**SECTION 31 13 16**

**SELECTIVE TREE AND SHRUB PROTECTION AND TRIMMING**

**BASED ON DFD MASTER SPECIFICATION DATED 02/17/2016**

This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.

1. **GENERAL**

**SCOPE**

This Section includes the protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction. The contractor shall: Protect trees and plants indicated on the drawings to remain in location from all damage during construction. Do not injure trunks, branches or roots of trees and plants to remain. Perform cutting and pruning only as approved and as directed by the Owner’s Project Representative.

PART 1 – GENERAL

 Scope

 Related Work

 Definitions

 Submittals

 Quality Assurance

 Project Conditions

PART 2 – MATERIALS

 Topsoil

 Organic Mulch

 Tree Protection Zone Fencing

 Tree Protection Zone Signage

PART 3 – EXECUTION

 Examination

 Preparation

 Tree and Plant Protection Zones

 Excavation

 Root Pruning

 Crown Pruning

 Regrading

 Field Quality Control

 Repair and Replacement

 Disposal of Surplus and Waste Materials

**RELATED WORK**

Applicable provisions of Division 1 govern work under this Section.

Section 02 41 13 - Demolition

Section 31 10 00 - Site Clearing

Section 31 13 00 – Selective Tree and Shrub Removal and Transplanting

Section 31 20 00 – Earthmoving

Section 31 23 16 13 – Trenching

Section 31 23 16 26 – Rock Removal

Section 31 23 19 – Dewatering

Section 31 25 00 – Erosion Control

Section 32 92 00 - Plants

**DEFINITIONS**

Arborist or Certified Arborist: As referenced here in all “arborists” or “certified arborists” shall be at minimum an ISA Certified Arborist or and ASCA Registered Consulting Arborist unless other specified.

Caliper: Diameter of a trunk in inches measured by a diameter tape at 4’-6” above the ground or DBH (diameter at breast height). (Standard as defined by the ISA – International Society for Arboriculture).

Tree Protection Zone (TPZ): Area surrounding individual trees or groups of trees to be protected during construction, and defined by calculating the critical root radius (crr). The crr is the tree trunk caliper (diameter in inches) at 4’-6” above the ground multiplied by 1.5, the result expressed in feet. The root protection zone is the outside edge of a concentric circle with the crr as its radius extending from the truck of the tree or as indicated on the drawings which ever is larger. Note that a particular tree/plant sensitivity or tolerance to construction disturbance may require a larger TPZ area than the area based on this calculation. This is to ensure that both the feeder and structural support roots are undamaged to maintain the integrity of the tree.

Vegetation: Trees, shrubs, groundcovers, grass and other plants.

**SUBMITTALS**

***Edit the required submittals as appropriate for the scale of the project. Simple projects may not require all of the submittals below. The intent is to document existing conditions and tree health before construction activities. The Archtiect/Engineer’s tree protection plan provided in the construction documents may be used to meet the submittal requirements if verified to be followed by the contractor in the field by the AE and DFD Construction Representative.***

Product Data: For each type of product indicated.

Existing Tree and Plant Inventory and Condition Report: Documentation of existing trees and plantings by a certified arborist for the vegetation indicated to remain, which establishes preconstruction conditions and plant health. Arborist should also verify that none of the trees marked for protection are a potential hazard tree per ISA - International Society for Arboriculture standards.

Include detailed photographs or videotape.

Include notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

Indicate specimen trees and shrubs recommended for protection by the arborist that may not have been included in the tree protection plan.

Tree Pruning Schedule: Written schedule from arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction. Include description of pruning to be performed and maintenance following pruning.

Tree Protection Plan:

***If a Tree Protection Plan has been provided by the Architect/Engineer as part of the construction documents include the following paragraph:***

A tree protection and removal plan has been prepared for this project. It represents the trees and plants to be removed or protected and their related tree protection zones. Tree protection zones indicated are considered minimums; provide additional protection measures as necessary to protect the short and long-term health of each individual tree and as indicated by the arborist’s review of site conditions and any additional recommendations. Arborist should provide supplementary information to the plan based on field review prior to construction. In particular, mark-ups must include an indication of locations where pruning of branches or roots outside of tree protection zones is necessary to avoid damage during construction or for the health of the tree – AND – locations for each type of tree protection fence footing (post driven, flange foot, etc.) based on location of tree protection fence in relationship to each specific tree or groups of trees root and canopy structures.

