CONTECH®
ENGINEERED SOLUTIONS

# Mining & Industrial

## Coal, Metal & Aggregates

- Proven history with material handling systems, grade separations & surface mining applications
- Complete bridge systems engineered to meet unique project requirements
- Prefabricated structures install quickly with less on-site equipment and less waste
- Durable products manufactured and installed to the industry's highest specifications
- Clear spans from 5'-0" to 250'-0"
- Total site solutions provided with extensive technical support

**Baker Industrial Bridge (WV)** — supports heavy construction equipment (Vehicular Truss Bridge)

**Sugar Creek Mine (MO)** — protection from falling rocks (CON/SPAN)

**Jacob's Ranch Mine (WY)** — extends mine entrance to accommodate third rail line (SUPER-SPAN)

**Carlota Mine (AZ)**— erosion control for high flows (ArmorFlex)

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# Pipe Support

## Truss Structures

- Proven history with installed pipe support and material handling systems
- Prefabricated structures install quickly with less on-site equipment and less waste
- Durable products manufactured and installed to the industry's highest specifications
- Clear spans from 5'-0" to 250'-0"
- Total site solutions provided with extensive technical support

**Long Span Solutions** — single truss pieces can be combined to span large areas or waterways

**Elevated Structures** — designed to meet project owners' clearance requirements

**Dual Applications** — pipe support structures may also provide necessary pedestrian walkways

**Multiple Structures** — support 72" diameter pipes carrying extreme temperature liquids at a nuclear facility

**Corrugated Steel Pipe** **Southeast Wisconsin**

**A-Jacks®** **Miami, AZ**

**ArmorFlex®** **Miami, AZ**


**ArmorFlex®** **Converse County,WY**

**MULTI-PLATE®** **Pueblo, CO**

**Steadfast** **Baker, WV**

**MULTI-PLATE® Rail Tunnel** **Black Thunder, WY**

**MULTI-PLATE® Conveyor Tunnel** **Black Otter, MT**

**CON/SPAN®** **Waynesburg, PA**


**SUPER-SPAN™** **Gillette, WY**

# Carlota Copper Mine

**, Arizona**

## Channel Lining

**Owner:**
Quadra

**Engineer:**
MWH

**Contractor:**
R.E. Monks

**Technical Description:**

- Product: ArmorFlex® Class 40
- Area: 151,000 sf

**Installation:**
August 2008

In the process of constructing the Carlota Copper Mine, Quadra needed to create a diversion channel for a large stream and eight other tributaries in the canyon. Originally, the channel was designed to be lined with shotcrete. After reconsideration of water velocities, differential settlement issues and long term maintenance, it was decided that articulating concrete blocks (ACB) would be the best solution.

The project was under a tight timeline and needed to be completed before the end of summer, when the heavy rains would begin to fall. Quadra chose ArmorFlex as the most economical, time efficient and environmentally friendly solution for the project.

Part of the challenge for contractor R.E. Monks was the limited working conditions. The site provided no access from above for a crane and allowed only loaders and excavators to be utilized. The installation began in early June and ended on August 8, 2008, meeting the construction deadline for the mine.

Additionally, the channel lining is designed for short term use. Due to the estimated mine life of nine years, the ACB mats will be in place for ten years before the channel is restored to its natural state.

The Carlota Copper Mine is a permitted and financed development copper project and is expected to be in full production in fourth quarter 2008. It is located in one of the most significant copper mining regions in the world.

# Arizona Copper Mine Diversion Channel

**, Arizona**

## Channel Lining

**Owner:**
Confidential

**Engineer:**
AJAX - Ltd.

**Contractor:**
Ames Construction

**Technical Description:**

- Product: ArmorFlex® Class 50T
- Area: 38,830 SF
- Product: DuroMaxx® SRPE, 440 LF of 36-in.

**Installation:**
June 2009

The owner of a copper mine required a new hard armor solution for the banks of a diversion channel. Their search led them to the website for Contech. After meeting with a Contech representative, they found out that a neighboring mine was installing 150,000 square feet of the same product they had been researching. After reviewing the product being installed, the mine decided to utilize ArmorFlex articulating concrete block (ACB) systems for their project as well.

ArmorFlex was selected from a group of channel lining options during the design process due to several advantages.

Challenges faced during this project included a very steep grade - 28.33% slope with high velocities - and three bends with super-elevation concerns at each bend. In addition, due to site constraints, it was challenging to unload the trucks near the first 500-ft. of the channel.

“The sales and engineering staff at Contech was very responsive to any questions or concepts we had during the early stages of design and continued to provide input and support throughout the bidding and construction stages of the project,” states Robert L. Martin of AJAX Ltd, the engineer on the project. “Once the design concept was selected, the Contech staff provided details and specifications for the products that were used for bidding. During construction, several minor adjustments were made to the alignment of the channel and they worked quickly with the Contractor and Project Engineer to verify the design change without affecting the construction schedule.”

