SECTION 01 56 40 – TREE PRESERVATION AND PROTECTION

PART 1 – GENERAL

1.1 The objective of this section is to reduce the negative impacts of construction on trees. Tree protection measures are intended to guide a construction project to ensure that appropriate Best Management Practices (BMPs) will be implemented in the field to eliminate or mitigate undesirable consequences that may result from construction.

A. Physical injury to trunk and crown

B. Soil compaction in the root zone

C. Severing of roots

D. Smothering roots by adding soil

E. Split and broken branches

F. New exposure to wind and sunlight

PART 2 - GUIDING PRINCIPALS

2.1 All work shall be performed in accordance with guidelines in the booklet Tree Protection & Preservation, A Pocket Guide to Best Management Practices., APWA Press, American Public Works Association. Copies are available from the American Public Works Association bookstore: https://www.apwa.net/Store/detail.aspx?id=PB.A1221

PART 3 - FENCING:

3.1 Orange vinyl construction fencing, snow fencing or other similar **fencing should be at least 4 feet high and supported by 6' steel T-posts.**

3.2 Chain link fence shall be 6 feet tall with 2-inch mesh chain link fabric. 2-inch posts shall be tied with 6-gauge aluminum wire ties.

PART 4 – PRE-CONSTRUCTION REQUIREMENTS:

4.1 TREE PROECTION AND PRESERVATION PLAN: Tree Protection and Preservation facilities and notes are included in the plant set. The Owner shall be notified if any adjustments to the is plan is expected or made. Trees to be preserved are marked with an "O" in green paint. Trees to be removed are marked with an "X" in orange paint.

4.2 PRE-CONSTRUCTION MEETING: Demolition, grading and general contractors are required to meet with the Owner's Representative and/or appropriate Consultant at the Project site prior to any phase of site work, clearing or grading to review tree protection measures, enforcement of tree protection zones, review Contractor and Consultant's responsibilities, field quality control, sequence of work and other items including, but not limited to: construction parking, construction trailers, materials storage, fuel and chemical storage, masonry staging, concrete wash-out, equipment access, haul routes, staging areas, soil and mulch stockpiles, demolition access, and dumpsters. The limits of disturbance must be clearly marked prior to the pre-construction meeting.

4.3 VERIFICATION OF TREE PROTECTION: Site preparation work shall not begin until all tree protection measures have been installed as set forth in the Plans, verified, and approved by the Owner's Representative and/or appropriate Consultant.

TEMPLATE

4.4 INSTALLATION OF PROTECTIVE FENCING AND SIGNAGE

A. Tree protection fence is required to enclose and protect as much of the Critical Root Zone (CRZ) as possible. Locate tree protection fence a minimum of 10 (ten) feet outside of dripline.

B. Orange vinyl construction fencing, snow fencing or other similar fencing should be at least 4 (four) feet high and supported at a maximum of 10-foot intervals by metal T-posts or approved methods sufficient enough to keep the fence upright and in place. **T-posts shall be a minimum of 2 (two) feet in the ground**. Wooden stakes and rebar posts are not considered as an approved method sufficient enough to keep the fence upright and in place.

C. Chain link fence shall be 6 (six) feet tall with 2-inch mesh chain link fabric. 2-inch posts shall be tied with 6-gauge aluminum wire ties at 24-inch on center. Posts shall be a minimum of 2 (two) feet in the ground and spaced at a maximum of 10 (ten) feet on center. Plastic zip-ties may not be used.

D. Tree protection fencing and signage shall be erected prior to any demolition, site clearing, grading or construction work and maintained throughout duration of project. There shall be no violation of the fencing without approval from the Owner's Representative and/or Consultant.

4.5 PREVENTATIVE ROOT PRUNING: Recommended when roots of healthy, vigorous, and/or significant community trees designated for protection must be removed.

A. Where excavation or construction within the critical root zone of a tree is necessary and less than 50% of the root system will be affected, root pruning can occur.

