Engineering And Robotics Learned Young
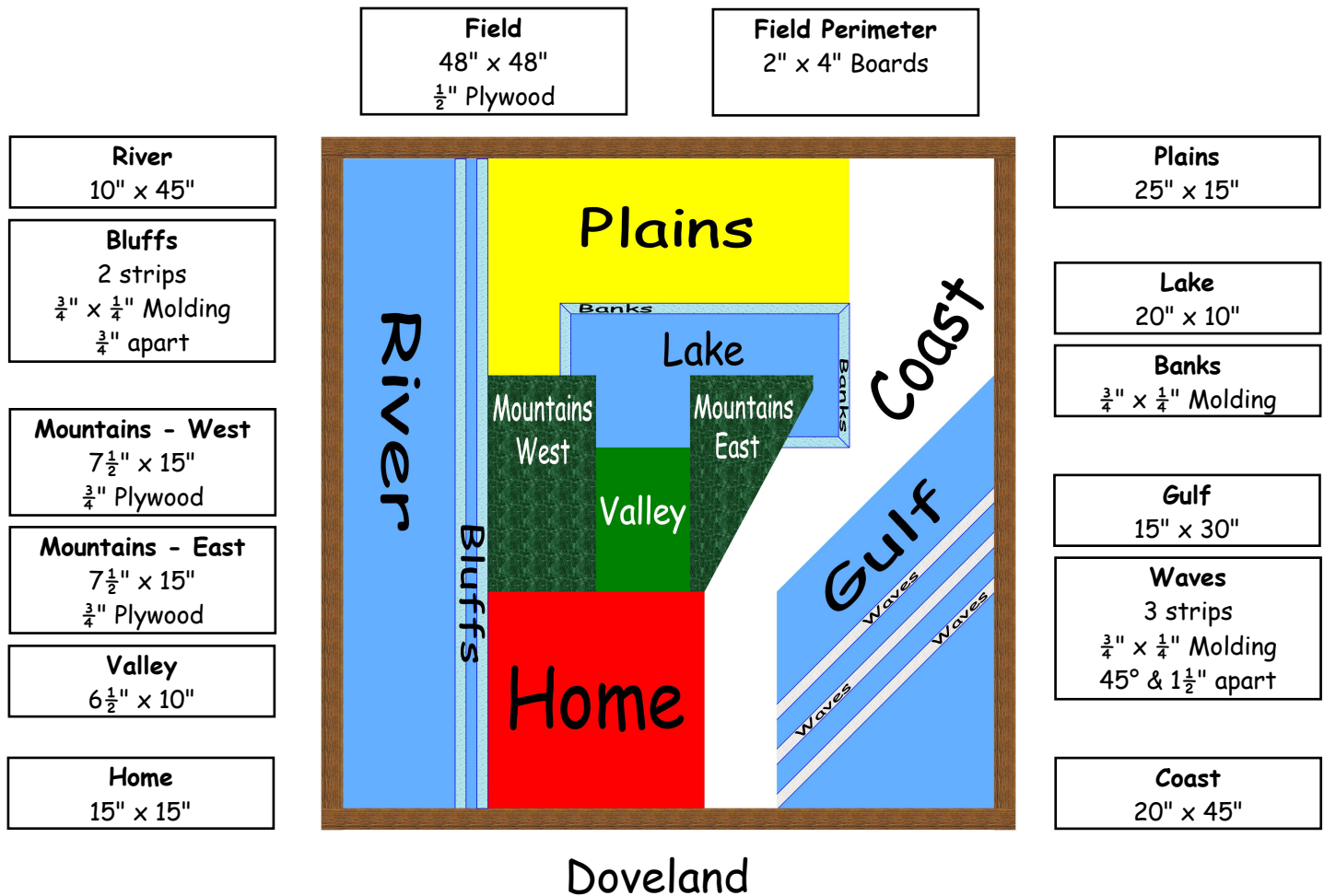## ◈ **EARLY** ◈
