RoboMission

Senior
Temporada 2024

ALIADOS DE LA TIERRA
FUERZA DE LA NATURALEZA

World Robot Olympiad Spain. Versión: 15 enero 2024

WRO International Premium Partner

1. INTRODUCTION

The forces of nature are powerful and unpredictable. We need to be prepared for the possibility of major disasters in many places in the world where people live. We need to develop new technologies and strategies to help us mitigate the effects of these disasters and to rebuild our communities after they occur.

Robots are an example of one of these new technologies. They can help to warn us in advance for a coming disaster. They can also help us to prevent excess damage from and to help with rescues and rebuilding after a disaster has hit.

On the Senior game field, the robot will help restoring a city after a natural disaster. The robot will rebuild houses, clean the streets from debris and will repair water pipes.

2. GAME FIELD

The following graphic shows the game field with the different areas.
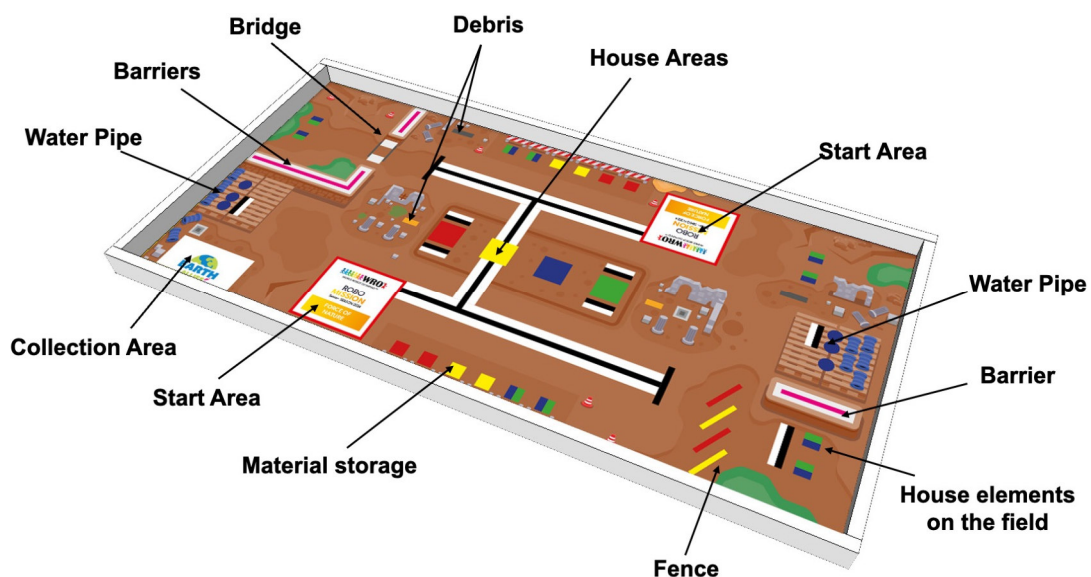
If the table is larger than the game mat, centre the mat in all directions.

3. GAME OBJECTS, POSITIONING, RANDOMIZATION

Randomization of the Start area

There are two Start areas on the game field. On the day of competition, one Start area is selected for the full day. Teams will then start from this area and the placements of some House elements (see next) will align with that.

House elements

There are 16 House elements (4 red, 4 yellow, 4 blue, 4 green) on the field:

