ABU ASIA-PACIFIC ROBOT CONTEST 2027
SOLO, INDONESIA



Theme & Rules
“The Pursuit of Mustika Nusantara”

October 2026 (V1.1)
Asia-Pacific Robot Contest 2027 Solo, Indonesia
Organising Committee
http://www.aburobocon2027.id

Summary of Changes from Rulebook V1.0

This Rulebook V1.1 replaces Rulebook V1.0. The main changes are listed below. In this Redline version, text deleted from V1.0 is ~~struck through in red~~ and new or revised text is shown in blue.

Rule	Change
General	Terminology: *Zone* is used only for the zones where robots are positioned (Start/Retry Zone, L1 Retry Zone); *Area* is used for regions of the Game Field (e.g., Red Team Area, Blue Team Area, Operating Areas, Area Violation).
General	Sections 6 *Violation* and 7 *Disqualifications* have been revised (see the table below). All other section numbers are the same as in V1.0.
1, 13.6, 14	Detailed specifications of the Earth Blocks and Sky Blocks and detailed drawings of the Game Field are given in a separate Appendix document.
2, 3.6.1, 4.5.1	Sanctuary Mandate: two Complete Towers must be standing *at the same time*.
2, 14	Earth Blocks and Sky Blocks are cardboard boxes in their original colors (no stickers); see the Appendix document.
2 (Level 2), 14	There are no stairs between Level 1 and Level 2; BR may climb onto Level 2 from any position on Level 1.
2, 5.1.4	New term: *Failure*. An Earth Block that touches the floor outside the Storage Area, Transfer Area or a Building Spot (whether released or still held), or that is placed out of sequence, becomes invalid without a Forced Retry. Transfer points already awarded remain valid.
3.4, 4.4.2	Carry limits apply to blocks (TR: 3, BR: 2). A robot carrying the Mustika may not carry any block.
3.4.5, 3.6.3, 4.5.2	The Mustika must be handed directly from TR to BR in the Transfer Area without touching the floor; BR may receive it with any mechanism.
3.5.6	A Sky Block scores only when it rests flat with one team color fully on top. If it is later turned so that no team color faces up, the points stay with the team whose color last faced up.
3.5.8	A Sky Block may be lifted only to flip it and must be placed back on the same tower. The score changes only when a flip is completed. Placing a Sky Block on another tower results in a Forced Retry.
3.6.6–3.6.8, 4.5.3, 5.1.3, 5.3.2, 6.2	The Mustika Pillar is kept supplied with a Mustika until one is enshrined; a team may possess only one Mustika at a time; only the first enshrined Mustika is valid; a dropped Mustika is removed.
4.1.4	Figure 4 (initial Sky Block layout) revised so that the layout is the same when seen from the Red Team and Blue Team sides (mirror image with colors swapped).

Rule	Change
6.3	A Sky Block that is dropped, pushed out of the Ground Shared Area, touches the floor outside the Ground Shared Area, Transfer Area or a Building Spot (whether released or still held), or is placed out of sequence becomes invalid and the robot receives a Forced Retry. If several Sky Blocks leave the Ground Shared Area at once, only one becomes invalid. Transfer points already awarded remain valid.
6.4	Exceeding the carry limit results in a Forced Retry; the block(s) picked up last become invalid.
6.6	Tower Protection: if a robot causes a tower to collapse or displaces a block, a Forced Retry is declared and the tower is restored, regardless of intent (replaces V1.0 Rule 7.2).
7.3	Intentional invalidation of Sky Blocks is unsportsmanlike conduct.
7.4	Unauthorized Touching moved to Disqualifications; the procedure, including warnings, will be specified in the Participation Guideline.
8.1	Transfer points are awarded only once per block.
9.3.5, 9.4	The final tie-break is decided by the judges. Section 9.4 renamed *Scoring State*.
10.3	Pit Crew members may assist during preparation, including the setup on the Game Field; during the match they must stay in the Pit Area.
11.4	New: BR must have a remote Freeze/Resume function, used only when instructed or permitted by the referee.
11.8	The total weight of both robots must not exceed 60 kg (including batteries, manual operating devices and cables used during the match). Devices used only for setup, activation and a retry are excluded.
11.9	Radio communication is permitted for TR manual control, the BR start switch and the Freeze/Resume function. Zigbee standard corrected to IEEE 802.15.4.
11.11	Clarification of prohibited communication between TR and BR; no information may be sent to BR during the match except through the start switch and the Freeze/Resume function.
11.19	BR start method.
12.2	Every robot must have a physical, hardwired emergency stop button; a remote emergency stop is not permitted.

Renumbering from Rulebook V1.0

Section and rule numbers are the same as in Rulebook V1.0, except for the rules listed below.

V1.0	V1.1	Title
—	5.1.4	Failure (new)
6.1	—	No-Pushing Rule (deleted; see Rule 5.1.4)
6.2	6.1	Area Violation (was Zone Violation)
6.3	—	Handover Violation (deleted)
6.4	—	Out of Bounds (deleted; see Rules 5.1.4, 6.2, 6.3)
6.5	6.2	Invalidation of Mustika (was Dropped Objects)
—	6.3	Invalidation of Sky Blocks (new)
—	6.4	Carry Limit (new)
6.6	6.5	Blocking and Interference (Shared Areas)
—	6.6	Tower Protection (new)
6.7	7.4	Unauthorized Touching (moved)
7.2	—	Displacement of Placed Blocks (deleted; see Rule 6.6)
7.3, 7.4	7.2, 7.3	Safety Violations, Unsportsmanlike Conduct
—	11.4	Freeze/Resume function (new)
11.4–11.17	11.5–11.18	Robot rules (same order)
—	11.19	BR start method (new)

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Background and Concept

Long before modern technology existed, ancient visionary engineers constructed monumental temple circuits to harmonize the raw forces of nature. These structures were far more than just stone monuments; they functioned as a massive, interconnected energy network. At the very peak of this architecture sat the Mustika—a radiant artifact that activated and stabilized the grand Nusantara energy grid across the archipelago. Over the centuries, time has scattered these perfect foundations, leaving the ancient grid completely silent. Now, a new generation of bold robotics teams is called upon to resurrect this sacred stone architecture and restore its lost power.

To accomplish this task, teams must design machines that combine raw lifting strength with sophisticated automation. The Transporter Robot (TR) acts as the agile gatherer, navigating the lower terrain to harvest the heavy Earth Blocks and delivering them to the designated ~~transfer~~ ~~zone~~ Transfer Area. The Builder Robot (BR), a fully autonomous master architect, precisely stacks these foundations to rebuild the lost pillars, sealing the energy circuit by placing the crowning Sky Block at the very top. The ultimate test unfolds in the fiercely contested central ~~zone~~ area, where rival builders race to enshrine the Mustika on the highest pillar and reboot the grid. The competition is designed as a grueling, three-minute marathon of relentless vertical logistics.

The Importance of Safety

▶

Safety is the highest priority in ABU Robocon. Teams must prioritize safety during all stages, including robot design, manufacturing, and contest participation. Full cooperation with organizers is required to ensure a safe environment for everyone involved (team members, spectators, officials, and the surroundings). All team members must wear organizer-specified safety gear during games and practice sessions.

Contest

All domestic competitions selecting teams for ABU Robocon 2027 Solo, Indonesia must adhere to the rules in this rulebook. However, if specified materials are unavailable for domestic contests, local ~~organisers~~ organizers should use the best possible replacements available in their country/region.

