Chapter 1

Location of Structure on Site

A number of factors affect the location of a structure on a site, as well as the type of building that may be erected. Once the site is chosen, different methods may be used to create the plan for building the structure. Required documentation to attain final approval of the building includes the plot plan, the Certified Plot Plan, and the Certificate of Occupancy.

Basic Conditions

A number of conditions determine what kind of building may be erected, as well as where on the lot it may be located, including the following:

- Covenants
- Zoning ordinances
- Well location
- Septic system location
- Corner lots
- Nonconforming lots
- Natural grades and contours

Covenants

Covenants are legally binding regulations that may, for example, limit the size or set the minimum size of a house, prohibit utility buildings, or ban rooftop television antennas. Because covenants are *private agreements*, they are not enforceable by local government. A lot may be zoned for duplexes, but the covenants may allow *only* single-family residences. When buying lots, check the deed or with the city building department to see if there are covenants.

Zoning Ordinances

Zoning regulates how much of the site may be occupied by a building, restricts the minimum size of a dwelling, and limits its height. Zoning also establishes *setbacks*, which are the minimum distances permitted between a building and the property lines around it. Because setbacks can vary according to soil conditions, you should confirm setback requirements with the local zoning administrator.

Wells and Septic Systems

Building lots requiring a septic system and well can make locating the house difficult. An approved septic system design shows the

location of proposed house, well, septic system, and required safety zone distances. A typical safety zone may require that a house with footing drains be located 25 feet from the septic tank and 35 feet from the leach field, and that the well be located 75 feet from the septic tank. If footing drains are not required, the house can be 5 feet and 10 feet, respectively, from the tank and leach field. Well distance is constant.

A buyer of a lot with approved septic designs may not like the location of the house and want it changed. Lot size, shape, natural grades, contours, and safety zone requirements may not allow moving the house. If safety zone distances can be maintained, house relocation may be approved. Otherwise, another soil percolation (perk test) must be performed and a new design submitted to the state for approval. The well can be relocated, but some zoning ordinances do not allow it in the front yard setback.

Corner Lots

Corner lots front two streets. They have two front yard setbacks, a rear yard setback, but no side yard setback. Which street the house faces is the builder's or buyer's decision, but local government subdivision regulations may prohibit two driveways. Because of the two front yard setbacks, the lot area within the setbacks is somewhat reduced. If a septic system and well are required, fitting all of this on a smaller lot is tricky, and will be more difficult if wells and swimming pools are prohibited in the front yard setback. Many states limit how close the leach field can be to the property line. Local ordinances also may prevent locating the leach field between the side yard setbacks and the property line.

Designing the septic system requires digging deep-hole test pits to examine the soil at various depths to locate the seasonable high water table (SHWT); to determine the presence or absence of water, ledge, stumps, or debris; and to obtain a soil profile. This information is recorded on the design plan. This data tells how expensive excavation may be and how far down the bottom of the basement should be. On lots with town sewers, to find the depth of water table and if ledge is present, dig test holes 8 feet to 10 feet deep where the house will be located.

Nonconforming Lots

Nonconforming (grandfathered) lots are those whose area, frontage, depth, or setbacks do not conform to present zoning ordinances. Getting a building permit may be difficult. As with smaller corner lots, trying to fit house, well, septic system, and safety zone within the setbacks can be very demanding (if not impossible).

Natural Grades and Contours

Natural grades and contours also affect location of septic systems, houses, wells, and driveways. Is the lot on a hill, on flat land, or in a valley? What are the soil types and how do they affect site use? Is the soil-bearing capacity adequate for the proposed construction?

Heavily treed lots are a mixed blessing. Trees provide shade on the south and west and act as a buffer on the north. After the site is cleared of trees, where do you dispose of the stumps? If the local dump will not accept them, who will? Does the local conservation commission allow them to be buried on the lot?

If the house is built on raised fill, what effect will this have on drainage of water toward abutter's property? Are there stagnant ponds, marshes, or other breeding sources of mosquitoes? If wetlands exist, is enough land left for building after subtracting the wetlands area from the total lot area?

