

A Survey of the Douglas Fir
Pole and Piling Industry in the
Willamette Valley

by
Rex Caffall, Jr.

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Introduction

The purpose of this article is to present a survey of the Douglas Fir Piling business in an analytical manner. The use of D. F. piling is extensive for abutments, flood dams, trestle work, harbor, river and other marine improvements. In swampy or morass areas piling are used for under structure and lastly they are used for support of false work in foundation building.

The market of this business includes the Orient, South America, Pacific Coast and in longer lengths the Mississippi Basin plus the East Coast. Japan being the greatest purchaser of D. F. piling export stock. The piling sold in this market range from the 18' pole to the 90, 100 and 120' long piling. This variation in size of the product shows where, in the very start, this business requires careful planning and administration to carry on its functional operation. For example, it may be seen that the company could become too wholly involved in the storage function and lose its profits by reason of lost interest on investment.

The Pacific Northwest is the greatest producer of D. F. piling and the Willamette Valley produces the greatest amount of export piling. Since the Northwest is the only production area of D. F. and if there is to be D. F. piling, it is only natural that a fairly large percentage would come from here. Besides being able to produce large quantities there is another reason for our high percentage of D. F. export. This is the only place in the world where

commercial quantities of 90', 100' and 120' piling can be produced and in the Orient there is a demand for these lengths.

CHAPTER I

Qualities of Pole and Piling Timber.

The basic consideration for piling is concerned with the specie. It is necessary to obtain a specie that will not rot in contact with the soil, however, the importance of this consideration is somewhat alleviated by the use of preservative treatment. Cedar is the most durable specie and is least affected at the ground line by alternating dry and moist conditions. Poles and piling are used almost without exception in the round form exposing their sapwood to the soil. This being the most vulnerable part of the tree to decay. This last point shows the need to select a durable specie or one which may be duly treated.

Second in importance in considering what to use is a combination of accessability and quantity. The timber to use must be readily accessible to modern logging means and in commercial quantities. The purpose here is an expression of cost. A producer must be able to offer his product at a favorable price or he will be affected by the direct substitution of another product.

Also important is the strength of the wood. The wood used for poles and piling must be strong enough to resist the stress and strain incident to its condition and loading. Added to the factor of loading are the loads caused by sleet, snow and excessive windage. It is important here that the wood be not brittle. For explanatory purposes herein is presented a precise of what the "Cedar Makers Handbook" remarks

on the question "What is a pole".

This article in its strict meaning applies to Red Cedar poles, but it can, due to its generality, be readily adopted to Douglas-Fir poles and piling.

A pole is a support for wires carrying various form of electrical energy. Piling are used for structural support. Lengths from 20' - 25' are used in the city. Poles 25' long with a 6" top diameter are used for long distance telephone lines. The pole dimensions increase with the voltage carried until they reach the point where two pole towers are built. These poles, therefore, all have to carry considerable weight. When the engineer starts out to figure what size pole he must use, he figures weight of the wires, the cross arms, the insulators and then the natural factors as wind and sleet. He then figures the weight of the man who will be climbing the pole to repair the wires, often when the wind is blowing and a sleet storm raging. Consequently, a pole must be of good timber and contain very few defects. Ask yourself when you make a pole, if you would be willing to be the lineman, climbing up that pole some windy night. A pole must be made of live, growing timber. A dead pole is brash and will snap off if a little extra load appears.

The engineers for telephone and power companies have determined by tests the load of an average pole of a certain length and of certain top and butt measurements. Therefore, knowing the prevailing loading conditions for a particular job, they can set up the requirements for an order.

In conclusion, a perfect pole will be one that is cut from green growing timber, has a uniform taper from butt to top, has no butt rot, no cat faces, no top rot, knots trimmed close, no dead or dry streaks and is straight. Poles and piling may deviate slightly from these requirements, but only to a limited extent, subject to rigid inspection. (The Cedar Makers Handbook)

Another important item in the basic consideration is that of straightness. This particular characteristic is very definitely defined in reference to poles and piling. In the scaling rules it is stated "that the axis must remain within the pole or piling over its entire length". In plain language this means a theoretic straight line drawn from the center of the butt to the central point of the top must at all places be contained within the piece.

