

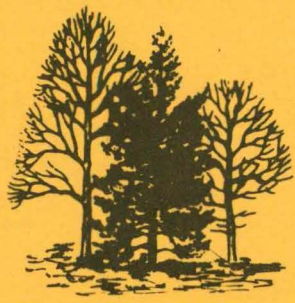
R. W. PRATT

OFFICE OF CONSTRUCTION

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INSPECTOR'S HANDBOOK

LANDSCAPING



IOWA STATE HIGHWAY COMMISSION

AMES, IOWA

1972

LANDSCAPING

James Cummings

INTRODUCTION

This handbook is an inspector's aid. It was written by an inspector to bring together all of the most-often-needed information involved in his work.

Much care has been taken to detail each phase of construction, with particular attention to the requirements and limitations of specifications. All applicable specification interpretations in Instructions to Resident Engineers have been included.

The beginning inspector should look to the handbook as a reference for standards of good practice. The Standard Specifications and Special Provisions, however, are the basic sources of information on requirements and restrictions concerning workmanship and materials.

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Plan Evaluation

When the plans for an erosion control planting arrive in the office, the inspector should look them over very carefully and note the manner in which the plant groupings are marked.

Plants are listed by code, botanical name, common name, size and totals for the project. Sheet totals are also listed on each of the detail sheets.

Codes for the various plants are found in the planting guide on the plans. For example, the code for a single Skyline Honeylocust tree is G-3. A group of 3 such trees would be coded 3-G-3.

The totals should be checked by count from the detail sheets and any discrepancy corrected by Plan Revision or Extra Work Order.

The sizes given in the plans are either diameter in inches or height in feet, and are the minimums required. Behind some sizes are the letters B-B, while others show sizes only. The letters B-B indicate the plant is to be "balled and burlapped", which is nothing more than digging the plant with a ball of soil attached to the root system and wrapping the soil and roots with burlap to preserve and protect the root system. Evergreens and other slow starting plants require B-B treatment.

Part of the requirements for B-B material are a specified number of transplants. When a root is cut, it will put

out several root shoots at the cut. Each time a plant is transplanted the root system is cut close to the trunk and becomes thicker. After several transplants a good share of the plant roots are massed close to the trunk and can be easily included in a ball.

Instead of completely transplanting the plant, some nurserymen simply cut the roots by pushing a spade into the ground or undercutting with mechanical equipment. This process is common with larger trees and is acceptable in lieu of actual transplanting.

If the plant is not designated B-B, it indicates a bare root plant is intended. Bare root stock is dug with no dirt remaining on the roots. These are easier starting plants and are able to put out a suitable supporting root system quickly. However, just because a plant is designated as bare root, it should not be denied good care and protection.

The Standard Specifications, Special Provisions and Section XV of the Instructions to Resident Engineers offer a complete guideline for all types of planting.

One of the more perplexing problems of this type of work is keeping an accurate record of the planting operation. Figure 3 shows the headings for a site-by-site workbook, proceeding from one end of the project toward the other, remaining on the same side of the road throughout.

