Gdańsk, 09.01.2018

wyKOMBinuj mOst 2018

Competition regulations

Organizer

§ 1

The Competition „**wyKOMBinuj mOst 2018**" (eng. Create the bridge 2018) is organized by Structural Mechanics Student Society KOMBO, supervised by Department of Mechanics of Materials at Faculty of Civil and Environmental Engineering at Gdansk University of Technology, further called „Organizer".

Date, place and course of the competition

§ 2

1. The Competition will be held on 16-18 May 2018 on the campus of Gdansk University of Technology.
2. The Competition is held by the Organizer on the grounds of this document.
3. The Competition is divided into stages, strictly connected with particular days:
   - first day – solving competition task,
   - second day – Student Scientific Conference on Civil Engineering „KOMBOferencja 2018" (PL),
   - third day – load tests of prepared structures, results announcement and closing ceremony with winners award.
4. The Organizer has a right to make minor changes, if necessary, in the Competition Regulations in future, with public announcement of that fact on the Competition's website www.wilis.pg.edu.pl/wykombinuj-most.

Participants

§ 3

1. The Participants of the Competition are three-man Teams of Students on the Bachelor's or Master's level or high-school Students, all further called Participants.
2. One Team can involve Students from different Universities or High Schools.
3. Participation in the Competition is free of charge.
4. The Organizer does not cover the costs of the transportation, oversleeps and other additional costs.

Comittee

§ 4

1. Composition of the Competition Committee will be determined by the Organizer and announced before the first day of the Competition. Assured Members of the Competition Committee would be: Head of Department of Mechanics of Materials, chosen scientific workers from GUT, and chosen members of KOMBO Society. Scientific Supervisors from other Universities would be also invited to participate in the Committee works during Competition days. The Committee has a right to invite Special Guests to participate in the Committee works.
2. Head of the Committee is chosen from the Members of the Committee, during the Competition, by the voting majority.
3. Committee's tasks involve:
   - supervision of following the Competition Regulations,
   - supervision of correctness of the carried out load tests,
   - deciding eventual disputes bounded with the Competition Regulations,
   - evaluation of sent projects and decisions about their qualification to the Competition in case of the situation when the number of application is above 30.

Essence of the Competition

§5

1. The aim of the Competition is to complete the tasks described in the section 6, paragraph 1 of this document.
2. The main and only condition of participating in the Competition is sending an application followed by sending a project of the Competition's structure.
3. The applications and projects should be sent to the Organizer before 30th April 2018 by email to the stated address kombo@pg.edu.pl.
4. The registration form is presented in the *Attachment A* below. The applications must involve signatures of team's members and must be sent as a scan in pdf format.
5. Projects must be sent in pdf format. Project should involve at least plan, side and front view along with dimensions, which will enable to check by the Committee if the project meets the Regulations' requirements.

6. Three pdf files should be involved in the application mail:
    - scan of the registration form named: *TEAM_NAME*_FORM,
    - project of the bridge named: *TEAM_NAME*_PROJECT,
    - list of the additional things (see 6.2) named: *TEAM_NAME*_THINGS.

    Subject of the application mail: *TEAM_NAME*_WM2018.

    Exemplary application mail for the team named 'KOMBO breaker':

    Subject of the mail: KOMBO_BREAKER_WM2018

    Files: KOMBO_BREAKER_FORM, KOMBO_BREAKER_PROJECT,
    KOMBO_BREAKER_THINGS
7. The correctness of the structure will be checked during the Competition. Incompatibility could be a ground for disqualification.
8. List of teams qualified to the Competition will be announced on 7th May 2018 on the base of evaluation, in which correctness and technical understanding of the project would be taken into account. Projects would be verified by scientific Workers from GUT, members of the Competition Committee.
9. In case of the number of application above 30, teams representing foreign universities would be taken into account with priority.
10. All Participants by taking part in the Competition allow to put their names, photos and University Name on our websites www.wilis.pg.edu.pl/kombo and www.wilis.pg.edu.pl/wykombinuj-most.

