

Case History

CertainTeed

The Product:

A/C Water Pipe

The Location:

San Antonio, Texas

The Issue:

Corrosion

San Antonio, tenth largest city in the United States, found that metallic water pipe corroded disastrously in soil characterized by low resistivity and that, by converting to A/C, its soaring maintenance costs could be cut in half.

The Situation

The corrosive effect of San Antonio's low soil resistivity on metallic water pipe was widely publicized during the 1960's. (See attached reprint from the April, 1961 issue of Southwest Water Works Journal). This report is an update on what has happened to the San Antonio water system over the past 10 years.

The Problem

Maintenance costs for metallic pipe had increased from \$350,000 in 1951, to almost \$900,000 in 1959. The projected cost for the year 1970 was estimated at an "increasing rate of increase" to be \$4,000,000. This was in terms of 1959 dollars and without provision for the towering inflation of the 'seventies

The City Water Board realized that additional municipal funding to cover such costs would be next to impossible to obtain.

It further recognized that the necessity of continuing to provide quality water to the city's rapidly rising population was absolute.

The Solution

City Water Board General Manager Robert P. Van Dyke explained how San Antonio tackled its problem just as 4,500 other cities have done: it converted the system to A/C pipe.

"When pipe fails, the real cost of replacement comes from the labor involved in digging it up, burying new pipe and covering it up," he says.

Today, 99% of all pipe being installed in both replacement and new development areas of San Antonio is A/C.

Director of Engineering Hugh R. Anderson says A/C now represents over one-half of all pipe in the system. He says the conversion rate to A/C will continue at the current rate.

The Benefit

Maintenance expense for the system today is well under \$2,000,000 (half the figure projected in 1959). And this covers a 2400-mile system

that is about 25% larger than it was only 10 years ago.

The Results

By 1973, the system had reached an equal balance between A/C and metallic pipe in miles. In that year, the number of all breaks per mile of metallic pipe was 0.34, compared with 0.09 breaks per mile of A/C. That same year, breaks due to corrosion alone on metallic pipe were 0.25 per mile.

From 1967 through 1976, the San Antonio water system experienced a total of 11,815 main breaks, 8,970 (75.9%) of which were in metallic pipe. Corrosion was the direct cause of 6,781 (75.5%) of the metallic pipe breaks. (The remaining 2,189 breaks occurring in metallic pipe were attributed to soil shift and accidental causes.) During the same period, there were 2,738 breaks in A/C pipe, or only 23% of the total number of breaks in the entire system and all attributed to accident or soil shift.

In this connection, Mr. Anderson said in a 1975 report to the Water Board: "The bonding action of highly plastic clay soil as the clay shrinks could probably be minimized by the use of an envelope of four to six inches of tamped sand around the

Year	Total Breaks	Metallic Pipe Breaks	Metallic Breaks per Mile	Breaks Caused by Corrosion	Total A/C Breaks	A/C Breaks per Mile	Break Repair Expense	Miles in System
1976	1,185	888	0.37	640	288	0.12	\$1,180,647	2,373.5
1975	1,439	957	0.40	562	477	0.20	1,050,222	2,347.3
1974	1,395	923	0.40	631	465	0.20	900,677	2,258.0
1973	999	741	0.34	548	202	0.09	765,826	2,167.7
1972	963	751	0.36	700	212	0.10	552,822	2,090.0
1971	1,104	898	0.44	870	206	0.10	612,189	2,034.4
1970	1,143	931	0.47	825	212	0.10	601,960	1,981.5
1969	1,163	909	0.46	683	254	0.13	520,214	1,957.9
1968	1,116	923	0.48	650	193	0.10	486,538	1,915.7
1967	1,308	1049	0.69	672	229	0.15	445,238	1,870.0

over ▶

pipe. This recommendation has since been adopted for all A/C pipe through the 12-inch diameter. Since sand is a relatively low-cost commodity, it adds only minimally to installation expense.

Mr. Anderson observes that, although the 1975 study of main breaks blamed "soil shifts" as the cause of a number of metallic pipe failures,

"most of these breaks occurred on pipe sections that had already been significantly deteriorated and weakened by prior corrosion action."

"In the context of main breaks," he concludes, "the primary concern with metallic pipes is corrosion."

A/C pipe does not corrode. This is one major factor that has prompted so many municipalities to convert to value-engineered asbestos cement pipe. Other factors include:

1. Low installed cost
2. Structural integrity
3. Self-purging
4. Joint reliability
5. Versatility
6. Long service life

Case History



The Product:

A/C Water Pipe

The Location:

Waterford Township, Michigan

The Issue:

Maintenance Costs

Waterford Township, a suburb of Detroit, found that because A/C water pipe is impervious both to extremely low ambient temperatures and to extremely "hot" (low resistivity) soil, repair costs literally are reduced to zero.

The Situation

Since the city of Detroit supplies water to 40% of the population of Michigan, it specifies the kinds of materials that may be used by many suburban water systems. Until the 1960's, the specification was predominantly for metallic pipe.

