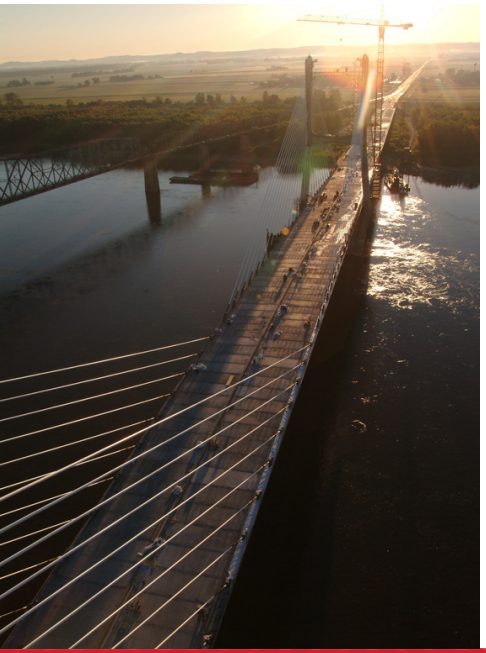
TRAYLOR BROS., INC.
A Traylor Construction Group Company

Bridge Experience

April 24, 2024



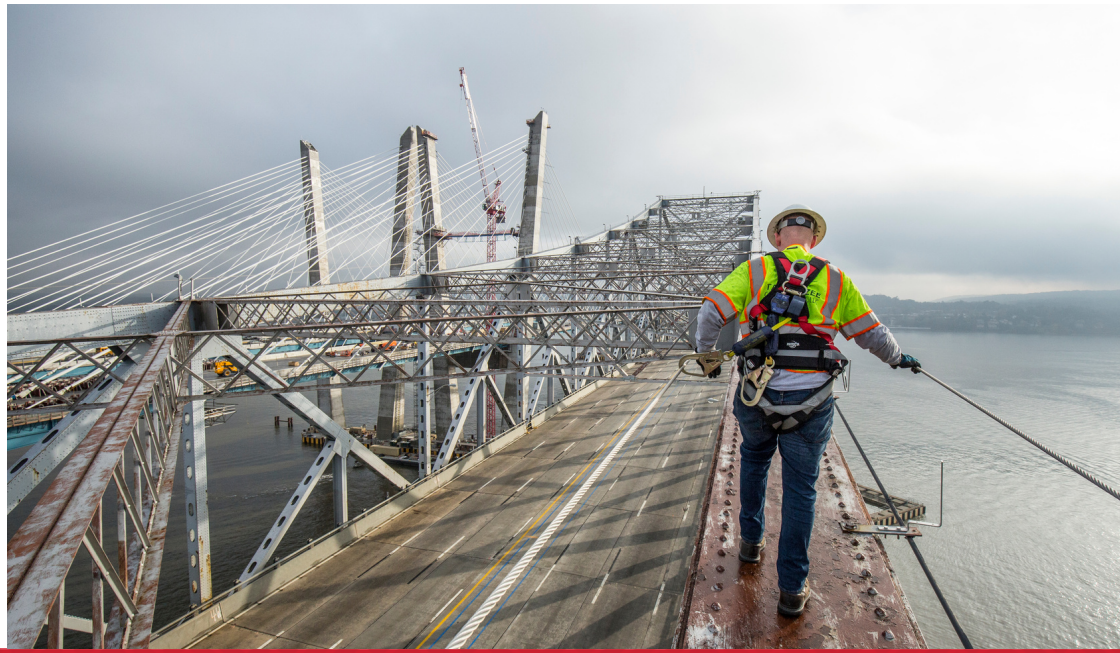


TABLE OF CONTENTS

COMPANY OVERVIEW

Over the last 76 years, Traylor Bros., Inc. has developed into a highly adaptable construction organization with a proven capability to tackle the most difficult bridge, underground, and marine projects. Engineer-managers and craftsman alike follow the lead of our founder, William F. Traylor, Civil Engineer, inspector for the city of Evansville on a compressed air tunnel, officer in the Navy's Pacific Theater Construction Battalion, and finally, in 1946, the co-owner of fledgling Traylor Bros., Inc.

By 1956 William had bridged the Ohio River and driven his first mile of tunnel. He flourished by succeeding on projects that frightened away other construction firms. Careful attention to methods, equipment, and design of special equipment and excavation support schemes were his personal focus. Ever down to earth and approachable, Bill's understanding of fundamental ethics and his generosity made him an example that goes beyond engineering excellence.

Maintaining the high standards of ethics and technical expertise set by his father, Thomas W. Traylor helped to catapult Traylor Bros., Inc. into one of North America's leaders in underground, marine, and bridge construction. Tom was honored by The Beavers in 2008 with the prestigious Beavers Management Award and in 2010 by The Moles for his outstanding achievement in construction, both the result of nominations by his colleagues.

Traylor Bros., Inc. was organized in 1946 in the State of Indiana and is thriving under the leadership of the third generation of Traylors: Co-Presidents Christopher and Michael Traylor. Each are committed to passing on William's and Thomas' values and traditions to the next generation of leaders. The firm's home office is located in Evansville, Indiana, with our east coast office in Alexandria, Virginia, and our west coast office in Long Beach, California. Each of these offices, along with staff on-site at our ongoing projects, supports our work building landmark bridges, tunnels, and marine structures across the nation.

Traylor Bros., Inc. Key Facts

- Founded in 1946
- Third generation family owned and operated
- Headquartered in Evansville, IN
- Four regional offices nationwide
- Ranked in the top 50 of domestic heavy contractors and 158th of the top 400 contractors for 2022

From left to right: Daniel Traylor, Vice President; Michael Traylor, Co-President; Thomas Traylor, Christopher Traylor, Co-President; and Thomas Traylor, Jr., Vice President

Strategic Plan

Traylor Bros., Inc. is a busy place, both on our job sites and in our offices. As we go about our daily work, Traylor management is focused on four key strategic areas to strengthen our business: safety, people, growth, and continuous improvement.

Over the last decade our health and safety program has adopted industry-leading concepts—with incredible results. As we move forward, we will build a safety culture in which every team member "actively cares" for themselves and their co-workers each minute of each shift they work.

Further, Traylor knows that our people are our most important asset. To support our current and future team members, we plan to implement several measures to improve recruiting, increase employee retention, and further reward our talented staff.

Sustainable, profitable growth is crucial to the continued success of Traylor. Our plan to do so involves identifying—and winning—key projects in current and new markets that best suit our unique talents.

And finally, we never plan to rest on our laurels. Our commitment to continuous improvement means that we will regularly take a step back to assess our current processes to determine how we can improve the quality and productivity of our work.

