



UTM
UNIVERSITI TEKNOLOGI MALAYSIA



UTM BRIDGE COMPETITION 2026


Undergraduate Category: Drawbridge Model


1.0 TEAM COMPOSITION

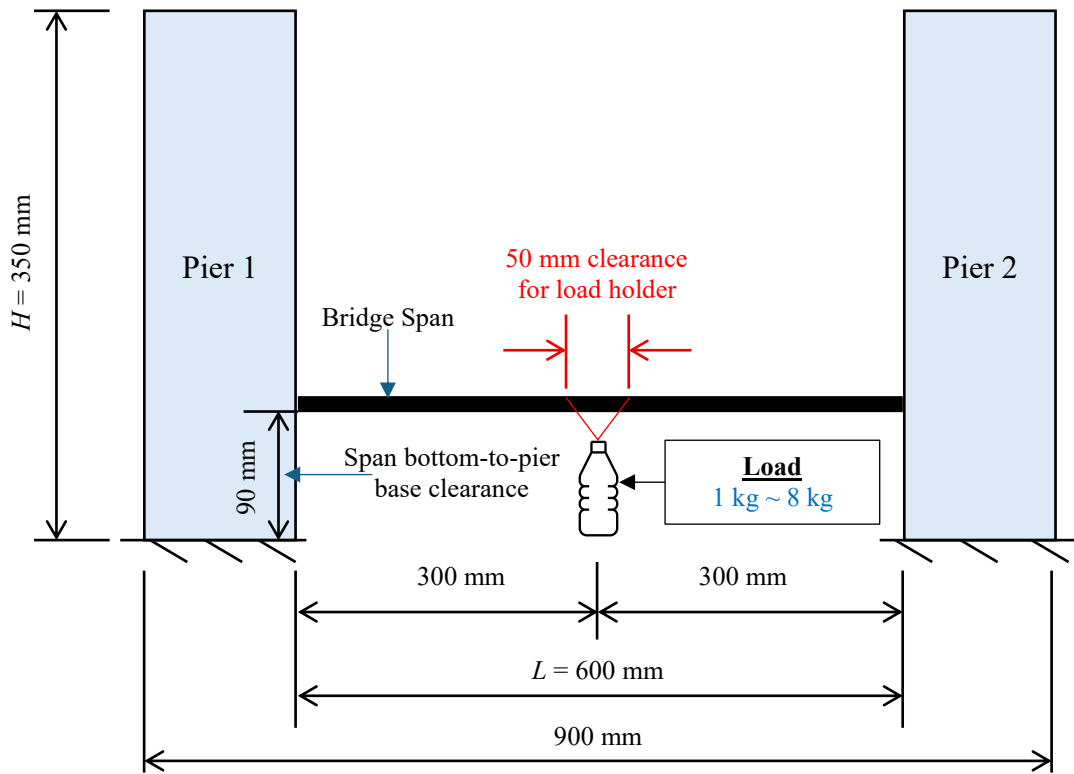
- a. Each participating team shall consist of one (1) Advisor and four to five (4–5) student members. The Advisor must be a full-time educator, lecturer, or instructor from the respective institution. Individuals who are currently registered as students are not eligible to serve as Advisors.
- b. Participating teams must represent a higher learning institution, and all student members must be currently enrolled at Diploma or First-Degree level only during the competition period.
- c. The composition of the student team may consist of participants from any academic discipline and is not limited to students from a Civil Engineering background only.
- d. Each participant may only represent one (1) team throughout the competition. Students are not permitted to register or compete under multiple teams.
- e. Each team shall appoint one (1) student member as the Team Leader for official correspondence and coordination with the organizing committee.
- f. A maximum of two (2) teams from each institution may qualify to participate on the official competition day.
- g. Any replacement of team members or Advisors after registration must receive prior approval from the organizing committee. The organizers reserve the right to verify the eligibility and institutional affiliation of all participants at any stage of the competition.

