

When our last newsletter was released this past summer we were discouraged by the lack of progress Congress was making to approve a new transportation bill. Now six months later **MAP-21**, our next long-term transportation funding bill, is officially signed into law. Although this bill does not provide the level of funding and long duration that many were hoping for, it was clear that the spirits of many bridge engineers and owners in attendance at recent bridge engineering conferences has improved.

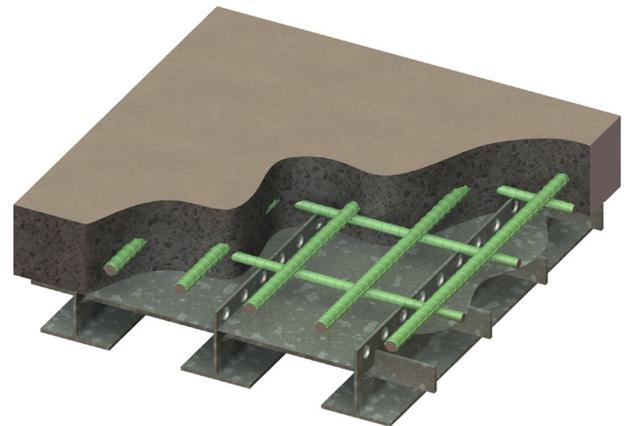


In October the **BGFMA** was pleased to have the opportunity to share two separate case studies with readers of *Roads & Bridges* magazine. The articles explained how grid reinforced concrete and Exodermic™ bridge decks can both accelerate construction and save weight, while still providing a very durable system for owners to rely on. The case studies highlighted several projects in which various types of closures and staging were used to minimize traffic disruption - such as overnight and short-term closures using precast grid deck panels, and also single lane closures using cast-in-place construction to rapidly replace the bridge decks.

Finally, the BGFMA would like to wish everyone a safe and happy holiday season!

Exodermic™ Bridge Decks an Economical Choice for New Movable Structures in Florida

Whether it's a swing span, vertical lift or bascule, movable bridges require drive machinery designed to move the span and create increased or unlimited vertical clearance for vessels passing below. To design cost effective drive machinery and counterweights it is critical for these moveable spans to be as lightweight as possible - which means a light deck system is required. Prior to the late 1990s nearly all movable structures utilized open steel grid decks since it is the lightest deck system available. Although these open grid decks are light weight, most owners will avoid their use whenever possible because of several commonly known disadvantages. To solve this problem, over the last decade most of the new movable bridges in Florida have been designed with a lightweight **Exodermic™** bridge deck system.



Exodermic™ Bridge Deck System

The first Florida bascule structure to use an **Exodermic™** deck was the **17th Street Causeway** in Ft. Lauderdale, designed by **EC Driver & Associates** and completed in 2001. The Exodermic™ deck allowed EC Driver to eliminate stringers and span the deck between floorbeams at 14.4 feet. This rigid deck weighed only 68 pounds per square foot and provides a safe and solid concrete driving surface. Exodermic™ bridge decks provide the same ride quality as a conventional rebar reinforced concrete deck at only a fraction of the weight, while eliminating the noisy ride of open grid decks. In addition the Exodermic™ deck system is more durable, protects the steel framing below from water and debris which reduces future maintenance, and is also bicycle & pedestrian friendly to name *(continued on next page)*

a few other advantages. When used in conjunction with lightweight concrete, these bridge decks can be designed to weigh as little as 45 pounds per square foot. Although this is still roughly twice the weight of an open grid deck system, it's likely **40-50% lighter** than a conventional concrete deck which allows for the design of an efficient drive machinery system.

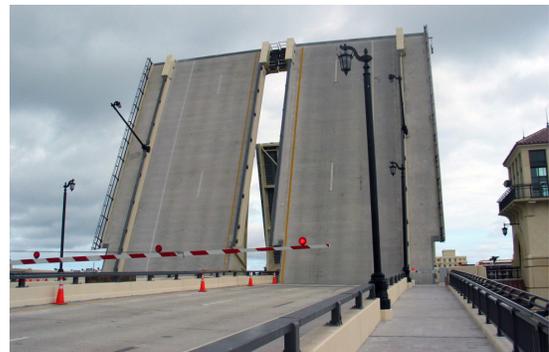


17th Street Causeway Bridge



Precast Exodermic™ Panels Prior to Closure Pour

With approximately **150 movable bridges** statewide, Florida has one of the largest inventories in the country. The DOT maintains approximately two-thirds of these movable bridges, and the other 50 or so moveable bridges are maintained by local or private sectors. The state has seven movable bridges with Exodermic™ decks installed and two more bascule bridge replacements currently underway that will utilize this type of deck: *Ocean Avenue* in Lantana and *Flagler Memorial* in Palm Beach. Consistent with Florida's past success using Exodermic™ decks, there are at least three additional movable structures in the design phase where an Exodermic™ deck will be specified. Outside of Florida, Exodermic™ bridge decks have also been successfully used on movable structures in NY, NJ, WI, WA, SC, VA, NH and OR.



