

Wooden Street Paving A Forgotten Technology

By David H. Journey

BEFORE THE DEVELOPMENT OF brick and asphalt paving for Dallas streets at the end of the nineteenth century, the city spent nearly twenty years experimenting with wooden paving blocks. Historical accounts have identified these blocks as "bois d' arc", derived from the Osage orange or bois d'arc tree (*Maclura pomifera*). However, recent scientific analysis of sample blocks recovered during archaeological excavations in Dallas's West End Historical District has revealed that they are creosote-treated pine, not bois d'arc. Why the discrepancy?

There's no question that early Dallas streets were abysmal. Little more than dirt paths, they became mudholes in rainy weather and dust bowls in dry. "I often saw from four to six mules pull themselves into 11 sorts of shapes trying to drag an empty wagon out of the black waxy bog of east Dallas," recalled one man. In 1881 the Dallas Herald complained that the city "had the most wretched streets and sidewalks" of any city its size in the country.

Timber blocks had been used as paving as early as the fourteenth century in Russia. Wood block pavements were laid in New York and Philadelphia about 1835, in England about 1838, and in Paris about 1880. The first blocks were round or hexagonal, and many different types of wooden pavements were patented between 1840 and 1913. About 1881 William M. Johnson, the Dallas city engineer, developed and patented a process for cutting and treating wood blocks and persuaded Tom L. Marsalis, owner of a grocery on Elm street east of Murphy, to pave a ninety-five foot strip of Elm which ran in front of his business.

Unfortunately, the first blocks, which were twelve inches long and irregular in shape, were laid down without any foundation in the virgin soil, and they began to sink, each to a different depth. "About the roughest thoroughfare in the world resulted," recalled one man. "Going over it in a vehicle was as wearing as riding a camel, and the people began to beg the City Council to give them back the original black, waxy mud." Trial and error disclosed that the wooden blocks worked better if cut into uniform eight to ten inch sections and spread on a bed of six to eight inches of gravel. The spaces between the blocks were packed with sand and then covered with coal tar or pitch. After a year of study and discussion, on June 19, 1883, the City Council accepted a bid from J. M. Henry to pave all of Elm Street from Jefferson to Sycamore at a cost of \$2.05 per yard.

In November, reporting to the council that the project was nearly completed, Mayor Cabell claimed it would be "durable and far superior to any wood pavement that has been laid down thus far." City Engineer Johnson reported that the new paving, which he referred to as bois d'arc, "will be a street of which Dallasites will be proud." The mayor recommended paving Main Street from Jefferson to Sycamore. By 1886 the Dallas City Directory proudly reported, "Three miles of bois d'arc pavement, the best in the world, have been put down in these two years."

Throughout the United States a variety of woods were used for paving blocks. Soft pine and cedar predominated, although oak, cypress, hemlock, Washington red cedar, cottonwood,

mesquite, Osage orange (bois d'arc), redwood, Douglas fir, tamarack, longleaf yellow pine, shortleaf pine, Norway pine, and blackgum were also utilized. In 1912 the American Society of Municipal Improvements specified that only one kind of wood be used in any one contract and that "blocks must be cut from good grade timber, sound and free from red heart, well manufactured," "free from worm holes, knot holes, and other defects."

The manufacturing process was also specified. Planks which had already been sawn from logs and correctly sized were cut up by a machine specifically designed for this purpose. The machine consisted of a series of circular saws spaced at distances depending upon the size of the block to be cut. The bed of this machine was wide enough to take a long plank, subsequently to be cut during its passage over the saws, producing up to 240,000 blocks per day.

The decay of wood paving blocks is due to fungi, produced by heat, air, and moisture. Creosote, obtained by distilling coal tar, wood tar, or water-gas tar, was used to preserve the wood, especially when the blocks were to be installed in wet areas. The success of a wood pavement depends on the quality of the creosote oil, not only to preserve the wood but also so that it will neither expand nor contract. The wood pavement of Tremont Street in Boston employed a mixture of one-half creosote oil and one half resin. Similar pavements were laid on the streets of lower New York up to 1904.