2.0 BRIDGE MODEL SPECIFICATIONS

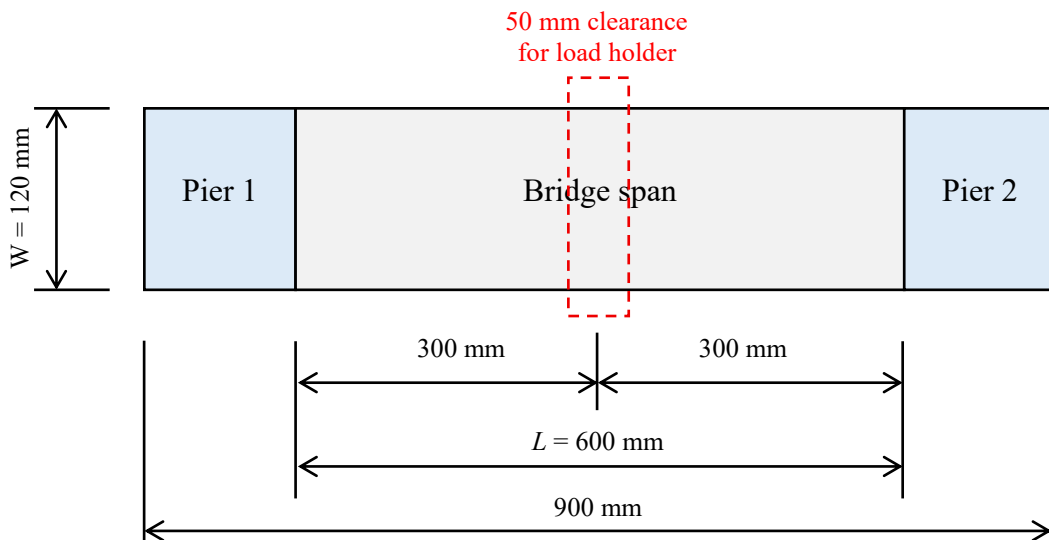
- a. The drawbridge model (hereinafter referred to as “The Model”) must satisfy all geometry specifications specified in Figure 1a (Bridge Closed position) and Figure 1b (Bridge Open position) and Figure 2 for 3D illustration purpose on the draw-bridge closed and loading position. No structural components shall obstruct the specified clearance zones or extend below the bridge deck within the designated navigational passage area.

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- b. The Model shall be prefabricated prior to the competition day. Participants are only permitted to carry out assembly and setup works at the competition venue
 - c. The Model shall consist of two (2) piers, where each pier is independently supported on separate tables provided by the organizing committee. One table shall support the left pier, while another table shall support the right pier.
 - d. The height from the bottom to the top of each pier shall be 350 mm with an allowable tolerance of ± 5 mm.
 - e. The overall distance measured from the outer face of Pier 1 to the outer face of Pier 2 shall be 900 mm with an allowable tolerance of ± 5 mm.
 - f. The clear span length of the bridge measured between the inner faces of Pier 1 and Pier 2 shall be 600 mm with an allowable tolerance of ± 5 mm.
 - g. The width of the bridge span shall be 120 mm with an allowable tolerance of ± 5 mm.
 - h. The bridge span shall be positioned 90 mm ± 5 mm above the bottom level of the pier structure.
 - i. A minimum clearance length of 50 mm shall be provided at the midspan of the bridge to accommodate the placement of the load cell holder during testing.
 - j. The Model must be capable of full opening, providing a minimum vertical clearance of 500 mm between piers to simulate a navigational passageway.
 - k. Participants are free to adopt either single-leaf or double-leaf drawbridge configurations.
 - l. The transition between Bridge Open and Bridge Closed positions shall be performed manually by participants. The use of any mechanised or electrically powered system for opening or closing the drawbridge is strictly prohibited. Model bridge shall remain statically stable without any external support in both Bridge Open and Bridge Closed positions.
 - m. The Model that does not comply with the geometry specifications shall be penalised.
 - n. The Model shall be designed to carry load at the mid span (see Figure 1). The highest load factor will be given if the capacity (P) is 5 kg. Lower score factor will be given if the capacity (P) is smaller than or larger than 5 kg.