Material was staged at the top and then trammed down to a more level starting point and worked uphill in order to eliminate movement of the mats. Benches/roads were improved to drive the trucks to the channel so that they could stage next to or near the working area.

Overall, the project utilized 38,300 square feet of Class 50T ArmorFlex, 4,900 square yards of geogrid, 5.532 square yards of Propex 104F filter fabric and 440-ft. of 36-in. DuroMaxx steel reinforced polyethylene pipe.

# Jefferson County Stone Conveyor Tunnel

## Louisville, Kentucky

### Mining

**Owner:**
Rogers Group

**Engineer:**
Process Machinery Inc.

**Contractor:**
Process Machinery Inc.

**Technical Description:**

- Product: MULTI-PLATE® Structural Plate
- Diameter: 14-FT

The Rogers Group needed a solution that could accommodate a conveyor system for a rock quarry in Louisville, Kentucky. Contech provided a 14’ diameter MULTI-PLATE structure designed with external ring stiffeners/ring beams, and 96 feet of 48” corrugated metal pipe utilized for the escape tunnel. The height of the pile will not exceed 60’.

This reclaim tunnel is used to mingle aggregate passed through a conveyor belt and loaded into delivery trucks. The structure allowed for three points of entry to pass the aggregates onto the conveyor belt. A concrete bottom was also poured to give a leveled path for the conveyor belt. Installation took one week.

# Bridgeport Quarry

## Chico, Texas

## Outfall Protection

**Owner:**
Lehigh Hanson, Inc.

**Engineer:**
Lehigh Hanson, Inc.

**Contractor:**
J.S. Redpath Corporation

**Technical Description:**

- Product: BridgeCor® 63S Single Radius Arch
- Span: 41-ft. 6.5-in.
- Rise: 29-ft. 8-in.
- Length: 30 ft.

**Installation:**
July 2014

Owned by Lehigh Hanson, Inc. (LHI), the Bridgeport Quarry is among the company's largest and most technically advanced aggregate facilities in North America. In addition to state-of-the art technology and environmental controls, the facility has comprehensive waste minimization, pollution prevention and recycling programs in place that focus on first minimizing any waste and then recycling it to the fullest extent possible. In fact, in February 2012, the Quarry was recognized for its environmental efforts by the National Stone, Sand and Gravel Association (NSSGA) by winning its top award, the Environmental Excellence Gold Award. The NSSGA's awards program was created in 1992 to provide national recognition for aggregate producers that meet and exceed technical, environmental and regulatory requirements.

In order to access the other side of the quarry under existing railroad tracks, LHI proposed blasting two 30 foot tall tunnels through a 100+ foot tall wall of limestone. There was concern that the exposed face of the limestone wall would deteriorate over time causing debris to fall and potentially injure workers and/or damage equipment residing close to the wall. It was decided that a canopy extending out from the tunnel would be installed to provide protection for workers and equipment. The traditional approach is to utilize large steel I-beams and corrugated steel sheets as lagging between them, but this option is both costly and time intensive so an alternative was discussed.

As a solution, four 41'-6.5" x 29'-8" BridgeCor® 63S Single Radius Arches, 30 linear feet in length, were installed in the tunnels as outfall protection canopies. The structures had a hot-dipped galvanized finish with the portion within the tunnels shotcreted to seal any gaps.

Numerous challenges presented themselves during all phases of the project. Initially, limited design criteria, structure geometry and geotechnical recommendations were unavailable so many assumptions were made. There was considerable coordination back and forth between Contech and J.S. Redpath Corporation (JSR), the contractor on the project, to finalize the structure and meet client expectations. Due to the application being a free

standing structure, rather than a buried structure, additional design considerations had to be factored into the structural analysis. These additional parameters lead to structural challenges, such as overturning from the wind load, and resulted in a higher than expected gage and more robust foundations. Due to the versatility of the product, these challenges were met and exceeded.

JSR selected Contech Engineered Solutions because of its ability to provide a turnkey solution. Contech provided: (1) preliminary consultative services to aid in structure selection, (2) cost analysis to assist with the contractor's bid and LHI's budget, (3) design services for the structure and foundation, as well as (4) assembly services to construct the arches in their final location. Overall, it took 14 days on-site to install and assemble the four BridgeCor plate structures.

"Working with Contech on the design, manufacturing and assembly of four BridgeCor portal canopies proved to be a great project decision," stated Kellan Osborne, Project Manager, with JSR. "From preliminary structure design through structure assemblies, Contech's customer service, product and installation were to the highest standards. We look forward to teaming with Contech on future projects."

