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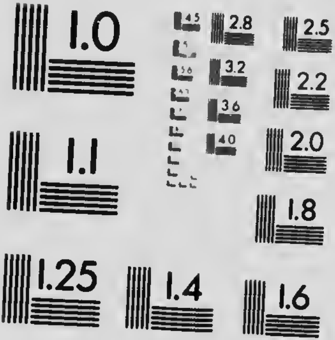

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DEPARTMENT OF THE INTERIOR, CANADA

HON. W. J. ROCHE, Minister. W. W. CORY, Deputy Minister.

FORESTRY BRANCH—BULLETIN No. 35

R. H. CAMPBELL, Director of Forestry.

FOREST PRODUCTS OF CANADA

1911

POLES AND CROSS-TIES

(REVISED EDITION)

COMPILED BY

R. G. LEWIS, B.Sc. F.

ASSISTED BY

W. GUY H. BOYCE

OTTAWA

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50682—1

LETTER OF TRANSMITTAL.

FORESTRY BRANCH, DEPARTMENT OF THE INTERIOR,
OTTAWA, September 15, 1912.

SIR,—I beg to transmit herewith reports on the 'Cross-ties Purchased' and on the 'Poles Purchased' in the Dominion during the calendar year 1911, and to recommend their publication as Bulletin No. 35 of this Branch.

The first of these contains an account of the cross-ties purchased by the different railway companies in Canada, steam and electric, during the year. The second report, namely, that on 'Poles Purchased,' contains an account of the poles purchased during the year, both in the aggregate and also separately, by (1) the steam railways, and telephone and telegraph companies and (2) by the electric railways, power and light companies. It groups also the poles used according to their length.

Your obedient servant,

R. H. CAMPBELL,

Director of Forestry.

W. W. CORY, Esq., C.M.G.,
Deputy Minister,
Department of the Interior,
Ottawa.

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CROSS-TIES PURCHASED IN 1911.

The reports on which this bulletin is based were received from 51 steam railways and 33 electric roads. The values given are based on the cost at point of purchase. The greater part of these ties are cut in Canada, but some of the higher-priced material is imported from the United States. The totals also include a few mine ties.

Table 1 gives the number of ties of different kinds of wood purchased in 1910 and 1911 with their total and average cost and the percentage each forms of the total.

TABLE 1.

Cross-ties Purchased, 1910 and 1911, by Kinds of Wood: Number, Cost, Average Cost per Tie and Per Cent each Species forms of the total.

Kind of Wood.	1910 Number.	1910 Cost.	1910 Average cost each.	1910 Per cent Distribution.	1911 Number.	1911 Cost.	1911 Average cost each.	1911 Per cent Distribution.
		$	$ cts.			$	$ cts.	
Tota	9,213,962	3,535,628	·38	100·0	14,389,224	5,540,769	·39	100 0
Jack Pine ..	2,195,075	728,496	·33	23·8	5,457,586	2,230,321	·41	37·9
Douglas Fir.	885,480	261,582	·30	9·6	1,947,662	740,548	38	13·5
Hemlock...	1,254,605	509,190	·41	13·6	1,674,047	590,878	·35	11·6
Cedar...	3,670,398	1,509,943	·41	39·8	1,433,395	577,427	40	10·0
Tamarack...	663,922	241,092	·36	7·2	1,389,897	438,280	32	9·7
Western Larch .					1,194,779	514,013	43	8·3
Spruce..	233,702	64,590	·28	2·5	901,629	232,969	·26	6·3
Oak.....	264,647	195,135	·74	2·9	149,747	121,215	·81	1·0
Red Pine..					73,712	23,308	·32	0·5
Chestnut..	19,184	12,243	·64	0·2	65,849	37,016	·56	0·5
Western Cedar					59,072	25,057	·42	0·4
Birch..					13,891	2,908	·21	0·1
Maple..					13,891	2,908	·21	0·1
Beech...					6,460	1,352	·21	*
White Pine.	1,838	661	·36	*	5,882	1,688	·29	*
Poplar ..					1,001	270	·27	*
Hard Pine..					444	491	1·11	*
Elm.......					222	95	·43	*
Black Ash.					58	25	·43	*
Unspecified	25,111	12,696	·51	0·3				*

*Less than one tenth of one per cent.