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- o. All materials are to be prepared by the participants. The following list of materials are strictly PROHIBITED: any fibre reinforced polymer (FRP), iron alloy, and 3D-printed materials.
 - p. Any joining method is permitted provided that prohibited materials are not used.
 - q. Participants shall ensure that the Model does not contain sharp edges, hazardous components, or unstable elements that may endanger judges, technical staff, or other participants.
 - r. The Model that does not comply with the material specifications shall be disqualified and will not be permitted to participate in the competition.
 - s. In case of any dispute, final decision is made by the chief of judges.



SIDE ELEVATION

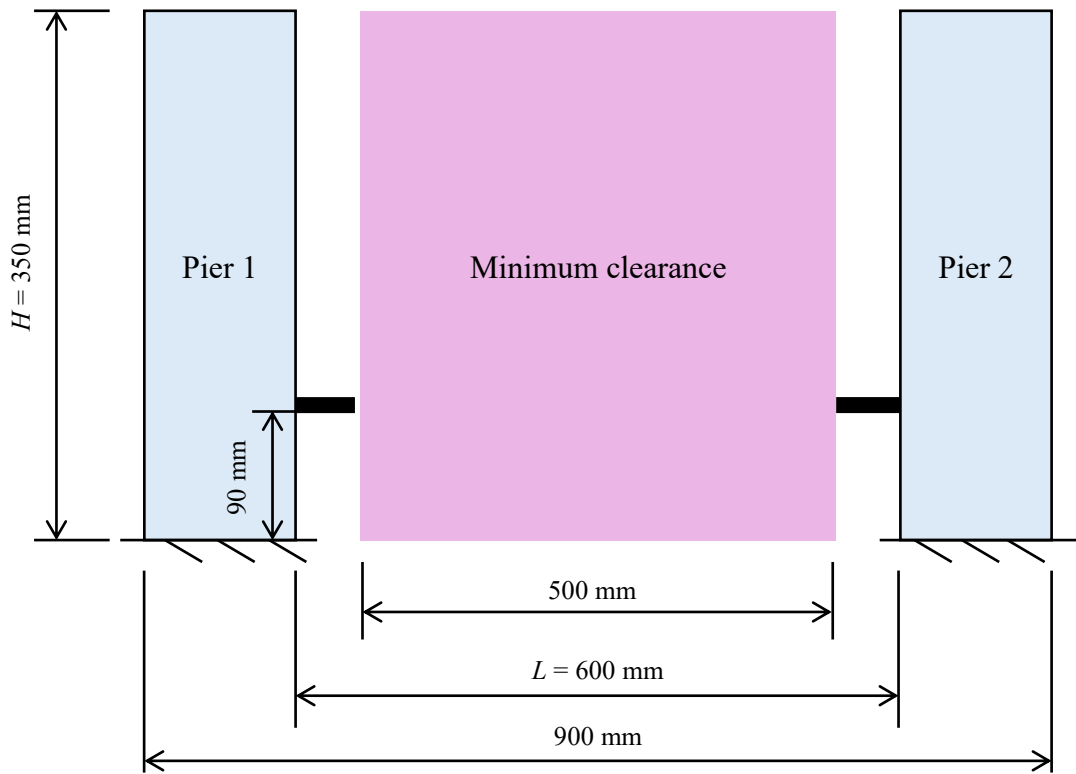


PLAN VIEW

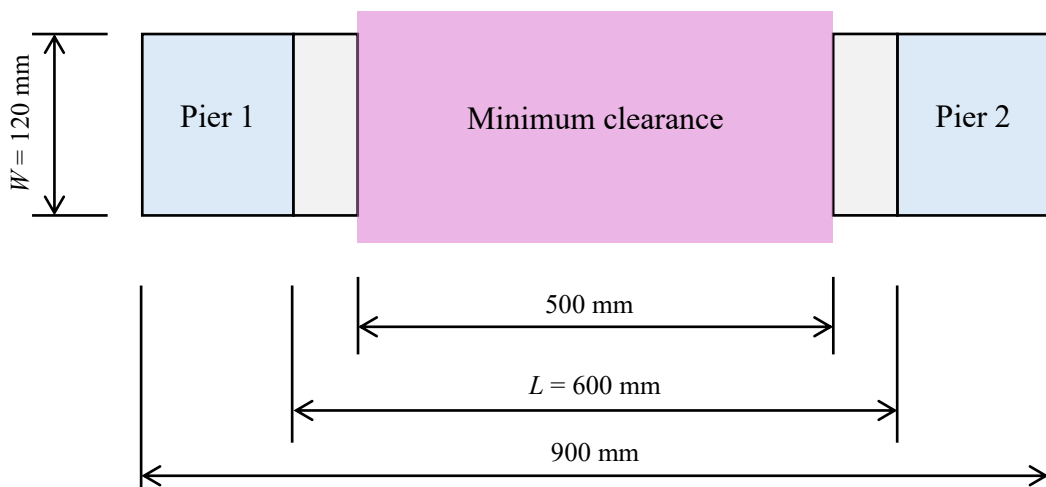
NOTES:

Drawings are not to scale

Figure 1(a): Bridge Closed position



SIDE ELEVATION



PLAN VIEW

NOTES:

