Engineering And Robotics Learned Young
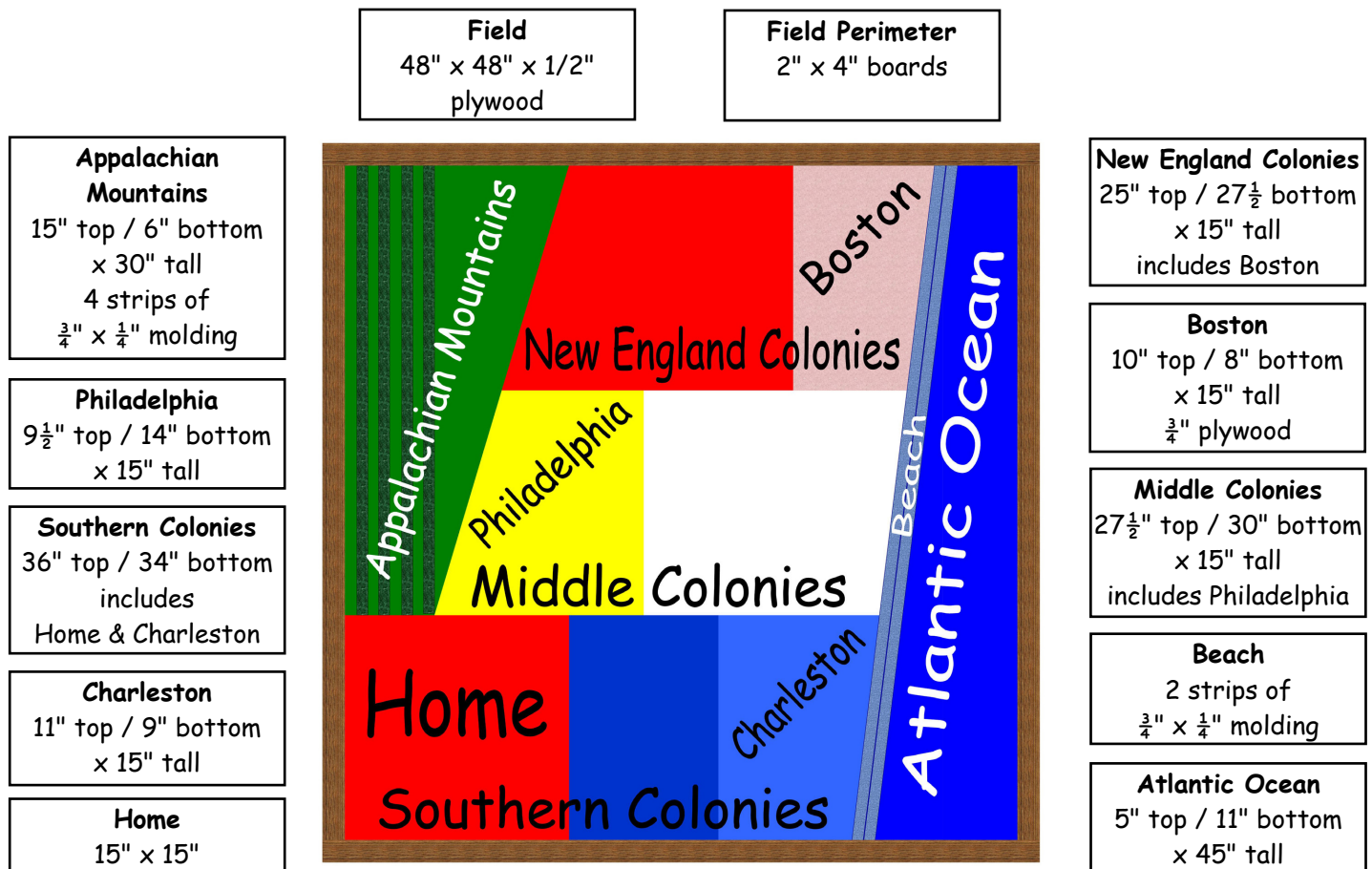## ◈ **EARLY** ◈
Fall 2009 Robotics Competition