Competition task

§ 6

1. Each Team must complete a task, building a model of a bridge with the span of 100 cm, working as a simply supported beam in 7 hours using only provided materials and equipment described in the section 6, paragraph 2 of this document.
2. Participants must complete the given task using the materials and articles provided by the Organizer:
    - nine bristol boards with dimension of 700 x 1000 mm and grammage 250 g/m^2,
    - two bottles of polimer glue – 2 x 500 ml.

    Additionally, Participants can use own tools as:
    - scissors/scalpels,
    - rulers,
    - pens and pencils,
    - weights,

- other articles declared by email along with the application and accepted by the Organizer.

3. Usage of power tools such as: drillers, grinders, jigsaws and others powered by electricity is forbidden. Usage of machines speeding up the gluing is forbidden. That process should proceed naturally.
4. Gluing the bridges will be held in the place pointed out by the Organizer and on the previously prepared slot. Gluing and cutting outside the slot and directly on the floor is forbidden. Each slot is pointed out with the lines on the floor and consists of one table and three chairs.
5. After ending the gluing part, Teams are obliged to mark the „front" of their structures (*Attachment C*) and to transport their own bridges to the place indicated by the Organizer. It is not possible to transport the bridge before the end of regulated time – Teams, that end before the regulated time have to wait till the end of the stage. The Organizer bears no responsibility of any eventual damage acquired during the transportation. The transportation would be accompanied by the Organizer.
6. Teams are obliged to transport their Bridges on the second day of the Contest in order to participate in the additional category „the most beautiful bridge". The exact place and time would be determined by the Organizer on the first day of the Contest. The structure cannot bear any additional loads and reinforcements during the voting. After the end of the day, the Teams are obliged to transport their bridges to the place pointed by the Organizer. Bridges, which Representatives would not appear in the defined places, would be transported by the Organizer.
7. The structure is required to have a bridge deck, which will enable to directly apply the load with Zwick/Roell testing machine. The load will be applied with the use of a force cell with dimensions of 10 x 10 cm in a drawn place according the scheme presented in *Attachment C*. The structure must allow applying the load by the testing machine described in *Attachment C*.
8. Allowed dimensions of the span could be found in *Attachment B* of this document. The dimensions must also allow the test vehicle (toy car) to pass across the whole length of the bridge deck. The structure gauge is described in *Attachment C*. Moreover, the bridge deck should be straight and horizontal, to meet construction requirements typical for normally existing bridge structures.
9. The place of applying the load would be drawn during the load test day and will be the same for each Team. There are five possible places for applying the load by means of the force cell (*Attachment C*).
10. Stages of loading the span present as follows:
    - the bridge is weighed and measured to check if it meets the requirements,
    - if the mass and geometry are correct, the span is loaded by the Organizer with the test vehicle with a mass of 2 kg and meeting the dimensions defined in *Attachment C*,
    - if the vehicle is able to pass through the deck, the bridge is placed by the Team members in the Zwick machine,

- the span is initially loaded with the force of 10 N in the previously drawn place (*Attachment C*), obtained deflection is adopted as „zero state”,
- the span is then further loaded in the same place with the speed of 15 mm/min,
- a test is regarded as finished as soon as the deflection reaches 40 mm,
- the load is relieved,
- the bridge is taken out from the machine.

11. The Structures are classified relating to their load capacity and mass according to the formula:

$$K_i = \frac{R_i^2}{m_i^{obl}} \cdot 100 ,$$

where:

K_i – points of *i* team [–],

R_i – maximum force carried by the bridge of *i* team [N],

m_i^{obl} – computational mass of the bridge of *i* team [g], calculated according to the formula:

$$m_i^{obl} = \begin{cases} 200 \text{ g} & \text{for} \quad m_i < 200 \text{ g} \\ m_i & \text{for} \quad m_i \geq 200 \text{ g} \end{cases}$$

m_i – real mass of the bridge of *i* team [g],

12. The Organizer has a right to exclude from the Competition Participants who do not respect the rules stated in the Competition Regulations. Particular reasons to exclude the Participants from the Competition could be:
    - breaking fair play rules,
    - using materials and tools other than stated in paragraph 2 of this article.

