

SECTION 31 10 01  
PLANT PROTECTION  
Design Standard

PART 1 GENERAL

1.1 PURPOSE:

- A. Preserve and protect existing trees, shrubs and other plant materials to remain, including protecting plants on adjoining properties during site preparation work and construction.
- B. Provide tree and shrub pruning and removal in accordance with these Specifications if required by the Contract Documents.
- C. Layout and review of utility and irrigation trenches that occur in the Tree Protection Root Zone is required as part of this Plant Protection work as described below in PART 3 EXECUTION.

1.2 RELATED DOCUMENTS

- A. Section 32 84 00 – Irrigation
- B. Section 32 90 00 - Planting

1.3 QUALITY ASSURANCE

- A. Reference Standards:
  - 1. Ordinances and Regulations: All local, municipal and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard than is required by the above mentioned codes and regulations, the provisions of these Specifications and Drawings shall take precedence. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.
  - 2. International Society of Arboriculture, Guide for Plant Appraisal, latest version.

1.4 DEFINITIONS

- A. Diameter at Breast Height of tree trunk (DBH):
  - 1. Location 54 inches from the ground as measured on the high side of the tree trunk.
- B. Tree Protection Zone (TPZ):
  - 1. Root Area around tree that is 5 times the DBH, or the tree Dripline, whichever is greater.
- C. Structural Root Zone (Radius of Three):

1. The Structural Root Zone is a circular area with the tree trunk at the center and a radius equal to 3 times the diameter of the tree trunk measured at breast height (4.5 feet above ground line). This zone, where most of the structural roots exist, is based upon tree failure research conducted by E.T. Smiley at the Bartlett Tree Research Laboratory. Any structural (buttress) root, which has been severed or is rotten within this zone, can no longer provide adequate support to the tree and must be considered missing.

D. Dripline:

1. The area of the ground directly beneath the vertical projection (shadow) of the trees foliage canopy.

## 1.5 QUALITY ASSURANCE

A. Review:

1. Contractor shall review and identify with the Owner's Representative the limits of Work and extent of plant materials to be protected and any to be pruned or removed.
2. At the Owner's discretion, an Arborist may represent the Owner to review the work of the Contractor in regards to plant protection.

B. Stipulations:

1. Plant Protection:
  - a. Protect trees against cutting, breaking, skinning and bruising of bark; permit no traffic or stockpiling within drip line.
  - b. Do not change earth surface within drip line of trees except as approved in writing by the Owner.
  - c. Do not park vehicles or store materials, supplies and construction equipment within drip line of trees.
  - d. Install a temporary 6-foot high chain link fence typically at the drip line of the tree(s) except as otherwise directed by the Arborist / Owner's Representative.
  - e. Obtain specific instruction from Arborist / Owner's Representative for pruning of trees, shrubs, roots or disturbance of soil within spread of tree branches. The Contractor shall utilize protection measures as outlined by Arborist / Owner's Representative, which may include directional drilling, or hand clearing to expose the roots
  - f. Generally cutting of roots two inches or greater shall be avoided. Roots one inch and greater in diameter that must be cut shall be cut cleanly and obliquely with the cut surface facing down.
  - g. Exposed and pruned roots shall be covered with light well-drained soil backfill and mulch over. The area shall be kept moist.
  - h. Prior to trenching, layout main and lateral line locations within Drip Line of trees and review locations with Owner's Representative. Examine proposed trench areas for possible conflicting tree roots by hand digging (pot holes) to determine tree root sizes and locations. Relocate any lines that may interfere with existing root systems to avoid or reduce damage to root systems as accepted by Arborist / Owner's Representative.