There were 14,389,224 ties purchased in Canada in 1911. This is an increase of 5,175,262, or 56·2 per cent, over the figures for 1910. The increase is due largely to railway construction, which was specially noticeable in the western provinces on the new transcontinental lines. The replacement of ties on existing lines amounted to about 10,000,000.

There were in all eighteen kinds of wood reported for cross-ties in 1911. Western larch, red pine, western cedar, birch, maple, beech, poplar, hard pine, elm and black ash were reported and classified separately for the first time.

Jack pine replaced cedar at the head of the list and formed 37·9 per cent of the total. The quantity of available jack pine and its wide distribution were probably responsible for its popularity.

Douglas fir increased from 9·6 per cent in 1910 to 13·5 per cent in 1911 and moved up from fourth to second on the list. Hemlock fell back and formed only 12 per cent. The new railway lines are building north of the northern range of this species. Spruce increased from 2·5 to 6·3 per cent on account of the same activity of railway building in the northern regions of the country. Cedar took an abrupt fall from first place on the list in 1910 to fourth in 1911. Practically all the cedar reported is Eastern cedar, as the western species is too soft for satisfactory use for cross-ties.

The average price of ties in 1911 was 39 cents, one cent more than in 1910. Of the species used in quantity, oak ties at 81 cents were the most expensive, and spruce ties were the cheapest at 26 cents. Spruce, hemlock, cedar and tamarack all show a decrease in average price while jack pine, Douglas fir and oak all show an increase. The prices of other woods are not comparable as they are purchased in such small quantities.

Table 2 shows the number and cost of cross-ties used by steam railways in 1910 and 1911, classified by kinds of wood, with the average cost per tie of each kind of wood and the percent each forms of the total.

TABLE 2.

CROSS-TIES PURCHASED, 1910 AND 1911, FOR STEAM RAILWAYS BY KINDS OF WOOD: Number, Total Cost Average Cost per Tie and Per cent each Kind of Wood forms of the Total.

Kind of Wood.	1910.				1911.			
	Number.	Cost.	Average cost each.	Per cent Distribution.	Number.	Cost.	Average cost each.	Per cent Distribution.
		$	$ cts.			$	$ cts.	
Total†	8,909,422	3,412,308	0·38	100·0	13,799,982	5,368,330	0·39	100·0
Jack Pine	2,180,891	723,402	0·33	24·5	5,433,086	2,219,521	0·41	39·4
Hemlock.	1,230,815	500,281	0·41	13·8	1,658,504	585,181	0·35	12·0
Douglas Fir.	788,286	217,409	0·28	8·8	1,624,392	673,787	0·41	11·8
Tamarack.	650,446	234,320	0·36	7·3	1,366,346	433,962	0·32	9·9
Cedar...	3,525,228	1,457,419	0·41	39·6	1,266,510	508,776	0·40	9·2
Western Larch..					1,194,779	514,013	0·43	8·7
Spruce	229,676	62,611	0·27	2·6	896,814	231,752	0·26	6·5
Oak..	257,947	191,155	0·74	2·9	144,763	118,172	0·82	1·0
Chestnut.	19,184	12,321	0·64	0·2	61,549	36,416	0·56	0·5
Western Cedar					59,072	25,057	0·42	0·4
Red Pine...					51,712	12,928	0·25	0·4
Birch..					13,891	2,908	0·21	0·1
Maple..					13,891	2,908	0·21	0·1
Beech....					6,460	1,352	0·21	*
White Pine...	1,838	661	0·36	*	3,488	716	0·21	*
Poplar					1,001	270	0·27	*
Hard Pine..					444	491	1·11	*
Elm......					222	95	0·43	*
Black Ash..					58	25	0·43	*
Unspecified ...	25,111	12,696	0·51	0·3				

* Less than one tenth of one per cent. † Includes a quantity of unspecified species.

