Missouri's Local Program
for community development

COVER SHEET

(This must accompany your firm's letter of interest and does not count in the page limit)

Firm's Full Legal Name: TERRA Engineering, Ltd.

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St. Louis, MO 63119

Work Category:

- ☐ Roadway Design
- ☐ Trails & Sidewalks
- ☐ Construction Inspection
- ☐ Traffic Engineering & TEAP
- ■ Structures
- ☐ Environmental
- ☐ Historic Preservation
- ☐ Multimodal Planning / Systems and Facilities Design
- ☐ Transportation Planning – NEW CATEGORY

Letter of Interest
Structures

Missouri's Local Program On-Call

Response to Request for Letter of Interest

TERRA Engineering, Ltd. (TERRA), is submitting our Letter of Interest to Missouri Highways and Transportation Commission to perform on-call professional services in the Category of Structures for local public agencies. The Structures On-Call Services contract requires expertise in numerous types of work that may be requested, including plans development, cost comparisons, hydraulics, detailing, and structural design. TERRA has experienced staff with the availability to complete any on-call project on time and on budget and can be available to mobilize quickly to assist communities throughout the state. Our structures design services are managed from our offices in Chicago and Peoria, Illinois. Our approach to every structures design project will be to meet with local agency staff to determine the overall needs for each project and to assign the appropriate staff and resources to meet the timeline and budget.

General Experience of Firm

TERRA's structures design experience includes working as the prime consultant on numerous structural projects throughout the Midwest. TERRA has worked with multiple municipalities, counties, and state clients on various transportation and/or structural projects, including the Illinois Department of Transportation (IDOT), the Illinois Tollway (ISTHA), the City of Old Monroe, Missouri, and the City of Peoria, Illinois. These projects have included the creation of Phase I reports, Phase II design plans and construction documents for structures, focusing on structural design, geotechnical, and geometric adequacy as well as to ensure that all procedural requirements, whether at the federal, state or local level are met. For each project, after meeting with local agency staff to determine their needs, budget, and schedule, our team goes out to complete on-site bridge inspections to review the conditions of the pavement, structure, erosion issues, utility concerns, hydraulics, and other applicable site concerns.

If needed, soil borings, hydraulic analysis, and topographic surveys are completed to ensure that we have all of the necessary information to create complete structures designs that can be constructed with limited need of additional information. Our team then sits down to discuss the most cost-efficient and sustainable manner to design the structure, including any necessary civil design as it pertains to the roadway leading up to the structure. TERRA strives to ensure that our designs meet client and community satisfaction, that they meet the standards set forth by MoDOT and federal requirements if applicable, are as economical and sustainable as possible, and are designed in such a manner so as to prevent the need for redesign of the project for years and years.

With structures design projects, our team, when assembled, may consist of a variety of disciplines including structural, survey, geotechnical, transportation and traffic to name a few. The majority of these disciplines will be fulfilled in-house through the teamwork of our staff in our St. Louis, Peoria, and Chicago offices. Our software capabilities include AASHTOWare, MDX, Midas, PY Wall, MX Road, InRoads, Geopak, Openroads, Microstation, Openbridge Modeler, AutoCAD, Civil 3D Synchro, VISSIM, Tru-Traffic, HCS, and similar packages.

Past Performance

TERRA understands that the best way for you to evaluate our team and our record of past performance on projects is to contact our references and discuss how they feel about our services. We have provided some examples of TERRA's recent structures design related project experience as follows:

Lancaster Road Bridge over the West Branch of LaMarsh Creek, Bartonville IL | 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 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 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 Lane Bridge, Peoria County Highway Department | TERRA provided Phase I and II structural engineering, transportation engineering and surveying services for the Peoria County Highway Department's Dogtown Lane Bridge that spans overthe West Fork of Kickapoo Creek. After considering both single span and 3-span options in the Phase I bridge design, the Phase

II design proceeded with 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 plate girders. The bridge was 114 feet long back to back of abutments, with pile-supported integral abutments and a widge of 32'-10". Pre-coring was used for the piles at the South Abutment due to the presence of rock at a shallow depth. Construction plans and specifications were prepared. Bridge load 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, Knox County IL | 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*

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*

Qualifications of Personnel

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 Lancaster Rd Bridge over West Branch of LaMarsh Creek and IL 78 over West Fork of Kickapoo Creek, to name a couple.

Structural Engineer | Dan Carroll, PE – Dan's 12+ years of experience includes structural analysis and design of various highway components including bridges, retaining walls, foundations and culverts. He has experience in bridge inspection and evaluation and creating condition reports with suggested course of action.

Senior Project 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.

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.

Familiarity + Capability

Our structural team utilizes MDX, AASHTOWare, FB Pier, HEC-RAS, Openbridge Modeler and Midas to analyze and design bridges, and GeoPak, AutoCAD, Openbridge Modeler and Microstation for drafting of various bridges design projects. Prior to the drafting process, our team evaluates all Phase I analyses and drafts the required structure geotechnical reports, bridge condition reports, etc. These software programs help in determining the operational effectiveness in both existing and future proposed conditions for comparison.

Our ability to quickly mobilize our team and our attention to detail on our transportation projects have led to us being a provider of choice on transportation and structural projects for multiple clients. We take pride in our quality of work and have created our own QA/QC processes to ensure our work is accurate before submitting to MoDOT.

Accessibility

TERRA Engineering has worked throughout the Midwest on traffic and transportation projects and will make our team easily accessible to work with MoDOT staff no matter which district the project is located. Our team is based out of our office in St. Louis, and other staff can easily travel as required to meet with MoDOT as required.

Workforce Diversity

TERRA Engineering is a woman (WBE) owned company which believes in promoting workforce diversity. Our engineering and support staff employ many minorities and women. A diversified and qualified staff will be assigned to work on any on-call structures projects based on the skills and knowledge needed for each task.

TERRA is proud to submit this LOI and looks forward to partnering with MoDOT throughout the State of Missouri providing quality and economical structures design services for a wide variety of transportation related projects.

Sincerely,
TERRA Engineering, Ltd

Kristen Fields, PE, SE
Senior Structural Engineer

B Brochure Structures

Missouri's Local Program On-Call

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
Kristen Fields, PE, SE
kfields@terraengineering.com
O: 309.999.0123
M: 309.634.6604

Experience

- Lancaster Road Bridge over laMarsh 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 & Elmhurst 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
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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 p/*****ublished 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

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- 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

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IDOT Comprehensive Impact Study: Increased Size/Weight of Trucks

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