Awards

§ 7

1. Awards are funded by the Organizer.
2. Awards will be given to the Members of Teams, whose structures reach the three highest values of *K* factor.
3. Additional awards will be given to Teams:
    - whose bridge was classified as the best in case of stiffness, which means reaching the shortest deflection with the load of 300 N; when the structure fails before reaching the given load, maximum value of deflection is taken into account (40 mm),
    - who estimate the load capacity of their bridge with the best accuracy; estimation take place after the construction stage – captains must submit the estimated load in [N],

- who estimate the mass of their bridge with the best accuracy, estimation take place after the construction stage – captains must submit the estimated load in [g],
- whose bridge will win the „beautiful contest", taking place during the second day of the Competition.

Closing resolutions

§ 8

1. All the disputes and claims related with the Competition will be solved by the Committee's voting majority.
2. When two Teams reach the same place – the same number of points, the maximum load is decisive.
3. Participants are obliged to wear the ID in a visible place during the competition. During the first day of the competition, participants are required to wear a T-shirt provided by the organizer.
4. In all cases that are unregulated with this document common law is used.

Attachment A

Application form
„wyKOMBinuj mOst 2018”

Organizer

Structural Mechanics Student Society KOMBO, supervised by Department of Mechanics of Materials
Faculty of Civil and Environmental Engineering
Gdansk University of Technology

PLEASE FILL IN THE FORM READABLY WITH CAPITAL LETTERS

I) University: .....

II) Supervisor*: .....

III) Team:

- team name: .....

- members:

	Member 1	Member 2	Member 3
Name			
Surname			
Faculty			
Field of study			
Specialization			
Year			

IV) Team captain:: .....

- email address: .....

- phone numer: .....

I hereby agree for processing my personal data for the purpose of participation in „wyKOMBinuj mOst 2018” (as defined in the Act of August 29, 1997 on the Protection of Personal Data (Journal of Laws No. 133, item 883).

….……..……..……..…… ….……..……..……..……

place, date

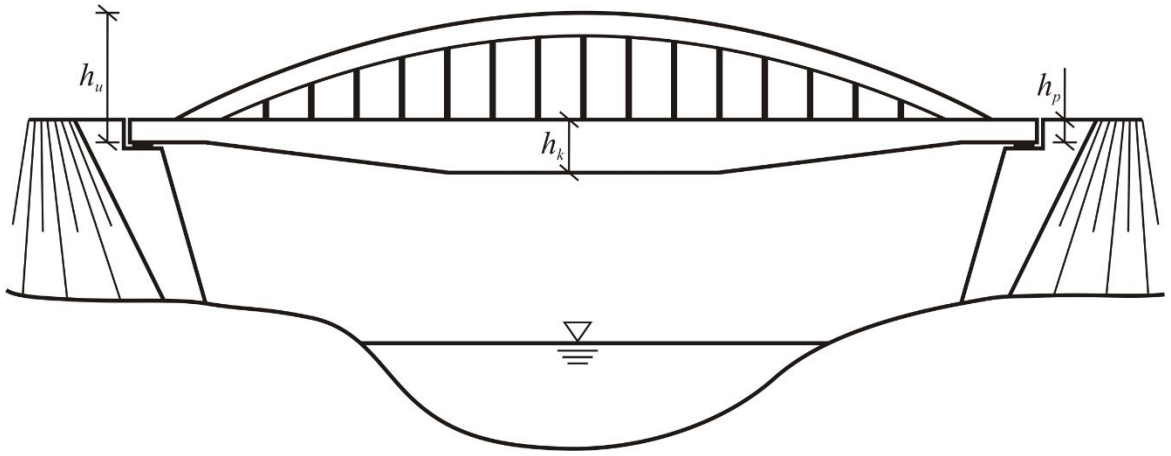
….……..……..……..……

Participants’ signatures

* not obligatory

Attachment B

Acceptable span dimensions in longitudinal section



h_k – **constructional height** longest distance between the deck gradeline and bottom edge of the span (considered without deflection)