Steam railways in 1911 used 95·9 per cent of all the ties purchased. They purchased, in 1911, 13,799,982 ties— an increase of 4,890,560, or 54·9 per cent over 1910. This increase is due, as stated above, to the construction of the new transcontinental railways. The steam railways bought their ties at practically the same prices as given in Table 1. They used all the ties made from Western larch (*Larix occidentalis*), Western cedar (*Thuja plicata*), birch, maple, beech, poplar, hard pine, elm and black ash.

Table 3 shows the number and cost of cross-ties purchased by electric railways in 1910 and 1911, classified by kind of wood with the average cost per tie of each kind of wood and the per cent each forms of the total.

TABLE 3.

Cross-ties Purchased, 1910 and 1911, by Electric Railways by Kinds of Wood: Number, Total Cost, Average Cost per Tie and Per Cent each Kind of Wood forms of the Total.

Kind of Wood.	1910.				1911.			
	Number.	Cost.	Average cost each.	Per cent Distribution.	Number.	Cost.	Average cost each.	Per cent Distribution.
		$	$ cts.			$	$ cts.	
Total	302,540	123,401	0·41	100·0	589,242	172,439	0·29	100·0
Douglas Fir	97,194	44,173	0·46	32·2	323,270	66,761	0·20	54·9
Cedar	145,170	52,524	0·37	48·1	166,885	68,651	0·41	28·3
Jack Pine	2,000	1,020	0·51	0·6	24,500	10,800	0·44	4·2
Tamarack	13,476	6.772	0·50	4·4	23,551	4,318	0·18	4·0
Red Pine	...	...	...	...	22,000	10,380	0·47	3·7
Hemlock	23,790	8,909	0·37	7·9	15,543	5,697	0·37	2·6
Oak	6,700	3,980	0·59	2·2	4,984	3,043	0·61	0·8
Spruce	4,026	1,949	0·48	1·3	4,815	1,217	0·25	0·8
White Pine	.		..	...	2,394	972	0·41	0·4
Cypress	10,184	4,074	0·40	3·3	....		....	..
Chestnut	......	.	.	....	1,300	600	0·46	0·2

Electric railways used only 4·1 per cent of the total number of ties purchased in 1911. The total of 589,242 is an increase of 95 per cent over 1910. This increase is greatest with Douglas fir, the use of which has increased over six-fold from 1910 to 1911, on account of the exclusive use of this material by some of the larger companies in Western Canada. Douglas fir was not used for ties by any of the electric railways of Eastern Canada. Fir ties formed over half of the total number purchased; this species replaced cedar at the head of the list. The cost of 20 cents is below the average for all kinds of wood.

Cedar ties, which had hitherto headed the list, fell back to second place with 28 per cent, and these ties increased in price from 37 to 41 cents, a price above the general average, demonstrating the increasing scarcity of this material.

Tamarack shows an increase in number but a reduction in price. Tamarack is found in small isolated stands and its prices and quantities vary with the accessibility of the material to the railway line.

The average price of 29 cents per tie in all kinds of wood used by electric railways is a reduction of 12 cents from 1910 and is due to the great reduction in the cost of Douglas fir ties, which form over half of the total. Electric railways got their ties 10 cents cheaper than steam railways. No red or white pine ties were used by electric railways in 1911.

PRESERVATIVE TREATMENT.

In Canada during 1911 only 206,209 ties received preservative treatment, or about 1·4 per cent of the total number purchased. This is nevertheless an indication of the growing interest taken in the subject by tie-users. In 1910 practically no treated ties were used, but since that time two plants have been established and are now treating ties for some of the larger railway companies.