Our core values are:

Safety. We are committed to providing a safe work environment. This is always our first priority.
People. Our talented team is our greatest asset. We provide opportunity, reward performance, and support a positive and balanced work environment.
Innovation. We have the ability to engineer creative solutions to overcome any obstacle.
Ethics. We are honest and ethical in all of our business dealings.
Communication. We encourage open and honest communication throughout our organization.
Community. We add value to our industry and the communities in which we work.

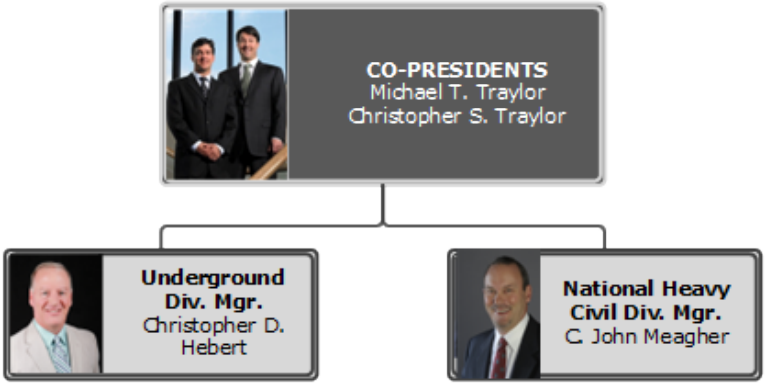
Our Vision is to be the most respected, preferred and consistently performing heavy civil contractor in the North America.

Our Mission is to excel at constructing complex infrastructure safer, better, and faster by engaging the entrepreneurial and innovative spirit of our team members and providing limitless opportunity for personal and professional growth in a close knit and collaborative organization.

Summit, Mount Whitney, 2022
Sequoia National Park, California

Corporate Structure

Traylor Bros., Inc. is a third-generation family-owned and -operated contractor. Corporate leadership stems from each of our operating divisions, which are managed by highly experienced, well respected industry professionals. Most of Traylor's leadership staff has been with the firm for upwards of 15 years.




Manager's Meeting 2022
Tour of Belle Chasse Bridge & Tunnel, Belle Chasse, LA

National Heavy Civil Division

TBI's National Heavy Civil Division provides comprehensive, cutting-edge heavy civil construction services through traditional and non-traditional delivery methods. TBI has completed more than 137 complex bridge construction and rehabilitation projects across the nation, including world record cable-stayed structures and segmental bridges. The group also has a history of providing some of the nation's largest port authorities and the maritime industry with the construction of deep water container piers, wharf facilities, transit terminals, locks, and dams. The division pursues and builds projects across the nation: along the eastern and Gulf coasts, throughout the nation's vast array of inland waterways, and across the western U.S., Hawaii, Alaska, Mexico, and Canada.

The tremendous depth of experience of our engineering and management staff, together with our highly experienced and competent field personnel, has allowed TBI to develop some of the most innovative construction techniques,


Gantry set-up
Airport Guideway and Stations, Honolulu, HI


Tower construction
Stan Musial Veterans Memorial Bridge, St. Louis, MO

methods, and solutions in the industry. This focus has resulted in measurable success through advanced technology, productivity, safety, value, and quality on-time construction.

Underground Division

TBI's Underground Division is focused on constructing the most challenging tunnel projects in North America and abroad. Our team of experts employs state-of-the-art technology to deliver projects in every type of ground, including soft ground, hard rock, and everything in between. TBM tunneling methods include mixed shield/slurry, earth pressure balance, and hard rock tunnel boring. Additionally, we have extensive experience in sequential excavation mining and drill and shoot excavation.

Our Underground Division has more than 116 tunneling projects on our resume, including two of the most technically demanding EPB tunnels in the United States and over 115 miles of bored tunnels. This experience, combined with the fact that we have the resources and ability to produce precast concrete tunnel liners, makes us a sought-after resource for private and public owners alike.

Hole through
Regional Connector, Los Angeles, CA

TBM being lowered into the launch shaft
Blue Plains Tunnel, Washington, DC

Financial Stability

Beyond the firm's unmatched technical and management ability, Traylor's strength and stability means that we can tackle the largest and riskiest projects in the industry. A few indicators of our firm's strength are:

- 76 years in business
- Approved bonding from St. Paul Travelers in excess of $1.5 billion
- Consistently ranked by Engineering News Record as a Top 400 Contractor and Top 100 Design-Build Firm
- Worked in 33 states, the District of Columbia, Canada, and Singapore
- Corporate office in Evansville, Indiana, supported by four regional offices (Long Beach, CA; Alexandria, VA; Texas City, TX; and Baton Rouge, LA)

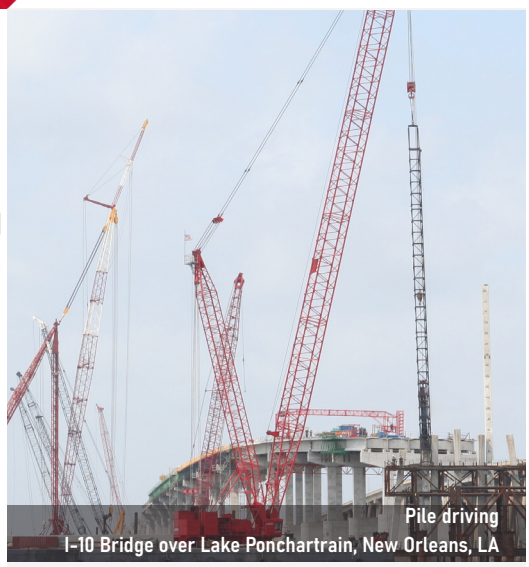
Corporate office
Evansville, IN

Bridge Structures

BRIDGE STRUCTURES

For more than 60 years, Traylor Bros., Inc. has self-performed highly technical, cutting-edge construction of complex bridges. We constructed our first bridge across the Ohio River in 1954 and since then have completed more than 135 major bridge projects across the nation. Our ability to manufacture prestressed concrete structural elements in our precast yards provides a distinct competitive and technical advantage. Our focus on developing the most innovative construction techniques in the industry has allowed us to generate measurable success in the productivity, safety, value, and quality of our projects.

The chart below illustrates the vast breadth and depth of experience we have building landmark bridges.



