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A Case for Concrete Bridges and Flyovers

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This essay is not written to dispute the right of the government agencies to execute infrastructure programmes to suit the needs of a country as appropriate. However, this is written in the background when the Sri Lankan media is acclaiming the wonderful achievement s in the construction of steel bridges and flyovers in record times, and the general perception being built up that the building of concrete bridges are taking much longer times than steel alternatives, and are unsuitable in a rapid development phase. Although this fact of such delays had been true in many instances in Sri Lanka, this essay is an attempt to expose the reasons behind, and to highlight the positive side of adopting concrete bridges in comparison with steel deck bridges. Being fortunate to gain exposure in bridge / flyover / interchange design and construction in a few countries including Sri Lanka, here I wish to clear some of the misconceptions against concrete bridges.

Firstly, any bridge or a flyover needs to be specifically designed to suit the locations, economics and the end uses. The time taken for studies, conceptual designs, calculations and the preparation of drawings / specifications and other contract documents will generally be similar, whether it will be a concrete or a steel bridge. When it comes to construction phase, the time taken for the building of bridge foundations including the abutments and piers cannot be much different whether the deck is of steel or concrete construction. Time span taken for the foundations and the bridge superstructure construction will be based on the availability of equipment and of course the availability of funds to purchase materials in line with the programme and pay for the plant / labour.

Any Engineer experienced in bridge construction will know that the concrete deck elements such as conventional deck beams, or the precast concrete sections used for in balanced cantilever larger spans could be manufactured as soon as the Tender is awarded. Generally the lead time available for such fabrication could be even as long as one year. This operation will go ahead when the bridge foundations and the superstructure works are proceeding at the work site. You could argue that the fabrication of steel deck members being made in factories takes shorter time than concrete deck units. However there cannot be an overall delay in construction when using concrete elements, since the deck units are required only when the bridge superstructure is ready to accept it. We have to note that, with the use of HTS Strands in prestressed concrete deck sections, super-plasticizers and efficient concreting equipment, the time required for the manufacture of concrete deck elements have also become shorter than in the past.

The time span taken for the erection of deck elements and the finishing works will depend mostly on the project management skills, availability of materials, equipment, the skills of the work force, and not on the fact that they are steel or concrete. It is very easy to pin point at the delays taken place in some of the recent concrete bridge / flyover projects

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Kelaniya flyover

such as Flyover at Gampaha over the railway line. When you go into the facts, you will note that the delays are mainly due to the shortfalls in availability of funds for these organizations to procure plant, and pay for materials and labour.

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I could vouch that in concrete technology we were in a reasonably advanced stage for many decades, in comparison to foreign places such as Middle East, Malaysia and even developed countries as New Zealand. Public sector organizations such as Port Commission, State Engineering corporation, Bridges Design and Construction Divisions of the PWD, which later became the RDA & SD & CC under the guidance of great engineers such as Dr. ANS Kulasinghe and Mr. M.Chandrasena, were utilising these technologies from late 1950s. Some of the notable structures, designed and built using prestressed concrete technology a basic concept used in bridge design and construction in the past include Dematagoda flyover, New Kelani Bridge, Kalutatara Highway Bridge, Planetarium and Kettarama Stadium. I could boldly say that we continue to possess the knowhow to design and build both RC and prestressed concrete structures whether it is for bridges, buildings or stadiums. The main reason which hampers further progress in gaining advanced technological knowhow, is the finance capability of organizations which prohibits the acquisition of complex computer software, high speed computers, and much efficient plant and equipment , and also the training opportunities. However, without doubt, now there are some local and international companies based in Sri Lanka who are capable of design and construction of complex structures using concrete.

Materials used in the construction of concrete bridges are predominantly locally made except for high tensile steel reinforcement and smaller volumes of specialised items, whereas for steel bridge decks the materials are imported in totality . In addition, the advancement of technological skills and the creation of employment opportunities achieved in the way of utilizing advance concrete technologies are very significant which will benefit the country both in short and long term.

Policy makers in countries are not technological experts. However, the senior officials of relevant development agencies and the learned bodies such as the the Institution of Engineers have the duty to advise the policy makers on the selection of suitable technological criteria in the implementation of development projects. With the successful completion of a cancerous war and the country is on the verge of embarking on massive development programme, I earnestly hope that such worthwhile advice will be given in good faith by the officials and the engineering fraternity, and accepted by the policy makers with humility.