An estimate of the saving that could be accomplished by a more universal use of treated material is of great interest. The average life of an untreated tie is seven years, and with the increasing use of perishable woods like jack pine, hemlock and spruce, this figure will be greatly reduced in time.

Assuming that there are about 70,000,000 ties placed in road-beds on well established lines in Canada, and that one seventh of these are replaced each year one can safely estimate the annual replacements at 10,000,000. The average life of a treated tie is seventeen years, and if the ties in use in Canada were treated, the annual replacements would be one seventeenth of the 70,000,000, or only a little over 4,000,000. To make this estimate conservative we can call the saving 5 million ties a year. The average tie is cut from a log containing 70 feet, board measure, of material, so the result would be an annual saving to the country of at least 350,000,000 feet, board measure, of raw material every year.

The saving in dollars and cents to the tie purchasers is also worth considering. The average tie purchased in 1911 cost 38 cents at the point of purchase and 20 cents to put in place; this brings the initial cost to 58 cents. In an untreated state this tie would last 7 years, and if the initial cost is divided by the number of years' service and a rate of interest of 5 per cent on the investment allowed, the annual cost of such a tie is found. This would amount to a trifle over 10 cents a year. If the same tie were treated with creosote at a cost of 35 cents, it would last seventeen years. Its initial cost would be 93 cents, and its annual cost through its lifetime only about 8 cents. This would result in a saving of two cents a tie and applied to the 70,000,000 ties in use would amount to a saving of $1,400,000 annually.

In considering the advisability of applying preservative treatment to railway ties the question of mechanical wear cannot be neglected. In the case of the softer woods it frequently occurs that the tie is actually worn out long before it decays. The constant sawing and cutting of the rail and the pulling and redriving of the spikes cannot be prevented by preservative treatment. A thorough impregnation with creosote reduces the moisture content in the tie and prevents further absorption of moisture. The result of this is an actual increase in the strength of the tie, but its amount can hardly be measured.

If, however, precautions are taken to prevent this excessive mechanical wear and preservative treatment is applied to prevent decay, the average life of the tie can be greatly increased. In addition to this, inferior species can be used for ties at a further saving. Jack pine, spruce, hemlock, lodgepole pine, Western yellow pine and many other species cannot be used economically for ties at present on account of rapid decay or mechanical wear, but were they treated and protected they would make excellent tie material.

The number of ties destroyed annually by various causes has been estimated as follows:—

Destroyed by decay	87	per cent.
Destroyed by insects	0·5	"
Destroyed by mechanical wear	12·5	"

The total number of ties destroyed annually in Canada and requiring replacement is approximately 10,000,000 and 12·5 per cent of these, or 1,250,000 ties, are annually destroyed by mechanical wear before they are decayed.

Under present conditions it would be of little use to treat this material with preservatives, but several new mechanical devices have been developed that tend to reduce the factor of mechanical wear to a considerable extent.

The screw spike used extensively on European railways holds the rail more firmly to the tie and reduces the wear due to spike pulling. Flat tie-plates of either metal or hardwood reduce the cutting of the rail-base. These two devices are not used to any great extent in Canada at present, but would materially reduce the loss of ties annually and permit the greater use of many species of wood now considered as inferior.

POLES PURCHASED IN 1911.

The statistics for wooden poles purchased in Canada during 1911 were obtained from reports from 282 companies. Of these 129 were electric light and power concerns; 102 were telephone companies; 28 were electric roads, 19 were steam railways and 4 were telegraph companies. The 102 telephone companies reporting included the three provincial telephone departments which buy poles in large quantities for the rural lines connecting with their systems. The 19 steam railway companies reporting included in their reports poles purchased for a large number of subsidiary companies. Taking this into consideration it is felt that the reports received represent at least 95 per cent of the poles purchased by Canadian companies.

These companies' head offices were distributed among the different provinces as follows:—Ontario, 165; Quebec, 33; Nova Scotia, 20; British Columbia, 16; Manitoba, 15; Saskatchewan, 14; Alberta, 9; New Brunswick, 9; and Prince Edward Island, 1.

