The List of Rule Revisions

Version No.	Date	Remarks
V1.0	2026-06-24	First version

The content presented below serves as the primary rules of this competition. However, if there are cases not stipulated or clearly defined in the rules, the organizer reserves the right of final interpretation.

1. Overview

Each team is required to design and construct a building model at the competition venue. The model should be able to resist the artificial earthquakes generated by the shaking table at the National Center for Research on Earthquake Engineering (NCREE). This is a two-day competition. On the first day, each team has 5.5 hours, lunch break included, to construct the building model. All materials and tools are provided by the organizer. On the second day, all models will be tested on the shaking table at NCREE. Artificial earthquakes with various intensities will be generated by the shaking table. The peak ground acceleration (PGA) will gradually increase to 900 gal (gal = cm/s^2).

The theme this year is “making a tower structure with a single load platform.” Structures with a single concentrated load are very common in daily life, such as water tanks, bridge piers, huge T-shaped billboards along highways, telecommunications towers with telecommunication equipment, high towers with observatories, and incinerators with revolving restaurants. Taking a water tank as an example, greater water storage and a higher water level, which results in higher water pressure, are generally desirable for its function. To evaluate the model in this competition, the maximum base shear and base bending moment are used to represent the capability of the model. The material weight used to construct the model is used to represent its price. The main evaluation criterion is the capability-price ratio (CP value = capability / price). A higher CP value represents a higher team score in the competition.

2. Team Composition

Each team shall consist of four students registered in the same high school and one instructor who is a teacher at the same school. During model construction, the instructor may provide verbal guidance or advice, but shall not physically participate in the construction of the model.

3. Materials and Tools

Except for the allowable non-electric hand tools prepared by participating teams, only the materials and tools provided by the organizer may be used in this competition. Participating teams may bring their own stationery, such as pencils, rulers, erasers, and calculators. The service counter will provide a limited number of L-shaped rulers for measuring and marking.

3.1 Materials

The materials provided by the organizer include:

Item	Quantity	Details
1. Wooden base board	1	It is made of medium-density fiberboard (MDF). The board is about 0.55 cm thick, and its size is 26 cm (L) × 26 cm (W) (±0.3 cm).
2. Wooden stick	30	They are made of MDF and are used for constructing the model. Each stick is 70 ± 0.5 cm long with a rectangular cross section of 5.5 mm × 4 mm (±1 mm).
3. Hot-melt glue stick	20	Each glue stick is about 30 cm long and 6 mm in diameter. These glue sticks shall only be used with the hot-melt glue gun as adhesive material and shall not be used directly as structural members of the model.
4. Rubber band	16	Each rubber band is about 3 mm wide and 1.5 mm thick, with a perimeter of about 240 mm.
5. A4-size paper	12	12 sheets of A4 paper.
6. String	1	A cotton string about 4 m long.
7. Bamboo stick	1	This item is used for making the team flag.

3.2 Tools

The tools provided by the organizer include:

Item	Quantity	Details
1. Fixing frame	1	This frame is used for fixing the models to the shaking table and for checking the construction area.
2. Scissors	1	A general office scissors.
3. Wire saw	1	It is about 0.9 cm wide and 30 cm long.
4. Tape measure	1	The total length is 5.5 m.
5. Manual drill	1	The drill bit diameter is 8 mm.
6. Hot-melt glue gun	1	A general hot-melt glue gun.
7. Large utility knife	2	The blade is about 1.8 cm wide.
8. Pencil	1	A general office pencil.
9. Pencil sharpener	1	It is used for sharpening pencils.
10. Protractor	1	A general office plastic semicircular protractor.
11. Marker pen	1	A general office marker pen.
12. Ruler	1	A 30 cm long plastic straight ruler.
13. Cotton gloves	2	Participants may wear the cotton gloves to avoid burns when using the hot-melt glue gun.
14. Hammer	1	A small hammer.
15. File	1	A small file.
16. Glue stick	1	A general stationery glue stick.
17. Cutting mat	1	A3 size