Staking Out House Location

With site analysis completed and a specific location chosen, the next step is to locate each corner and lay out the building lines. Staking a building on a level rectangular lot is simple. On a sloping, odd-shaped lot, it is more difficult. In both cases, accuracy is important. Following are two methods of staking out the house location:

- Measuring from a known reference line
- Using a transit-level

Staking Out from a Known Reference Line

When a building is to be erected parallel to the property line, the property line is a known, identifiable line. The property line becomes the *reference* point and makes a builder's level unnecessary. First, ensure that corner markers or monuments (usually granite in the front and iron pipes or pins in the rear) are in place. If markers are missing, call the surveyor. From the plot plan (Figure 1-1), find the setback distances.

Caution

Taping is more difficult than it seems to be. The distances to be measured are *horizontal*, not sloped distances. If the lot is sloped and you are downhill from the reference marker, use plumb bobs and hand levels to keep the tape level. On ground that is level lay the tape on the ground, rather than supporting each end. On sloping lots, pull hard on the tape to remove most of the sags. In this instance, a steel tape is best.

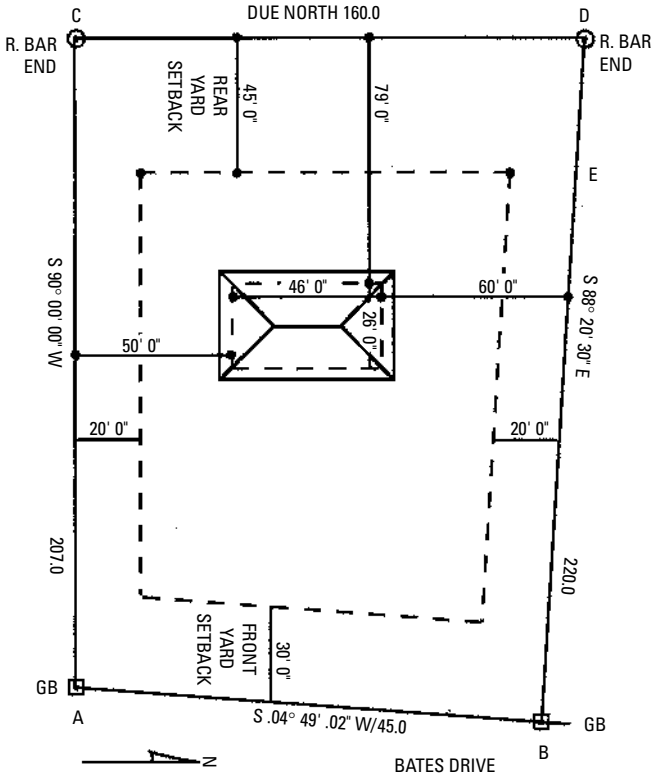

Figure 1-1 Plot plan showing property lines and corner markers, located and identified, house location, and setback lines.

To stake out, refer to Figure 1-2 and proceed as follows:

1. Prepare 10 or more 3-foot long stakes by drawing diagonals on the flat head to locate the center, and drive a nail where the lines cross.
2. Locate the right rear property marker *D*. Measure 45 feet-0 inches from *D* toward the front granite marker *B*. This is the rear yard setback distance. Drive a stake. This stake is marked *E1* in Figure 1-2.
3. Locate the left rear property marker. Measure 45 feet-0 inches from *D* toward the front granite marker *A*. This stake is marked *E2*.

