INTISARI

Berdasarkan Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat No. 41 tahun 2015 tentang Penyelenggaraan Keamanan Jembatan dan Terowongan Jalan, jembatan yang sudah selesai tahap konstruksi harus dilakukan uji kelayakan. Uji kelayakan dilakukan sebelum jembatan dioperasionalkan secara resmi. Uji kelayakan dilakukan dan diawasi oleh tim Komisi Keamanan Jalan, Terowongan, dan Jembatan. Salah satu uji kelayakan yang dilakukan yaitu uji beban. Uji beban jembatan dilakukan untuk mendapatkan informasi kondisi tegangan dan deformasi yang terjadi pada jembatan. Tujuan dari penelitian ini yaitu untuk mendapatkan besar, arah, dan pola lendutan akibat uji beban jembatan. Besar, arah, dan pola lendutan diamati menggunakan *total station* dan *waterpass*. Pengamatan terhadap jembatan akan dilakukan pada kondisi sebelum terbebani, saat terbebani, dan sesudah terbebani oleh truk. Studi kasus penelitian ini dilakukan pada jembatan tipe pelengkung baja jembatan Situ Gintung yang terletak di Kabupaten Purbalingga, Jawa Tengah.

Tahapan penelitian dimulai dari perencanaan dan pengukuran titik kontrol, perencanaan dan pemasangan titik-titik objek pengamatan pada jembatan, pembebanan jembatan dan pengukuran, serta perhitungan dan analisis lendutan. Alat yang digunakan yaitu *total station Sokkia series iM50* dan *waterpass digital Topcon series DL-503*. Terdapat empat titik kontrol yang dipasang, satu titik di sisi utara jembatan, satu titik di sisi selatan jembatan, dan dua titik masing-masing dipasang di timur dan barat bawah jembatan. Adapun titik-titik pengamatan yang dipasang di jembatan sebanyak 36 titik, 16 titik di sisi timur, 16 titik di sisi barat dan empat titik di sepanjang as jembatan. Pengukuran titik kontrol dilakukan dengan metode statik jaring GNSS dengan lama pengamatan 6 jam. Titik-titik kontrol ini digunakan sebagai acuan dalam pengukuran titik-titik pengamatan baik posisi horisontal maupun vertikal. Gerakan vertikal pada empat buah titik yang terletak di as jembatan diukur dengan *waterpass*. Adapun gerakan horizontal dan vertikal pada 16 titik sisi timur dan barat jembatan diukur dengan *total station*. Pengukuran dilakukan sebelum jembatan terbebani, saat terbebani, dan sesudah tidak terbebani. Pembebanan dan pengamatan lendutan dilakukan sebanyak 15 tahap dimulai dari kondisi tanpa beban (0 truk), 2 truk, 4 truk, 8 truk, 12 truk, 16 truk, 20 truk, dan 24 truk. Pengurangan beban juga dilakukan secara bertahap seperti pemberian beban hingga kembali ke kondisi tanpa beban (0 truk). Beban yang digunakan berupa truk yang diberi muatan sebesar 11 ton. Perhitungan lendutan dihitung dari permukaan awal ke posisi setelah terjadinya lendutan.

Pengamatan lendutan menggunakan *total station* dan *waterpass digital* mampu mendeteksi lendutan jembatan. Berdasarkan nilai lendutan akhir di titik-titik pengamatan sesudah pembebanan, jembatan terdeteksi mengalami deformasi disebabkan posisi jembatan yang tidak kembali ke titik semula. Meskipun jembatan mengalami deformasi, namun besarnya lendutan yang terjadi masih memenuhi batas ijin lendutan yang mengacu RSNI T-03-2005 tentang Perencanaan Struktur Baja untuk Jembatan, yaitu sebesar 75 mm untuk bentang panjang dan 37,5 mm untuk bentang pendek. Dengan kata lain, jembatan ini sudah lolos uji beban.

Kata kunci : jembatan, lendutan, uji beban statis, *total station*, *waterpass*

ABSTRACT

Based on the Ministerial Regulation of Public Works and Housing No. 41 of 2015 concerning the Implementation of Road Bridge and Tunnel Safety, bridges that have completed the construction phase must be tested for feasibility. The feasibility test are carried out before the bridge operated. The feasibility tests are carried out and supervised by the Road, Tunnel and Bridge Safety Commission team, one of which is through a load test. The bridge load test is carried out to obtain information on the stress and deformation conditions that occur in the bridge. The purpose of this study is to obtain the magnitude, direction, and pattern of deflection due to the bridge load test. The magnitude, direction, and pattern of deflection will be observed using a total station and a spirit level. Observations on the bridge will be carried out in conditions before being loaded, when it is loaded, and after being loaded by trucks. This research was conducted on a steel arch type bridge, the Situ Gintung bridge located in Purbalingga Regency, Central Java.

The research stage starts from planning and measuring control points, planning and installing observation points on the bridge, loading and measuring bridges, calculating and analyzing deflections. The instruments used in this study are the Sokkia iM50 total station and the Topcon DL-503 automatic level. There are four control points installed, each point on the north, south, east, and west bottom of the bridge. Moreover, there are 36 observation points installed decided into three parts, 16 points on the east side, 16 points on the west side and four points along the bridge's axle. The method used to measure the control point was GNSS net static method, and it took 6 hours observation. These control points are used as a reference in measuring the observation points both horizontally and vertically. The vertical movement at four points located on the axle of the bridge is measured by the automatic level. The horizontal and vertical movements at 16 points on the east and west sides of the bridge are measured by the total station. Measurements were made before the bridge was loaded, when it was loaded, and after it was unloaded. Loading test and deflection observations were carried out in 15 stages starting from the no-load conditions (0 truck), 2 trucks, 4 trucks, 8 trucks, 12 trucks, 16 trucks, 20 trucks, and 24 trucks. The load reduction is also carried out in stages such as giving the load until it returns to a no-load condition (0 truck). The load used is a truck with a load of 11 tons. The deflection calculation is calculated from the original surface to the position after the deflection occurs.

The Observations of deflection using the Sokkia iM-50 total station and the Topcon DL-503 automatic level able to detect bridge deflection. Based on the final deflection value at the observation points after loading, the bridge was detected to be deformed due to the bridge's position not returning to return point. Even though the bridge is deformed, the amount of deflection that occured still meets the allowable deflection limit set by the RSNI T-03-2005 concerning Design of Steel Structure for Bridges, which is 75 mm for long spans and 37.5 mm for short spans. It can be concluded that this bridge has passed the load test.

Keywords: bridge, deflection, static load test, total station, waterpass