***If the contractor is to provide the Tree Protection Plan include the following paragraph:***

Should correspond to the tree protection/site demolition plan which includes the trees and plants to be removed or protected and their related tree protection zones. Include species and size of tree or plant, location on plan, include unique identifier for each, indicate removal with an “x” through the plant symbol, indicate protection with the tree protection zone and fence location, indicate location of pruning of branches or roots outside of tree protection zones to avoid damage during construction or for the health of the tree, and include typical tree protection measures.

Qualification Data: For tree service firm and arborist.

Certification: From arborist that adequate tree protection is in place before construction begins and certifying that trees indicated to remain have been protected during construction according to the tree protection plan and recognized standards and trees were promptly and properly treated and repaired when damaged.

Maintenance Recommendations: From a certified arborist, for the care and protection of trees affected by construction during and after completing the Work. Written maintenance recommendations should be provided to the Owner and the Maintenance Contractor prior to the end of construction.

**QUALITY ASSURANCE**

Arborist Qualifications: An arborist certified by ISA-International Society of Arboriculture.

Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

Tree Pruning Standard: Comply with ANSI A300 Pruning Standards.

Tree Protection Standard: Reference and Comply with *“Arboriculture”*, Harris, Mathey and Clark, 3rd Edition, Simon & Schuster Adult Publishing Group, July 31, 1998, Sections: 7 – Modifying and Managing the Site, 10 – Special Management Situations, 11 – Preserving Existing Trees, 16 – Tree Hazard Management, 17 – Preventative Maintenance and Repair.

Protect Your Trees From Oak Wilt: Wisconsin Department of Natural Resources Forestry Division Publication PUB-FR-127 2009 for f Oak tree protection information.

Preinstallation Conference: Conduct conference at Project site. Before tree protection and trimming operations and construction activities begin, meet with DFD Construction Representative, Agency Representative, Architect/Engineer, Arborist, Tree Service Firm and other concerned entities to review tree protection and trimming procedures and responsibilities. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.

Enforcing requirements for protection zones.

Arborist’s responsibilities.

Field quality control.

**PROJECT CONDITIONS**

The following practices are prohibited within tree protection zones:

Storage of construction materials, debris, or excavated material.

Parking vehicles or equipment.

Foot traffic.

Erection of sheds or structures.

Impoundment of water or excessive wetting.

Spillage of noxious material while mixing, placing or storing construction materials.

Excavation or other digging unless otherwise indicated.

Compaction of soil over root systems.

Fill in excess of one inch over tree roots.

Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

Do not direct vehicle or equipment exhaust toward tree protection zones.

Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

1. **MATERIALS**

**TOPSOIL**

Natural or cultivated top layer of the soil profile or manufactured topsoil: containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch (25 mm) in diameter; and free of weeds, roots, and toxic and other non-soil materials.

Obtain topsoil only from well-drained sites where topsoil is 4 inches (100 mm) deep or more; do not obtain from bogs or marshes.

Topsoil shall conform to the testing requirements and standards outlined in Section 32 91 13 Soil

Preparation in order to be used on the project.

ORGANIC MULCH: Shredded hardwood, free of deleterious materials.

**TREE PROTECTION ZONE FENCING**

Fencing fixed in position and meeting the following requirements:

Galvanized-steel chain-link fencing fabricated from minimum 2-inch opening, 0.148-inch diameter wire chain link fabric; with pipe posts, minimum 1.9-inch OD line posts, and 2-3/8-inch OD Corner and pull posts; with 1-5/8-inch OD top rails and 0.177-inch diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system. [4 foot ] <Insert requirement> minimum height.

**TREE PROTECTION ZONE SIGNAGE**

Shop fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:

Sign Size and Text: [as shown on drawings] <Insert requirement>. TREE PROTECTION ZONE

Lettering: [3-inch] <Insert dimension> high minimum, <Insert color> characters on <Insert color> background.