Pile driving
I-10 Bridge over Lake Ponchartrain, New Orleans, LA

Traylor Bridge Experience Highlight

Project Name, Location	Project Attributes													
	Alternative Procurement	Cable-Stayed Structure	Arch Structure	Truss Structure	Complex Steel Erection	Shallow Water / Trestle Const.	Segmental Precast/CIP	Self-Performed Pile Driving	Self-Performed Drilled Shafts	Cofferdams	Open Well Caissons	Precast Concrete	Cast-in-Place Concrete	Over/Under/ Alongside Rail
Portal North Bridge, NJ			■		■	■		■	■	■			■	■
Mt. Vernon Viaduct, CA	■											■	■	■
Howard Frankland Bridge, FL	■							■				■	■	
Belle Chasse Bridge, LA	■							■		■		■	■	■
Houston Ship Channel Bridge, TX	■	■				■	■	■	■			■	■	
Gov. Mario M. Cuomo Bridge, NY	■	■			■	■		■	■			■	■	■
Stan Musial Memorial Bridge, MO		■			■			■	■	■		■	■	■
Missouri Safe and Sound, MO	■											■	■	
Huey P. Long Main Span Bridge, LA				■	■			■	■	■		■	■	■
I-10 over Lake Ponchartrain, LA					■			■				■	■	
Biloxi Bay Bridge, MS	■							■				■	■	■
LA1 Relocated, LA					■	■		■				■	■	
Galveston Causeway, TX						■	■	■	■	■		■	■	
Conway Bypass, SC	■					■		■		■		■	■	
William H. Natcher Bridge, KY		■			■	■		■	■	■		■	■	
William Harsha Bridge, KY		■			■	■		■	■	■			■	
Sailboat Bridge, OK							■		■			■	■	
17th Street Causeway, FL					■		■	■	■	■		■	■	
Mississippi River Bridge, MO		■			■			■		■	■	■	■	
Blackwater Bridge, FL	■				■			■				■	■	

Cable-Stayed Bridges

Over the last 25 years, Traylor has been at the forefront of the construction of cable-stayed bridges—generally speaking the most economically feasible, and technically challenging, bridge design for crossings longer than 500 feet.

In 1986, as a non-sponsoring partner in a joint venture, TBI began work on the Fred Hartman Bridge, a 2.6-mile crossing over the Houston Ship Channel in Texas. At the time, cable stay structures were a unique and relatively untested bridge type. Particularly challenging to build, they have the added element of being constructed over some of the deepest, swiftest bodies of water in the nation. It quickly became apparent that these challenges perfectly suited TBI's unique corporate makeup: highly competent technical staff; unmatched experience working in challenging marine environments; and ownership of specialized equipment particularly suited for the marine environment. As a result, TBI has worked or is working on eight major cable-stayed bridges in the U.S.

In 1997, TBI began work on the William Harsha Bridge in Maysville, Kentucky, a 2,420-foot bridge over the Ohio River. That same year, TBI was also selected to construct the William Natcher Bridge over the Ohio River in Owensboro, Kentucky. At 4,505 feet, the bridge is one of the longer cable-stayed spans over an inland waterway. And in 2001, TBI led the construction of the Bill Emerson Memorial Bridge in Cape Girardeau, Missouri, a 2,086-foot-long bridge over the Mississippi River. As a testament to their success, the three projects were awarded a total of five awards from both clients and industry organizations. In 2014, TBI completed work on the I-70 Mississippi River Bridge in Missouri, which has a 1,500-foot main span and 400-foot towers. Currently, TBI is working on the 3.1-mile-long Tappan Zee Bridge in Tarrytown, NY, which is the single largest bridge construction project in New York's history. The design combines the use of a composite deck cable-stayed structural system for the main span and long-span steel girders for the approach structures. The new bridges have vastly improved safety features, and provide a high quality, low maintenance replacement of this critical crossing.

300-foot towers over the Ohio River
William Harsha Bridge, Maysville, KY

Floating equipment
William H. Natcher Bridge, Owensboro, KY

Westbound span complete
Tappan Zee Bridge, Tarrytown, NY

Steel Erection

The specialized field of steel construction for complex bridges is one in which Traylor has significant experience. Since 1984, Traylor has built more than 25 major transportation bridges in which a significant portion of construction was the erection of an intricately designed steel structure.

We have successfully constructed some of the most challenging steel erection projects in the country. For the 17,000-ton Huey P. Long Bridge in Louisiana, we employed an innovative span-by-span erection method that virtually eliminated the need for falsework in the river. On the Burro Creek Bridge, located in a remote area of Arizona, we utilized an 'over the top' steel erection procedure to walk an 80-ton crawler over the top of the arch, building structural steel truss work below. Similarly, the Navajo Bridge in Arizona was a 720-foot-long spandrel steel arch constructed 470 feet above the Colorado River. And the Blue Water Bridge in Michigan utilized a unique temporary stay tower to erect the 1,415,733 pounds of structural steel over the St. Clair River.

Over-the-top steel erection
Burro Creek Bridge, Kingman, AZ

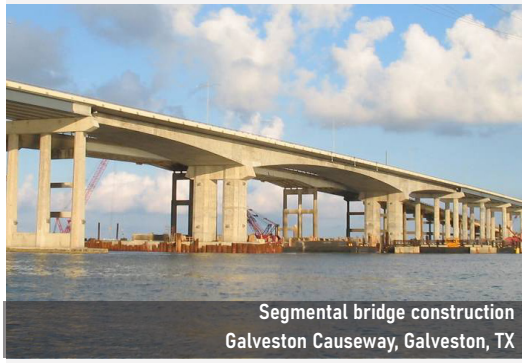
Shallow Water Construction

Throughout our history building transportation projects across the U.S., Traylor has gained specialized expertise in shallow water flat slab construction techniques where the use of floating equipment is not possible. This challenging method of construction requires the use of temporary work trestle and top down construction in order to protect the sensitive land areas. Traylor Bros. owns 2,500 linear feet of heavy trestle which can be quickly mobilized to successfully complete these types of projects.

Shallow water flat slab construction
LA1 Relocated, Leeville, LA

Segmental Bridges

Over the years, Traylor has constructed numerous segmental bridges using precast and cast-in-place methods. Used for long-length crossings with limited or no access below, we are able to build these types of bridges without impacting the area below.



Segmental bridge construction
Galveston Causeway, Galveston, TX

On the Sailboat Bridge in Grove, Oklahoma, precast segments were cast at our off-site casting facility and loaded on an 'underslung' erection truss for placement. The Galveston Causeway Bridge in Texas consisted of twin six-lane bridges; each bridge consisted of a three-span cast-in-place twin cell segmental main span bridge over the active navigational channel.

View from the catwalk
Coronado Bridge, San Diego, CA

Seismic Retrofit

The practice of infrastructure retrofit has increased in recent years, not only to protect the public from earthquakes and other natural disasters, but also to increase life span and enhance functionality. Traylor has performed multiple retrofits up and down the west coast of the U.S., utilizing our fleet of marine equipment to make crossings safer for the traveling public. Projects include the seismic retrofits of the San Mateo-Hayward Bridge in San Francisco, California; the Vincent Thomas Bridge in Long Beach, California; and the Coronado and West Mission Bay Bridges in San Diego, California.

Foundations

FOUNDATIONS

Traylor Bros., Inc.'s unique corporate makeup makes us one of the nation's most sought after contractors for the construction of all types of foundations. First, our owned fleet of heavy cranes assures that we always have the equipment on hand to accomplish the job. Second, the ability to capitalize on our Underground Division staff's geotechnical knowledge allows us to be comfortable enough to take on geotechnical risk, which often results in significant payoffs in terms of time and money saved on projects. Third, we are able to fabricate our own steel temporary structures in our Evansville, Indiana shop. Finally, our unmatched experience along our nation's most challenging inland waterways and coastlines means that we are able to successfully complete some of the riskiest work in the industry.