Contest Dates

Date	Event
27/8/2027 (Fri)	Arrival
28/8/2027 (Sat)	Test-run, Rehearsal
29/8/2027 (Sun)	Contest Date
30/8/2027 (Mon)	ABU General Meeting
31/8/2027 (Tue)	Departure

Contest Venue: Edutorium UMS, Solo, Indonesia

1. Game Field and Object

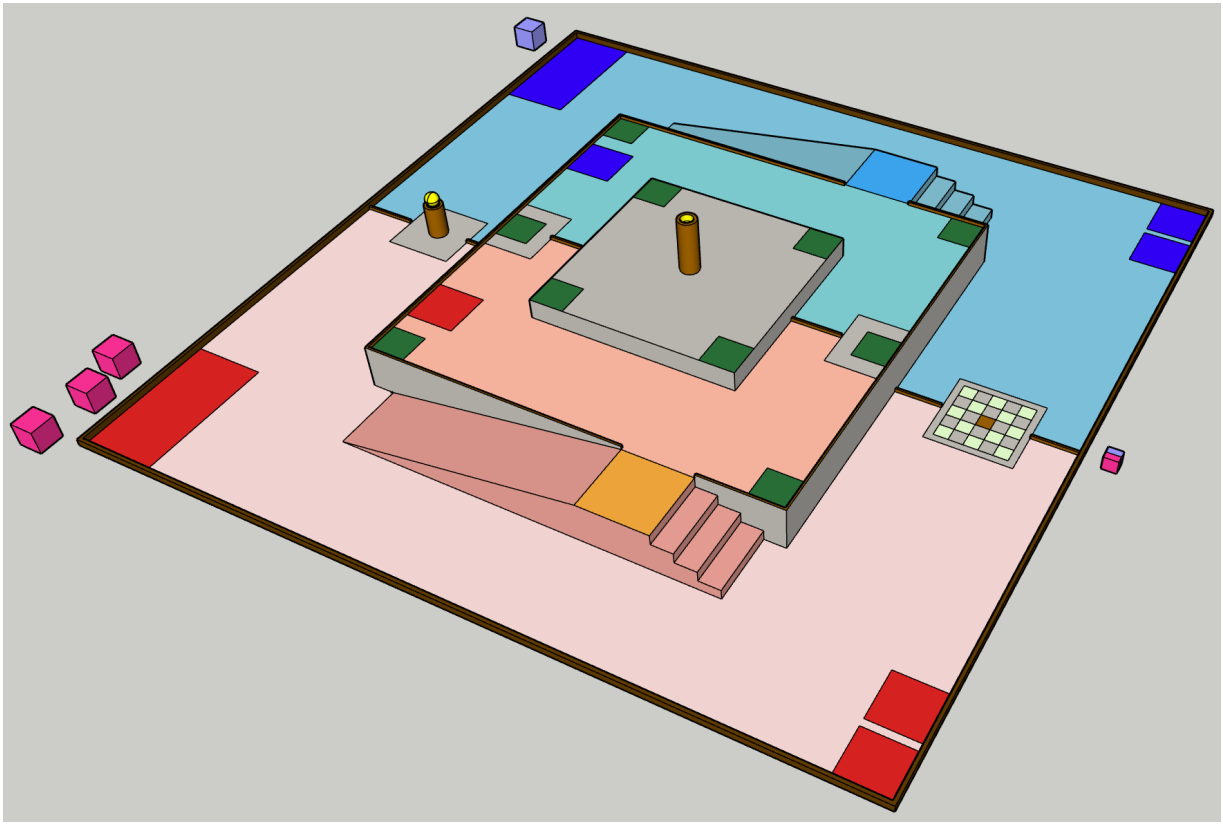

Figure 1: Game Field Overview — ABU Robocon 2027

Detailed drawings with the dimensions of each part of the Game Field are given in the Appendix document, published separately.

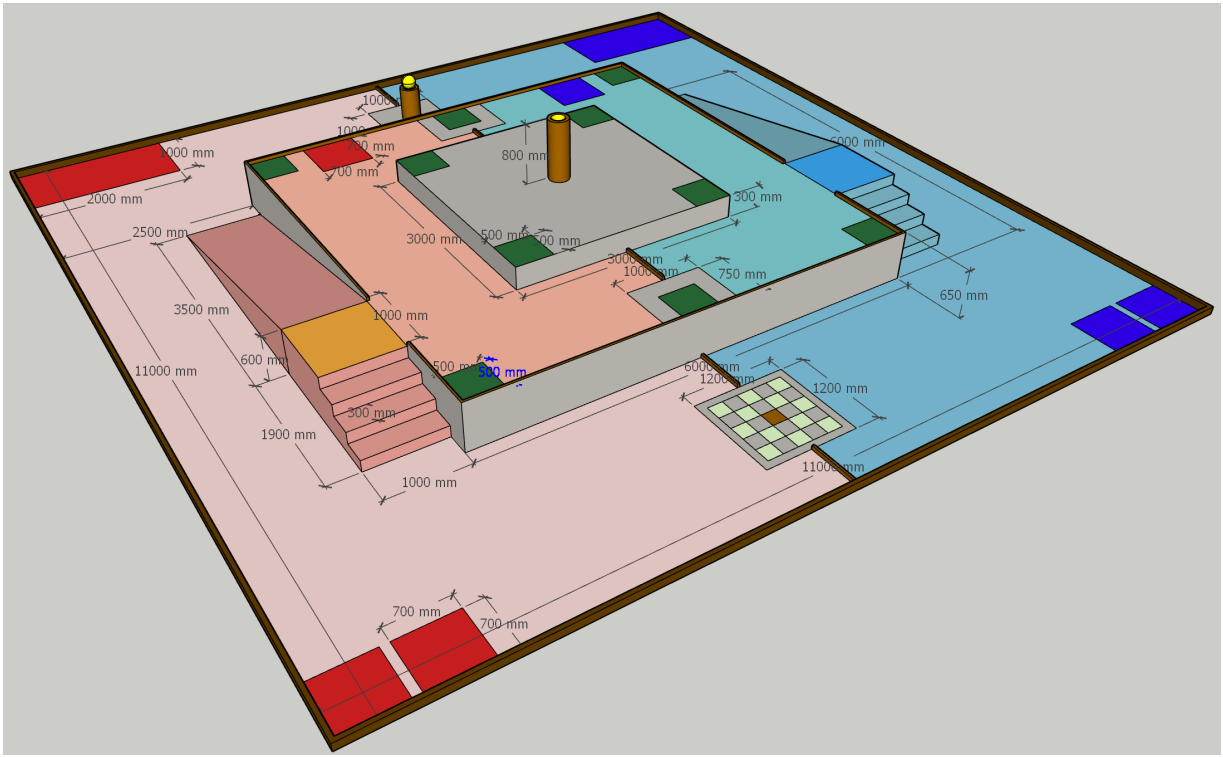

Figure 2: Game Field Dimensions — ABU Robocon 2027

2. Terms and Definitions

Terms	Definitions
Game Field	The main contest venue measuring 11000 mm × 11000 mm, divided into specific operational ~~zones~~ areas for both teams.
Ground Area	The lowest flat surface of the Game Field where the ~~Start Zone~~ Start/Retry Zone, Storage Area, Ground Shared Area, and Mustika Pillar are located, serving as the primary operating ground for the Transporter Robot (TR).
~~Start Zone~~ Start/Retry Zone	Two designated ~~boxes~~ zones measuring 700 mm × 700 mm each in the Ground Area. Teams have the strategic freedom to choose which ~~box~~ zone is for the Transporter Robot (TR) and which is for the Builder Robot (BR). Each zone is used both for starting the match and for retries.
~~Retry Zone (Ground)~~ (Deleted)	~~The same physical location as the Start Zone. During a retry, the malfunctioning robot must be returned to its Start Zone before it can resume operation.~~ Merged into Start/Retry Zone.