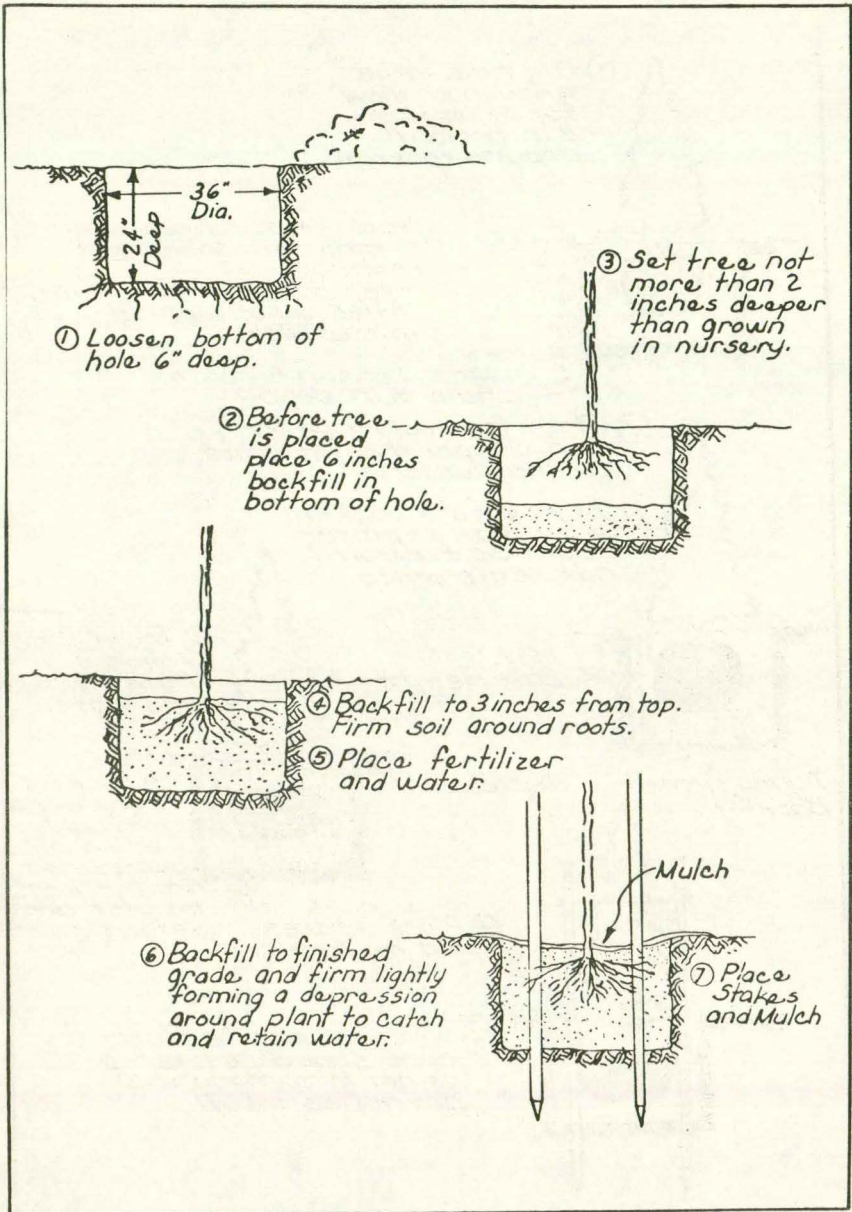


Figure 1 - Bare Root Planting

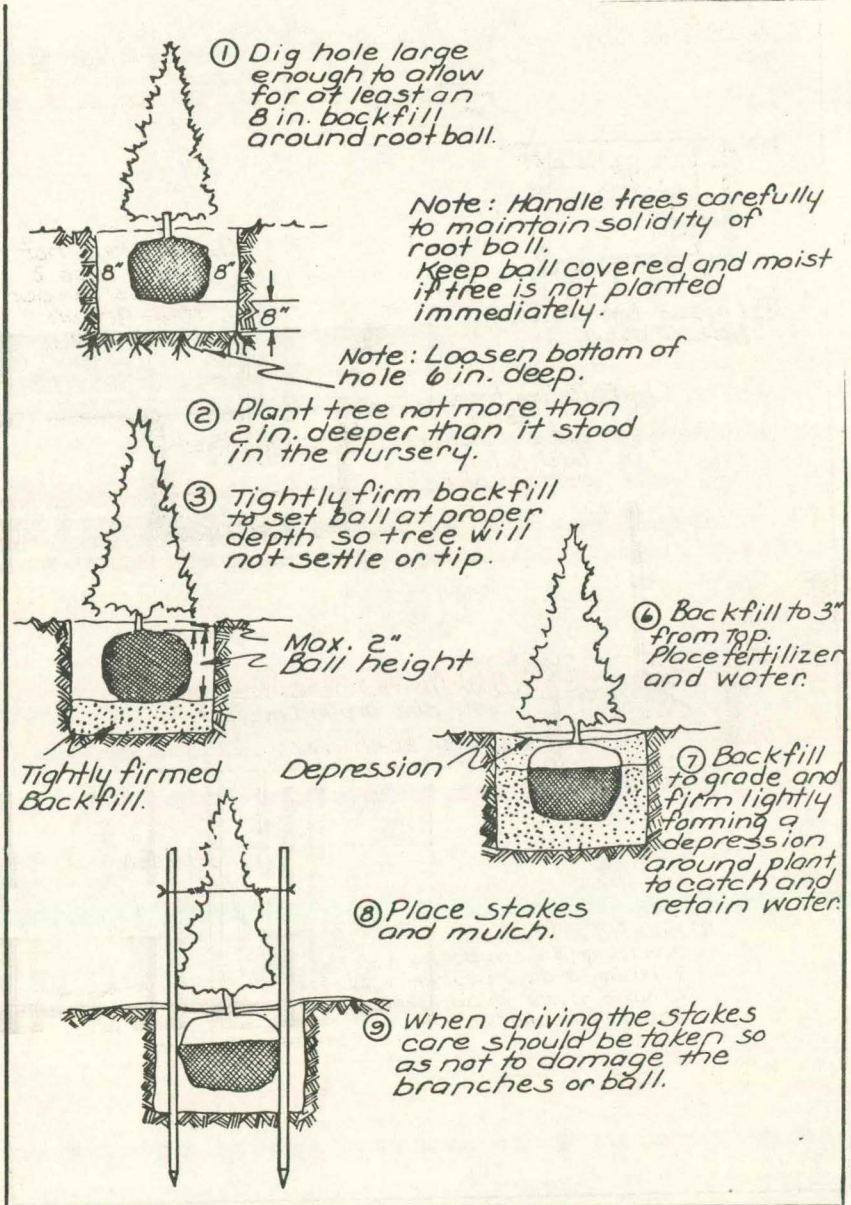


Figure 2 - B-B Planting

Remaining on one side of the road during half a project eliminates crossing traffic lanes while planting. This system has been used on several large projects and has proven to be very satisfactory.

The headings given on Figure 3 provide a record of the various steps, along with a replant record. The lower portion shows entries to date for each type of plant. It is suggested that each item have a page or pages for itself. These can be set up well in advance of the actual start of the job, and will be helpful when plant locations are staked.

The peat mentioned on Figure 3 is also known as peat moss and is introduced as a soil conditioner and for its water-retaining quality. Peat does not replace the required application of commercial fertilizer.

Plant Material Inspection

All plant material furnished must be of the type and size specified by the contract documents.

Careful measurement of the diameter of the trunks of bare root stock is important. Trees up to four inches in diameter should be measured six inches above the ground line. Larger trees should be measured twelve inches above the ground line.

Trees must also meet defined height requirements, be of high quality and

condition and have well-developed branch and root systems.

Balled and burlapped stock also has to meet given requirements as to ball sizes and number of transplantings, according to tree type.

Shrubs are required to meet a minimum root spread based on plant height.

All plants should be inspected for compliance by an authorized representative of the contracting agency, either at the nursery, at the time of digging, or at the collection point prior to planting. However, acceptance at this time does not relieve the contractor of any responsibility for damage incurred during the handling of stock prior to installation.

At the time of planting the inspector should be alert for any damaged leaders, branches, roots, balls, or unhealthy-appearing plants. All damaged plants should be rejected and removed immediately.

Balled and burlapped material must come from soil which will hold a firm ball. Broken or loose balls are a cause for rejection because of possible damage to the hair roots, which are a very important part of the larger roots and act as a feeder system to the plant.

