2026 Region 4 Engineering Design Challenge for Students

Location:

McKinney Conference Center at Region 4 Education Service Center
7200 Northwest 100 Drive
Houston, Texas 77092

Date: Thursday, March 5, 2026

Background Information

The term *Houston Strong* has been adopted across the nation as people have watched us work together to rebuild our communities following severe weather catastrophes and other events. Released in the Spring of 2020, the city unveiled a plan named *Resilient Houston,* which aims to help Houstonians prepare for and recover swiftly from weather catastrophes and other environmental stressors. The document provides a call to action as well as an explanation of the city's challenges.

Design Challenge

Although some solutions have been proposed to address the challenges facing the Houston area, your task is to select one challenge and engineer a solution using the *Resilient Houston* framework.

Instructions

Working in teams of 3 or 4, select one of the five identified challenges (or design your own challenge) using the *Resilient Houston* framework and then engineer a solution. You must create a prototype and a presentation that represents your solution. You will present your solution to a panel on the day of the event. Prizes will be awarded to the winners of the challenge.

1. Challenge 1: Be Prepared, Be Resilient
   Key Question: How can we help people in the Houston area be ready for emergencies?
   Challenge: During an extreme weather event or other disaster, first responders can become overwhelmed and are not able to respond quickly to every emergency. Design and describe a personalized emergency kit and plan that supports at least one person for 3-7 days. Think about your family's or neighborhood's unique needs—like dietary restrictions, medical conditions, pets, and shelter needs. Explain how your kit provides solutions for key survival needs, including access to clean water, food, shelter, and temperature control. (Action 1.1 on page 47)

2. Challenge 2: Street Smarts: Avoid Getting Caught in Flooded Streets
   Key Question: How can we help inform people about flooded streets to help them make better evacuation decisions?
   Challenge: During a flood, people can become stranded unexpectedly and evacuation options can be limited. Develop a tool or system that provides people with real-time information about road conditions during extreme weather events, particularly in flood-prone areas of Houston. Your design should help people safely evacuate and access resources, such as grocery stores or medical facilities. Identify and apply traffic and flooding patterns to understand and design solutions to make our city more connected and responsive. (Action 1.4 on page 47)

3. Challenge 3: Storm Ready Home Protection
   Key Question: How can we engineer homes to better survive storms and save energy?
   Challenge: People want to protect their homes and belongings during extreme weather events and other disasters. Design and build a model of a weather-resistant, energy-efficient upgrade for homes in Houston. Use evidence-based reasoning to design a solution to retrofit existing homes to better handle flooding and power outages while also saving energy. Your solution should show how structure relates to function in a home's ability to protect people and belongings. (Action 2.2 on page 50)

4. Challenge 4: Put Nature to Work
   Key Question: How can green spaces protect us from problems with increased stormwater levels in Houston?
   Challenge: Green stormwater infrastructure (GSI) uses natural systems, such as plants and landscape design, to manage runoff and reduce flooding during weather events. Identify an area at your school or neighborhood that struggles with flooding, runoff, or puddles. Design and build a model for a green stormwater infrastructure (GSI) solution. Use your knowledge of natural systems and how water moves through the environment to engineer a solution that fits your area's needs. (Action 2.3 on Page 50)

5. Challenge 5: Safer Streets, Stronger Houston
   Key Question: How can we design our neighborhoods to keep pedestrians safe, comfortable, and engaged?
   Challenge: Houston is a city on the move, but pedestrians often face safety challenges, including heavy traffic, limited crosswalks, poor lighting, and uncomfortable walking conditions. Your task is to identify a location in your neighborhood or near your school where walking feels unsafe or unwelcoming. Design and build a prototype for a pedestrian-friendly solution that improves safety, comfort, and enjoyment for people traveling on foot. Consider elements such as lighting, signage, walkways, traffic-calming designs, shade, or seating. Use your knowledge of engineering, community needs, and design thinking to create a solution that helps make Houston a more resilient and pedestrian-friendly city. *(Action 8.3 on Page 65)*

Evaluation: Students or student teams will present prototypes to a panel of judges. The criteria for evaluation include:

- Innovation and Creativity: Originality in addressing the challenge
- Feasibility: Practicality of the engineered solution
- Community Impact: Potential to increase the quality of life for those impacted
- Presentation: Clarity and professionalism of the presentation
- Following the Engineering Design Process: Evidence of all steps of the EDP, including Ask, Imagine, Plan, Create, Test, and Improve.