Pile Driving

The majority of Traylor's bridge and marine experience requires driving pile. Whether in land or water, Traylor is able to drive all types and sizes of pile. A few of our standout efforts include:

- **LA1 Relocated, Phase 1B & Phase 1C, Leeville, LA.** 16-, 24-, and 30-inch prestressed concrete pile. Laid end-to-end, the total number of piles required for this project would extend more than 268,000 linear feet, or 50-plus miles
- **GIWW West Closure Complex, New Orleans, LA.** The pump station cofferdam required the installation of a complex combi-wall with 54-inch pipe king pile and 105-foot-long intermittent sheet pile. King piles were driven 120 feet into the southern Louisiana clay substructure
- **Pier 400 Wharf, Phases I and II, San Pedro, CA.** Driving of more than 2,200 24-inch octagonal, prestressed concrete piles up to 130 feet in length

Keys to Traylor's Success with Foundations

- Seasoned and highly trained technical staff
- Owned fleet of heavy cranes
- Ability to take on geotechnical risk
- Ability to fabricate temporary steel structures
- Unmatched experience along the nation's inland waterways

Prestressed concrete pile foundation
LA1 Relocated, Phase 1B & 1C, Leeville, LA

Drilled Shafts

Drilled shafts are another commonly used method of foundation construction in which Traylor has significant experience self-performing.

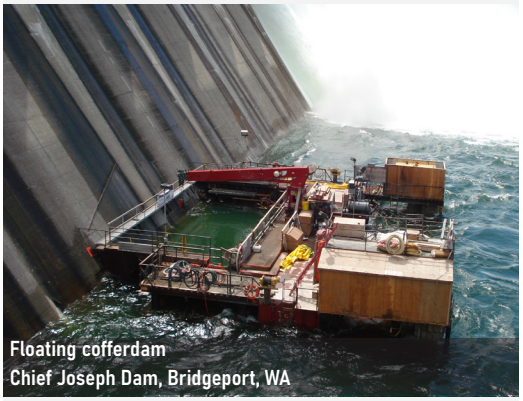
- **I-70 Mississippi River Bridge, St. Louis, MO.** Recently constructed the 12 largest capacity load-tested drilled shafts in the U.S. Traylor crews were able to prove a world record 36,000-ton Osterberg cell load test on 119-foot-long, 11-foot-six-inch-diameter shafts
- **Rocky Reach Juvenile Fish Bypass, Chelan County, WA.** Installation of deep water drilled shaft foundations in 20,000 psi bedrock to extremely tight tolerance
- **Braddock New Gated Dam, Allegheny County, PA.** The dam sits on 89 78-inch-diameter drilled shafts

Coring rock in test shaft
I-710 Mississippi River Bridge, St. Louis, MO

Cofferdams

Traylor is comfortable working with the often unusual design of cofferdams of all types, including floating and cellular. Our ability to fabricate temporary steel and internal bracing, utilize our fleet of specialty marine equipment, and capitalize on our geotechnical experts results in cofferdam projects of the highest quality.

- **Gramercy Superstructure over the Mississippi River, Natchez, MS.** Bridge foundations of caisson and cofferdam piers, three land and three river, requiring approximately 60,000 cubic yards of concrete and 8.3 million pounds of reinforcing steel
- **Gas Abatement Spillway Deflectors, Chief Joseph Dam, Bridgeport, WA.** 50'-foot floating, mobile cofferdam completed spillway deflector construction at 19 monoliths
- **McAlpine Lock Replacement, Louisville, KY.** Demolition of existing cofferdam and construction of cellular cofferdam



Floating cofferdam
Chief Joseph Dam, Bridgeport, WA

Caissons

The use of open well dredge caissons in foundation construction is relatively unusual and has largely been replaced by drilled shaft foundations. However, Traylor is one of a few contractors that has experience with this specialized method of construction, having successfully sunk a total of 10 caissons in our history.

- **US 82 Mississippi River Bridge, Greenville, MS.** Two dredged caissons anchored 120 feet in the riverbed and constructed by floating method
- **Bill Emerson Memorial Bridge, Cape Girardeau, MO.** Two concrete caissons approximately 60 feet wide by 100 feet long by 35 feet tall sunk to 60 feet
- **Gramercy Superstructure over the Mississippi River, Natchez, MS.** Bridge foundations of caisson and cofferdam piers, three land and three river, requiring approximately 60,000 cubic yards of concrete and 8.3 million pounds of reinforcing steel

Caisson sinking
US 82 Mississippi River Bridge, Greenville, MS

Equipment Management

EQUIPMENT MANAGEMENT

The ability to furnish reliable heavy-duty, cutting-edge equipment for projects has been one of the keys to TBI's success. Through the strategic acquisition of this equipment and strong product support, our Equipment division provides a competitive advantage for the company. TBI is recognized for its vast inventory of equipment to support major tunnel, bridge and marine projects. Our world-class fleet is operated and maintained by highly trained equipment mechanics, operators and welders who work on our projects and in our fabrication facilities and equipment yards nationwide.

Equipment

Since 1946, TBI has recognized the value in owning and maintaining the often specialized equipment to support our projects and most importantly, our customers. We are currently approaching 3,000 pieces of equipment, consisting mostly of cranes up to 750 tons, tugboats up to 1,000 H.P., more than 400 barges/pontoons, general construction equipment, tunnel boring machines, tunnel locomotives/cars, batch plants, concrete equipment, pile driving equipment, crane trestle, heavy bent falsework, and support equipment.

Equipment Team

The highly trained equipment team consists of a management/office team located in Evansville, Indiana; corporate equipment superintendents; field equipment superintendents; engineers; welders; shop/field mechanics; machinists; fabricators; and strong vendor relationships. We believe these relationships are very important assets and consider our vendors to be members of the team when it comes to resolving specialized equipment needs.

Members of our equipment team have an average tenure of 10-and-a-half years, with eight personnel having more than 25 years of experience with TBI. The majority of our key positions are held by personnel that have made a career in the equipment field. We also have relationships with local community colleges, sponsoring active internships for future mechanics and welders.

Traylor Owned Equipment by the Numbers

- 80 cranes
- 52 100-ton-plus cranes
- 6 floating cranes
- 402 barges
- 2,500 linear feet of trestle

The Thomas W driving pile
SFOBB Self Anchored Suspension, San Francisco, CA

Rebuild of the Favco tower crane
Evansville Shop, Evansville, IN

Quality and Safety Culture

At TBI, our quality and safety programs are much more than processes—they are our culture. The equipment team is proud of this culture and understands that it takes dedication and follow-through to maintain this level of commitment. Examples of how the equipment team works to maintain our culture of quality and safety are listed below.