-   4 red and 4 yellow House elements will always be placed next to the two different Start areas
-   4 blue and 4 green House elements will be randomized and placed on the different positions on the field: 2 elements top-left, 2 top-right, 2 bottom-right and 2 elements next to the Start area of the competition day
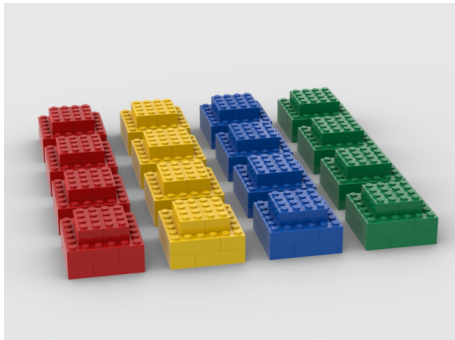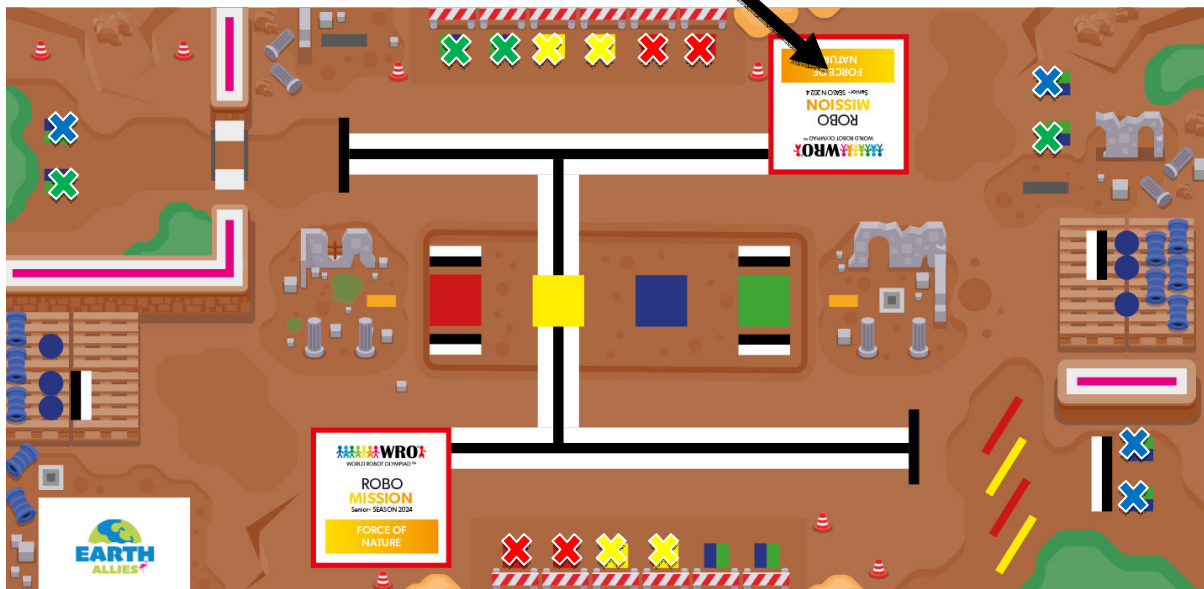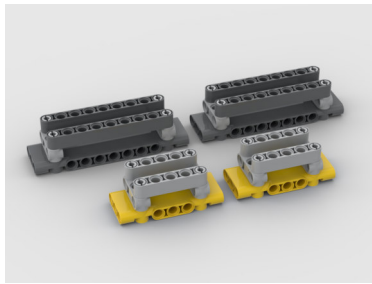

House elements

Example of a House element
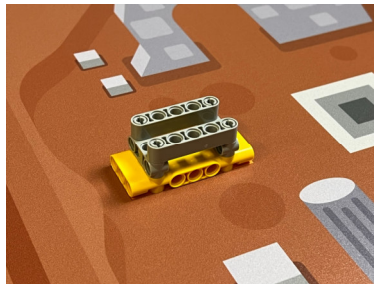on a start position

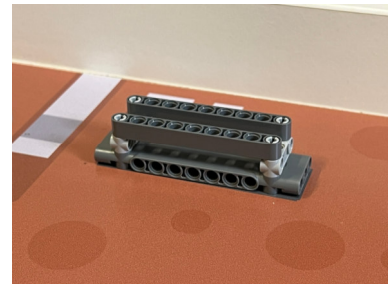Example: Start area on top of the field

Debris elements

There are 4 Debris elements (2 yellow, 2 dark grey) on the field. They are always placed on the orange and grey rectangles on the game field.
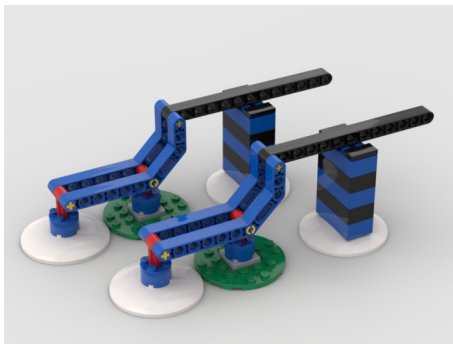
Debris elements

