STRUCTURES

BROCHURE

TERRA Engineering, Ltd. (TERRA), provides structural and bridge design engineering services to help our clients successfully complete their projects involving the rehabilitation, reconstruction, and/ or design of a new structure at the municipal and state level. The TERRA team has designed various structures made of various materials, including concrete, steel, masonry, and wood. TERRA's experts have knowledge in highway and railroad structures, buildings, pedestrian bridges, and utility towers.

The TERRA structural team has more than 20 years of experience in designing and inspecting various types and sizes of bridges. Inspections are completed using National Bridge Inspection Standards (NBIS) certified program managers and team leaders. Bridge inspections include condition ratings, reports, and options for maintenance and rehabilitation. Illinois Structure Information System (ISIS) reports are prepared for every structure inspected to ensure all critical information is recorded. Our team utilizes their knowledge of AASHTO procedures, geotechnical engineering, and various other disciplines to ensure that the designs are up to code, economically viable, and safe for the community with a focus on the life and maintenance of the bridge.

Point of Contact

Kristen Fields, PE, SE

kfields@terraengineering.com

O: 309.999.0123 | M: 309.634.6604

1804 Borman Circle Drive, Ste 200

St. Louis, MO 63146

EXPERIENCE

- Lancaster Road Bridge over LaMarsh Creek - Peoria County, Illinois
- Ten Mile Creek Bridge - Tazewell County, Illinois
- Downtown Bike Path - Matteson, Illinois
- Ten Mile Creek Bridge - Tazewell County, Illinois
- Mud Creek Bridge - Tazewell County, Illinois
- IDOT Bureau of Bridges & Structures Foundation & Geotechnical
- Unit In-Hosue Consultant - Statewide, Ilinois
- I-90 & Elmhurt Road Interchange Improvement Project - Cook County, Illinois
- Illinois 17 over Edwards River - Mercer County, Illinois
- US 67 over Pope Creek - Mercer County, Illinois
- Illinois 8 over West Fork of Kickapoo Creek - Peoria, Illinois
- Illinois 78 over Kickapoo Creek - Knox County, Illinois
- Reconstruction of Illinois 9 over Mud Creek - Tazewell County, Illinois
- Reconstruction of Illinois 116 over Ten Mile Creek - Tazewell County, Illinois
- Illinois 336 Bypass - Macomb, Illinois
- Wildlife Bridge - Macomb, Illinois
- US 20 over West Branch of DuPage River Bridge Replacement - DuPage County, Illinois
- MacArthur Highway Bridge - Peoria, Illinois

SERVICES

- Structure Geotechnical Reports (SGR)
- Roadway Geotechnical Reports (RGR)
- Subsurface Profile Plotting
- Foundation Recommendation
- Subsurface Data Analysis
- Ground Improvement Recommendations
- Pavement Remediation Recommendations
- Slope Stability Analysis
- Municipal Engineering
- Structural Engineering
- Bridge Inspections
- Transportation Engineering
- Maintenance of Traffic Plans
- Roadside Safety & Barrier Warrant Analysis

MANAGEMENT

WBE*

Karen Steingraber, PE, President • Jamil Bou-Saab, PE, Executive Vice President
George Ghareeb, PE, F.ASCE, Associate Vice President • Eric Therkildsen, PE, Associate Vice President

MEET THE TEAM

TERRA ENGINEERING LTD.

Senior Structural Engineer | Kristen Fields, PE, SE

Ms. Fields' 29-years of experience includes performing analysis and design of structural systems for buildings, bridges, retaining walls, underground storage tanks and various other types of structures. In addition to design work, she has performed numerous evaluations of structures with regard to structural condition and provided recommendations for repair or improvements if necessary. She has designed various structural systems consisting of steel, concrete, masonry, and timber. Ms. Fields has served as the Project Structural Engineer and Project Manager for design projects which have included both the planning and conceptual design phase as well as the final design phase with preparation of construction plans and specifications. Design projects have included new construction, structure expansion and rehabilitation, and structure repairs. In addition to design work, she has performed numerous evaluations of structures regarding structural condition and providing recommendations for repair or improvements, if needed. Kristen is a Certified Program Manager for NBIS Bridge Inspections. Some projects include IL 116 over Mud Creek, IL 78 over West Fork of Kickapoo Creek, to name a couple.

Senior Structural Engineer | Junshan Liu, PhD, PE, SE

Dr. Liu has more than 20 years of comprehensive building and transportation project design experience. Dr. Liu has designed a wide variety of projects ranging from commercial buildings (parking garage structures), bridges, retaining walls to nuclear power plants and fossil power plants. Software development and computer application to structural engineering are his research interests. Dr. Liu is a member of American Society of Civil Engineering (ASCE) and a peer reviewer for ACI Structural Journal. He has excellent experience in serving as Engineer of Record (EOR) for both transportation projects and utility projects. John is a Certified Program Manager for NBIS Bridge Inspections.

