

## 33.930 Measurements

# 930

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### 33.930.010 Purpose

This Chapter explains how measurements are made in the zoning code.

### 33.930.020 Fractions

When calculations result in fractions the results will be rounded as follows:

- A. Minimum requirements.** Minimum requirements other than density are calculated as described in Paragraph A.1. Minimum requirements for density are calculated as described in Paragraph A.2.
  - 1. Generally. When a regulation is expressed in terms of a minimum requirement, any fractional result will be rounded up to the next consecutive whole number. For example, if a minimum requirement of one tree for every 30 feet is applied to a 50 foot strip, the resulting fraction of 1.67 is rounded up to 2 required trees.
  - 2. Density. Minimum density calculations are rounded based on a fraction that is truncated to two numbers past the decimal point. For example, 3.4289 is truncated to 3.42. Where a minimum density calculation results in a fraction that is .50 or above, the fraction is rounded up to the next whole number. Where a minimum density calculation results in a fraction that is less than .50, the fraction is rounded down to the preceding whole number.
- B. Maximum limits.** Maximum limits other than density are calculated as described in Paragraph B.1. Maximum limits for density are calculated as described in Paragraph B.2.

1. Generally. When a regulation is expressed in terms of maximum limits, any fractional result will be rounded down to the preceding whole number. For example, if a maximum limit of one parking space for every 2,500 square feet of site area is applied to an 8,000 square foot site, the resulting fraction of 3.2 is rounded down to 3 allowed parking spaces.
2. Density. Maximum density calculations are rounded as follows. For the purposes of this measurement, rounding is based on a fraction that is truncated to two numbers past the decimal point. For example, 1.7398 is truncated to 1.73.
  - a. 1.01 to 3.99. Where a maximum density calculation results in number that is at least 1.01 and up to 3.99:
    - (1) If the fraction is less than .90, the fraction is rounded down to the next whole number. For example, if a maximum limit of one dwelling unit for every 5,000 square feet of site area is applied to a 13,900 square foot site, the resulting fraction of 2.78 is rounded down to 2 allowed dwelling units.
    - (2) If the fraction is .90 or above, the fraction is rounded up to the next whole number. For example, if a maximum limit of one dwelling unit for every 5,000 square feet of site area is applied to a 14,600 square foot site, the resulting fraction of 2.92 is rounded up to 3 allowed dwelling units.
  - b. 4.01 to 10.99. Where a maximum density calculation results in a number that is at least 4.01 and up to 10.99:
    - (1) If the fraction is less than .75, the fraction is rounded down to the next whole number. For example, if a maximum limit of one dwelling unit for every 5,000 square feet of site area is applied to a 23,400 square foot site, the resulting fraction of 4.68 is rounded down to 4 allowed dwelling units.
    - (2) If the fraction is .75 or larger, the fraction is rounded up to the next whole number. For example, if a maximum limit of one dwelling unit for every 5,000 square feet of site area is applied to a 23,900 square foot site, the resulting fraction of 4.78 is rounded up to 5 allowed dwelling units.
  - c. 11.01 or larger. Where a maximum density calculation results in a number that is 11.01 or greater:
    - (1) If the fraction is less than .50, the fraction is rounded down to the next whole number. For example, if a maximum limit of one dwelling unit for every 5,000 square feet of site area is applied to a 56,200 square foot site, the resulting fraction of 11.24 is rounded down to 11 allowed dwelling units.
    - (2) If the fraction is .50 or larger, the fraction is rounded up to the next whole number. For example, if a maximum limit of one dwelling unit for every 5,000 square feet of site area is applied to a 58,200 square foot site, the resulting fraction of 11.64 is rounded up to 12 allowed dwelling units.

### 33.930.025 Measuring Development Standards

Unless otherwise stated below or elsewhere in this Title, all measurements involving development standards are based on the property lines and area of the site after dedication of public rights-of-way and/or designation of private rights-of-way. Standards include, but are not limited to, building coverage, floor area ratio, setbacks, and landscaping requirements. When site area is being dedicated for public right-of-way, calculation of floor area ratio is based on the site area at the time of building permit application.

### 33.930.030 Measuring Distances

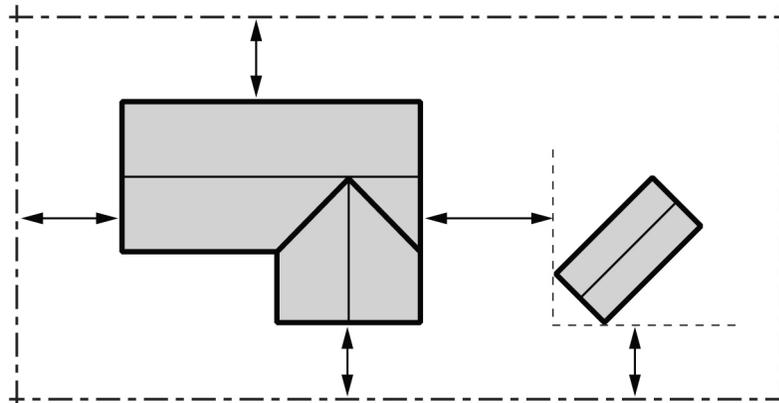
- A. Distances are measured horizontally.** When determining distances for setbacks and structure dimensions, all distances are measured along a horizontal plane from the appropriate property line, edge of building, structure, storage area, parking area, or other object. These distances are not measured by following the topography of the land. See Figure 930-1.

**Figure 930-1  
Horizontal Measurement**



- B. Measurements are shortest distance.** When measuring a required distance, such as the minimum distance between a structure and a lot line, the measurement is made at the shortest distance between the two objects. See Figure 930-2. Exceptions are stated in Subsections C., E., and F.

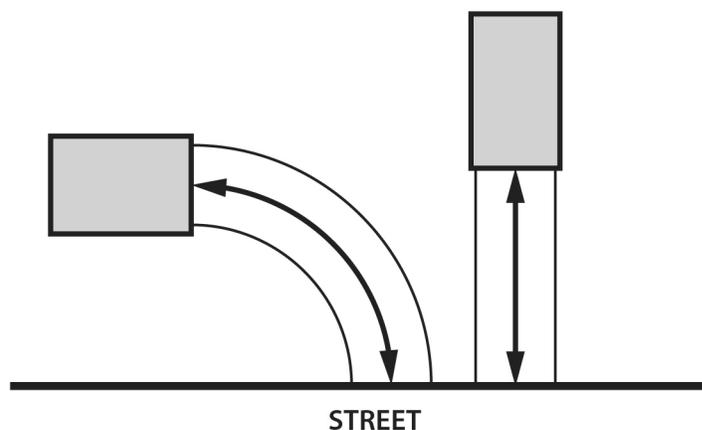
**Figure 930-2  
Closest Distance**



Measurement is taken from the shortest distance between the points.

