



**Construction
Structures
Geotech**

Local engineering.
World-class engineers.
World-class results.

■ Strategic partnership —

The Texas Transportation Institute's (TTI's) Constructed Facilities Division represents a collaboration with Texas A&M University's Zachry Department of Civil Engineering.

We study

- construction engineering and management,
- structural engineering of major highway structures, and
- geotechnical and geoenvironmental engineering.



EXPERTISE & EQUIPMENT

Created in 2005, the division began to benefit immediately from two major endeavors.

First, Texas A&M University's Zachry Department of Civil Engineering aggressively hired new faculty with whom we were able to partner.

Next, we acquired use of the High-Bay Structural and Materials Testing Laboratory, a massive facility capable of testing full-scale bridge and structural components weighing up to 20 tons.

Having the right equipment for research means our multi-disciplinary faculty and researchers can study better ways to build and maintain the great and minor structures of our world. And if you need our assistance, we can help you do the same.

Rising above

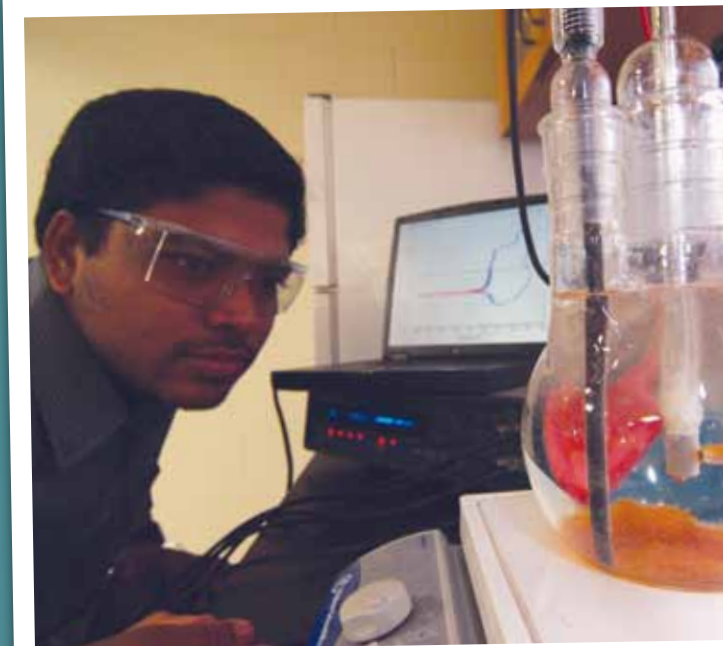
Within the division, the construction engineering and management group focuses on three major themes

- development processes that drive progress and innovation;
- risks that threaten performance; and
- ways of improving construction with advanced materials, integrated models and innovative management processes.



Construction engineering and management require expertise in all specialties of civil engineering. This group of engineers focuses on engineering and management methodologies and processes needed to ensure successful construction projects, how transportation and other facilities perform over time, and how facilities are best maintained or renewed.

Researchers in construction engineering study materials engineering, materials performance, life-cycle costing, service-life prediction and facility performance. Construction management researchers study innovative management processes such as cost estimating, accelerated construction, contracting, risk impacts and construction-cost reduction measures.



Monitoring deterioration of existing facilities to accurately estimate their useful service life is very important. Information gathered through this process is crucial to make better future material selections, to determine best construction practices and to make good economic decisions. This picture shows potentiometric corrosion testing of carbon steel in simulated concrete pore solution in the presence of chloride ions. Results can help us understand the corrosion performance of steel reinforcement in different structures exposed to chlorides, such as bridges and marine structures.

Standing ■ steady—

With an array of engineering disciplines to cover the field of transportation structural engineering, our researchers work to develop innovative methods to analyze, design, construct, maintain and manage components of the nation's transportation network.

Bridge research is heavily emphasized within TTI's Constructed Facilities Division. The High-Bay Structural and Materials Testing Laboratory provides testing equipment, instrumentation and technician support to conduct large-scale tests of structural bridge components. This facility, along with specialized materials-characterization laboratories and extensive computing resources, supports comprehensive, state-of-the-art research projects.

Structural engineering researchers in the Constructed Facilities Division have significant experience and expertise in the following areas

- analysis, experimental testing and design of reinforced concrete, prestressed concrete, steel and composite steel-concrete structures;
- development and analysis of high-performance materials;
- natural-hazards engineering and performance-based design;
- structural reliability;
- risk and life-cycle analysis;
- structural-health monitoring, non-destructive testing and condition assessment of structures;
- active and semi-active control of structures;
- finite-element modeling and analysis; and
- structural optimization.