All plant material must be true to name and size and legibly tagged. Small bare root plants are shipped bundled together and will probably only have

one or two tags to the bundle. If several similar-appearing varieties are required on the same project, the inspector should insist on individual tags.

Plant Material Storage

In the best interest of the stock, the word "storage" should be construed to mean "any time the plant material is not in the ground, regardless of length of time".

If the storage area is outside, the bare root stock should be heeled in (see illustration) if it cannot be planted within a reasonable length of time after receipt.

If the storage area is inside, care should be taken to ensure that the roots are kept covered with moss or straw, and damp.

When stock is being moved from the storage area to the planting site, caution must be taken to avoid drying damage to the roots. Roots should be packed in moss or straw and covered by a tarpaulin.

Balled and burlapped material need not be heeled in but must be protected from drying damage. In extremely dry weather it might become necessary to water B-B plants. This should be done by using a very fine mist spray with several light applications, instead of a heavy stream which may cause severe damage to the balls.

Plant Locations

The Roadside Development Section will normally stake the plant locations. However, due to timing or workload, it sometimes becomes necessary for the field forces to stake the plant locations. Staking is to be done before excavating.

If plastic flags aren't used a suitable stake is half a plaster lath, with six inches of one end dipped in yellow paint. The type of plant can be marked, using the botanical code, on the painted section. A waterproof marking pen works well, and the marking should be on both sides of the stake for ease in reading. The stake is then driven at the selected site. Stakes of this type and marking method have survived a complete planting season, retaining their effectiveness and remaining readable.

When locating a plant site the inspector should maintain sufficient clear distance (normally 15 to 20 feet) between the new tree and any obstacle to allow clear passage of a maintenance mower. Don't locate plants in low, poor-draining areas. Also bear in mind the problems of snow removal, and do not put potentially large bushy trees in areas where they could cause drifting.

