Cracks

Crack = a separation of the wood, a deep split through the bark and into the wood.

Cracks form when the load exceeds the capacity of the stem to withstand the load. The vast majority of cracks are caused by improper closure of wounds, by the splitting of weak branch unions, or by flush-cut pruning. See Figures 3.46 through 3.49. Cracks can occur in branches, stems, or roots. The wood behind the crack may be sound, decayed, or missing (cavity). Several types of cracks can be found in trees and, like other defects, the severity of cracks ranges across a spectrum. Vertical cracks run with the wood grain, along the length of the tree and may appear as shear cracks, inrolled cracks, or ribbed cracks. Horizontal cracks run across the wood grain. See Box 6: Types of Cracks.

Figure 3.46. *A crack indicates that the tree is failing.*

BOX 6

Types of Cracks

Vertical

Shear crack: Separates the stem into two halves along the wood grain.
Inrolled crack: Margins of crack turn inside the stem.
Ribbed crack: Has a raised rib of wood on stem.

Horizontal

Horizontal crack: Cuts acrosss the grain; like cutting a tree down.

Figures 3.47-3.49. *Most cracks develop from improper wound closure, splitting of weak branch unions, or from flush cut pruning.*

Shear cracks, a type of vertical crack, become hazardous when they go completely through the stem and separate the stem into two halves. See Figures 3.50 and 3.51. As the tree bends and sways in the wind, one half of the stem slides over the other, elongating the crack. Eventually the enlarging crack causes the two halves of the stem to shear apart. See Figures 3.52 and 3.53. A shear crack always has a high risk of failure. See Box 7: Shear cracks.

Figure 3.50. *A shear crack always has a high potential for failure.*

Figure 3.51. *The enlarging crack causes the stem to shear apart.*

Figure 3.52. *Codominant stems commonly split, creating a shear crack.*

Figure 3.53. *Aftermath of shear crack failure*

BOX 7

Shear Cracks

Shear cracks are formed when weak, codominant stems break apart. A shear crack always has a high risk of failure. See Figure 3.54.

Figure 3.54. *Cross section of a shear crack. The tree is split into two halves.*

Another type of vertical crack is an inrolled crack, also called a ram's horn. The margins of this type of crack curl inward on each of its sides and forms inrolled bark and wood. See Figures 3.55 through 3.58. The fissure of an inrolled crack may appear open or closed. Serious decay is always associated with an inrolled crack because the crack margins rewound the tree each year allowing decay to spread rapidly. Inrolled cracks often generate other cracks in the same stem segment. See Box 8: Inrolled crack. Trees with an inrolled crack, advanced decay, and another crack, all in the same stem segment, have a high risk of failure. To determine the potential for failure, measure the shell thickness in a few locations around the tree's circumference, determine the width of the crack opening and look for the presence of any other type of crack.

Figure 3.55. *An inrolled crack with crack margins open exposing hollow interior.*

Figure 3.56. *An inrolled crack with crack margins closed.*

Figures 3.57-3.58. *Decay is always associated with an inrolled crack. There may or may not be a hollow column inside the cracked tree.*

BOX 8

Inrolled crack

An inrolled crack is formed when a wound does not close properly. The layers of bark and wood forming the margins of the wound meet but do not grow together and do not seal over the wound. Instead these layers curl inward on each side of the wound and form inrolled bark and wood. See Figure 3.59. The crack perpetuates itsfelf as new layers of wood are added each year to the inrolled bark and wood, increasing the separating force between the two sides and enlarging the crack. Serious advanced decay is always associated with inrolled cracks. Inrolled cracks become more hazardous as they enlarge and generate secondary cracks in the stem.

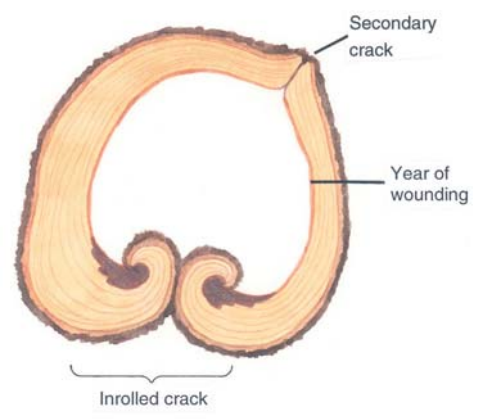

Figure 3.59. *Evaluate inrolled cracks by determining shell thickness, size of crack opening and by checking for the presence of a secondary crack.*

A tree with a ribbed crack has a raised rib of wood on its stem with a crack along the length of the rib. See Figures 3.60 and 3.61. The crack can be open or closed. See Box 9: Ribbed cracks. A ribbed crack has a high risk of failure when associated with another crack or with extensive advanced decay. Evaluate shell thickness and size of crack opening. Ribbed cracks may also form at the base of weak unions or on large branches.