maximum constructional height: $h_k^{\max} = 15$ cm

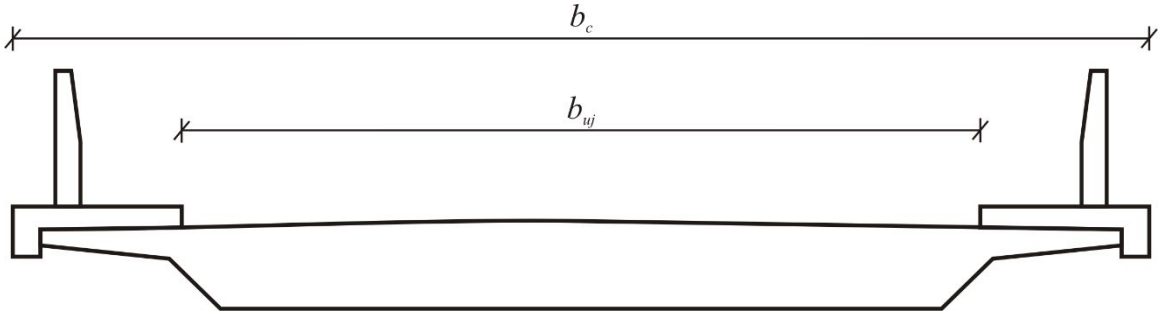
h_p – **support height** distance between the deck gradeline above the support and support point

maximum support height: $h_p^{\max} = 5$ cm

h_u – **superstructure height** height measured from the supporting point to the top edge of the structure

maximum superstructure height: $h_u^{\max} = 25$ cm

Acceptable span dimensions in cross section



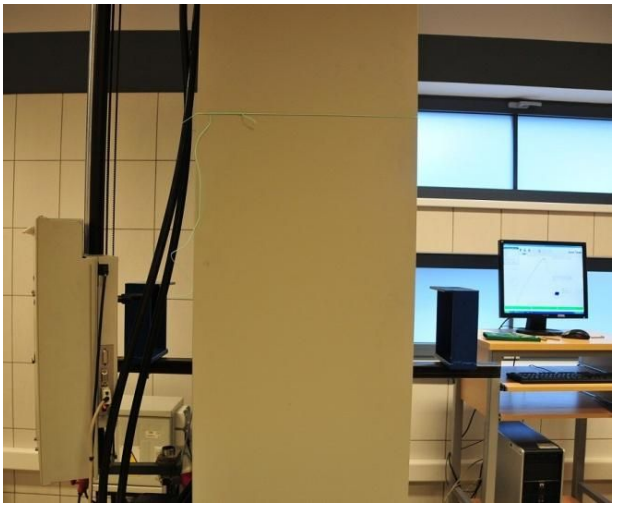
b_c – **total width** horizontal distance between external edges of the span cross section

maximum total width: $b_c^{\max} = 25$ cm

b_{uj} – **usable deck width** width of the passable deck (*Attachment C*)

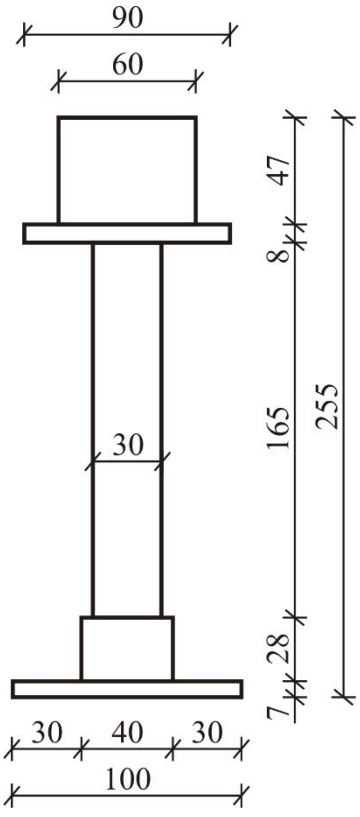
minimum usable deck width: $b_{uj}^{\min} = 16$ cm

