

If the trench is to be three feet deep it need be opened only one foot wide at the top, and with proper tools, it can be carried down to a width of about two inches at the bottom, though, of course, the foot of a man cannot come within six or eight inches of the bottom, in which case the pipes are laid by a man walking on the surface at the edge of the trench, who lifts the pipe, piece by piece, with a kind of hook made for the purpose, and lays them carefully in the trench.

If the work is done by a common spade, the width of opening at the top may be the same and the sides can be carried down as near together as the width of spade will allow. The "Irish spade" has been used by Judge French in opening trenches on his grounds in Exeter, during the past season, and with very satisfactory results. This tool being owned by many persons in this vicinity, who may undertake such work, I suggest that it will be well to use it in preference to the common spade.

As it is not necessary to the convenience of the workmen that the sides of the trench be carried down any nearer vertical than is represented in the engraving, they may be opened and carried down in the same manner, for each size of the pipe, until the sides have approached so near, that a pipe of the size required can be just passed between them; the cut may then be carried down vertically to the depth required. This allows much earth to remain which would be thrown out if the sides were cut straight down from the width opened at the top to the width at bottom. A skillful workmen will dig the trenches with ease in this way, after some practice, though it may be a little troublesome at first. I am now having trenches dug in which the opening at the surface is even less in width, for the required depth, than is here given.

The labor of one man in a day of ten hours varies very much under different circumstances.

1. In hard, gravelly and clay soils, where picking is constantly necessary, a man will throw out only from three to five cubic yards in a day.

2. In ordinary clay and gravel, with one occasional use of the pick, he will throw out about ten cubic yards a day.

3. In loose earth, without picking, or in shovelling after the picking of another, as in railroad excavations, a man throws out fifteen to eighteen cubic yards a day.

In the first case, a yard, or twenty-seven cubic feet, will be removed for twenty-five cents, by a man who works a day, of ten hours, for one dollar.

In the second case the removal of a yard will cost ten cents. This will be the basis of our estimate of the cost of cutting trenches, from the fact that most soils which need draining may be classed under this head.

In the third case, one yard will be removed for about six and one-fourth cents. The solid contents of earth removed from a trench one hundred feet long, of sufficient width at bottom to admit the smallest sized pipe, and of the depth as shown, is as follows—

Depth.	Cubic Feet.	Cubic Yards.	Cost.
24 feet.....	127.5.....	4.72.....	\$0.47.
3 ".....	174.....	6.46.....	0.65.
4 ".....	227.5.....	8.43.....	0.84.
5 ".....	288.....	10.67.....	1.07.
6 ".....	355.5.....	13.17.....	1.32.
7 ".....	430.....	15.93.....	1.59.
8 ".....	511.5.....	18.94.....	1.90.
9 ".....	600.....	22.22.....	2.22.

To this must be added the cost of tools, trimming, and superintendence.

The quantity removed by encreasing the width at the bottom of the trench so that it may admit pipes of the larger sizes is very slight being only one and one-