

FIBERGLASS PIPE DRAIN SYSTEMS for ELEVATED HIGHWAYS, BRIDGE APPROACHES and BRIDGES

By GARLAND R. WESTFALL

The I-70 interstate passes through busy downtown St. Louis, Missouri in view of the Gateway Arch. In the summer of 1986 a complete replacement drain system was installed to connect the scuppers and drains on the elevated I-70. The replacement program was to replace failing steel drains with reinforced thermal resin plastic (RTRP) drainpipe and fittings and to also paint the existing structures. The steel drains corroded due to high salt exposure and oil and gasoline droppings, to which the fiberglass is inert. This fiberglass drain installation was a first in the state of Missouri. The 1,320 feet of 10" pipe, 1,850 feet of 8" and a combination of 570 prefabricated and standard fittings were installed by two mechanics and a high school summer apprentice.

EASY INSTALLATION

A major advantage of a fiberglass system during installation is its prefabrication capabilities. Directional changes, clean-out saddles and scupper collectors can be attached and fitted to sections of pipe then lifted into place. The light weight and high strength is a natural for this type of installation. Figure 1 show two men can carry 40 feet of 8" pipe, which has been fitted with two collectors, one clean-out and one coupling. The total weight of this pipe section, with fittings, is 120 pounds. A simple two-man lift can be used to place the pipe into pre-installed hangers.

The RTRP pipe and fittings are easily assembled and can be fabricated by any



Figure 1 – Two men carry 40' of 8" pipe in Topeka, Kansas

competent contractor. No welding, brazing or soldering skills are required. The fundamentals of the adhesive bonded joints are easily learned. Contractors in the St. Louis area have been installing this type of pipe for more than twenty-five years.

DESIGN ADVANTAGES OF FIBERGLASS

Fiberglass is classified as a thermoset resin material. Fiberglass drain systems provide many advantages over metal and thermoplastic piping systems (PVC and CPVC). In the ambient temperature range of highways, the RTRP will not experience extreme expansions during hot temperatures or brittleness during the extreme cold. As a result, the support spacing does not present the problems that are associated with thermoplastics and is compatible with metal systems. (See figure 2 for support spacing) Fiberglass has the advantage of being stronger, lighter in weight (see figure 3) and also has a higher impact resistance

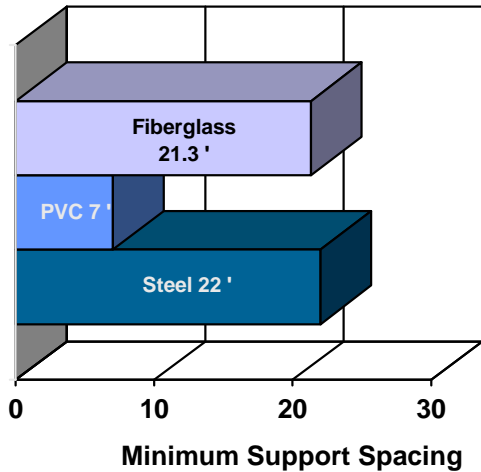


Figure 2 – Support Spacing for 10” pipe

than thermoplastics. Also, metal pipe is very heavy to handle and is a burden of weight on the structure. Metal pipe can experience corrosion both internally and externally. Normally the need for painting will occur. As mentioned, fiberglass pipe and fittings are now pigmented which eliminates the need for painting. Originally a fiberglass system was painted along with the structures. With the restriction of the V.O.C. of painting, pigmentation of the system was developed. This provides a shiny, slick finish that maintains a clean appearance and is U.V. resistant. Concrete Gray has become somewhat of a standard color for Illinois, Missouri and Kansas.

DESIGN FLEXIBILITY

Development of our fiberglass bridge system has occurred over the years with input from the Illinois, Missouri and Kansas Departments of Transportation.

Due to corrosion, removal of nuts and bolts from flanges on drain clean-outs was always a difficult task. That is now solved by installing a nonmetallic female thread in the fitting and inserting a threaded PVC plug. A clean-out saddle on a 45-degree angle provides clean-outs on the straight runs. The drains off the scupper are caught with a collector fitting. This collector acts as a funnel that allows several features. It reduces the vibration from the deck, allows for expansion and contraction, and provides a contractor a certain amount of plumbing flexibility. No splash-out is allowed because a floating fiberglass washer is used to cover the approximate 1-1/2 inch or space around the top. This collection design is perfect for retrofit, where a fitting is not available due to corrosion.

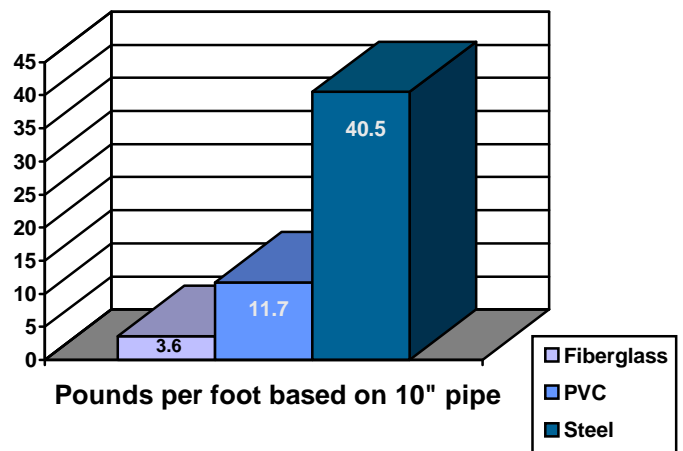


Figure 3 – Fiberglass Weight Advantage

An “all fiberglass” expansion joint will allow several inches of “water-tight” movement. Anchors are utilized with the expansion joints to provide a total

engineered system. This takes into consideration expansion and contraction to span the seasons. An expansion joint fitting was developed for the Calumet Skyway in Chicago (7,000 feet of 8" to 18") and the Southwest Trafficway I-35 in Kansas City, Missouri (5,000 feet of 8"). Figure 4 shows where two men are hanging 30 feet of 16-inch pipe, 95 feet above ground level.

Figure 4 – Chicago Skyway



CONCLUSION

A recent article in the June, 1996 publication of the American Automobile Association titled "America's Aging Highways and Airways," states that of the 570,000 highway bridges; twenty-five percent of those bridges are rated as "structurally deficient" or "functionally obsolete." A Westfall Company, Inc. survey indicates that many structures, both concrete and steel, are damaged due to failing drains. RTRP is the practical solution for the drain systems.

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About the Author:

Founded Westfall Company, Inc. in 1972. He holds a double major in Math and Physics. He is co-author of an ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc.) paper titled "The Use of Fiberglass Piping Systems in a District Cooling Application." Garland has been a distributor of fiberglass pipe since 1972, was a Piping Engineer at Monsanto, Queeny Plant, in St. Louis, Missouri from 1967 to 1971.

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