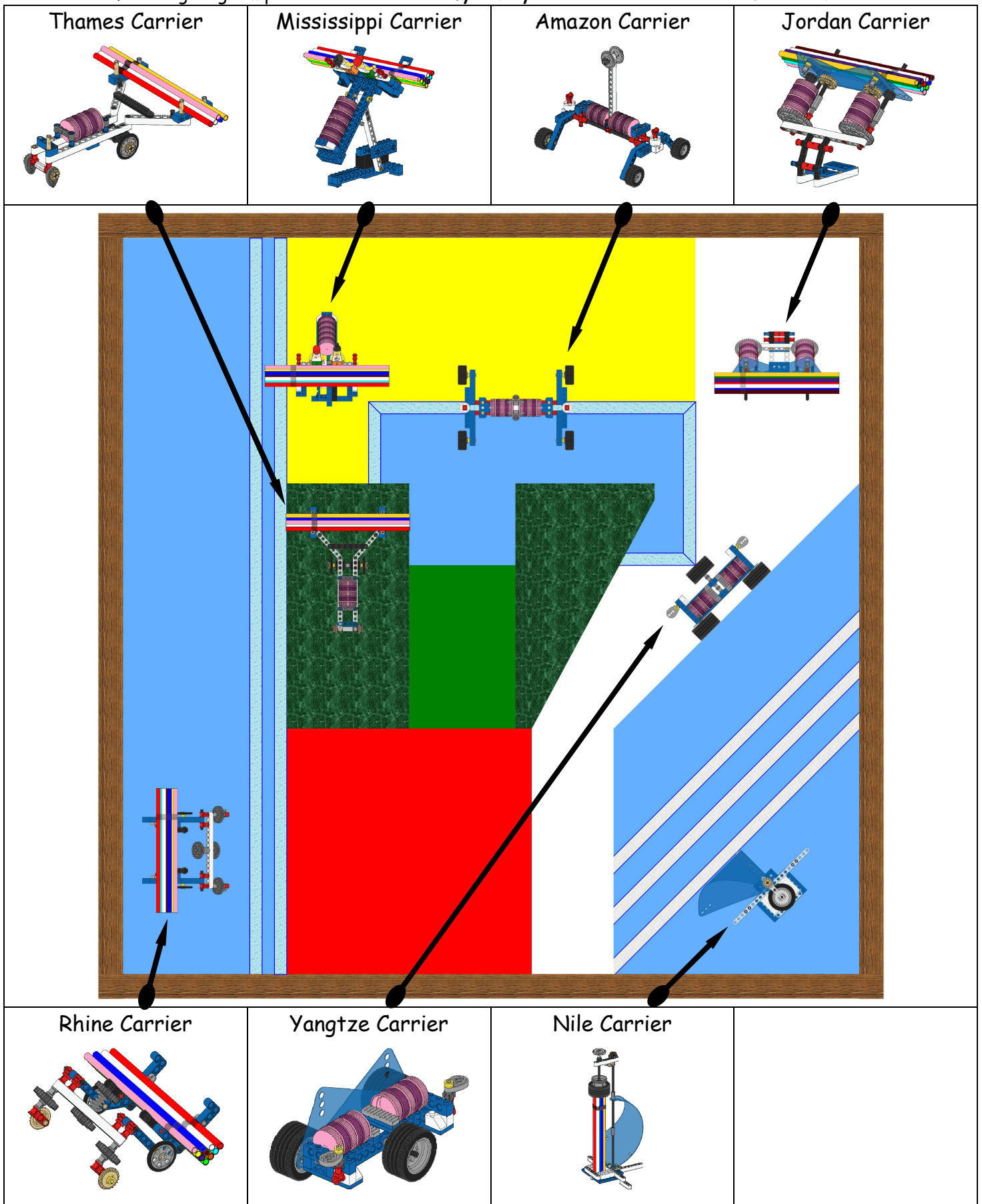## Fall 2013 Robotics Competition

