

# INTERNATIONAL STEEL BRIDGES COMPETITION

## ***REGULATIONS OF THE INTERNATIONAL STEEL BRIDGES COMPETITION 2020***

***„DESIGN, BUILD, TEST”***

***ISBC 2020***



## CHAPTER I - General provisions

### Organiser

#### § 1

1. *The organiser of the International Steel Bridges Competition 2020, hereinafter referred to as the Competition, is the "Young Bridges PWR" Scientific Association, hereinafter referred to as the Organizer, operating at the Wrocław University of Science and Technology at the Faculty of Civil Engineering, the Bridge and Railway Cathedral.*
2. *The Permanent Patron of the Competition is the Dean of the Faculty of Civil Engineering of the Wrocław University of Technology.*

### Regulations

#### § 2

1. *The rules of the Competition are defined in these Competition Rules.*
2. *The Regulations of the Competition can be found on the website [www.mlodzimostowcy.pwr.wroc.pl](http://www.mlodzimostowcy.pwr.wroc.pl)*
3. *Failure to comply with any of the points of the regulations may result in the disqualification of the Team.*

### Time and Place

#### § 3

1. *The competition will take place on the campus of the Wrocław University of Science and Technology.*
2. *The Competition date is specified in the schedule mentioned in Annex I. The time and exact location of the Competition will be announced electronically to the Teams at least one week before the official opening of the Competition.*

### Participants

#### § 4

1. *Participants of the Competition are all members of the declared Teams.*
2. *In the Competition may participate only adults being students or graduates of universities operating in Poland or abroad.*
3. *A participant may be a member of only one team.*
4. *Organizer members may be Competition Participants and take part in the competition.*

### Team

#### § 5

1. *The Team consists of five Participants.*
2. *A team may have a Supervisor who is a research associate or doctoral student at the university where the team members study.*
3. *The team must choose a Captain.*

## Purpose and assumptions of the competition

### § 6

1. *The teams* have to design and make bridge models themselves, which will then be put under to a load test.
2. The idea of *the Competition* is to improve skills in shaping, modelling and analysis of bridge structures, as well as to develop technical and manual skills of *Participants*.
3. The assumption of *the Competition* is its cyclical organization under a different slogan that defines the type of construction of the constructed objects.

## CHAPTER II – Participation

### General Conditions

#### § 7

1. *The Organiser* provides materials and tools for making *the Bridge* designed by *the Team*. *The Bridge* may only be created from the materials listed in *Annex 3*.
2. The costs of purchasing materials and tools listed in *Annex 3* and *Annex 4* are covered by the registration fee and sponsorship payments.
3. The amount of the entry fee is listed in the application form specified in *Annex 2*. Each *Team* that successfully passes the *Project Stage* (see Chapter III) and wishes to participate in further stages of *the Competition* should pay the entry fee on the Organiser's bank account by the date specified in *the Competition* schedule, listed in *Annex 1*.
4. Details for the transfer will be sent electronically along with the results of the *Design Stage*.
5. *The Bridge* design must enable its technological execution.
6. *Teams* send completed projects *Bridges*, containing:
  - editable (dwg) files consisting of at least a side view, top view and cross section with dimensions and full information about who made the project,
  - non-editable files (pdf) consisting of at least a side view, a top view and cross section with dimensions and full information about who made the project,
  - an exact list of components and connectors used, specified in *Annex 3*.
  - indicate the beginning and end of the object in the drawings, according to the drawing from *Annex 6*.
  - The project should be sent by the date specified in *the Competition* schedule, listed in *Annex 1*, to the e-mail address *mlodzimotoowcy@pwr.edu.pl*.

## Application

### § 8

1. *Teams* must complete and send to *the Organizer*, by e-mail to [mlodzimostowcy@pwr.edu.pl](mailto:mlodzimostowcy@pwr.edu.pl), a scan of the completed application form, listed in *Annex 2* to the date specified in *the Competition* schedule. The form is available on the website [www.mlodzimostowcy.pwr.wroc.pl](http://www.mlodzimostowcy.pwr.wroc.pl)
2. *The Organizer*, based on *the Competition* Commission decision, confirms the qualification of *the Team* for *the Competition* by sending an electronic message to *the Team Captain* at the latest by the date specified in *the Competition* schedule, listed in *Annex 1*.
3. Submitting a *Team* to *the Competition* is tantamount to acceptance of the Regulations by all *Competition Participants* from a given *Team*.

## Resignation from participation in the Competition

### § 9

1. In the event of resignation from participation in *the Competition* after the deadline specified in *the Competition* schedule, listed in *Annex 1*, the *Team* shall bear the entry costs listed in the application form, specified in *Annex 2*, as compensation for the organizational measures taken (including purchased competition materials).
2. In the event that a registered *Team Participant* is not able to participate in *the Competition*, for reasons beyond the *Participant's* control, *the Competition Commission* may allow another *Participant* to participate in *the Competition* after informing the *Organizer* in advance.
3. Indication by the *Captain of another Team Participant* must be in writing form and should be delivered to *the Organizer* by electronic means no later than 4 business days before the *Executive Stage*.
4. *The new Participant* must provide the signed *Competition Regulations*. Otherwise, the *Competition Commission* has the right to exclude him from participating in the *Competition*.