Drawings are not to scale

Figure 1(b): Bridge Open position

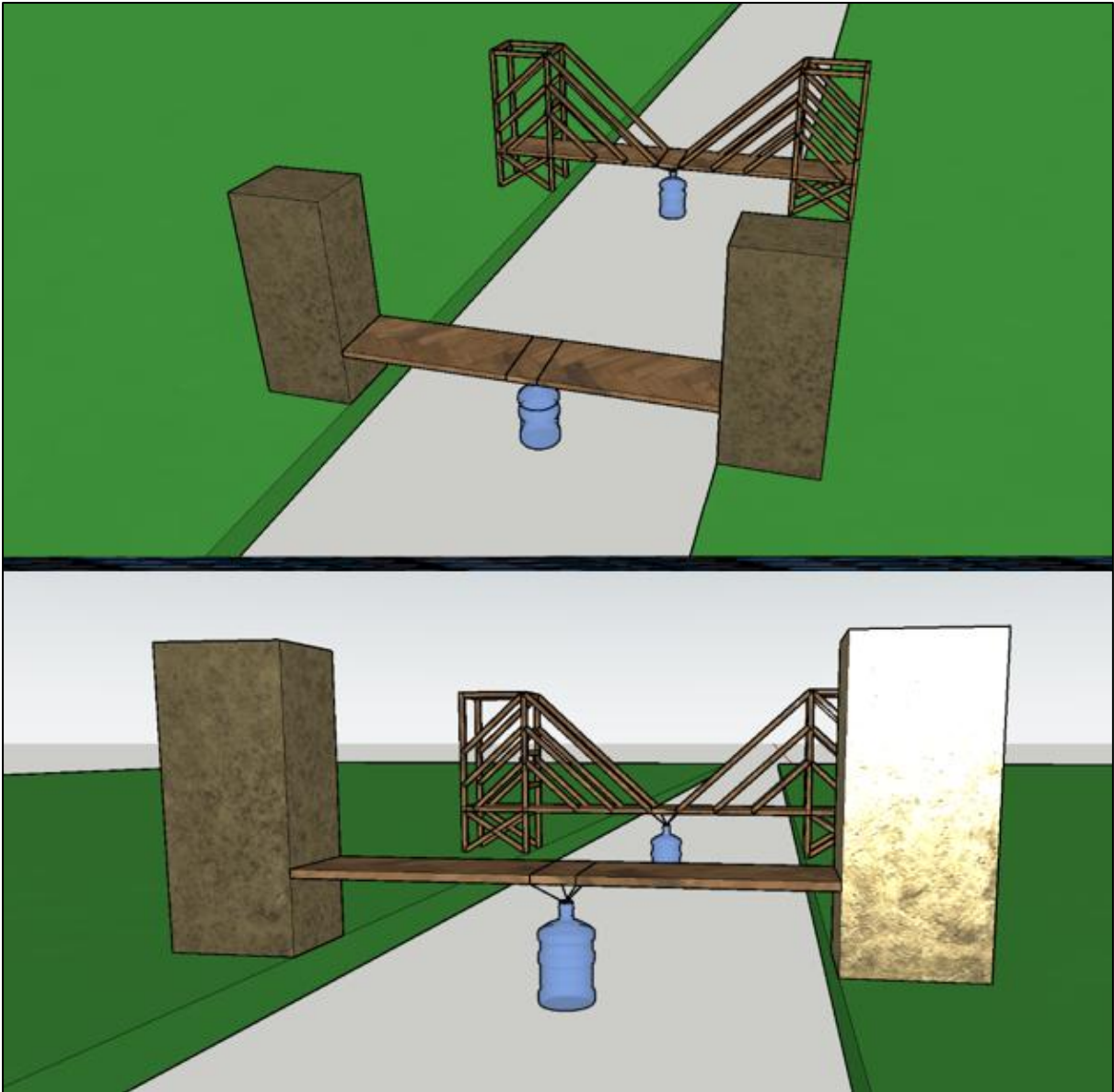


Figure 2: 3D Illustration of bridge model in draw-bridge-closed and loading position

3.0 MODEL ASSEMBLY & ASSESSMENT PROCEDURE

3.1 Booth Allocation and Setup

- a. Each participating group shall be provided with two (2) tables to support and display their bridge model (hereinafter referred to as the “Model”).
- b. Participants are given two (2) hours for booth setup. This includes installation of the Model, posters, and any approved decorative materials.
- c. Posters will be limited the size 594 × 841 mm of the bunting stand (refer Figure 3).



Figure 3: Example of bunting stand for A3 poster

3.2 Dimensional Verification

- a. The competition shall commence with dimensional verification conducted by the technical committee to ensure that the Model complies with all specified design requirements.
- b. Any non-compliance with dimensional requirements shall be penalised using the Dimensional Factor (P1), which shall be applied to the judges’ marks (J) in accordance with Table 1.

Table 1: Dimension factor (P1) for the Model

Category	Dimension factor, P1
Full compliance	1.0
Noncompliance	0.5

3.3 Mechanism Evaluation

- a. The technical committee shall evaluate the drawbridge opening mechanism to ensure proper functionality.
- b. The drawbridge mechanism must be capable of opening upward. When fully lifted, the bridge shall provide a minimum vertical clearance of 500 mm between the piers to represent a navigational passageway for ships.