Sometimes the plans include a grouping of bushes which are placed to specifically act as a snow fence. In this case they should be placed at the proper distance from centerline, usually

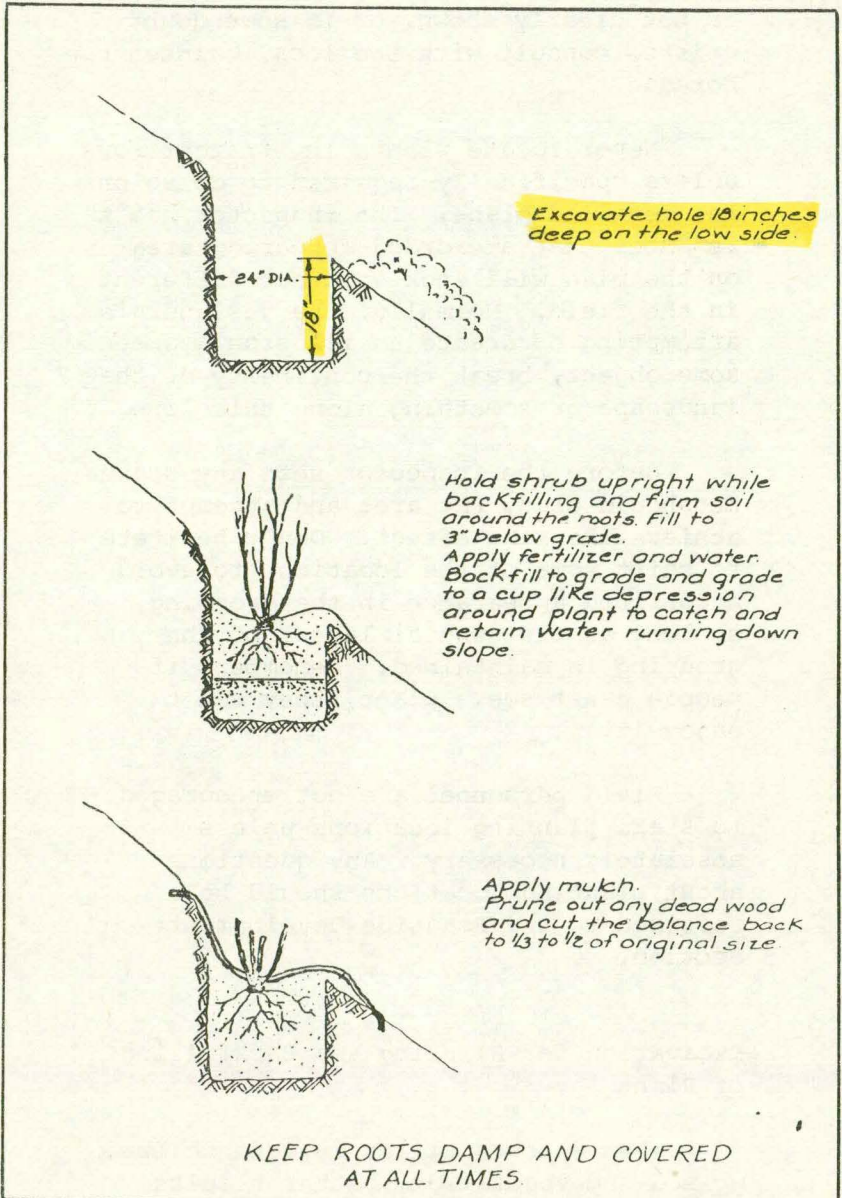


Figure 4 - Shrub Planting on Slopes

about 100 feet. If the troubled area is not clearly shown, or if some doubt exists, consult with the local Maintenance Foreman.

Never locate plants in straight rows unless specifically required to do so on the detailed plans. The inspector has to remember that a crowded-appearing area on the plan will look somewhat different in the field. Normally, the designer is attempting to create an illusion, screen some object, break the continuity of the landscape or something along this line.

Before the inspector sets any stakes he should study the area and attempt to achieve the same effect. Don't hesitate to shift some of the locations to avoid a confined appearance in the grouping, so long as the general layout of the grouping is maintained. Remember, if people can't see a plant, they can't enjoy it.

Field personnel are not encouraged to stake planting locations unless absolutely necessary. Any questions about planting locations should be referred to the Roadside Development Section.