Terms	Definitions
~~**Retry Zone (L1)**~~ **L1 Retry Zone**	A designated ~~area~~ zone on Level 1 measuring 700 mm × 700 mm, located on each team's side. During a retry, BR may be returned to the L1 Retry Zone instead of the ~~Ground Start Zone~~ Start/Retry Zone, allowing faster recovery when operating on the upper levels.
Storage Area	The exclusive area in each team's Ground Area measuring 1000 mm × 2000 mm. This is where 20 Earth Blocks are initially placed for the team to harvest.
Ground Shared Area	The central contested ~~zone~~ area in the Ground Area measuring 1200 mm × 1200 mm. This area holds 12 Sky Blocks placed in an alternating pattern and can be accessed by both teams. An additional shared area of 1000 mm × 1000 mm is located around the Mustika Pillar and can also be accessed by both teams.
Mustika Pillar	A cylindrical pedestal located in the Ground Area where the Mustika is placed at the start of the match. Dimensions: height 500 mm, diameter 270 mm, with a concave receptacle at the top (diameter 180 mm, depth 100 mm) to securely hold the Mustika before retrieval by the robots.
Transporter Robot (TR)	A manually or automatically controlled robot (maximum starting size: 700 mm × 700 mm) that harvests blocks and the Mustika from the Ground Area and delivers them to the Transfer Area.
Builder Robot (BR)	An automatic robot (maximum starting size: 700 mm × 700 mm) that picks up or receives objects from TR at the Transfer Area, constructs towers on Level 1 and Level 2, and is responsible for enshrining the Mustika on the Central Pillar.
Earth Block	A cubic object measuring 350 mm × 350 mm × 350 mm (±5%) used as the foundation and middle section of a tower. Each team is provided with 20 units. Material: 3-layer corrugated cardboard box~~, all six sides covered with stickers~~ in its original color (see the Appendix document). Approximate weight: 600 grams per unit (±20%).

Terms	Definitions
Sky Block	A cubic shared object measuring 200 mm × 200 mm × 200 mm (±5%), colored red on one side and blue on the other, used to cap the top of a tower. There are 12 units available in the Ground Shared Area. Material: 3-layer corrugated cardboard box~~, all six sides covered with stickers~~ in its original colors (see the Appendix document). Approximate weight: 220 grams per unit (±20%).
Mustika	The Great Artifact in the shape of a sphere (approximately 210 mm diameter), worth 250 points, to be enshrined on the Central Pillar. Additional identical Mustikas are prepared by the organizer. A Mikasa V300W volleyball (Size 5, circumference 65–67 cm) shall be used in its original condition without additional paint or coating. Approximate weight: 260–280 grams.
Level 1 (L1)	The first elevated platform, standing 600 mm above the Ground Area, measuring 6000 mm × 6000 mm. Accessed from the Ground Area via a ramp (3500 mm in length) or stairs. **Stairs:** Steps connecting the Ground Area to Level 1, with each step measuring 300 mm (length) × 1000 mm (width) × 150 mm (height). **L1 Side Wall:** The vertical sides of the Level 1 platform.
Level 2 (L2)	The highest elevated platform, standing 300 mm above Level 1 (900 mm above the Ground Area), measuring 3000 mm × 3000 mm. ~~Accessed from Level 1 via stairs, with a step measuring 300 mm (length) × 1000 mm (width) × 150 mm (height).~~ There are no stairs between Level 1 and Level 2; BR may climb onto Level 2 from any position on Level 1. **L2 Shared Area:** The entire platform of Level 2, which is open to both teams for building towers. **L2 Side Wall:** The vertical sides of the Level 2 platform.
Failure	A Failure is declared when an Earth Block touches the floor of the Game Field outside the Storage Area, the Transfer Area or a Building Spot, whether it has been released or is still held by a robot, or when an Earth Block is placed out of sequence in the construction of a tower.

Terms	Definitions
Transfer Area	A designated 1000 mm × 1000 mm ~~zone~~ area at the boundary of L1 where TR and BR exchange game objects. ~~TR may hand over objects directly to BR or place them on the floor within this boundary for BR to retrieve.~~
Building Spot	The green-colored target squares with a built-in tolerance measuring 500 mm × 500 mm, located on L1 (exclusive and shared) and L2 (all shared) where Complete Towers must be constructed by the Builder Robot. **L1 Shared Area:** The contested ~~zone~~ area located on the boundary between the Red and Blue sides of Level 1.
Central Pillar	The tallest cylindrical structure on Level 2 where the Mustika must be enshrined to complete the ultimate objective. Dimensions: height 800 mm, diameter 270 mm, with a concave receptacle at the top (diameter 180 mm, depth 100 mm) for Mustika enshrinement.
Fence / Barrier	Vertical partition walls and edge barriers used to define ~~zone~~ area boundaries on the Game Field. ~~Two types are used:~~ Three types are used: **Game Field Boundary:** A fence around the outer edge of the Game Field. **Center Divider:** A fence running along the center line of the Ground Area and Level 1, separating the ~~Red Zone~~ Red Team Area from the ~~Blue Zone~~ Blue Team Area. **L1 Perimeter Barrier:** A barrier along the outer edges of Level 1 to prevent robots and objects from falling off the elevated platform.
Complete Tower	A fully constructed structure consisting of exactly two Earth Blocks stacked vertically and crowned with one Sky Block facing the correct team color, placed in order on a Building Spot.
Sanctuary Mandate	The strategic requirement to ~~build~~ have at least two Complete Towers standing at the same time, with at least one of those towers located in an upper ~~shared zone~~ Shared Area (either L1 Shared Area or L2 Shared Area), to unlock the eligibility to place the Mustika.

