Bridge over Uhamba river

CASE STUDY | BRIDGES

General Information

Owner: INEA - Highway Institute of Angola

Business Type: Governmental Organization

Location: Angola

Description

The bridge over Uhamba river is located in Caungula, North Lunda, Angola, at 800km of the capital Luanda (Figure 1). It was designed, fabricated and erected by VESAM in 2013.

The bridge comprises three spans of 24, 40 and 24 meters (Figure 2). The main girders and the cross beams were fabricated with S355 steel. The bridge deck comprises a concrete slab cast on the top of a steel profiled sheet used as formwork. The abutments, columns and foundations are in concrete.

The cross section of the girders is constant in the intermediate span while the end spans present a variation of height. The connections between steel members are performed using spliced joints with TCB bolts.

Figure 1 – Bridge over Uhamba river.

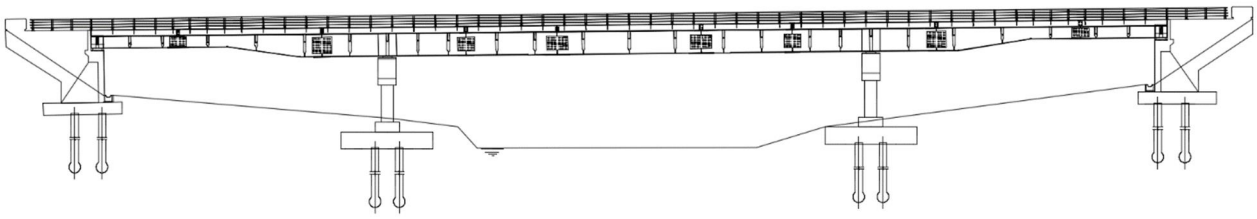

Figure 2 – Longitudinal profile of the bridge over Uhamba river.

SHM Installation

The adopted structural health monitoring (SHM) installation comprises the complete monitoring of two cross sections: 1) at mid-span of the largest span (Figure 3); and 2) at one of the intermediate supports (Figure 4).

The instrumentation comprises the following sensors: 1) 16 strain gauges; 2) 2 accelerometers; 3) 1 weather station (wind speed and direction, rainfall); 4) 2 inductive loops; 5) 1 temperature sensor; 6) 1 relative humidity sensor; and 7) 1 corrosion sensor.

The data acquisition unit (SIGMA) is located in the intermediate support and connected by wire to all sensors (Figure 5). It is powered by a solar panel combined with a 12V battery. All equipment is provided by the VESAM Group.

The adopted communications protocol for data transfer between the SHM system and the VESAM servers is by satellite. The data are collected by the data acquisition unit and sent on a periodically basis to the VESAM server.

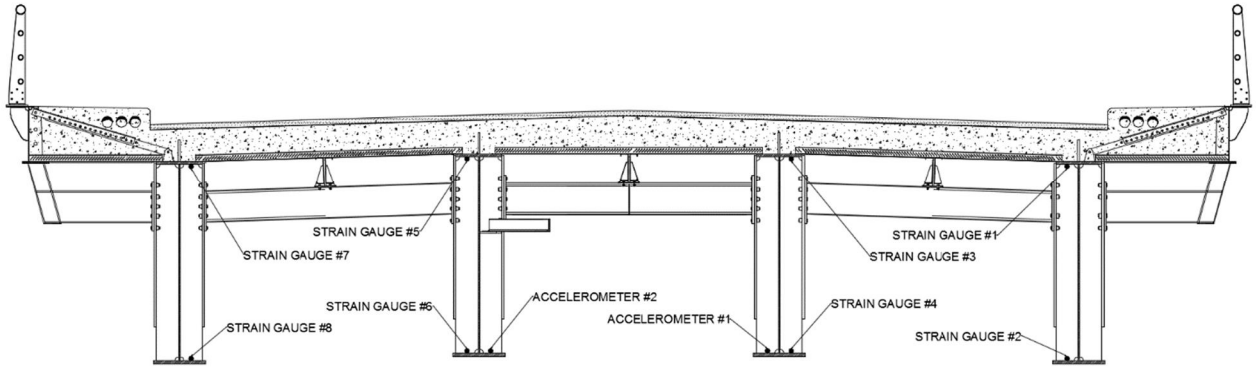

Figure 3 – Instrumentation of the cross section at the mid-span of the largest span.

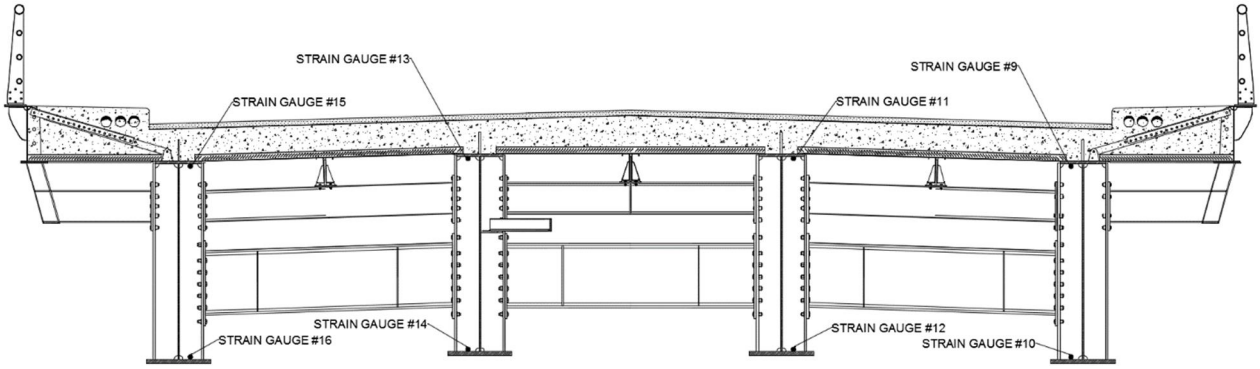

Figure 4 – Instrumentation of the cross section at the intermediate support.

Figure 5 – Installation of data acquisition system.

Figure 6 – Installation of strain sensor on the bottom flange of the main girder.

Figure 7 – Installation of inductive loop on the pavement for traffic detection.

Expected Benefits

Our client (INEA) receives from VESAM, on a daily, weekly or monthly basis, technical reports containing the variation of each monitored parameter. The collected data are also used to calibrate several deterioration models (corrosion, fatigue, among others). On a monthly basis, the status of each deterioration model is reported to our client advising about the need of visual inspections, in situ testing or/and maintenance works. When extreme events are detected, an alert is issued to the client by e-mail, SMS or phone, to provide a fast intervention.

Our client can also access all the information related with the SHM installation by using the online SIGMA SHM portal provided by VESAM.

With this SHM solution, starting from USD 25.500, our client expects to save more than USD 50.000 each year by avoiding regular bridge inspections performed on a two-year basis. A time gap of 3 years can be adopted. Moreover, the monitoring of the painting scheme performance can lead to a significant saving by delaying the maintenance works by 5 years (time gap of 15 years instead of 10).

VESAM Group
www.vesamgroup.com
info@vesamgroup.com
+351 231 419 320