Position of yellow Debris element

Position of dark grey Debris element

Water pipes

There are 2 Water pipes on the game field. The different parts are always placed on the blue circles on the field, all elements will be fixed to the mat.
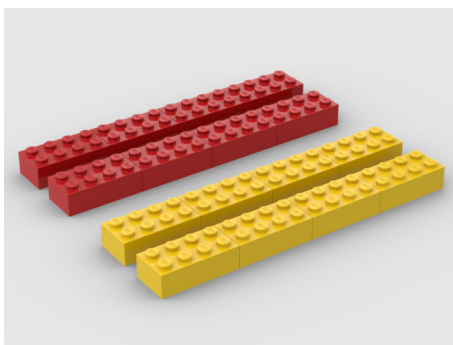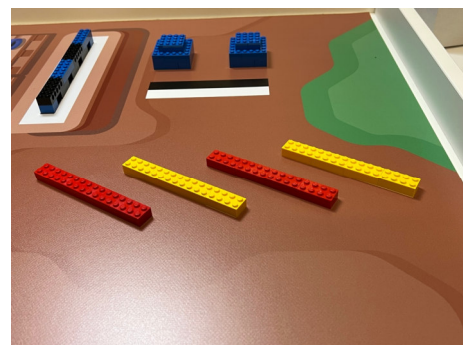

Water pipes (in connection)

Water Pipe setup on the field (not connected, all parts fixed to the mat)

Obstacles

There are 16 individual 2x4 LEGO bricks (8 red, 8 yellow) that are fixed on the game mat as Obstacles for the robot.
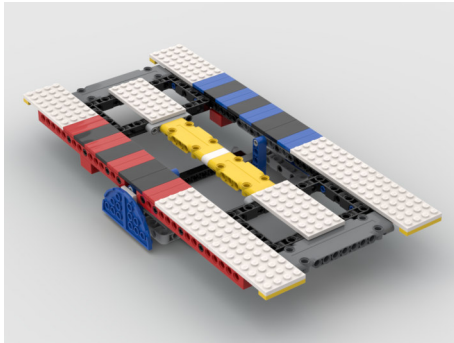

Obstacles

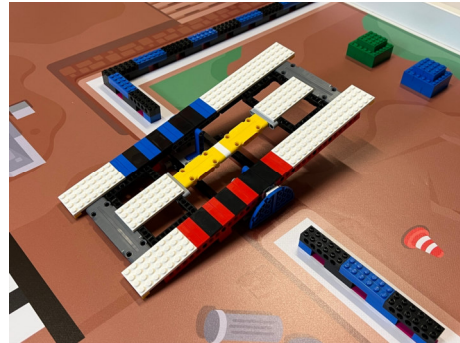Placement of Obstacles (fixed to the mat)

Bridge

There is a Bridge on the way to the top-left corner. The Bridge is always placed with the lower side looking to the Start area and will be fixed on the mat.
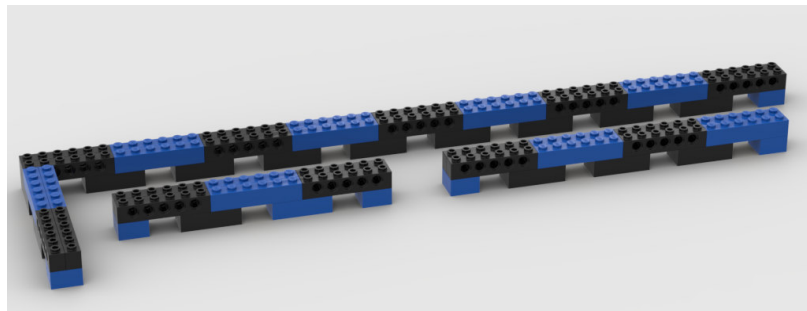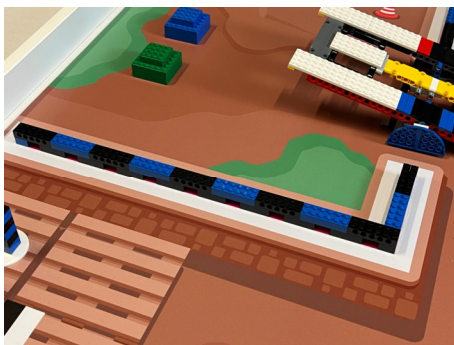
Bridge