- i. Unless the Contractor has secured approval of marked trench locations within Tree Protection Zones with the Arborist / Owner's Representative prior to beginning trenching, any trenching required within the Tree Protection Zone, shall be done by hand and as directed by the Arborist / Owner's Representative.
- j. Provide periodic watering for all planting within Contract limit and any adjacent areas affected by the work as accepted by the Owner's Representative. Maintain soil moisture to a minimum 6" depth as approved by the Landscape Architect.
- k. Using an approved pruning saw, provide selective tree limb pruning as accepted by the Landscape Architect if branches interfere with new construction. Limb diameter shall be limited to 5" diameter and shall be pruned just outside the branch collar in accordance with American National Standards Institute, (ANSI 300) and International Society of Arboriculture, (ISA) standards.
- l. Approved branches to be shortened must be cut just above a fork with another living branch which is plus or minus 1/2 the diameter of the removed branch as shown in the pruning figure herein. Branches to be removed which exceed 2" in diameter shall be severed with a 3-step cut to prevent bark peeling. Final cuts must not injure the branch collar or branch bark ridge of the remaining branches and trunk.

C. Air Spading:

1. Air spading, or hand removal of soil or tunneling is required for excavation in the Tree Protection Zone of any trees for the installation of infrastructure where roots 2 inches in diameter and larger are encountered. The "critical root zone" is defined as any area around a tree in which a two inch diameter root is encountered. The Arborist / Owner's Representative shall define the critical root zone and the Contractor shall excavate using a pneumatic excavator (AIR-SPADE or equivalent) as follows:
2. Trenching for utility lines or other infrastructure may be done mechanically outside the Tree Protection Zone. As the equipment operator approaches the canopy radius, or for certain species up to 1.5 times the canopy radius out from the base of the tree (Oaks, Poplars, Redwoods, etc.) the operator shall be assisted by a spotter who shall inspect the excavation for roots. If a root of two inches diameter is encountered the spotter shall halt mechanical excavation and pneumatic excavation shall proceed. If no other two inch or greater diameter root is encountered in an excavation of two feet forward and two feet deep, the single two inch root may be cleanly cut proximal to (on the tree side of ) any fracture or torn bark. Mechanical excavation may continue until a two inch diameter root is encountered, and the pneumatic excavation, exploration is then repeated.
3. The Contractor shall control dust and the spread of soils excavated. The air-spade operator shall moisten the soil to field capacity and to a minimum probe depth of 2.5 feet with a watering needle (hydro-spear) 48 hours prior to pneumatic excavation. The spread of excavated soil shall be contained to the area adjacent to the trench path with upright plywood sheeting.
4. These specifications shall not be considered operating instructions or a requirement to use a specific pneumatic excavation product. It is the responsibility of the Contractor to read and understand the pneumatic excavator operation instructions and safety procedures (including the proper and safe use of air compressor, hoses, excavation tools, etc.) prior to operations.

- D. Plant Replacement: Contractor shall replace trees cut or severely damaged due to the Contractor's work as follows:
1. An ISA Certified Arborist may be retained by the Owner to determine the condition of trees in question as to their ability to survive in a healthy condition and in their original shape, or a pruned aesthetically pleasing shape acceptable to the Owner. Comply with recommendations to rehabilitate as recommended by the Arborist, or to replace in accordance with the requirements below.
  2. Trees size shall be determined by Diameter at Breast Height (DBH). Replacement of trees and shrubs shall also include providing acceptable plant installation, automatic irrigation system and a minimum maintenance period of 120 days. If plant(s) is not acceptably maintained and is not healthy and thriving at the end of the 120 day maintenance period, the Contractor shall continue the maintenance work until such time that healthy tree(s) and/or shrub(s) is achieved.
  3. Replace any damaged planting in kind using "specimen" plants as follows and at no cost to Owner:
    - a. Trees up to 3" DBH: Replace with 36" box size.
    - b. Trees 3" to 6" DBH: Replace with 72" box size.
    - c. Trees 6" to 12" DBH: Replace with 84" box size.
    - d. Trees 12" DBH and larger: Tree value shall be determined by Arborist using Council of Tree and Landscape Appraisers (CTLA) method. Replace damaged tree with largest available nursery boxed tree and cash difference between value of damaged tree and nursery stock replacement cost.
    - e. Shrubs: Replace with 15-gallon can size.
    - f. Coordinate shutoff of irrigation systems with the Owner and be responsible for any damage caused to adjacent landscaping by Contract work.
  4. Obtain and pay for permits required for execution of this work.
  5. In areas where construction in tree protection zones is authorized, Contractor shall protect trees with a strapped "barrel stave-like" surrounding of 2"X4"s, around the full circumference of the tree trunk. Such protection shall be installed at no additional cost to the Owner as accepted by the Owner's Representative.
  6. Accomplish disposal of materials removed from site in accordance with applicable state and local regulations.
  7. Coordinate shutoff of irrigation systems with the Owner and be responsible for any damage caused to adjacent landscaping by Contract Work.
  8. If the damaged tree is a "Heritage type" tree as designated by the local authority or District, the value of the large trees should be appraised and their monetary value reimbursed by the Contractor, or amounts deducted from monies due the Contractor. Appraisals shall be in compliance with the most current version of the Guide for Plant Appraisal listed herein.