- Tracking equipment deficiencies
- Active member within industry organizations
- Work closely with manufacturers (ie., OSHA, MSHA, and Coast Guard) on safety issues
- Weekly safety calls with equipment personnel
- Annual quality meetings
- Annual safety initiatives
- Internal quality audits every five years
- Activity Hazard Analysis (AHAs)
- New hire buddy system
- Continuous training
- Factory trained personnel
- Forklift preparation
- Man lift inspection
- Crane inspection
- Equipment electrical
- Mobile hydraulics
- Signalman certification
- Rigging certification
- Assembly/disassembly person
- NCCO crane operator training

Safe operator access
Evansville, IN

Traylor equipment yard
Wickliffe, KY

Equipment Yards

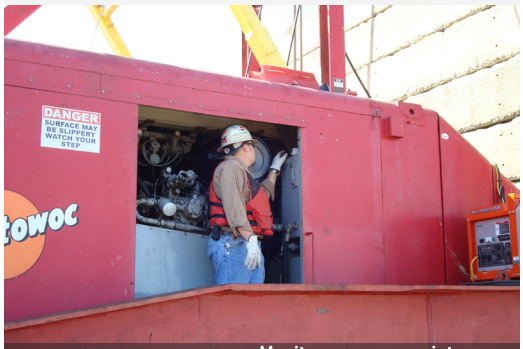
The continued growth of TBI has increased the need for equipment storage yards. Today, we own four equipment yards located in Evansville, Indiana; Wickliffe, Kentucky; Rosamond, California; and Olympia, Washington. The yards were established to provide nationwide support and include one centralized deep water port.

Traylor Equipment Yards								
Equipment Yard Location	Year Established	Region of Support	Heavy Fabrication	Equipment Maintenance	Equipment Storage	Equipment Staging	Product Support Staff	Deep Water Port
Evansville, IN	1946	Central U.S. and nationwide	■	■	■	■	■	■
Rosamond, CA	1985	West coast		■	■	■	■	
Wickliffe, KY	1997	Central U.S. and nationwide	■	■	■	■	■	■

Equipment Maintenance

Whether working on land or water, TBI remains an industry leader in equipment maintenance. Our people, practices, facilities, and history speak for themselves. Our stringent maintenance program provides maximum uptime and return on investment for our company—year in and year out.

Equipment maintenance does not end with our condition-based maintenance programs or with our facilities to remanufacture and/or rebuild. TBI is committed to installing cutting edge technology on the equipment fleet. Some of the latest systems to be utilized are biodegradable fluids, camera monitoring systems, tire pressure sensors, rear obstacle sensors, lubrication systems, Telematics systems, and improved handrails and steps.



Manitowoc crane maintenance
Evansville, IN

Most companies tout a maintenance program, but only a few can boast the capability to perform complete rebuilds. TBI maintains the staff and equipment necessary to perform complete rebuilds on nearly all equipment. The most notable rebuilds in recent years include three American 9310 crawler cranes; a Manitowoc 4100 and ring attachment; a Manitowoc 3900WVSII crawler crane; two Favco Tower cranes; and a tug boat. Our rebuild program starts with bare frames and then assembles utilizing the latest technology, incorporating operator comforts. Further, with new Tier emission standards, repowers have become a regular part of TBI's maintenance schedule.

Heavy Fabrication

TBI's shop facilities, located in Evansville, Indiana and Wickliffe, Kentucky, have the experience, knowledge, and capability to meet your heavy fabrication needs. The specialized team consists of office management, engineering, fabricators, welders, and machinists. Their primary responsibility is to support TBI's projects by providing cost-effective solutions with a quality product in a timely fashion. These projects often include trestles, cofferdams, tunnel structures, TBM launching pads, tunnel rolling stock (cars), pile templates, and barge and tug repairs and construction.

Heavy fabrication
Galveston, TX

Product Support

TBI maintains a staff of well-trained craftsman that include the management team, equipment superintendents, field mechanics, shop mechanics, machinists, fabricators, and welders, all available 24 hours a day, seven days a week within the U.S. This group is equipped to take on any task to ensure equipment uptime is maximized.

Mechanics and equipment superintendents are required to have two weeks of factory training annually, in addition to being certified in forklift operation, man lift inspection, crane inspection, welding, equipment electrical, mobile hydraulics, signalman certification, rigging certification, assembly/ disassembly, and as an NCCCO crane operator.

Equipment product support
GIWW West Closure Complex, New Orleans, LA

Marine Fleet Service

TBI offers the complete spectrum of marine fleet services coast-to-coast. Regardless of the task at hand, we have the expertise and equipment you need to complete complex marine projects. When it comes to working in and around water—whether the Atlantic or Pacific coast, the Great Lakes, the Gulf Coast, or inland waterways—TBI's 70-plus years of experience is critical. TBI also specializes in barge and tug repair, tug repower, and barge fleeting.

Unload and launch of 600 hp tug
Galveston, TX

Precast

PRECAST

Early in Traylor Bros., Inc.'s 76 year history, we realized the value of utilizing precast elements for both bridges and structures. On bridges, use of precast elements can increase construction zone safety, minimize traffic impacts, minimize disruption to the community and the environment, and improve constructability and safety. On tunneling jobs, segmental lining systems are continually being improved to help make the safe construction of tunnels in soft ground beneath the water table both technically and economically feasible.

Therefore, Traylor has embraced the use of precast segmental elements. For example, the 19,265-linear-foot precast segmental concrete box girder superstructure across Choctawhatchee Bay near Destin, Florida, included 1,167 bridge segments weighing up to 93 tons each and involved concrete segments (83,000 cubic yards of concrete) cast in a job-specific 36-acre construction yard located at the foot of the bridge. The project is a world record holder in segmental bridge erection: seven spans, seven days, and 952 feet of bridge. In underground construction, the trend for improvements in segment quality and tunneling productivity continues. Traylor owns and operates multiple dedicated manufacturing plants that continually push the envelope, innovating more efficient, higher quality segments for our projects.

Precast Facility, Littlerock, CA

TBI's precast facility, which includes more than 30 acres of storage and production area, boasts the first double carrousel segment plant in the U.S. and an on-site twin mixer batch plant. In support of projects such as the NOS-ECIS and NEIS Tunnels in Los Angeles, CA; the Arrowhead Tunnel in San Bernardino, CA; the Metro Red Line Tunnel in Los Angeles, CA; the San Vicente Pipeline Tunnel in San Diego, CA; and the Avenue 45 Tunnels, the Littlerock facility has produced more than 350,000 tunnel segments to date.

