

## Case Study



### Connecticut Department of Transportation Waterbury Branch Railroad Culvert Relining Naugatuck, CT

**R**ebuilding America's infrastructure is the charge for today's municipal stewards. The infrastructure boom of the early 20<sup>th</sup> century is being followed by the reconstruction and rehabilitation boom of the early 21<sup>st</sup> century. Much has changed over the past 100 years, but the necessity for these critical components has not. In fact, the necessity drives the most notable challenge – maintaining functionality during reconstruction. This challenge is best illustrated by a recent rehabilitation of a Waterbury Branch RR culvert crossing in Naugatuck, CT, where CTDOT was tasked with the rehabilitation of severely corroded twin concrete arches.



The State of Connecticut purchased their portion of the New Haven Line from Penn Central in 1985, assigning ownership and maintenance responsibility to CTDOT. Subsequent maintenance assessments of culvert crossings are now culminating into a number of rehabilitation projects to ensure the continued operation of this railway. Due to its size, condition and location, the culvert crossing of the Waterbury Branch in the Borough of Naugatuck presented some interesting challenges.

The Waterbury Branch is located along the Naugatuck River, and this particular crossing has historically served as the outlet for the Long Meadow Pond Brook. As is commonly done to accommodate development, the stream was subsequently enclosed upstream of the crossing. The interesting twist in this story is the fact that a concrete vault at the upstream side of the crossing is under the Uniroyal Rubber Factory (three-story) Building.

With the river maintaining a water level several feet deep in the culverts and access crippled at the upstream opening, rehabilitation options were narrowing. The solution was found in a specialty product used for decades but virtually unknown by many of today's engineers – *aluminum structural plate*.

The existing concrete arches each had a 20-ft span and an open (i.e. natural) bottom. An 18'-5" x 11'-6" aluminum structural plate pipe arch shape was chosen for the reline material. The south culvert required 109-ft of relining, while the north culvert required 111-ft.

#### **CTDOT**

**Project No. 300-102  
Bridge No. 08280R  
Waterbury Branch**

#### **Owner**

**State of Connecticut  
Dept. of Transportation  
Bureau of Public Trans.  
Office of Rail**

#### **Engineer**

**H.W. Lochner, Inc.  
Rocky Hill, CT**

#### **Contractor**

**Mohawk Northeast, Inc.  
Newington, CT**

#### **Plate Manufacturer**

**Lane Enterprises, Inc.  
Pulaski, PA**

#### **Plate Supplier**

**New Form Supply  
Bucksport, ME**

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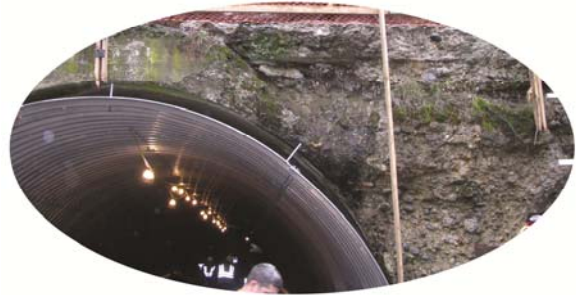


Structural plate is shipped to the site in curved plates and field assembled into its final shape by bolting. Lane Fabricators (a division of Lane) provides assembly when needed, but in this case the contractor had no qualms in completing the assembly.

With flow bypassed into the north culvert and a cofferdam constructed around the south culvert outfall, the south culvert was completely lined with structural plate in one day. A reversal of this arrangement facilitated the installation of the north culvert in a similar fashion.



Once the structural plate is assembled and the bolts are tightened, the pipe arch is precisely positioned with the use of alignment bolts. Alignment bolts around the periphery and along the entire length of the relining plate ensure the shape is properly situated within the host structure.



After the pipe arch has been completely aligned into its final position, preparations can be made to grout the annular space. The relining plate includes a number of grout plugs around the circumference and along the length to facilitate this process.



Due to the buoyant forces generated as the annular space is filled, additional bracing may be necessary to help counteract any associated movement. The grouting is typically staged into multiple lifts to lesson any flotation effects, with adequate setting time allowed between each pour.

The project included the complete rehabilitation of the concrete headwall. This final touch brought the appearance of the culvert restoration to a “like new” condition. From beginning to end the restoration project was accomplished in two months.

Aluminum structural plate is a durable, cost-effective relining material offered in a multitude of shapes, some capable of exceeding a 50-ft span. In today’s tough economic times with the demand for culvert rehabilitation growing stronger than ever, aluminum structural plate is the option not to be overlooked when budgeting related capital improvements. Please contact your local Lane representative to discuss related options for your upcoming projects.

