THESIS

A FOREST PLANTING IN MICHIGAN

PAUL B. HAINES

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The land planted comprised part of the Orchard Bay Farm owned by Edward C. Waller, 705 "The Rookery", Chicago, Ill. and located in Sec. 13- T.34 N.- R. 8 W. Charlevoix, Mich. The area consists of numerous small sand dunes, lying parallel to the shore of Lake Michigan and about one quarter of a mile distant. They are moving only slightly in a few exposed portions.

The soil is a light sand, deep and quite free from organic matter, except in the ravines or pockets, where there is from four to ten inches of loam. The excess water drains into the lake but along the two temporary brooks that cross the plantation wet patches occur. These now grow willow, but originally grew fine cedar and for that reason pine was not planted where it was very moist.

With the exception of the higher knolls the cover was fairly heavy, consisting of brush , under six inches in diameter and twenty five feet high, of the following species:

Poplar.....	40%
Pin Cherry.....	50%
Paper Birch.....	10%
Willow.....	
Others.....	

Ferns formed a light ground cover over the entire area,Red Raspberries also a light cover in places, with some grass in the more favored places. The latter had been grazed by sheep which were pastured on the land for several years past. In addition to the above vegetation old stumps averaged eighteen

PLATE 1.

Typical View.

Showing character of the land planted.

or twenty to the acre, while the more numerous decaying logs averaged from twenty-five to thirty. The remaines of the original timber indicated that it consisted of hemlock with a little red pine and cedar and balsam on the wet areas.

The planting stock was five year old white pine once transplanted, purchased from the Mich. Agr. College. The plants were tied in bundles of twenty-five each, puddled packed with moist hay in a box car. They arrived at Charlevoix, after five days on the road, in first class condition. Heating however had started to take place but the car was unloaded before any damage had resulted.

In hauling the trees to the scene of planting a hay-rigging was used. This outfit permitted an average load of 4,250 trees, yet more could be hauled over hard ground with no difficulty. In this case the haul was three miles over a good gravel road, but terminated with a stretch of soft pasture slightly frozen. Over this haul four trips a day was the average.

Three situations were chosen upon which to heel-in the stock. Theu were located close to water, where the digging was good, and so that they were accessable from any part of the area that was to be planted. As fast as the trees were unloaded from the wagon they were puddled and heeled-in.

In planting two men crews were used entirely; one man digging the holes, with a round pointed shovel, the other planting and carrying the trees along as the work progress-

PLATE 11.

A Particularly Large Bare Dune.

Showing trees heeled-in in the fore ground.

ed. The holes were dug deep enough to permit the trees being set at their original depth as they grew in the nursery, and wide enough so that the roots could be well spread out. The men were instructed to put a thin layer of good soil over the roots and press it down well with the feet. The hole was then filled up and further pressed down in the same manner. At first the hands and feet were used to fill in the holes, but later short handled hoes were substituted.

Brush and other obstructions hindered the men and the best results were obtained by keeping the crews seperated. To accomplish this end a line of pickets was run for every ninth row, and planted up a little in advance of the intermediate rows. By working out from both sides of these guide rows the crews were seperated and the work kept straight.