B. Cut roots cleanly prior to mechanical excavation near tree to minimize damage to remaining roots and reduce the risk of causing disease, decay and instability.

C. As a temporary measure, place burlap material and/or spread mulch over exposed roots after cuts are made and before soil is replaced. Keep this material damp until backfilled to prevent the fine roots from drying and dying.

D. Proposed root cuts should be marked in the field and reviewed by the Owner's Representative and/or appropriate Consultant prior to trenching, excavating or cutting to determine the impact on any structural critical roots and the closest point to tree that soil may be disturbed.

E. The Contractor shall arrange for the Owner's Representative and/or appropriate Consultant to be on-site during the process to monitor, photograph, and document all root cuts.

F. Root pruning shall occur along or behind the line of a planned excavation and therefore should coordinate with the tree protection fencing.

G. Root pruning can be accomplished with circular saws of varying types and/or a rotary-type stump grinder to a depth of 18" or to the maximum depth of the required grading cut, whichever is less. Saw blades and grinder teeth should be sharpened prior to use.

H. Root pruning can also be accomplished with the aid of a supersonic air tool and a trained operator.

I. The exact location and depth of root pruning will be determined during the pre-construction meeting. Specific equipment and methods will be determined by the Owner's Representative and/or appropriate Consultant based upon depth and tree impact.

PART 5 - TREE PROTECTION ZONES (TPZ):

5.1 ACTIVITIES PROHIBITED WITHIN PROTECTION ZONES:

TEMPLATE

A. Storage of construction materials, debris, or excavated material.

B. Parking vehicles or equipment.

C. Foot traffic.

D. Erection of sheds or structures.

E. Drainage changes or impoundment of water.

F. Cutting tree roots by utility trenching, foundation digging, placement of curbs, trenches and other miscellaneous excavation or other digging.

G. Soil disturbance, soil compaction or grade change.

H. Washout activities.

I. Attachment of signs to or wrapping materials around trees or plants.

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

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

5.2 ACTIVITIES PERMITTED OR REQUIRED WITHIN PROTECTION ZONES:

A. Mulching – should be used during construction to protect the soil from compaction, conserve soil moisture, and moderate soil temperature. Refer to project plans for specific trees or areas within the Tree Protection Zone (TPZ) that require mulching. Spread wood chips or similar material to a depth of 4 (four) inches, leaving the trunk clear of mulch.

B. Wood chip mulch can be used for temporary road access and to reduce compaction in and near tree protection areas. When used for this purpose, at least 12 (twelve) and up to 18 (eighteen) inches of chips should be applied where vehicles will travel or park.

C. Geogrids filled with aggregate can be used to protect tree roots where a temporary or semi-permanent road, access route, or driveway is required.

D. Root Protection Matting (RPM) can be used to protect existing roots and soils from proposed short-term construction traffic and activities with the Tree Protection Zone (TPZ). Exact location and layout of RPM should be approved by the Owner's Representative and/or appropriate Consultant. RPM should be installed by an arborist experienced in root protection matting for construction applications

E. Irrigation, aeration, fertilizing or other beneficial practices that have been specifically approved for use by the Owner's Representative and/or appropriate Consultant within the Tree Protection Zone (TPZ).

5.3 EROSION CONTROL: If a tree is adjacent to or in the immediate proximity to a grade slope of 8% (23 degrees) or more, then approved erosion control or silt barriers shall be installed outside the Tree Protection Zone to prevent siltation and/or erosion with the TPZ.

5.4 TUNNELING OR DIRECTIONAL BORING/SUPERSONIC AIR TRENCHING: If trenching or pipe installation has been approved within the Tree Protection Zone (TPZ), then the trench shall be either cut by hand, air spade, or by mechanically boring the tunnel under the roots with a horizontal directional drill and hydraulic or pneumatic air excavation technology. The Contractor shall arrange for the Owner's Representative and/or Consultant to be on-site during the process to monitor, document, photograph, and make adjustments as needed.