# La Farge Mine Tunnel Extension

## Sugar Creek, Missouri

### Mining

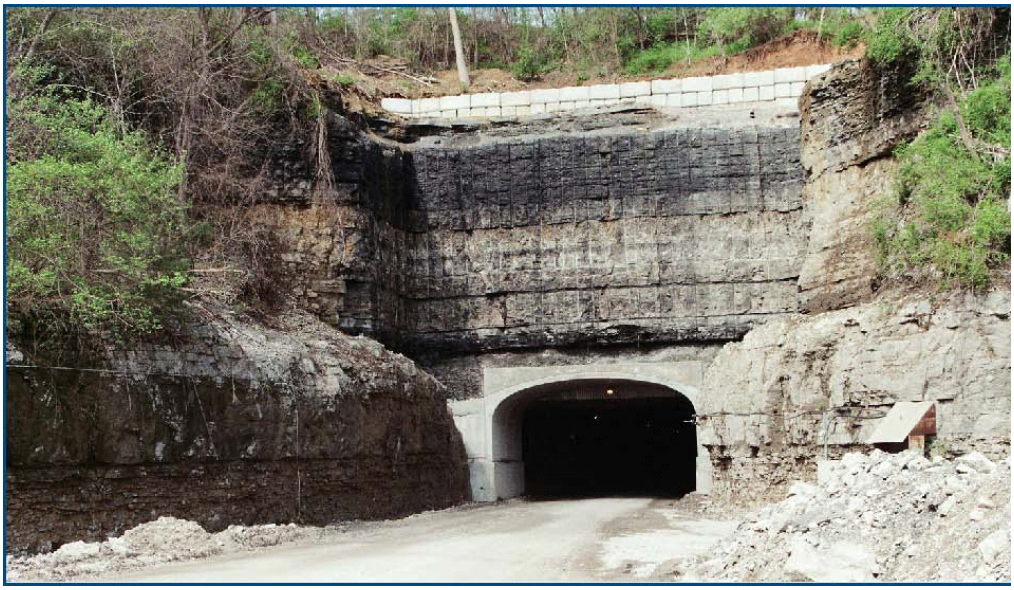
**Owner:**
LaFarge North America

**Engineer:**
LaFarge North America

**Contractor:**
LaFarge North America

**Technical Description:**
- Span: 28 ft
- Rise: 11 ft
- Length: 24 ft

**Installation:**
November 2007



Due to the concerns of falling rock at one of their limestone facilities, LaFarge North America (LNA) needed to secure the mine entrance from debris as soon as possible.

After consulting with Contech about their unique situation, LNA chose a 28' CON/SPAN precast arch because of the structures ability to withstand heavy impact loading. Construction was difficult in the very narrow working conditions between the rocks. However, each arch was lifted and set with heavy crane and instillation was complete in four hours.

LNA is the largest diversified supplier of construction materials in the North America. The company produces and sells cement, ready-mixed concrete, gypsum wallboard, aggregates, asphalt, and related products and services. These products are used across North America to build residential developments, office buildings, schools, hospitals, and recreational facilities.

# San Miguel Lignite Mine

## Christine, Texas

### Mining

**Owner:**
San Miguel Electric Cooperative, Inc.

**Engineer:**
Marston Environmental

**Contractor:**
M. Hanna Construction , Pesado Construction

**Technical Description:**
- Products Used:
- 6,000+ LF of 18-in. - 96-in.
- 937 LF of 20-ft.-5-in. x 13-ft.-0-in. galvanized and asphalt-coated MULTI-PLATE® pipe-arch

**Installation:**
July 01, 2008

San Miguel Electric Cooperative, Inc. and the North American Coal Company met to discuss the mine plan for the Christine, TX, lignite mining operation. The decision was made to develop an area north of the current mine area, enabling extraction of additional lignite reserves. San Miguel Electric Cooperative then contacted Marston Environmental about putting together plans for expanding the mine.

The project was a major expansion to the existing mine and it was imperative that the construction of this new phase did not hinder the existing mining operation. The scope of the project was to include the moving of over 1.8 million cubic yards of fill, the construction of nearly 3 miles of haul roads – in conjunction with several drainage crossings along the new route – and the construction of three separate pond structures.

One particular drainage crossing was analyzed as a major bridge crossing, so Marston Environmental contacted Contech to discuss the available options. After considering a BEBO® Concrete Arch structure, it was decided that a 5-Barrel MULTI-PLATE pipe-arch structure was needed in order to pass the required flows for the specific location.

Due to the permitting and approval process required by the Texas Railroad Commission, the overall project had a very short deadline. The project was bid in late April 2008; awarded the first week of May; construction began the second week of May and the entire project had to be completed by August 1st, 2008. Failure to do so would subject the contractor to liquidated damages of $10,000 per day.

As a result, the San Miguel Electric Cooperative decided to expedite part of the process by ordering the galvanized and asphalt-coated MULTI-PLATE pipe-arch structure direct. Contech provided the design engineer shop drawings, fabricated the material, coated the plates with an additional asphalt coating due to the existing corrosive soil conditions, delivered the material and provided two separate assembly crews to work around the clock in order to meet the required production schedule.

# San Miguel Lignite Mine

## Christine, Texas

The assembly of all 5 barrels was completed in 23 days which allowed the contractor to backfill the structures, construct the haul road using Tensar BX1200 geogrid and open the first segment of the project by July 1st, 2008 – a month ahead of the deadline.