

INSTRUMENTATION AND TESTING OF KHOONI NALA BRIDGE – JAMMU AND KASHMIR

OVERVIEW

Structural Health Monitoring of Khooni Nala Bridge was carried out by DGC Engineering Pvt.Ltd. awarded by Hindustan Construction Company Limited . Load testing of one Span at Khooni Nala Bridge which is located between Banihal to Ramban Section of NH-1A (Now NH-44). The load Test was carried out on 22nd July 2019.

The bridge was constructed and opened for road traffic in 1989. It was observed that there is excessive vibration in the deck of bridge. This vibration can be easily felt during passage of vehicles over it.



Fig 1:- Khooni Nala Bridge.

STRUCTURAL HEALTH MONITORING OF BRIDGE.

To check the concrete quality of the structure Non – Destructive tests of concrete were carried out. Structural Health Monitoring of bridges was carried out to monitor the Deflection and Natural frequency of the bridge.

The biggest challenge in this Health Monitoring of the bridge was the valley below the bridge. So arrangement of Linear potentiometers was not possible. Hence the Deflection check was carried out using Total Station Equipment.

Hydra was used to Place the accelerometer below the Girder and to carry out Non-Destructive tests like Rebound hammer and Ultrasonic Pulse velocity tests.

A) Non – Destructive Test of concrete: -

- The Rebound hammer test were done at 25 different locations in both webs and flanges of prestressed girders. Six readings of rebound hammer were taken at each location and the average of all reading is considered and rebound hammer number.
- The ultra-Sonic tests were also performed at 25 different location of prestressed girder and on the first span the readings were recorded for future analysis of concrete.



Fig 2:- Crane used to carry out inspection



Fig 3: - Rebound Hammer test.

B) Structural health monitoring of bridges

Static load tests were performed to know the behaviour of girders in flexure under live loads. Two loaded trucks, each weighting 32 tonne, were used for performing load test. Axle load distribution and load configuration of the loaded test trucks used for static loading are as shown in figure 4. Trucks were placed back to back to produce maximum bending moment and vertical deflection at centre.

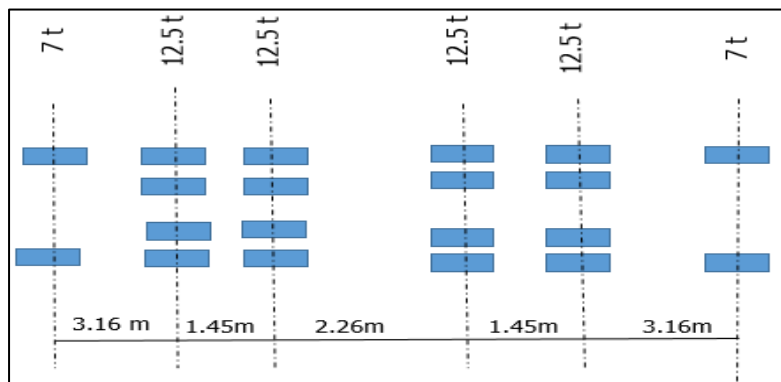


Fig 4 :- Axle Loads Configuration for Static Load Test



Fig 5 :- Loading arrangements for Static load testing

Dynamic load tests: - Natural frequencies of the superstructure were measured by installing accelerometer on the deck. The accelerometer was installed at the bottom of the girders.

The deck was excited by getting a vehicle passed over the deck. The response under free vibration were measured in time domain. The response was then converted into frequency domain by using Fast Fourier Transform, FFT.



Fig 6 :- Total station to measure deflection

CONCLUSION

- 1) Excessive Vibrations were noticed at the center of middle span during movement of vehicles
- 2) All the data was acquired and filtered and given in the report format to HCC.