Precast concrete segment placement
Choctawatchee Bay Bridge, Destin, FL

Precast segmental tunnel liners
University Link Light Rail U220 Tunnels, Seattle, WA

Quality check
Littlerock, CA

Precast Facility, Stockton, CA

TBI's Stockton facility has produced more than 60,000 tunnel segments to date (more than eight miles of tunnel liner) and supports projects such as the Upper Northwest Interceptor Tunnel in Sacramento, CA and the Bay Tunnel in San Francisco, CA. The facility has more than eight total acres of storage and production area, and includes an automated carrousel segment plant with an on-site batch plant.

T-lock line
Stockton, CA

Project Experience

Governor Mario M. Cuomo (Tappan Zee) Bridge

New York State Thruway Authority, Tarrytown, NY

The 3.1-mile-long Governor Mario M. Cuomo Bridge connects Rockland County to Westchester County in the Lower Hudson Valley, approximately 25 miles north of midtown Manhattan. It is a critical transportation link that serves an average of 140,000 vehicles per day.

Over the course of the project more than 100,000 tons of pipe pile were driven and 134 enormous steel-blue plate girder assemblies that support the road deck on the new twin-span bridge were installed. The plate girders were pre-assembled into two and three girder assemblies ranging from 290 to 410 feet in length, 60 feet wide, and weighing as much as 1,020 tons. The steel superstructure supports the precast deck panels. With a total of 110,000 tons of plate girders placed, 1,020-ton lifts by the Left Coast Lifter were commonplace.

The main span pylon construction moved forward simultaneously, with concrete poured in place beneath jump forms. The pylon crossbeams were precast directly on barges, sent directly to the project site, and placed with the Left Coast Lifter. The height of the eight pylons is 419 feet.

Structural steel erection, stay cable installation, and precast deck panels were constructed in a balanced cantilever sequence. High levels of production resulted in the team being able to erect four stay cables plus two structural steel field sections, precast deck panels, rebar and concrete filler joints, and make tensioning adjustments in one week's time. The main span has a total of 192 stay cables totaling 700 miles of metal cable strands.

The roadway deck consists of steel-reinforced concrete deck panels, each 12 feet long and varying from 22 to 45 feet wide. More than 6,200 individual precast concrete road deck panels were installed to complete the driving surface for the twin spans.

The westbound span opened to traffic in August of 2017. Traffic from the existing structure was moved to the new westbound span until the eastbound span was completed and opened in September of 2018. Demolition of the old bridge is complete.

VALUE

$3,928,025,169

DATES

01/18/2013 – 9/28/2020

ROLE

Prime contractor, joint venture

REFERENCE (01/24)

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MTA Construction and Development
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HIGHLIGHTS

- Design-build
- Innovative design
- Composite deck cable-stayed structural system (main span)
- Steel girders (approach structures)
- 110,000 tons plate girders
- 100,000 tons pipe pile
- 192 stay cables
- 2,230-ft. cable-stay main span (1,200 ft. channel span)
- 72-in. diameter pipe piles, up to 300-ft.-long
- Split deck cross section for EB and WB roadways
- 100-year service life

Airport Guideway and Stations Design-Build Contract

Honolulu Authority for Rapid Transportation, Honolulu, Hawaii

As part of a joint venture, Traylor Bros., Inc. is constructing the Honolulu Authority for Rapid Transportation's (HART) Airport Guideway and Stations Design-Build Contract. The approximately $875 million contract is to design and build the project. The new 5.2-mile elevated guideway will extend from Aloha Stadium to the Middle Street Transit Center Station in Honolulu, Hawaii and includes four stations. This is the third in a series of projects to design and build the Honolulu Rail Transit Project, a 20-mile grade separated fixed guideway transit system with 21 stations.

Drilled shaft production concluded with some shafts reaching depths of up to 350 feet, addressing the challenges of the soft soils found along the alignment. More than 230 columns were erected to support the structure.

During operation, the precast yard manufactured segments over 30 feet in width, each weighing between 45 and 65 tons. At the height of its capacity, the yard delivered 36 segments weekly, including larger pier segments produced at a rate of one per weekend along with six typical segments and an additional pier segment on weekdays. In total, more than 2,700 segments were crafted, along with 5,400 permanent sound walls now installed along the entire alignment.

Three overhead gantry systems, custom designed and fabricated in Italy, set all spans along the alignment.

Construction of Airport, Middle Street, Pearl Harbor, and Lagoon Drive Stations is complete. Installation of the rail on the finished guideway sections is done, and the necessary electrical and wet utility relocations have been conducted to facilitate the new guideway and stations.

VALUE

$990,000,000

DATES

12/01/2016 – 2/29/2024

ROLE

Prime contractor, joint venture

REFERENCE

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HIGHLIGHTS

- Design-build
- Precast concrete construction in precast yard
- Construction in an urban environment
- Drilled shafts in difficult ground

AWARDS / ACHIEVEMENTS

- Set record for the deepest 10-foot diameter cast-in-drilled hole pile in foundation history

Huey P. Long Bridge Main Span Superstructure, Pier A to Pier IV

Louisiana Department of Transportation and Development, Jefferson, LA

The Huey P. Long Bridge Widening was a four-phase project vital to the recovery of Greater New Orleans. The widening added an additional travel lane, as well as inside and outside shoulders to each side of the bridge, providing a safer and more reliable crossing over the Mississippi River.

As part of a joint venture, Traylor Bros., Inc. employed an innovative span-by-span erection method to build this project. By utilizing temporary stabilizing frames that span between the bottom chords of the proposed widening trusses, and stabilizing towers to brace the compression chord of the truss while lifting, the joint venture eliminated the need for falsework in the river, with only one exception: the West Bank anchor span, which was constructed using a modified stick build method.

The stabilizing frames and trusses were erected on barges and floated into place directly underneath the bridge. The whole system of trusses and stabilizing frames was lifted at the four corners by strand jacks supported on top of the widened pier trusses of the bridge. Therefore, despite the contract anticipating the team delaying bridge and marine traffic, we devised a scheme that allowed preassembly of the bridge, minimally impacting the public. This was a huge win for both the team and the local economy.

This phase of the project consisted of .451 miles of a cantilever truss highway and railroad bridge widening with parallel trusses and steel stringers for a widened roadway deck system. The work included widening the roadways on the 71-year-old span from two nine-foot lanes in each direction to three 11-foot lanes, with appropriate shoulders and fastening on the new trusses. The existing bridge was retrofitted in order to be connected to the 17,500 tons of new steel and 60,000 existing rivets were replaced with high-strength permanent bolts.

"[The Huey P. Long Main Span Superstructure] project will be entered into many contests and will win many awards for quality, safety, innovation, and effective partnering. This was a project that I remember as a joy to be associated with and truly partnered. The owner and its program manager are truly happy with the performance of Massman/Traylor/IHI Joint Venture."

