About three years ago 'the writer heard Mr. Andrew Rinker, city engineer of Minneapolis, state that there had been no trouble from "bleeding" in the six or seven hundred thousand yards of creosoted blocks they laid in that city. Since that time there has been a change made in the timber specifications, while the oil is practically the same as was used prior to that time. Now there are complaints of "bleeding" in Minneapolis. As usual, this defect has been attributed entirely to the oil, and so far as the writer knows no one has even suggested that the wood is in any way responsible for the condition.

In selecting a wood for paving purposes, three things should be taken into consideration. These are:

First. The adaptability of the wood to the purpose designed.

Second. The availability of the wood selected.

fhird. The commercial conditions surrounding the wood selected.

By "adaptability" is meant both the probable service that will be given by the blocks manufactured therefrom, as well as the natural characteristics of the wood with respect to the manufacture of the blocks.

The writer of this paper does not intend to enter into any extended discussions of the natural characteristics of the various woods available for paving purposes. It is thought sufficient only to touch lightly upon this phase of the subject, in the hope that some of the members who are practical treating engineers will more extensively bring out these points.

A pavement, be it wood block, brick, stone, asphalt or tar, is laid for two purposes—namely, to facilitate traffic and to increase sanitation. The only feature worthy of consideration from the standpoint of this paper is that relating to traffic, and more particularly with reference to the effect of traffic upon the pavement. As this is true, it is necessary to select a wood which is sufficiently strong in texture to withstand the effects of the traffic and give a long life to the pavement.

Engineers, as a rule, are prone to be entirely too strict in their requirements. For instance, engineers of this country have been making long-leaf yellow pine the standard of perfection in a paving block. This wood has been used in probably seventy-five (75) per cent. of the creosoted block pavements laid prior to 1911, when they decided that a shortleaf pine might be used if of close growth. The change was a wise one, inasmuch as short-leaf pine, while not so strong a wood as the long-leaf, is sufficiently strong for a paving block.

There is a great deal of difference in the characteristics of the two woods. Long-leaf pine, according to Sargent, weighs 43.6 lbs. to the cubic foot, against 38 lbs. per cubic foot for the short-leaf. The specific gravity of the one is .70, against .61 for the other, while the modulus of rupture of short-leaf pine is barely 75 per cent. of the long-leaf.

The foregoing is cited simply to show that it is not necessary in selecting a wood for paving purposes to require one of the greatest possible strength, but simply to call for a timber of sufficient strength to withstand the stress to which it will be subjected under traffic.

Following this principal you will find that there are several commercial woods available for paving purposes, any of which are sufficiently strong for the purpose and elimination must come through the more technical features of wood preservation, such as the adaptability of the wood to treatment, and its power to withstand decay after treatment.

Experience has proved that in the Central West we have at least four woods which, when tested by every possible requirement, are suitable for paving purposes. These woods are Southern yellow pine, tamarack, hemlock and maple. The writer has had no opportunity to study the Norway pine. One street paved in Chicago with black gum is not considered a sufficiently conclusive experiment to warrant one to form a definite opinion.

The writer is thoroughly convinced that each of the four woods mentioned is sufficiently strong to withstand the heaviest of traffic, and from actual experience knows that each is adapted to treatment Observations made at our plant during the past year show that maple is the wood most easily treated, followed closely by tamarack and hemlock, all three greatly outclassing yellow pine in this respect.

Before proceeding to the other phases of the subject, I want to give you a few observations I have made of the results obtained by the use of these woods. For the past ten years the city of Chicago has confined its wood block pavements almost entirely to yellow pine, in fact all the streets laid prior to 1912 were yellow pine with two exceptions. These were about 1,500 yards of Southern black gum and about 8,000 yards of street car right-of-way paved with tamarack. In the past year we have laid a test intersection with maple, and about two miles of tamarack blocks. The yellow pine has given excellent satisfaction on some of the heaviest traffic streets in the country. We have one street in the loop district in Chicago paved six years ago with yellow pine, and certainly no one can say there has been the slightest failure due to any defects in the timber.

About five years ago The Kettle River Company, of Minneapolis, sold to the Chicago Railways Company some tamarack blocks which were used in paving the right-of-way on Dearborn Street, between Van Buren and South Water Street. Although the construction of this pavement is open to considerable criticism, especially the treatment around the tie rods, yet the pavement is in excellent condition to-day, and shows just as good results as have been obtained from yellow pine blocks.

A little more than a year ago our company furnished enough hard maple blocks to lay the intersection of Madison Street with Fifth Avenue, one of the heaviest traveled spots in the city of Chicago. It is estimated that the daily vehicle traffic on Madison Street is eight thousand, while that of Fifth Avenue is over five thousand. Pounded by traffic from four directions, these blocks do not show the slightest sign of wear. In fact, so satisfactory was the result that the Chicago Railways Company purchased its entire supply for 1912, specifying maple.

With reference to hemlock, I will simply call your attention to the results shown by this wood in the test pavement in Minneapolis laid under the supervision of the United States government. In a seven-year test, hemlock shows only a sixteenth of an inch more wear than the strictly long-leaf yellow pine. In compensation for this, I am reliably informed that the relative quality of yellow pine used in this test was better than that of any other wood placed in the pavement.

Certainly these instances would prove that so far as the strength of the four woods mentioned is concerned, that the engineer should have little or no hesitation in making his specification open to all. There is no doubt that hard maple is the strongest of the four, followed next by the yellow pine, and then by tamarack and hemlock. But each is sufficiently strong for paving purposes.

Little can be said on the subject of the availability of the wood to warrant the selection of any wood for paving purposes. It is necessary to assure oneself that the available supply is sufficient to fill the demand, and in considering this phase of the subject it is well to look to the future. The wood that is plenty to-day—when the pavement is planned may be scarce to-morrow, when the pavement is laid.