

GENERAL CIVIL & STRUCTURAL ENGINEERING SERVICES

Three things that Alfred Benesch & Company prides itself on are providing a wide array of civil engineering services, quality based engineered solutions and client satisfaction. Our expertise lies in most all areas of civil and structural engineering including geotechnical engineering, environmental assessments, sustainable design and value engineering. Our responsiveness to short term, long term and emergency needs is well known among our clients. In addition, our clients will tell you that the attention to detail in our engineering documents sets the standard for quality.

The Benesch team resume includes a variety of civil/structural studies and designs for many clients across the United States. Our experience in municipal engineering provides a solid knowledge base that will be a valuable resource. Additionally, our work with numerous small and large scale commercial developments is particularly important. Many of our projects have involved public involvement and environmental permitting efforts that required specialists within Benesch. Further, managing and improving infrastructure facilities requires knowledge not only of pertinent design standards but also sustainability. Our engineers are well versed in designs that accommodate all types of users including complying with the Americans with Disabilities Act and the pursuit of LEED certified projects.

Benesch has been named one of the nation's Top 20 Go-To Bridge Design Firms by Road and Bridges Magazine for many years. MoDOT can be assured that our nationally recognized expertise in structural design will be at their disposal.



VALUE ENGINEERING

Value Engineering (VE) is one of Benesch's core services, and we have a rich history of project success in this area. Benesch began practicing VE in 1979. In 1989, we were the first consulting engineering firm to receive the SAVE International Excellence in Value Engineering Award, which recognized ten years of outstanding contributions to the practice of VE. Leading our practice is Muthiah Kasi, PE, SE, CVS (Life), a certified value specialist with the honorable distinction as a lifetime certificate holder. Under his guidance, Benesch has performed hundreds of VE studies and received international recognition for our work in this area.

Over the last 30 years, Benesch has been able to positively impact our clients' projects by saving millions of dollars, sharpening project schedules and developing innovative ways to manage life-cycle costs, all through the application of VE principles.

TRAFFIC ENGINEERING

The Benesch team combines traffic engineering expertise with real world experience to develop innovative, practical, sustainable and cost-effective solutions. Our team is committed to staying at the forefront of the latest traffic engineering technologies. We use advanced tools like Miovision traffic cameras and sophisticated in-house simulation software such as Synchro, SimTraffic, Vissim and HCS. These tools enable us to better understand design implications and meet project needs. Benesch engineers strive to develop practical, sustainable solutions. Tackling traffic issues from the “demand side” to encourage multi-modal and environmentally friendly solutions is just as important as looking at traditional “supply side” solutions that involve physical improvements.

Our areas of expertise include:

- ITS Management and Design
- Electrical Engineering
- Noise Studies
- Traffic Impact Studies
- Origin and Destination Studies
- New and Modernized Signal Design
- Highway Operational Analysis
- Travel Demand Modeling
- Safety Studies
- Structures
- Access Management Studies
- Gap Analysis
- Traffic Signal Coordination and Timing (SCAT)
- Signal Timings
- Intersection Analyses
- Corridor Progression Analysis
- Level of Service Analysis
- Traffic Data Collection
- Maintenance of Traffic Plans

ROADWAY

Hundreds of interstate miles have been designed by Benesch engineers. We routinely work with state Departments of Transportation and their FHWA counterparts to rehabilitate, modify or create new roadways that effectively connect people and places. Our road and highway projects traverse farm lands, urban cities and everything in between.

We provide much more than geometric solutions, however. You can consider Benesch a one-stop shop for all civil infrastructure needs. Within our civil division, we have staff experts in areas such as MOT, drainage, traffic engineering, electrical engineering, surveying and geotechnical. Quality is our top priority. We deliver plans that are quality-checked for constructability, enabling clients to use a low-bid system to their advantage. In addition, we go the extra mile to ensure minimal change orders and field issues during construction.

Our areas of expertise include:

- Highway and Toll Roads
- Interchanges
- Utility Coordination
- Horizontal and Vertical Alignment
- Drainage
- Maintenance of Traffic
- Agency Coordination and Permitting
- Surveying
- Transportation Project Plats
- Specification Development
- Construction Plans and Estimates
- Geotechnical Services

CONSTRUCTION

Benesch provides construction services for roadway, bridge, aviation, railroad and building projects. Our construction staff has years of experience overseeing contractors, coordinating subconsultants, testing materials and executing complex staging plans. We continuously monitor all phases of a project's development, from data collection and field surveys through contract documents and construction observation.

Our team has completed hundreds of DOT and LPA federal aid construction engineering projects. We have the experience and background to work successfully with the Federal Highway Administration, MoDOT Construction staff and Local Public Agencies. We are a full-service provider that brings a proven approach, based on efficient operations and utilizing versatile, knowledgeable, experienced staff who understand the work being performed and the construction engineering services required to satisfy project oversight requirements.

We have experts on staff who are able to provide assistance should major changes or unanticipated situations arise. Besides construction, our staff includes designers and scientists ready to provide support. Their proximity and accessibility allows for rapid response and accurate advice. This ultimately leads to successful projects, prevents surprises, and helps avoid lengthy delays.