Attachment C
Measurement site

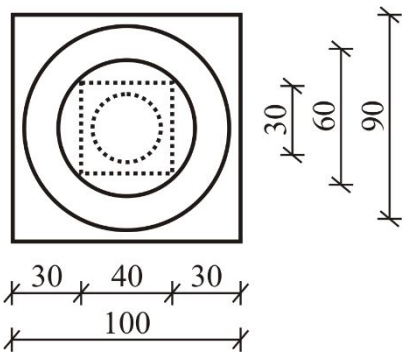


Force cell

Side view

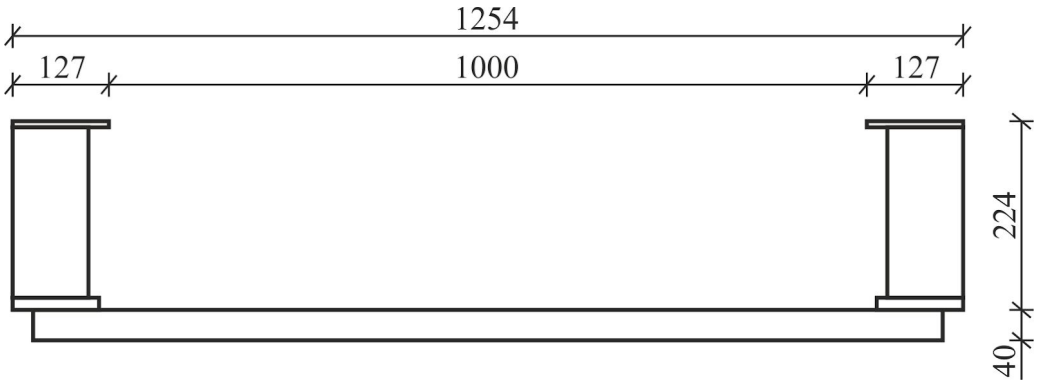


Plane view

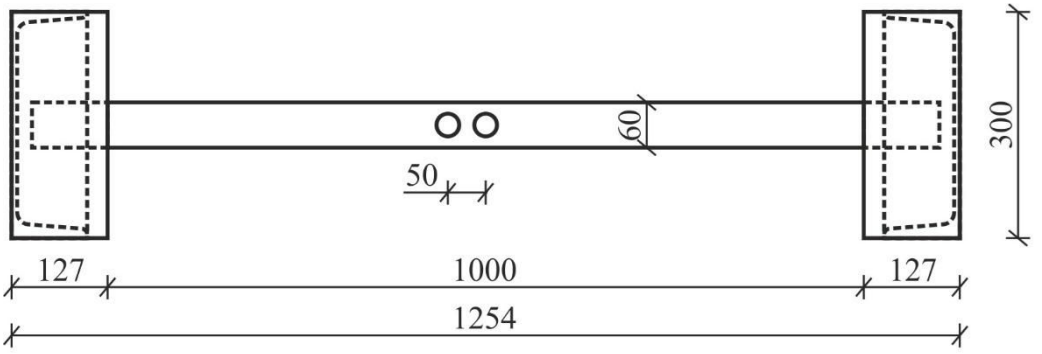


Support

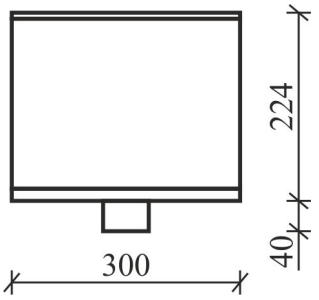
Side view



Plan view



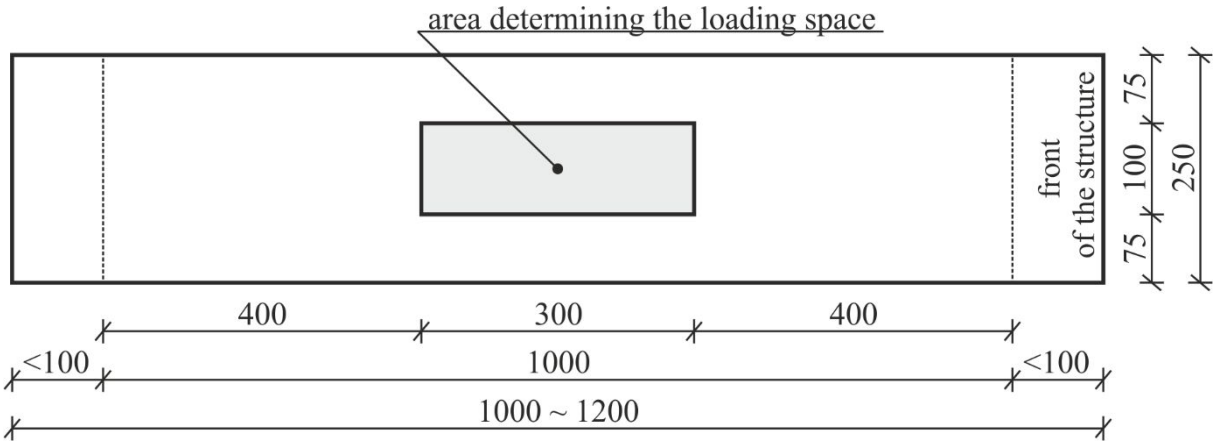
Front view