## Additional information

### § 10

1. *The Organiser* provides each *participant*:
  - 1) competition T-shirt/shirt and protective gloves,
  - 2) souvenir gadgets.*The Organiser* does not provide other protective clothing (including protective shoes).
2. During the *Executive Stage*, each *Participant* must be equipped with personal protective equipment (protective gloves, safety shoes).

## CHAPTER III - Stages of the International Steel Bridges Competition

### General information

#### § 11

1. *The competition* is divided into five stages in the following order - *Design Stage, Control Stage, Executive Stage, Loading Stage and Summary Stage.*
2. The Competition Commission and the *Competition Jury* supervise the proper course of each stage of *the Competition.*

### Design Stage

#### § 12

1. In *the Design Stage*, all teams that have submitted completed detailed designs of bridge models along with a list of materials used and their quantity until the date specified in *the Competition* schedule listed in *Annex 1.*
2. Process:
  - 1) *The Competition Commission* by the *Organizer* is convened,
  - 2) Project control in terms of compliance with the regulations is carried out by the *Competition Committee,*
  - 3) Selection by *the Competition Commission* of Teams that will take part in the next stages of *the Competition.*
3. Teams that pass *the Project Stage* will be qualified to the next stages of *the Competition.* *The Organiser,* based on the decision of *the Competition Commission,* confirms the qualification for *the Competition* by sending an email to the *Team Captain* at the latest by the date specified in the *Competition* schedule, listed in *Annex 1.*
4. For organizational reasons, the number of qualified *Teams* is limited to 8. *The Competition Commission* decides on the qualification of *the Teams* to *the Competition* based on the submitted project.

### Control Stage

#### § 13

1. Process:
  - 1) Control by *the Competition Commission* of the compliance of the number and quality of individual materials and tools in given positions. Contest Participants are prohibited from using their own materials and tools (it is allowed to use one drill-driver per *team*);
  - 2) Verification by *the Competition Commission* of the compliance of the composition of *the Team* with the application form.
2. *Teams* that do not meet the requirements of *the Control Stage* will be charged penalty points or disqualified by *the Competition Jury* at the request of *the Competition Commission* depending on the scale of discrepancies with *the Regulations.*
3. *The Control Stage* is carried out by *the Competition Commission.*

### **Executive Stage**

#### § 14

1. Teams that have received a positive evaluation of *the Competition Commission* at the *Control Stage* can only take part in it.
2. Process:
  - 1) Production of Elements and Assembly of the object by *Teams* with time measurement by *the Competition Commission* in accordance with §25 of *the Regulations*,
  - 2) Teams transfer the structure from the assembly site to the weighing and loading station.
  - 3) Compliance of the execution of the Bridges with the project and *the Regulations* is checked by *the Competition Jury*.
3. *The Executive Stage* is supervised by *the Competition Jury* and *the Competition Commission*.
4. The maximum duration of *the Executive Stage* is 8 hours.

### **Load Stage**

#### § 15

1. *Teams* that have received a positive evaluation of *the Competition Commission* at the *Executive Stage* can only take part in it-
2. Process:
  - 1) weighing the Bridge by the lab assistants in accordance with §26 of *the Regulations*,
  - 2) load on the bridge by lab assistants in accordance with §26 of *the Regulations*.
3. *The Competition Jury* awards points to *the Team* in accordance with §27 of *the Regulations*.
4. *The Loading Stage* is supervised by *the Competition Jury*.

### **Summary Stage**

#### § 16

1. All *Teams* participating in the previous stages of *the Competition* take part in it.
2. Process:
  - 1) *Preparation* of the final classification of the *Teams* by *the Competition Committee* and *the Competition Jury*,
  - 2) Determining the winner and awarding prizes by *the Competition Jury*,
  - 3) official ending of *the Competition* by *the Competition Jury*.

## CHAPTER IV - Competition Commission

### Composition

#### § 17

1. *The Competition Commission* is constituted by:
  - 1) Representatives of *the Organizer* performing functions:
    - a) *President of the Competition Commission*,
    - b) *Secretary of the Competition Commission*;
  - 2) Representatives of "Young Bridgeers PWR";
  - 3) *The Competition Commission* must consist of a minimum of 5 people;
  - 4) the exact composition of *the Competition Commission* will be announced no later than 5 business days before the end of *the Design Stage*.

### Competence

#### § 18

1. The competence and duties of *the Competition Commission* include:
  - 1) objective assessment and verification of compliance with the *Regulations* of submitted projects during *the Design Stage*;
  - 2) supervising compliance with the *Competition Regulations*;
  - 3) resolving any doubtful or disputed situations;
  - 4) supervision over compliance with health and safety regulations during the *Competition*;
  - 5) Checking compliance of the number and quality of individual materials and tools at assembly stations before the start of the *Executive Stage*;
  - 6) Measurement of assembly time during the *Executive Stage*;
  - 7) checking *the Gauge* and measuring the mass of constructed objects.
2. The competences and duties of *the Chairman of the Competition Commission* include:
  - 1) Supervising the work of *the Competition Commission*;
  - 2) Announcement of the results of *the Design Stage*.
3. *The Chairman of the Competition Commission* during his absence is replaced by the *Secretary of the Competition Commission*.
4. The duties of the *Secretary of the Competition Commission* include documenting the results obtained during individual stages of *the Competition*.