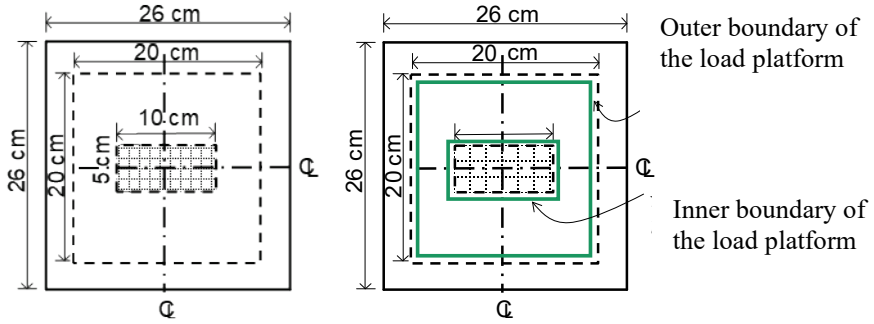
Each team shall examine the provided materials and tools before constructing the building model. Teams shall refer to Tables 3.1 and 3.2 when checking the provided materials and tools. If any material or tool is missing or damaged, please inform the responsible judge immediately. In addition to the tools provided by the organizer, participating teams may bring their own non-electric hand tools, such as carving knives, gardening shears, cutting mats, and drill bits of various sizes. Please note that **electric tools are not allowed.**

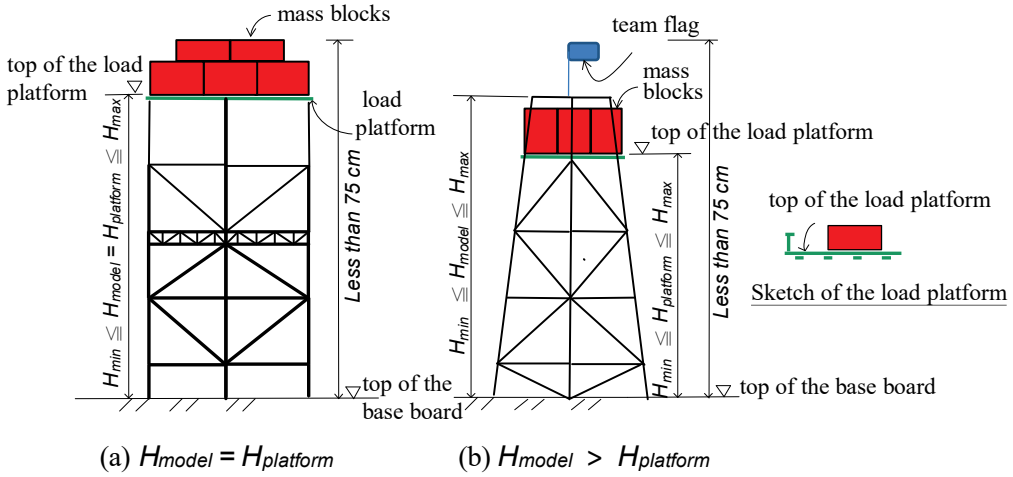
Figure 1. Schematic illustration of the tools

4. Requirements for Structures

All teams are encouraged to use their creativity in constructing the model. Nevertheless, the building model must meet the following requirements:

Item	Description
4.1 Basic Requirements	4.1.1 Each team has 5.5 hours in total to construct its building model. 4.1.2 The structural components shall be made of the materials provided by the organizer. For example, a structural component may consist of a single wooden stick or may be assembled from multiple wooden sticks, strings, rubber bands, paper, and other provided materials. 4.1.3 Models must be constructed on the base board provided by the organizer. The size of the base board is 26 cm × 26 cm × 0.55 cm. A ***3 cm clearance*** around the edges of the base board must be kept in order to fix the model to the shaking table.