Excavation for Planting and Backfilling of Plant

When a power tiller is used to break up sod and vegetation, better results are obtained if this is done prior to excavation. The contractor must be careful during this operation to avoid

tilling excess areas which require seeding later.

The size of the excavation is determined in relation to the size of the ball or the size of the plant. The Special Provisions might contain instructions along this line. Remember that the bottom of the planting well is to be loosened an additional six inches. This is most often done by digging the hole too deep and backfilling.

Most digging is now done by a mobile power auger. On occasion, it will be necessary to enlarge the drilled hole to accommodate an oversized ball. In those cases the sides of the hole can be shaved with a common spade. If it is apparent the excavation is in impervious soil, the plantings can be relocated or a blind drain installed.

Some contractors backfill the hole after the initial digging, mixing the peat with the backfill dirt. This method is commonly used if the contractor is digging in the winter and anticipates an early spring start. When these holes are re-dug in the spring, the peat gets a second mixing by the auger's action.

Care must be taken at the time of the first backfilling to reset the identification stake, if this method is used.

When plants are delivered to the excavation the inspector should examine them, particularly the ball or roots, and have any unsuitable plants removed. Broken or previously cut roots are to be cut back to sound wood with pruning shears.

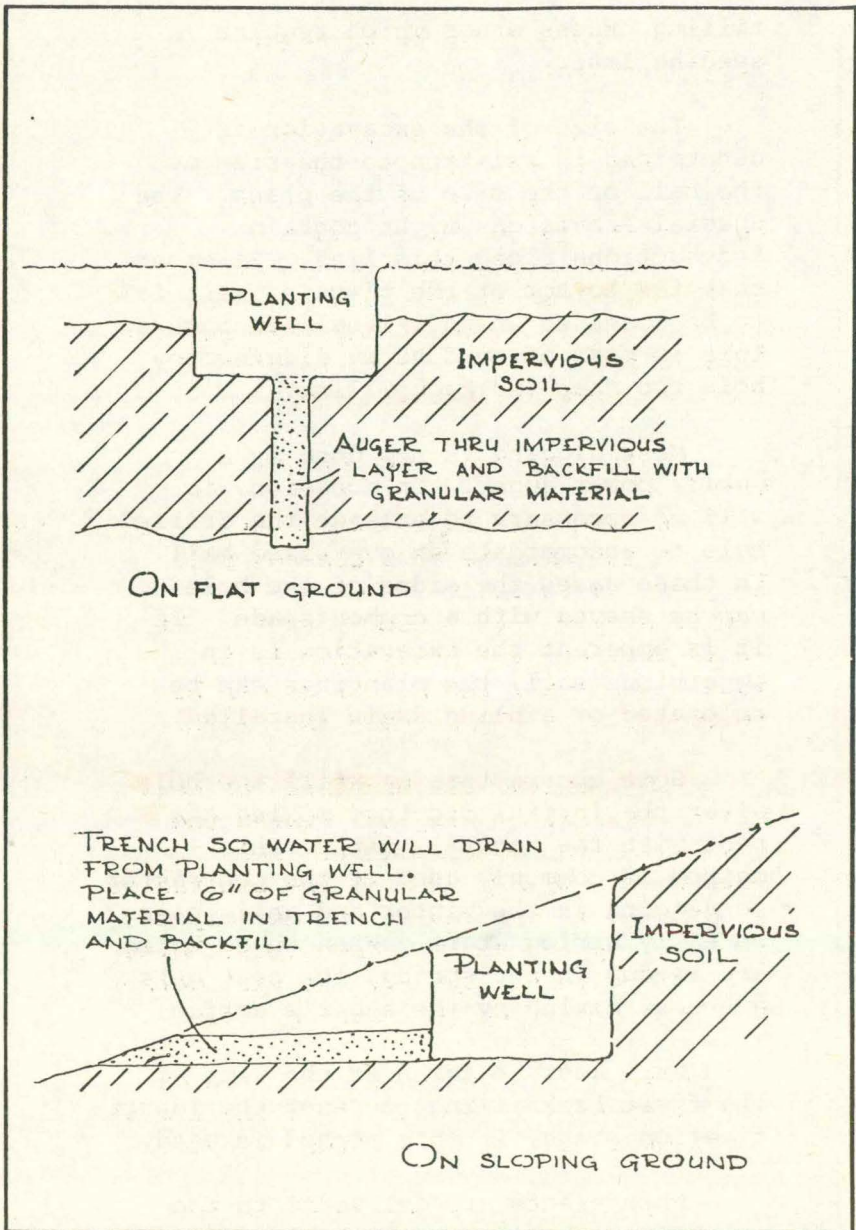
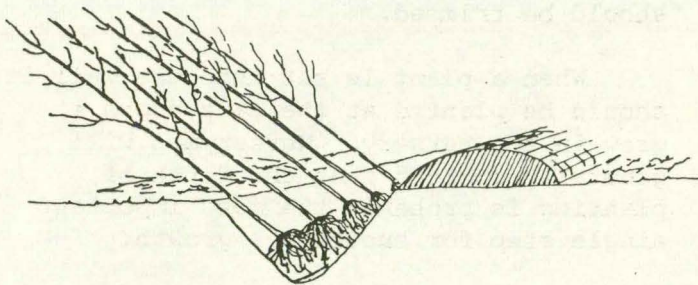
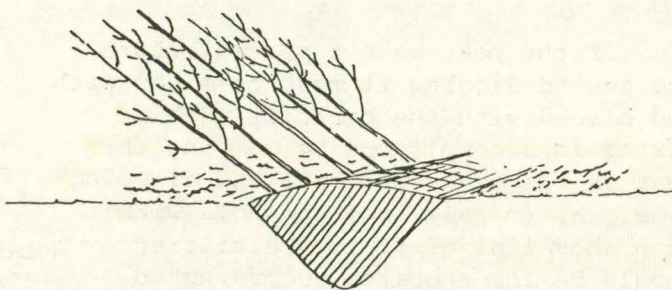