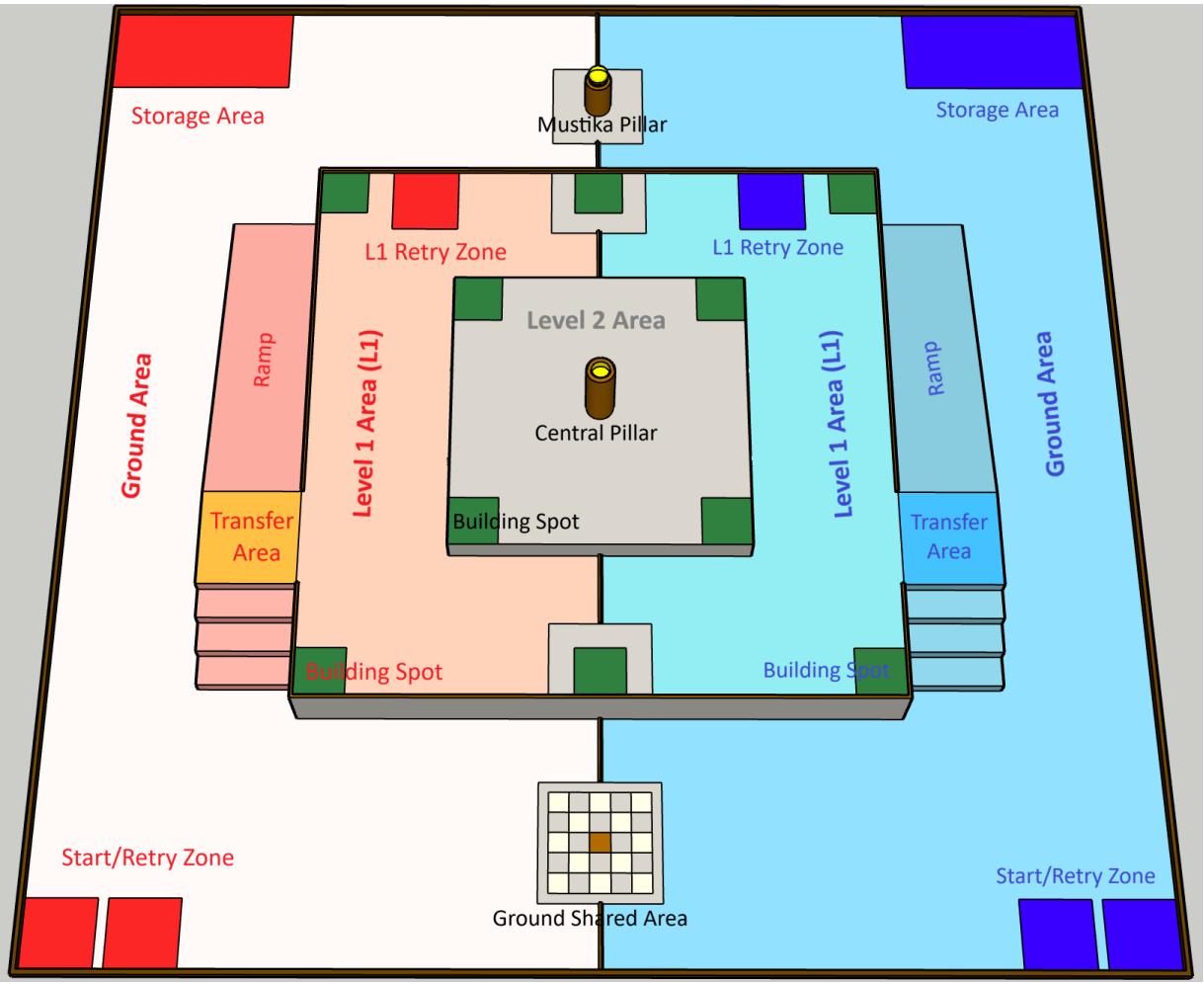

Figure 3: Game Field Labeled Area Names — ABU Robocon 2027

3. Game Outline

3.1 Method of the Match

3.1.1 A match is contested between a red team and a blue team.

3.1.2 The match lasts for exactly three minutes.

3.1.3 The winner is decided by the total accumulated score at the end of the match.

3.2 ~~Operating Zones~~ Operating Areas

3.2.1 Transporter Robot (TR) is permitted to operate in the Ground Area and ~~reach~~ enter the Transfer Area. TR is strictly prohibited from entering any other ~~parts~~ part of Level 1 (L1) or Level 2 (L2).

3.2.2 Builder Robot (BR) is permitted to operate in the Transfer Area, Level 1 (L1), and Level 2 (L2).

3.3 Start of the Match

3.3.1 At the start of the match, TR and BR must be positioned within their respective ~~Start Zones~~ Start/Retry Zones.

3.3.2 The match begins upon the start signal from the referee.

3.4 Handling of Game Objects

3.4.1 TR harvests Earth Blocks from the Storage Area and Sky Blocks from the Ground Shared Area.

3.4.2 TR transports these ~~objects~~ blocks to the Transfer Area on Level 1 (L1).

3.4.3 TR is permitted to carry a maximum of three (3) ~~objects~~ blocks at any time.

3.4.4 BR is permitted to carry a maximum of two (2) ~~objects~~ blocks at any time.

3.4.5 In the Transfer Area, TR may hand ~~objects~~ blocks directly to BR or place them on the floor within the area's boundary for BR to retrieve. However, the Mustika must be handed directly from TR to BR and must not touch the floor. BR may receive it with any mechanism (e.g., a gripper, basket or tray), and TR may release it only when it is supported by BR. A Mustika that touches the floor is a dropped Mustika. While touching the Ground Area, TR cannot place objects on the Transfer Area.

3.4.6 A robot carrying the Mustika may not carry any block at the same time.

3.5 Tower Construction and Interaction

3.5.1 BR is fully responsible for constructing Complete Towers on the designated Building Spots (500 mm $\times$ 500 mm) in L1 and L2.

3.5.2 A Complete Tower must be assembled by stacking two Earth Blocks vertically (serving as the foundation and middle section) and crowning them with one Sky Block (top) in that specific order.

3.5.3 Robots are prohibited from dragging or pushing blocks along the floor of the Game Field to the Building Spot; blocks must be actively lifted or carried during the assembly process.

3.5.4 To place a Sky Block on a tower located in the L2 Shared Area, BR must be physically present on Level 2 (L2).

3.5.5 Earth Blocks that have been correctly placed on a Building Spot must not be moved, removed, or interfered with by the opposing team. A team's own robot may reposition its own Earth Blocks on a Building Spot, provided there is no opponent's ~~Sky Block~~ block on top of them.

3.5.6 Sky Blocks are scored based on the color of their top surface. A team only receives points for a Sky Block if its top surface color matches the team's designated color (Red or Blue). A Sky Block scores only if it rests flat and its top face is fully one team color. If a correctly

placed Sky Block is later turned so that no team color faces upward, the points remain with the team whose color last faced upward.

3.5.7 The team whose Sky Block color is facing up on top of a tower is considered to have completed that tower (Complete Tower), even if the Earth Blocks beneath it were initially placed by the opposing team.

3.5.8 Teams are permitted to flip ~~or change the position of~~ a Sky Block on any tower to ensure their color faces upward, effectively "stealing" the tower from the opponent. A Sky Block may be lifted from a tower only to flip it and must be placed back on the same tower; it may not be moved to another tower. The score of the tower changes only when a flip is completed, not when the Sky Block is lifted. Placing a Sky Block on another tower is a violation: a Forced Retry is declared on that robot, and the Sky Block is returned to its original tower. If a lifted Sky Block is dropped, a Forced Retry is declared and the tower is restored.

3.6 Sanctuary Mandate and Mustika

3.6.1 A team fulfills the Sanctuary Mandate by ~~successfully constructing~~ having at least two (2) Complete Towers standing at the same time, provided that at least one (1) of those towers is located in a Shared Area (L1 Shared Area or L2 Shared Area).

3.6.2 Once the Sanctuary Mandate is achieved, the mandate is considered permanently fulfilled even if the team's towers are later modified by the opponent.

3.6.3 TR retrieves the Mustika and transfers it to BR at the Transfer Area by direct handover.

3.6.4 BR then transports and enshrines the Mustika on the Central Pillar located on L2 to complete the ultimate objective.

3.6.5 Teams may continue to build towers or flip Sky Blocks to accumulate points until the match time expires.

3.6.6 Until a Mustika has been enshrined on the Central Pillar, the Mustika Pillar shall be kept supplied with one Mustika. When a Mustika is taken from the Mustika Pillar, the referees or competition assistants shall place another Mustika on it when it is safe to do so.

3.6.7 A team may take a Mustika only after it has fulfilled the Sanctuary Mandate. A team may possess only one Mustika at a time (a Mustika carried by its TR or BR). A robot carrying the Mustika may not carry any block.

3.6.8 A Mustika is enshrined when it has been released by the robot and rests stably in the receptacle of the Central Pillar. The first Mustika enshrined is the only valid Mustika; from that moment any other Mustika becomes invalid and shall be removed from the Game Field when it is safe to do so.

3.7 End of the Match

3.7.1 The match concludes the exact moment the three-minute duration has elapsed.

3.7.2 The final score is tallied based on the state of the blocks and the Mustika at the exact moment the match ends. The team with the higher score is declared the winner.

4. Game Procedure

4.1 Setup of Robots and Objects

4.1.1 Before the match begins, teams are granted one (1) minute to set up their robots and finalize their strategy on the field.

4.1.2 Both Transporter Robot (TR) and Builder Robot (BR) must be positioned completely within the two provided ~~Start Zones~~ Start/Retry Zones before ~~set up~~ the setup time ends. Teams have the strategic freedom to choose which specific ~~Start Zone~~ Start/Retry Zone ~~box~~ accommodates the TR and which accommodates the BR based on their own field strategy. No part of the robots (including mechanisms, grippers, or sensors) may exceed the vertical boundary of their chosen ~~Start Zone~~ Start/Retry Zone during the setup phase.

