



Case Study: City of Canfield, Ohio

Northeast Drainage Improvement Project

A multi-phase drainage improvement project in Canfield, OH, will alleviate local flooding by upsizing an existing 48" concrete pipe no longer adequate to provide the drainage relief needed in a northeast neighborhood of the city bounded by I-76, Rt. 46 and Rt. 224. The first two phases will cost around \$1.2M, of which \$690,000 has been secured with a state grant. Two additional phases will follow.

Options precluded the use of larger (i.e. taller) circular crosssections due to the low burial depths over much of the concrete pipe. Under these restrictive conditions the design engineer consulted the local Lane representative to determine if a solution could be found in a specialty product used for decades but virtually unknown by many of today's designers – Structural Plate.

Offered in a multitude of shapes, some capable of exceeding a 50' span, structural plate affords a versatility unmatched by other engineering materials. Since Lane manufactures both steel and aluminum structural plate, the engineer could choose the material best suited for the application.

The initial phase used a 14"-8" x 4"-1" aluminum structural plate box culvert with a full invert, which provided the additional hydraulic capacity needed while not breaching the height restriction. Subsequent phases will primarily utilize a comparable 13'-0" x 3'-0" section. Fabrication of the full range of fittings (inlets, elbows, manholes, etc.) was also managed by Lane at their structural plate facility located in Pulaski, PA.



General Contractor
Foust Construction
Girard, OH

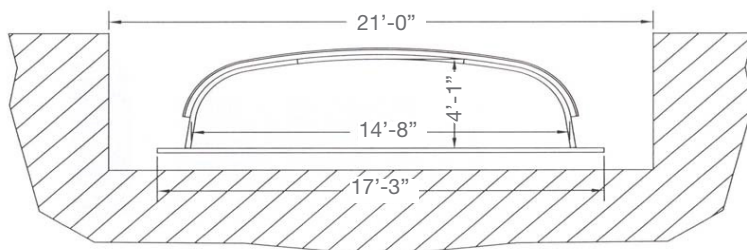
Design Engineer
MS Consultants, Inc.
Youngstown, OH

Owner
City of Canfield, OH

Structural Plate Supplier
Lane Enterprises, Inc.
Pulaski, PA

Construction Contracts
Phase I: \$512,520
500 LF ASP Box Culvert
(14'-8" x 4'-1")

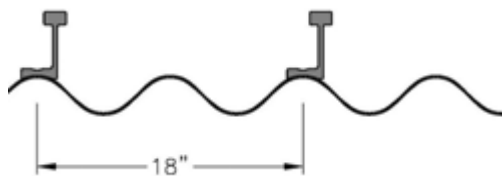
Phase II & III: \$665,000
900 LF ASP Box Culvert
130' of 14'-8" x 4'-1"
770' of 13'-0" x 3'-0"



Structural plate is usually shipped to the site in curved plates and field assembled into its final shape by bolting. However, a requirement to backfill excavations at the end of each day, coupled with an installation time constraint, created an insurmountable challenge with conventional installation methods. With Lane's plate manufacturing facility in close proximity to the job site, the economy was achieved by having Lane erectors assemble the box culvert in 9' sections at their Pulaski, PA facility, and ship the sections to the job site.

The lighter weight of aluminum structural plate created a significant handling advantage, especially in comparison to comparable concrete shapes. Foust Construction was able to install between four and five of the 9' sections per day and stay ahead of an aggressive completion schedule. Given the adverse conditions associated with excavating in between homes and in backyards, along with the potential for citizen complaints, the solution was optimized with the use of aluminum structural plate.

At the same height as a 48" concrete pipe, the box culvert shape provided over four times the cross-sectional area of the 48" pipe, significantly enhancing hydraulic capacity while also creating flood storage previously unrealized.



With the inclusion of stiffening elements low profile shapes can be constructed to withstand anticipated loading. Reinforcing ribs bolted to the corrugations along the top of the structure (ASTM Class C spacing) addressed any concerns associated with high service loads at low burial depths.

Structural plate is an AASHTO and ASTM recognized engineering material with published standards and specifications to guide the engineer through design and installation. The published material provides clear and rational engineering methods to ensure the highest levels of conservatism are maintained. Plate manufacturers can provide any necessary assistance to the design engineer to further ensure appropriate use. Please contact your local Lane sales representative to discuss related options for your upcoming projects.

