

## Project Year

2004

## Project Team

Sanjay Arwade, Assistant Professor, Civil Engineering, Whiting School of Engineering; Benjamin Schafer, Assistant Professor, Civil Engineering, Whiting School of Engineering; Rachel Sangree, Graduate Student, Civil Engineering, Whiting School of Engineering

## Project Title

An Engineer's Guide to the Structures of Baltimore

## Audience

Students from the Krieger School of Arts and Sciences and the Whiting School of Engineering who take the *Perspectives on the Evolution of Structures* course (500.141).

## Pedagogical Issue

The *Perspectives on the Evolution of Structures* course surveys great works of structural engineering and provides students with the skills to critique the social and structural aspects of the works. However, structural analysis is typically taught in the abstract, an approach that ignores the richness of real structures and can cause the student to feel disconnected from the material. In addition, course evaluations indicate a desire to apply this knowledge to structures accessible to Hopkins students.

## Solution

By creating an online database of structures in and around Baltimore City, interfaced through a course website, the team will integrate descriptions of structural behavior based on engineering concepts with historical and aesthetic descriptions. The information will be available to students at all times, and the online format will be able to incorporate structural computer models and large amounts of photographic information which would not be practical to publish in a print format.

## Technologies Used

HTML/Web Design, MySQL

## Project Abstract

Structural analysis is typically taught in the abstract, an approach which ignores the richness of real structures. It was clear that students in the first installment of *Perspectives* were more interested in learning about structures when the structures were familiar to them, but the course had only a small amount of local, Baltimore-specific content. We relied primarily on slide-based lectures. A disadvantage of this method was that the students could not have free access to the image resources at times of their choosing. This proposal seeks to correct those shortcomings by developing an online database of structures in and around Baltimore City. The completed database, interfaced through a website, will contain several classes of information: (1) Text descriptions of the historical, structural, and architectural features of the structures; (2) photographic documentation of the structures; (3) interpretation of the

engineering performance of the structures, using computerized structural analysis; and (4) directions for visiting the structures. Baltimore is a city with a significant heritage of structural engineering. Notable structures in the area range from 19th century railroad bridges, such as the Carrollton viaduct, to innovative modern skyscrapers, such as the cantilevered tower at 100 E. Pratt St. Too many Hopkins students depart the university without a sense of this heritage. While a variety of architectural guides to the city exist, there is no guide which offers interpretation of local structures from the engineer's point of view. This resource will aid the Department of Civil Engineering in its continuing effort to bring an appreciation of the structural and aesthetic interpretation of civil structures to the Hopkins community. From an engineering education standpoint, another advantage of studying structures in and around Baltimore is that students can visit the structures and interact with them, providing an experience and understanding which cannot be obtained through the study of slides or text description. The proposed database will provide students with the background understanding and tools to make such visits intellectually productive. When *Perspectives* was taught in the fall of 2003, we used a series of Zoomerang surveys to quantify evolution in student satisfaction of the course learning objectives, and the effectiveness of the various instruction methods/tools used in the class. We expect to use a similar assessment scheme in the spring of 2005, when the class will be offered again. A learning objective specific to local structures will be introduced to the class, and student surveys will be used to quantify how well the proposed database helps students meet that objective. We expect to continue development of the project past the end of the Technology Fellowship grant through the use of undergraduate assistants who are funded by the department or pursuing independent work for credit.

A link to the course site for *Perspectives on the Evolution of Structures* is available here:

<http://www.ce.jhu.edu/perspectives/>