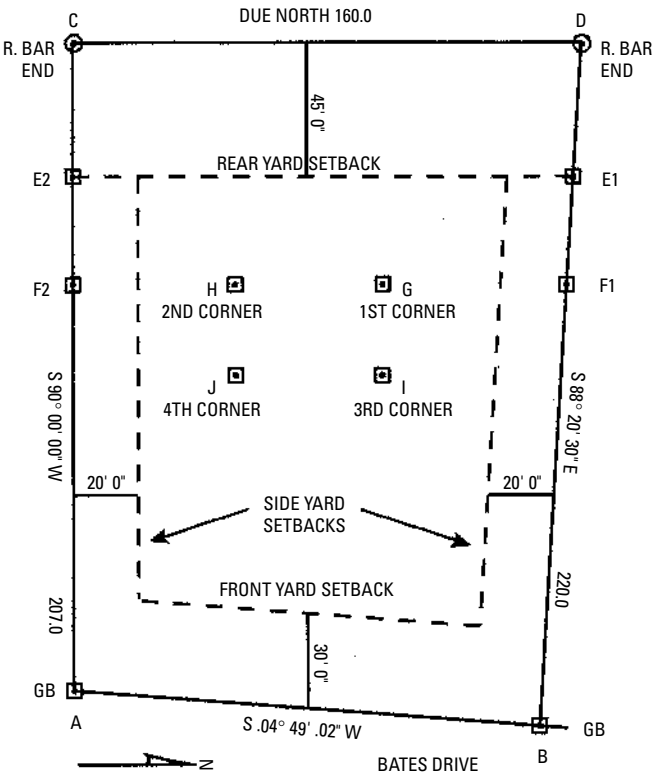

Figure 1-2 Steps 1 to 8. Laying-out with a transit level.

4. Stretch a line tightly across the lot between stakes *E1* and *E2* to locate the rear yard setback line. Next, the two rear corners of the house must be located. The plan shows the house is 34 feet from the rear yard setback line. From the left stake *E2* measure 34 feet-0 inches toward the front and drive a stake, *F2*. From the right stake *E1* measure 34 feet-0 inches toward the front and drive a stake, *F1*. Consult the plot plan to see how far in the house corners will be from the left and right property lines.
5. From the left stake *F2* measure in 50 feet-0 inches to the right, and drive a stake. This is the *left rear corner* of the house. From the right stake *F1* measure in 60 feet-0 inches to the left, and drive a stake. This is the *right rear corner* of the

house. The distance between these two stakes is the length of the rear of the building. Confirm that this distance, 46 feet-0 inches, agrees with the length given on the plot plan (Figure 1-1).

6. Get the depth of the house from the plot plan. From the left rear corner stake measure 26 feet-0 inches toward the front yard, and drive a stake. This is the *left front corner* of the house. From the right rear corner stake measure 26 feet-0 inches toward the front yard, and drive a stake. This is the *right front corner* of the house. The distance between these two stakes is the length of the front of the building. Confirm that it agrees with the length shown on the plot plan (Figure 1-1). If the property lines form a 90-degree angle at the corners, the left and right sides of the building should be parallel with the left and right property lines. The front and rear lengths should be parallel with the front and rear property lines.

On a nonrectangular lot, where the corners do not form a 90-degree angle, this method will not work because the building lines will not be parallel to the property lines. The setback lines should be staked out, and the corner of the building closest to the property line, but within the setback, should be located. The building should be staked out from this point, with a dumpy level or transit level, using the method described in the "Batter Boards and Offset Stake" section later in this chapter.

Laying Out with a Transit Level

There are two types of surveyor's levels in common use: the automatic optical level (also known as a *dumpy level* or *builder's level,* as shown in Figure 1-3) and the *transit level* (Figure 1-4). The optical level is fixed horizontally and cannot be used to measure angles. The transit level can be moved horizontally or vertically, and can be used to measure vertical angles, run straight lines, and determine whether a column, building corner, or any vertical structure is plumb. The *laser level* (Figure 1-5), common in commercial construction, is slowly replacing the transit level in residential construction.

To lay out the building using transit level, a reference point, or *benchmark*, is needed. The rear right corner marker serves this purpose. To lay out the building using a transit level, refer to Figure 1-3 and follow these steps:

