E | 3410 | | | | | |
| Salal | | 33°6'59.23"N | 74°48'24.64"E | 2360 | | | | | |
| Surukot | | 33°35'52.53"N | 74°18'15.25"E | 6337 | | | | | |
| Basin dodhar | | - | - | - | | | | | |
| Sangaldam | | 33°14'32.11"N | 75°5'25.13"E | 4259 | | | | | |
| Loale | | - | - | - | | | | | |
| Arpinchla | | 33°23'17.11"N | 75°08'34.79"E | 5116 | | | | | |
| Banihal | | 33°25'45.66"N | 75°11'45.79"E | 6037 | | | | | |
| Quazigund | | 18 | 33°35.72'72"N | 75°10'16.92"E | | | | | |

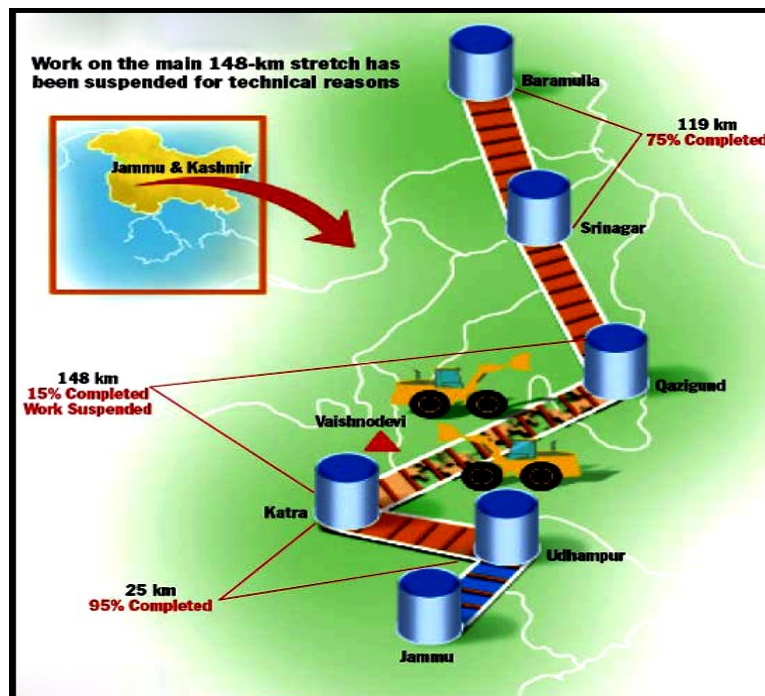
(Source: www.nr.indianrailways.gov.in; Leg 3: Qazigund – Baramulla (119 km)

Table.3 Detail of Station, Bridge, and Tunnel between Quazigund – Baramulla

| Station | Distance between stations (km) | Latitude | Longitude | Altitude above MSL (ft) | No : of bridge | Tunnel length | Highest bridge | Longest tunnel | Track details |
|------------|--------------------------------|----------------|-----------------|-------------------------|----------------|---------------|----------------|----------------|---------------|
| Quazigund | | 33°35'35.72" N | 75°10'16.9 2"E. | 5708 | 811 | 0.00 | 22 m | 0.00 | Single track |
| | 12 | | | | | | | | |
| Anantnag | | 32°43'53.01" N | 75°08'55.6 0" E | 5260 | | | | | |
| | 7 | | | | | | | | |
| Bijibehra | | 33°47'51.38" N | 75°5'24.57 " E | 5278 | | | | | |
| | 7 | | | | | | | | |
| Panzgam | | - | - | - | | | | | |
| | 7 | | | | | | | | |
| Awantipora | | 33°55'5.14" N | 75°5'24.57 " E | 5278 | | | | | |
| | 10 | | | | | | | | |
| Kakapura | | 33°56'49.06" N | 74°55'46.7 6" E | 5233 | | | | | |
| | 6 | | | | | | | | |
| Pampore | | 34°00'21.63" N | 74°55'25.6 8" E | 5231 | | | | | |
| | 6 | | | | | | | | |
| Srinagar | | 34°5'2.44" N | 74°47'34.3 9"E | 5445 | | | | | |
| | 11 | | | | | | | | |
| Badgam | | 34°01'4.01"N | 74°47'12.9 1" E | | | | | | |
| | 15 | | | | | | | | |
| Mazhom | | - | - | - | | | | | |
| | 8 | | | | | | | | |
| Pattan | | 34°09'38.09" N | 74°33'18.4 7" E | 5361 | | | | | |
| | 8 | | | | | | | | |
| Hamre | | | | | | | | | |
| | 7. | | | | | | | | |
| Sopore | | 34°17'15.54" N | 74°27'44.7 9" E | 5194 | | | | | |
| | 8.00 | | | | | | | | |
| Baramulla | 0.00 | 34°12'53.04" N | 74°20'34.7 1"E | 5428 | | | | | |

(Source: www.nr.indianrailways.gov.in)

Fig.4 Construction progress of JUSBRL



(Source: www.indiatoday.intoday.in)

was envisaged to provide an efficient all weather transportation channels that could function in adverse weather conditions and reduce the travel time to various destinations in and outside the valley considerably. Considering that the project has been declared to be of national importance, funds are provided for it from the Consolidated Fund of India rather than the operating surplus of the Indian Railways. The current outlay expected for this project is 19,565 cr.

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