TEMPLATE

A. If directional boring is the selected method, the length of the bore should be equal to the width of the protected zone and be a least 24 (twenty-four) to 48 (forty-eight) inches in depth.

B. If trenching with a supersonic air tool is the selected method, the Contractor shall arrange for the Owner's Representative and/or appropriate Consultant to inspect any roots encountered over 2 (two) inches in diameter, determine the impact of their removal on the structural stability of the tree and give the final approval for proper root cutting. All root cuts must be monitored, photographed and documented by the Owner's Representative and/or appropriate Consultant.

C. In all cases, install the utility pipe, immediately backfill with soil and soak within the same day.

5.5 LIMB PRUNING: Pruning for adequate clearance to accommodate equipment use, temporary site access for vehicles, and other construction activities may be needed prior to commencing work. Pruning may also be necessary to ensure worker and public safety and to safeguard the health and vigor of protected trees.

A. Follow current ANSI A300 Standards for Tree Care Operating – Tree, Shrub, and Other Woody Plant Management – Standard Practices (Pruning).

B. Never remove more than 25% of a tree's crown at one time.

C. Use the three cut method to remove large or heavy limbs. If the whole limb must be removed, properly prune to the trunk without cutting into the branch bark ridge. Do not leave a stub or flush cut into the trunk.

D. If only part of a limb must be removed, prune branches to an existing branch of the proper size. The remaining lateral branch must be at least one-half to one-third the diameter of the branch or leader that is being removed.

E. Limbs may be gently lifted and temporarily tied back with rope to allow access or clearance, thus eliminating the need for pruning at all.

F. Pruning shall not be attempted by construction or Contractor personnel, but shall be performed by a qualified tree care specialist.

5.6 TREE REMOVAL: Any tree determined to be high risk due to construction impact, root loss, damage or other reasons, and trees deemed hazardous for any reason shall be reported the Owner's Representative and/or appropriate Consultant. High risk trees shall be recommended for removal. Tree removal within the Tree Protection Zone (TPZ) in a manner that causes no damage above or below ground to remaining trees.

A. If more than 50% of a tree's root system will be cut or destroyed and/or the Structural Critical Root Zone (SCRZ) cannot be protected, the Contractor shall immediately notify the Owner's Representative and/or appropriate Consultant who will determine if the tree should be removed for safety reasons.

5.7 MONITORING AND ENFORCEMENT: The Owner's Representative and/or appropriate Consultant shall frequently monitor construction sites containing protected trees. Accidental or negligent actions that damage trees may result in a penalty or affect the contractor evaluation rating.

PART 6 - INJURY MITIGATION: A mitigation program is required if the approved development will cause drought stress, dust accumulation or soil compaction to trees that are to be saved. To help reduce impact injury, one or more of the following mitigation measures shall be implemented and monitored by the Owner's Representative and/or appropriate Consultant. Any fees associated with injury mitigation will be a Contractor's expense.

TEMPLATE

6.1 IRRIGATION PROGRAM: Irrigate to wet the soil within the Tree Protection Zone (TPZ) during the dry season as specified by the Owner's Representative and/or appropriate Consultant.

6.2 DUST CONTROL PROGRAM: During periods of extended drought, or grading, spray trunk, limbs and foliage to remove accumulated construction dust.

6.3 SOIL COMPACTION DAMAGE: Compaction of the soil is the largest killer of trees on construction sites due to suffocation of roots. If compaction to the upper 12 inches of soil within the Tree Protection Zone (TPZ) has occurred, then one or more of the following mitigation measures shall be implemented as recommended by the Owner's Representative and/or appropriate Consultant.

A. Type I Mitigation – if an approved paving, hardscape or other compromising material encroaches within the Tree Protection Zone (TPZ), an aeration system shall be designed by the Owner's Representative and/or appropriate Consultant and used within this area.