But because Waterford Township, located in the center of Oakland County, pumps its own water from 12 wells to serve 11,000 customers over a 36 sq. mi. area, it has never been under Detroit's aegis. It is the only suburban community free to make its own rules and draw up its own specifications for materials.

Rapid growth of sub-divisions in the late '50's and early '60's turned Waterford Township from open farmlands dotted with lakes and recreation areas, into a community of homes. And with this growth came demands for a quality water system to serve the burgeoning community.

The Problem

Waterford Township has hot soil with high electrolytic concentrations. It also faces frequent "deep freezes" in wintertime.

The Water and Sewer Department of the township was well aware of the fragility of iron pipe under these conditions. Iron pipe, laid during the depression in an older section in the extreme southeastern corner of the township, was undergoing breaks at the rate of up to 40 a year with repair

costs running up to \$400 a break. The Department sought an alternative to metallic pipe, something which Alfred E. Beanblossom, assistant utility manager for the township, said would provide "more miles for the dollar" and stand up to the demanding climatic and soil conditions prevalent in the area.

The Solution

The township decided to go all the way with A/C pipe. Today, there are only ten miles of metallic pipe left in the entire system and, as it deteriorates, A/C is being used to replace it.

The Result

Mr. Beanblossom put it best when he said: "I can't recall even one break in our A/C pipe due to natural causes since it was installed in the early '60's."

Any breaks occurring as a result of contractor error or accident stemming from operations of other utilities are billed back to the party at fault so the program indeed is one with almost zero maintenance expense.

Mr. Beanblossom said that during the very cold winter of 1977-1978, he personally examined a section of A/C pipe that had been completely encased in frost four feet below ground level.

"The water was flowing through that pipe as freely as it does on a summer day," he said.

The Waterford Township system was designed by computer, Mr. Beanblossom said. It employs A/C pipe in all available dimensions: Class 150 in the 6", 8", 10" and 12" diameters and Class 200 in the 16".

"Fifteen years ago, the city of Detroit tried to persuade us we shouldn't put in A/C pipe," he recalled. "Today, due to the success we're having with it, Detroit is relaxing its previous rules on A/C for the suburban systems it serves."

He cites Independence Township, just to the north of Waterford, as one

example of a system that is converting to A/C as a result of Waterford Township's experience.

As a footnote, Mr. Beanblossom observed: "We use A/C everywhere: in our sewer system which serves 9,955 customers—as well as in our water system, and we're getting good results from both."

Case History

CertainTeed

The Product:

A/C Water Pipe

The Location:

Hutchinson, Kansas

The Issue:

Installation Cost

This city, in the geographical center of the U.S., saved \$149,000 (20%) by installing A/C water pipe and proved that, due to A/C's cost effectiveness, its very appearance in the specifications creates spirited competitive bidding on all materials specified.

The Situation

Until recently, metallic pipe, in one form or another, was the only material ever permitted in specifications written for the Hutchinson City Commission's water system. Except for certain circumstances, this also would have been the only specification permitted in a recent project for a municipal expansion area requiring 52,412 ft. of pipe as follows:

11,516 ft. of 12".

1,476 ft. of 10".

35,980 ft. of 6".

The above to be installed complete, including all related engineering work, fittings and valves.

As is the case in most municipalities, soaring inflation and the threat of further rate increases put mounting pressures upon the City Commission to keep down capital and maintenance costs and still provide satisfactory service to the community.

City Engineer Bernie Williams was faced with a financial dilemma of major proportions. After careful calculation, he estimated that this job would come in at about \$739,000. Both he and the Commission recognized that the time had come to reexamine the city's standard specifications in a search for more cost-effective alternatives.

The Solution

The search led the city to consider for the first time A/C Class 150 pipe. The Commission listened to the case for "A/C as equal to Metallic" on the

basis of both performance and cost. It heard estimates that the city could expect savings on first costs alone of from 10 to 15% by using A/C versus metallic in the city system. (Events proved even that estimate to be conservative.)

The Commission voted unanimously to allow A/C into the specifications, with one member expressing curiosity about why this had not been done long before.

The Benefits

Opening bids to A/C pipe had an immediate effect. Ductile Iron pipe prices for the first time in many years became truly competitive.

In fact, some contractors attempted unsuccessfully to stockpile quantities of D.I. pipe at these drastically reduced prices for their own inventories.

Successful bidder was Eve, Inc., Hutchinson contractor, who quoted the job with CertainTeed A/C Class 150 pipe, installed complete, at \$589,551.

"This bid represented a savings to the city of \$149,500, or 20% below the original estimate," said Mr. Williams.

City officials said this further assured the community that water rates would not be increased for at least the next two years.

The Hutchinson project was financed in the main through a federal grant from the HUD-administered Community Development Fund, with the balance supplied by the City Water Fund. Had financing come through a typical 5%, 20-year bond issue, the savings achieved through A/C would have totaled a quarter-million dollars at maturity.

The Results

After the installation was completed, the system tested out on the very first try without a single leak or any other problem. Mr. Williams was unable to estimate projected savings

in maintenance costs through use of A/C pipe because: "We have no track record with A/C as yet on which to base such an estimate."

