RESEARCH LABORATORY TECHNICAL REPORT

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Prop System Installation

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Props are rigid structures anchored in the ground that support tree branches or trunks from below. Props are used under horizontal or downward growing branches to keep them off of the ground, vehicles, or structures and above pedestrians' heads. They are also used to provide supplemental support to leaning tree trunks.

Props can be made from wood, steel, concrete or other materials. The structure must have sufficient strength to support the expected load. Branches typically weigh 50 to 80 pounds per cubic foot of volume, depending on tree species. The load may be greater if the trunk leans toward the branch or if the branch is significantly affected by wind. Props constructed from wood and steel should be protected from deterioration, decay and rust.

Props need to be designed to keep the branch from moving laterally and falling off the top of the prop. Options for keeping the branch on the prop include a pin, rod or bolt into or through the branch or a saddle below the branch. However, the prop should also be designed to allow future growth of the branch. Saddles and straps often end up damaging branches by girdling, so they should be avoided or adjusted frequently.

The prop must be anchored in the ground to keep it from moving excessively. A concrete footing is often the preferred anchor. It should be large enough to hold the expected load and deep enough to reduce frost heaving. When a hole is dug for a footing, care should be taken to minimize root damage.

Summary

Props can be an effective means for maintaining clearance height of branches. They should be designed to hold the intended load while not restricting future growth. Props should be maintained adn replaced if they deteriorate or no longer function as designed.

Materials Needed

1) Steel pipe - 1 ¼ or 1 ½ inch in diameter, either black pipe or galvanized. Maximum pipe length is 10 feet.

2) Reducer - 1 ¼ or 1 ½ inch diameter to ¾ inch diameter

3) Lag threaded rod - ½, 5/8, or ¾ inch diameter and 6" long, with 2 nuts and 2 washers

4) Scaffold jack with fixed or swivel base plate (fixed for perpendicular application, swivel for angle applications)

5) Concrete block- "trailer block" or retaining wall "end cap", min. size is 16" x 16" x 4". Poured concrete footings are acceptable with the same minimum size.

6) Concrete anchors (3/8 or ½ inch diameter), four are needed.

7) One tube of *Loctite*

8) Spray paint – optional

Tools

Hacksaw or reciprocating saw with steel cutting blade
Electric drill capable of drilling concrete and wood, hammer-drill preferred.
Drill bits for concrete (3/8 or ½ inch) and wood (7/16, ½, 9/16, or ¾ inch diameter, spade bits are acceptable) Adjustable and/or ratchet wrenches.
Pipe wrench (2 preferred)
Plumb bob or string with a weight (nut).
Level - torpedo level or 2 foot long framing level
Shovel
Hammer

Installation

Select the location of the prop. This is typically: 1) between ½ and 2/3 the distance from the junction to the end of the branch or 2) at a low point in the branch. Do not install a prop directly under a crack or area of decay.

On the lower side of the branch, drill straight upward, 1 – 2 inches deep (Fig. 1) using a drill bit diameter 1/16 to 1/8 inch smaller than the diameter of the threaded rod. For angle applications, drill at the angle of the prop.

Figure 1:

Cut a 6 inch long piece of the threaded rod (Fig. 2). Thread the rod into the branch hole using two nuts that are locked together on the rod (Fig 3). 4-5 inches of rod should remain exposed. After the rod is secure, remove one of the nuts and adjust the other so that is about 2 inches from the lower end of the rod.

Figure 2:

Figure 3: Use 2 nuts to screw in rod

Tie a plumb bob line to the rod and suspend the bob to locate the center of the footing (Fig. 4). Mark the soil at this point. This is the center of the concrete block.

Figure 4: Use a weighted string to determine the block's center

Dig a level area for the concrete block. In areas where the soil freezes, the depth of this excavation should be below the frost line. It may be easier to pour concrete than use a block if large rocks are present in the soil. If branch lifting is likely, use a larger block or install the standard size deeper in the soil (Fig. 5). The soil below the block should be undisturbed and low in organic matter so it will not settle over time. Back fill around and over the block to keep it from moving.

Figure 5: Level and center the concrete block

Figure 6: Measure the distance from the rod to the block

Measure the distance from the threaded rod to the top of the concrete block (Fig. 6). Subtract 4 to 6 inches from this distance and cut the pipe to that length.

Place two washer onto the threaded rod and hold them by hand as you insert the reducer over the threaded rod (Fig. 7). Screw the second nut onto the threaded rod below the reducer. The lower nut does not have to be tight, but it should be treated with Loctite to keep the nut from moving.

Figure 7: Attach the reducer to the rod

Screw the support nut on the scaffold jack to the lowest level (Fig. 8). Insert the scaffold jack into the cut end of the pipe. Move the top of the pipe under the reducer/threaded rod and stand the pipe and jack straight up.

Fasten the reducer/ threaded rod combination onto the top threaded end of the pipe (Fig. 9). Apply *Loctite* to the threads and tighten the reducer onto the pipe. At this point the bottom of the pipe should lift off the adjuster nut on the scaffold jack.

Figure 8: Lower the support nut on the jack to the lowest point and insert into the pipe

Figure 9: Screw the pipe into the reducer

Adjust the nut on the scaffold jack so the system is tight and the prop is supporting a portion of the branch weight. Avoid lifting the branch any more than necessary. It is best if the adjuster nut is only a few inches above the jack stand's base. The adjuster nut can be below grade for a cleaner appearance.

Figure 10: Use a masonry bit to drill 2 to 4 holes for anchor bolts

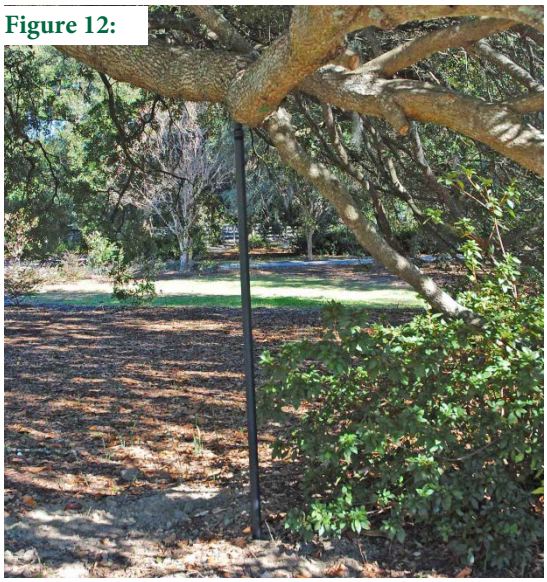
Install at least four concrete anchors through the holes on the scaffold jack into the concrete block (Fig. 10). Tighten the anchors.

Spray paint the assembly if needed (Fig. 11). Galvanized pipe does not need to be painted unless the client prefers a different color.

Figure 11: Spray painting the pipe may make it less visible

Replace soil around and over the concrete block and base of scaffold jack, as needed (Fig. 12).

Figure 12:



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