Roboticists, the country of Doveland needs your help! Doveland is constructing a water purification system that will provide clean drinking water to every citizen and they need you to build a robot to deploy Pumps & Pipes for the project. Please help the citizens of Doveland!

Below is everything that we know about the mission.

- The team must be ready to execute the mission for your EARLY Tournament.
- The equipment available for a team to build a robot is 3 LEGO® Simple & Motorized Mechanisms Kits.
- The following diagram presents the environment that will be encountered. Construction details are found in the *Mission Field Details* document.

Field 48" x 48" ½" Plywood	**Field Perimeter** 2" x 4" Boards

River 10" x 45"

Bluffs 2 strips ¾" x ¼" Molding ¾" apart

Mountains - West 7½" x 15" ¾" Plywood

Mountains - East 7½" x 15" ¾" Plywood

Valley 6½" x 10"

Home 15" x 15"

Plains 25" x 15"

Lake 20" x 10"

Banks ¾" x ¼" Molding

Gulf 15" x 30"

Waves 3 strips ¾" x ¼" Molding 45° & 1½" apart

Coast 20" x 45"

Field diagram labels: Plains, Banks, Lake, Coast, River, Bluffs, Mountains West, Mountains East, Banks, Valley, Gulf, Waves, Waves, Waves, Home

Doveland

- The following diagram presents where the **Pumps & Pipes** and **Carriers** will be in Doveland.

Thames Carrier	Mississippi Carrier	Amazon Carrier	Jordan Carrier

Rhine Carrier	Yangtze Carrier	Nile Carrier	

Mission Rules

1. The team has 2 minutes to complete the mission.

2. There are 45 *Pumps* on the playing field at the beginning of each mission, represented by water bottle caps and there are 45 *Pipes* on the playing field at the beginning of each mission, represented by straws. Cap and straw details are found in the *Mission Object Details* document.

3. There are 7 *Pump & Pipe Carriers* on the playing field at the beginning of the mission constructed from one LEGO® Simple & Motorized Mechanisms kit. Carrier details are in each *Carrier Instruction* document.

4. The team's score is determined at the end of the 2-minute mission.

5. If a *Pump* or *Pipe* is moving when time expires, the *Pump* or *Pipe's* scoring position is determined when the *Pump* or *Pipe* has come to rest.

6. There are six scoring zones: the Mountains, Plains, Coast, River, Lake, and Gulf. The Mountains, Plains, and Coast are "*land*" scoring zones and the River, Lake, and Gulf are "*water*" scoring zones. The Bluffs are part of the River, the Banks are part of the Lake, and the Waves are part of the Gulf.

7. The goal of the mission is to evenly *deploy Pumps* amongst the *land* zones and evenly *deploy Pipes* amongst the *water* zones.

8. A *Pump* or *Pipe* is *deployed* when the *Pump* or *Pipe* is directly supported by the field or other *Pumps* or *Pipes* that are *deployed*. A *Pump* or *Pipe* is NOT *deployed* if it is on a *Carrier* or in a robot.

9. The team scores **2** points for each *Pump* that is deployed in a *land* scoring zone that has corresponding *Pumps deployed* in the other two *land* scoring zones. Therefore, each of these evenly *deployed Pump Trios* is worth 6 points.

10. The team scores **1** point for each *Pump* that is *deployed* in a *land* scoring zone and is not part of a *Pump Trio*.

11. The team scores **2** points for each *Pipe* that is deployed in a *water* scoring zone that has corresponding *Pipes deployed* in the other two *water* scoring zones. Therefore, each of these evenly *deployed Pipe Trios* is worth 6 points.

12. The team scores **1** point for each *Pipe* that is *deployed* in a *water* scoring zone and is not part of a *Pipe Trio*.

