



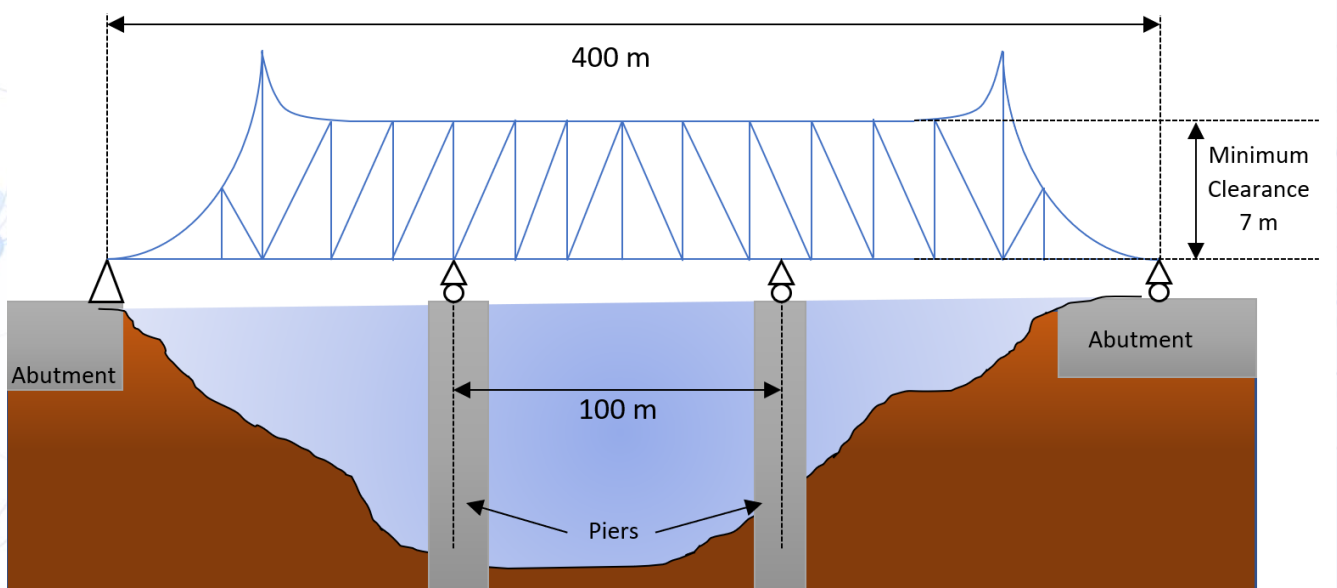
SAP 2000 Bridge Design [20 POINTS] {Pool Event}

PROBLEM STATEMENT

The world's longest truss bridge broke in an accident, now it needs your help. This bridge used to connect the mainland to an island which serves as the national treasury. You need to design the most economical continuous truss bridge using your expertise in Structural Engineering. The dimensional constraints are given below.

- **Dimensions**

- The bridge spanned 400 m and had two marine concrete piers which are still functional. You need to design the main truss and decide which kind of supports to place on the piers and main abutments. The width of the bridge should lie between 8 and 10 m and it should have a clearance of minimum 7 m throughout its span.



- **Event Structure**

Single Round event, each pool has to submit one SAP2000 model of a truss bridge. Only one submission from each pool will be accepted.

- **Team Structure**

A maximum of 3 people is allowed.

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SCIENCE AND TECHNOLOGY COUNCIL

TAKNEEK '18

ON THE SHOULDERS OF GIANTS



- **Material and Weight requirements**

1. The bridge can be made of any section and can be of any configuration, the choice of section for truss members is up to participants
2. The material of the truss members can be chosen by participants in accordance to Indian Standards.
3. There is a cap on the weight of the bridge.

- **Judging and Scoring**

First the structure will be reviewed to check if it violates any rules mentioned in above sections. The scoring of the structure will be based on performance as well as aesthetics. In engineering, the best solution may not always be the biggest or strongest bridge.

Scoring Elements:

- a. **DEFLECTION:** The deflection of the bridge will be checked for various combinations of concentrated and uniformly distributed live, dead and wind loads.
- b. **WEIGHT:** The weight of the bridge will be calculated by the reaction forces.
- c. **AESTHETICS:** Up to the discretion of the Judges (based on uniqueness of design and resemblance to actual engineering designs).

Scoring Criteria:

- a. **Deflection (D):** 100 points will be awarded to the team with the lowest deflection, 30 points to the team with the highest value of deflection, and all others will be awarded points based on linear interpolation between these two extremes
- b. **Weight (W):** 100 points will be awarded to the team with the lowest dead weight, 20 points to the team with the highest value of weight, and all others will be awarded points based on linear interpolation between these two extremes.
- c. **Aesthetics:** points for aesthetics (A) will be awarded by the judge out of 100.
- d. **Total Score:** Total score (T) will be calculated as follows:

$$T = D*0.4 + W*0.35 + A*0.25$$

Violating any of the conditions mentioned above, penalty will be imposed according to the judges and may lead to disqualification:

Dimensional specifications are not met (Penalty of 20% of the total score)

In case of any discrepancies, the decision taken by the judges and the council will be the final verdict.