4.1.3 Teams are responsible for placing their twenty (20) Earth Blocks within their designated Storage Area. Teams are permitted to stack the blocks, but stacking is strictly limited to a maximum height of two (2) Earth Blocks per column. All columns must be completely within the Storage Area boundaries.

4.1.4 The 12 Sky Blocks in the Ground Shared Area shall be placed by the organizer before the setup time begins.

- The blocks will be positioned in an alternating chessboard pattern on a 5×5 grid, leaving the exact center spot empty.
- The placement pattern shall follow the layout shown in Figure 4.

4.1.5 The Mustika shall be placed on the Mustika Pillar by the organizer before the setup time begins.

4.1.6 Three team members and up to three ~~pit crew~~ Pit Crew members are allowed to participate in the ~~set-up~~ setup.

4.2 Match Start and Duration

4.2.1 The match begins immediately upon the sound of the referee's buzzer or whistle.

4.2.2 Every match lasts for exactly three (3) minutes (180 seconds).

4.2.3 The match will not end early, even if the Mustika is enshrined. Teams may continue to score

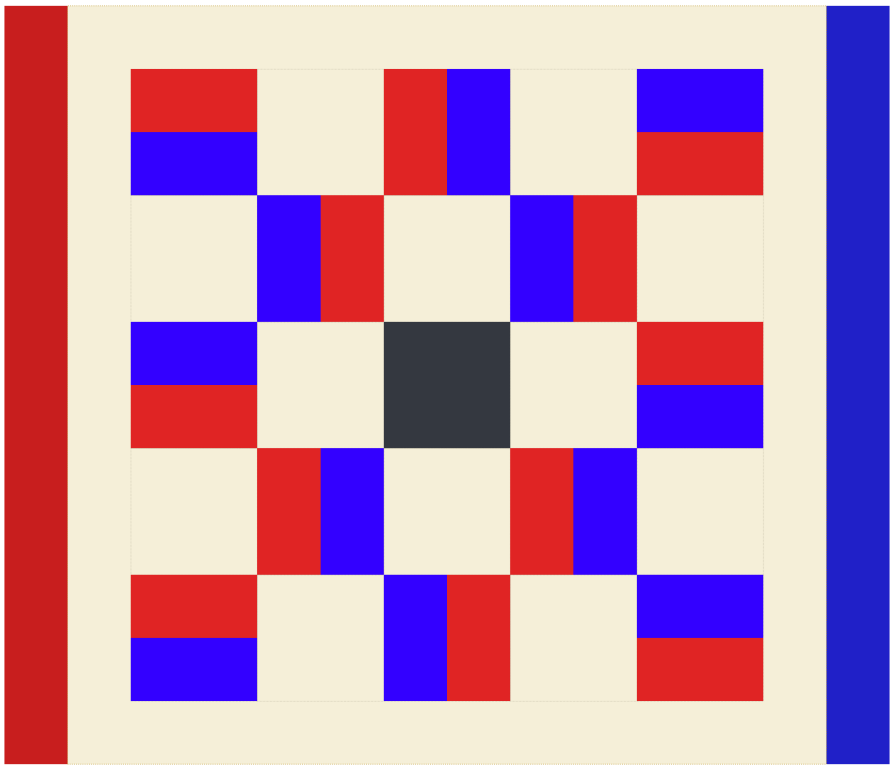

Figure 4: Sky Block Initial Layout — Mirror-Symmetric Color on 5×5 Grid

transfer points and tower points until the full time elapses.

4.2.4 Once the match starts, team members are strictly prohibited from touching the robots, the ~~game field~~ Game Field, or any game objects, except during an authorized Retry or to press a robot's emergency stop button when instructed by the referee or for safety reasons.

4.3 ~~Operating Zones~~ Operating Areas and Constraints

To maintain the specialized roles of the robots, strict ~~zone~~ area boundaries are enforced.

4.3.1 Transporter Robot (TR) is permitted to operate in the Ground Area and enter the Transfer Area. TR is strictly prohibited from entering any other part of Level 1 (beyond the Transfer Area boundary) or Level 2.

4.3.2 Builder Robot (BR): Permitted to operate in the Transfer Area, Level 1 (L1), and Level 2 (L2). BR may come into contact with the Ground Area during retries or while ~~navigating onto the Stairs.~~ moving from the Ground Area onto Level 1 (via the ramp or the stairs).

4.3.3 ~~Zone violations~~ Area violations are judged by the vertical projection of any part of the robot crossing into a restricted area.

4.4 Handling and Transfer of Objects

4.4.1 Robots must lift and carry blocks to move them. Pushing, dragging, or sliding blocks along the floor to a Building Spot or Transfer Area is ~~a violation.~~ not permitted.

4.4.2 TR may carry a maximum of three (3) ~~objects~~ blocks at any time, BR may carry a maximum of two (2) ~~objects~~ blocks at any time. A robot carrying the Mustika may not carry any block.

4.4.3 Transfer Protocol:

- When picking up or receiving an object from the Transfer Area, BR is permitted to touch only objects that are within the Transfer Area, including the airspace above it.
- TR may hand the object directly to BR or place it on the floor within the Transfer Area for BR to retrieve (the Mustika must be handed directly).
- If an object falls or is released outside the Transfer Area, it is ~~considered a Handover Violation.~~ handled as a Failure (Earth Block), an invalid Sky Block or a dropped Mustika.
- Physical contact between TR and BR during the handover phase is permitted, provided that the portions of the robots that are in contact are within the Transfer Area boundary, even if other parts of either robot extend beyond it.

4.5 Sanctuary Mandate and Mustika Retrieval

4.5.1 TR is only permitted to retrieve the Mustika once the team has fulfilled the Sanctuary Mandate (~~successfully constructing~~ having at least two Complete Towers standing at the same time, with at least one located in the L1 Shared Area or L2 Shared Area).

4.5.2 TR retrieves the Mustika from the Mustika Pillar and delivers it to BR at the Transfer Area by direct handover. BR then carries the Mustika to Level 2 for enshrinement on the Central Pillar.

4.5.3 The Mustika Pillar is kept supplied with a Mustika until a Mustika has been enshrined; only the first enshrined Mustika is valid.

4.6 End of Match and Scoring State

4.6.1 When the 3-minute buzzer sounds, all robots must stop immediately.

4.6.2 The final score is tallied based on the position of blocks and the Mustika at the moment the buzzer sounds.

4.6.3 Any object still being touched, gripped, or supported by a robot when the match ends will not be counted for points.

5. Retry

5.1 Retry Protocols

5.1.1 A retry can be requested by a team. A team may request a retry at any time by calling out "Retry".

5.1.2 Referees will call a ~~forced retry~~ Forced Retry if a robot commits a violation.

5.1.3 If a retry is called while a robot is in possession of the Mustika, the Mustika must be ~~returned to the Mustika Pillar.~~ removed from the Game Field; the Mustika Pillar is refilled.

5.1.4 A Failure is declared when an Earth Block touches the floor of the Game Field outside the Storage Area, the Transfer Area or a Building Spot, whether it has been released or is still held by a robot, or when an Earth Block is placed out of sequence in the construction of a tower. A Failure does not result in a Forced Retry. When a Failure is declared, the block becomes invalid and shall be removed from the Game Field by the referees or competition assistants when it is safe to do so. Transfer points already awarded for the block remain valid.

5.2 Requesting a Retry

5.2.1 A team may request a retry at any time if their robot malfunctions, gets stuck, or if the team wishes to reset their strategy.

5.2.2 The team leader must signal the referee by raising their hand and shouting "Retry!".

5.2.3 A retry begins only after the referee acknowledges the request.

5.3 Retry Procedure

5.3.1 Robot Reset: The affected robot(s) must be moved back ~~in~~ to their respective Retry Zone.

- TR must always be returned to the ~~Start Zone (Ground Retry Zone)~~ Start/Retry Zone.
- BR may be returned to either the ~~Start Zone (Ground Retry Zone)~~ Start/Retry Zone or the L1 Retry Zone, at the team's discretion. To be able to use the L1 Retry Zone, BR must have completely entered L1 at least once during the match.