## CHAPTER V - Competition Jury

### Composition

#### § 19

1. *The Competition Jury* consists of:
  - 1) Employees of the Department of Bridges and Railways of the Wrocław University of Science and Technology;
  - 2) Supervisor of the Science Clubs of the Teams participating in *the Competition* who will be entered in the Application Form in *Annex 2*;
  - 3) The exact composition of *the Competition Jury* will be announced no later than 5 business days before the start of the *Executive Stage*.

### Competence

#### § 20

1. The competence and duties of *the Competition Jury* include:
  - 1) Supervising the process of testing structures under load, including measuring the destructive force and deflections at the *Loading Stage*;
  - 2) Summarizing the results of individual Stages and selecting the winner of *the Competition* and determining the places occupied by all Teams that completed *the Competition*;
  - 3) Deciding on the distribution of prizes;
  - 4) resolving any doubtful or disputed situations.
2. The competences and duties of the *Chairman of the Competition Jury* include:
  - 1) supervising the work of *the Competition Jury*;
  - 2) announcement of the results of *the Competition*.
3. *The Chairman of the Competition Jury* is replaced by the Deputy Chairman of *the Competition Jury* during his absence.
4. All decisions of *the Competition Jury* are final and indisputable.

## CHAPTER VI – Bridge

### Projects

#### § 21

1. The object of design is a steel bridge span called the Bridge, whose gauge is given in *Annex 5*.
2. *The Bridge* consists of Mounting Elements, hereinafter referred to as *Elements*.
3. The number of *Elements* is limited and specified in *Annex 3*. Materials which are not in *Annex 3* may not be used.
4. During *the Bridge* design process, the team may seek the advice of any consultants except members of *the Competition Commission* and *the Competition Jury*.
5. *The bridge* must be constructed in such a way that it is possible to apply the model load defined in *Annex 6* on the object on the surface specified in *Annex 5*.



6. The type of structure of the object is defined by *the Competition* slogan set out in *Annex 1*.
7. The bridge should reflect the actual construction of the bridge structure as much as possible.

### **Supports**

#### § 22

1. Laboratory supports are supports on which Bridge bearings rest during the *Loading Stage*.
2. A scheme of the laboratory support is provided in *Annex 7*.

### **Platform**

#### § 23

1. The bridge must be constructed so that, within the gauge (see *Annex 5*) on the object, it is possible to apply the model load defined in *Annex 6*.
2. Permissible deviation in the place of application of the load, shown in *Annex 6*, is 10 mm.
3. The platform must be completely covered with plywood provided by *the Organiser*.
4. The road gauge of 50 x 50 cm as defined in Annexes must be maintained on the platform.

### **Connections**

#### § 24

1. The elements must be joined with bolts and screws.
2. The elements are connected by a limited number of bolts and screws specified in *Annex 3*.
3. The connections in the form of bolts and screws must be tightened using the Tool Kit specified in *Annex 4* and provided by *The Organiser*.

### **Assembly**

#### § 25

1. Assembly takes place at the construction site.
2. The construction site is divided into Zones for individual *Teams*. Each team can only move in its own zone. The use of *Materials and Tools* of other teams is prohibited.
3. Screwing of *Elements* at ground level and on assembly tables is allowed.
4. When screwing *the Elements*, no additional scaffolding or tools may be used that are not included in the regulations.
5. Before Assembly:
  - 1) all *Elements and Tools* must be in the Assembly zones;
  - 2) Team members are on the starting line.
6. *The Assembly* is started after the “Start” command issued by a member of *the Competition Commission*.
7. Assembly is done on time.

8. The assembly time limit is 8 hours.
9. *The Competition Commission watches over the Executive Stage. For failing to comply with the rules of Assembly, the Competition Jury may charge the Team with penalty points or disqualification at the request of the Competition Commission.*
10. Only *the Tools* provided by *the Organiser* listed in *the Annex* may be used. *The Organiser* allows the use of one own drill-driver, but is not responsible for any damage resulting from use or loss of the tool.