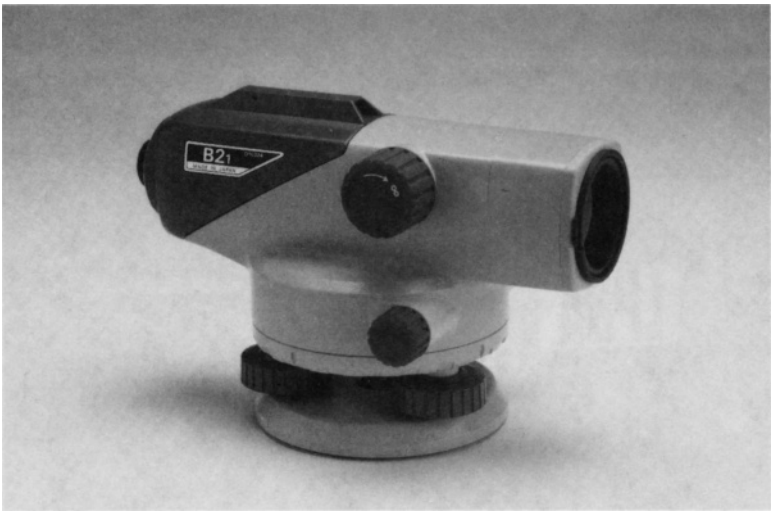

Figure 1-3 Automatic level. *(Courtesy The Lietz Company)*

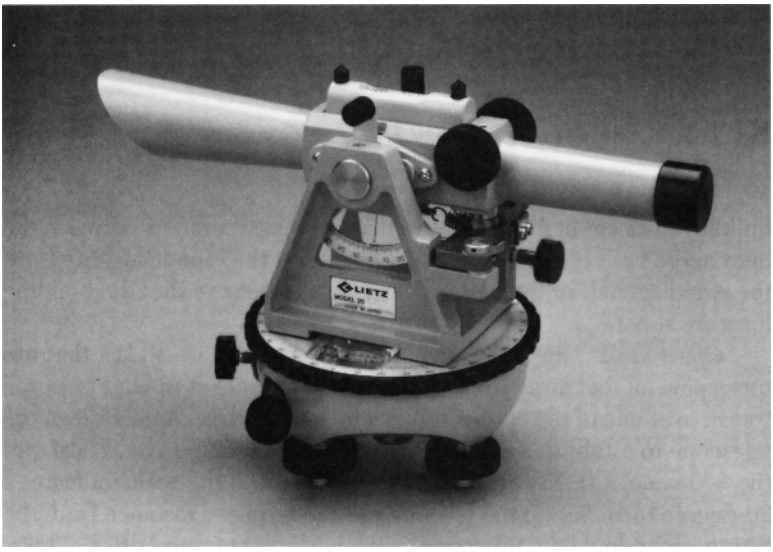

Figure 1-4 Transit level. *(Courtesy The Lietz Company)*

Figure 1-5 Laser level. *(Courtesy The Lietz Company)*

Caution

When setting up the transit over a marker on a slope, put two of the tripod legs on the downhill side, and the other leg on the uphill side. Locate the top of the tripod as close as possible to the marker.

1. Level and plumb the transit over marker *D*. Sight down to the opposite corner marker *B*.
2. The rear yard setback is 45 feet-0 inches. Measure 45 feet-0 inches from marker *D*. Take one of the previously prepared stakes, align the 45 feet-0 inches mark on the tape measure with the center of the stake. Release the transit telescope, and lower it until the crosshairs, the nail in the center of the stake, and the 45 feet-0 inches mark agree. This is point *E*.

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3. The house is 34 feet from the rear setback line. From point *E1* measure 34 feet-0 inches. While holding the tape 34 feet-0 inches mark at the nail in the center of the stake, raise the telescope until the crosshairs are exactly on the 34 feet-0 inches tape mark, and drive the stake. This is point *F1*.
4. Move the transit to mark *F1*, level and plumb it, and sight back on marker *B*. Now turn the telescope 90 degrees to the right.
5. The distance from the property line (Figure 1-1) to the right side of the building is 60 feet-0 inches. From mark *F1* measure 60 feet-0 inches and drive a stake. Lower the telescope until the horizontal crosshair is on the 60 feet-0 inches mark on the tape. This is the *first* corner of the building, and it is point *G*.
6. Move the transit to point *G*, and level and plumb it. Measure 46 feet-0 inches from point *G*. This is the length of the building. Now raise the telescope until the horizontal crosshair coincides with the 46 feet-0 inches mark on the tape. Align the center of the stake with the 46 feet-0 inches mark on the tape, and drive the stake. Point *H* has been located and is the *second* corner of the building.
7. With the transit still over point *G*, turn it 90 degrees to the left. Measure 26 feet-0 inches from point *G*. Then, lower the telescope until the horizontal crosshair is on the 26 feet-0 inches mark on the tape. Align the nail with the 26 feet-0 inches tape mark, and drive the stake. Point *I* is established and is the *third* corner of the building.
8. Level and plumb the transit over point *I*, and sight back to point *G*. Rotate the telescope 90 degrees to the left. From point *I* measure 46 feet-0 inches. Lower the telescope until the horizontal crosshair is on the 46 feet-0 inches mark on the tape. Align the center of the stake with the 46 feet-0 inches mark on the tape, and drive the stake. This, the *fourth* and final corner of the building, is point *J*.