These companies are divided into two main classes; (1) Steam railways telephone and telegraph; (2) Electric railway, power and light. Most Canadian steam roads operate telephone and telegraph lines in connection with the railways, and most electric roads distribute power and light. On this account it was found impossible to separate the different concerns further.

Table 1 shows the number, total value and average value of poles purchased in 1910 and 1911 divided into these two classes.

TABLE 1.

Poles Purchased 1910 and 1911: Number, Total Cost and Average Cost by Kinds of Wood and Chief Uses.

TOTAL OF ALL USES.

Kind of Wood.	1910. Number.	1910. Value.	1910. Average Value.	1911. Number.	1911. Value.	1911. Average Value.
		$	$ cts.		$	$ cts.
Total	782,811	1,043,874	1 33	585,703	1,056 277	1 80
Cedar	758,209	1,002,513	1 32	463,234	746,854	1 61
Western Cedar	.....	......	......	72,354	216,444	2 99
Larch	73	87	1 19	28,226	40,410	1 43
Spruce	5,524	7,228	1 31	8,764	8,983	1 02
Douglas Fir	60	180	3 00	7,906	29,994	3 79
Jack Pine		...		3,318	2,986	90
Hemlock		...	...	555	936	1 69
Red Pine	..	......	...	156	2,054	13 17
Chestnut	772	1,084	1 50	150	788	5 25
White Pine				68	728	10 71
Hard Pine				30	280	9 33
Unspecified	18,203	32,782	1 80	942	5,820	6 18
STEAM RAILWAYS, TELEPHONES AND TELEGRAPHS.						
Total	744,387	891 899	1 18	521,572	764,398	1 47
Cedar	720,758	852,860	1 18	422,588	595,880	1 41
Western Cedar	....	......		57,597	112,234	1 95
Larch	60	60	1 00	28 213	40,394	1 43
Spruce	5,026	5,847	1 16	8,577	8,730	1 02
Jack Pine	...	..		3,318	2,986	0 90
Hemlock		....		555	936	1 69
Red Pine		......		156	2,054	13 17
White Pine	.....	.....		68	728	10 71
Unspecified	18,203	32,782	1 80	500	456	0 91
ELECTRIC RAILWAYS, POWER AND LIGHT.						
Total	38,454	151,975	3 98	64,131	291,879	4 55
Cedar	37,451	149,653	3 99	40,646	150,974	3 71
Western Cedar	.	.	....	14,757	104,210	7 06
Douglas Fir	60	180	3 09	7,906	29,994	3 79
Spruce	498	1,381	2 [illegible]	187	253	1 35
Chestnut	432	734	1 69	150	788	5 25
Hard Pine	...	.....	...	30	280	9 33
Larch	13	27	2 08	13	16	1 23
Unspecified		.....	...	442	5,364	12 14

The total number of poles purchased in Canada in 1911 was 585,703, being a decrease of 197,138 from the figures for 1910. In all the different classes of pole-users there was a decided decrease in the number of firms reporting purchases, as compared with 1910. It is probable that many of these firms were sufficiently stocked to meet their requirements for 1911. There was also a decrease in the construction of new pole lines.

The total value of the poles was $1,056,277, an increase over 1910 of $12,403, which is explained by the advance in the average price per pole from $1.33 to $1.80.

Cedar was still the most important pole wood, probably on account of its form, durability and comparative cheapness. A total of 535,588 poles was reported for the two kinds of cedar, comprising over ninety per cent of all poles purchased. Of these 463,234 were Eastern cedar at $1.61 and 72,351 were Western red cedar at $2.99. On the whole there was a decrease of about 30 per cent in the number of cedar poles purchased, and an increase in price of almost 36 per cent.