5.3.2 Object Handling:

- Any game objects (Earth Blocks or Sky Blocks) held by the robot at the time of the retry request may be retained by the robot upon restart.
- If the Mustika was being carried during a retry, it must be ~~returned to the Mustika Pillar.~~ removed from the Game Field.
- Objects already correctly placed on a Building Spot or the floor of the Transfer Area (and not touched by the robot at the time of the retry) shall remain in place.

5.3.3 Restart: Robots may restart immediately after acknowledged by the referee.

5.3.4 Non-Interference:

- A retry shall be carried out in a manner that does not interfere with the opposing team's actions.
- When the opposing team has been granted a retry, no team shall intentionally interfere with the retry process.
- During a retry, both teams must make every reasonable effort not to interfere with the actions of the opposing team.
- Violation of any of these provisions may result in a warning or a ~~forced retry~~ Forced Retry at the referee's discretion.

6. Violation

A violation results in a Forced Retry. The referee will call the violation, and the team member must immediately stop the offending robot. The robot must then return to ~~the Start Zone~~ its Retry Zone following the retry procedure.

~~6.1 No-Pushing Rule~~

~~Robots must lift or carry blocks (Earth Blocks and Sky Blocks). Pushing, dragging, or sliding a block along the floor to a Building Spot or Transfer Area is strictly prohibited.~~

~~6.3 Handover Violation~~

~~If BR touches objects which are not completely inside of Transfer area.~~

~~6.4 Out of Bounds~~

~~If a robot knocks a block (Earth Block or Sky Block) out of the game field, the block is permanently removed from play. If the Mustika is knocked out, it is immediately returned to the Mustika Pillar by the referee.~~

~~6.2 Zone Violation~~ 6.1 Area Violation

6.1.1 TR (Transporter Robot): Any part of TR (including mechanisms) crossing the vertical boundary into Level 1 (beyond the Transfer Area) or Level 2.

6.1.2 ~~Opponent's Territory~~ Opponent's Team Area: Any part of a robot crossing into the opponent's ~~territory~~ Team Area except the shared areas.

~~6.5 Dropped Objects~~ 6.2 Invalidation of Mustika

~~If a robot drops a block, it must be picked up by actively lifting it. Pushing a dropped block to correct its position is a violation of the No-Pushing Rule.~~ If the Mustika is dropped at any point, including during the handover in the Transfer Area, or is being carried by a robot when a retry is called, it ~~must be immediately returned to the Mustika Pillar. The Referee is responsible for resetting dropped game objects (such as the Mustika) to their initial positions on the field.~~ shall be removed from the Game Field by the referees or competition assistants. The Mustika Pillar is refilled.

6.3 Invalidation of Sky Blocks

A Forced Retry is declared on a robot and the Sky Block becomes invalid if the robot drops a Sky Block; causes a Sky Block to leave the Ground Shared Area without lifting and carrying it (e.g., by pushing, knocking, or dragging); lets a Sky Block touch the floor of the Game Field outside the Ground Shared Area, the Transfer Area or a Building Spot, even while still holding it; or places a Sky Block out of sequence in the construction of a tower (e.g., directly on a Building Spot, on a single Earth Block, or on another Sky Block). If several Sky Blocks leave the Ground Shared Area in one incident, only one of them becomes invalid; the others are returned to any free position in the Ground Shared Area by the referees or competition assistants when it is safe to do so. An invalid Sky Block shall be removed from the Game Field by the referees or competition assistants when it is safe to do so. Transfer points already awarded for the block remain valid. Intentionally invalidating Sky Blocks is unsportsmanlike conduct and may result in disqualification. A Sky Block lifted from a tower to flip it does not become invalid: if it is dropped or placed on another tower, a Forced Retry is declared and the Sky Block is returned to its original tower.

6.4 Carry Limit

If a robot carries more blocks than permitted (TR: three, BR: two), or carries any block together with the Mustika, a Forced Retry is declared on that robot. The block(s) picked up last, above the limit, become invalid; the robot may restart with the permitted number of blocks. Example: if TR carries four blocks, the fourth block picked up becomes invalid and TR may restart with the other three. If a robot carries a block together with the Mustika, that block becomes invalid.

~~6.6~~ 6.5 Blocking and Interference (Shared Areas)

In the Shared Areas (Ground Shared Area, L1 Shared Area, and L2 Shared Area), any physical contact or action that clearly results in interfering with the opposing team's manipulation of game objects shall be considered a violation. ~~A robot must not intentionally block the opponent's path or obstruct the opponent's robot from performing its tasks in these areas.~~ Upon determination of interference by the ~~Referee~~ referee, a Forced Retry will be called on the offending robot.

6.6 Tower Protection

6.6.1 If a robot causes a tower to collapse, or causes any block of a tower to be displaced from its Building Spot, a Forced Retry is declared on that robot regardless of intent. If robots of both teams are in contact with the tower at that moment, both robots shall retry.

6.6.2 The referees or competition assistants shall restore the tower to its state immediately before the incident (same blocks, same order, same Sky Block color facing up). Blocks that fall from the tower are restored with it and are not treated as a Failure or as invalid Sky Blocks. A block that was being placed at that moment becomes invalid.

6.6.3 If a robot displaces a Mustika that has been enshrined on the Central Pillar, a Forced Retry is declared on that robot and the Mustika is restored.

6.6.4 Flipping a Sky Block in place on the same tower is not a displacement. If a flip attempt causes a collapse, a Forced Retry is declared and the tower is restored.

7. Disqualifications

A team will be disqualified and lose the match (score set to 0) if they commit any of the following:

7.1 Intentional Damage

Intentionally damaging the Game Field, game objects (Earth Blocks, Sky Blocks, or the Mustika), or the opponent's robot(s).

~~7.2 Displacement of Placed Blocks~~

~~Intentionally removing, displacing, or interfering with an opponent's Earth Block that has already been correctly placed on a Building Spot.~~

~~7.3~~ 7.2 Safety Violations

Operating a robot that poses a danger to people, the venue, or the field infrastructure (e.g., sharp parts flying off, battery smoke, or fire).

~~7.4~~ 7.3 Unsportsmanlike Conduct

Refusing to follow the referee's instructions, aggressively arguing with match officials, or engaging in behavior that violates the spirit of fair play. This includes intentional invalidation of Sky Blocks.

~~6.7~~ 7.4 Unauthorized Touching

A team member physically touching the robots, the Game Field, or any game objects without the referee's explicit permission or without an authorized Retry declaration. The procedure, including warnings, will be specified in the Participation Guideline.

8. Scoring

The final score for each team is calculated based on the final state of the game objects on the field at the exact moment the three-minute match duration elapses (signaled by the buzzer). Any object that is still in contact with or being physically controlled by a robot when the match ends will yield zero (0) points for its specific task.

8.1 Transfer Points (TR Tasks)

Points are awarded to the team for the successful logistics performed by the Transporter Robot (TR).

- **Point Value:** 5 points are awarded for each block (Earth Block or Sky Block) successfully delivered to the Transfer Area.
- **Condition:** A block is considered "delivered" once it has been released by the TR and remains entirely within the vertical boundaries of the 1000 mm $\times$ 1000 mm Transfer Area.
- **Permanence:** Transfer points are awarded immediately and remain with the team even if the Builder Robot (BR) later retrieves the block to construct a tower.
- **Once per block:** Transfer points are awarded only once per block. A block that TR lifts again from the Transfer Area and re-releases earns no additional transfer points.

8.2 Individual Block Scoring (Tower Placement)

Points are awarded for blocks successfully placed on Building Spots. Unlike the "Transfer Points," these points depend on the level (L1 or L2) where the block is positioned.