Florida Bascule Bridge with an Exodermic™ Deck

McDonald Steel Corporation Celebrates 30 Years

With the announcement by United States Steel Corporation in November, 1979, of the closing of the Ohio and McDonald Works with a combined loss of 3,000 steel jobs, Dave Houck, then Superintendent of the McDonald Works, began to implement a business plan he developed years earlier. His vision was one of a much smaller operation utilizing one of the eleven original rolling mills in the McDonald Works. Instead of 1,750 employees, his plan called for 75 employees and a \$3.0 million investment.

Mr. Houck took his plan to politicians seeking funds to start his new company. With steel mills shutting down all around them, no politician wanted to be involved in such a risky proposition. He then approached U S Steel, but still being an active employee, no one there would negotiate with him. Eventually he was introduced to David Tod and Attorney Daniel Roth, who through their venture capital firm Torent Inc., helped raise the funds to launch McDonald Steel Corporation. So, on December 16, 1981, born out of the ashes of “Black Monday”...the beginning of the end for Youngstown, Ohio’s steel industry, McDonald Steel Corporation began producing hot rolled special shapes on a 1926 vintage rolling mill.

Fast forward thirty-one years later and **McDonald Steel Corporation** is the world’s leading producer of high quality hot rolled steel shapes and bars. Among the many products produced by McDonald Steel is the main bearing bar used on grid decks. Grid decks, coincidentally, were first produced at the McDonald Works of United States Steel Corporation, the very plant McDonald Steel operates today. The bridge industry, in general, is an important market for McDonald Steel as special shapes used in expansion joints are also produced by the company.

The company celebrated its Thirty Year Anniversary in 2011, with a steak fry and commemorative jackets for all employees and a dinner for the founders and board members at the Youngstown Country Club. Incidentally, the three principal founders are still active with McDonald Steel today, with Messrs. Roth and Houck serving as Chairman and Vice Chairman respectively, and Mr. Tod as Director Emeritus.

The company has always strived to be diversified in the markets we serve among which, in addition to bridges, are over road and off road truck rims, automotive and truck door hinges, material handling, railroad and the reinforced concrete pipe connector markets.

Through the years McDonald Steel Corporation has made numerous upgrades to the facility including back-up motor generators, a new metallurgical laboratory, new roller bearing stands for the rolling mills, implementation of first step manufacturing for our automotive markets in the form of saw cutting, installation of a new reheat furnace and this past year constructed a new office building.

McDonald Steel Corporation is ISO 9001 certified and utilizes lean manufacturing to reduce waste and lower cost on a daily basis. We look forward to the next thirty years and continued association with the BGFMA with much optimism.

Tim Egnot

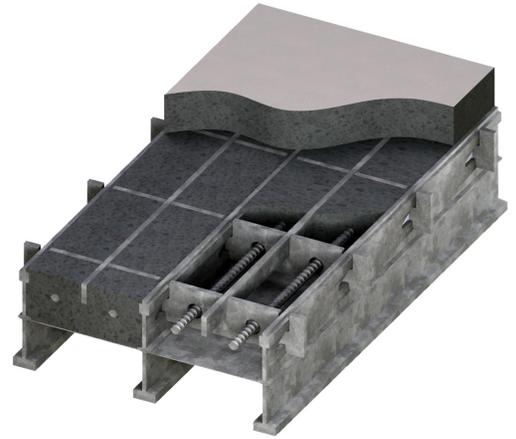
McDonald Steel Corporation



Grid Facts

Q: Is fatigue a concern with concrete filled grid or Exodermic™ bridge decks, and are these systems designed / checked for fatigue?

A: Fatigue has never caused performance issues with grid reinforced concrete decks. In fact, research on longevity of these decks supported recent revisions to the fatigue design provisions in the **AASHTO LRFD Bridge Design Specifications**. All grid reinforced concrete decks are designed for fatigue (Category C) in accordance with Article 4.6.2.1.8 although different approaches are used for standard fully and partially filled grids and Exodermic™ decks (unfilled grid decks composite with reinforced concrete slabs). Standard filled grids, with punches and welds encased in concrete, are checked in positive bending at the bottom of the cross bar punch as simply supported regardless of the span configuration; whereas Exodermic™ decks, with punches and welds external to the concrete, are checked at the bottom of the cross bar punch in positive bending and at the top of the cross bar in negative bending respective of the span configuration.



Rectangular Half Filled Bridge Grid Decking

When most people think of grid decks they think of open grid decks with no concrete infill, and often get the issues with this system confused with concrete filled and Exodermic™ bridge decks. An interesting statistic is that roughly 75% of all grid decks (by square footage) sold in the United States are concrete filled or Exodermic™ decks, and the other 25% are open grid decks. BGFMA is currently conducting research on open grid deck systems to help generate better design methods and increase the longevity of these systems, because they still have a role in the bridge industry.

More Information

If you would like to receive more information about the features and benefits of grid deck systems, please contact us at **1-877-257-5499** or bgfma@bgfma.org. We are also available to make presentations at your office and can offer continuing education credits for professional engineers as a registered provider in New York and Florida.

BGFMA Tradeshow Schedule

Please visit BGFMA members at our exhibit booth during the following upcoming bridge engineering conferences:

International Bridge Conference (IBC)	June 2-6	Pittsburgh, PA
New York City Bridge Conference	August 26-27	New York, NY
Western Bridge Engineers' Seminar	September 3-6	Bellevue, WA



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