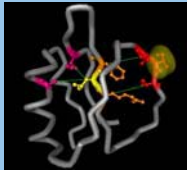


# RESEARCH

Civil Engineering profession encompasses broad and interdisciplinary areas of study. Accordingly, our faculty has diverse research interests, which are driven in part by the need to solve current industrial and application oriented problems, and in part by the need to prepare to face the challenges of tomorrow.

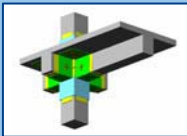
Research projects are the key elements of our graduate program, where the students are encouraged to join in the ongoing research projects as soon as they begin their education. The curriculum is organized to maximize academic and practical experience to help the students with their research. MS and PhD theses, which are mandatory, are expected to lead to publications in well known international journals and conference proceedings.

The Department's focus in research is primarily on sustainable solutions, hazard mitigation, innovative materials & technologies, and industrial applications.



## Innovative Materials & Technologies

Civil engineers contribute to the discovery of the underlying rules for the design of *complex adaptive systems*. Such systems have diverse applications including large construction projects, protein structures, transportation, logistic and financial systems.



A study, jointly funded by Turkish and American National Science Foundations, investigates the seismic performance of reinforced concrete beam-column joints strengthened with *FRP-wraps*.



## Hazard Mitigation

*Earthquakes* pose imminent risks on engineering structures. Our researchers develop new analysis and design techniques for seismic hazard mitigation. Vibration signatures of a long-span suspension bridge has been analyzed in an international *health monitoring* project. Research on *cost-benefit analysis of structural retrofitting* is a recent focus of our



Department. It employs multi-disciplinary efforts including nonlinear structural dynamics, probability and economics. In an EU sponsored project, new sustainable methods are developed using reversible mixed technologies for *seismic protection of historical buildings*. In another effort, *tsunami risk* in coastal waters is investigated with mathematical models developed for water waves induced by seismic ground motion on sloping coasts.

Transport of hazardous materials, both on land and at sea, impose a growing risk for urban life. New methods are required to accurately assess *accident risks*. A numerical model is developed by our researchers to predict regions of high accident risk for oil tankers navigating in narrow waterways. The first implementation of the model was at the Strait of Istanbul. Similar problems on land are investigated in *highway safety* and *traffic optimization* projects under the sponsorship of federal and local governments.



# DEVELOPMENT

## Sustainable Solutions

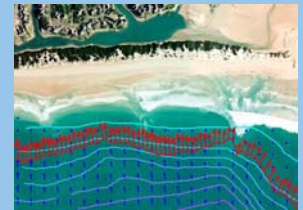
The Department has nationwide pioneered the industrial use of *geosynthetics*. Cutting edge research in *polymer applications* leads to new construction materials which are economic and earthquake safe. *Recycled flyash* has been tested as a new environment-friendly technology in highway construction.

In a joint project with GeorgiaTech, funded by the Turkish National Science Foundation and the Dredging Industry, our researchers have investigated environmental impacts of *offshore dredging* in the Black Sea using field measurements and computer models. For lakes and reservoirs, *integrated sustainable watershed monitoring & management* projects are being developed.



Numerical simulations of *bioremediation* projects for hydrocarbon contaminated soils are performed within the research scope undertaken at the faculty. This research allows the optimum implementation of remedial actions for *soil contamination* cases.

The Department is actively involved in developing and using numerical models to study *coastal circulations and the changing morphology*. In a recent project, numerical modeling techniques were used to study a section of the South African beaches to design environment friendly structures against *coastal erosion*.



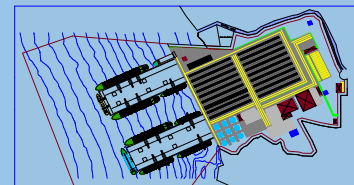
numerical modeling techniques were used to study a section of the South African beaches to design environment friendly structures against *coastal erosion*.

## Industrial Applications

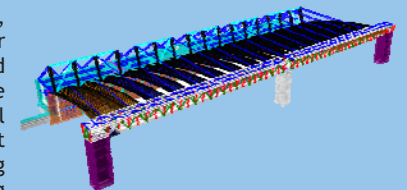


Our researchers developed new technologies which are successfully implemented in real-life industrial projects. In geotechnical engineering, special support systems are designed to achieve *deep foundations* of highrise buildings.

As earthquake risk is better assessed by the industry, technologies developed in our Department are transferred into *complex retrofit projects*. As an example, the Aircraft Maintenance Center at Istanbul International Airport was designed at the Department using horizontal steel framing for diaphragm action.



The growing demand in regional maritime trade has led to new harbour projects, for which the Department has offered professional services. All projects are usually accompanied by graduate research which feeds students' theses.



..a new generation of engineers in the service of civilization..