Larch poles are used extensively in the Western provinces for rural telephone lines. Out of the 28,226 larch poles reported, 25,000 were used by the Alberta Government. These poles were cut in Alberta. Larch is the only tree native to Alberta which can be used, untreated, for poles.

The use of spruce poles has increased steadily in the last three years. In 1909, 2,070 poles were used. In 1910, 5,524, and in 1911, 8,764. During that time the average price remained practically the same.

Chestnut poles were used only locally and in small quantities.

Altogether eleven different kinds of wood were reported as having been used for poles. Of these, six were reported and classed separately for the first time in 1911. These were Western cedar, jack pine, hemlock, Norway or red pine, white pine, and hard or yellow pine.

Steam railways, telephone and telegraph companies purchased 521,572 poles in 1911 at an average cost of $1.46. This was a decrease in number of thirty per cent from 1910, but this class still included about ninety per cent of all poles used. These companies also purchased nearly ninety per cent of all the cedar poles of both species—a total of 480,185, at a price of $1.47. They also used all the poles reported for white pine, red pine, jack pine and hemlock.

Electric railways, power and light companies purchased 64,131 poles in 1911 at an average cost of $4.55. This was an increase of 69 per cent over 1910 in quantity, and an increase of 14 per cent in price. These companies purchased all the Douglas fir and yellow pine poles reported. The high average price paid by the electric companies was probably due to the fact that they purchased the largest and the best class of poles in comparatively small quantities and usually could not obtain their poles locally.

The high price paid for white pine, yellow pine and chestnut cannot be compared with the others as these poles were purchased in very small quantities for special uses. The activity of hydro-electric power companies in 1911 was largely responsible for the increase in this class.

TABLE 2.

Poles Purchased, 1911, by Length-classes and Kinds of Wood: Number, Total Cost and Average Cost.

Kind of Wood.	Total—All Length Classes. Number.	Value.	Average Value.	20–25 Feet—(58%). Number.	Value.	Average Value.
		$	$ cts.		$	$ cts.
Total.	585,704	1,056,277	1 80	402,746	451,156	1 12
Cedar.	463,234	746,854	1 61	333,557	368,828	1 10
Western Cedar.	72,354	216,414	2 99	27,778	29,383	1 05
Larch	28,226	40,410	1 43	28,213	40,394	1 43
Spruce..	8,764	8,983	1 02	8,087	7,053	0 87
Douglas Fir	7,906	29,994	3 79	835	1,459	1 74
Jack Pine.	3,318	2,986	0 89	3,318	2,986	0 89
Hemlock.	555	936	1 68	458	597	1 30
Red Pine.	156	2,051	13 16			
Chestnut.	150	788	5 25			
White Pine	68	728	30 58			
Hard Pine.	30	280	9 33			
Unspecified.	942	5,820	6 17	500	156	9 91

Kind of Wood.	26–30 Feet—(17%). Number.	Value.	Average Value.	31–35 Feet—(3%). Number.	Value.	Average Value.
Total.	99,884	217,601	2 17	49,840	183,993	3 65
Cedar.	77,901	166,739	2 14	31,658	323,512	3 50
Western Cedar.	21,619	49,926	2 30	12,205	49,265	4 03
Larch						
Spruce	301	719	2 48	314	949	3 02
Douglas Fir				2,328	8,213	3 52
Jack Pine.						
Hemlock..	60	180	3 00	20	77	3 85
Red Pine.						
Chestnut.				150	788	5 25
White Pine						
Hard Pine.				30	280	9.33
Unspecified.				135	879	6 51

Kind of Wood.	36–40 Feet—(3%). Number.	Value.	Average Value.	41 Feet and Over—(2%). Number.	Value.	Average Value.
Total.	20,788	102,754	1 93	12,445	302,770	8 25
Cedar.	11,344	49,211	1 31	5,771	40,494	7 01
Western Cedar.	6,499	12,505	6 54	4,253	45,365	10 66
Larch	13	16	1 23			
Spruce.	18	61	3 41	34	68	4 85
Douglas Fir	2,867	10,716	3 74	1,876	9,576	5 30
Jack Pine						
Hemlock	17	82	4 82			
Red Pine.				156	2,054	13 16
Chestnut.						
White Pine				68	728	10 70
Hard Pine.						
Unspecified.				307	4,485	14 60

In the above table the poles are classified according to length-classes, which permits of a close comparison of the relative values of the different kinds of wood.