Batter Boards and Offset Stakes

Now that the building corners have been established, building lines must be set up to mark the boundaries of the building. *Batter boards* are used to permanently mark the excavation and foundation lines. The forms for the foundation walls will be set to these building lines. The batter boards should be installed 4 to 6 feet back from the building corner stakes. Suspend a plumb bob over the

building corner stakes to exactly locate the lines over the corner stakes. When all the building lines are in place, ensure that the measurements between the lines agree with the measurements shown on the blueprints. Measure the two diagonals of the batter board lines to ensure that the building lines are square.

Offset stakes (an alternative to batter boards) are stakes that are offset several feet away from the corner markers. Set up and level the transit over one of the corner stakes, which we will call *A*. Site down the telescope to establish a reference point called *B*, and drive a stake. Set the 360-scale at 0. Now rotate the telescope until the scale indicates a 90-degree turn. Set up the leveling rod the required distance from the transit, sight down the telescope to establish point *C*, and drive a stake. Line *AC* is perpendicular to line *AB*, forming a right angle where the lines intersect at point *A*. Lines stretched between the pairs of stakes intersect at point *A*, one of the house corners.

Pythagorean Theorem Method

The squareness of the corner can be checked by using the Pythagorean theorem to determine the length of the *hypotenuse* in a right angle triangle. The theorem says that the square of the hypotenuse of any right-angle triangle is equal to the sum of the squares of the other two sides: $C^2 = A^2 + B^2$. Imagine a triangle with one 9-foot side (*A*), a 12-foot side (*B*), and a hypotenuse, 15 feet, *C*. Thus, in this example, $A^2 = 81$ and $B^2 = 144$. Thus, C^2 is the sum of A^2 and B^2, or 225.

We need the square root of the hypotenuse (that is, the number that, when multiplied by itself, equals 225). Most pocket calculators have a square root function key. Enter 225, press the square root key, and the number that appears is 15. If the corner is square (that is, if side A is perpendicular, or at 90 degrees, to side B), the diagonal should measure exactly 15 feet. Any multiple of three can be used. In the example, we used a 9-12-15 triangle ($3 \times 3 = 9$, $3 \times 4 = 12$, $3 \times 5 = 15$). The numbers 9, 12, and 15 are multiples of three.

Other Important Documents

In addition to the plot plan, other important documents include a Certified Plot Plan and a Certificate of Occupancy.

Certified Plot Plan

A *Certified Plot Plan* (Figure 1-6) shows how the property was actually built, as opposed to how it was proposed to be built (known as an as-built). It is very important to check state regulations as to

PLOT PLAN

FOR: BARRY J. WHITE LOCATION: MERRIMACK N.H. SCALE: 1" = 50'

THIS PLOT PLAN, DEPICTS THE FOLLOWING INFORMATION:

A. METES AND BOUNDS IN ACCORDANCE WITH THE SUBDIVISION REGULATIONS ARE SET AS SHOWN;
B. LOCATION TO SCALE OF THE BUILDING FOUNDATIONS WITH SETBACK DIMENSIONS TO THE CLOSEST PROPERTY LINES;
C. DIMENSIONS FROM FOUNDATIONS TO THE WELL, SEPTIC TANK CLEANOUT COVER WITH THE APPROXIMATE SIZE AND LOCATION OF THE LEACH BED; KNOWN EASEMENTS AND APPROXIMATE LOCATION OF ANY UNDERGROUND UTILITIES AND ZONING SETBACKS.