- C. **Measurements of vehicle travel areas.** Measurement of a minimum travel distance for vehicles, such as garage entrance setbacks and stacking lane distances, are measured down the center of the vehicle travel area. For example, curving driveways and travel lanes are measured along the arc of the driveway or traffic lane. See Figure 930-3.
- D. **Measurement of distance between rights-of-way.** Distance between rights-of-way is measured from centerline of one right-of-way to the centerline of the other right-of-way.

**Figure 930-3  
Measuring Vehicle Travel Areas**

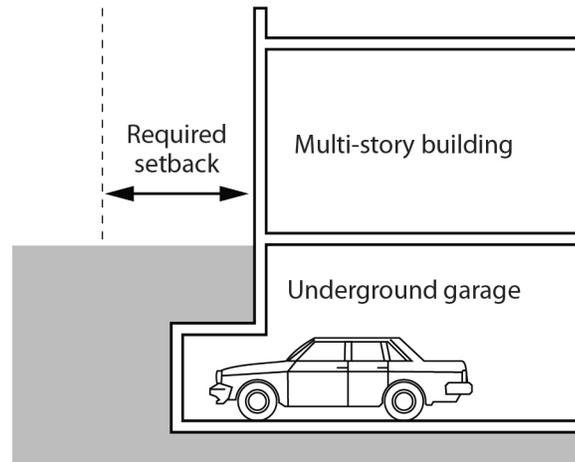


Measure down the middle of the travel area.

- E. **Measurements involving a structure.** Measurements involving a structure are made to the closest wall of the structure. Chimneys, eaves, building and window trim, and bay windows up to 12 feet in length, are not included in the measurement. Other items, such as covered porches and entrances, are included in the measurement. See Figure 930-2 above, and the base zone chapters.

- F. **Underground structures.** Structures or portions of structures that are entirely underground are not included in measuring required distances. See Figure 930-4.

**Figure 930-4**  
**Underground Structures**



Measurements do not include underground structures

- G. **Landscaping.** Measurements of the dimensions of a landscaped area include only the area that is actually landscaped, and not any other elements, such as protective curbs.
- H. **Measurement of distance from a bus stop or Transit Station.** When measuring distance from a bus stop, the measurement is taken from the bus stop sign. When measuring distance from a Transit Station, the measurement is taken from the edge of the platform.

### 33.930.040 Measuring Distances on Maps

Zone boundaries that are shown crossing lots are usually based on a topographic feature or a set measurement from a property line or topographic feature, such as the top of slope, middle of stream, 25 feet from top of bank, or 30 feet from property line. When zone boundaries are shown crossing properties with no clear indication of the basis for the line, exact distances are to be determined by scaling the distances from the Official Zoning Maps, using the center of the zoning line.

### 33.930.050 Measuring Height

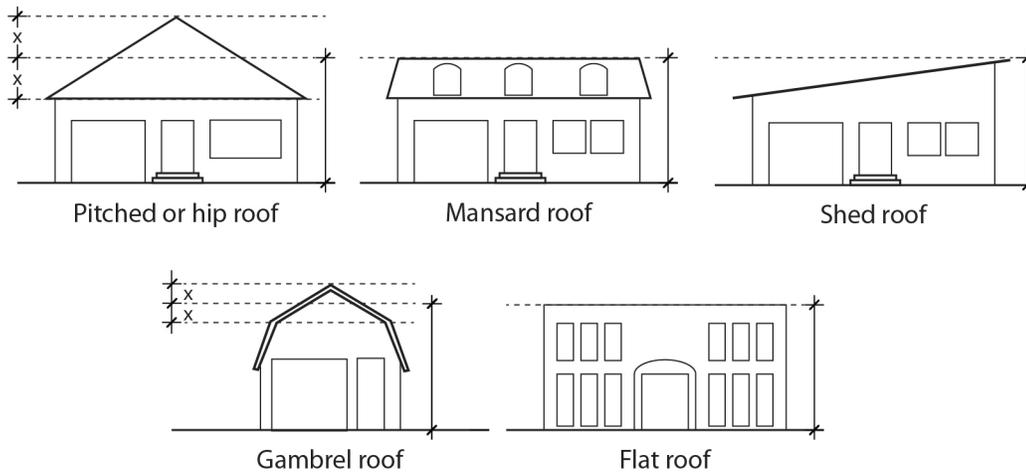
- A. **Measuring building height.** The height of a building is the vertical distance between the base reference point and the highest roof-type reference point. The methods for establishing the base reference point are described in Paragraph A.1. Methods to establish the roof-type reference point are described in Paragraph A.2.
1. Base reference point.
    - a. In commercial/mixed use and multi-dwelling zones. In the commercial/mixed-use zones, when any portion of a building is within 25 feet of an existing or proposed sidewalk, the base reference point is determined using the method described in Subsubparagraphs A.1.a(1) and A.1.a(2). See Figure 930-25 and 930-26. If no

portion of a building is within 25 feet of an existing or proposed sidewalk, the base reference point is determined using the method described in Subparagraph A.1.b. In addition, in the multi-dwelling zones, when the structure is a multi-dwelling structure, and some portion of the building is within 25 feet of an existing or proposed sidewalk, the applicant may choose to use the following method for determining base reference point:

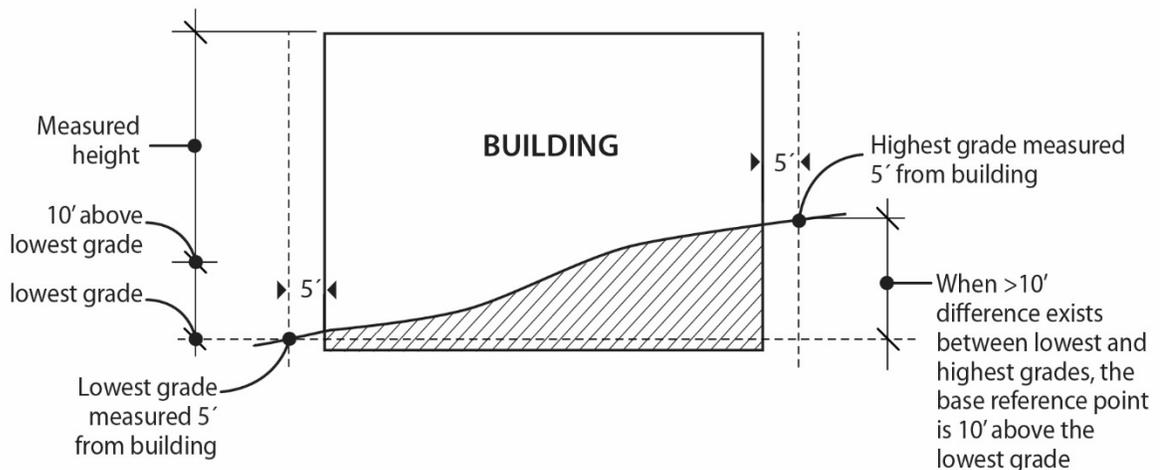
- (1) Identify the lowest and highest grade of the sidewalk located within 25 feet of the building.
  - (2) Determine the base reference point:
    - When the lowest grade of the existing or proposed sidewalk located within 25 feet of the building is not more than 10 feet below the highest grade of the sidewalk adjacent to the site within 25 feet of the building, the base reference point is the highest grade of the sidewalk.
    - When the lowest grade of the existing or proposed sidewalk located within 25 feet of the building is more than 10 feet below the highest grade of the sidewalk adjacent to the site within 25 feet of the building, the base reference point is the lowest grade of the sidewalk plus 10 feet.
- b. In all other situations, the base reference point is determined using the method described in Subparagraphs A.1.b(1) and A.1.b(2). See Figure 930-6:
- (1) Identify the lowest and highest grade exactly 5 feet from the building. To establish lowest and highest grade, draw a line exactly 5 feet from all sides of the building and identify the lowest and the highest grade along the line. Exclude from the identification of lowest grade pedestrian-only paths that are no more than 5 feet wide that provide access from the street to an entrance into the building. If the property line is less than 5 feet from any side of the building, the line must follow the property line for the segment where the property line is less than 5 feet from the building.
  - (2) Determine the base reference point:
    - When the lowest grade is not more than 10 feet below the highest grade exactly 5 feet from the building, the lowest grade is the base reference point.
    - When the lowest grade is more than 10 feet below the highest grade exactly 5 feet from the building, the base reference point is the lowest grade plus 10 feet.
2. Roof-type reference point. The methods to determine the roof-type reference point are described below and are shown in Figure 930-5. There may be multiple roof-type reference points on a building:
- a. Flat roof (pitch is 2 in 12 or less): Measure to the highest point of the roof except in the single-dwelling zones where the measurement is to the top of the parapet, or if there is no parapet, to the highest point of the roof.
  - b. Mansard roof: Measure to the deck line.

- c. Gabled, hipped, gambrel, or pyramidal roof: Measure to the average height of the gable.
- d. Other roof types such as domed, shed, or vaulted shapes: Measure to the highest point.
- e. Stepped or terraced building: Measure to the highest point of any segment of the building.

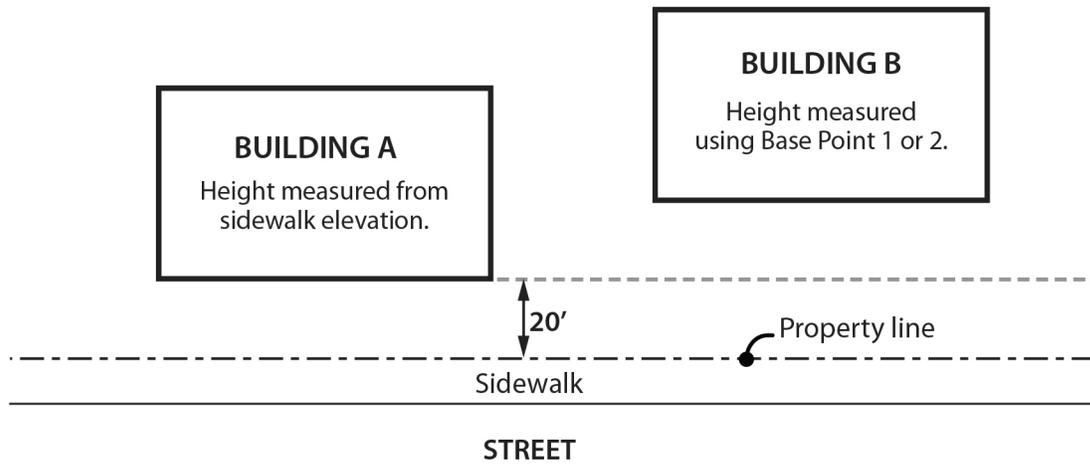
**Figure 930-5**  
**Measuring Height – Roof Types**



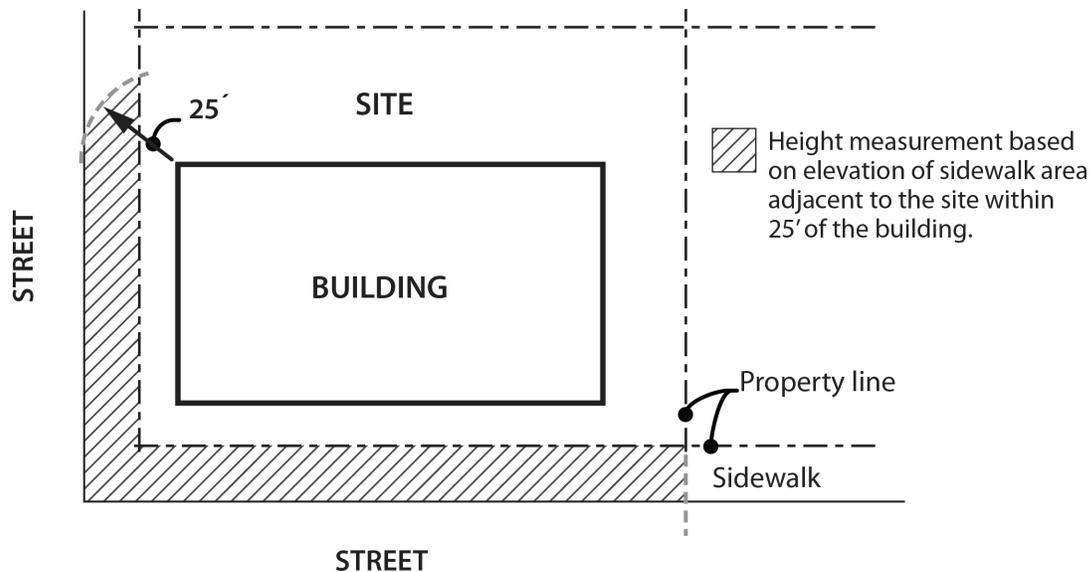
**Figure 930-6**  
**Measuring Height – Determining Base Reference Point**