Over 68 per cent of the poles purchased were 25 feet long, or less, this being the length most used by telephone and telegraph companies. In this length-class, Douglas fir was the most expensive wood used at $1.74, although the quantity was comparatively small. Larch came next in average value, at $1.43, and, as practically all the larch poles are in this class, the price is a fair indication of the relative value of the wood. Spruce poles at 87 cents and jack pine at 89 cents were the cheapest reported. Cedar poles, of which there were altogether 361,335 at a price of $1 10, were still the most important in number and below the average in price. Cedar poles at $1 10 each would appear to be much better than larch poles at $1.43 each.

A small difference in the length of a pole makes a great difference to its price. In the 26-to-30-foot class, the average price was nearly double that in the 20-to-25-foot class. Seventeen per cent of all the poles used were of this length. Cedar (Eastern) made the cheapest pole at $2.14. The quantities of fir and hemlock used were too small to be considered in a comparison.

The 31-to-35-foot poles formed only eight per cent of the total and had an average value of $3.65. Douglas fir became more important in this class and formed about four per cent of the poles of this length, at a price below the average. Spruce was the cheapest wood used at $3.02, but formed a very small per cent of the total. Chestnut and hard pine poles were confined to this class.

Douglas fir became still more important in the 36-to-40-foot class and increased in quantity to over 13 per cent and was also the cheapest wood used in any quantity in the class.

In the highest length-class, that of poles 41 feet long or over, fir still formed over 15 per cent and was the cheapest wood used in any quantity. Red and white pine poles were confined to this class, the red pine poles being all over 50 feet.

In all length-classes cedar formed the greatest part of the purchases, and its price was below the average in every case. As cedar is the most durable Canadian wood as well as one of the lightest, it will continue to be the most popular species for poles so long as it can be secured in large enough quantities.

When one considers that a purchase of nearly 800,000 poles a year means the destruction of even a greater number of whole trees, he realizes the extent of this particular drain on the forests. While the greater number of these trees are small, under thirty feet in length and eight inches in diameter, each one represents a potential timber tree. In cutting timber for poles there are several sources of waste, including damage to remaining timber, cutting to specification and long butting to avoid flares and hollow butts. While this waste is partly necessary, careful and scientific utilization would effect a considerable saving before the poles were set in place.

Cedar poles in 1911 formed over ninety per cent of all poles purchased in Canada. Cedar grows only in southeastern Canada and British Columbia being entirely absent from our great stretch of northern woodland.

Cedar poles are now imported into Canada in fairly large quantities from the United States.

The average cedar pole is cut from a tree about 190 years old, and if put in place, untreated by any chemical preservative, it will decay and become useless within 14 years. It is evident from these facts that the supply of cedar poles is doomed to speedy destruction.

A telephone pole is not subjected to mechanical wear or excessive strain of any sort, and practically never wears out. It invariably decays long before the end of its mechanical life. Under these conditions some sort of preservative treatment is a self-evident necessity. Up to the present time in Canada the cheapness of poles and the cost of the treatment have prevented pole-line builders from using any preservatives.

Table No. 3, from Bulletin 84 of the U.S. Forest Service, shows the actual financial saving per annum in the maintenance of a pole line by using different preservative treatments. Interest is figured at five per cent.

TABLE 3.

ESTIMATED financial saving due to creosote treatment of poles.