Roboticists, the American Colonists need your help! The Colonists are preparing to ratify the United States Constitution and, so they can make an informed decision, the Colonists need you to build a robot to distribute copies of the Declaration of Independence, Constitution, and Bill of Rights to the colonies. Please help the American Colonists!
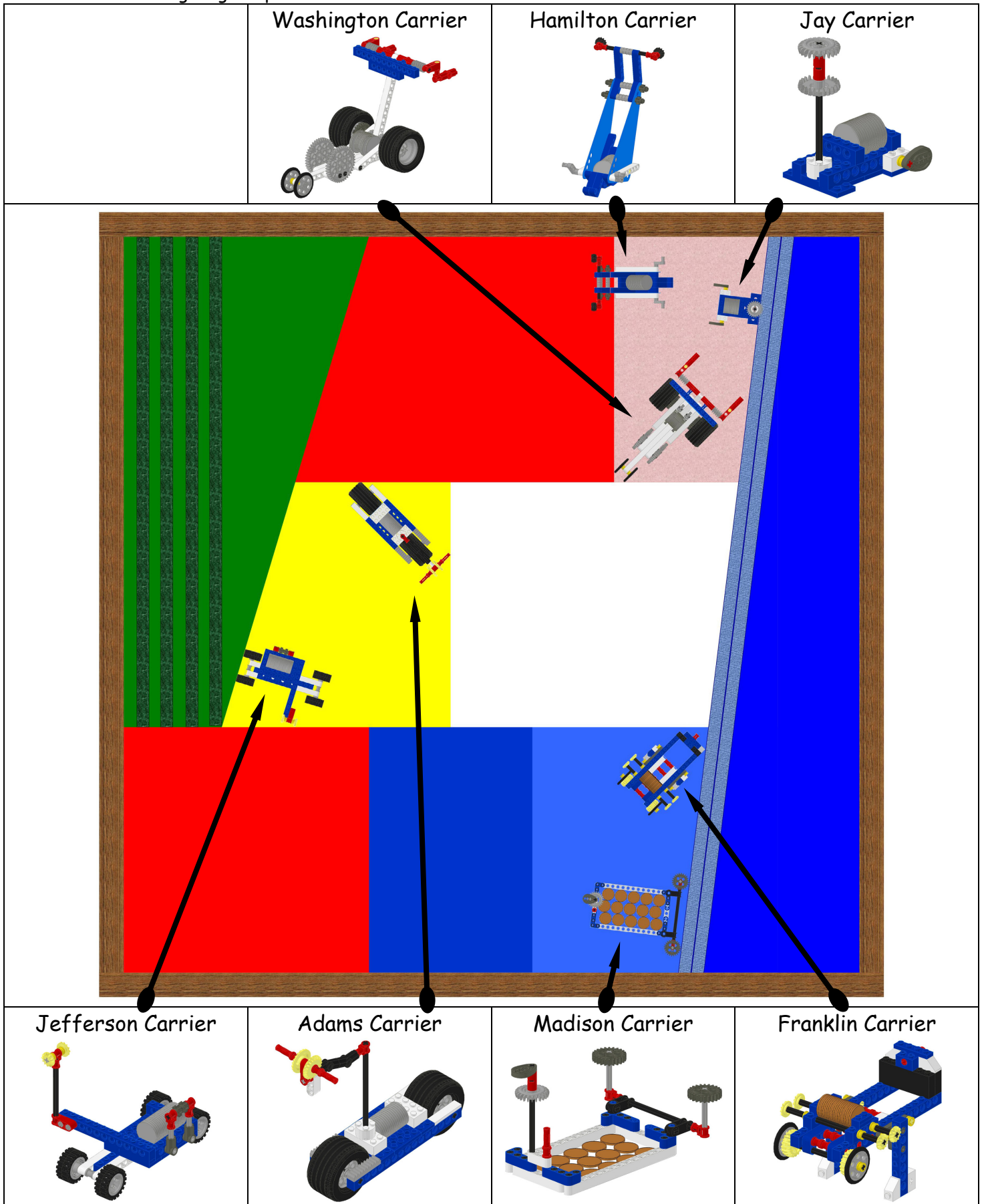
Below is everything that we know about the mission.

- The team must be ready to execute the mission for your EARLY Tournament.
- The equipment available for a team to build a robot or robots is 3 LEGO® Simple & Motorized Mechanisms Kits.
- The following diagram presents the environment that will be encountered.

Field 48" x 48" x 1/2" plywood	**Field Perimeter** 2" x 4" boards

Appalachian Mountains
15" top / 6" bottom
x 30" tall
4 strips of
¾" × ¼" molding

Philadelphia
9½" top / 14" bottom
x 15" tall

Southern Colonies
36" top / 34" bottom
includes
Home & Charleston

Charleston
11" top / 9" bottom
x 15" tall

Home
15" x 15"

New England Colonies
25" top / 27½" bottom
x 15" tall
includes Boston

Boston
10" top / 8" bottom
x 15" tall
¾" plywood

Middle Colonies
27½" top / 30" bottom
x 15" tall
includes Philadelphia

Beach
2 strips of
¾" × ¼" molding

Atlantic Ocean
5" top / 11" bottom
x 45" tall

Appalachian Mountains — New England Colonies — Boston — Atlantic Ocean — Philadelphia — Middle Colonies — Beach — Home — Charleston — Southern Colonies

United States of America

- The following diagram presents where the **Documents** and **Carriers** will be in the United States.