However, Mr. Williams said:

"Prior to the specifications being changed to include A/C pipe, I was satisfied with its performance based on information received from other cities."

It would appear that after its textbook perfect acceptance test, Hutchinson will experience what other municipalities have already found: that A/C demonstrates the best track record of any pipe in the ground in every city where it replaces D.I.

An interesting sidelight was that the Hutchinson system was installed by a crew and foreman brand new to A/C pipe. Training was provided by CertainTeed personnel and some of the contractor's older hands, and the work proceeded without problem or incident.

Don Munsil, director of public works, said that by permitting A/C pipe to be bid, it resulted in a substantial saving in initial construction cost. "This left additional budgeted funds that could be allocated for other Water Department maintenance and operations or for future capital expenditures," he said. "Because of Hutchinson's water main extension policy, any saving in construction activity is a benefit for all our customers."

As a result of the success of the Hutchinson project, South Hutchinson has specified A/C pipe for a water main project that comes up for bid August 15. It comprises 11,000 ft. of 20" pipe, 11,000 ft. of 16", 6,000 ft. of 14", 4,000 ft. of 12", and 1,400 ft. of 10". Here, too, ductile iron was originally to have been the only material allowed.

Case History

CertainTeed

The Product:

A/C Water Pipe

The Location:

Northern California to Los Angeles

The Issue:

Cost Effectiveness

This is one of the largest, privately-owned, profit-motivated water companies in the western U.S. It serves 300,000 customers in 37 communities through 3,682 miles of pipe. The company feels that the pipe it uses must be cost-effective if it is to contribute to profits while fulfilling its primary mission of providing an uninterrupted flow of high quality water.

Company officials feel that widespread use of A/C pipe is a major contributor to its profitability because, in the words of one spokesman, "It costs from 30 to 50 percent less than ductile iron, is less expensive to install, and is considerably more reasonable to maintain."

In the ten years since 1968, company revenues have doubled, its net profit has grown 60 percent, and it has increased its dividends to some 10,000 shareholders every single year.

The Situation

California Water Service Company has 500 employees. It operates throughout the state from the upper Sacramento River Valley in the north, through the San Francisco Peninsula, down to Los Angeles County in the south. It supplies water at retail through 21 separate systems.

Shortly after World War II, the company found its iron mains suddenly disintegrating at a disastrous rate. As many as 80 breaks a day were commonplace. In one district of 25,000 customers, a six-month moratorium had to be declared on new connections because of the mounting break rate.

The causes: corrosion due to low soil resistivity in a number of areas, including populous Stockton and East Los Angeles. Additionally, salt intrusion was "playing hob" with ferrous pipe in the "blue mud" flats of the San Francisco Peninsula. Repair costs were becoming prohibitive.

The Solution

The company, upon the advice of its Engineering Department, turned to A/C—all it could get its hands on, even though it was in short supply at the time. A/C became an absolute "must specification" for all areas with "hot" or salty soil characteristics.

From that critical time, A/C has been used to supplant ferrous pipe and is installed exclusively in all new and expansion areas in diameters up to 18"

The Benefits

Company Purchasing Agent William R. Lewis said the installed cost of A/C is considerably lower than for steel or ductile iron.

"In diameters of 6" to 8", A/C costs 50 percent less than ductile," he said. "In larger diameters, the cost of A/C is from 25 to 30 percent less."

Mr. Lewis also stated that when A/C is installed right, breaks from all causes are few and far between.

"We sand-bed most of our A/C," he said. "That gives excellent protection at a nominal cost, especially in adobe soil which has a tendency to dry and shift during late summer."

The Results

The California Water System Company now has 2,097 miles of A/C pipe in its system. Approximately 98 percent of it is Class 150. Here are the footages of A/C pipe in the system by diameters:

4"	879,000
6"	5,463,000
8"	3,276,000

10"	267,000
12"	964,000
14"	44,000
16"	97,000
18"	57,000
20"	17,000

Most of the A/C pipe being installed in the system is CertainTeed

Since A/C has replaced iron in "hot" soil, salty soil, and even in earthquake-prone areas, maintenance and repair costs per foot have been substantially lower, according to Mr. Lewis.

An interesting sidelight is that the company does not require pressure tests after installation on pipe diameters up to 8". The reason is that the contractors used for these installations guarantee no leaks on these sizes for one year. On sizes over 8", the company does require pressure tests of 50 psi above the maximum operating pressures and never less than 150 psi.

"Our contractors are very pleased with the performance surety of A/C," Mr. Lewis said. "They have been for over 25 years."

Financing for sub-division installation work usually is done by the developer as is common with private utilities throughout California. Developers can use one of the company-recommended contractors and advance the cost of piping and hydrants under a 20-year refundable contract. The alternative is to use the water company's specs and choose their own approved contractor under the same financial arrangement.

Mr. Lewis summed up A/C's positive impact on company earnings by stating:

"A/C makes a definite contribution to our company's profits, not only because of its low initial cost, but because of its ease of installation, and much lower maintenance costs."