B. Type II Mitigation – if inadvertent compaction of the soil has occurred with the Tree Protection Zone (TPZ), the soil shall be loosened by a method approved by the Owner's Representative and/or appropriate Consultant such as core aeration (vertical mulching).

PART 7 - DAMAGE TO TREES:

7.1 REPORTING: Any damage or injury to trees shall be reported the Owner's Representative and/or appropriate Consultant so that mitigation can take place. All mechanical or chemical injury to branches, trunk or to roots over 2 (two) inches in diameter shall be noted in the monthly inspection report as required. Any fees associated damage mitigation will be at Contractor's expense.

7.2 APPRAISED VALUE: If a tree is damaged during construction, the University will request a Tree Appraisal from an appropriate Consultant. Any fees associated with this appraisal will be at Contractor's expense. The value/replacement cost will be determined by adjusting a tree's basic value by its condition, location, and species using the most recent edition of the *Guide for Plant Appraisal*, published by the Council of Tree and Landscape Appraisers. The formula used should also be noted.

7.3 MITIGATION:

A. Root Injury: During the excavation process, tree roots greater than 2 (two) inches in diameter that have not been root pruned, shall be cut back to a sound wood lateral root with a hand saw or sharp axe and not ripped with earth moving equipment. The Contractor shall arrange for the Owner's Representative and/or appropriate Consultant to review any roots over 2 (two) inches that are encountered to determine structural stability of the tree and give final approval for root cutting. All root cuts must be monitored, photographed and documented by the Owner's Representative and/or appropriate Consultant. The end of the root shall be covered and kept damp. All exposed root areas within the Tree Protection Zone (TPZ) shall be backfilled or covered within 1 (one) hour. Exposed roots may be kept from drying out by temporarily covering the roots and draping layered burlap over the upper 3 (three) feet of trench walls. The material must be kept wet until backfilled to reduce evaporation from the trench walls.

B. Bark or Trunk Wounding: that occurs during construction shall be reported to the Owner's Representative and/or appropriate Consultant. Treatment methods shall be performed by an arborist or qualified tree care specialist.

C. Scaffold Branch or Leaf Canopy Injury: Remove broken or torn branches back to an appropriate branch capable of resuming terminal growth within 5 (five) days.

PART 8 - INSPECTION SCHEDULE: The Owner's Representative and/or appropriate Consultant shall frequently monitor construction sites containing protected trees and conduct the following required inspections. Inspections shall verify that the type of tree protection is consistent with the standards outlined within this specification. For each required inspection, a monthly inspection report of any change in tree conditions and actions taken shall be provided to Planning, Design and Construction.

TEMPLATE

PART 9 - REQUIRED INSPECTIONS:

9.1 PRE-CONSTRUCTION MEETING: Prior to commencement of construction, contractor(s) shall attend a pre-construction meeting to discuss tree protection with the job site superintendent, grading equipment operators, Owner's Representative and/or other Consultants.

9.2 INSPECTION OF PROTECTIVE TREE FENCING/PREVENTATIVE ROOT PRUNING: The Contractor shall call for an inspection of protective tree fencing when it has been erected and any proposed preventative root cuts.

9.3 INSPECTION OF ROUGH GRADING: The Contractor shall call for an inspection of the site when rough grading has been completed.

9.4 MONTHLY INSPECTIONS: The Owner's Representative and/or other Consultants may perform inspections of the work site on a monthly basis.

9.5 SPECIAL ACTIVITY WITHIN THE TREE PROTECTION ZONE: The Contractor shall call the Owner's Representative when any activity not covered herein will occur in the Tree Protection Zone (TPZ) to schedule a meeting with the Owner's Representative and/or other Consultants before proceeding with the activity.

PART 10 - METHOD OF MEASUREMENT: Measurement of construction fencing will be made for payment to the nearest linear foot of fencing installed, in place, and accepted. Measurement will also include fencing to protect work from railroad tracks.