## Research

### § 26

1. After assembly, the bridge is manually transferred to the weighing place.
2. The bridge is weighed by the employees of *the Wrocław University of Science and Technology laboratory* using a scale. The resulting mass is the real mass of this bridge  $M_{rz}$ .
3. The bridge is subjected to a load test using the equipment of *the Wrocław University of Science and Technology laboratory*.
4. *The Load Scheme* is described in *Annex 6*.
5. The load application site will be randomly selected from among 3 locations described in *Annex 6* before proceeding to the *Test stage*.
6. The load test continues until one of the following events occurs:
  - 1) the occurrence of the phenomenon of increase in deformations of *the Bridge* structure without a simultaneous increase in the force applied to the structure (so-called plastic flow of the structure);
  - 2) occurrence of a threat to the safety of conducting a stress test;
  - 3) contact of any structural element with the loading foot in a place other than the contact surface with the structure specified in *Annex 3*.
  - 4) exceeding the deflection value of the structure, measured by means of the maximum cylinder extension.
7. The value taken into account when determining the score according to §27 is the maximum force registered on the testing machine generating vertical load, until one of the events described in par. 6.
8. An additional criterion taken into account when determining the scoring is the preservation of the structure gauge, as shown in the drawings in *Annex 5*.
9. The decision to end the load test of each structure is made by *the Competition Jury*.

## CHAPTER VII – Scoring

### Scoring and rewards

#### § 27

1. *Teams* score points according to the following criteria:

1) *Criterion of Ultimate Limit State:*

$$S = \frac{P}{G}$$

$$G = M_{rz} \cdot g ,$$

where:

$S$  – ratio of destructive force to the weight of the Bridge,

$P$  – value of destructive force [N],

$G$  – weight of the Bridge [N]

$M_{rz}$  – mass of the Bridge [kg],

$g$  – gravitational acceleration value  $(9,81 \frac{m}{s^2})$ .

The maximum number of points to be obtained is 50 points. The team whose ratio of destructive force ( $P$ ) to bridge weight ( $G$ ) reaches the highest value receives the maximum number of points. Successive Teams receive points in proportion to the best result.

$$N = \frac{50 \text{ pts} \cdot S}{S_{max}} ,$$

where:

$N$  – number of points received by the Team for the carrying capacity of the Bridge,

$S$  – ratio of destructive force to mass of the Bridge obtained by the Team,

$S_{max}$  – the ratio of destructive force to the mass of the Bridge obtained by the best Team.

$$N \in < 0 \text{ pts}; 50 \text{ pts} >$$

2) *Criterion of Serviceability Limit State:*

$$U = \begin{cases} 15 & \text{for } a \leq 70 \text{ mm}, \\ \frac{100 - a}{2} & \text{for } 70 \text{ mm} < a < 100 \text{ mm}, \\ 0 & \text{for } a \geq 100 \text{ mm} \end{cases}$$

where:

- $U$  – number of points received by the Team for the carrying capacity of the Bridge,  
 $a$  – Bridge deflection under load 2500 N [mm].

$$U \in < 0 \text{ pts}; 15 \text{ pts} >$$

3) *Executive Criterion:*

$$W = \left\{ \begin{array}{l} 15 \text{ for } t \leq 4h \\ 15 - \frac{15}{4} \cdot (t - 4) \text{ for } 4h < t \leq 8h \end{array} \right\},$$

where:

- $W$  – number of points received by the Team for the time of completing the Bridge,  
 $t$  – construction time of the Bridge [h].

10 negative points will be added for every hour started above  $t = 8$  hours.

$$W \in < -20 \text{ pts}; 15 \text{ pts} >$$

4) *Investor Criterion:*

Each team along with the submitted project is obliged to send a bill of materials, in which they must state their needs for structural elements. The permissible quantity and their cost of available materials is listed in Annex 3. The cost of the model is calculated on the basis of the submitted statement. During the Executive Stage it is possible to buy materials for a double price of the element.

The maximum number of points to be obtained is 15 points. The team whose cost ( $K$ ) reaches the lowest value receives the maximum number of points. Successive Teams receive points in proportion to the best result.

$$I = 15 \text{ pts} \cdot \frac{K_{min}}{K},$$

where:

- $K$  – the cost of the model obtained by the Team,  
 $K_{min}$  – the lowest cost value obtained by one of the Teams.

5) *Quality Assurance Criterion:*

Points are awarded on a scale of 0 points to 10 points. This part will assess the aesthetics and engineering diligence of the structure. Points will be awarded by the Competition Jury.

$$J \in < 0 \text{ pts}; 10 \text{ pts} >$$

6) *3D visualization:*

It is possible to obtain an additional 10 points. for sending 3D model by the Team along with the Bridge project.

$$B = 0 \text{ pts or } 10 \text{ pts}$$

2. The final result is the sum of points obtained during the Competition:

$$Q = N + U + W + I + J + B$$

The maximum number of points that can be obtained is 115.

3. The winner of *the Competition*, based on the decisions of *the Competition Jury*, is the *Team* with the highest number of points. The next places are taken by *Teams* with subsequent results.
4. The prizes are awarded to *Teams* which took the first three places. All *Teams* that complete *the Competition* will receive commemorative diplomas.