Game Object / Position	**Level 1 (L1) Points**	**Level 2 (L2) Points**
Earth Block (First / Bottom Layer)	10 Points	20 Points
Earth Block (Second / Middle Layer)	20 Points	40 Points
Sky Block (Top Layer)	40 Points	80 Points

8.3 Ownership and Individual Counting

To ensure fairness, each block in a tower is scored independently based on the team that placed it, with the exception of the Sky Block.

8.3.1 Points are awarded to the team that successfully placed the block on the Building Spot. Once an Earth Block is correctly placed (either as a foundation or middle layer), its points are "locked" to that team and cannot be claimed by the opponent, even if the opponent adds more blocks on top of it.

8.3.2 Points for a Sky Block are awarded based on the color facing upward at the end of the match.

- If a Sky Block shows Red on top, the Red Team receives the points (40 or 80 pts).
- If the Blue Team flips that same block to show Blue, the points shift to the Blue Team.

8.3.3 Flipping a Sky Block does not grant ownership of the Earth Blocks beneath it. Those foundational blocks always score for the team that originally placed them.

8.4 Multi-Team Towers

In the L1 Shared Area and L2 Shared Area, a tower may be composed of blocks from both teams. Example: If the Red Team places the first Earth Block on L2 (20 pts) and the Blue Team stacks the second Earth Block on top of it (40 pts), the Red Team keeps their 20 points, and the Blue Team earns their 40 points.

8.5 Mission Points (The Mustika)

The enshrinement of the Mustika represents the completion of the ultimate objective.

8.5.1 Mustika Enshrinement: 250 points.

8.5.2 The Mustika must be placed on the Central Pillar (L2) and remain stable at the exact moment the match ends. Only the first enshrined Mustika is valid.

8.5.3 Mustika points are awarded to the team that successfully places it, provided they have fulfilled the Sanctuary Mandate requirements.

8.6 Invalid Scoring Scenarios

No points shall be awarded for:

8.6.1 Any object still being touched, gripped, or supported by a robot when the buzzer sounds.

8.6.2 Any block placed out of Building Spots or out of the required Complete Tower sequence (must strictly follow: Earth Block $\rightarrow$ Earth Block $\rightarrow$ Sky Block).

8.6.3 Blocks that have been knocked out of the ~~building~~ ~~spots~~ Building Spots (unless the tower is restored by the referees or competition assistants).

8.6.4 Blocks that were pushed, dragged, or slid along the floor to the Building Spot rather than actively lifted/carried.

9. Deciding the Winner

The winner of a match is determined by the total accumulated points at the end of the full match duration.

9.1 Match Duration

9.1.1 Each match lasts for a fixed duration of exactly three (3) minutes.

9.1.2 There is no early victory or "instant win." Even if a team successfully enshrines the Mustika, the match continues until the timer reaches zero.

9.1.3 The final scoring state is determined by the exact position and condition of all game objects at the exact moment the end-of-match buzzer sounds.

9.2 Total Score Calculation

The winner is the team with the ~~highest~~ higher Total Score, calculated as the sum of:

9.2.1 5 points for every block (Earth Block or Sky Block) successfully delivered to the Transfer Area by TR.

9.2.2 Individual points for every Earth Block and Sky Block correctly placed on Building Spots in L1 and L2 by BR.

9.2.3 250 points for the successful enshrinement of the Mustika on the Central Pillar.

9.3 Tie-breaking Criteria

If both teams have the same Total Score at the end of the 3-minute match, the winner will be determined by the following tie-breakers in descending order of priority:

9.3.1 The team that successfully enshrined the Mustika on the Central Pillar.

9.3.2 The team with the higher number of Sky Blocks showing their designated team color facing up on top of towers across the entire Game Field.

9.3.3 The team with the higher total number of blocks (Earth Blocks and Sky Blocks) correctly placed on Level 2 (L2) Building Spots.

9.3.4 The team with the higher total number of blocks (Earth Blocks and Sky Blocks) correctly placed on Level 1 (L1) Building Spots.

9.3.5 If a tie still persists, the ~~referee~~ ~~panel~~ judges will ~~uniquely~~ determine the winner based on a

final assessment of technical merit and sportsmanship during the match.

9.4 Scoring State ~~and Objections~~

9.4.1 Once the buzzer sounds, the referees will evaluate the field. Robots must be stopped immediately and must not be touched by any team member until the evaluation is complete.

9.4.2 Any object still in contact with or being physically supported by a robot at the 3-minute mark will be excluded from the final score.

10. Teams

10.1 Each participating country or region shall be represented by one (1) team. Indonesia, as the hosting region, will be represented by two (2) teams.

10.2 A team must consist of exactly three (3) student members and one (1) instructor. All team members and the instructor must belong to the same higher education institution (university, college, or polytechnic).

10.3 Up to three (3) additional students from the same institution may be registered as Pit Crew members. Pit Crew members ~~are permitted to assist exclusively during preparation in the designated Pit Area and are strictly prohibited from entering the Game Field during the match.~~ may assist during preparation, including the setup on the Game Field. During the match, they must stay in the designated Pit Area.

10.4 Participation as a team member or Pit Crew is restricted to undergraduate or diploma students. Postgraduate students are strictly prohibited from participating in these roles.

11. Robot

11.1 Each team is allowed to bring two (2) robots: one Transporter Robot (TR) and one Builder Robot (BR).

11.2 TR may be manually controlled by an operator or be an automatic robot capable of operating independently.

11.3 BR must be a fully automatic robot capable of operating independently without any manual intervention.

11.4 BR must have a remote Freeze/Resume function with which a team member can immediately pause all actuators and allow the robot to resume. The function may be used only when instructed or permitted by the referee, and the robot may resume only with the referee's permission. When a team member needs to enter a Shared Area during the match, for example for a retry, the referee may instruct the teams to freeze their BR. Using the Freeze/Resume function is not considered manual intervention or communication.

11.5 The initial dimensions of both TR and BR must each strictly fit within 700 mm × 700 mm × 700 mm (Length × Width × Height) before the game starts.

11.6 During the game, when fully extended, the dimensions of TR must not exceed ~~1000 mm × 1400 mm × 1200 mm (Width × Length × Height)~~ 1400 mm × 1000 mm × 1200 mm (Length × Width × Height).

11.7 During the game, when fully extended, the dimensions of BR must not exceed ~~1000 mm × 1400 mm × 1200 mm (Width × Length × Height)~~ 1400 mm × 1000 mm × 1200 mm (Length × Width × Height).

11.8 The ~~weight of each individual robot,~~ total weight of both robots (TR and BR), including ~~its~~ their respective batteries, manual operating devices, and cables used during the match, must not exceed ~~50 kg per robot.~~ 60 kg. Devices used exclusively for setup, activation and a retry (e.g., laptops, external start buttons) are excluded from this weight limit, and must be removed from the Game Field before the robot starts or restarts.

11.9 For radio frequency communication ~~between the manual operating devices, and the robot,~~ used for TR manual control, the BR start switch and the Freeze/Resume function, teams are only permitted to use Wi-Fi (IEEE 802.11), Zigbee (IEEE ~~802.15)~~ 802.15.4), and Bluetooth.

11.10 The ~~Organizer~~ organizer will not control or guarantee the environmental quality of Wi-Fi, Zigbee, or Bluetooth signals at the competition venue.

11.11 TR and BR are strictly prohibited from any communication with each other during the game. For clarity: (a) BR may autonomously observe the field environment using its own onboard sensors to make independent decisions, including perceiving the general state of the field, game objects, and other robots; (b) any system, device, or deliberate action whose primary

purpose is for TR to send signals or convey encoded information to BR is considered communication and is prohibited; (c) no person or external device may send information to BR during the match, except through the start switch and the Freeze/Resume function.