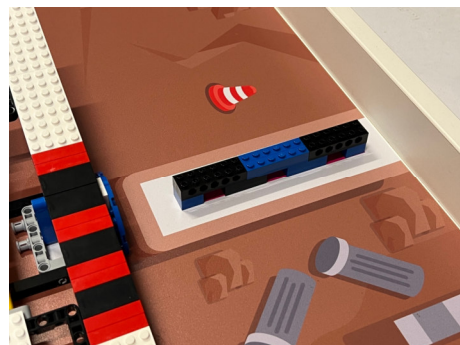Bridge on game field (fixed to the mat)

Barriers

There are 3 Barriers on the game field (2 surrounding the top-left corner, one on the right side of the game field). All Barriers should not be to be moved or damaged.
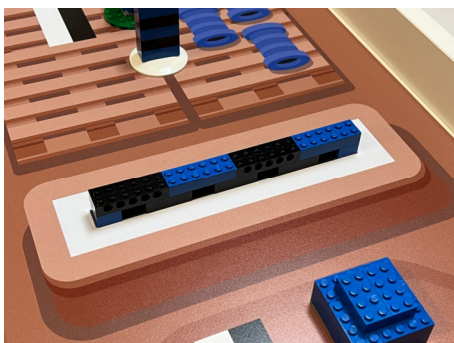

Barriers

Placement around top-left area

Placement around top-left area

Placement on the right side

4. ROBOT MISIONS

Rebuild houses

The robot should help rebuilding houses after an earthquake in the city:

- 4 houses – one in each colour (red, yellow, green, blue) – should be built in the different coloured areas on the field (e.g. red house in red area).
- Every house can have four floors. Maximum points are awarded if all four houses are built with 4 House elements of the colour matching the colour of the area below.

For the scoring of the House elements please note the following:

- The lowest element (floor 1) must always be completely inside a coloured house area and the colour of the lowest floor element must match the colour of the area, otherwise no points are awarded for the entire house. Completely means that the game object is only touching the coloured area.
- All House elements must always be stacked with the studs facing upwards. House elements cannot be upside down or on the side.
- House elements stacked on the 1st element can only be supported by the element below it. They cannot be supported by anything else, like the floor or another element.
- Only one house per coloured area counts. If there are two houses in an area that could score points, then the house with the most points will be scored.

Clean Debris

In the city, some Debris are lying around and the robot should help collecting them. Full points are awarded if the Debris are touching the Collection area in the bottom-left of the game field.

Repairing Water pipes

The Water pipes in the city are not functioning anymore and the robot should repair the pipes. Full points are awarded if one part of the Water pipe was tilted to the other and with that, the Water pipe is reconnected.

Bonus for Barriers

Barriers should not be moved outside of the white surrounding area and should not be damaged. If those objects are not damaged and not moved (outside of the white surrounding area) and the robot has completely left the Start area, you get the bonus points.

5. SCORING

Tasks	Each	Total
Rebuild houses		
House with one floor	3	
OR: House with two floors	6	
OR: House with three floors	10	
OR: House with four floors	**14**	**56**
Additionally: House with exactly 4 floors + All elements have the same colour as the coloured area below.	**8**	**32**
Clean Debris		
Debris is not touching the coloured area (yellow area for small Debris, grey area for big Debris) anymore and not touching the Collection area	**2**	
Debris is touching the Collection area	**5**	**20**
Repairing Water pipes		
Water pipe repaired (element touches the other element)	**8**	**16**
Bonus for Barriers		
Barrier not moved or damaged	**7**	**21**
Maximum Score		**145**

Scoring Interpretation
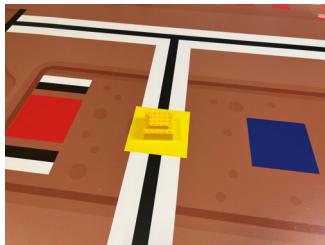
3 points (one floor)
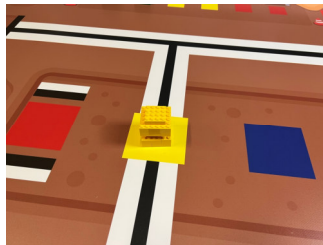
6 points (two floors)

10 points (three floors)