## CHAPTER VII - Final Provisions

### Regulations

#### § 28

1. The rules of *the Competition* are set out in these *Competition Regulations*, which apply to *Competition Participants* from the moment *the Team* is notified to participate in *the Competition* until the end of *the Competition*.
2. The Regulations of *the Competition* can be found on the website [www.mlodzimostowcy.pwr.wroc.pl](http://www.mlodzimostowcy.pwr.wroc.pl)
3. *The organizer* reserves the right to amend the Rules of *the Competition* (including changing the date of the competition) in substantively justified cases. *Captains* and *Carers* of *all Teams* will be immediately notified of any changes.
4. Any corrections to *the Competition Regulations* will be posted on the website [www.mlodzimostowcy.pwr.wroc.pl](http://www.mlodzimostowcy.pwr.wroc.pl). The organizer will notify *Team Captains* about changes by e-mail within 2 days of posting the correction.
5. Interpretation of *the Regulations* and the resolution of issues not covered in the Regulations are vested solely in *the Competition Commission* and *the Competition Jury*.
6. The decisions of *the Competition Commission* and *the Competition Jury* are final and may not be appealed.
7. Any questions regarding the organization or *Regulations of the Competition*, including the interpretation of *the Regulations*, should be sent to *the Organiser's* e-mail address [mlodzimostowcy@pwr.edu.pl](mailto:mlodzimostowcy@pwr.edu.pl). *The organizer* or *Competition Commission* will answer these questions on the website [www.mlodzimostowcy.pwr.wroc.pl](http://www.mlodzimostowcy.pwr.wroc.pl).

### Responsibility

#### § 29

1. In the event of causing damage related to participation in the competition, *the Participant* bears full responsibility for them and is obliged to repair them by paying compensation or otherwise agreed with *the Organizer*.

2. A participant who is under the influence of alcohol or psychoactive substances during *the Competition* will be the basis for disqualification of *the Team* of which he is a member by *the Competition Commission* or *the Competition Jury*.
3. The participant is obliged to comply with the principles of health and safety, fire protection, as well as the organizational and technical instructions and instructions of *the Organizer, Competition Commission and Competition Jury*.
4. By entering *the Competition*, *the Participant* is tantamount to agreeing to publish his name and surname, as well as all press materials from the competition (including photos).
5. The participant undertakes to arrive on time at *the Competition Stage*.
6. *The Organizer* does not provide participants with accident insurance, health insurance, third party liability insurance or any other forms of insurance during *the Competition*.
7. *The Organizer* is not responsible for the Participants' belongings that may be lost, destroyed or stolen during *the Competition*.

## Annexes

- Annex 1* – Contest password and schedule
- Annex 2* – Application form
- Annex 3* – List of available materials
- Annex 4* – Summary of available tools
- Annex 5* – Object gauge
- Annex 6* – Permitted load application schemes
- Annex 7* – Construction support scheme
- Annex 8* – Construction notes

## *Annex 1 – Contest password and schedule*

### Catchword ISBC 2020: **SUSPENSION BRIDGES**

- **by March 8, 2020 r.** – teams send a scan of the completed application form to the email address of *the Competition Organiser* [mlodzimostowcy@pwr.edu.pl](mailto:mlodzimostowcy@pwr.edu.pl);
- **by March 22, 2020 r.** – teams sending design drawings and a list of used materials to the email address of *the Competition Organizer* [mlodzimostowcy@pwr.edu.pl](mailto:mlodzimostowcy@pwr.edu.pl);
- **by March 29, 2020 r.** – verification by *the Organizer* of the submitted projects in terms of compliance with *the Competition Regulations* and informing *the Teams* by electronic means of qualifying to the next stages of the competition;
- **by April 12, 2020 r.** – transfer by *the Teams* to the bank account provided by *the Organizer* of the registration fee or possible resignation willingness to participate in subsequent stages of the competition. After the deadline of 12/04/2020, if *the Team* resigns from participation in subsequent stages of *the Competition*, the entry fee will not be refunded;
- **19 – 22 May 2020 r.** – *Control Stage, Executive Stage, Load Stage and Summary Stage of the International Steel Bridges Competition*, taking place on the campus of *the Wrocław University of Science and Technology*.

*Annex 2 – Application form*

**APPLICATION FORM**  
**„INTERNATIONAL STEEL BRIDGES COMPETITION 2020”**  
**„DESIGN, BUILD, TEST”**

**Organiser:** Academic Club "Young Bridges PWR" operating at the Wrocław University of Science and Technology at the Faculty of Civil Engineering, Cathedral of Bridges and Railways

PLEASE READ FILLING IN CAPITAL LETTERS

1) **College:** .....

2) **Team:**

- Team Name: .....

- Participants (first name / surname / department / specialization / year)

1) Team captain (contact person): .....

Phone: .....

E-mail adress: .....

2) .....

3) .....

4) .....

5) .....

- Team supervisor. ....

Phone: .....

E-mail adress: .....



In the event of the Team's resignation from participating in *the Competition* after April 12, 2020, we hereby undertake to waive the claims regarding the registration fee in the amount of PLN 1300 + VAT specified in *the Competition Regulations* as compensation for purchased competition materials and dinners for the entire *Team*.