- Stephen Spohrer, PE, Program Director

VALUE

$ 454,088,569

DATES

08/17/2007 – 04/19/2012

ROLE

Prime contractor, joint venture

REFERENCE

Brian Buckel
Construction Manager
GEC Inc. (Formerly with LADOTD)
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HIGHLIGHTS

- Heavy waterfront construction and pile driving
- Limited site access and laydown
- Compliance with complex environmental regulations
- Work in a marine environment
- Driving 48-inch steel pipe piles to support foundations
- Driving piles greater than 150 feet in length
- Grade separation

AWARDS / ACHIEVEMENTS

- 2013 AGC Alliant Build America Award
- 2013 AGC Alliant Build America Grand Award
- 2012 NOVA Award

Sam Houston Tollway Ship Channel Bridge Replacement

Harris County Toll Road Authority (HCTRA), Houston, TX

Ship Channel Constructors, LLC (SCC) was awarded a contract on January 9, 2018, for the construction of twin bridges over the Houston Ship Channel based on a concrete-material design by FIGG Bridge Engineers. However, after the National Transportation Safety Board (NTSB) identified design flaws by FIGG in the collapse of a pedestrian bridge in November 2018, an independent review of FIGG's design for the Ship Channel Bridge was initiated. With findings that echoed the NTSB's concerns, the Harris County Toll Road Authority (HCTRA) halted parts of the construction by January 2020. Subsequently, in August 2020, FIGG was removed as the engineer of record, and COWI North America, Inc. was appointed in October 2020 for the main span bridge design. HCTRA then chose to revise the design to a composite steel structure, expected to be more cost-effective and quicker to complete.

The team is building new twin landmark cable-stayed bridges across the channel while maintaining traffic on the water and roadways along the alignment. The new bridges remove foundations from the waterway and will prompt the widening and deepening of the channel to make way for supertankers and mega vessels, advancing the shipping industry in Harris County.

The new southbound bridge will be constructed first, adjacent to and west of the existing bridge. The design of the uniquely shaped main span structures has prompted innovations in construction, and the team is applying lessons learned from previous cable-stayed bridge projects. The rebar for each jump is on the critical path—especially because of the complications created by the curved design—so the cages are being pre-tied in advance in designated areas next to the towers. The jump forms for the cast-in-place concrete were custom designed to accommodate the curved design of the towers.

The superstructure of the main span was redesigned to have a composite deck span with steel girders and precast deck panels. In the areas over land, the steel will be pre-assembled and hoisted in one large field section. Over the water, the steel superstructure will be stick-built. The steel spans will be connected to the pylons with 14 cables ranging in length from 300 to 1400 feet and tied into the pylon towers with anchor boxes cast into the upper lifts rather than the original design saddles.

The north and south approach structures are nearing completion.

VALUE

$859,400,000

DATES

03/19/2018 – 06/24/2029

ROLE

Prime contractor, joint venture

REFERENCE

Roberto Trevino, P.E., Executive Director
HCTRA

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HCTRA Project Engineer Manager
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HIGHLIGHTS

- Composite deck Cable-stay bridge (main span)
- TX-70 Concrete girders (approach span)
- Drilled shafts
- Cofferdams
- Demolition of existing structures

Stan Musial Veterans Memorial Bridge

Missouri Department of Transportation, St. Louis, MO

The first bridge built connecting downtown St. Louis and southwestern Illinois in more than 40 years, the completely new alignment helped relieve the Poplar Street Bridge (PSB), which is one of only two bridges in the U.S. to carry three interstates. Shifting I-70 from the PSB to the new Mississippi River Bridge has significantly relieved traffic congestion.

Foundation work is always challenging in the deep, swift water of the Mississippi River. The conditions at the site were subject to flooding with a difficult current. By using proven means and methods and adapting the owner's design to fit particular tools and equipment currently in hand, construction of the 12 shafts on the Stan Musial Veterans Memorial Bridge proceeded as planned.

Another challenging element of the bridge construction was the towers, which are 400 feet above the river. Having the experience and equipment to build towers of such height was crucial.

The project entailed construction of a 1,500-foot main span with 400-foot towers. The total length of the improvement was 1.22 miles. The work included 12 drilled shafts (11 feet, 6 inches in diameter); 38,225 cubic yards of substructure concrete; 9,446 cubic yards of superstructure concrete (pre-stressed slab panels); 27,622 cubic yards of mass concrete; 39,737 linear feet of cooling tubes; 8,188 tons of fabricated structural steel; 1,257 tons of stay cable strand; and 7,563 tons of reinforcing steel.

The 11.5-foot diameter drilled shafts averaged 85 feet in length at the deeper of the two main tower foundations. All were installed over water from a temporary work platform and were socketed 20 to 24 feet into 20-30 ksi limestone bedrock. Permanent casings were installed by the twist-in method.

The project included a major value engineering proposal that reduced piers 11 and 12 footing depths and seal depths, and increased quantities for seal concrete to meet required specifications. Additional modifications included changes to tower anchor boxes per MoDOT's request and an additional value engineering proposal that modified the electrical plans.

VALUE

$229,727,189

DATES

01/04/2010 – 03/08/2014

ROLE

Prime contractor, joint venture

REFERENCE (6/2022)

Randy Hitt, PE
Construction and Materials Liaison Engr.
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HIGHLIGHTS

- Design-Bid-Build
- Long-span cable-stayed bridge
- Challenging marine conditions
- 400-foot towers
- 12 largest capacity load-tested drilled shafts in the U.S.
- Aesthetic bridge lighting

AWARDS / ACHIEVEMENTS

- Finalist for the ASCE's 2016 Outstanding Civil Engineering Achievement competition
- MoDOT Top Performance Award for Heavy Volume Contractor, 2012
- Drilled shaft ATC saved $7.5 million.
- St. Louis Council of Construction Consumers awarded MoDOT the "Diversity Advocacy Organization of the Year"

Bill Emerson Memorial Bridge & Route 74, East Approach

Mississippi Department of Transportation, Cape Girardeau, MO

The Bill Emerson Memorial Bridge was constructed to replace the Cape Girardeau Bridge, a steel truss bridge built in 1928. Construction of the bridge was performed just south of the original bridge, which was demolished in 2004.

The large-scale cable-stayed bridge was constructed in the always challenging conditions of the Mississippi River. The project was located in the area of a sharp river bend, which created barge tow navigation hazards. The portion of the river was susceptible to large elevation fluctuation—a total of 40 feet in variation. Severe ice floes occurred, along with heavy debris drift during flood conditions. The sandy river soils were prone to scour, which required rock armoring of the cofferdams and other temporary structures.

The 86-foot-4-inch-wide cable-stayed bridge is supported by a total of 15 piers, including the land abutments in Missouri and Illinois, and has a main span of 1,150 feet and two side spans of 468 feet. The bridge substructure work included two dredged caissons and two 356-foot-tall main pylons. The drilled shaft foundation has 10 drilled shafts that extend into the rock 12 to 15 feet, each with a diameter of six feet. The superstructure work included 128 stay cables, eight million pounds of structural steel, and a precast concrete deck.