- c. The lifted span must remain in the open position using its own mechanical system or locking mechanism and shall not be manually supported or held by hand during the evaluation process.
- d. Any non-compliance with mechanism requirements shall be penalised using the Mechanism Factor (P2), which shall be applied to the judges' marks (J) in accordance with Table 2.

Table 2: Mechanism factor (P2) for the Model

Category	Mechanism factor, P2
Full compliance	1.0
Noncompliance	0.5

3.4 Judging Procedure

- a. There shall be no formal presentation session.
- b. Judges will visit each team's booth for evaluation.
- c. Each team shall be allocated a maximum of ten (10) minutes for judges' interaction, including questions and evaluation (Q&A session).
- d. The judges' marks (J) shall be based on a total of 100%.

3.5 Judging Criteria

The evaluation criteria for judges' marks (J) are as in Table 3:

Table 3: Evaluation criteria and marks allocation for the judge's marks (J)

Criterion	Marks (%)	Description
Engineering concept and design	40	This criterion evaluates the structural efficiency, engineering rationale, stability, and practicality of the Model. Judges will assess how well the team applies engineering principles, including load transfer mechanism, structural configuration, material utilization, and overall functionality of the drawbridge system.
Aesthetic quality	10	This criterion assesses the visual appearance and overall attractiveness of the Model. Consideration will be given to workmanship quality, neatness, finishing, proportion, and the overall presentation of the bridge model.