I accept the ISBC 2020 Regulations, Participation Regulations and agree to the processing of my personal data for the purposes of the "International Steel Bridges Competition 2020" and for the information and marketing purposes of the Organizer. The data will be protected in accordance with the Act of 10 May 2018 on the protection of personal data (Journal of Laws from 2018, item 1000) and in accordance with the Regulation of the European Parliament and of the Council (EU) 2016/679 of 27 April 2016 on protection of natural persons in connection with the processing of personal data and on the free movement of such data, and repealing Directive 95/46 / EC (GDPR)..

.....

Date, place	Team supervisor's signature	Team leader's signature
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.....	.....
Participant's signature	Participant's signature

.....	.....
Participant's signature	Participant's signature

.....

Signature of the person authorized to enter into commitments  
(if the payment will be made by the University)

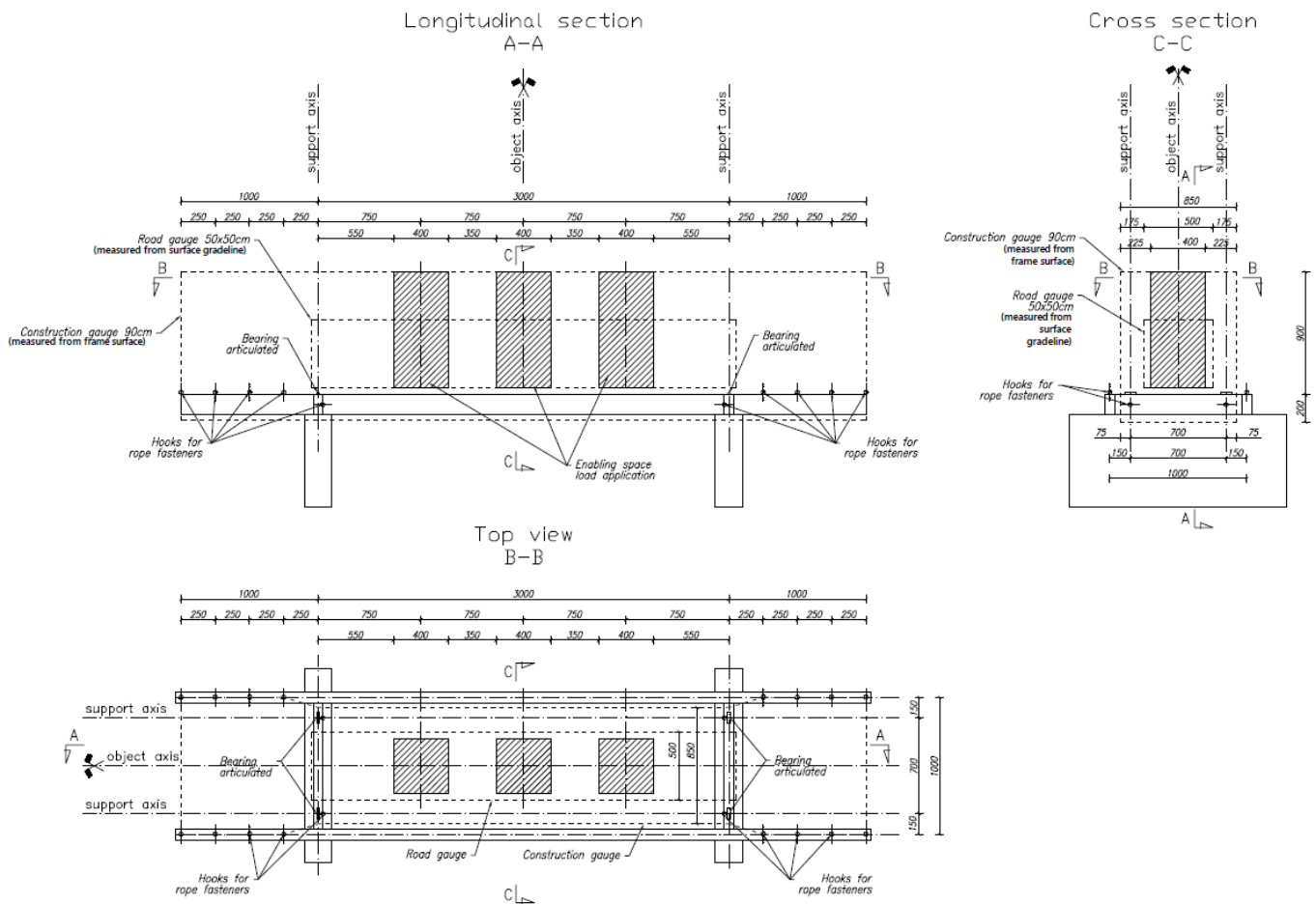
### Annex 3 – List of available materials

No.	Name of the element	Dimension	Value	Unit	Number	Unit price
					[pc.]	[PLN]
1	Steel profile U50	length	300	cm	6	9,00
2	Steel profile U75	length	300	cm	6	12,00
3	Steel profile U100	length	300	cm	6	15,00
4	Plywood 21 mm	length x width	250 x 125	cm	1	50,00
5	Sheet metal thickness 0,5 mm	length x width	125 x 200	cm	1	50,00
6	Self-drilling screws (300 pc.)	length	9	mm	4	3,00
7	Plasterboard screws (200 pc.)	length	35	mm	1	3,00
8	Steel rope 2 mm (capacity 240 kg)	length	25	m	6	25,00
9	thimble 3 mm	-	-	-	20	2,00
10	Steel cable clamp 3 mm	-	-	-	20	2,00
11	Steel cable clamp 6 mm	-	-	-	10	4,00
12	Turnbuckle	length	90-180	mm	10	6,00
		bearing capacity	125	kg		
13	Screw 10 x 50	length	50	mm	20	2,00
14	Washer	diameter	10	mm	40	1,00
15	Nut M10	diameter	10	mm	40	1,00