**Figure 930-25**  
**Measuring Height – Commercial/Mixed Use Zones**



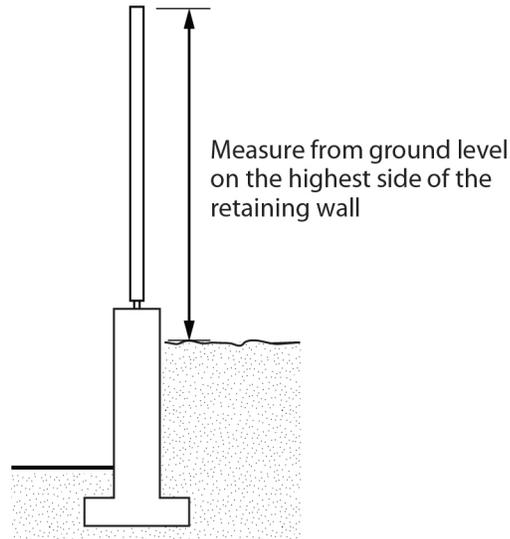
**Figure 930-26**  
**Measuring Height – Sidewalk Area Used for Height Measurement in Commercial/Mixed Use Zones**



- B. Measuring height of other structures.** The height of other structures such as flag poles and fences is the vertical distance from the ground level immediately under the structure to the top of a structure, excluding exempted portions. When chimneys and other objects are allowed to exceed the base height of the zone by a set amount, that set amount is measured to the top of these objects. Special measurement provisions are also provided below.

1. Measuring height of retaining walls and fences. Retaining walls and fences on top of retaining walls are measured from the ground level on the higher side of the retaining wall. See Figure 930-8.

**Figure 930-8**  
**Measuring Height – Retaining Walls**



2. Measuring height of decks. Deck height is determined by measuring from the ground to the top of the floor of the deck if there is no rail or if the rail walls are more than 50 percent open, and from the ground to the top of the rails for all other situations.

### **33.930.055 Measuring the Area of Limited Uses**

The extent of allowed area for a use that is limited in size is determined by adding the square footage that the use occupies including exterior eating areas.

Area devoted to mechanical equipment, elevators, and stairwells are not included.

In multi-tenant buildings common areas, such as lobbies, bathrooms and hallways are not included when other permitted primary uses that are not limited uses occupy the building.

Regulations in the base zone, overlay zone or plan district may specify additional area that is either included or excluded from the total area, such as parking area, exterior storage, or exterior display.

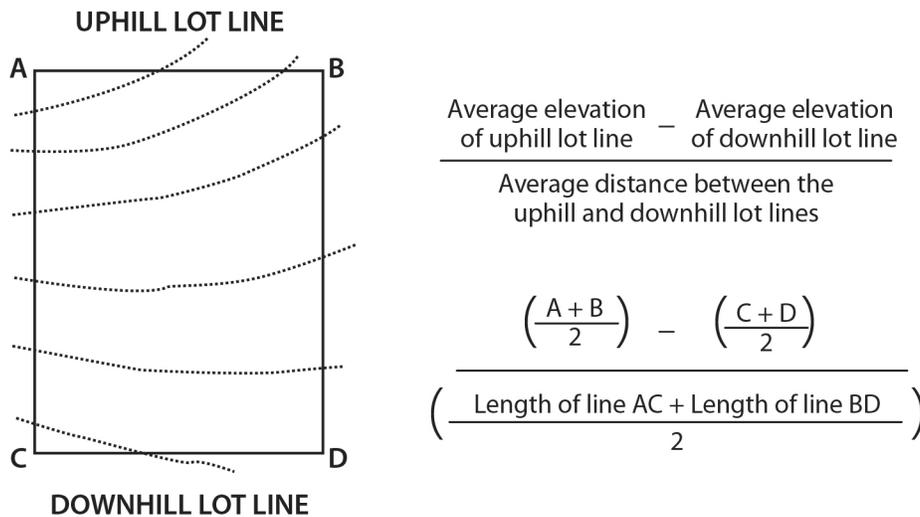
### **33.930.060 Determining Average Slope**

When calculating the slope of a lot an average slope is used based on the elevations at the corners of the lot. The average slope of a lot is calculated by subtracting the average elevation of the uphill lot line and the average elevation of the downhill lot line and dividing the sum by the average distance between the two lot lines. The average elevation of the uphill or downhill lot line is calculated by adding the elevations at the ends of the lot line and dividing by two. See Figure 930-9.

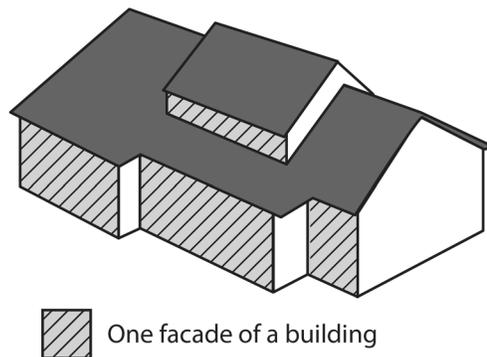
**33.930.070 Determining the Area of the Facade of a Building**

The area of a specific facade of a building is determined by adding the square footage of surface area of each section of wall visible from that perspective. For buildings with more than one wall along one facade (for example, rooms jutting out from the main building or a building where each floor is set back from the floor below), all of the walls are included in the total area. The total area does not include any roof area. See Figure 930-10.

**Figure 930-9  
Calculating Average Slope**



**Figure 930-10  
Facade of a Building**



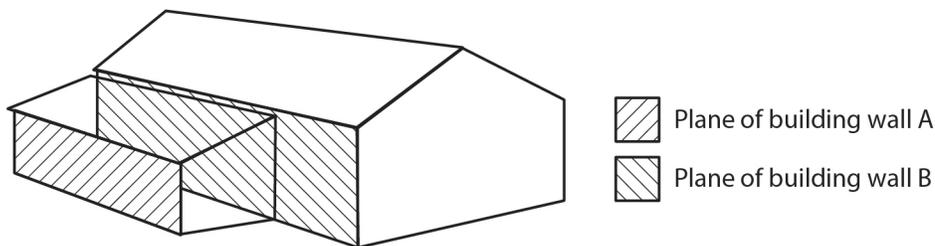
**33.930.080 Determining the Plane of a Building Wall**

The purpose of this measurement system is to provide a way to calculate varying amounts of bulk on a particular side of a structure. The plane of a building wall is a plane that extends from the ground to the top of each wall of a structure. A structure with more than one wall along one facade

(for example, rooms jutting out from the main structure or a structure where each floor is set back from the floor below) will have a different plane for each of the walls. The area of the plane is determined by calculating the area of the plane from the ground to the top of the wall. The plane does not include roof area.