	4.1.4 Each team may have only one load platform for placing mass blocks. The number of mass blocks shall be no fewer than 12 and no more than 24, and the mass blocks shall be stacked in no more than two layers. 4.1.5 The vertical projection of the entire model and the mass blocks must be located within the 20 cm × 20 cm central area of the base board, i.e., the area enclosed by the dashed lines shown in Figure 2. In addition, the vertical projection of any material, including hot-melt glue, and any mass block must not extend into the 10 cm × 5 cm central restricted area of the base board. 4.1.6 The load platform shall be constructed using wooden sticks, or using allowable materials such as cotton strings, rubber bands, and paper. If there are any other components erected on the load platform, the height of those components shall not be included in the height of the load platform, as shown in Figure 3 and Rule 4.3.6. 4.1.7 The boundary of the load platform, including both the inner and outer boundaries, must be marked by wooden sticks or cotton strings. As shown in Figure 2, both the inner and outer boundaries must fall within the range specified in Rule 4.1.5. 4.1.8 **Seismic isolation design is forbidden.** 4.1.9 Claddings or decorations may be added to the models for aesthetic purposes. However, they shall not affect model inspection, installation of mass blocks, determination of load platform boundaries, failure judgment, or testing safety.
	 Figure 2. Allowable and restricted areas for model construction
4.2 Base Board	4.2.1 Holes may be drilled in the base board to fix structural components. There is no restriction on the number of components fixed to the base board. 4.2.2 Reinforcement measures may be applied to the components fixed to the base board, such as enlarged holes or grooves for embedding strings.

	However, all holes and grooves must be filled with hot-melt glue and shall not be used to reduce the weight of the base board. 4.2.3 The base board must be kept flat so that it can be properly mounted onto the shaking table. 4.2.4 No components or materials, including wooden sticks, cotton strings, rubber bands, paper, hot-melt glue, or other materials, may be placed on the back side of the base board.
4.3 Model Height	4.3.1 $H_{min} \leq$ the height of the model excluding the mass blocks, denoted as H_{model}, $\leq H_{max}$ 4.3.2 $H_{min} \leq$ the height of the load platform, denoted as $H_{platform} \leq H_{max}$ 4.3.3 H_{min} = 50 cm, H_{max} = 65 cm 4.3.4 The total height of the model, including the mass blocks and team flag, shall not exceed 75 cm. 4.3.5 A schematic elevation of the model is shown in Figure 3. 4.3.6 All model heights mentioned above are measured from the top of the base board; that is, the thickness of the base board is not included. The height of the load platform is defined as the vertical distance from the top of the base board to the lowest point of the surface where the load platform contacts the bottom of the mass blocks, as shown in Figure 3.  (a) $H_{model} = H_{platform}$ (b) $H_{model} > H_{platform}$ Figure 3. Schematic elevation of a model

5. Requirements for Mass Blocks

In this competition, mass blocks are used to represent the vertical load applied to the load platform of the model. The weight of each mass block is calculated as 635 g. The dimensions of each mass block are approximately 6.0 cm × 4.5 cm × 3.0 cm, with a tolerance of ±2 mm. The rules for placing the mass blocks are as follows:

5.1 The number and arrangement of the mass blocks confirmed during model inspection shall not be changed.

5.2 The mass blocks must be installed on the load platform. They shall not extend beyond the outer boundary of the load platform, nor shall they intrude into the area enclosed by the inner boundary of the load platform.

5.3 When the model is mounted onto the shaking table, the mass blocks shall be installed at the same time. Only hot-melt glue may be used to fix the mass blocks to the load platform. Other materials, such as paper, cotton strings, and rubber bands, are not permitted for fixing the mass blocks.

5.4 A schematic diagram of the mass block layout shall be drawn within the 20 cm × 20 cm area shown in Appendix 1, and the boundaries of the load platform shall be included in the diagram. If necessary, other blank A4 paper may also be used for related drawings. The schematic diagram of the mass block layout shall clearly show the arrangement of the mass blocks, including the number, orientation, and location of the mass blocks. Plan views, front elevations, side elevations, or 3D perspective drawings may be used. Each team shall submit the schematic diagram of the mass block layout by 12:00 p.m. on the model construction day. The diagram may be prepared before the model construction day. During model inspection and mounting of the model onto the shaking table, this diagram will serve as a reference or basis for the judges' inspection.

6. Scoring the Models: Capability-Price Ratio

The models are scored based on the capability-price ratio, denoted as CP. A greater CP value represents a higher ranking in the competition.