Figure 5 - Blind Drains for Plantings



Dig V-shaped trench in moist shady place large enough to cover the roots of plant material being heeled in.



Fill in loose soil and water. Complete filling in soil and firm with feet.

Figure 6 - Heeling In

Sometimes it is hard to tell whether or not a root has unsound wood exposed. If the root end is freshly cut, there is probably no problem; however, if there is any question as to soundness, the roots should be trimmed.

When a plant is set into the well it should be planted at the same depth it grew in the nursery. Nurserymen will generally contend that the depth of planting is probably the most important single step for successful growth.

If the well is too deep, place and lightly tamp backfill dirt to the proper depth before placing the plant. Hold the plant in the proper position while placing and tamping the backfill. Don't tamp with a shovel handle. (See illustration on Bare Root Planting.)

If the peat wasn't placed before the second digging it must be mixed with and placed with the backfill. This mixing is accomplished by dumping the peat on the excavated soil and allowing some peat to fall into the hole with each shovelful of dirt. Fertilizer should be incorporated according to current specifications. The required amount of fertilizer is so small it is usually applied from a calibrated can. Backfill material should be loose, friable and free of hard clods.

Before the backfill is completed the burlap and retaining string on B-B plants should be trimmed and spread to expose the top of the ball. The plant should be watered by inserting a hose to the bottom of the well and running

water slowly until all the backfill material is completely moist. After this watering, the backfilling should be completed to the final grade line.

Several contractors prefer to do the final backfilling and shaping later. If this is the case, care should be taken to see that the original backfill is high enough to protect the roots and ensure holding the plant until the stakes are set.

If the final backfill is placed immediately a slight amount of settlement will result in a desirable water-holding basin; otherwise, a basin must be shaped later. Stock should be watered at 30-day intervals.

Stake and/or Guy

All plants must be staked or guyed by the end of the day in which they are planted. Stakes should be two-by-two inch nominal dimension or steel posts with the top one foot painted a bright yellow. Stakes must extend to half the height of the plant with a minimum of ^{maximum} seven feet required after driving. Two stakes are required, with one stake set on the prevailing wind side, usually southwest, and one directly opposite.

Stakes are to be set plumb and approximately one foot from the trunk. On B-B stock the stake should not be driven through the ball. (See illustration)

