The Carquinez Strait Bridge (And Other Historical American Structures)

This project impresses students by requiring them to build a large model bridge.

Curriculum/State Standard
Language Arts: Research, report writing, oral presentation.
Math: 3-D representation on 2-D surface; conversion (metric to English); ratio (reduction in scale); problem solving.
Social Science: Geography, history.
Science: Structural engineering, physical properties of building materials.

Overview
The purpose of this project was to build a small-scale (but large) model of the nearby and newly-completed Carquinez Strait Bridge. The students would then embark on their own models (including a report on the historical background) of their own chosen American structure. In addition to visiting the bridge construction site, my students were given a PowerPoint presentation by one of the bridge engineers.

Objectives
• The student will keep a folder including all work related to the Carquinez Strait Bridge project.
• The student will draw a sketch of the bridge from the dock of the Golden Bear (field trip to the Carquinez Strait).
• The student will identify and label the major components of a suspension bridge (anchorages, towers, main cable, suspenders and roadbed).
• The student will draw blueprints of the bridge to scale, including measurements in meters and feet.
• The student will assist in the construction of the large scale model of the bridge.
• The student will report on, draw blueprints for, and build a small scale model of an historical American structure.

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“The Carquinez Strait Bridge (And Other Historical American Structures)” project continued . . .

**Materials**

For our grand model of the bridge we needed nearly $250 worth of wood, rope, insulated cable, screws, paint and cement cinder blocks.

- **Towers and Roadbed:** 8–2x4’s (10’); 10–2x4’s (8’); 2–2x6’s (8’); 1–2x8 (8’); 5–4’x8’ sheets of 1/2” plywood
- **Fasteners:** 1 box of 1 ¼” 3-penny nails; 1 box of 2 ½” Phillips exter. screws; 2 boxes of 1 ¼” Phillips exter. screws; 2 boxes of ½” eyelet screws; 2 boxes of S-hooks (50 each)
- **Anchorages:** 8 6”x8”x16” cinder blocks; 4 pr. heavy-duty clasps + rings
- **Cables and Suspenders:** 1 500’ spool of 12-guage wire
- **Paint:** 2 gallons Mismatched exterior latex
- **Tools/Equipment:** 1 pkg. 9-piece brush set; 1 youth hand saw

The students will need to purchase various modeling materials themselves (clay, toothpicks, string, glue, balsa wood, popsicle sticks, etc.).

**Readiness Activity**

I had the luxury of having a third of this year’s 5th grade class as 4th graders the previous year. Those 4th graders benefitted greatly from the PowerPoint presentation by one of the bridge engineers and from the field trip to the bridge construction site. The readiness activity for the other two thirds of this year’s 5th grade class was drawing blueprints to scale of the bridge (based on information from the Internet - www.ketchum.org/carquinez.html) and watching a documentary on the Golden Gate Bridge (PBS, Spanning the Gate).

**Strategies/Activities**

1. PowerPoint presentation on the on-going construction of the Carquinez Strait Bridge.
2. Field trip to the Carquinez Strait Bridge construction site.
3. Draw blueprints to scale of the bridge.
4. Discuss major components of a suspension bridge (anchorages, towers, main cable, suspenders and roadbed).
5. Build small-scale model out of cardboard (6-foot towers, 36-foot span).
6. Watch documentaries on bridge construction. (PBS’s “NOVA” and “American Experience” have aired programs on the Golden Gate Bridge, the Brooklyn Bridge and other bridges).
7. Build a large-scale model of the bridge out of heavier materials (wood and wire) which rely (more heavily!) on proper engineering techniques (anchorages, cables, suspenders and a supportive roadbed).
8. The student will report on, draw blueprints for, and build a small scale model of an historical American structure of their choice.

**Culminating Activity**

The culminating activity is the report-blueprint-model of an historical American structure. (Examples: Hoover Dam, the Erie Canal, the Empire State Building, the Panama Canal, the Los Angeles aqueduct.) Each student will choose a different structure on which to report. The report must include such information as when and where the structure was built; why it was built; how it was built; difficulties encountered while building it; and the structure’s eventual social and economic impact. Each student will present his/her report to the class.

**Evaluation**

Each student will be evaluated, based on the content of his/her Bridge Project folder; on his/her contributions to the construction of the class project bridge model; and on his/her own report and model of his/her chosen historical American structure. The project will be graded based on the standards addressed in language arts (research, report writing, oral presentations); math (drawings to scale, 3-D representation on a 2-D surface, problem solving); and social studies (American history and social and economic impact).