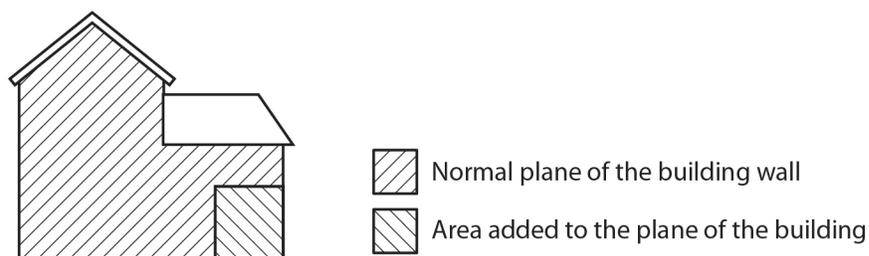
In situations where there is more than one wall along one facade, the bulk of the closer walls covers the bulk of walls that are farther back. In these situations, the wall is measured by extending the plane of the wall to the area that is behind a closer wall. See Figure 930-11. [There are special measurement rules for situations where the plane of the building wall is wider than portions of the wall below. See Figure 930-12, below.]

**Figure 930-11**  
**Plane of a Building Wall**



Where the plane of a building wall contains portions that are wider than areas of the wall that are below it, the calculation of area is made using the wider dimension and extending the plane to the open area below. See Figure 930-12.

**Figure 930-12**  
**Additions to the Plane of a Building Wall**



### **33.930.090 Determining the Garage Wall Area**

The garage wall area is determined by calculating the area of the specific side of a structure that is backed by garage space. The garage wall area is not limited to the area of the garage door; it includes all the area on the specified side of a structure between the ceiling, floor, and walls of the garage (see Figure 930-13). For carports, the garage wall area is determined by calculating the area of a vertical plane extending from the outer edges of the roof to the nearest grade. The area within a gable is not included in the calculation. See Figure 930-14.

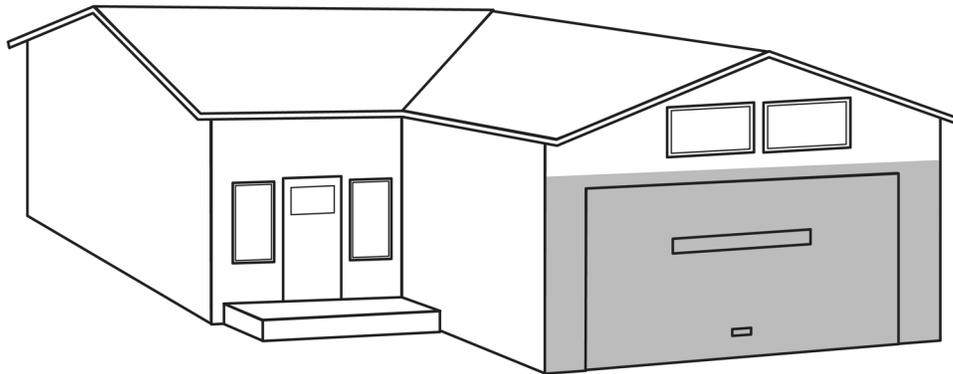
### 33.930.100 Measuring Lot Widths

- A. Single-Dwelling zones.** In the single-dwelling zones, lot width is measured by placing a rectangle along the minimum front building setback line. Where the setback line is curved, the rectangle is placed on the line between the intersection points of the setback line with the side lot lines. See Figure 930-20.

The rectangle must have a minimum width equal to the minimum lot width specified for the zone in Chapters 33.610 and 33.611. The rectangle must have a minimum depth of 40 feet, or extend to the rear property line, whichever is less. The rectangle must fit entirely within the lot. See Figure 930-20.

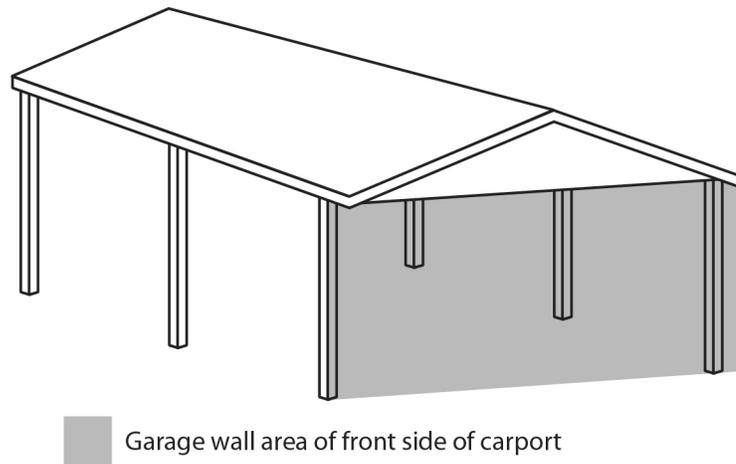
- B. All other zones.** In all other zones, lot widths are measured from the midpoints of opposite lot lines. See Figure 930-15.