PART 11 - BASIS OF PAYMENT: Tree preservation shall be paid through line item Construction Fencing and Tree Protection in the form of proposal and measured per lineal foot. This shall include all cost associated with installing T-Post, fence, excavation, orange mesh, and maintenance of tree fencing. Cost associated with pruning trees, mulch, and providing cleaning up shall be incidental to the contract.

PART 12 - REMOVAL: With this project, it is understood that tree removal will be necessary for the completion of the project. During the survey, Owner staff worked to identify trees recommended for removal. The trees identified for removal are identified in the project drawings. Health Trees 6" of greater were surveyed and are shown for either removal or protection.

12.1 CLEARING AND GRUBBING: Trees, brush, vines, shrubs, etc. that are health or unhealthy and less than 6" in diameter that are located within the project limits shall be removed by the Contractor and shall be considered incidental to the Clearing and Grubbing pay item.

12.2 TREE REMOVAL: Trees, brush vines, etc. that are healthy tress 6" or greater, as shown for removal, shall be removed by the Contractor and shall be considered part of the Tree Removal pay item. Any trees, brush, vines, etc. that are healthy or unhealthy trees 6" or greater, not shown for removal, shall be removed by the Contractor and shall be considered incidental to tree removal. Any tree determined to be high risk due to construction impact, root loss, damage or other reasons, and trees deemed hazardous for any reason shall be reported to the Owner's Representative and/or appropriate Consultant. High risk trees shall be recommended for removal. Tree removal within the Tree Protection Zone (TPZ) shall not be attempted by construction or Contractor personnel with grading or other heavy equipment. A certified arborist shall remove, or oversee the removal of the tree(s) from within the Tree Protection Zone (TPZ) in a manner that causes no damage above or below ground to remaining trees.

If more than 50% of a tree's root system will be cut or destroyed and/or the Structural Critical Root Zone (CSRZ) cannot be protected, the Contractor shall immediately notify the Owner's Representative and/or appropriate Consultant who will determine if the tree should be removed for safety reasons.

