

# SAFETY IN THE STRAITS: Line 5 design and construction

The Straits of Mackinac is a special place, and that’s why we take special precautions to continue the safe and reliable operation of Line 5 as it crosses under the Straits. Thanks in part to extraordinary design and construction standards, the twin pipelines under the Straits have not experienced any leaks in six decades of operation.

## Who built Line 5?

Bechtel Corporation, which also built the Hoover Dam, managed engineering, procurement and construction of the Straits crossing.

## What’s so special about the pipe?

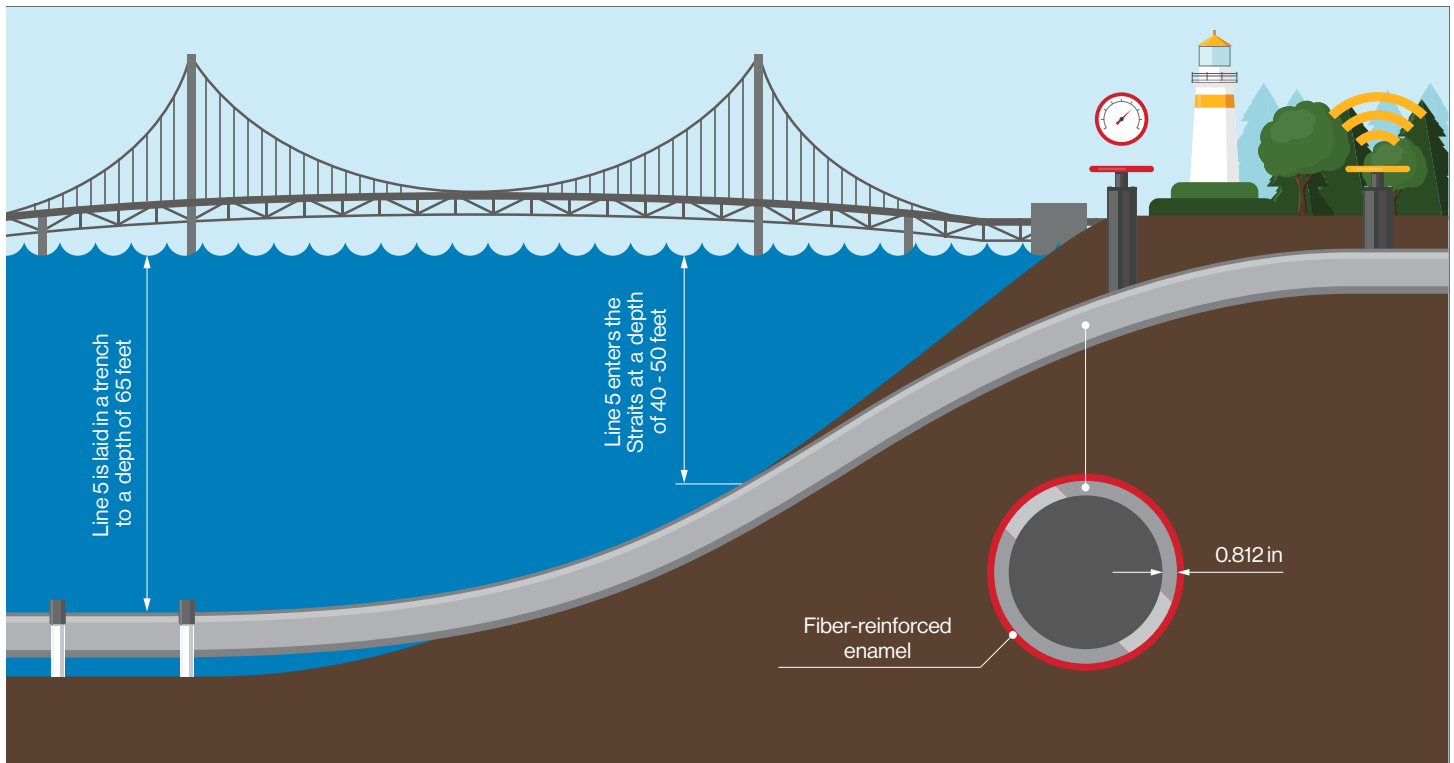
As it crosses the Straits, Line 5 uses heavier-walled pipe – a minimum of 0.812 inches – specially manufactured from molten steel “billets” for added strength. The Line 5 pipeline at the Straits crossing is the thickest walled pipe in our entire North America-wide network.

## Who else was involved?

Merritt-Chapman & Scott, which built the iconic Mackinac Bridge was the underwater contractor for Line 5, and used the same steel as the Mackinac Bridge.

## How does Enbridge approach design and construction?

In the midst of one of the most highly regulated and safest industry environments in the world, we look around the globe to apply the most advanced technologies and methods available to our pipelines. We also examine how other industries like medicine and aviation use science and technology to make their own critical infrastructure safe.



> The twin lines enter the Straits at a depth of 40 to 50 feet, protecting Line 5 from incidents involving anchors or moving ice packs. The pipes are laid in dredged ditch until the Straits reach a depth of 65 feet. At depths of more than 65 feet, the pipes run above the bed and are secured with screw anchors.

### Heavier-walled pipe, special steel

Before it began operation, Line 5 underwent extensive pressure testing with water (hydrostatic testing) multiple times, at more than twice the maximum operating pressure of the line – and up to four times the typical normal operating pressure of the pipes.

Key safety features in the design of the twin pipelines included:

- Specially manufactured steel, formed from a molten “billet” to produce seamless piping;
- Heavier-walled pipe – at a minimum of 0.812 inches, this is much thicker than required by the line’s operation or today’s regulators and is the thickest pipe in the entire Enbridge system;
- An external coating of fiber-reinforced enamel, recognized as one of the most robust pipeline protection materials, protecting the pipe from water corrosion.

### Built to last

In 1953, Enbridge’s Line 5 Straits of Mackinac crossing was built to extraordinary standards, using the finest engineering expertise from across the United States. The Line 5 Straits crossing was built for the underwater environment, and still exceeds today’s standards for pipeline construction safety. The twin pipelines under the Straits have not experienced any leaks in six decades of operation – a testament to their exceptional design, construction, and maintenance regimen.

Bechtel Corporation – one of the most respected firms in the world, with the Hoover Dam among its achievements – managed the engineering, procurement, and construction of the pipeline.

The underwater contractor for the Line 5 Straits crossing was Merritt-Chapman & Scott – the same company that built the iconic Mackinac Bridge, and the Line 5 crossing uses the same steel as the Mackinac Bridge.

The design of the Line 5 Straits crossing was co-ordinated, and underwent peer review, by engineering specialists from Bechtel, the University of Michigan’s Department of Naval Architecture and Marine Studies, and Columbia University’s Civil Engineering Department.

### What is Line 5?

Enbridge’s Line 5 is a 645-mile, 30-inch-diameter pipeline that travels through Michigan’s Upper and Lower Peninsulas, originating in Superior, Wisconsin, and terminating in Sarnia, Ontario, Canada.

Products moved on Line 5 heat homes and businesses, fuel vehicles, and power industry in the state of Michigan.

Built in 1953 by the Bechtel Corporation to meet extraordinary design and construction standards, the Line 5 Straits of Mackinac crossing remains in excellent condition, and has never experienced a leak in more than 60 years of operation. We’re working hard to keep it that way.