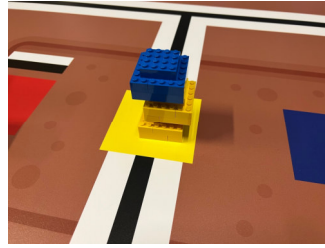14 + 8 points (4 floors + only yellow + correct area)
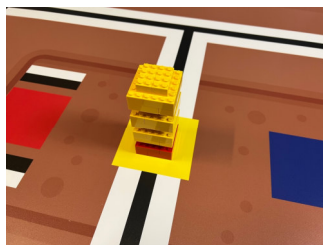
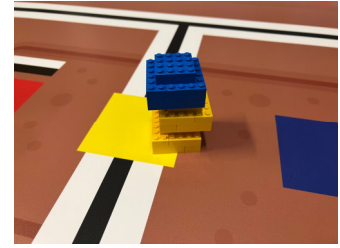0 points (floor 1 element is red and not yellow)
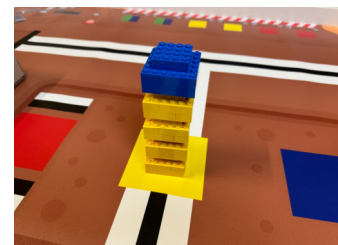
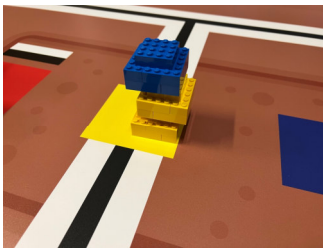14 points, no extra points because house should have exactly 4 floors
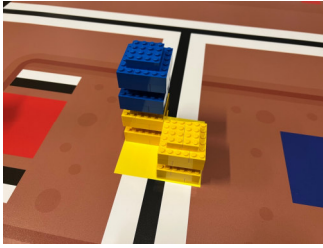
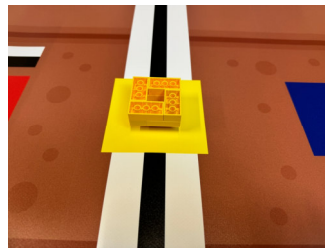14 points (only one house, with more points, counts)

10 points (3 floors, does not matter that they are shifted to the left and right on top of each other)
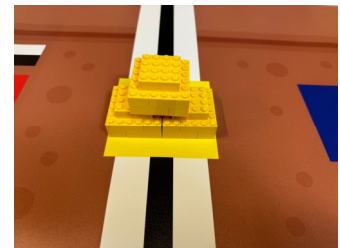

0 points (floor 1 is not completely in the coloured area)
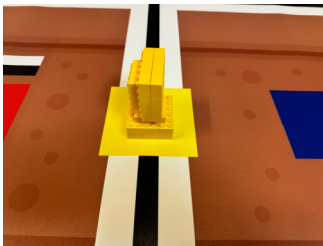

10 points (3 floors, floor 1 is completely in and it is OK if the other floors are outside in projection view)
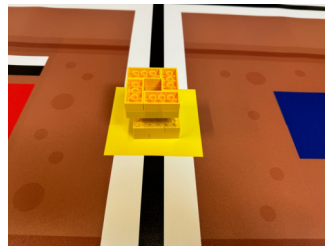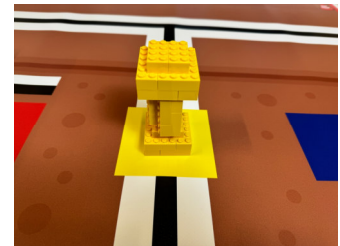

0 points (studs not up)

3 points (only for one element in first floor)
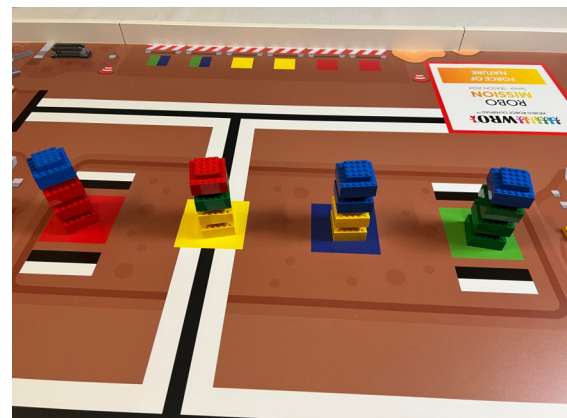

3 points (only for one element in first floor)

3 points (only for one element in first floor)

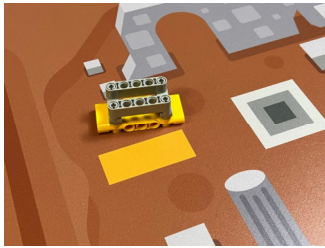3 points (only for one element in first floor)