12.3 MEASUREMENT OF PAYMENT: No Measurement will be made for Clearing of Grubbing.

TEMPLATE

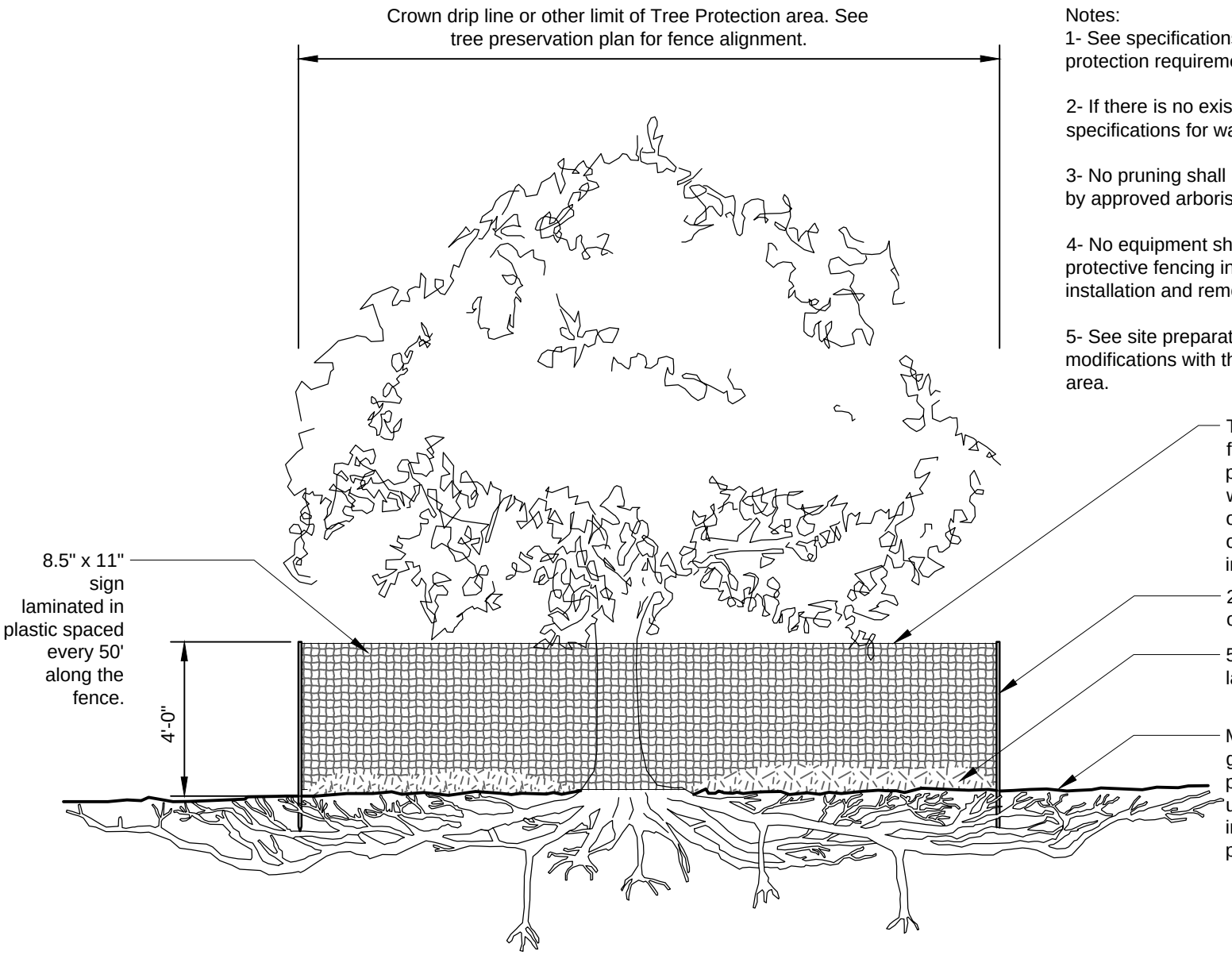
No measurements will be made for Tree Removal unless there are appreciable errors in the contract quantity or authorized changes are made to the planned area of removal. Appreciable errors will only be considered in areas where original removal varies from planned removal area by more than 50%. For changes to the quantity as a result of appreciable errors to be considered, the Contractor shall notify the Owner's Representative and/or appropriate Consultant in wiring of the suggested appreciable errors and provide supporting data. The Owner's Representative and/or appropriate Consultant shall be granted 5 (five) business days to review this data and survey existing conditions on the site before any work shall proceed in the representative area. If the Contractor's notification of appreciable errors are found to be unwarranted, no additional compensation for delays while evaluating the need for consideration of appreciable errors will be granted to the Contractor. Any change to the plan quantity will be field measured to the tree removed and added to or subtracted from the original plan quantity.

12.4 BASIS OF PAYMENT: The accepted quantities of clearing and grubbing will be paid for at the lump sum contract price. Payment shall include all incidental items necessary to complete the work. When no pay item for clearing and grubbing is included in the contract, clearing and grubbing, including scalping, will be considered incidental to the work and no direct payment will be made.

The accepted quantities of tree removal will be paid for at the unit price bid for the items stated in the contract. Payment shall include all incidental items necessary to complete the work including but not limited to: hauling, dust control, mulching, pruning, chainsaw work, gas, oil, and finishing and grading. When no pay item for tree removal is included in the contract, tree removal will be considered incidental to the work and no direct payment will be made.

END OF SECTION 01 56 40

TEMPLATE



Notes:

1- See specifications for additional tree protection requirements.

2- If there is no existing irrigation, see specifications for watering requirements.

3- No pruning shall be performed except by approved arborist.

4- No equipment shall operate inside the protective fencing including during fence installation and removal.

5- See site preparation plan for any modifications with the Tree Protection area.

S-X

TREE PROTECTION