The CP is computed as:

$$CP = \frac{\phi \times Capability}{Price} \tag{1a}$$

where

$$Capability = c_0\bar{V}_{base} + c_1\bar{M}_{base} \approx \frac{a_{max}W_{mass}/g}{V_{min}}\left(c_0 + \frac{c_1 H_{platform}}{H_{min}}\right) \tag{1b}$$

$$Price = \frac{W_{model}}{W_0} \tag{1c}$$

Capability：The capability of the model

Price：The price of the model

ϕ：Reduction factor = 1 - 0.02 n_v。

n_v: Participating teams must strictly abide by the Category-I items listed in the model inspection form (Appendix 2). Any violation of the Category-I items will disqualify the team from the competition, i.e., n_v = 50. n_v is also equal to 50 when other serious violations are unanimously identified by the judges. In addition, n_v is equal to the total number of violated Category-II items listed in the model inspection form (Appendix 2), which may result from construction errors. Participating teams must submit the model inspection form, filled in with only the team number and school name, before 12:00 p.m. on the model construction day.

$\bar{V}_{base}$：Normalized base shear

$\bar{M}_{base}$：Normalized base bending moment

c_0, c_1：Weighting coefficients, c_0 = 1, c_1 = 50/65。

a_{max}：Maximum test acceleration passed by the model (gal)

g：Gravitational acceleration, g = 980 gal

W_{mass}：Total weight of the mass blocks (N)

V_{min}：Minimum base shear, V_{min} = 16 N。

$H_{platform}$：The vertical distance from the top of the base board to the lowest point of the surface where the load platform contacts the bottom of the mass blocks (cm)

H_{min}：Minimum height of the model, H_{min} = 50 cm

W_{model}：The weight of the model, excluding the weights of the base board and mass blocks; it also refers to the total weight of the materials used in the model (gw)

W_0：Target value for the total weight of the model, W_0= 320 gw

7. Mounting Models onto the Shaking Table

7.1 Two members from each team shall be assigned to mount the model and mass blocks onto the shaking table. The allowed mounting time is 12 minutes. Each team is responsible for ensuring that its model and mass blocks are securely fixed. During testing, if the base board

of a model becomes obviously loose and the model is judged to have failed as a result, the team shall not raise any objection.

7.2 The organizer will provide each team with two screwdrivers and a sufficient number of screws for fixing the model to the shaking table.

7.3 The organizer will provide each team with one hot-melt glue gun and sufficient hot-melt glue sticks for fixing the mass blocks to the load platform.

7.4 No materials or tools other than those provided by the organizer may be used to mount the model or fix the mass blocks.

7.5 During the mounting period, teams may only mount the model and fix the mass blocks. Strengthening the structure of the model is not allowed.

7.6 Team members shall be careful when mounting the model and mass blocks to avoid hitting other teams' models or other team members.

7.7 One side of the base board is marked with an orientation sticker. This side must face upward, and the model must be built on this side of the base board. When mounting the model onto the shaking table, the corner marked with the orientation sticker must face the northwest direction of the laboratory. The relative positions of the model, shaking table, and control room are shown in Figure 4. If there are any questions, please ask the staff on site.

7.8 The base board is fixed to the shaking table using a metal fixing frame, as shown in Figure 5. Since the hole layouts on the four sides of the fixing frame are different, please ensure that the fixing frame is installed in the correct orientation.

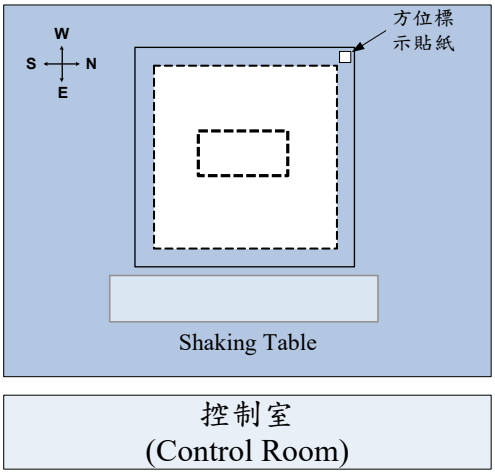


Figure 4. Orientation of the model on the shaking table

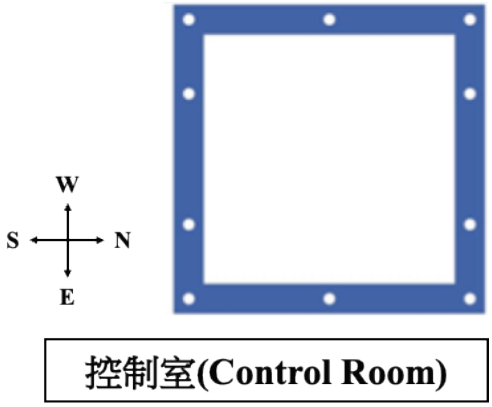


Figure 5. Metal fixing frame used to fix the base board to the shaking table

8. Loading Protocols

All models will be tested simultaneously on the shaking table. The artificial earthquakes generated by the shaking table will contain a broad range of excitation frequencies. Each test is a bidirectional sinusoidal swept-frequency motion. The intensity of each artificial earthquake is represented by the peak ground acceleration (PGA).