*Annex 4 – Summary of available tools*

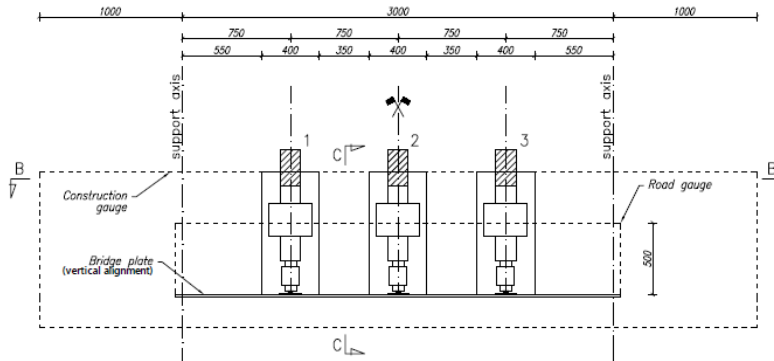
No.	Name of the element	Number
		[pc.]
1	Screwdriver	1
2	Screwdriver bit set	1
3	Drill set	1
4	Hacksaw	1
5	Replacement saw blade set	1
6	Shears for metal	1
7	Wood saw	1
8	Hammer	1
9	Pliers	1
10	Builder's square	1
11	A set of spanners	1
12	Tape measure	2
13	Drawing set (pencils, markers)	1

## Annex 5 – Object gauge

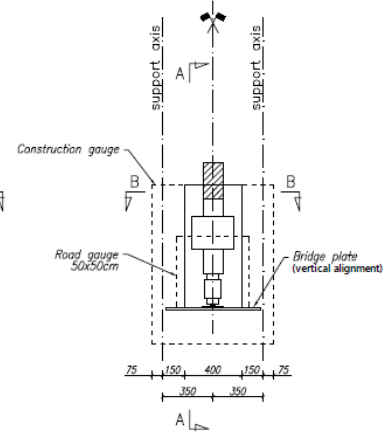


## Annex 6 – Permitted load application schemes

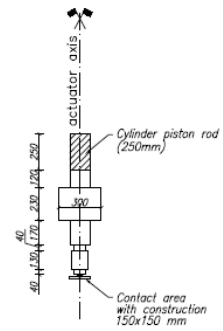
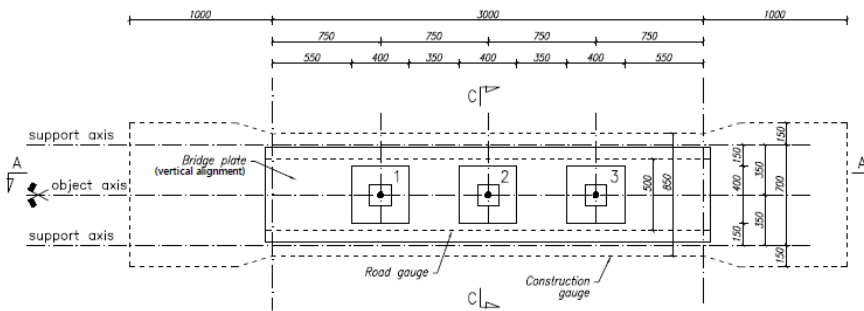
Longitudinal section  
 A-A