Washington Carrier

Hamilton Carrier

Jay Carrier

Jefferson Carrier

Adams Carrier

Madison Carrier

Franklin Carrier

Mission Rules

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

2.   There are 108 *Founding Documents* on the playing field at the beginning of each mission, represented by 36 quarters, 36 nickels, & 36 pennies. A nickel represents the Declaration of Independence, a quarter represents the Constitution, and a penny represents the Bill of Rights.

3.   There will be 7 **Document Carriers** on the playing field at the beginning of each mission constructed from one LEGO® Simple & Motorized Mechanisms kit.

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

5.   If a **Document** is moving when time expires, the referee will wait until the **Document** has stopped moving before determining the **Document's** scoring position.

6.   There are three scoring zones: NEW ENGLAND COLONIES, MIDDLE COLONIES, and SOUTHERN COLONIES. BOSTON is part of the NEW ENGLAND COLONIES. PHILADELPHIA is part of the MIDDLE COLONIES. CHARLESTON and HOME are part of the SOUTHERN COLONIES.

7.   The goal of the challenge is to evenly distribute the different **Documents** amongst the COLONIES. A perfect score is achieved by having 12 quarters, 12 nickels, & 12 pennies in each of the scoring zones.

8.   The team scores **4** points for each **Document** that is part of a **Fully Distributed Document Set**. A **Fully Distributed Document Set** is defined as one each of a particular **Document** in each of the scoring zones. An example of a **Fully Distributed Document Set** is a quarter in each of the three scoring zones and scores 3x4=12 points.

9.   The team scores **2** points for each **Document** that is part of a **Partially Distributed Document Set**. A **Partially Distributed Document Set** is defined as a particular **Document** in two of the scoring zones. An example of a **Partially Distributed Document Set** is a nickel in the MIDDLE COLONIES and a nickel in the SOUTHERN COLONIES and scores 2x2=4 points.

10.   The team scores **1** point for each **Document** that is a **Lone Document**. A **Lone Document** is defined as a particular **Document** in one scoring zone. An example of a **Lone Document** is a penny in the SOUTHERN COLONIES and scores 1 point.

11.   There are two penalty zones: APPALACHIAN MOUNTAINS and ATLANTIC OCEAN. The BEACH is part of the ATLANTIC OCEAN.

12.   The team is penalized **3** points for each **Document** in the APPALACHIAN MOUNTAINS and ATLANTIC OCEAN.

13.   A **Document** breaking the plane of a scoring zone is considered in the scoring zone.

14.   A **Document** in multiple zones simultaneously (straddling scoring zones, scoring zone & penalty zone, penalty zone & non-scoring zone, etc.) is considered in the zone that results in the most points.

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

16. The team's robot/robots and all parts must start inside the HOME at the beginning of the 2-minute mission (i.e. no part of the robot may be off the playing field when the mission starts). The parts do NOT have to be assembled together and the parts can be removed from and returned to the field during the 2-minute mission.

17. The HOME is the 15" x 15" boundary extended vertically (i.e. the robot can not extend over the line at the beginning of the mission).

18. The team can retrieve their robot without penalty when the robot is partially inside the HOME by lifting the robot vertically. After retrieving, the robot must be placed completely inside the HOME to continue the mission.

19. Any *Document* or *Carrier* that remains with the robot when the robot is retrieved without penalty remains in play. This rule is intended to eliminate the need for the referee to determine if a *Document* or *Carrier* is completely in the HOME when a robot is retrieved after entering the HOME. It is NOT intended to allow teams to retrieve their robot in such a way as to drag *Documents* or *Carriers* into the HOME; *Documents* or *Carriers* that are dragged into their base will be removed from play by the referee.

20. The team's robot/robots must start inside of the HOME every time it is returned to the HOME during the mission (i.e. no part of the robot may be breaking the plane of the HOME after being touched by a team member).

21. A penalty of 10 points will be assessed if a team touches their robot, including parts that have become separated from the robot, that is outside of the HOME.

22. If a robot is touched, the robot must be returned to the HOME to continue the mission.

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

24. The robot shall not have any elastic stored energy (i.e. stretched rubber band) when the mission begins or when the robot is returned to the HOME, but elastic stored energy can be created with a motor.

25. The controller and wire can ONLY be used to provide electrical power to robot motors (i.e. it can not be used to drag or corral a robot, *Documents* or *Carriers*).

26. If a controller or wire is used illegally (referee's judgment), the team will be required to immediately place the robot back in the HOME to continue the mission.

27. A team may touch any *Document* or *Carrier* COMPLETELY inside the HOME without penalty.

28. If a *Carrier* is illegally touched, the *Carrier* along with any *Documents* it is holding will be removed from play for the remainder of the mission.

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

30. Because *Documents* are very valuable, a penalty of 10 points will be assessed for each *Document* that is ejected from the playing field. No penalty will be assessed for *Documents* that are removed by a team member or referee.

31. A score of zero will be awarded if penalties result in a negative score.

32. All referees' rulings are final and may not be appealed.

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