One other consideration which is made is concerned with the susceptibility of the material to treatment. This particular process is a subject in itself and is only mentioned here in regard to its being a basic consideration in the selection of piling material. For simple comparative purposes and with a degree of accuracy which may be depended upon in deciding upon investment in treated material this following statement is called to the attention of users of wood.

"Properly treated D. F. piling costs four or five times more than green but gives a protected life of 25 to 40 times longer".

Figure 1



Piling felled and peeled.

Figure 2



Cat skidding peeled piling
from the woods to the landing.

CHAPTER II

Production

Section 1. Standing timber.

Cruising

Cruising of piling is usually accomplished by two different approaches. To describe these, one is called a subsidiary cruise; the other a straight piling cruise.

The first of these, called the subsidiary cruise, is, as its name implies, the situation where the primary motive of the cruise is to procure the board footage of logs in the area, and piling is cruised as an additional item. In pursuing this method the only process necessary is to carry a special tally on the piling which is mixed with the stand.

Considerable piling is logged off of small tracts and so called farmers' wood lots. In both of these cases a straight piling cruise is made of the patch. In some of these cases an operation is called upon to buy the land outright, therefore, a cruise is necessary to determine what will allow for an operation. This cruise determines the value of the timber both physically and as to footage.

The main differences in cruising piling are in the volume determination and the factor of straightness. Logs are cruised in terms of board footage, piling is always cruised as to lineal footage. As to cruising for straightness, its importance is self evident. This particular item last mentioned is greatly a point of judgement and necessitates ex-

perience in order that the effect of the amount of "off alignment" may be determined.

Stumpage values

Variation in stumpage values is directly proportional to length. The range includes from one half cent ($\frac{1}{2}\text{¢}$) up to three cents (3¢) per lineal foot. The cost according to length can be best cited by some examples:

low 20' to 25' length @ $\frac{1}{2}\text{¢}$ to $3/4\text{¢}$ / lineal foot

high 100' to 120' length @ $2\frac{1}{2}\text{¢}$ to 3¢ / lineal foot

(Herein may be included a price list on poles and piling of various lengths.)

Another variation in general stumpage values may occur according to the method by which the product is purchased. There may be a difference in price between the timber bought directly or that which is bought from a logging operation. Another difference may also occur with the type of purchase which concerns outright buying of the land.

Direct buying referred to in this article means the type of purchase wherein the piling is purchased on a per footage basis and charged as stumpage. This is the system under which the poles and piling are paid for as so much per foot of length. This is often practiced on farmers' wood lots and small tracts, and under these conditions is the fairest method.

In larger areas and in connection with a log show the piling is purchased in a unit of a thousand lineal feet at an average price, either in the woods or delivered to a

pre-agreed point.

Direct land purchase involves a study to see if the timber value will give the returns sufficient to cover the original investment plus incurred expenses. Under this system the form of accounting determines the price either per foot of length or as a unit of one thousand feet. The accounting principles involved vary from simple to complex cost accounting and the final price may under this system vary from those prices of the other methods of price determination. The only way that this price could be compared with the other prices would be to divide the total cost (for land) by the total footage standing, giving a value for a foot standing.

Section 2. Expenses on standing timber.

Expenses on the standing timber occur on tracts bought to be kept in reserve. The main item of expense here is the lack of return on the money herein invested. At the usual rate of 6% per annum this is charged off against the timber and carried as an accrued expense against the timber. The second item charged here is that of taxes and is handled in the same manner as loss on investment. If this timber is held by an option you may or may not have to pay the tax amount. In some areas that are controlled by a protection group it may be necessary to pay a small fee per year to maintain this fire protection. These above items are the main sources of standing timber expense and apply mainly to reserve tracts held by the operator.

Section 3. Logging.

Straight piling show.

On an operation which is strictly a piling show it is a tractor (cat) and truck job. Piling is too valuable a piece commodity to risk the possibility of power logging. To delve slightly into the history of the operations it must be remembered that prior to cats it was an animal type of logging operation. As the business modernized it evolved from animals to "cats". Due to this description of the type of "short haul" transportation it can readily be seen that in this business that all the pieces are moved in the woods by the "skidding" process.