The two concrete caissons were located at the Illinois pylon and the back pier of the main cable-stayed span. The caissons were approximately 60 feet wide by 100 feet long by 35 feet tall. Each caisson contained 15 dredge wells approximately 15 feet in diameter. Both were constructed using the sand island method with 60-foot-tall sheet pile follower cofferdams attached to the top. The total sinking distance for each caisson was approximately 60 feet.

Work on the east approach involved construction of the deck, barrier walls, and electrical work on the Illinois approach bridge partially completed under separate contracts.

VALUE

$60,958,630

DATES

03/03/2000 – 12/13/2003

ROLE

Prime contractor

REFERENCE

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HIGHLIGHTS

- Cable-stayed bridge
- Challenging marine conditions
- One main span (1,150 feet) and two side spans (469 feet)
- Precast concrete deck

AWARDS

Recognition and appreciation for achievement of top ratings for prosecution and progress on the 2003 Contractor Performance Rating System for Specialty Contractors

William Natcher Bridge

Commonwealth of Kentucky Transportation Cabinet, KY and IN

The 4,505-foot William Natcher Bridge crosses the Ohio River connecting Owensboro, Kentucky, with Rockport, Indiana. The project has a 2,200-foot cable-span unit that consisted of two 500-foot backspans and a main span of 1,200 feet. The superstructure consisted of steel plate girders with precast deck panels that received a concrete overlay. The approach spans were steel plate girders along with AASHTO concrete girders. The three river piers were founded on 96-inch diameter drilled shafts. The land approach span piers were founded on 48-, 60-, and 72-inch diameter drilled shafts.

Use of a temporary stay cable provided stiffness to the main towers and falsework to support structural steel during erection. Erection of the Indiana cable-stayed spans began in July 2000 and was completed in May 2001 and the erection of the Kentucky cable-stayed spans began in June 2001 and was completed in February 2002. The project included 25,328 cubic yards of concrete and 7,650,000 lbs of reinforcing steel. There was a total of 5,489 tons of structural steel that was erected by Traylor's workforce. The towers were constructed to 345-feet above normal pool.

The contract value changes consisted of the added roadway items for the Indiana approach, additional drilled shaft length to achieve capacity, various other quantity overruns and underruns along with a VECP for 14-foot-long piles versus drilled shafts at end bent 2.

The fact that the project is one of the longer cable-stay spans over inland waterways speaks for itself. The main challenge was being able to work with the large amount of floating equipment, especially due to the capacity and size of the equipment. The experienced staff was able to overcome the challenge and minimize the risks associated with working in a difficult environment.

VALUE

$57,119,957

DATES

10/10/1997 – 10/01/2003

ROLE

Prime contractor

REFERENCE

Kevin McClearn (Retired)
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HIGHLIGHTS

- Cable-stayed bridge
- Precast deck panels
- 96-inch drilled shafts

AWARDS

2004 ASCE Opal Award Finalist for Outstanding Civil Engineering Achievement

2003 National Steel Bridge Alliance Prize Bridge Competition - Merit Award in recognition of outstanding design in structural steel, Major Span Category

William H. Harsha Bridge

Commonwealth of Kentucky Transportation Cabinet, Maysville, KY

The 2,420-foot Maysville cable stayed bridge crosses the Ohio River connecting Maysville, Kentucky, with Aberdeen, Ohio. The project has two main river piers founded on thirty-two 72-inch diameter drilled shafts. The approach span piers are founded on six 96-inch diameter drilled shafts.

Construction included two 52-feet by 74-feet sheet pile cofferdams located on each side of the navigational channel. This permitted the construction of the lower substructure to be cast in the dry.

The project consisted of 2,019 tons of reinforcing steel, 3,060 tons of structural steel, 24,924 cubic yards of concrete and 1,058,400 linear feet of stay cable. Compensation for various redesign changes such as stay cable pipe and wind tie collars along with final quantity overrun adjustments made up the difference in contract value.

The erection of the structural steel for the backspans on falsework towers was a challenging phase of the project. The fact that the stay cable towers were in excess of 300 feet above the water made the construction of the towers challenging.

There was an onsite precast yard with a batch plant to fabricate the precast floor slabs. The batch plant used was a rotating drum Ross 10 cubic yard central mix plant capable of producing up to 200 cubic yards of concrete per hour. The batch plant produced all of the precast concrete as well as the concrete bridge structure.

VALUE

$37,382,724

DATES

01/16/1997 – 07/27/2001

ROLE

Prime contractor

REFERENCE

Steve Criswell
Director of Construction
Commonwealth of
Kentucky Transp. Cabinet
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Frankfort, KY 40622
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HIGHLIGHTS

- Cable-stayed bridge
- Two river piers
- Challenging height for stay cable towers

AWARDS

American Consulting Engineers Council Engineering Excellence Award, 2001

US 82 Mississippi River Bridge

Mississippi Department of Transportation, Greenville, MS

The US 82 Mississippi River Bridge project involved the construction of a new cable-stayed bridge over the Mississippi River connecting Greenville, Mississippi, and Lake Village, Arkansas. The old Greenville Bridge was built in 1940 and was still structurally sound, but was poorly located, and as a result, was often struck by river traffic.

The new bridge includes 2.5 miles of bridge deck, twin concrete towers soaring 425 feet above the Mississippi River, two dredged caissons anchored 120 feet into the riverbed constructed by the floating method, and four fans of pre-stressing strand steel cable. When completed in 2006, the bridge's main span of 1,378 feet was the third longest cable-stayed span in North America, and one of the longest bridge spans of any type on the Mississippi River.

The new US 82 bridge has three spans of 591, 1378, and 591 feet and was relocated approximately 2,800 feet downstream from the existing bridge. The bridge carries four lanes of traffic (two in each direction). Each lane is 12 feet wide; has a 12-foot outside shoulder and an 8-foot inside shoulder. Close monitoring of the piers identified excessive scouring around the footings caused by levee and dike work performed upstream by others. The team worked with the client to provide a long-term, durable solution that left the cofferdam sheets in place, cut just above the top footing, and installed 40,000 tons of riprap in and around the cofferdam. The low-cost design change effectively mitigated impacts caused by other projects and was quickly implemented to keep the US 82 Mississippi River Bridge project on schedule.

The biggest challenge was floating the caissons, which was a unique aspect of bridge construction. Other concerns throughout construction involved dealing with high winds, flooding, and the steady current of the Mississippi River..

VALUE

$113,920,321

DATES

07/10/2001 – 09/25/2006

ROLE

Prime contractor, joint venture

REFERENCE

Scott Westerfield, PE
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HIGHLIGHTS

- Design-bid-build
- Long-span cable-stayed bridge
- 3.4-mile-long project
- Four lanes of traffic

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