13. There is one penalty zone: the Valley.

14. The team is penalized **2** points for each *Pump* or *Pipe deployed* in the Valley.

15. A *Pump* or *Pipe deployed* and breaking the plane of a scoring zone is considered *deployed* in the scoring zone.

16. A *Pump* or *Pipe deployed* and breaking the plane of two scoring zones simultaneously is considered *deployed* in both scoring zones.

17. A *Pipe* or *Pump deployed* in multiple zones simultaneously (scoring zone & non-scoring zone, scoring zone & penalty zone, penalty zone & non-scoring zone, etc.) is considered *deployed* in the zone that results in the greatest points. Please remember that a *Pump* or *Pipe deployed* in two scoring zones simultaneously is considered *deployed* in both scoring zones.

18. Only the parts that are contained in three LEGO® Simple & Motorized Mechanisms kits along with nine 20" controller extension wires may be used to construct the robot and attachments (i.e. no other materials such as glue may be used on the robot). The kit parts may not be altered.

19. HOME is the 15" x 15" boundary extended vertically.

20. The robot and all attachments must begin completely inside HOME at the beginning of the 2-minute mission (i.e. no LEGO parts may be off the playing field when the mission begins). The parts do not have to be assembled together and the parts may be removed from and returned to the field during the 2-minute mission.

21. The team may retrieve their robot without penalty when the robot is partially inside HOME by lifting the robot vertically. After retrieving, the robot must be returned to HOME. If a *Pump*, *Pipe*, or *Carrier* remains with the robot when the robot is retrieved without penalty, the *Pump*, *Pipe*, or *Carrier* that is now in HOME remains in play.

22. If a team touches their robot, including parts that have become separated from the robot, that is completely outside HOME, the team is penalized 10 points. The robot must be returned HOME to continue the mission and if a *Pump*, *Pipe*, or *Carrier* remains with the robot when the robot is returned HOME, the *Pump*, *Pipe*, or *Carrier* is removed from play.

23. The robot must start completely inside HOME every time the robot is returned HOME (i.e. after retrieving the robot, no part of the robot may be breaking the HOME plane when continuing the mission).

24. The controllers and wires are NOT considered part of the robot.

25. The controller wires may only be used to provide electrical power to robot motors (i.e. the controller wires may not be used to drag or corral a robot, *Pump*, *Pipe*, or *Carrier*). If a controller wire is used illegally (referee's judgment), the robot must immediately be returned HOME to continue the mission.

26. The robot shall not have any elastic stored energy when the mission begins or when the robot is returned HOME, but elastic stored energy may be created with a motor during the mission (i.e. the robot may not be "wound up" manually).

27. The team may touch a *Pump*, *Pipe*, or *Carrier* without penalty if the *Pump*, *Pipe*, or *Carrier* is COMPLETELY inside the HOME.

28. If a *Carrier* is illegally touched, the *Carrier* along with any *Pumps* or *Pipes* it is carrying will be removed from the field. If a *Pump* or *Pipe* is illegally touched, the *Pump* or *Pipe* will be removed from the field.

29. A *Carrier* is never considered part of the robot.

30. *Pumps* or *Pipes* may only leave HOME by using the robot or by "letting go" of a *Pump, Pipe,* or something carrying a *Pump* or *Pipe*. For example, a team member may not roll, push, or throw a *Pump* but a team member may put a *Pump* on a 'LEGO slide' and "let go" of the *Pump*.

31. Because *Pumps* and *Pipes* are very valuable, the team is penalized 10 points for each *Pump* or *Pipe* ejected from the field. No penalty shall be assessed for a *Pump* or *Pipe* that is removed by a referee.

32. A score of zero shall be awarded if penalties result in a negative score.

33. All referees' rulings are final.

Please contact Mission.Control@EARLYrobotics.org with any questions or comments.
Thank you for maintaining the spirit of the game!