***Add requirements here for other products such as drainage materials, fertilizers, or antidesiccants****.*

1. **EXECUTION**

**EXAMINATION**

Erosion and Sedimentation Control: Examine the site to verify that temporary erosion and sedimentation control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree protection zones.

**PREPARATION**

Prior to all construction trees, shrubs and other plantings to be protected are to be fenced.

Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. [Flag] [Tie a 1-inch blue-vinyl tape around] <Insert requirement> each tree trunk at 54 inches above the ground.

Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

Tree Protection Zones: Mulch areas inside tree protection zones and other areas indicated.

Apply 2-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

**TREE AND PLANT PROTECTION ZONES**

Tree Protection Zone Fencing: Install protection zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected area. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

Tree Protection Zones include the canopy area above and beyond all tree protection areas as indicated in the construction documents. Canopy damage to protected vegetation is not acceptable. Contractor shall take extraordinary measures to protect tree canopies and trunks from aerial construction equipment and shall maintain an aerial clear zone over the tree for the extent of the entire tree protection area and beyond to the edge of each individual tree canopy. Tree protection zone fencing shall be erected before any construction activities commence and remain until construction has concluded and shall be installed and removed without harm to trees or shrubs. If trees scheduled to remain are injured notify DFD Construction Representative immediately.

Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer’s written instructions.

Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing pavement or concrete to remain, provide appropriate means of post support acceptable to DFD construction representative. Other means of support may be required in archaeological areas where excavation is not allowed or where tree roots may be damaged. Alternative fence support not designated on the Tree Protection Plan / Details will need approval by Architect/Engineer and DFD construction representative.

Tree Protection Zone Signage: Install protection zone signage in visible prominent locations in a manner approved by Architect/Engineer. Install one sign spaced approximately every [20 feet] [35 feet] [50 feet] <Insert dimension> on tree protection fencing, but no fewer than [four] <Insert number] signs each facing a different direction.

Maintain tree protection zones free of weeds and trash.

Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations. Repair should occur within 24 hours of the damage. Treat damaged trunks, limbs, and roots according to certified arborist’s written instructions and Architect/Engineer’s approval.

Maintain tree protection zone fencing and signage in good condition as acceptable to Architect/Engineer and remove when construction operations are complete and equipment has been removed from the site.

Do not remove tree protection fencing to allow for deliveries or equipment access through the protection zone.

Temporary access may be permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

Roots torn or damaged by construction operations shall be repaired according to the standards outlined in this section and by a certified arborist.

Silt fence may not be trenched within the Tree Protection Zone of any tree or shrub. In areas where silt fence is shown within Tree Protection Areas as indicated on drawings, silt fence shall be folded toward the flow direction and secured at grade-level by pinning or backfilling with a 6” layer of clear stone.

Contractors will be responsible for setting up tree maintenance programs to maintain trees and surfaces within construction boundaries for the duration of construction and until tree protection measures are completely removed from the site. This includes watering, preconstruction pruning, clearance pruning during construction, mowing, and re-mulching. Coordinate tree maintenance programs with DFD

Construction Representative.

**EXCAVATION**

General: Excavate at edge or beyond tree protection zones. Install shoring or other protective support systems to minimize sloping or benching of excavations.

Trenching near trees: Where utility trenches are required within tree protection zones, tunnel under the roots a minimum of 24” below the soil surface by drilling, auger boring, pipe jacking or digging by hand. Do not cut main lateral tree roots or tap roots; cut only smaller roots in the within the proposed utility line area. Cut roots as required for root pruning.

Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction as required for root pruning.

Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

**ROOT PRUNING**

Prune roots that are affected by temporary and permanent construction. Prune roots as follows:

Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.

Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.

Cover exposed roots with burlap and water regularly.

Backfill as soon as possible with topsoil or planting mixture as outlined in Section 32 91 13 Soil Preparation. Tamp to settle soil and eliminate voids and air pockets. When the area is approximately one-half filled with topsoil, water thoroughly then place the remaining topsoil required to fill around the exposed roots.