Structural testing in the high-bay laboratory requires extensive monitoring of test specimens with instrumentation and data-acquisition systems that collect measurements electronically. Visual observations are also critical to monitoring the performance of structural test specimens. This photo shows researchers documenting the propagation of cracks during testing of a prestressed concrete bridge girder.

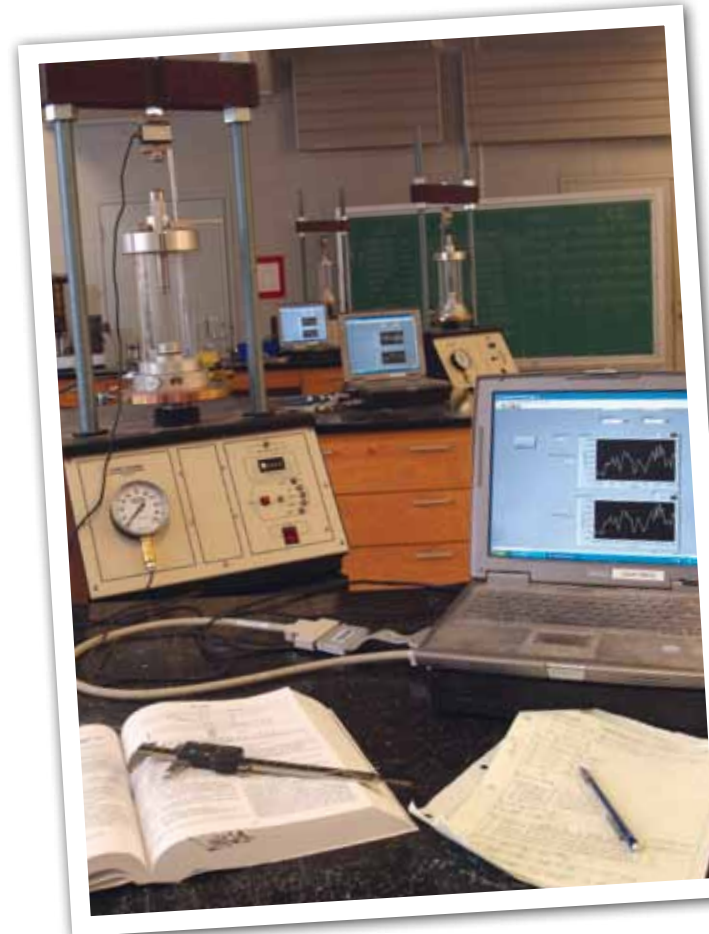


■ Staying grounded—

The soil or rock on which a structure stands and the soil or rock that makes up structures are the focus of research in the division's Geotechnical & Geoenvironmental Engineering Program.

To study the behavior of foundation elements, retaining walls, slopes, pavements and landfills, our researchers utilize multi-million-dollar facilities that include some of the most sophisticated and most modern pieces of equipment in the country.

GEOTECHNICAL & GEOENVIRONMENTAL ENGINEERING LABORATORY



The laboratory provides a wide variety of equipment capable of testing virtually any aspect of soil, foundation, rock and groundwater research. The laboratory facilities and the National Geotechnical Experimentation Site mentioned below, along with extensive computing resources, allow researchers to study

- shallow and deep foundations,
- bridge scour,
- pavements on expansive soils,
- meander migration,
- slabs on shrink-swell soils,
- intelligent compaction,
- deepwater anchors,
- seafloor interactions with steel catenary risers,
- mine burial in seafloors,
- performance of high-plasticity clay slopes,
- experimental methods for characterization of soil behavior,
- dynamic response of soils, and
- seismic slope stability.

THE NATIONAL GEOTECHNICAL EXPERIMENTATION SITE

The National Geotechnical Experimentation Site at Texas A&M University (NGES-TAMU) is one of a handful of sites nationwide selected for full-scale research in the field. Full-scale retaining walls, embankments, deep foundations and shallow foundations have been built and studied at the NGES-TAMU.

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INFORMATION

For more information about TTI's
Constructed Facilities Division,
please visit
<http://tti.tamu.edu/groups>.

To learn more about our research
capabilities, please visit with the
division director

Bryan Alan Wood, P.E.
Phone: (979) 862-3181
Fax: (979) 862-7696
E-mail: b-wood@ttimail.tamu.edu



Constructed Facilities Division

Texas Transportation Institute
The Texas A&M University System
3135 TAMU
College Station, TX 77843-3135
(979) 862-3181
tti.tamu.edu



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Saving Lives, Time and Resources