Species.	Size of Pole.		Character of Treatment.	Amount of preservatives applied per pole.	Estimated cost of treatment.	Estimated cost of pole in place.	Estimated length of life.	Annual cost.	Annual saving due to treatment.
	Diameter.	Length							
	In.	Ft.			$ cts.	$ cts.	Yrs.	$ cts.	$ cts.
Northern white cedar	7	30	Untreated			7 00	14	0 71	
			Brush treatment.	5	0 20	7 20	17	0 64	0 07
			Open-tank treatment..	50	1 05	8 05	22	0 61	0 10
Western red cedar	8	40	Untreated. ..			9 50	10	1 23	
			Brush treatment...	8	0 30	9 80	13	1 04	0 19
			Open-tank treatment..	40	1 35	10 85	20	0 87	0 36
Western yellow pine	8	40	Untreated			8 00	3	2 94	
			Brush treatment...	6	0 30	8 30	5	1 92	1 02
			Open-tank treatment...	60	1 90	9 90	20	0 79	2 15
Lodgepole pine.	7	35	Untreated			7 00	5	1 62	
			Open-tank treatment..	40	1 25	8 25	20	0 66	0 96

In this table the two Canadian cedar species were chosen because poles of these woods formed the majority of the poles purchased in 1911. Western yellow pine and lodgepole pine were included to show the great increase in life that can be effected by preservative treatment of those so-called 'inferior species'. It is seen that the financial saving is greatest in the case of those woods which are perishable in contact with the soil if used untreated. In this state their annual cost is high on account of the frequent replacements necessary. When treated, however, they last from four to six times as long, and their annual cost is greatly reduced.

Considering Eastern cedar alone, the table shows that the brush treatment effects a saving of 7 cents a pole every year, while the open tank treatment saves 10 cents a pole. In 1911, Canada purchased 463,234 cedar poles. By applying the brush treatment an annual saving of $32,426 would be made, and with the tank treatment the annual saving would be $46,323.

One can estimate with reasonable accuracy the reduction in the annual cut of pole timber that would result from the use of preservative treatment. The average life of an untreated pole is 13 years, and of a treated pole 23 years. The life of the average pole would be increased ten years by preservative treatment. Practically all the poles set in Canada at the present time are untr[illegible] and the annual replacements approximate 600,000.

If all the poles used in Canada were treated, a saving of 264,000 poles would be made each year, which is equivalent to a saving of 1,584,000 board feet of timber.

This estimate does not take into account the treatment of perishable woods. When these so-called inferior species are treated, their natural life is increased by much more than the general average of 10 years used in the above estimate, and the corresponding annual saving is greatly increased.

Spruce, jack pine, lodgepole pine and Western yellow pine are all fairly good pole-timbers as far as taper, height, strength and weight are concerned, but they are not durable if used in the untreated state. There are two methods of creosote or tar-oil treatment that are specially adapted to poles and can be easily and cheaply applied.

While the brush treatment does not give the best results, it can be applied without the installation of expensive apparatus: a bucket of hot preservative and a brush complete the equipment. In seasoned timber a penetration of from one-eighth to a quarter of an inch can be obtained. If two coats are applied to the surface, between the two foot and eight foot points on the butt, each pole will absorb about four pounds of the preservative.

The open-tank method requires a stationary equipment and is not adapted for use in remote districts. A tank of some sort to hold the preservative, in which the butts of the poles can be heated, is necessary. The method consists in immersing the poles in alternate hot and cold baths of preservative. The contraction and expansion of air in the wood cells causes an absorption of the liquid into the sapwood of most coniferous woods. Where a large number of poles are used annually, this method is applicable and is fairly inexpensive.

In the United States where poles are even more expensive, on the average, than in Canada, it evidently pays to apply preservative treatment. In 1910, there were 824,673 treated poles used in the United States, or over 21 per cent of all poles used in that year.

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" 38. Forest Products of Canada, 1912: Pulpwood.
" 39. Forest Products of Canada, 1912: Poles and Cross-ties.
" 40. Forest Products of Canada, 1912: Lumber, Square Timber, Lath and Shingles.