Innovation of bridge design and drawbridge mechanism	20	This criterion evaluates the originality and creativity of the bridge concept and opening mechanism. Teams are encouraged to demonstrate innovative ideas, unique structural approaches, and efficient mechanical systems while maintaining functionality and structural integrity.
Poster presentation (A3 size)	10	This criterion evaluates the quality and effectiveness of the technical poster displayed by the team. Judges will assess clarity of information, technical explanation, graphical presentation, layout organization, and the ability of the poster to communicate the design concept effectively.
Question and answer session	20	This criterion assesses the participants' understanding of their Model and their ability to explain the engineering concepts, design decisions, structural behaviour, and construction process. Judges will also evaluate the team's confidence, communication skills, and ability to respond accurately to technical questions.

3.6 Load Testing Procedure

- a. Participants shall transfer their Models to the designated testing platform.
- b. A load holder shall be installed at the midspan of the Model (refer to Figure 1).
- c. Load shall be applied incrementally up to a maximum of 8 kg or until failure occurs, whichever comes first.
- d. For each load increment, the Model must sustain the applied load for a minimum of thirty (30) seconds before the next increment is applied.

3.7 Load Capacity Definition

- a. The load capacity (P) is defined as the load sustained by the Model for at least thirty (30) seconds without failure.
- b. The Model shall be considered as failed when any of the following occurs:
 - The load holder detaches from the Model or touches any external object;
 - Any structural component of the Model detaches, fractures, or breaks;
 - The Model loses stability or collapses.

3.8 Load Factor

- a. The Load Factor (L) shall be determined based on Figure 4.
- b. The ultimate objective is for the Model to achieve failure at an optimum load of $P = 5$ kg, with a maximum Load Factor (L) of 1.0.

- c. This requirement is intended to promote understanding of the concept of optimum design, encouraging participants to avoid both overdesign and underdesign in their structural solutions.

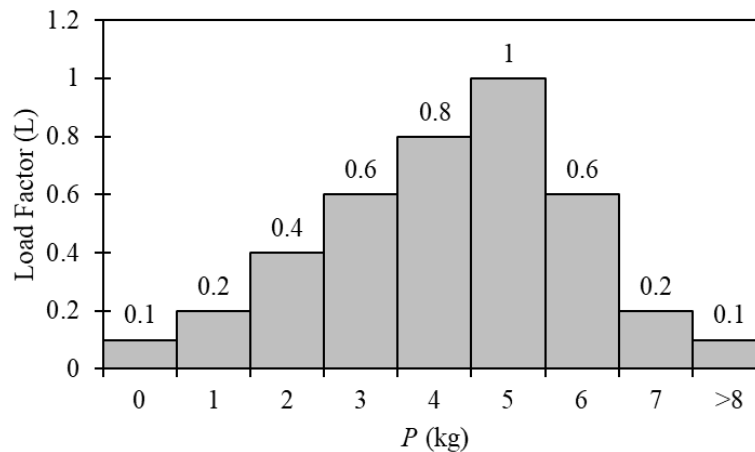


Figure 4: Load Factor (L) graph

3.9 Scoring System

- a. The overall score shall be calculated using the following equation:

$$\text{Overall Score} = J \times P1 \times P2 \times L$$

- b. In the event of a tie in the overall score, the team with the higher judges' marks (J) shall be ranked higher. If the tie persists, the team with the higher Load Factor (L) shall be ranked higher. If a tie still remains, the ranking shall be determined based on the score for the Engineering Concept and Design criterion, which carries a 40% weightage under the judges' marks (J). If the teams remain tied after all criteria have been considered, the teams shall be declared joint champions.
- c. In the event of any dispute, the decision of the Chief Judge shall be final and binding.
- d. Participants are required to dismantle their Models and clear their booths upon completion of the competition.