Power loading apparatus and machinery are more or less foreign to a straight piling show. The process used almost without exception is the principle of the "Rollway". The "rollway" is a landing located at a slightly higher elevation than the road upon which it lays parallel. The poles and piling are skidded onto this landing from which they pass to the truck. The truck pulls along side the rollway and skids are placed between the truck's bunks and the landing. The poles are then rolled onto the truck with peavies. This method, although accompanied by hand labor still remains the most economical way even in this machine age. Different mechanical loading systems have been applied to this basic principle but as yet no one has been universally accepted.

This straight piling show is extensively used in the Willamette Valley where a large percentage of the piling cut

is from the small area tracts.

Subsidiary to log show.

Each particular log show, where piling is present in commercial quantities, may offer a different method. Quite often these methods are an outgrowth of the company's policy. Some timber companies prefer to sub-let the piling contract to a private operator, others log it in conjunction with the original operation, and still others sell the piling outright.

When the piling is sub-let to an individual operator, he will log it in a method closely approaching the straight line method. He will use as many principles of straight piling operation as will remain in harmony with the logging operation.

Where the company does its own logging, the piling will be cut and handled in the same manner as the logs.

Under the circumstance where the piling is sold outright, the operator will attempt to get away from the log show and usually conforms to a straight piling operation principle.

Comparison of logging methods.

Cutting piling in cooperation with logging is usually a little less expensive because it allows for use of the roads put in by the logging company. Also many timber companies have considered this business as an unimportant subsidiary item and consequently have sold it at a low price only as an additional return on investment.

Through inquiries in the Willamette Valley it is found

that about 75% to 80% of the piling cut is produced by straight piling show methods. Due to the difference in volume of cut the value of any price comparison is faulty. It is, however, at the present time slightly cheaper to produce piling in cooperation with a log show.

CHAPTER III

Transportation

One of the pioneer industries in large scale truck hauling was the piling-pole business. At the present time, nearly all poles and piling are hauled from the woods by truck. Only the places where rail transportation facilities are readily at hand or economically available is the product taken from the woods by rail. This truck hauling works very well with the straight piling show principle.

To the sorting yard.

The transportation system leads to two distinct types of storage areas. One is the yard type; the other is the boom or pond type.

In supplying the yard type storage area, it is not uncommon for the trucks to haul from the woods to the yard. Also under this type of storing, it will often be found that the trucks will haul to a rail head in the area adjacent to the woods. From the rail head the pieces will be loaded on to cars and hauled by rail to the sorting yard. This particular method is most often applied to poles and used in areas where water transportation is impractical.

When the product is placed in yards, it is sorted as to size and prepared for sale. If the product is sold to the consumer near by, the usual method is to handle the short haul by truck. If the product is to go quite a distance away, it will be re-loaded on to cars and hauled by railroad.

The best specific example of efficiency in yard storage and delivery from the same that I can cite is that of the National Cedar Pole Company. This company, then the largest in the business, had a standing gaurentee to deliver any place in the United States any size order of cedar poles within twenty four hours (24). The margin of profit here was sacrificed to efficiency, and direct substitution of other timbers for cedar poles finally forced them to limit their scope.

Water transportation.

Piling carried by water is taken from the woods by the same primary hauler as used with the railroad and truck. This piling is hauled to a "dump" where it is unloaded into a boom on the river. The piling is then rafted and held together by "dog lines". These dog lines are cable lines with open headed dogs through which the cable passes. The dogs are driven into the piling and the cable wrapped around the outside sticks, then pulled tight to hold the individual sticks in place. This line is passed across the front end of one brail of piling, wrapped around the outside stick, then carried ahead and wrapped around the outside stick of the brail ahead; thus a continuous line of brails (one line wide) are stretched out and prepared for transportation. The boat hooks onto the head end of the raft and tows it to its destination.

When the piling reaches the sorting boom it is scaled. After scaling the raft passes through a process of breakdown wherein it is sorted into rafts of like lengths and sizes.

Those pieces which do not conform to a particular size or are culled out in scaling are sorted to a cull pocket to be processed into a merchantable product later as the need arises. This water method may appear to involve considerable handling and movement, but piling is light and easily moved around in water so the cost is relatively small for the amount of work done.

Both rail and water methods are used. For the smaller sizes, especially poles, either method is practical. In handling the longer lengths, however, the water method is the cheaper.