8.1 There will be at most four tests, starting from a lower intensity and increasing gradually. The PGAs are arranged in the sequence of 400 gal, 600 gal, 800 gal, and 900 gal.

8.2 The teams whose models pass the test with a PGA of 400 gal will receive the Quake-Resistant Certificate.

8.3 If a model completes the test with a PGA of 900 gal and is not judged to have collapsed or failed according to the failure criteria specified in Section 9, the team will receive the Still Standing Certificate. This certificate does not include any cash prize.

8.4 Only the models passing the test with a PGA of 600 gal are qualified for ranking in this competition.

8.5 The bidirectional time histories of the artificial earthquakes are available on the IDEERS website. All teams are encouraged to download these data.

8.6 The displacement time histories and directions of the bidirectional artificial earthquake input are shown in Figure 6.

8.7 In the event that, during testing, a model is damaged, displaced, dropped, impacted, or otherwise affected by force majeure or factors not attributable to the organizer, such as the collapse of another model or falling components or mass blocks impacting the model, the judging panel may, based on the on-site conditions, determine whether the test result is valid, whether the model may continue testing, or whether other necessary measures shall be taken. Teams shall not raise objections.

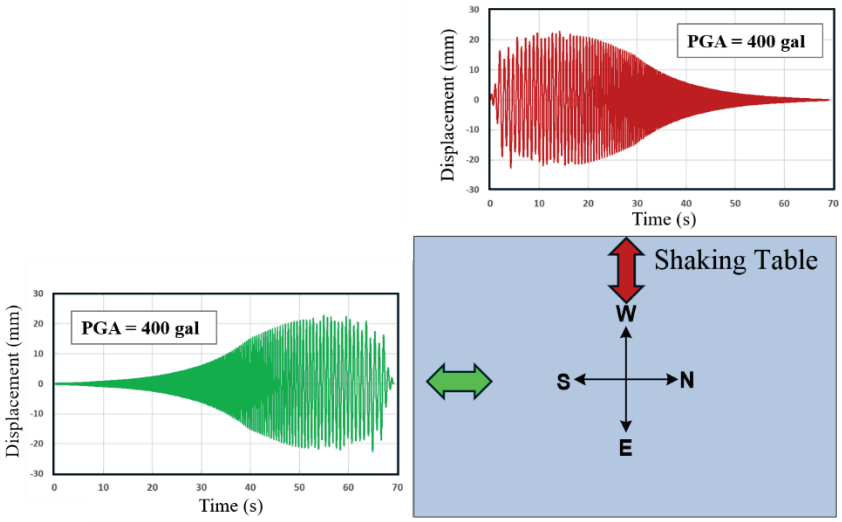


Figure 6. Bidirectional input displacement time histories and directions

9. Failure Criteria

A model will be judged as having failed the test if any of the following situations occurs. The failed model will be removed from the shaking table before the next test.

9.1 The model collapses.

9.2 The load platform becomes unstable or collapses.

9.3 Any mass block falls off, becomes detached, or exhibits severe swaying or rocking.

9.4 Half or more of the main supporting components are detached from the base board.

9.5 The maximum residual lateral displacement of the model is greater than 10 cm. The maximum residual lateral displacement is defined as the maximum lateral displacement of the model after the shaking table stops.

9.6 The base board becomes obviously loose or is not securely fixed.

9.7 Any other situation judged by the judging panel as indicating failure of the model.

10. Design Concept Display

Each team must prepare a design concept display before the competition. The display may be two-dimensional or three-dimensional, and may be presented in a static or dynamic manner. The space occupied by the display shall not exceed 35 cm in height, 25 cm in width, and 25 cm in depth, as shown in Figure 7.