Our areas of expertise include:

- Construction Observation
- Design-Build
- Shoring Tower Design
- Schedule Management
- Earthwork Quantities
- Temporary Earth Retention Systems
- Cost Management
- Pavement Quantities
- Demolition Plans
- Structural Engineering
- Value Engineering



MEP

Benesch offers a full spectrum of MEP services to our clients. Professionals in our Kansas City office provide design, consulting and sustainable solutions for mechanical, electrical and plumbing systems. Our services include design drawing preparation, specifications, and cost estimates. We bring a strong foundation of industrial and commercial engineering experience, including both new construction and the renovation of existing facilities. Over the past twenty years we have completed projects in wastewater treatment plants, hospitals, schools, military facilities, vehicle maintenance buildings, telecommunication facilities, correctional institutions, and various commercial buildings.

Mechanical Practice Areas

- Heating, Ventilating, and Air Conditioning Systems
- Exhaust Systems
- Chilled and Heating Water Systems
- Facility Assessment & Energy Audits
- Life Cycle Cost Analysis
- Industrial Ventilations
- Energy Recovery
- Temperature Controls
- Solar Thermal Systems
- Direct Digital Control (DDC) Systems

Electrical Practice Areas

- Power Distribution
- System Analysis, Assessment and Planning
- Interior and Exterior Lighting Design and Controls
- Energy Code and LEED Compliance
- Fire Alarm Systems and Emergency Power Systems
- Paging, Public Address, and Sound Systems
- Uninterruptible Power Supply
- Programmable Logic Controls
- Facility System Controls and SCADA Systems

Plumbing Practice Areas

- Facility Plumbing Systems Design
- Process Systems Piping
- Site Utilities and Yard Piping Systems
- Distribution Systems
- Storm Water Systems



STRUCTURAL

From road stream crossings to high-profile arch bridges, the structural team at Benesch has designed thousands of bridge structures ranging from 35 to 2,000 feet. Our engineers are proficient in the study and design of continuous complex structures, including plate girder, tied arch, segmental box girder, continuous/cantilever truss and cable stay bridges. In addition, we specialize in high order finite element analysis associated with various forms of nonlinear and buckling behavior. We are relentless in the pursuit of industry advancements, and pride ourselves on implementing innovative solutions.

Benesch has been awarded several Eminent Conceptor awards from the American Council of Engineering Companies and has consistently been named as a top 50 "Go To" firm for bridge design by government subscribers of Roads and Bridges magazine.

Our areas of expertise include:

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| - Simple, Typical and Complex Bridges | - Inspections and Ratings | - Seismic Analysis |
| - Major River Crossings | - Bridge Retrofit and Rehabilitation | - Bridge Modeling |
| - Railroad Bridges | - Retaining Walls | - Structural Survey |
| - Pedestrian Bridges | - Culverts | - Value Engineering |

STORMWATER MANAGEMENT

We develop stormwater solutions that provide value while respecting the environment. Our engineers and professional staff provide clients with a host of services including stormwater design and modeling; comprehensive planning and management services; and Low Impact Development (LID) expertise. Whether on a watershed-wide or site-specific project, Benesch has the unique ability to balance function, cost and aesthetics while ensuring compliance to all local and regulatory requirements.

Using advanced software and analytical tools, our staff combines technology with expert engineering knowledge to ensure our designs offer value-based solutions to meet our client's project needs. Whether that be for building sites or roadways and infrastructure, Benesch's team of planners, hydrologists and civil and hydraulic engineers are prepared to assist with your flooding, water quality, regulatory issues or any other stormwater need.

Our areas of expertise include:

- Hydraulic Studies
- Storm Sewer Design
- Detention Pond Modeling and Design
- Location Drainage Studies
- Permit Reviews
- Green Initiatives

ENVIRONMENTAL

At Benesch, we bring substantial local, regional and national environmental consulting experience and strategic insights to our clients. Our environmental specialists provide due diligence services; Brownfields and property development assessment; hazardous building materials consulting to include asbestos, lead based paint, IAQ; regulatory compliance; and permitting.

As complex environmental issues can have major impacts on project budgets and schedules, Benesch develops innovative and cost-effective solutions to environmental risk management challenges. We assist our clients by finding solutions that offer a balance between environmental stewardship and results-based business practices.

Our areas of expertise include:

- Compliance and Due Diligence
- Investigations and Remediations
- NEPA Services
- Natural Resources
- Facilities
- Brownfields / Hazardous Materials
- Noise Analysis
- Public Involvement
- Environmental Assessments
- Threatened and Endangered Species
- Wetlands

GEOTECHNICAL

Our geotechnical engineers, geologists, and scientists specialize in identifying solutions that mitigate construction challenges and make good business sense. Our goal is to balance initial construction capital costs and the ongoing operating costs over the life of the proposed structure or transportation system. Benesch's proactive approach to construction material design can reduce or eliminate unforeseen construction delays and overall construction costs. We promote optimum service life for the structure or transportation system once it is in operation. Benesch has the capability to service any project location.

Our materials testing laboratory is certified by the Accredited American Association of Laboratory Accreditations (A2LA). Our technicians are experienced in the laboratory test procedures necessary to evaluate the pertinent engineering properties of foundation materials for design and certified in concrete, asphalt, aggregate and soils testing by NICET, ACI and several state transportation departments for materials testing during construction.

