

Introduction of the Technical Solutions for Repairing Thang Long bridge at the University of Transport and Communications

On July 30th 2020, the seminar on the technical solutions for repairing the orthotropic steel deck of Thang Long bridge was organized at the University of Transport and Communications (UTC). Attending the seminar were representatives of the Ministry of Transport, Directorate for Roads of Vietnam, Prof. Dr. Nguyen Ngoc Long - UTC Rector, experts in the field of transport, managers and reporters.

After two years of research, the overall solution for repairing Thang Long bridge proposed by the University of Transport and Communications has been approved by the Ministry of Transport (MOT) and the Directorate for Road of Vietnam (DRVN). In the seminar, Professor Duc Nhiem Tran, head of the research group from the University of Transport and Communications had summarized the process of two year working, indicated the significant contributions of many scientists, engineers in Vietnam and all over the world in the result of the research, concluded the principle reason that consequent to the failure in the pavement on the orthotropic steel deck is the lack of rigidity of the deck. In which, the orthotropic steel deck, fabricated from the middle of 1980s, cannot meet the requirement of rigidity for such a heavy traffic flow in the current times.

The solution, therefore, is to increase the rigidity of the deck and the bonding between the pavement and the bridge deck by renovating the existing plate into a lightweight composite deck by: cleaning the steel plate, welding 5cm stubs by quick plasma welding technology (0.17 seconds), placing the two-way reinforcement and pouring the ultra-high performance concrete (UHPC) with the minimum strength of 120MPa, minimum thickness of 60mm. During the construction process, Thang Long bridge will be covered to be protected from rain, sunlight, and concrete temperature.

In such a solution, the studs will be able to fix the bridge steel deck with the high tensile strength reinforced ultra-high performance concrete layer. The sliding phenomenon will be prevented.

The light-weight composite deck has been widely and successfully employed in repairing orthotropic steel deck in many countries such as: Netherlands, France, Japan, and China since 2003. In Thang Long bridge, a 40 mm polymer asphalt layer will be placed on the top of the light-weight composite deck to ensure the smooth and reduce the noise for vehicles to pass over.

In order to ensure the reliability of the above technical solution, the UTC has carried out many experiments on the ultra-high performance concrete technology, welding technology and the adhesion of the polymer asphalt on the ultra-high performance concrete surface. Experimental results had confirmed the reliability of the solution in repairing Thang Long bridge deck. UTC will continue to support the

contractor during the construction period in order to complete the construction sequence and technology.

In the seminar, Prof. Dr. Tran Tung Tong – Vice Chairman of Vietnam Bridge and Road Association said that even though it was come into force in 1985, the main structure of Thang Long bridge is still stable due to the very good construction quality. However, in 2003, after 18 years of use, the asphalt pavement on the steel bridge starts cracks. At that time, the Ministry of Transport had to cut off 3cm on the top of asphalt pavement and re-casting the new asphalt layer, but cracks still happen, especially after the rain fell.

In 2009, the old bridge pavement was replaced by SMA asphalt concrete. But the foreign consultants did not fully understand Thang Long bridge and the Vietnamese consultants was inexperienced, so few day after reparation, the SMA layer de-bonded from the steel deck and surface water stagnated on the plate. Since then, the pavement is continuing to repaired due to the rehabilitation process.

Prof. Dr. Tong Tran Tung also declared his believe in the solution proposed by the University of Transport and Communications. In which, using ultra-high performance concrete in combination with the steel deck through the anchorage system will ensure the stability, the bonding in comparison to the old solution applying in the past.

Some photos



Overview of the seminar on Introduction of the technical solutions for repairing Thang Long bridge



Prof. Dr. Duc Nhiem Tran – University of Transport and Communications presented the technical solution for repairing Thang Long steel deck.



Prof. Dr. Tran Tung Tong – Vice Chairman of Vietnam Bridge and Road Association gave a speech.



The structure of the adhesive material and the polymer asphalt concrete layer which will cover the ultra-high performance concrete surface was tested to select the sample used on the Thang Long deck.