The display should mainly explain the design concept, structural features, creative ideas, and seismic design concept of the model. The Design-concept Exhibition Award will be judged

based on this display. Each team shall indicate its school name, team name, and the names of team members on the display.

Except for the school name, team name, and names of team members, all written descriptions on the display shall be in English and shall be sufficient to clearly express the design concept, structural features, creative ideas, and seismic design concept of the model. If the written descriptions on the display are not in English as required, or if the English descriptions are clearly insufficient to present the design concept, the organizer may deduct points when judging the Design-concept Exhibition Award.

If the display uses electronic products, the team shall be responsible for the power supply. During the entire IDEERS event, the organizer is not responsible for keeping valuables, including electronic products, power banks, tablets, laptop computers, or other related equipment.

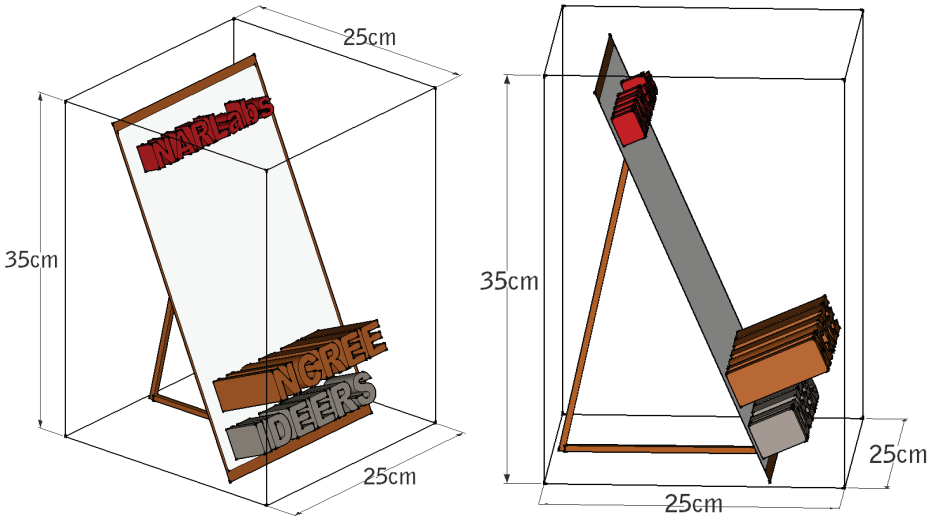


Figure 7. Allowable space for the design concept display

11. Team Flag

Each team must place one team flag on its model during the model construction period. The team flag may be prepared before the competition or drawn at the competition venue. There is no restriction on the shape of the team flag; however, its size shall not exceed the size of an A6 sheet of paper, i.e., 14.8 cm in length and 10.5 cm in width, which is approximately one quarter of an A4 sheet of paper. During the model construction period, the team flag may be fixed to the model using the bamboo stick provided by the organizer. Each team may decide whether to use the bamboo stick. The team flag and its fixing materials shall not be used as main load-bearing or reinforcing components of the model.

12. Model Inspection

The entire period from the completion of model construction to the mounting of the model onto the shaking table is regarded as the model inspection period. During the model inspection period, if the judges find any violation of the rules, they may require the team to correct the violation or apply a reduction factor according to the rules.

12.1 Model Inspection Procedures

After model construction is completed, the model inspection procedures are as follows:
(1) The host calls the team number.
(2) The model is weighed.
(3) The model is inspected by the judges, and the model inspection form is completed.
(4) The model and the design concept display are placed at the designated location for photographs.
(5) The model and the design concept display are placed on the display table in order for award evaluation.

12.2 Items to Be Submitted for Model Inspection

Each team shall assign two members to bring the following completed items to the designated inspection table:
(1) the model;
(2) the model inspection form and the schematic diagram of the mass block layout;
(3) the design concept display.

12.3 During the entire competition, if there is any dispute among the judges regarding the inspection result of a model, the judging panel may re-inspect the model. The team shall not refuse or raise any objection.

12.4 If a participating team is verified by the judging panel to have intentionally violated the regulations or maliciously damaged another team's model, the judging panel may immediately disqualify the team from the competition.

13. Awards

The awards of this competition include the Seismic Performance Award, Still Standing Certificate, ranking awards, Structural Design and Innovation Award, and Design-concept Exhibition Award. The award criteria are described below.

