

## Visible Elements in Photo



- A large multi-story residential building (tan/beige with red tile roof) positioned on a steep hillside
- Dense green vegetation and trees covering the surrounding landscape
- A distant cityscape visible through haze on the horizon
- Sloped terrain with significant elevation changes between foreground and background
- Clear evidence of other structures scattered across the hillsides in the distance

## Reasonable Inferences

- From the hillside building placement: Structures built on slopes must resist sliding, erosion, and water runoff—the foundation and design choices matter greatly for safety and durability.
- From dense vegetation coverage: The area experiences adequate rainfall and soil retention; engineers must account for water management and soil stability when building on natural slopes.
- From distant cityscape visibility: Air quality and view preservation are factors residents and engineers consider, suggesting multi-use design in populated regions.

## Engineering Task

### K-2 Challenge:

Build a small house on a tilted hill made from clay or sand. Your house must not slide down the hill. You can use sticks, rocks, or cardboard pieces to hold it in place. What works best to keep your house safe on the slope?

### 3-5 Challenge:

Design and build a stable foundation system for a two-story structure on a slope inclined at 30 degrees. Your structure must remain standing when tested with a gentle push and must channel water away from the building base using only craft materials (cardboard, straws, tape, sand, pebbles). Success criteria: (1) structure stays upright after three push tests, (2) water diverted at least 10cm away from the building base, (3) design uses only provided materials within a 6-inch height limit.

## EDP Phase Targeted

Ask / Define Problem

This photo shows a real-world need without showing an active solution. Students must first identify the challenges: Why is building on a hill difficult? What problems might the builders have faced? This grounds the task in authentic context before they imagine and test solutions.

## Suggested Materials

- Sand, clay, or kinetic sand (slope material)
- Wooden craft sticks, toothpicks, or straws (structural supports)
- Index cards or cardboard (building walls)

- Tape, glue, or hot glue gun (fasteners)
- Small rocks, pebbles, or gravel (stabilizers and drainage)
- Ruler or protractor (measuring slope angle)
- Small cup of water (testing drainage)

### Estimated Time

3-5 sessions of 30-40 minutes each (planning, building, testing, redesign, final test).  
Or single 45-60 minute session if students build one quick prototype only.

### Why This Works for Teachers

This task directly addresses NGSS 3-5-ETS1-1 ("Define a problem") and 3-5-ETS1-2 ("Generate and compare design solutions"), as students must identify real constraints (slope, stability, water) before testing their own hillside structures—just like the engineers who designed the visible building.