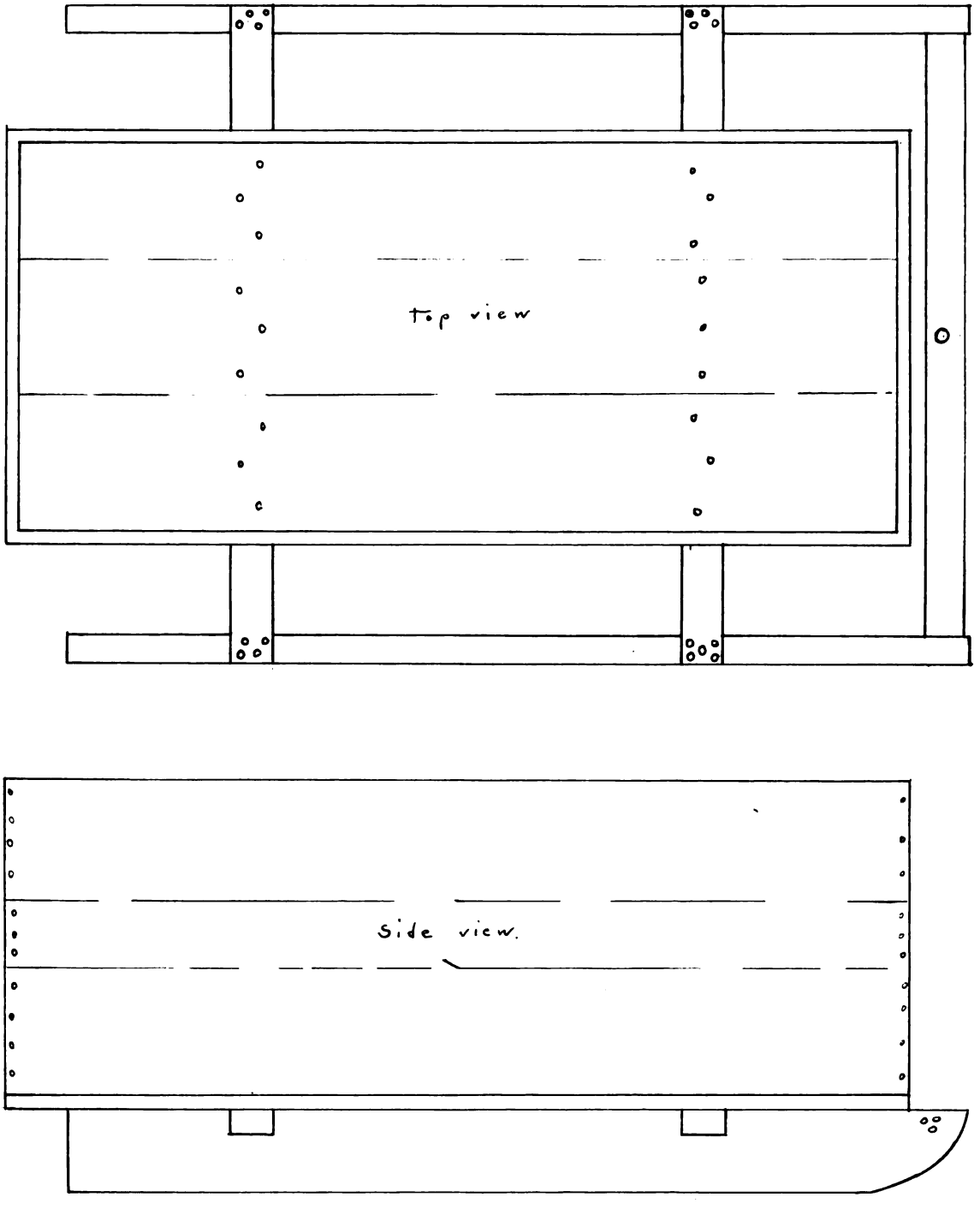
In distributing the trees from the beds where they were heeled-in a sled was devised. The dimensions of the same are shown on page (4); also see plate 1V, for photo. This rig would hold about twenty-five bundles of trees, the box being narrower than the width between the runners to prevent its being torn off by collision with trees. As the trees were taken from the bed, they were dipped in a half barrel of water. It would have been better to have puddled the roots in a solution of clay but as this substance was very scarce, water alone was used. One man was kept very busy at this job, (hauling, dipping and carrying the bundles to the crews) when there were fourteen men, or seven crews at

PLATE 111.

A Planting Crew At Work.

Sled

Fig. 1.



Scale: 1" = 1' ft.

PLATE IV.

Distributing Sled In Operation.

Showing also the character of the land planted.

work. A few roadways had to be brushed out in order to haul the trees close to the scene of planting. After these were abandoned they were planted up.