11.12 Teams may only use batteries, compressed air, and/or elastic force as power sources for their robots.

11.13 The nominal voltage of any battery used in the robots, controllers, or any other related devices during the game must not exceed 24V. When connecting batteries in series, the total combined nominal voltage must be 24V or less.

11.14 The power circuits of the robots must be designed so that any actual maximum voltage in the circuits does not exceed 42V. If the power supply system includes multiple isolated circuits, the voltage in each individual system must remain 42V or less.

11.15 Teams using compressed air must use either a purpose-built pneumatic container or a plastic bottle in pristine condition prepared safely and appropriately. The air pressure in the system must not exceed 600 kPa.

11.16 The following devices and components are strictly prohibited:

11.16.1 Lead-acid batteries, adhesive-sealed batteries, explosive or high-temperature energy sources, and any items that pose a risk of damaging the Game Field or hindering the competition.

11.16.2 Unsafe lasers. When using lasers, teams must strictly use Class 1 or Class 2 products that comply with the IEC 60825-1 standard and must implement safety measures based on those exact standards.

11.17 Robot Transportation: The Organising Committee will arrange the transportation of robots for all participating teams. Each team is permitted to prepare a maximum of one (1) transportation box. The box must have maximum dimensions of 1500 mm $\times$ 800 mm $\times$ 900 mm (Length $\times$ Width $\times$ Height). The maximum gross weight of the transportation box must not exceed 180 kg.

11.18 Suction mechanisms are permitted on robots, provided they do not leave any residue on or physically damage the ~~game field objects or surfaces~~ Game Field or game objects.

11.19 BR shall be started only by a team member operating a start switch (on the robot or on an excluded activation device) at the start signal or when a retry is acknowledged. After that, no manual intervention is allowed.

12. Safety

12.1 The design and construction of all robots must not pose any kind of physical danger to any person at the competition venue.

12.2 All robots (both TR and BR) must be equipped with a clearly visible and easily accessible red emergency "STOP" button. ~~Additionally, a remote emergency stop switch is permitted and strongly encouraged for enhanced safety.~~ The emergency stop must be a physical, hardwired button on the robot; a remote emergency stop is not permitted.

12.3 Robots must be designed, manufactured, and operated to ensure the absolute safety of team members, opposing teams, surrounding event staff, and the Game Field infrastructure.

12.4 Team members must wear appropriate safety gear as mandated by the ~~Organizer~~ organizer during all matches, test runs, and setup phases.

12.5 The use of dangerous power sources, hazardous materials, or mechanisms that could damage the Game Field or harm participants is strictly prohibited.

12.6 The use of flying mechanisms or drones as part of the robot design is strictly prohibited due to safety concerns and conflicts with the intended game mechanics.

13. Other

13.1 Situations not expressly mentioned in this Rulebook shall be subject to the final decisions of the Panel of Judges and the Organising Committee.

13.2 The dimensions, weights, and other physical specifications of the Game Field and game objects described in this Rulebook may have a manufacturing tolerance of $\pm$ 5% unless otherwise specified.

13.3 All official inquiries should be directed to the official website of ABU Robocon 2027. An FAQ (Frequently Asked Questions) section will be provided and regularly updated on the contest's website.

13.4 Any changes, updates, or addendums to the Competition Rules will be officially published on the website of the ABU Robocon 2027 Organising Committee.

13.5 Teams must strictly comply with all instructions given by the Organising Committee and the referees at all times to ensure the absolute safety of the robots, participants, and all personnel involved.

13.6 Detailed specifications of the Earth Blocks and Sky Blocks and detailed drawings with the dimensions of each part of the Game Field are given in the Appendix document, which is published separately from this Rulebook and may be updated independently.

14. Colors and Materials Specification

The following table outlines the material composition and specific RGB color codes for all primary elements of the 2027 Game Field. Teams and domestic ~~organisers~~ organizers should refer to this table when constructing or painting local game fields to ensure uniformity and visual consistency across all ABU Robocon 2027 venues.

Game Field Item	**Material Specification**	**Color (R-G-B)**	**Swatch**
Ground Level			
Ground Area (Red)	Plywood, Water Paint	240-210-210	
Ground Area (Blue)	Plywood, Water Paint	170-210-230	
Ground Shared Area	Plywood, Water Paint	245-240-200	

Game Field Item	Material Specification	Color (R-G-B)	Swatch
~~Start Zone / Retry Zone~~ Start/Retry Zone (Red)	Plywood, Water Paint	223-34-34	
~~Start Zone / Retry Zone~~ Start/Retry Zone (Blue)	Plywood, Water Paint	50-0-255	
Storage Area (Red)	Plywood, Water Paint	240-210-210	
Storage Area (Blue)	Plywood, Water Paint	170-210-230	
Mustika Pillar	PVC pipe (⌀270 mm) with wooden cap, Oil Paint	100-62-0	
Transition Elements (Ground to L1)			
L1 Stairs (Red)	Plywood, Water Paint	235-180-160	
L1 Stairs (Blue)	Plywood, Water Paint	150-215-220	
Ramp (Red)	Plywood, Water Paint	200-150-140	
Ramp (Blue)	Plywood, Water Paint	130-180-200	
Level 1			
Level 1 Area (Red)	Plywood, Water Paint	235-180-160	
Level 1 Area (Blue)	Plywood, Water Paint	150-215-220	
Building Spot (L1)	Plywood, Water Paint	40-100-50	
L1 Shared Area	Plywood, Water Paint	245-240-200	
Transfer Area (Red)	Plywood, Water Paint	245-170-60	
Transfer Area (Blue)	Plywood, Water Paint	60-170-245	
L1 Perimeter Barrier	Plywood, Water Paint	190-190-185	
L1 Retry Zone (Red)	Plywood, Water Paint	223-34-34	
L1 Retry Zone (Blue)	Plywood, Water Paint	50-0-255	
L1 Side Wall	Plywood, Water Paint	190-190-185	
~~**Transition Elements (L1 to L2)**~~ (Deleted — no stairs to Level 2)			
~~L2 Stairs (Red)~~	~~Plywood, Water Paint~~	~~235-180-160~~	—
~~L2 Stairs (Blue)~~	~~Plywood, Water Paint~~	~~150-215-220~~	—
Level 2			

Game Field Item	Material Specification	Color (R-G-B)	Swatch
Level 2 Area	Plywood, Water Paint	190-190-185	
Building Spot (L2)	Plywood, Water Paint	40-100-50	
Central Pillar	PVC pipe (⌀270 mm) with wooden cap, Oil Paint	100-62-0	
L2 Side Wall	Plywood, Water Paint	190-190-185	
Boundaries and Barriers			
Game Field Boundary	Plywood, Water Paint	100-62-0	
Center Divider Fence	Plywood, Water Paint	100-62-0	
Game Objects			
Earth Block (Red)	3-layer corrugated cardboard box~~, stickers on all six sides~~ Approx. weight: 600 g (±20%)	~~223-34-34~~ Refer to Appendix document	—
Earth Block (Blue)	3-layer corrugated cardboard box~~, stickers on all six sides~~ Approx. weight: 600 g (±20%)	~~50-0-255~~ Refer to Appendix document	—
Sky Block	3-layer corrugated cardboard box, colored red on one side and blue on the other~~, stickers on all six sides, with reinforced claws/hooks.~~ (details in the Appendix document) Approx. weight: 220 g (±20%)	Refer to Appendix document	—

Game Field Item	Material Specification	Color (R-G-B)	Swatch
Mustika (Sphere)	Mikasa V300W volleyball (Size 5, ∅210 mm), used in original condition Material: Synthetic leather Closest Pantone colors: Yellow: Pantone 1235C, Blue: Pantone 3591C Approx. weight: 260–280 g	Original ball color	—