**Figure 930-13**  
**Garage Wall Area**

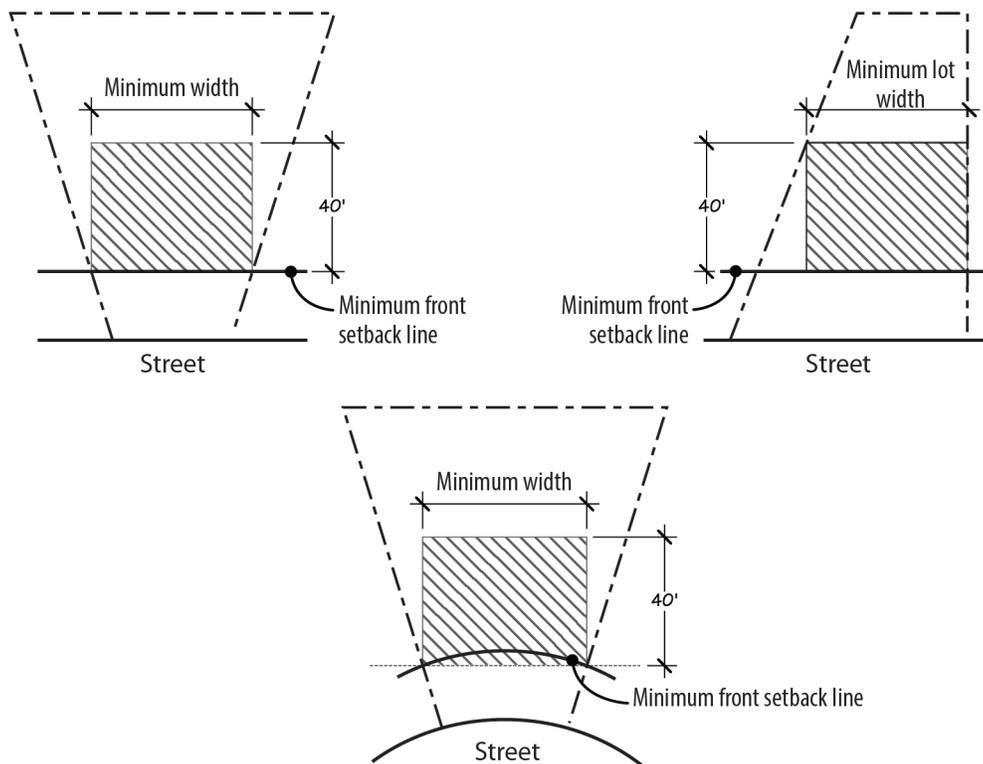


■ Garage wall area of front side of building

**Figure 930-14**  
**Garage Wall Area (Carport)**



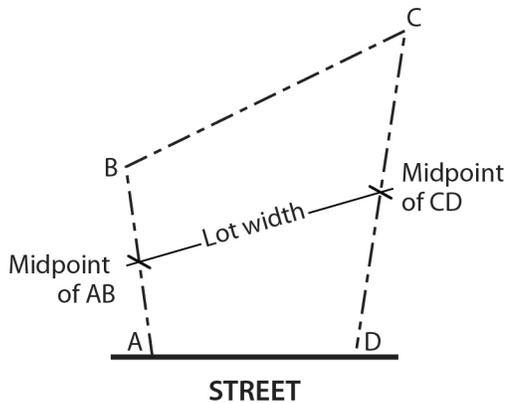
**Figure 930-20**  
**Measuring Lot Width in Single-Dwelling Zones**



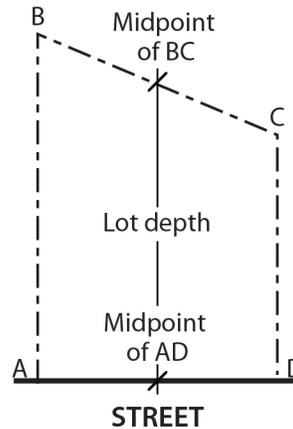
**33.930.103 Measuring Lot Depths**

Lot depths are measured from the midpoints of opposite lot lines. See Figure 930-16.

**Figure 930-15**  
**Measuring Lot Width**



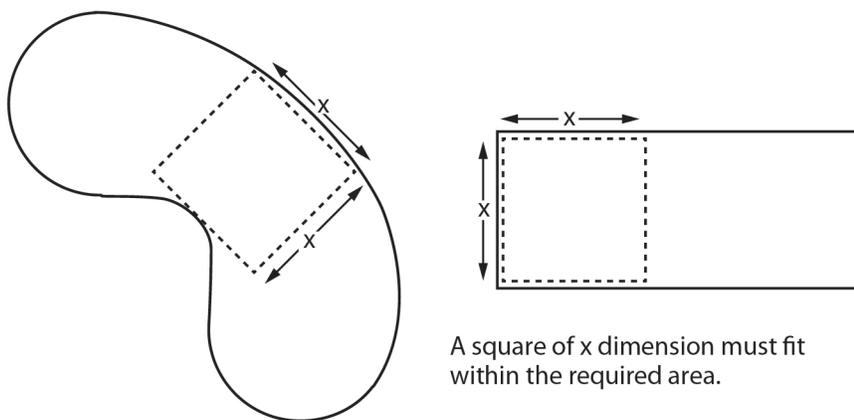
**Figure 930-16**  
**Measuring Lot Depth**



**33.930.110 Measuring Areas with Squares of Specified Dimensions**

Required areas (for example, required usable outdoor areas in residential zones and the industrial zone lot standards) must be of a sufficient size and configuration so that a square measuring X by X can be placed totally within the required area. The dimensions of the square are stated in the base zone chapters. See Figure 930-17.

**Figure 930-17**  
**Using Squares With Specified Dimensions**



A square of x dimension must fit within the required area.

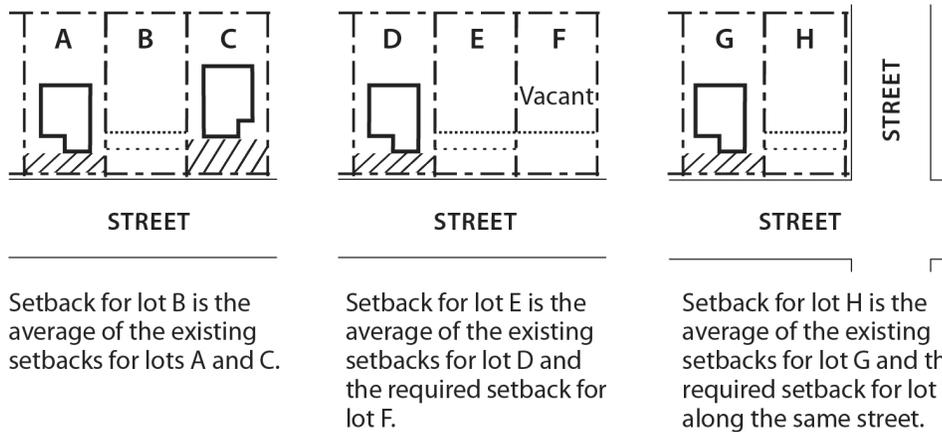
**33.930.120 Setback Averaging**

Certain regulations allow for setbacks to be averaged. In these situations the required setback may be reduced to the average of the existing setbacks of the lots that are on both sides of the site. See Figure 930-18. The following rules apply in calculating the average:

- A. The setbacks used for the calculations must be for the same type of structure that is being averaged. For example, only garage entrance setbacks may be used to average a garage entrance setback, and only deck setbacks may be used to average a deck setback.
- B. Only the setbacks on the lots that abut each side of the site and are on the same street may be used. Setbacks across the street or along a different street may not be used.
- C. When one abutting lot is vacant or if the lot is a corner lot, then the average is of the setback of the nonvacant lot and the required setback for the zone.

