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Laying Out the Foundation For a Building

By Ralph L. Patty

In erecting a new building it is very desirable to have the foundation properly squared-off and with the correct dimensions. It is also important to have the foundation exactly level on top as it helps in the construction of the building and insures a better and neater job.

Laying out a simple foundation according to the method suggested here can be done without special equipment. The following material will be needed: A cloth tape 50 or 100 feet long, a dozen spike nails, a ball of heavy twine, and smooth, well sharpened stakes.

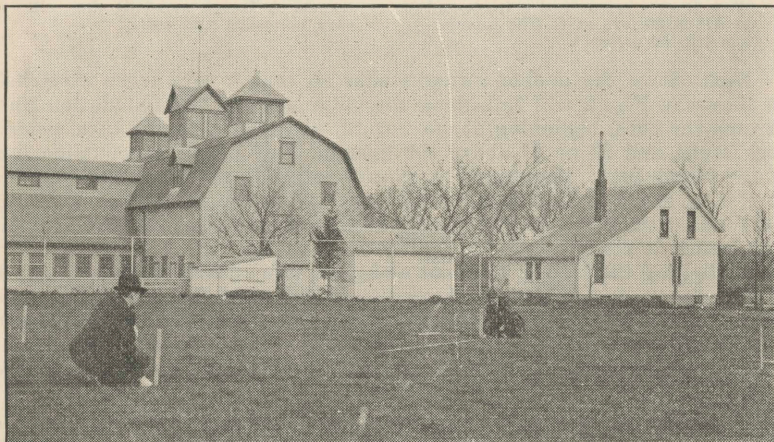


Fig. A.—TESTING THE LENGTHS OF THE DIAGONALS FOR THE FOUNDATION

The most important thing in squaring the foundation for a building is to see that the diagonal distances from opposite corners measure exactly the same.

A stake is first driven for one corner of the building which will be a permanent corner. Use the inside corner of the stake which we shall call stake A (Fig. 1). Construct a right angle at this corner according to the method shown in either Fig. 3 or Fig. 4 and set temporary spikes at G and E. These spikes will give the correct direction for the two sides of the foundation. Next extend the side AD by sighting through or by means of a tight line, and measure off the proper length for it, setting a spike at the corner D, Fig. 1. Using the cloth tape or a non-stretchable cord as a radius, strike two arcs at corner C, Fig. 1. The lengths for BC would be the same as AD and the length of DC would be the same as AB. The point where these two arcs cross should be the cor-

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rect location for the fourth corner, C of the foundation. Stick a spike at this point and then measure the diagonals of the foundation as shown in Fig. 1. If these diagonals prove to be exactly the same distance the figure is correct. If they are not, the work must be gone over carefully until the diagonals check. All measurements must be made with the tape held level.

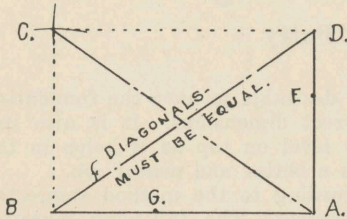


Fig. 1 To COMPLETE RECTANGLE

From D as center and a length of line equal to AB strike an arc at C. With B as a center and a line equal to AD strike arc at C. The intersection will be corner C.

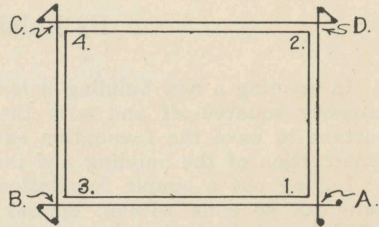


Fig. 2 COMPLETED LAY-OUT

Showing the twine stretched for marking the exact location of the trench. A trench carefully dug will save materials and cost.

Next, drive the double corner stakes so that a cord when stretched as shown in Fig. 2 will fall along the outer edge of the foundation line. Stretch the cord, beginning at one corner, giving it a double turn around each stake and 2" or 3" above the ground. This marks the outside line of the foundation. Now leave the corner spikes in place and drive stakes at 1, 2, 3, and 4 in Fig. 2, allowing eight inches for the proper width of the foundation wall. Stretch a cord around these stakes and the foundation trench is ready to start.

In digging the trench, first cut along the line on both sides to a depth of four to six inches with a sharp tile spade. Dig the trench one inch inside the lines, or about two inches narrower than the final width and then dress down the sides to the exact width. This practice will prevent getting the foundation too wide and will save materials and reduce the cost.

In laying out the foundation for a farm building the first thing to consider is a position that will correspond with the other buildings and properly fit in with them. In practically all cases this position will be parallel if not in line with certain other buildings. One corner of the building should first be located and a stake driven corresponding to stake "A" in the directions on the preceding page. The direction of the line AG should next be determined by measuring accurately in parallel lines from the side of an adjacent building or property line. After the direction of this line is established, one side of the building foundation is permanently located and the other sides are then laid out. Buildings do not necessarily need to stand "square with the world." It is much more important that their "setting" correspond to adjacent buildings. In no case should an attempt be made to orientate a building by means of a magnetic needle or compass, as the magnetic deflection varies too greatly in South Dakota. A true north and south line can be established only by delicate reading and calculations made on the sun or the north star with engineering instruments.