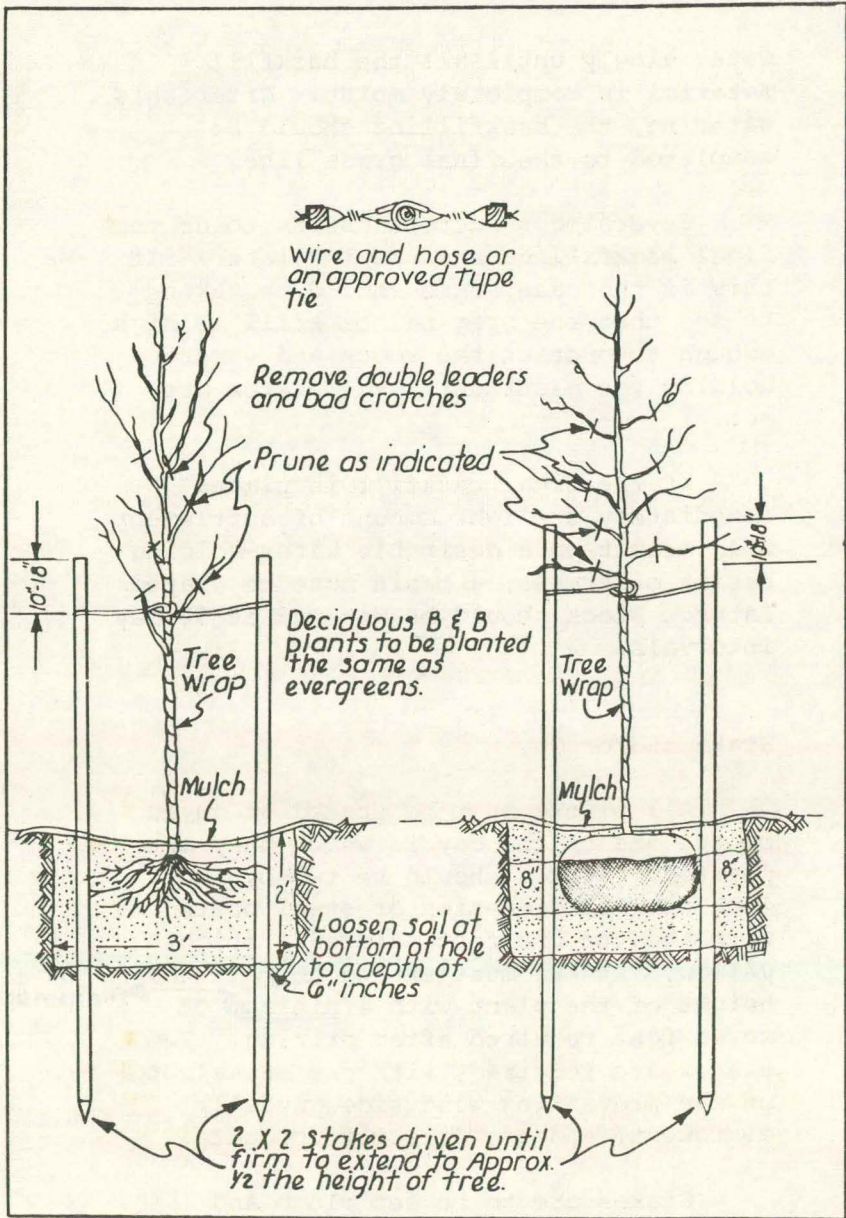


Figure 7 - Deciduous Pruning and Staking
Bare Root and B-B

Refer to specifications for plants that must be attached to the stakes with wire ties. The trees must be protected from cutting by some sort of insulating material, such as a piece of hose through which the wire has been passed. Don't twist the tie too tightly around the plant. Care must also be taken to prevent the tie from becoming loose and sliding on the stake.

For trees less than one inch in diameter (and shrubs), no ties are required. (See illustration.)

Trees over two and one half inches in diameter must be guyed with three guys spaced equally around the tree.

Guys are to be attached at a point approximately two thirds of the distance from the ground to the top. Ties are to be attached to a collar encased with a protective material, such as rubber hose, and firmly secured to anchors embedded in the ground.

Anchors are set away from the trunk a distance equal to half the distance from the ground to the point of collar attachment.

Guys require periodic adjustment because trees large enough to need guying tend to settle. Check the guys several times shortly after planting to be sure the guys maintain their effectiveness. This is especially important after a rainy or windy period.

Pruning

Before making any pruning cut you should know why pruning is necessary, have a definite picture of what the plant should look like when properly pruned, and know how to achieve the desired results. (See illustration.)

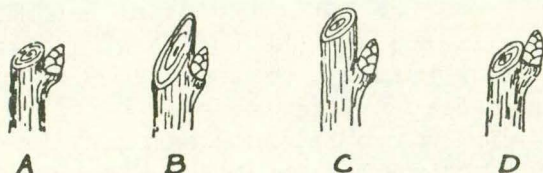
Plants are pruned before planting to restore a proper balance between the roots and the top growth. The top is pruned to compensate for loss of part of the root system when the plant was removed from the ground at the nursery.

