COMMONWEALTH AVENUE BRIDGE- HERITAGE

IN EXPLAINING WHY I BELIEVE SO STRONGLY THAT COMMONWEALTH AVENUE BRIDGE SHOULD BE MAINTAINED FOR A VERY LONG TIME AS AN IRREPLACEABLE HERITAGE STRUCTURE, I SHALL DESCRIBE THE DESIGN AND CONSTRUCTION OF THE TWO PARALLEL BRIDGES THAT MAKE UP THE COMMONWEALTH AVENUE BRIDGE.

The bridges were designed by a British firm- Maunsell and Partners, and constructed by an Australian firm- Hornibrook, under the supervision of the Commonwealth Dept of Works. Tom Crotty and I were the supervising engineers.

The plan was for the Bridge to be built over the dry bed of the proposed Lake Burley Griffin. It had to be a design of outstanding quality, to accommodate six lanes of traffic, three on each of the dual structures and with footways cantilevered out from them. It was required to be an aesthetically pleasing design with a generally horizontal impression and with reasonably long spans resting on slim piers, in order to provide a sense of visual continuity between the central and west basins of the future lake.

The final design was considered to have met these requirements. In inaugurating Lake Burley Griffin, the Prime Minister Sir Robert Gordon Menzies described the Bridge as “the finest building in the National Capital.”

DETAILS

The final design, incorporating engineering and architectural advices, was considered to have satisfactorily met all these requirements. There were two shore spans of 180 feet, two intermediate spans of 210 feet, and a central span of 240 feet. Piers were to rest on clusters of bored vertical and raked piles six feet in diameter, belled at the base to nine feet.

Each bridge superstructure was designed in elevation as a single geometric arc formed by a continuous pre-stressed concrete box girder having a uniform depth of nine feet throughout the 1,020 feet length of the bridge. The road width was to be 37 feet, accommodating three traffic lanes 11 feet wide with the kerbside lane being widened by four feet. An asphaltic concrete wearing surface was designed to be placed on the top element of the box girder members, and footways, six feet wide, were to be cantilevered out from these box girder members. All these design features were fully met in the completed structure.

CONSTRUCTION EVENTS

Several elements of the detailed design were changed during construction, by the design section of the Commonwealth Department of Works or by the supervising engineers. These changes were necessary to improve the strength and life of the bridge.

The shore spans are supported at their ends on very large reinforced concrete abutments. The British design had not allowed for the rapid loss of moisture content in concrete structures in Australia and consequent shrinkage. In order to prevent this shrinkage causing cracking and potential collapse of the abutments, additional steel reinforcement set at 45 degrees to the vertical were inserted in the sections of the abutment which were to be subjected to the highest sheer stresses after construction. Shrinkage cracks did occur after construction in the six foot thick abutments, potentially subjecting the reinforcement in the abutments to corrosion. To prevent this occurring, epoxy resin was injected at high pressure through the cracks and the injection was successful in that the epoxy emerged from the other side of the concrete abutments.

The concrete in the box girders was required to have a strength of 6,000 pounds per square inch. The actual concrete strength exceeded 7,000 pounds per square inch.

The term “continuously pre-stressed box girder bridge” describes the fact that the entire 1,020 foot length of each box girder bridge was pre-stressed by 1.125 inch diameter steel cables which were tensioned at each end by high strength jacks. The tensioning from both ends simultaneously increased the strength and stability of the bridges.

The bridge design did not require guardrails between the motorways and the footways or the pre-cast aluminium handrails on the side of each bridge. The argument in design was that the height of the kerbs next to the roads was high enough to prevent a vehicle from swerving out of the side of the bridges. This assumption was clearly at odds with the fact that large vehicles, including buses, had axle heights higher than the kerb heights. Under extreme circumstances therefore, such vehicles could theoretically swerve through the handrails and into the lake. This was considered an unacceptable risk by the Commonwealth Department of Works which therefore insisted on the construction of guardrails next to the kerbs in the roadways.

CONCLUSIONS

The proposal to demolish the twin bridges and build a complete new structure to carry not only the existing traffic but also the proposed light rail is unsound for various reasons, both aesthetic, economic and unnecessary. It was noted after construction that each bridge has a roadway width of 36 feet and is separated from its twin by a clear width of 40 feet. It was pointed out at that time this clear area may someday be filled by a third bridge for public transport. This is obviously a superior method of providing construction of a rail line over Lake Burley Griffin for the proposed light rail system.

In addition to the arguments already made, it is noteworthy that one 24 inch diameter water main and two 18 inch diameter sewer mains are carried inside the box girders connecting the relevant systems between the north and south sides of the lake. Demolition of the existing Commonwealth Avenue Bridge would require an elaborate alternative connecting system.

It is extremely probable that demolition of existing bridges and their replacement by a new all-encompassing bridge would cut off transport along Commonwealth Avenue for at least a year. This would be of enormous economic cost to Canberra’s Government as well as inconvenience to people travelling through Canberra, including causing hold-ups in alternative routes due to excessive traffic and associated costs.

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