**Figure 930-18**  
**Setback Averaging**

..... The normally required setback    // // //, The existing setback    ..... The averaged setback

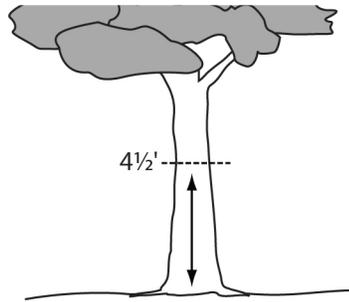


**33.930.130 Measuring Tree Diameter**

Tree diameter is measured in several ways:

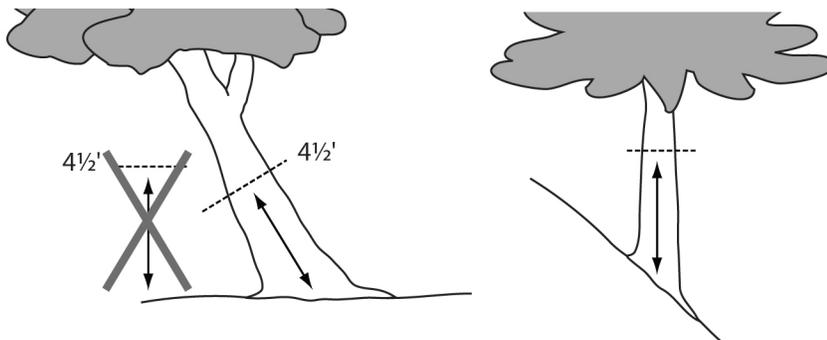
- A. Existing trees.
  - 1. Existing trees are generally measured in terms of diameter inches at a height of 4-1/2 feet above the ground. The diameter may be determined by measuring the circumference of the tree trunk and dividing by 3.14. See Figure 930-19.

**Figure 930-19**  
**Measuring Tree Size for Existing Trees**



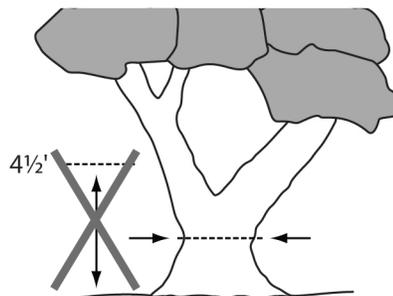
2. When the trunk is at an angle or is on a slope, the trunk is measured at right angles to the trunk 4-1/2 feet along the center of the trunk axis, so the height is the average of the shortest and the longest sides of the trunk. See Figure 930-21.

**Figure 930-21**  
**Measuring Existing Trees with an Angle or on Slopes**



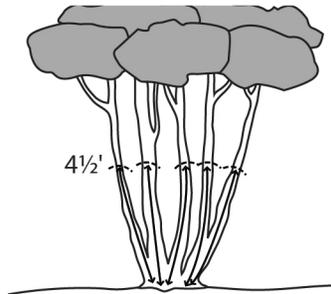
3. When the trunk branches or splits less than 4-1/2 feet from the ground, the trunk is measured at the smallest circumference below the lowest branch. See Figure 930-22.

**Figure 930-22**  
**Measuring Split Trunk Tree**



4. For multi-stemmed trees, the size is determined by measuring all the trunks and adding the total diameter of the largest trunk and one-half the diameter of each additional trunk; see Figure 930-23. A multi-stemmed tree has trunks that are connected above the ground and does not include individual trees growing close together or from a common root stock that do not have trunks connected above the ground.

**Figure 930-23**  
**Measuring Multi-stemmed Trees**

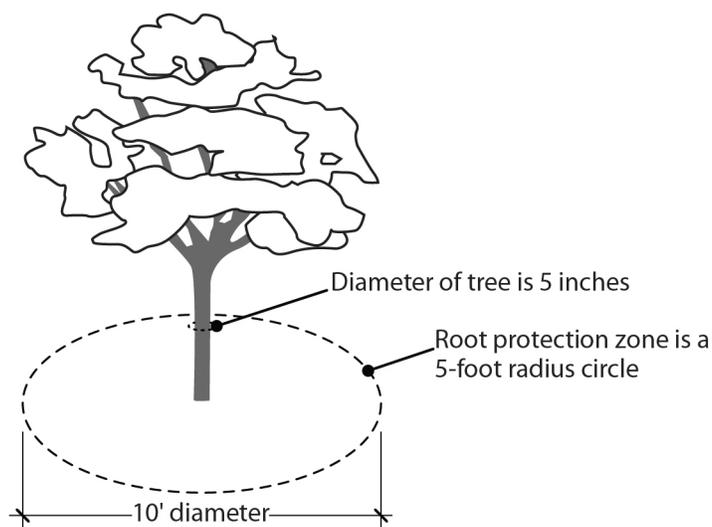


- B. New trees.** New trees are measured in caliper inch, which is the diameter of the trunk 6 inches above the ground or root ball. For coniferous trees, the tree height may also be used.

**33.930.140 Measuring the Root Protection Zone**

The root protection zone is a circular area around a tree that is based on the diameter of the tree. Each 1 inch diameter of tree equals 1 foot radius for the root protection zone. See Figure 930-24.

**Figure 930-24**  
**Measuring the Root Protection Zone**

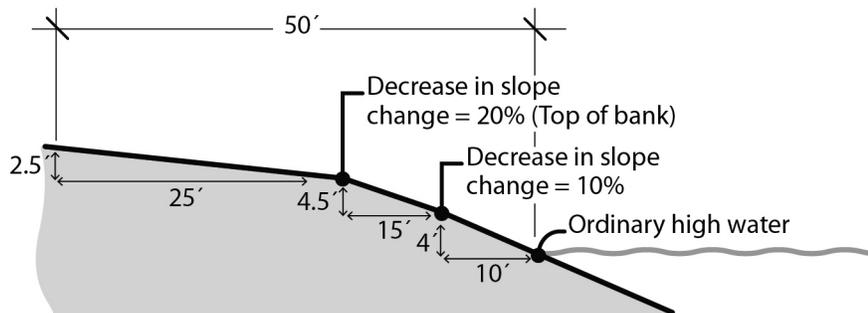


### 33.930.150 Measuring Top of Bank

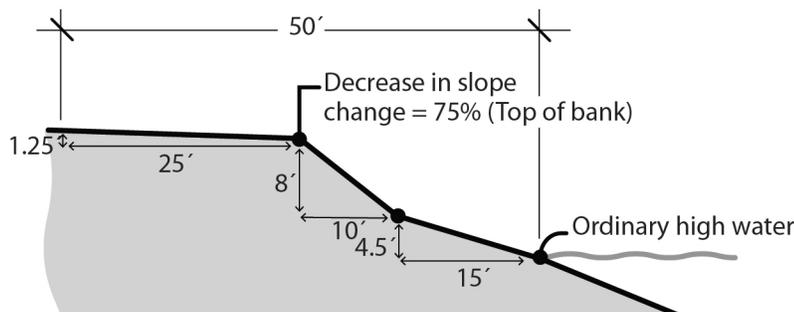
See Section 33.910.030, Environmental-Related Definitions, Top of Bank