Senior Project Engineer | Alfred Yousif, PhD, PE

Dr. Yousif has more than 29 years of bridge engineering experience specializing in the behavior of both conventional and complex structural components. His areas of expertise include analysis and design of arch and truss bridges as well as precast, pre-stressed/ post-tensioned structural systems; development of experimental and analytical techniques for monitoring and rating existing highway bridges; design of optimum structural slab systems for innovative rehabilitation and new bridge construction; application of advanced composite materials for rehabilitation of structural concrete systems; and finite element analysis. He has extensive knowledge and experience with IDOT and ISTHA design manuals, standards, guidelines and specifications. Dr. Yousif has taught advanced Bridge Design courses at the University of Illinois at Chicago and has published 20 technical papers.

Project Manager | William Kramer, PE

Mr. Kramer brings more than 30 years of experience from his time at the Illinois Department of Transportation's Bureau of Bridges and Structures, providing foundation and retaining wall designs, geotechnical reports, feasibility and forensic analyses, as well as geotechnical assistance to numerous structural engineers. He helped develop many of IDOT's design and construction policies through his work on manuals, specifications, research, technical papers, and training to explore and utilize new innovative technologies.

RELEVANT PROJECTS

LANCASTER ROAD BRIDGE OVER THE WEST BRANCH OF LAMARSH CREEK

TERRA provided Phase I and II engineering services for the replacement of the structure carrying Lancaster Road over the West Branch of LaMarsh Creek, near Bartonville, Illinois. The project's purpose was the replacement of a deteriorated bridge structure to improve the adjacent roadway by widening the lanes and shoulders, and to improve the roadway profile west of the bridge. concept design services included data collection; topographic and hydraulic surveys; hydraulic modeling and analysis for the waterway and bridge; scour analysis; and the preparation of the type, size and location (TS&L) studies needed for the bridge replacement and for a retaining wall. The hydraulic analysis was performed using HEC-RAS for the existing condition with the existing three-span bridge, and for the proposed condition where both three-span and single-span bridge options were considered. The recommended proposed bridge structure was a 115-foot-long, single-span plate-girder bridge supported on integral abutments. The Hydraulic Report and the TSL were prepared and approved. The Project Development Report anpermitting documents were prepared. The proposed retaining wall was needed to retain the new roadway embankment. Final design services included the preparation of the construction documents for the replacement structure, MSE retaining wall, roadway improvements with adjacent entrances, guardrail, storm sewer and drainage modifications, and maintenance of traffic.

- Key Personnel: Kristen Fields, PE, SE, Brenna Roether, PE
- Reference: Jeff Gilles, PE, Peoria County Highway Department, 309.697.6400, jgilles@peoriacounty.org

AKRON ROAD BRIDGE

TERRA provided concept and final design structural engineering, transportation engineering and surveying services for the Peoria County Highway Department's Akron Road Bridge that spans over a Branch of Kickapoo Creek. The project's scope included planning and design phases of a single-span steel girder bridge on integral abutments. The existing and proposed bridge structures were modeled for hydraulics using HEC-RAS software. The superstructure consisted of a cast-in-place concrete deck on composite steel girders. The bridge was 87 feet long back to backof abutments, with pile-supported integral abutments and a width of 33'-2". Construction plans and specifications were prepared. Bridge rating was performed using AASHTOWare software.

- Key Personnel: Kristen Fields, PE, SE
- Reference: Jeff Gilles, PE, Peoria County Highway Department, 309.697.6400, jgilles@peoriacounty.org

IDOT IL 8 OVER HICKORY CREEK

TERRA was selected, as part of Chastain & Associates' team, by the Illinois Department of Transportation (IDOT) to provide final design services for the replacement of the structure carrying Illinois Route 8 over Hickory Creek, in Knox County, Illinois. The new structure was a single-span bridge on a skew with composite steel beams and integral abutments. With the new location of abutments shifted 30-feet to the east and the proposed use of staged construction, temporary soil retention system was needed to keep one-lane open to traffic during construction. Overall final design services included bridge construction documents for the replacement structure, roadway design, guardrail design, and plan preparation. Right-of-way plats and legals were prepared for property acquisition and for easements needed to reconstruct and widen the bridge structure and highway approaches.

- Key Personnel: Kristen Fields, PE, SE
- Reference: Richard Dotson, IDOT, 309.671.3455, richard.dotson@illinois.gov

IDOT COMPREHENSIVE IMPACT STUDY: INCREASED SIZE/WEIGHT OF TRUCKS

Illinois is the crossroads for national and international companies and goods in the United States. With the fifth largest economy in the U.S, businesses depend on a safe and sound road, bridge and rail network to move products. TERRA provided IDOT with structural and transportation study engineering services to complete a comprehensive analysis of potentially legal truck configurations and analyze the effects of potential changes to the current truck configurations and/or legal weight limits, including the use of various truck length configurations. The report presented the results of the work of analyzing 75 State-maintained bridges chosen as representative of the various types of bridges present in the current state inventory, and estimated impacts of heavy trucks of variable weights and lengths on the pavements and on the structures. This study evaluated truck configurations to match those used for the federal study, with a maximum commercial truck envelope with a limit of 129,000 lbs gross vehicle combination weight.

- Key Personnel: Kristen Fields, PE, SE, Junshan Liu, PhD, PE, SE, Brenna Roether, PE
- Reference: Susan B. Stitt, IDOT, 217.782.8080, susan.stitt@illinois.gov

TERRA ENGINEERING LTD.