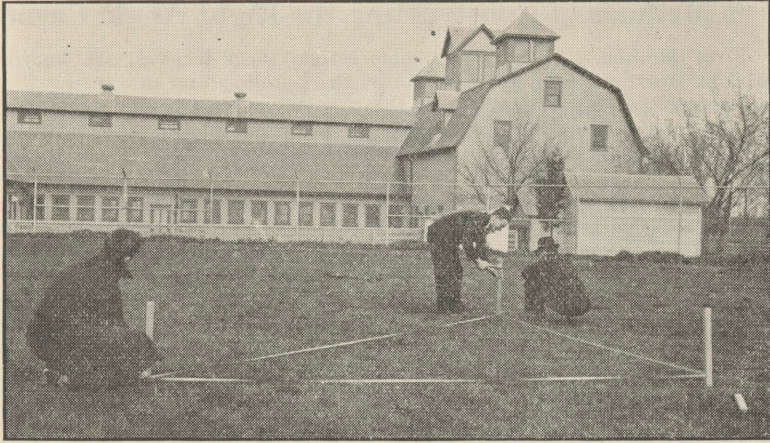


Fig. B.—LAYING OUT A RIGHT ANGLE AT THE FIRST CORNER AFTER ONE SIDE OF THE BUILDING HAS BEEN ESTABLISHED

Two persons are required. The man standing is moving his stake into the proper position for making the corner square. The man in the foreground is holding both ends of the tape. Stakes are being used in this picture but large spikes can be used more accurately.

After the foundation is laid out according to the directions, grade stakes marked for the exact elevation of the corners facilitate the work of the carpenter or contractor. The engineer's transit or architect's level is needed for this purpose. If a level is not available, a long straight-edged board may be used with a carpenter's level on top for leveling the form.

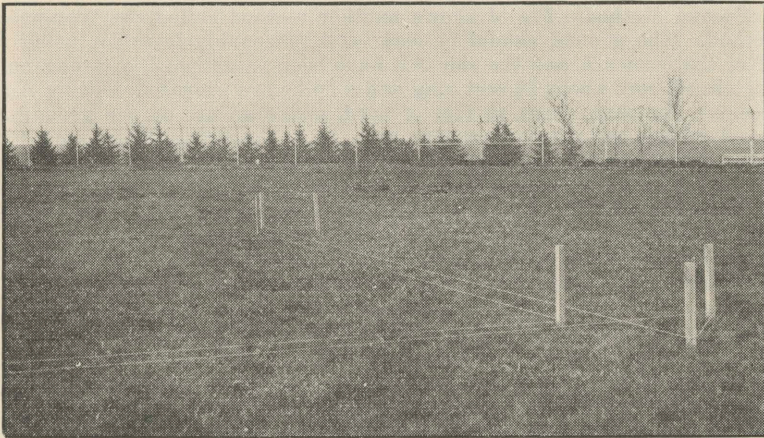


Fig. C.—A CORNER OF THE FINISHED LAY-OUT

Cutting along inside these lines with a sharp spade will insure a straight and true trench for the foundation.

Two Methods of Constructing the Right Angle Corner

First Method.—After the corner A has been located, set another stake at B after lining-up this side of the building and measuring it to the correct length. We now have the side AB of the foundation located. The dimensions for a building should be to the outside of the foundation. For a building 48 feet long the foundation should be 48 feet, measured from the outside edge of the foundation walls. To make the corner at A a square and true corner, measure exactly 16 feet to G and set a spike exactly in line with AB, Fig. 1. Next stretch 48 feet of the tape from spike G around stake A and around a spike at E that is held by a second person and back to G. See Fig. 3. The person at G holds both ends of the tape. The person holding spike E now stretches the tape both ways and moves the spike over until it is exactly 12 feet, by the tape, from stake A, and sets it. If accurately done this will make a true right angle corner at A. This method is based upon the mathematical principle that the sum of the squares of the two sides of a right angle triangle is equal to the square of the hypotenuse. The lengths of 12, 16, and 20 feet are used instead of 3, 4, and 5 feet in order that the probability of error will be lessened.

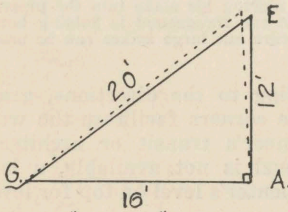


Fig. 3. "3-4-5" METHOD.

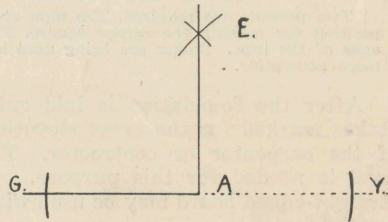


Fig. 4. COMPASS METHOD

Second Method.—Fig. 4 shows another method called the "compass" method. The ground should be clear and reasonably level for using it. After the corner A and the side AB have been established, a strong non-stretchable cord about 20 feet long and a spike are prepared. Using A as a center and with about 15 feet of cord, strike an arc on the ground at G and drive a spike exactly in line with AB. No certain lengths need be used. With exactly the same length of cord, swing around and scratch another arc at Y. Set a spike at Y exactly in line with A and G and exactly on the arc. Now using Y as a center and the full 20 feet or so of cord, scratch a long arc on the ground at E, and with G as a center and the same length of line, scratch another arc at E. Where these two arcs cross, drive a spike and you will have a square corner at A.

Published and distributed under Acts of Congress, May 8 and June 30, 1914, by the Agricultural Extension Service of South Dakota State College of Agriculture and Mechanic Arts, Brookings, A. M. Eberle, director, U. S. Department of Agriculture cooperating.