## 1.6 PROJECT CONDITIONS

- A. Coordination: Coordinate this work with the work of other Sections to avoid delay and interference with other work.

- B. Nuisances: Keep dirt, dust, noise and other objectionable nuisance to a minimum. Use temporary enclosures, coverings and sprinkling, and combinations thereof, as necessary to limit dust to lowest practicable level, except do not use water to the extent that it causes flooding or contaminated run-off.
- C. Traffic: Conduct work to ensure minimum interference with vehicular and pedestrian traffic, and to permit unencumbered access to site and adjacent properties.
  - 1. Do not close or obstruct streets, sidewalks, alleys or other public passageways without permission from authorities having jurisdiction.
  - 2. If required by governing authorities, provide alternate routes around closed and obstructed traffic ways.

## PART 2 PRODUCTS PROTECTIVE FENCING

- A. As accepted by Owner's Representative and as specified herein.

## PART 3 EXECUTION EXAMINATION

- A. Examine areas in which work is to be performed. Report in writing to the Owner's Representative all prevailing conditions that will adversely affect the existing plant materials to remain. Do not proceed with work until a solution acceptable to the Owner's Representative has been arrived at.
- B. Install and maintain temporary fencing and other required protective devices and exclude construction activities from tree/shrub zones except as supervised by the Arborist / Owner's Representative.
- C. If access to tree/shrub zones cannot be avoided an intact four inch layer of mulch with minimum 1.25 inch thick, metal strap linked plywood shielding shall be maintained in the tree/shrub zone where heavy equipment will be operated.
- D. Locate and clearly flag trees and vegetation to remain or to be relocated, as diagrammed and noted in the Construction Documents.

### 3.2 TRENCH LOCATION CONFIRMATION IN ROOT ZONES

- A. Where utility line trenches, including irrigation mainlines and lateral line trenches, occur in Tree Protection Zones, Contractor shall layout exact proposed trench locations and review locations with the Owner's Representative. If in the opinion of the Owner's Representative it is found that, trench locations can be adjusted to avoid cutting root systems 2" and larger without affecting the designed function of lines and systems, the Contractor will not be required to Air Spade or Tunnel in order to install the utilities. Adjustment of trench locations to avoid cutting root systems shall be at no additional cost to the Owner.

### 3.3 TREE REMOVAL

- A. Field Verification: Before removing non-designated trees, shrubs, stumps, bushes, vines, rubbish, undergrowth and deadwood as shown on the Drawings and as specified, obtain verification from Owner's Representative.
- B. Backfill and compact areas excavated and open pits and holes resulting from removal operations. Comply with requirements herein and as specified in Earthwork, Section 02300 for backfill materials, compaction and installation methods.

- C. Remove all stumps and roots in their entirety. Tree trunks shall be removed minimum depth of 2 1/2 feet below existing grade or finish grade, whichever is deeper. Stump grinding is an acceptable method of removal of roots and stumps of trees and shrubs; however, the chip contaminated soil shall be replaced with approved clean planting soil in planting areas and with approved clean fill soil in all other areas.
- D. Backfill and compact voids excavated and open pits and holes resulting from removal operations. Comply with Earthwork Specification for backfill materials, compaction and installation methods. Unless required otherwise, in planting areas backfill holes with clean approved planting soil compacted to 90% relative compaction to a minimum 12 inches below finish grade and 85% relative compaction for the top 12 inches, except as required elsewhere to a greater degree by Civil or Structural Engineer. In non-planting areas backfill holes with approved fill soil compacted to 95% relative compaction.

END OF SECTION