13.1 Seismic Performance Award

- Quake-Resistant Certificate: Teams whose models pass the test with a PGA of 400 gal will be awarded an individual certificate for each team member.
- Still Standing Certificate: Teams whose models pass the test with a PGA of 900 gal will be awarded an individual certificate for each team member.
- Gold Award: The team ranked 1st, with the highest CP value, will be awarded NT$20,000, a trophy, and an individual certificate for each team member.

- Silver Award: The team ranked 2nd, with the second-highest CP value, will be awarded NT$15,000, a trophy, and an individual certificate for each team member.
- Bronze Award: The team ranked 3rd, with the third-highest CP value, will be awarded NT$10,000, a trophy, and an individual certificate for each team member.
- Merit Award: Teams ranked 4th to 10th in terms of CP value will be awarded NT$2,000 per team and an individual certificate for each team member.

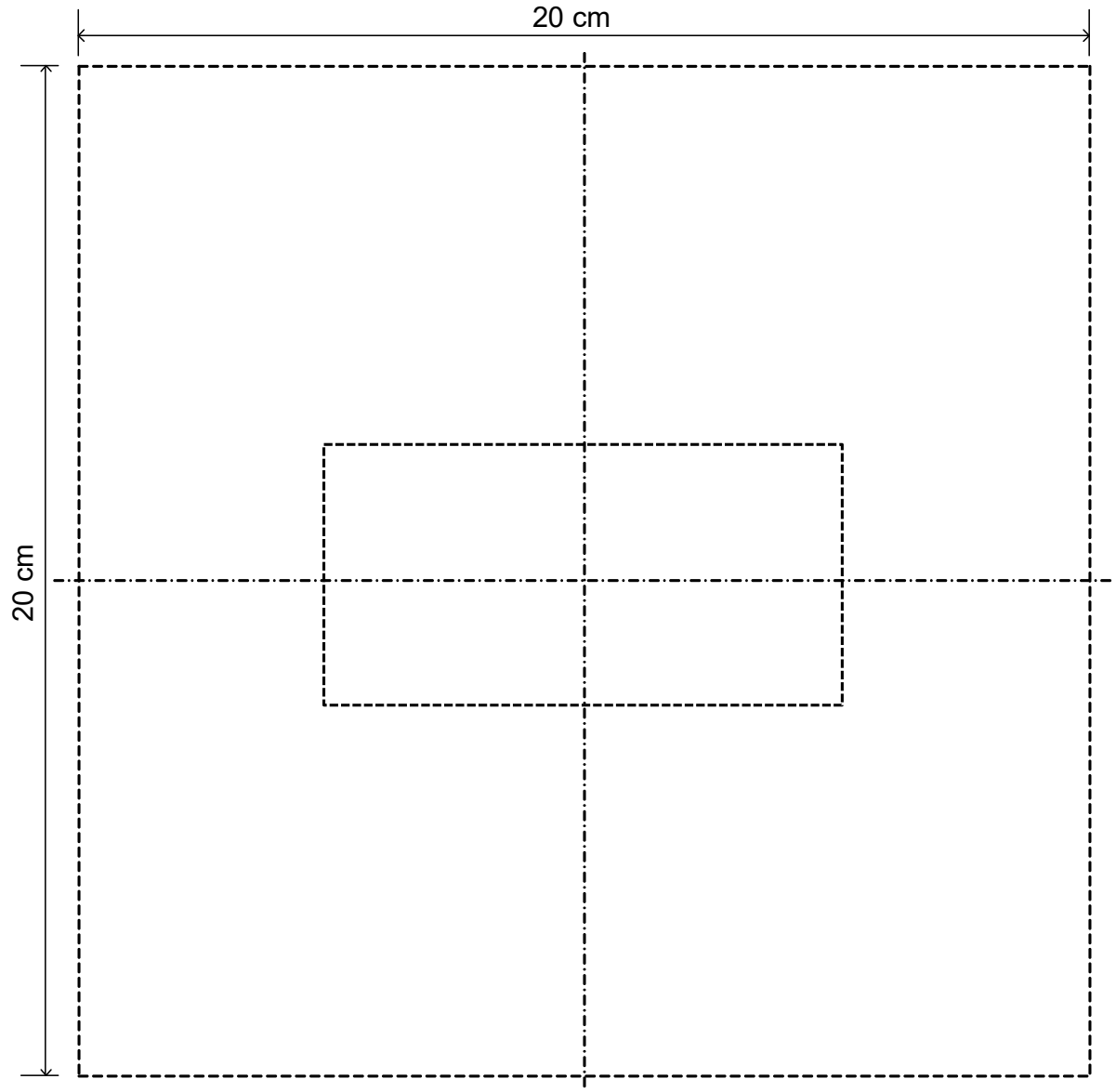
13.2 The Structural Design and Innovation Award is granted based on the structural design, seismic design concept, aesthetic appearance, features, and creativity of the models. The judging panel will select at most six teams for this award. Each winning team will receive NT$5,000 and an individual certificate for each team member. The evaluation items and corresponding score percentages for this award are as follows:

