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OF FINANCE**



Oesterreichische Kontrollbank AG



**ADOMI BRIDGE  
STRUCTURAL ASSESSMENT 2011**



Employer:


Österreichische Kontrollbank on behalf of the  
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**ABSTRACT:**

The Adomi Bridge situated in the Eastern Region is crossing the Volta river, which is the principal river in Ghana, at Atimpoku, around 100km northeast of the Ghana's capital Accra. The Adomi Bridge is designed as an arch suspension type whereby the roadway is suspended off two giant arches via cables. The bridge has a span of 805 feet and the rise to the crown of the arches is 219 feet.

The works for the construction of the Adomi Bridge started in 1955 and the bridge has been opened for traffic in 1957. Due to increased traffic loads the bridge showed fatigue failures in 2008 on transverse beams. One of the transverse steel beams has collapsed, while two others have developed serious cracks, resulting in a depression on a section of the bridge. The continued use of the bridge by heavy trucks had adversely compromised the safety and stability of the 52-year-old bridge. In April 2009 the bridge has developed fresh cracks.

As rehabilitations and strengthening of the bridge structure are unavoidable and have to be realised within a short period, the performed "Project Preparatory Program" consists of an overall bridge survey and a bridge assessment, including but not limited to material testing, preparation of as built drawings and chemical analyses: The assessment evaluates the bridge's actual structural behaviour, which shall be the bases for the design of rehabilitation and strengthening measures.


The survey has been performed by an Austrian geodetical specialist, using a total station "Leica System TCRM 1203". The bridge structure was surveyed independently from both river banks. Two models of the structure were processed and combined, to improve the accuracy of the survey data,.

The abutments have been assessed visually, the concrete strength has been determined, excavations around the abutments have been performed to gain knowledge about the rock surface and rock condition near the abutment.

The steel structure defined by the

- arch structure,
- the hangers and
- the deck structure

have been evaluated by a visual assessment. A comprehensive photo documentations shows the outcome.

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For the aim to determine the actual material strength of the arch structure, single plate and bolt samples have been taken from the structural elements. Circular specimens were machined out of the material samples - plates and bolts - and have been tested for tensile strength and their behavior. Furthermore a Charpy-V notch test and a chemical analysis have been performed to get further information on the material. Also the corrosion protection was checked - both: visually on site as well as various test at the laboratory.

The outcome of the assessment is, that the serviceability and the load bearing capacity of the decks steel structure in the present extent, is not given. Four cross girders cracked already in recent years. As a consequence, the traffic load has been reduced to 30tons maximum loading to prevent the further risk of damages. All the cracked girders have been repaired under very difficult circumstances. So the repair measures, already performed at the cracked girders are only to be considered as temporary measures. Accordingly all other cross girders are at the end of their lifetime, so even considering an already reduced traffic load does not ensure proper safety for the serviceability as also other girders could crack spontaneous.

In order to ensure the future safety of the structure, the cross girders have to be replaced. The structural design and works of a new deck have to begin as soon as possible. However, the arch structure is still in a good condition, except that the corrosion protection has to be renewed.

In summary, the arch's foundation and the arch structure are potentially suited for today's traffic loading, a crucial requirement for the decision of replacing the existing deck structure.