All deciduous trees are to be pruned one-third to one-half their former leaf surface. Any broken or damaged branches, plus competing leaders, should be removed. Pruning cuts are made in sound wood and cuts one-half inch or more in diameter are coated with an approved tree paint. When painting such cuts be certain they are very thoroughly covered to prevent the start of rot or disease.

Deciduous shrubs are pruned to approximately one-half of their former leaf surface.

Wrapping

All deciduous trees are to be wrapped with crinkle-type kraft paper four inches wide with the wrapping self-tied. Don't let the contractor use a wire tie to secure the wrapping. The wrapping must be applied before



When cutting back or heading in branches, make cuts at the proper place in relation to buds or joints. Cut just above, and close to, a bud at a slight angle as at "A". Cut at "B" is too slanting. It cannot heal over properly and the bud is injured. Cut at "C" is too far from the bud. The stub above will die and make a place for decay and disease to start. Cut "D" is too close to the bud, which will be weakened or killed.

Cutting above a bud facing the outside of the plant is usually the best practice. This encourages an open spreading growth. To encourage a compact upright growth cut above a bud facing into the plant.

When pruning varieties which have buds growing opposite each other on the branch, cut just above the buds. Remove the bud not wanted by rubbing it off with the finger.

To make a close, clean cut with a pruning shear and avoid injury to the bark, cut with the shear blade next to the side of the cut that is to remain on the plant.

Before making a single cut on a plant to be pruned, know why pruning is necessary, have a definite picture of what the plant should look like when properly pruned, know what to do, and how to do it in order to achieve the result.

Prune at the proper season and in accordance with directions.

Figure 8 - Pruning

planting. Refer to current specifications for exceptions and explanations.

The wrapping must be conscientiously applied so it remains snug and secure during all weather until the plant has become acclimated and the threat of sunburn has subsided. On some types of stock, contractors like to spray before wrapping with a rabbit-proofing agent to discourage chewing of the bark. In the past, this practice has proved to be beneficial and should be allowed.

At the time of wrapping, it is normal procedure to remove any remaining individual identification tags.

Applying Mulch

If the contractor elects to apply the mulch during slack planting periods, it will probably be necessary to reshape the basin around the tree because of settlement after backfilling.

The reason for the basin is to act as a storage unit, conserving water which would otherwise run off. The basin can be constructed by dishing out in a flat area, or by building a small dike on the downhill side of the plant. (See illustration.) While shaping the basin, all weed growth should be removed.

If the plant is located in an impervious soil or an area of difficult drainage, a blind drain might be the solution. (See illustration.)

When an herbicide is required by specification, extreme care should be exercised to take the necessary precautions - as specified by the manufacturer - regarding handling and application rate.

The most common type of mulch in use at this time is glass fiber mat. Durability is one of the prime reasons for the use of this material. If the mat isn't torn, it will serve its intended purpose well for several seasons.

The most important reasons for the use of mulch are the retention of moisture normally lost through evaporation, and the elimination of weeds that compete with the tree for existing moisture and nutrients.

A minimum six-by-six foot piece of mat will be used on each tree, securely stapled at the corners and at any slit or lapped area.

Shrubs are to be mulched as shown on the detailed plans.

Wire stakes or staples must be of stiff wire (No. 9 or heavier) bent into a square "U" shape, and of sufficient length to securely hold the glass fiber mulching mat in place.

Sometime after the mulch is applied, all disturbed areas should be seeded with the specified seed mixture. These are areas that have been severely rutted or torn up, or excessively large areas

worked up by tillers and not covered with mulch.

Established Period

The contract will contain a date for the completion of the original planting and a date to begin replacement planting. All plants that are not in a live, healthy and growing condition at the end of one growing season must be replaced by the contractor, during the period specified in the Special Provisions.

The establishment period of one growing season shall begin at the time the last plant is planted and all incidental work related to planting is completed.

During the establishment period, the contractor has a lot of maintenance work to do. Most of this work can be done when the intermediate waterings are taking place.

The proper way to water the plants is to fill the basin, allow this to soak away, then completely refill. Don't allow the contractor to use a high pressure pump when watering because of the damage of washing the soil away and exposing the roots. Any weeds should be removed from the planting areas when watering.

A field inspection by the Roadside Development Section will be made about September first and plants to be replaced

will be designated and marked. The inspector must record the location of these plants to avoid possible future questions.

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