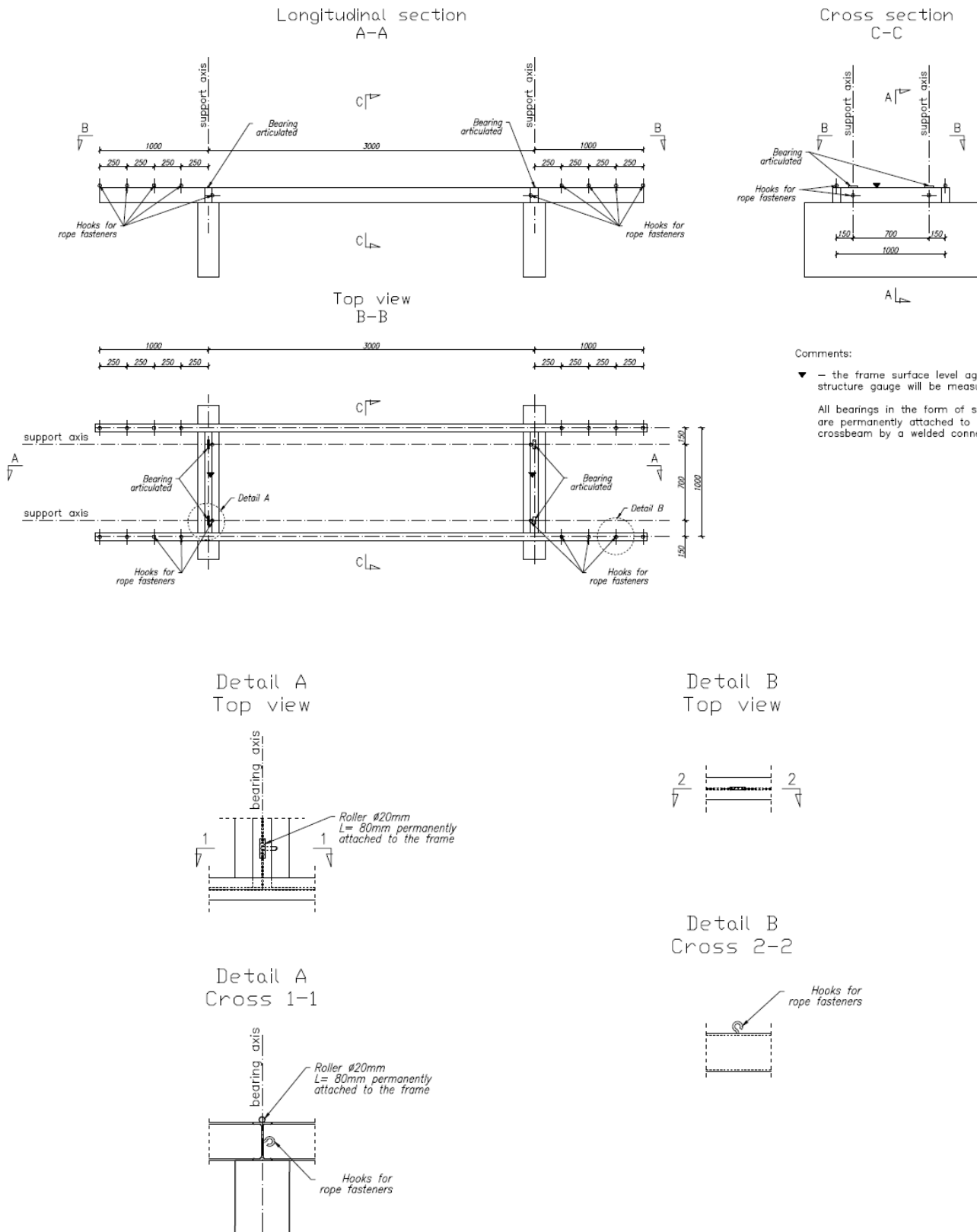
Cross section  
 C-C



Top view  
 B-B



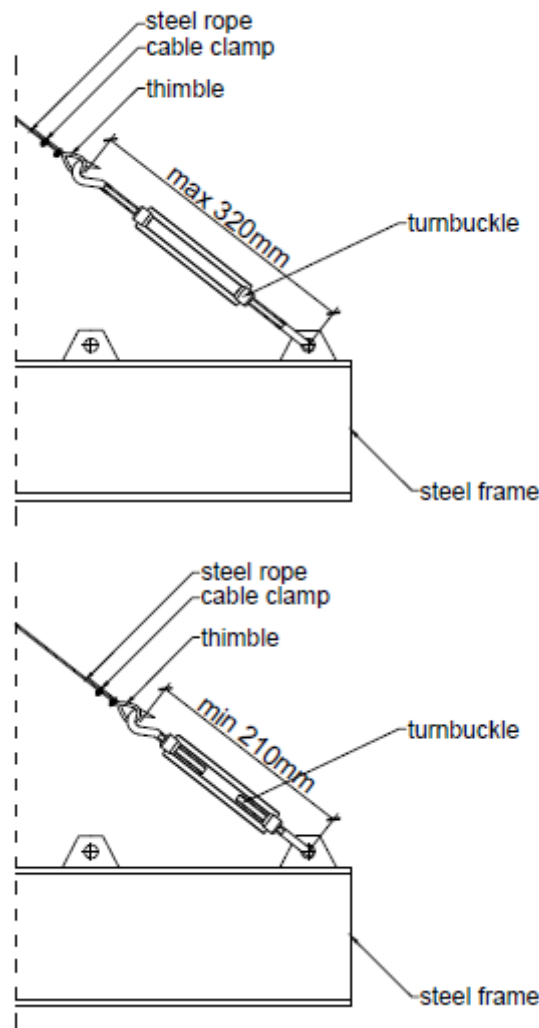
## Annex 7 – Construction support scheme



## Annex 8 – Construction notes

The main element carrying the system must be tensile elements. If the above criterion is not met, the project may be rejected or sent for correction.

### Example of *Bridge* to steel frame connection



The team must use turnbuckles to connect the structure to the frame. These turnbuckles are not included in the cost of the bridges and can be used to pull steel ropes. The turnbuckles cannot be used elsewhere in the structure. Turnbuckles will only be available when trying to load the model. Each team can use a maximum of 8 turnbuckles.