To break it down to single units, the essential difference in handling a single piece is: In the yard the single piece is moved about by mechanical power; in the water the single piece is moved by man power.

Figure 3



The landing.

Figure 4



Landing with loading rig in
the background.

CHAPTER IV

Scaling and Grading Piling

Section 1. Scaling piling.

Piling scaling is a process of determining the number of pieces of certain sizes and lengths contained in the random units delivered to the sorting place. In the yard these pieces are usually sorted and then scaled. In the water the process is different.

The random length and size raft is brought to the sorting boom. Now before breakdown to rafts of sorted pieces this raft is scaled. The best way to clarify this is to present the process. A man with a sharp axe goes through the raft "scabbing" (single cut in wood) to give a spot on the individual piece where its size can be marked. He is followed by two men with a measuring tape accompanied by a marker. The tapeman reads the size and the marker writes this on the scab. Then two men equipped with "swindle sticks" (scale hooks) and tally books start over the raft. These last two measure the diameters and record the number of pieces, also one of their functions is to cull out certain low line or otherwise obviously defective piles. The record kept is usually arranged according to the brands (marked on the butts) of the individual pieces. The utility of this last record is to supply a check against the scale presented by the cutting operator. It is necessary to keep an individual brand record of each raft because the usual condition is to have pieces from several different operations in each raft.

When a pile is culled its brand is kept on a cull sheet and the operator is paid for the calculated or actual utility of the piece. In this way the operator (cutting) is not paid full value for a piece which will not return full value in re-sale.

The reason for this scaling before breakdown is to obtain a boom record comparable to the woods record. After the breakdown process is started there are several instances wherein accuracy is impaired. The first of these is a possible loss due to river current or pirates. The next instance is where pieces are sent to a holding raft or cull pocket wherein they may remain for a considerable time unrecorded. Lastly, it is better to measure them all at once and then to sort them in one constant flow, rather than to measure and sort at the same time.

Between the woods operator and handling operator the basis of scale is most generally on the lineal footage calculation. The price ranging according to short and long lengths value per foot.

Section 2. Grading.

In Douglas fir piling there are three grades:

- (1) No. 1 piling--Top grade; long time service.
- (2) No. 2 piling--Low grade; used mostly for false work and short time service.
- (3) Culls--those pieces which cannot be used in their normal condition. Pieces which must be subject to further processing.

Earlier in this article the requirements of a good piece of piling were set forth. These particular requirements are the factors which determine the grade of the piling.

A top grade number one (1) pile is:

1. Red or Yellow Douglas fir.
2. It must be straight. Some specifications call for a piece which does not deviate over an inch per 10 lineal feet from a true line from the butt to top.
3. Top size of nine (9) inches.
4. Butts of 14" unless otherwise specified or not more than 20" in longer than 60' lengths.
5. Free from large knots, wind shakes, rots, cat faces, knot clusters in a single quadrant and other defects.
6. Must be knot trimmed.
7. Will not allow unusually coarse grained 2nd growth timber.
8. Will not allow swelled butts or tops nor concentrated crook or sweep areas.
9. Must be live timber.

There is some appearance of a No. 2 piling in the grade classification. These are most often referred to as "China piling" due to the fact that in one period in the export market Chinese importers purchased an inferior grade of piling. It was common at this time to sell to the Chinese market those low line pieces which were not acceptable in the other foreign markets.

There are, however, certain defects which would not be acceptable even in this former market, such as: Cats faces, falling split, excessive heart rot, excessive butt or top swell and any defect which would impair the pile driving.

The trend now is to produce no number two piling, but on rare occasions there appears a demand for these low order products; so they have to have a name, thus No. 2 piling.

This grade includes:

1. More sweep or deviation.
2. Larger knots and limited knot clusters in a single quadrant.
3. Swelled butts.
4. Larger rot areas.
5. In general a poor appearing pile.

The last mentioned grade of piling is the cull. This name applies to the type of piece that will meet no order as it stands. It is the type which needs further processing to make it a merchantable product. It is a cull to a greater or lesser extent depending upon its particular ability to be processed. In other words, the utility of some pieces may be gained by turning them to cord wood; while others may only need to be sawn in half to produce two good pieces of short length.