56 + 32 points – ideal solution, all houses are completely built (4 floors) and placed in the correct coloured area.
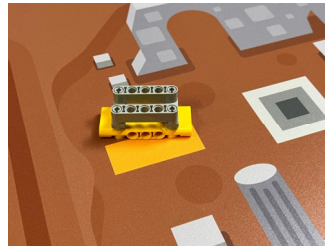

3x14=42 points (the house in the blue area do not score points because the lowest element is not matching the color)
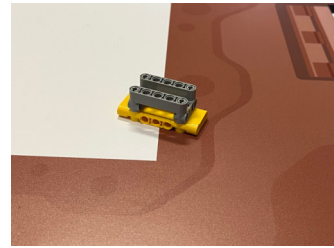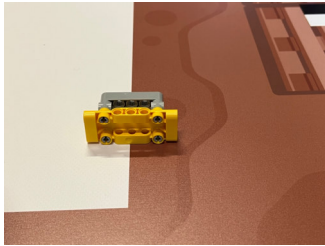
2 points (not touching the coloured area and not touching the collection area)
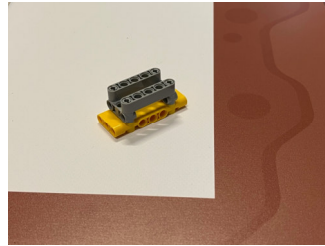

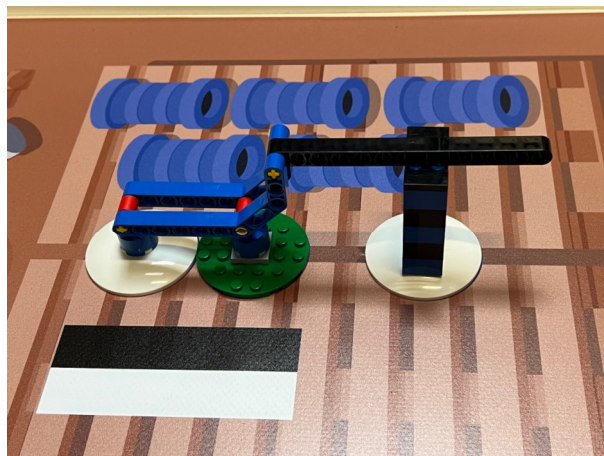0 points (still touching the coloured area)

5 points (touching collection area)

5 points (touching collection area, ok if lying on side)

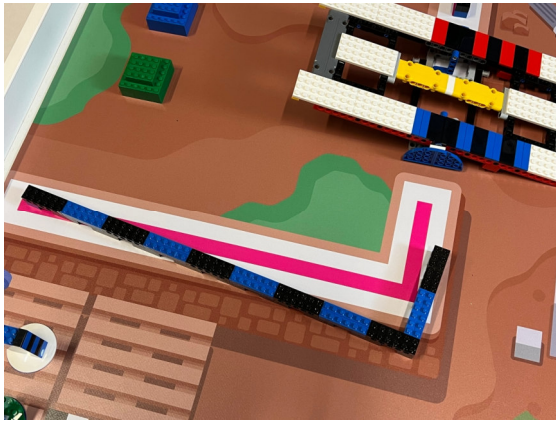5 points (completely in collection area)
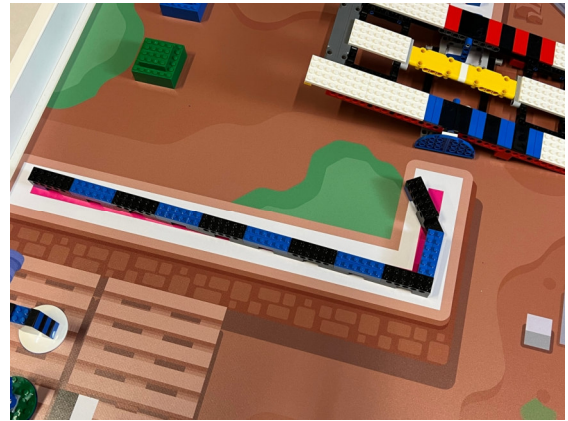

8 points (water pipe connected)

7 points (not moved)

7 points (moved inside white surrounding area)

0 points (moved outside white area)

0 points (damaged)