

TERRA Engineering, Ltd. (TERRA), provides structural 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, county and state level. The TERRA team has experience with both the planning and design phases for bridge projects. TERRA's experts have knowledge in transportation structures, buildings, pedestrian bridges, retaining walls, noise walls, 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

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Experience

- Lancaster Road Bridge over IaMarsh Creek - Peoria County, IL
- Akron Road Bridge over Branch of Kickapoo Creek - Peoria County, IL
- Downtown Bike Path - Matteson, IL
- IDOT Bureau of Bridges & Structures Foundation & Geotechnical Unit In-House Consultant - Statewide, IL
- I-90 & Elmhurt Road Interchange Improvement Project - Cook County, IL
- Illinois 17 over Edwards River - Mercer County, IL
- US 67 over Pope Creek - Mercer County, IL
- Illinois 8 over West Fork of Kickapoo Creek - Peoria, IL
- Illinois 78 over Kickapoo Creek - Knox County, IL
- Reconstruction of Illinois 9 Bridge over Mud Creek - Tazewell County, IL
- Reconstruction of Illinois 116 over Ten Mile Creek - Tazewell County, IL
- Illinois 336 Bypass - Macomb, IL
- Wildlife Bridge - Macomb, IL
- US 20 over West Branch of DuPage River Bridge Replacement - DuPage County, IL
- MacArthur Highway Bridge - Peoria, IL
- IDOT Comprehensive Impact Study for Bridges for Increased Size and Weight of Trucks - State of Illinois
- IL Tollway Pedestrian Bridge over I-294 and Flagg Creek and Retaining walls - Western Springs, Illinois
- IL 54 Bridge over I-57 - Iroquois County, Illinois

Services

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

Meet Your Key Team



Senior Structural Engineer | Kristen Fields, PE, SE

Kristen's 32+ 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, Akron Road Bridge over Branch of Kickapoo Creek, to name a couple.



Senior Structural Engineer | Alfred Yousif, PhD, PE

Dr. Yousif has more than 32+ 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.



Senior Structural Project Engineer | Dan Carroll, PE

Dan's 12+ years of experience includes structural analysis and design of various highway components including vehicular bridges, pedestrian bridges, noise walls, boardwalks, retaining walls, foundations and culverts. His project experience covers early planning phases through the final design phase for the preparation of construction documents. Dan is also a NBIS Certified Bridge Inspection Team Leader with experience in bridge inspection and evaluation and creating condition reports with suggested course of action. A recent relevant project was the Royce Road Bridge Rehabilitation project.



Bridge Hydraulics | Tom Davis

Tom has worked with design teams and State and Federal agencies to complete various projects in Illinois and California to maintain the highway systems. His work experience in Hydraulics and Design include full storm water design for roadways, fish passage design, modeling of creeks and rivers, rock slope design for abutments and creek protection, completing CLOMR and LOMR for FEMA, completing USACE studies for permits, and bridge analysis for flooding. Tom is proficient with a full suite of hydraulic modeling programs including HEC-RAS, HEC-HMS, SMS, PCSWMM, Hydraulic Toolbox, HY-8, WMS, and Hydraflow and the relevant ArcGIS applications.

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. Phase I 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 HECRAS for the existing condition with the existing threespan 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 and permitting documents were prepared. The proposed retaining wall was needed to retain the new roadway embankment. Phase II 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
- **Reference:** Jeff Gilles, PE, Peoria County Highway Department, 309.697.6400, jgilles@peoriacounty.org



Dogtown Road Bridge

TERRA developed the preliminary engineering and contract documents for the reconstruction of the Dogtown Lane bridge in Peoria County, Illinois. This included a detailed drainage design with lined ditches and revetment mats, guardrail and hazard analysis, and developing/coordinating detour plans.

- **Key Personnel:** Kristen Fields, PE, SE
- **Reference:** Jeff Gilles - Peoria County Highway Department; 6915 West Plank Rd, Peoria IL 61604; 309.697.6400; jgilles@peoriacounty.org

Relevant Projects



IDOT IL 8 Over Hickory Creek

TERRA was selected, as part of Chastain & Associates' team, by the Illinois Department of Transportation (IDOT) to provide Phase II 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 Phase II 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

Missouri's Local Program On-Call



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
- **Reference:** Susan B. Stitt, IDOT, 217.782.8080, susan.stitt@illinois.gov