- A. **Using Percent Slope.** Percent slope is determined by dividing the vertical rise by the horizontal run, and converting that decimal to a percentage. For example, a slope section that rises 1 foot over a distance of 4 feet is a 25 percent slope.
- B. **Identifying a Decrease in Slope.** A decrease in slope is a change in percent slope from a steeper to a less steep grade. For example, a change from 40 percent slope to 30 percent slope is a decrease in slope of 10 percent. A change from 35 percent slope to 15 percent slope is a decrease in slope of 20 percent. To identify the decrease in slope the slope must be sampled every 3 feet between the ordinary high water mark and a point 50 feet from the ordinary high water mark. See Figure 930-27.

**Figure 930-27a**  
**Example 1: Identifying a Decrease in Slope**



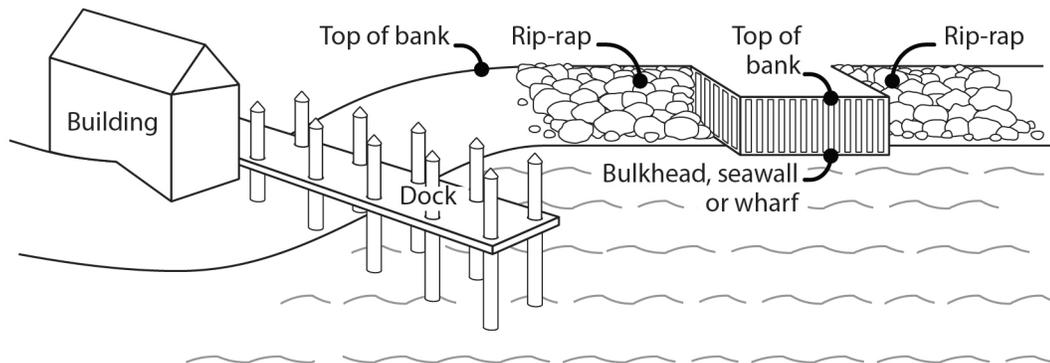
**Figure 930-27b**  
**Example 2: Identifying a Decrease in Slope**



- C. **Relationship to Other Structures. See Figure 930-28.**
  - 1. Where a structure straddles the top of bank, the top of bank line is drawn as a straight line through the structure, connecting the top of bank line on either side.
  - 2. Where there is a vertical bulkhead or seawall, the top of bank is the point at the top of the bulkhead that is closest to the river.

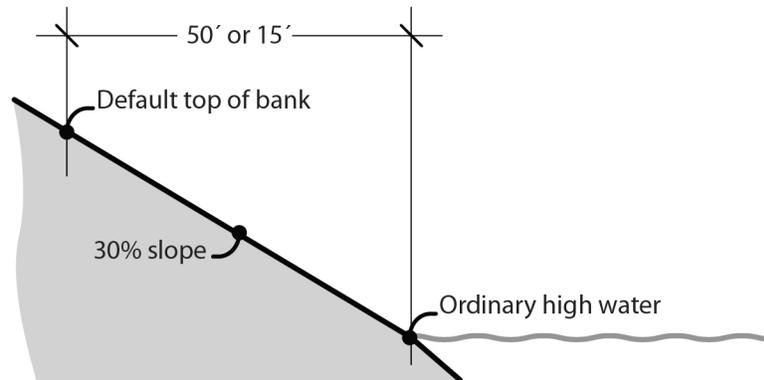
3. Docks, pilings, slips, wharves and other similar structures built over the water are not factored into the determination of top of bank. Where there is a dock, wharf or other structure on the bank, measurements of slope are taken on the underlying dry land.
4. Where the bank itself is a structure, such as a rip-rap slope at the edge of reclaimed land, the top of bank line is based on the predominant slope of that structure, rather than the slope of individual boulders or structural elements.

**Figure 930-28**  
**Top of Bank in Relation to Other Structures**



- D. Default Top of Bank.** If no slope decrease of 10 percent or more is found within 50 feet (measured horizontally) of the ordinary high water mark, then the top of bank will be one of the following default locations, see Figure 930-29. The Willamette River Reaches are shown on Map 440-1 and 475-1:
1. For the Willamette River Central Reach and Willamette River South Reach, the default top of bank is 50 feet (measured horizontally) from the ordinary high water mark.
  2. For the Willamette River North Reach and the Columbia River, the default top of bank is 2 feet (measured vertically) from the ordinary high water mark.
  3. For perennial streams, seeps and wetlands the default top of bank is 15 feet (measured horizontally) from the ordinary high water mark.
  4. For intermittent and ephemeral streams, the default top of bank is 15 feet (measured horizontally) from the centerline of the stream.

**Figure 930-29**  
**Measuring Default Top of Bank**



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*(Amended by: Ord. No.168698, effective 4/17/95; Ord. No. 173533, effective 8/2/99; Ord. No. 174263, effective 4/15/00; Ord. No. 175837, effective 9/7/01; Ord. No. 176443, effective 5/30/02; Ord. Nos. 175965 and 176333, effective 7/1/02; Ord. No. 176469, effective 7/1/02; Ord. No. 177028, effective 12/14/02; Ord. No. 181357, effective 11/9/07; Ord. No. 182429, effective 1/16/09; Ord. No. 184524, effective 7/1/11; Ord. No. 187216, effective 7/24/15; Ord. No. 187471, effective 1/1/16; Ord. No. 188259, effective 3/31/17; Ord. No. 188177, effective 5/24/18; Ord. No. 188958, effective 5/24/18; Ord. No. 189000, effective 7/9/18; Ord. No. 189805, effective 3/1/20; Ord. No. 190023, effective 8/10/20; Ord. No. 190241, effective 3/1/21; Ord. No. 190093, effective 8/1/21.)*