ENES 100 Introduction to Engineering Design
Hovercraft Product Specifications
HC_PS_005 Rev. A, 28 August 2008

- **HC_005_01 Structure and levitation requirements**
  (a) There are no minimum or maximum dimensional restrictions.
  (b) There are no minimum or maximum weight restrictions.
  (c) Only the skirt (rigid or soft) may contact the ground.
  (d) Skirts must be fabricated in-house.

- **HC_005_02 Power and propulsion requirements**
  (a) The use of internal combustion engines (gas and glow fuel engines) is prohibited.
  (b) The hovercraft must be able to levitate for at least 10 minutes without replenishing/recharging its energy source and without modulating the lift fans' power.
  (c) All fans must have protective fan guards to reduce the risk of bodily injury.

- **HC_005_03 Sensors and control requirements**
  (a) The hovercraft must be controlled by the Lego NXT microcontroller.‡
  (b) The hovercraft operation during testing must be autonomous.*
  (c) The Bluetooth feature must be disabled on the NXT during testing.

- **HC_005_04 Cost requirements**
  (a) Total cost of the hovercraft must be less than $350.†
  (b) The cost must be broken down in a Bill of Materials (BOM), in which the Fair Market Value (FMV) of each component must be listed along with the part number, vendor and quantity.
  (c) Donated and/or used components may be incorporated, but the FMV of a NEW equivalent component must be given in the BOM.

- **HC_005_05 Testing requirements**
  (a) The hovercraft must be capable of autonomously navigating the course layout shown in Fig. 1 in less than 10 minutes without contacting the side walls or obstacles.

- **HC_005_06 Product deliverables**
  (a) The Hovercraft
  (b) The final Bill of Materials
  (c) The preliminary and final Gantt charts
  (d) The final written design report with all design drawings and schematics
  (e) The final oral presentation (PowerPoint slide file)
  (f) The group log of team meetings (notebook or printed blog)

‡ The NXT can be rented for $25. You may use your own NXT, but the BOM must reflect a $25 charge for the NXT.

* For testing purposes, the NXT program will be manually started, the power to the propulsion/levitation system may be manually started, and no further direct contact or remote control will be permitted.

†Cost is calculated by adding the fair market value of all components used in the Hovercraft during the testing phase. It does not include shipping costs or costs for parts that were bought but later discarded/returned. Costs will be shared equally among group members.

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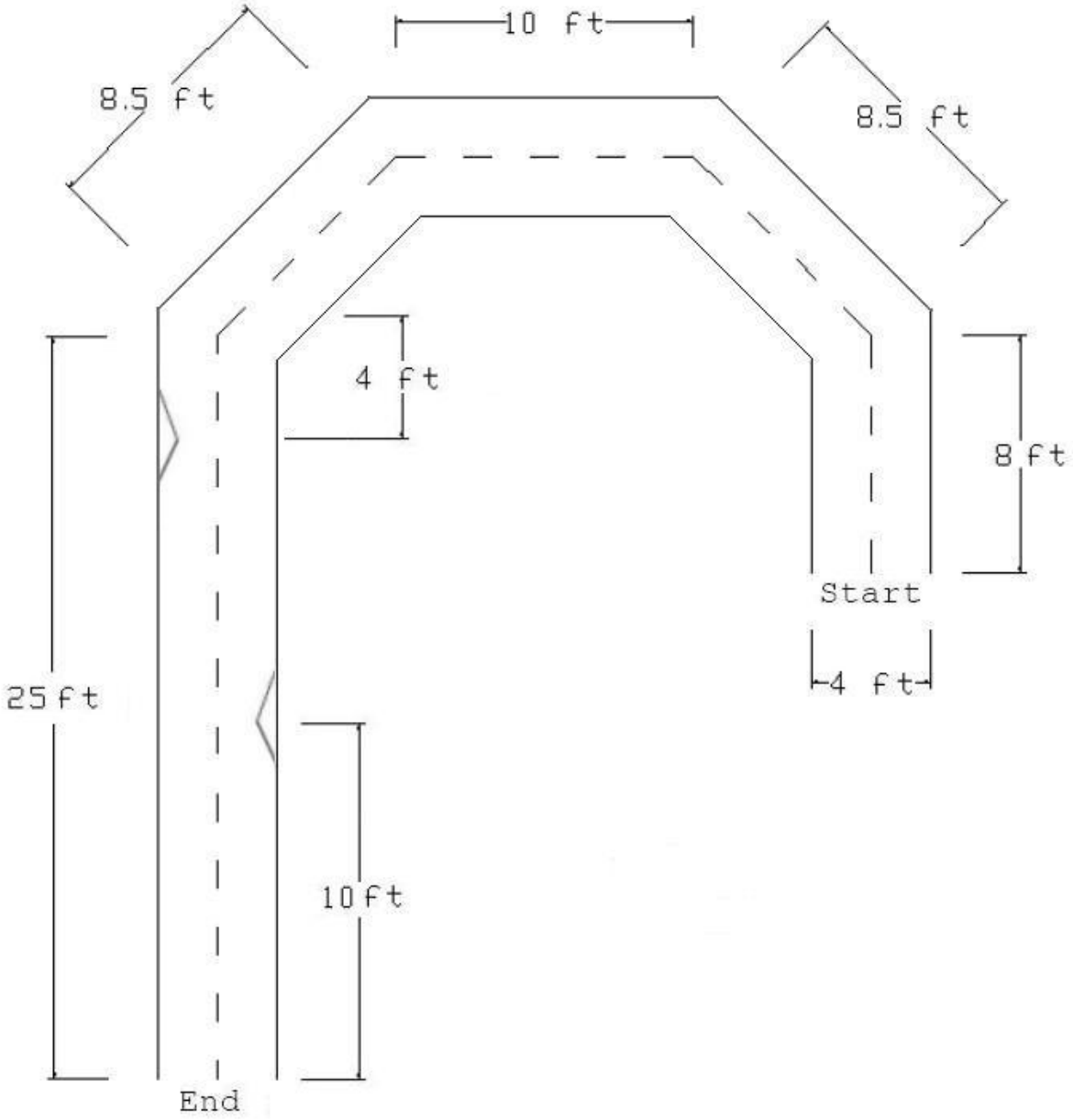

Figure 1: The test course layout (not to scale). The course will be indoors on a smooth surface. The dashed line indicates a solid, black, 4-inch wide contrasting tapeline fixed to the course centerline. The solid lines indicate the boundaries of the course within which the hovercraft must remain. These boundaries are constructed of standard 1x4 lumber spaced 4-feet apart. The boundary wall height is 3-½ inches tall. Note the two triangular obstacles on the final straight away. Each extends 6-inches into the course, causing the track to have a maximum width of 42-inches at these points. The obstacles are created with the same 1x4 lumber used for the boundary walls.