BRIDGE AESTHETICS

Bridges are the structures having their primary function of bridging the gap. A successful bridge design must be natural, simple, original and harmonious with its surroundings. Aesthetics and environmental considerations are increasingly becoming major factors in the selection of the type of structure, including its substructure to be adopted for a specific site. To achieve aesthetically pleasing view of bridges, attention should be paid to produce a clean, simple, well-proportioned structured form, including harmony with the general topography of the site. Optimization in the use of materials, environmental preservation, level of pollution during construction and service, conservation of flora and fauna etc. also need attention. Bridges dominate the landscape and play a very important role in our visual environment. Make the bridge as simple and elegant as possible to complement the surroundings and thus aesthetically pleasing structures.

In general, aesthetics is about proportion, balance, and harmony. The Italian Renaissance architect Alberti defined beauty as “a harmony of all the parts.” When we look at an object, we do not go through any logical derivation to determine whether it is beautiful or not; our reaction is a more spontaneous one. Although human perception often changes with time, real beauty transcends time and style. A beautiful bridge can be dramatic and daring, but it can also be graceful and poetic.

Aesthetics of a bridge must be considered both in the conceptual planning stage as well as in the detailed design stage. Some of the important points which need due consideration at the conceptual planning stage as well as at design stage of a bridge has been mentioned in IRC:5 “Standard Specification for Code of Practice for Road Bridge – General Features of Design”.

The basic idea of bridge design is to inspire an emotional response from viewers, and even a kind of surprise. How we achieve this is can be called an art. The bridge aesthetics are vastly improved when all the component parts of the bridge like piers, abutments, railings and the superstructure are designed to work together and complement each other visually. The bridge pier is a major element in forming the impression of a bridge and the beauty of pier design contributes to the aesthetics of the whole bridge. Those bridges that are considered to be the best examples of aesthetically-pleasing bridges are the ones whose primary structural systems represent the basic structural mechanics of how the structure transfers the applied loads to the foundations or ground. Therefore, a well-designed and aesthetically pleasing bridge is not one which is based on an abstract physical form, but, rather, the one which expresses the natural physical properties to which people intuitively relate. Colours and textures are the other important consideration which enhances to the aesthetics of a bridge structure.

The complexity in the design of a bridge should be minimized, as a simple structure provides an aesthetically pleasing contrast with the natural textures of the backdrop. Enhancing the primary elements of a bridge and reducing road furniture to the barest minimum is also important. When the colour of the surroundings is dark, light colour for bridge primary elements provide a good contrast. Bridges in a horizontal plane are generally preferable to bridges on a grade over flat simple areas and significant expanses of water. If this is unable to be achieved due to differing levels on either side of
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the water body, then fine tuning the location of the bridge should be considered, or adjusting the levels along the bridge approaches.

A bridge designed without consideration of aesthetics could also serve its function, but it would be unattractive and a visual barrier. A well-designed bridge appeals to everyone, not just the engineers and designers. The design of aesthetically pleasing bridges is not only a science but also an art. The designer must give due consideration to economy, transmission of forces to the ground, constructability, durability, environment and the adjacent structures. The design must emphasize on the horizontal elements of the bridge and strengthen the appearance of the bridge piers while concealing electrical conduits and drain pipes. Where one or more of these aspects is not sufficient or not fully considered, the final design would probably be flawed, in some cases with distressing results.

Aesthetic lighting is an art in itself: It not only makes bridges visible, but also gives them vibrancy at night. However, it is important to differentiate between illumination and aesthetic lighting. Illumination simply makes a bridge visible; aesthetic lighting makes use of the interaction between light and the structure to create special effects and impressions.

The cost of aesthetic quality is not always higher than the cost of poor design. In any event, attractive projects bring much greater long-term benefits to the public by increasing the development potential of communities. If additional funds are required for aesthetic design, they can usually be justified in terms of identifiable, long-range, economic benefits. Although few engineers today would dispute the importance of aesthetics, most of them have a singular lack of understanding of the subject and still tend to see aesthetic design as a simple extension of engineering design.