Loading space

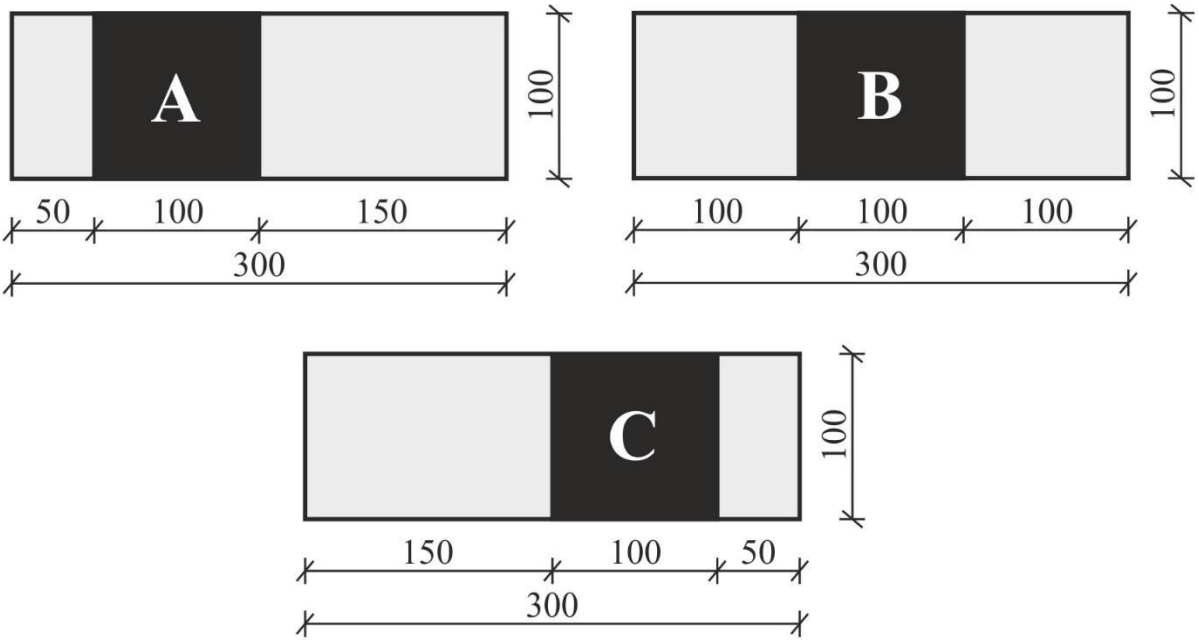
Loading space –space above the deck of the bridge marked by the rectangle field with dimension 300 x 100 mm, located symmetrically in regard to the structure. It is forbidden to place any elements in the loading space, since it is a potential place for putting a loading cylinder.