Factors that cause a piece to be culled out are:

1. Excessive rot or cats faces.
2. Coarse grain.
3. Excessive swelling in butts or tops.
4. Short crooks or concentrated sweep.

5. Excessive sweep--causing large deviation.
6. Double sweep.
7. Large knots or knot clusters.
8. Wind or falling shake, sun check.
9. Any outstanding defect which would affect strength or impair driving.

Grading piling is mainly an application of experience. The defects are discovered by inspection of the raft. Some defects are obvious and project their defection before the graders eyes. Others are not so easily found and when discovered present the problem of acertaining their effect. This latter case is where experience becomes the best basis for grading.

Figure 5



Gap stick on a sorting boom.

Figure 6



Drag saw on a sorting boom.

CHAPTER V

Export Piling.

Export piling is divided into two types; the oriental or foreign called "off-shore" business and the coastal and East coast called "coastal" business. Each of these types is definitely stamped insomuch as they use a different type of scaling rule to compute the actual contents of the cargo. The off shore business calls for the Brereton, whereas the coastal business makes use of a rule called the "square of the mean rule". The best way to compare these rules is to describe each in turn.

In 1918 the United States Shipping Board adopted the square of the mean diameter rule, owing to one sided errors of the Spaulding, Scribner and British Columbia log rules. Before its adoption there was a great loss in freight revenue due to the amount of allowance for saw kerf, also these other rules in shipping had been the subject of endless controversy. Under the former rules the exporter or steamship operators were convinced they were carrying about 50% of the cargo for nothing. The square of the mean rule was advanced to offset the disparity between the amounts given in the Pacific coast log scales and the actual contents of the log. This rule, although still used in coastal piling and pole business, did not solve the problem but moved the balance to the other side of the scale in favor of the shipper.

The formula for the "square of the mean" is:

$$\frac{D^2}{144} \times l = \text{Board feet content}$$

D--Average mean diameter in inches.

l--Length in inches.

In 1919 it was definitely known that the Square of the Mean Diameter rule would not solve the controversy. In looking around it was found that the Brereton rule would best suit the arguements of both parties as it was based on actual contents of the round cargo (logs, poles, piling). It was then adopted and has adequately facilitated the export business up to the present.

This Brereton rule is based on a formula that is mathematically correct and converts actual cubical content into board foot content.

The formula used is:

$$D^2 \times 0.7854 = P$$

$$\frac{P \times L}{12} = \text{Bd.foot.}$$

D^2 = Sq. of average middle diameter.

P = Product of formula.

L = Length in feet.

(Multiplying the square of the diameter by 0.7854 gives the area of a given circle).

These two rules are the ones used in the exporting business as explained. Most operators consider the Brereton as the correct export rule. The square of the mean rule runs constantly 27% higher than the Brereton rule and a sample problem worked for any dimensions will show this to be true.

The main foreign market for Douglas fir products in the

past twenty years has been Japan. The best possible approach to describing this outlet for D. F. piling is by explaining the process.

An order is placed by the representative of one of the three Japanese importing firms--namely--Metsui, Metsi Betsi, or Yamashita. The order is accepted on the strength of a trade acceptance or a letter of credit to forestall any unwarranted cancelation, which is a peculiar business shrewdness of the Japanese. This order is made ready at the sorting boom according to the specifications. Specifications will read in the required top diameter measurements for certain lengths and will be placed calling for a certain number of pieces of this classification. On the boom rafts the particular sizes are made ready in the number of pieces wanted.

After the rafts are made ready they are subject to a P. L. I. B. inspection. This inspection will cull out any low line pieces placed in the raft. As soon as the culls are removed from the raft it is ready to be placed F. A. S. the ship, bearing the inspector's guarantee. The inspection papers warrant that the particular raft meets all specifications and is of standard quality number one piling. Now as the ship's lines are made fast and if inspection is complete the liability is transferred from the exporter to the carrier, and the only connection which the exporter has with the piling is in servicing the ship.