We have the expertise and drive to meet the challenges, we have the vision to continuously introduce innovations, new working methods and new materials/technologies/equipment, but, now it is more important to take into account the social aspects of transportation. The citizens pay for the systems and have to live with them; therefore, we must ensure that we design the structures which are lively and appreciated by the public. We have a duty to create structures which deserve to become part of our Heritage. Tower Bridge, London, Sydney Harbour Bridge, Australia and Golden Gate Bridge, Sanfrancisco, USA are some of the world’s iconic and pleasing structures. Bandra-worli sea link and Vidyasagar Setu (second Hooghly Bridge) are some of the aesthetically pleasing bridge structures constructed in India.

Although a bridge engineer designs the bridge, the bridge engineer does not own the bridge. The owner represents the public, and the public has a right to ask for what it wants. A bridge engineer is there to serve the public with his/her best effort to ensure that a bridge is beautiful, in addition to being safe, functional, and economical.
CHALLENGES TO KEEP ROADS IN GOOD TRAFFIC WORTHY CONDITIONS DURING MONSOON

Monsoon has come to an end and rains has also receded in major part of the Country. However, the effect of rains and floods is being felt everywhere and mostly in urban areas where roads has got damaged and we are in receipt of public complaints regarding bad condition of roads and maintenance thereof. Monsoon is very important and good rain leads to agricultural economy which is one of the most important sector of Indian Economy. However, the damages caused by rains and floods also results in lot of resources to be put in to restore damages and bring road track to traffic worthy condition. The immediate requirement to make the roads in traffic worthy condition needs to be fulfilled in short duration which otherwise keep on lingering till the end of January/ February which bring very bad name to the Engineering department dealing with the maintenance of these roads and accordingly prompt action has to be taken to restore damages without further loss of time. The larger question which need to be addressed is to think of permanent restoration and development of roads keeping into account the drainage condition, soil underneath, adequate crust composition with impermeable bearing courses which are well maintained before onset of monsoon to avoid such large recurrence of rain induced damages leading to poor road surface quality. There is a need to have an organised development in consultation with all other infrastructure developing agencies i.e. water supply and sanitation, sewerage and other utilities department. There is a need to have a comprehensive development plan so that a comparatively prominent/ long term sustainable infrastructure is created which is less prone to such damages during rain and public inconvenience is avoided. A centrally organised body at each town/ city level is highly desirable to ensure such coordinated development.

In the above background, it would be desirable to all the authorities and practicing Engineers to stress on a long term solution while planning, designing, execution and operation of the road infrastructure at the planning and designing stage itself considering drainage conditions & sub soil behaviour has to be studied. Drainage should be linked to natural outfalls with proper longitudinal gradient for their efficient functioning. If the existing roads has been constructed on poor subsoil, this may need to rebuilt with adequate/ appropriate soil stablisation techniques/ raising above natural ground level or on the highest flood level providing adequate crust composition with comparatively impermeable bearing courses. If surface is affected due to rains in large part of the year, mastic asphalt/ stone mastic asphalt may be provided in the top bearing courses, with paved shoulders, connected to drains for effective drainage. Before monsoon and during monsoon, all drains has to be properly cleaned, repaired if required, pavement cracks are sealed, if any, and shoulders are dressed in proper grade and camber to ensure efficient draining out of the road surface water which otherwise stagnate on the shoulders just abetting edges of the pavement and leads to large scale damages to pavement. All these measures are reiterated every year through various instructions from Ministry however, has not received adequate attention. I would therefore appeal to all our Engineering faculties to rise up to the occasion and make their all out efforts to minimise damages to road infrastructure with due diligence during planning, design, construction and operation of the Highway Infrastructure. Furthermore, while attending to repairing/ reconstruction of already damaged roads during this monsoon, aforementioned measures may be taken so that recurring damages could be avoided.

(I.K. Pandey)