Root pruning at edge of tree protection zone: Prune roots 12 inches outside of the protection zone, by cleanly cutting all roots to the depth of required excavation.

Preventing Oak wilt: Do not prune, cut or injure Oaks between April 1 and October 1st. If an Oak is wounded during this period, cover the wound **immediately** with tree wound paint (water-based paint) in a 1” wide band around the circumference of the cut surface. November through March is the preferred period for pruning and tree removal. Refer to Wisconsin Department of Natural Resources Forestry Division Publication PUB-FR-127 2009 for further Oak tree protection requirements.

**CROWN PRUNING**

Coordinate all pruning of trees and shrubs and/or repairs to damaged limbs with DFD Construction

Representative. Pruning shall be performed by a certified arborist.

Prune branches that are affected by temporary and permanent construction. Pruning should be the minimum necessary and not more than ¼ of the live foliage/branches of a mature tree. Prune branches as follows:

Prune trees to remain to compensate for root loss caused by damaging or cutting root system.

Prune the minimum amount necessary. Do not remove more than ¼ of the live foliage or branches of a mature tree.

Pruning standards: Prune trees according to ANSI A300 Pruning Standards.

Cut branches with sharp pruning instruments; do not chop or break.

Preventing Oak wilt: Do not prune, cut or injure Oaks between April 1 and October 1. If an Oak is wounded during this period, cover the wound **immediately** with tree wound paint (water-based paint) in a 1” wide band around the circumference of the cut surface November through March is the preferred period for pruning and tree removal. Refer to Wisconsin Department of Natural Resources Forestry Division Publication PUB-FR-127 2009 for further Oak tree protection requirements.

Remove tree branches and dispose of off-site.

**REGRADING**

Grade Lowering: Where new finish grade is indicated below existing grade around trees slope grade away beyond tree protection zones. Maintain existing grades within tree protection zones.

Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

Minor Fill: Where existing grade is 1 inch or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations. Note raising grade within a tree protection zone should be minimal in area and depth and can be fatal to trees. No grade change is acceptable over Oak tree roots.

**FIELD QUALITY CONTROL**

Inspections: Engage a certified arborist to direct plant protection measures in the vicinity of trees, shrubs and other vegetation indicated to remain and to prepare inspection reports.

**REPAIR AND REPLACEMENT**

**The value of trees destroyed or damaged will be charged against the account of the contractor responsible for the damage in an amount determined by the Owner’s certified arborist using the ISA-International Society of Arboriculture, Council of Tree & Landscape Appraiser’s Guide for Plant Appraisal, Current Edition.** If a replacement tree is provided, the amount charged against the contractor will be reduced by the value of the replacement tree.

Repair trees, shrubs and other vegetation indicated to remain or be relocated that are damaged by construction operations, in accordance with a certified arborist’s written instructions and approved by the project Architect/Engineer and DFD Construction Representative.

Submit details of proposed root cutting and tree and shrub repairs.

Have certified arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.

Treat damaged trucks, limbs and roots according to certified arborist’s written instructions.

Perform repairs within 24 hours. Repair or treat Oak wounds immediately.

Replace vegetation that cannot be repaired and restored to full growth status, as determined by Architect/Engineer and DFD Construction Representative at no additional cost to the owner.

Remove and replace trees, shrubs and other vegetation indicated to remain that die or are damaged during construction operations that a certified arborist determines are incapable of restoring to normal growth pattern and approved by the project Architect/Engineer.

Provide new trees of same size and species as those being replaced at a minimum 2 inches caliper size per ANSI Z.60.1.

Plant and maintain as specified in Division 32 Section 92 00 "Plants."

Soil Aeration: Aerate surface soil compacted during construction in lawn areas . Aerate compacted lawn areas beyond the tree protection zones. Drill 2-inch- (50-mm-) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) on center. Backfill holes with an equal mix of augured soil and sand.

**DISPOSAL OF SURPLUS AND WASTE MATERIALS**

Disposal: Remove excess excavated material, displaced trees, trash and debris and legally dispose of them off Owner's property.

Burning of surplus and waste materials is not permitted.

END OF SECTION