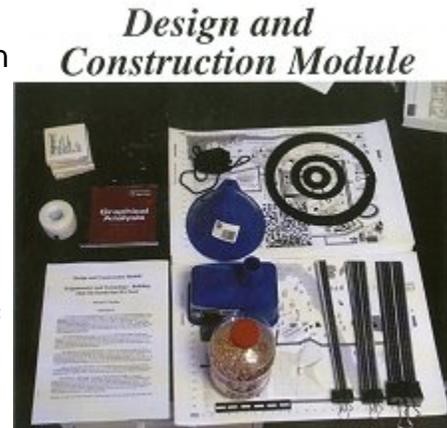


Roadway Design and Construction

This module covers the educational topics of data visualization, goodness of fit, and law of sines covered in a high school geometry or mathematics course, management of technology to benefit society taught in a social studies course, and the positive and negative impacts of transportation systems along with computer algorithms discussed in a technology course.

Transportation topics include horizontal curvature, traffic flow and capacity relationships used within traffic engineering, determining the “best” road location to acquire right of way, and traffic management systems.



One Construction Module will supply hands-on experience for 1 group of 20.

	Estimated Classroom Time	Module Contents
Activity 1	15 minutes prep, class time: 5 minutes part a 10 minutes part b	Construction Manual Construction CD
Activity 2	15 minutes prep, 45 minutes homework 45 minutes class time	Map of Study Area Popcorn Kernels Post-It Note Pads Road Curves
Activity 3	15 minutes prep, 45 minutes class time each for activities a, b, c 45 minutes discussion	Assorted Funnels Highroad Software Stopwatches Graphical Analysis Software
Activity 4	10 minutes prep, 50 minutes class time	Transparent Road Tangents
Activity 5	1-3 hours prep, class time: 1 hr for step 1, 4 hrs. total for steps 2 & 3 no time limit for step 4	Fabric Sample Textile

Activity 1, How Much Traffic Can the Road Handle? is a 15-minute demonstration, illustrating how a roadway has a finite capacity: a maximum number of cars that can move through a lane within an hour. The popcorn portion (Parts A and C) is appropriate for middle and high school students, and the traffic flow portion (Part B) is appropriate for high school students.

Activity 2, Not In My Backyard!! is a one- to two-class-period, hands-on drawing exercise that asks students to determine how to align a road that will go from point A to point B, given that there is no optimal location for the road: students consider design consequences, costs, and environmental impacts.

Activity 3, How Much Does it Cost? uses spreadsheets and computer-based modeling to estimate real estate prices for the land that must be taken for the roadway.

Activity 4, Keep Me on the Road! uses the High Roads computer aided design (CAD) software to create a road on the computer, given the challenge of incorporating horizontal and vertical curvature at different speeds. While Activity 2 (for middle and high school students) introduces the idea that a curve limits traffic speed, Activity 4, (for high school students) delves into the underlying mathematics.

Activity 5, Take the Short Way Home, is a computer programming exercise in Visual Basic for Applications (a language comparable to Visual Basic but included with Microsoft Excel), where students design a program to determine the fastest route between two points. Then, poor and good signal progression are compared with the Synchro/SimTraffic simulation package. This activity introduces the Intelligent Transportation System (ITS) concepts of sensors, traffic management systems, and software engineering.

Teachers may elect to do all, some, or none of the five activities in this module. The five activities are suitable for groups of 2-4 students. Diversity within the group is recommended; e.g., for Activity 2, each group may want to include “an artist, an organizer, and a technical expert.”