Figure 3.60. *A ribbed crack creates a ridge-like protruberance from the main stem.*

Figure 3.61. *A ribbed crack can fail when associated with extensive advanced decay or another crack.*

BOX 9

Ribbed cracks

Ribbed cracks are created as the tree attempts to seal over a wound. Margins of the crack meet and mesh but are reopened due to tree movement or extremely cold temperatures. Thicker annual rings are created in order to stabilize the developing crack at the location of the crack. This forms the ribbed appearance over a period of many years. See Figure 3.62.

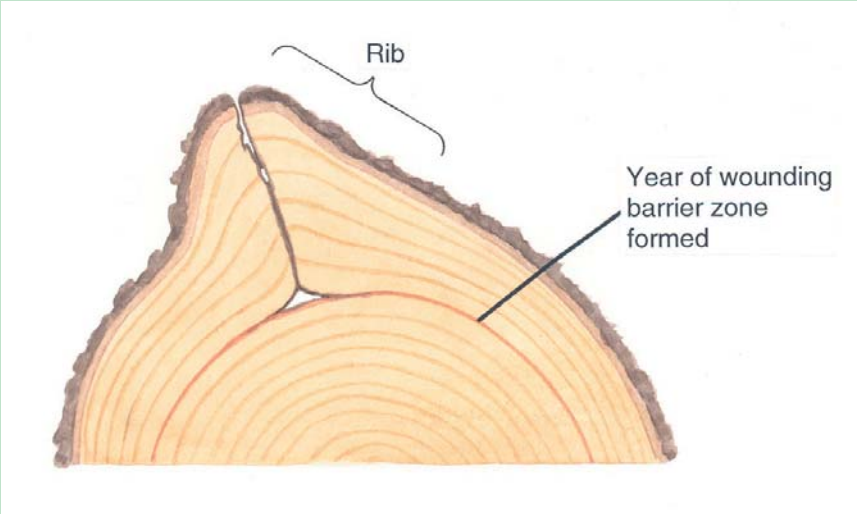

Figure 3.62. *Thicker annual rings are formed every year over the site of an old wound which creates a ridge (rib) of wood.*

Horizontal cracks run across the grain of the wood. See Figures 3.63 and 3.64. Horizontal cracks are rarely found because they develop just before the trees fail. See Box 10: Horizontal cracks. Horizontal cracks are a sign of imminent failure in leaning trees (see the section on Poor Architecture in this chapter for details).

Figure 3.63. *Horizontal cracks form across the wood grain.*

Figure 3.64. *Horizontal cracks are rarely found because they develop just before trees fail.*

BOX 10

Horizontal cracks

These cracks run across the grain of wood and are formed when loading in the tree's crown pulls wood fibers apart. Horizontal cracks are a sign of imminent tree failure.

Seams are generally not hazardous, but they can be confused with cracks. A seam is a vertical line in the bark. See Figure 3.65 Generally, a seam is flush with the stem. A seam can be considered a phase in the wound sealing process. See Figure 3.66. As time passes, a solid shell of wood begins to form over the old wound which strengthens the stem and, eventually, the seam disappears. The wood inside the tree may be sound or decayed. If in doubt, evaluate the tree's shell thickness to determine its risk of failure.

Figure 3.65. *Seams are fully compartmentalized. If internal decay is present, check shell thickness.*

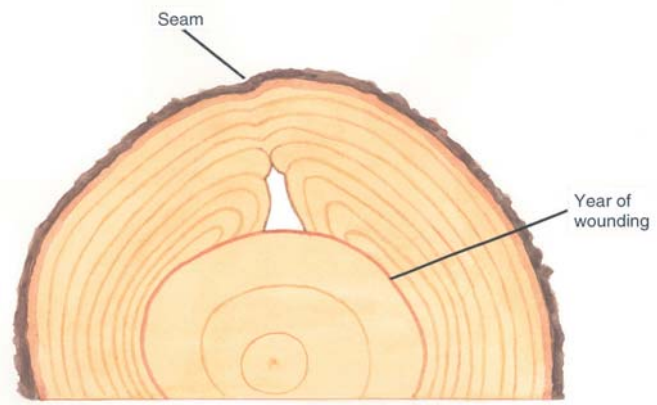

Figure 3.66. *A seam can be considered a final phase in the wound sealing process.*

Cracks are hazardous when they compromise the structure of the tree by splitting the stem in two or when another defect, such as internal decay and a crack, do not provide enough sound wood in the outer shell to support the tree. The presence of multiple cracks and decay indicates a very defective tree. Trees with an inrolled crack, advanced decay, and another crack, all in the same stem segment, have a high risk of failure.

Cracks

High risk of failure:

See Figures 3.67, 3.68, and 3.69.

- Stem is split in two by a crack.
- Stem segment has multiple cracks and decay.
- Any cracked branch.

Moderate risk of failure:

- Stem has a single crack and decay.

Figure 3.67. *High risk of failure: When stem is split in two by a crack.*

Figure 3.68. *High risk of failure: When stem segment has multiple cracks and decay.*

Figure 3.69. *High risk of failure: When any large branch is cracked.*