Item	Percentage	Description
Structural design and seismic design concept	70%	● The arrangement of structural components and the rationality of loading path ● Innovation of seismic design
Architectural features	30%	● Aesthetic of models ● Characteristic of models

13.3 The Design-concept Exhibition Award is granted based on the clarity and creativity of presenting the design concept of the model. The judging panel will select at most three teams for this award. Each winning team will receive NT$3,000 and an individual certificate for each team member. The evaluation items and corresponding score percentages for this award are as follows:

Item	Percentage	Description
The contents of introducing the design concept	70%	● The clarity and effectiveness of introducing the design concept and structural characteristics
The creativity of the way of displaying the design concept	30%	● The vividness of the way showing the design concept ● The creativity of the way showing the design concept

Appendix 1. Schematic diagram of the mass block layout (not drawn to scale)



Appendix 2. The model inspection form

Team Number		**Name of School**		
Weight of model and base board excluding mass blocks, W_{gross}			gw	Signature of examiner
Weight of base board, W_b			gw	
$W_{model} = W_{gross} - W_b$			gw	
Number of mass blocks			block	
Height of load platform, $H_{platform}$			cm	
Work area cleaning (Signature of examiner)		Tool return (Signature of examiner)		

Checklist	OK	NG
I-1. Only one load platform is allowed for placing mass blocks.		
I-2. 12 ≤ number of mass blocks ≤ 24.		
I-3. No more than two layers of mass blocks are allowed.		
I-4. Both the inner and outer boundaries of the load platform must be marked by wooden sticks or cotton strings.		
I-5. No seismic isolation design is allowed.		
I-6. Every hole in the base board must be filled with hot-melt glue, and the base board must remain flat.		
I-7. No material is allowed on the bottom side of the base board.		
I-8. The model inspection form and the schematic diagram of the mass block layout must be submitted before 12:00 p.m. on the model construction day.		
I-9. The working area must be cleaned, and the tools must be organized.		
I-10. Other obvious violations that do not fall under construction tolerance errors, including cases where the mass blocks are not placed on the load platform, the model clearly exceeds the boundaries, or the height of the model significantly violates the regulations.		
II-1. A 3 cm clearance must be kept around the model construction area and the edges of the base board.		
II-2. The vertical projection of the entire model and the mass blocks must be within the 20 cm × 20 cm central area of the base board.		
II-3. The vertical projection of any material or mass block must not extend into the 10 cm × 5 cm central restricted area of the base board.		
II-4. 50 cm ≤ the height of the model excluding mass blocks ≤ 65 cm.		
II-5. 50 cm ≤ the height of the load platform ≤ 65 cm.		

II-6. The total height of the model, including the mass blocks and team flag, must not exceed 75 cm.		
II-7. The mass blocks must be placed on the load platform. They shall not extend beyond the outer boundary of the load platform, nor shall they intrude into the area enclosed by the inner boundary of the load platform.		
II-8. The installation of all mass blocks is not completed, but the model still meets the requirements of I-2 and I-3 in the checklist.		
n_v =		

- Part 1 (I-1 to I-10) must be strictly followed. The team will be disqualified from the competition, i.e., n_v = 50, if any Category-I item is violated.
- Part 2 (II-1 to II-8) is for possible construction errors. The value of n_v is equal to the total number of violated Category-II items.