Location of the loading space on the deck



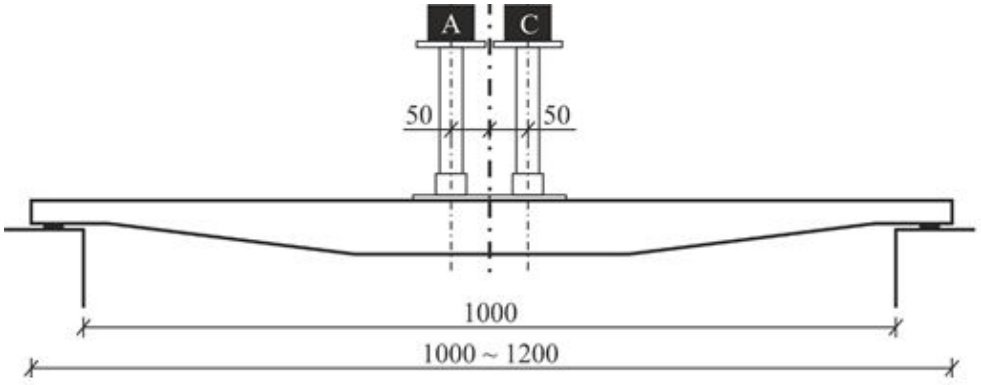
There are five possible locations of putting the loading cell (A, B and C). Teams, after the construction stage, before the load place drawn, are obliged to mark (with the marker) „front" of their bridge.

Plan view of the possible locations of setting the load cell

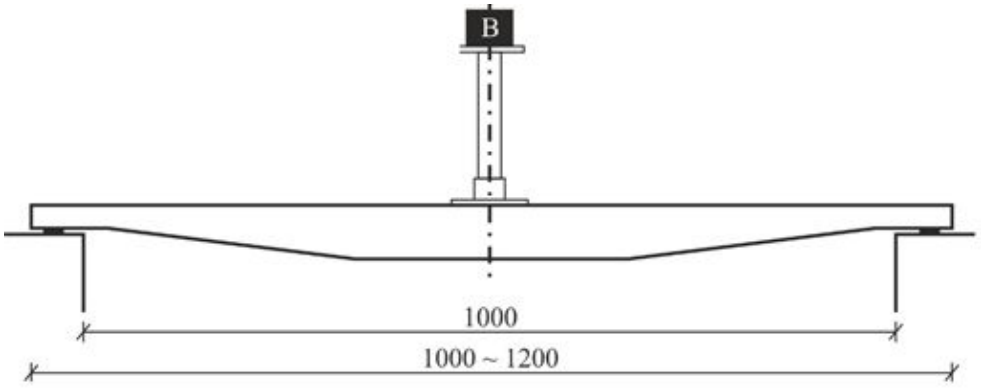


Side view of the possible locations of setting the load cell

Locations A, C



Locations B



Structure gauge for the test vehicle

Structure gauge is defined as a free space above the bridge deck, enabling the test vehicle to pass through the bridge. It is a rectangle in the cross section with a width equal to the minimum deck usable width $b_s = b_{uj}^{\min} = 160$ mm and height $h_s = 110$ mm. The dimension of the bridge in the front view should not exceed the gauge.

Front view of example structure with the structure gauge