PERIMETER DATA IS BASED SOLELY ON A PLAN RECORDED AT THE HCRD #11772, SITE DETAIL WAS LOCATED BY TIEING INTO POINTS "A" AND "B". A PERIMETER WALK 9/7/89 CONFIRMED THE EXISTENCE OF OTHER MONUMENTS SHOWN.

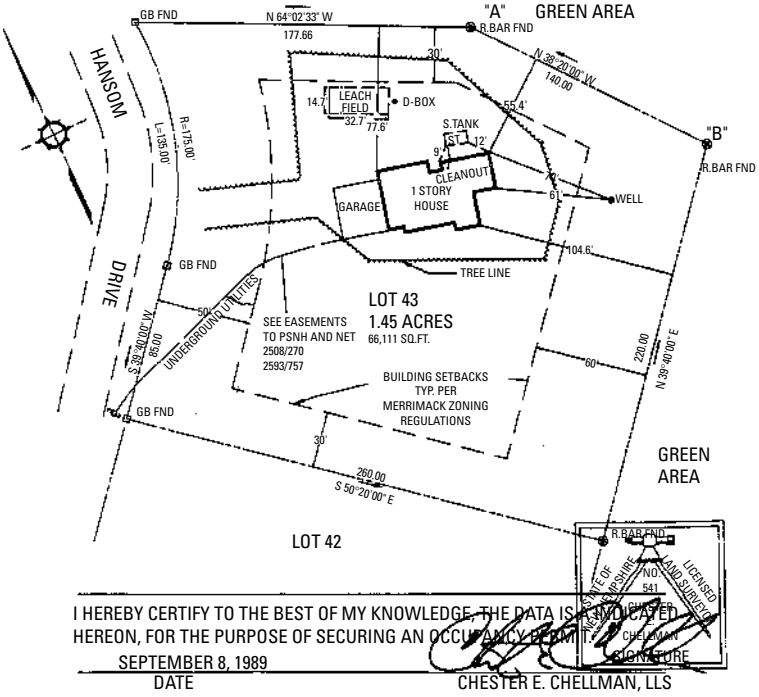

Figure 1-6 Certified plot plan.

who may legally certify a plot plan. A professional engineer (PE) may be qualified to survey the property, but in some states (New Hampshire, for example), unless you are a *licensed land surveyor*, you cannot certify the plot plan.

Certificate of Occupancy

One of the most importance pieces of paper in the life of a builder is the *Certificate of Occupancy* (CO). The CO is the final piece of paper, the sign-off, that says the construction of the building is complete and it is ready to be occupied. Not all municipalities require a CO before the property can be legally lived in. Any town that has adopted the building codes from the Building Officials and Code Administrators (BOCA) or the Uniform Building Code (UBC) will require a CO. In addition, many banks require a CO before the passing of papers can take place.

Very often, as a condition for getting a CO, municipalities require the builder to submit a Certified Plot Plan. If a well is the source of water, a certificate of the water test may also be required. The structure does not necessarily have to be 100 percent completed, but this requirement varies within a state, and from state to state. Check with the building code official to determine requirements.

Summary

A number of conditions determine the kind of building that may be erected on a plot of ground. These conditions may determine where on the lot it may be located. There are also covenants that are legally binding regulations. These may, for example, set the minimum size of a house, prohibit utility buildings, or ban rooftop television antennas.

Zoning laws regulate the setback and other factors that play into the equation of house location on a lot. Septic tanks also require special consideration.

A Certificate of Occupancy is an important piece of paper. It is the final piece of paper, the sign-off, that says the construction of the building is complete and it is ready to be occupied. Any town that has adopted the BOCA or UBC building codes requires a CO. In most instances, the bank making the mortgage loan requires a certificate of occupation as well.

Review Questions

1. Name four basic conditions that determine what kind of building may be built on a lot.
2. What is a covenant?
3. Why are septic tanks needed?
4. Where is the seasonable high water table important?
5. What affects the location of a septic tank?

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6. What is another name used for the property line?
7. What are the two types of surveyor's levels?
8. What is replacing the transit level in residential construction?
9. What is a Certified Plot Plan?
10. Why is a Certificate of Occupancy so important?