

Highway Development and the Environment

This module focuses on important issues that highway engineers, city planners, and environmental engineers often face. As suburban areas experience population growth, the need for additional highways and alternative types of transportation intensifies. New highways and increased development place a greater impact on the environment. Problems such as air pollution, declining water quality, noise pollution, and habitat loss are increasing important in highway planning. Understanding of environmental issues is fundamental to the highway engineer.

Environmental Module



This module focuses on environmental issues in relation to highway planning and development, and includes topics such as particle sedimentation rates, erosion, structures used to limit erosion, and highway planning issues. Specific relationships to the National Science Education Standards (NSES), National Technology in Education Standards, and Standards for Technological Literacy are outlined in the module.

One Environmental Module will supply hands-on experience for 1 group of 4 students and contains the following material:

	Estimated Classroom Time	Module Contents
Activity 1	15 minutes prep, initial activity 20 minutes, observations, 10 minutes over 2 class periods	Environmental CD Environmental Manual Flume w/ Blocks Burlap Fabric
Activity 2	15 minutes prep, getting dirt 20 minutes set-up 50 minutes class time	Water Softener Funnel Aquarium Gravel Graduated Buckets
Activity 3	20 minutes prep, 3 50-minute class sessions	Stopwatches Sand Sieves Clay

The first section of the module includes activities to illustrate the process of erosion.

Activity one, Settling Out relates particle size to its settling rate in still water. Students find that particles such as fine clay remain suspended in water for an extended period.

Activity two, Filtering the Silt, challenges students to determine the effectiveness of different materials to filter silt from muddy water. This activity is modeled after an experimental test developed by highway engineers to evaluate the filtering capability of silt fencing fabric used to manage erosion in construction areas. Students will find that fabrics are not able to filter all of the suspended particles from water, but each fabric will catch some of the particles. Additionally, students will discover that the type of soil varies each fabric's filtering capability.

The second section of the module challenges students to take a closer look at environmental issues prevalent in highway and city planning.

Activity three: The Connector Highway Project: An Environmental Webquest, places students in the role of an environmental specialist assigned to one of four community structures: 1) residential community; 2) public schools, 3) hospitals, or 4) natural park areas.

In **Part I of the webquest**, environmental specialists determine the affect a new highway would have on their community structure, considering issues in air quality, water quality, sound pollution, and habitat loss. A series of questions are included in the webquest to guide students through their research.

In **Part II two of the webquest**, environmental specialists studying the same community structure form specialist groups to identify environmental issues most pertinent to their area. Specialists determine the best solutions to these issues, considering cost and feasibility, and create a presentation to be shared at a mock hearing. Following the mock hearing, town groups reconvene to debate the issues. At the conclusion of the debate, students vote whether or not to approve plans for the Connector highway.

****NOTE: Class visits by NDDOT TRAC volunteers are available for this module. These visits include a presentation on NDDOT environmental process and engineering.***