The foundation under the blocks was also critical, as City Engineer Johnson discovered in his initial unsuccessful efforts. The most effective road-bed contained subdrains, basins, inlets, and curbs. The crushed gravel subgrade was shaped to the surface of the finished pavement and carefully rolled and compacted. On the subgrade, a concrete foundation was poured. A thin cushion of sand or mortar was placed on the concrete to seat the wooden blocks, which were laid with no joint more than 0.125 inch, using nothing but whole blocks. After the blocks were placed, they were rolled by a steam roller until the surface was smooth and brought to grade and contour of the finished pavement. After the blocks were thoroughly rolled, a fine sand, cement, or bituminous (coal-tar pitch, asphalt, etc.) material was used to fill the joints.

One of the principal problems with wood block pavements was the oozing (bleeding) of the preservative fluid. The wear of the pavements was excellent; in Chicago, ten-year-old pavements were expected to last another ten years. When Main and Elm streets in Dallas were paved with asphalt in 1899, the wooden blocks which had been put down fifteen years earlier were taken up and used on San Jacinto and other streets. The wood pavement was much less noisy than stone, brick, crushed rock (macadam), or asphalt. It was, however, very slippery and could be sticky in hot weather. When too much preservative fluid was used, and a bituminous filler was used between the joints, there was likely to be an unpleasant seepage of these materials onto the surface of the blocks.

Wooden paving blocks were used in several Texas cities in the late nineteenth century. Approximately 10,000 have recently been discovered in Waxahachie. These blocks were reported to have once comprised part of the pavement for the Ellis County courthouse square. In 1993, Lillian Thomas Price, age 92, recalled that her father authorized one of his

tenants, John Mulkey, to collect these blocks when the pavement was stripped up and replaced with clay brick sometime in the late 1910s or 1920s. Two horse-drawn wagon loads were obtained, and the blocks were then used to floor a barn until the 1970s. When the barn was torn down, Ms. Price gave the blocks to Bernard and Mary Ellen Dale, who stored them outdoors at their farm until donating them to the Ellis County Historical Museum. These blocks are all creosote-treated pine, with crushed rock and asphalt adhering to the worn upper surfaces. Upholstery tacks, wire nails, and various items related to horse-drawn vehicles are also evident on their surfaces.

Creosote-treated pine blocks have also been recovered during archaeological excavations in Dallas in 1983 and 1987. These investigations were conducted for the Dallas Area Rapid Transit system (DART) in the Central Business District and the Dallas County Historical Foundation. Based on examinations of Sanborn Fire Insurance maps, some of these remains appear to be from the old Water Street, which ran beside the channel of the Trinity River, parallel to Houston Street. Both contemporary printed sources and oral tradition refer to these paving blocks as "bois d'arc." Yet scientific analysis of surviving blocks has revealed them to be creosote-treated pine or bald cypress. It is possible that the first paving experiments utilized rough, hand-hewn bois d'arc blocks, but that the engineers later switched to other woods to produce uniform blocks. There are several objections to the widespread use of bois d'arc. First, because bois d'arc is such a dense, hard wood, it is difficult to saw or cut. True, bois d'arc piers have been recovered from under Dallas streets, but these are rough cut and have not been shaped into six inch blocks. Second, bois d'arc is noted for the knots and holes that occur in mature trees. And, finally, there was not enough bois d'arc in Texas to yield sufficient lumber to pave even three miles of Dallas street much less those of other Texas cities.

Somehow, "bois d'arc" became a generic term for all wooden paving blocks used in Texas, a fact that has created considerable confusion as surviving specimens have been discovered, analyzed, and determined to be of other woods. Ms. Price, whose father saved the Waxahachie paving blocks, stated, "they called them bois d'arc, but they were actually pine put together with asphalt." The mystery may never be completely solved. What is clear, however, is that wooden paving blocks - by whatever name - played an important role in the development of the street systems in Dallas and other cities, facilitating the transportation of people and goods essential to urban growth.