Oriental piling orders call for all pieces to be shipped with the bark on or, as it is called, here-barkies. The

purpose of leaving the bark on is twofold. First, to prevent weather and seasoning checking in transit; second, as a means of some minor fuel source in Japan. Another purpose for leaving the bark on Japanese cargo is due to a difference in import duties and their determination. Raw materials enter Japan at a low import rate; whereas manufactured goods demand a higher duty. Oddly, the import laws of Japan regard a peeled pole as a manufactured item; thus the call for "bark on" pieces. All the product shipped to the orient is scaled on the Brereton rule and in the inspection it must meet all of the requirements of No. 1 piling. However, there is a discrepancy. The aforementioned oriental piling applies to that portion of the product sold to Japan. On the other side the pieces sold to China are usually of a lower classification, included most often in the No. 2 grade piling. The only explanation of this is due to the large foreign exchange balance China must maintain to carry on trade. This last factor makes the purchase of superior quality goods almost prohibitive to China.

The East Coast purchases some D. F. piling and does offer a market for smaller sizes of peeled and treated piling. All of the product shipped coastwise either to the east or the west is scaled on the square of the mean diameter rule. A customer for the Willamette Valley product is the Puget Timber Co. of Seattle, Washington. A rather unusual aspect in reference to this last is that they buy here in the Willamette Valley and ship to Seattle, which fact does vouch for the quality of the poles and piling cut here.

Conclusions

This article has been a discussion bringing forth a survey of the Douglas Fir pole and piling business of the Willamette Valley. The reason for the occurrence of this industry here is due to the fact that we have here some of the best piling timber in the world and it is present in commercial quantities. As we have supply we must therefore be called upon to meet a portion of the world's demand.

The possible future of this operation, as well as log supply, is somewhat stimulated by the recent flood control plan to be carried out on the Willamette River. A map of Oregon will show the drainage direction of the valley toward the river from the sides, and from above Eugene to Portland. This means that timber on the west slope of the Coast Range will eventually flow to the Willamette. According to this flood control plan water transportation will be available from above Eugene on down the valley. When this cheap transportation is made possible, the drain from these areas will commence toward Portland, the point of export. This will create a larger supply.

Operators seem pretty certain this supply increase is certain. Then, if supply increases, there must also occur a demand increase to prevent a price maladjustment. To look at the demand side of the picture it is necessary to understand the world situation. The world today is in a chaotic destruction period, which is the price of war. In the orient this period has been in continual existence for about six (6) years. In Europe, Africa and Asia this period

is being actively engaged in by the people of these areas. To compensate, however, must come a longer period of rebuilding. All of these areas will be rebuilt and the demand for lumber will be acute as always. As surely as this war started, it is just as sure it must stop; so the reconstruction demand will appear.

The Willamette Valley will be more directly affected by the oriental demand, some by European demand, and more than ever by the South American demand.

South America has purchased considerable of its forest products needs from Sweden and Norway. The reason for this is that they can buy Scandinavian products cheaper than American products. Like demand for D. F. piling is present in South America but certain protective tariffs have made the purchase price prohibitive. Before they have purchased an inferior grade of piling from Europe, but now this market is closed; so the prohibitions are disappearing and this new market is appearing. To substantiate this conclusion, a check was made of South American orders of the past 15 years. Only one order of any size can be found and this called for 3000 pieces of 60, 70 and 80 foot piling. It was to Columbia in the year 1928. Personal opinion of the author predicts a future market in South America for the Willamette Valley supply.

Assuming a demand increase leads to a particular problem of good forestry. Piling and poles must be live, green timber and are a relatively good sample of young, sound timber which

if left to grow, would produce logs at a later date. The problem concerns good management in removing this crop to leave a sufficiency of seed trees in the area. It may be possible to log the piling on a selective basis, especially were the operation is carried on in conjunction with a log show. Large scale operators do practice the seed tree method of reforestation but its effect is limited. The main problem is with the farmers wood lot which often times is clear cut. The problem is present and the only solution is a convincing educational program on methods of crop protection. The whole field of timber is being affected by this same problem of future crop, so it is only natural to assume that piling operators and individual producers will eventually be subjected to the same control measures and general education projected upon the entire field.

The industry is present here in the Willamette Valley and its possible future as a specialized product is relatively certain. This particular outlet for forest products is constantly beset by the question: "Is the utility higher as a present time product (poles or piling) or will the utility be higher as a future product, lumber. This question demands a complete examination of the particular tract to which it is directed. This question presents the crucial point in this subject and can only be answered by forestry education plus a studied valuation of utilization referred to the entire industry.

FLOW CHART OF POLES AND PILING

