Innovative Design for Main Towers of Long Span Suspension Bridges

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Erection of main shaft

Generally speaking, when larger unit blocks are used to reduce the construction period of a main shaft or to speed up the work, not only is the unit weight increased but also larger manufacturing, transportation and erection equipment or facilities are required. The larger erection cranes (creeper cranes) which become necessary, in particular, will prove to be inconvenient.

It is proposed that the construction period be reduced by assigning many general-purpose cranes of relatively small capacity to each main shaft (for example, four 30t jib cranes for each main shaft).

As sufficient flexibility can be obtained by selecting an appropriate rigidity ratio for columns and beams even if a slender shaft is used, a wider space which makes the work easier is produced.

Top saddle

The vertical loads of main cables concentrated on the center of the saddle must be distributed on the columns around a main shaft. If a saddle beam of which the supporting point is on the periphery of a main shaft is used instead of a saddle and several cross beams made of steel plates are installed at right angles to the saddle beam to support it, the reaction forces of the saddle beam made of steel plates are installed at right angles to the saddle beam to support it, the reaction forces of the saddle beam are transferred to the periphery of the main shaft. In this case, it is necessary to distribute uniformly the reaction forces of the saddle beam on the periphery of the main shaft through the cross beam. This can be made possible by changing the size of the cambers which are fitted to the cross beams --- larger cambers near the periphery of the main shaft and smaller ones near the center of the cross beam.

Observation tower

As the inside of the main shaft is very large, it may be used as an observation tower, leisure facility, or for some other purpose.

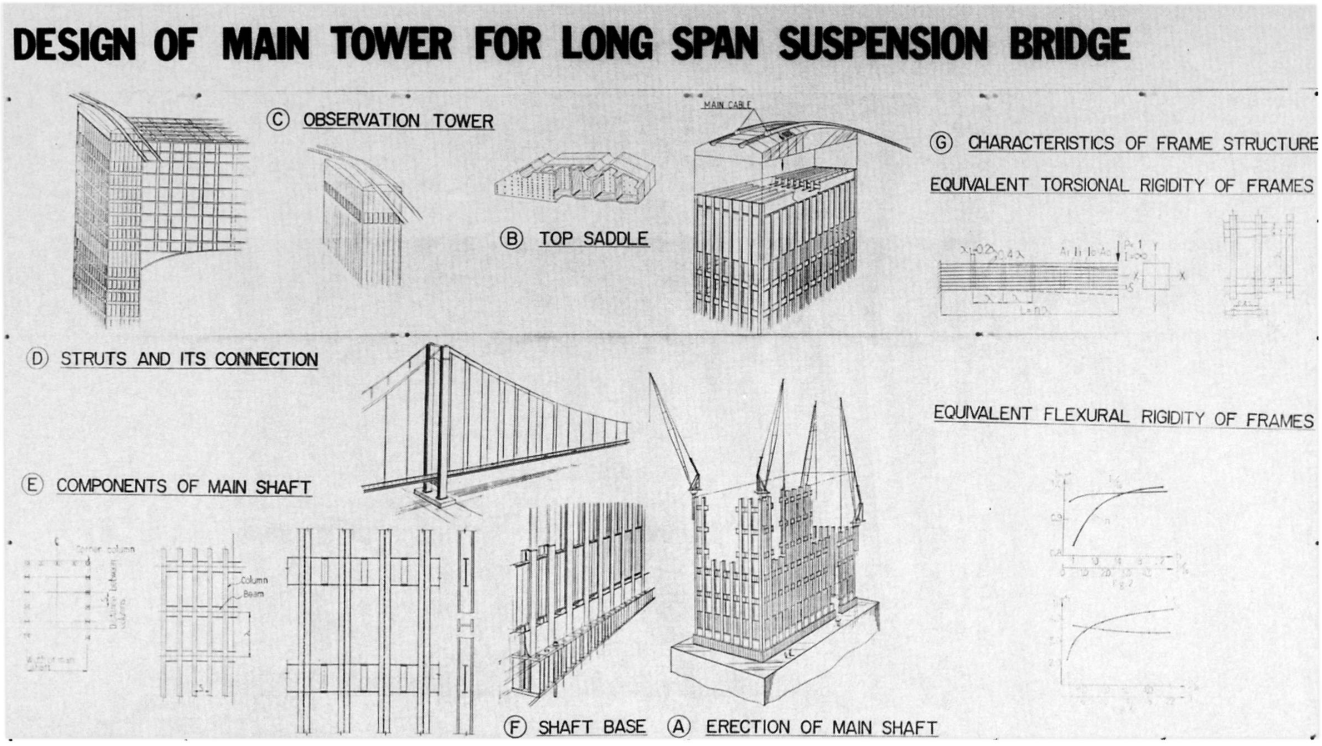
Struts and its connection

Although the width of a strut is necessarily large to match the width of the main shaft, struts should be of a rigid frame structure. When members are connected, the transmission of each members stress must be made certain.

Components of main shaft

The main members constituting a main shaft are called columns or column members. Since heavy H-shaped steel sections for columns are used as main members.

As the vertical loads of main cables working on the top saddles of a long span suspension bridge are very large, columns with a large cross-section are necessary. Some catalogue size typical heavy H-shaped steel sections for columns are used.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