In order that hte work from day to day can be followed a brief feport, taken from the field diary, is here inserted.

Mon. April 6, 1914.

Weather; Snowing with one inch on the ground in the morning, abating before noon.

Employed three men in the forenoon, six in the afternoon.

One team and a single horse all day.

Hauled, puddled and healed-in three loads of trees.

Tues. April 7, 1914.

Weather; Ground frozen an inch or more. Frequent snow flurries.

Employed three men one half day, two men total time of six and one half hours. One horse full time and two teams for one half day.

Finished healing-in the 33,975 trees by two thirty P.M.

For six days the weather was such that it was impossible to plant.

Mon. April 13, 1914.

Weather; Clear, warm and calm.

Employed seven men and one horse all day.

Frost in the ground in many places made planting difficult.

Total number of trees planted, 1475.

Tues. April 14, 1914.

Weather; Fair, warm and calm.

Employed fourteen men and one horse full day.

Bothered by frost in many places. Worked fourteen men planting and hauled the trees myself. Planted, 2925.

Wed. April 15, 1914.

Weather; Clear warm and calm.

Employed thirteen men and a single horse.

Used one men to haul trees and deliver them to the crews. Also equipped the men with short handled hoes. The ground was frozen only in sheltered spots. Planted, 3,125 trees.

Thur. April 16, 1914.

Weather; Warm and clear.

Employed thirteen men all day band two men one half day, also used the single horse.

Worked on hilly land free from frost and where the digging was easy. Total number of trees planted, 3,500.

Fri. April 17, 1914.

Weather; Clear, warm and calm.

Employed fifteen men and single horse for full day.

Total trees planted, 3,825.

Sat. April 18, 1914.

Weather; Fair and warm.

Employed fifteen men and horse full day and one man one half day.

Planted on a good site using short rows, Total planted,4,300

Mon. April 20, 1914.

Weather; Wind N. cloudy and freezing, ground covered with three quarters of an inch of snow.

Employed thirteen men amd horse all day and one man one half

day. Four of the men were new hands.

The weather was clear and warmer in the afternoon.

Total number of trees planted, 4, 300.

Tues. April 21, 1914.

Weather; Cool and cloudy.

Employed eleven men and one horse for full day.

Total number of trees planted., 3,050.

Wed. April 22, 1914.

Weather; Fair, cool and windy.

The results of this day are the same as the previous.

Thur. April 23, 1914.

Weather; Cloudy with traces of rain.

Employed eleven men and one horse for full day.

Total number of trees planted 3,275.

Fri. April 24, 1914.

Weather; Cloudy and cool.

Employed five men and single horse three quarters of a day.

Planted 850 trees which completed the work.

The length of a working day was supposed to be ten hours, but fourty minutes was consumed each day walking back and forth to the scene of planting. Also an extra quarter of an hour was taken at noon, which allowed some of the men to go home for dinner.

In making the following computations these costs are used: teams alone, $2.00 and single horse $1.00 per. day. Men, including teamsters $1.75 per. day.

Total cost on the land ready to plant.

Freight $35.05	per. M.	$1.05
Hauling three miles, $7.50	" "	$0.28
Puddling & healing-in, $15.40	" "	$0.45
Cost of 33,975 trees, $300.00	" 6"	$8.83
Total	" "	$10.61

Planting Averages.

Number planted per. day per. man.....253.

Time required to plant 1.000 (two men)....Two days.

Planting Costs.

Cost of labor to plant	per. M.	$7.00
Cost to plant per. acre (spacing 6 by 6)		$8.31
Cost of supervision and overseeing, $56.75	per. M.	$1.72

Summary of Time and Costs.

Time required to plant 33,975 trees (15 men).....9 days.

Number of acres planted (approximately).....28.25.

Total cost.....$625.20

" " per. acre including trees.....$22.13.

PLATE V.

A Planted Sand Dune.