

NAU Tree Bank

November 21, 2024

Introduction

The goal of the proposed Tree Bank is to provide for the replacement of trees planned for removal during construction and development on NAU's Flagstaff campus. A simple and reasonable method is used to determine tree canopy, replacement formula for trees, and implementation for new construction and renovation projects. The intent is to minimize loss of tree canopy due to construction or renovation of buildings, utilities, or circulation systems such as roads, parking and sidewalks. The secondary goal is to improve both the quality and quantity of the campus treed areas, including natural forested areas as well as developed areas such as quads and pedways.

With the establishment of a Tree Bank there is a separate account established for funds to be used for the sole purpose of tree planting and replacement. The fund allows for flexibility of planting time and provides a way to address sites with insufficient space for tree planting post-construction. The Tree Bank also supports NAU's Tree Campus USA designation and related activities such as the annual Service Learning project, and is included as part of NAU's Tree Care Plan.

Determination of Tree Canopy and Value

The standard in arboriculture for tree measurement is based on the assumption that tree canopy, trunk and root zone (tree biomass) is reflected in the caliper or diameter of a tree's basal area (the cross-sectional area of tree trunks measured at 4'-6" above ground level). Diameter is measured at 4'-6" above the ground elevation and is known as the DHB or diameter at breast height. For multi-stem trees (stems originating below 4'-6"), DBH is determined by the sum of the DBH of individual stems. Existing trees to be removed are categorized and replaced using the method below:

Single or Multi-Stem Deciduous Trees, and Ponderosa Pines:

Removal of a tree 6" DBH or greater but less than 15" DBH requires one (1) new 2" caliper deciduous tree or one (1) new 6' ht. evergreen tree.

Removal of a tree 15" DBH or greater but less than 24" DBH requires two (2) new 2" caliper deciduous trees, two (2) new evergreen trees at 6' height, or one (1) evergreen tree at 10' height.

Removal of a tree 24" DBH or greater requires three (3) new 2" caliper deciduous trees, three (3) new evergreen trees at 6' height, or two (2) evergreen trees at 10' height.

Evergreen Trees (Excluding Ponderosa Pines):

Removal of a tree less than 10 feet in height requires one (1) new 6' height tree.

Removal of a tree greater than 10 feet but less than 20 feet in height requires two (2) new trees at 6' height, or one (1) tree at 10' height.

Removal of a tree 20 ft in height or greater requires three (3) new trees at 6' height, or two (2) trees at 10' height.

Prohibited Removals:

Campus trees that have unique value include those part of NAU's Arboretum (Wommack Tree Walk, Littleman Tree Walk, J. Norm Grim Arboretum, and School of Forestry Tree Walk:

www.nau.edu/arboretum), or trees designated as donor or memorial trees, and shall be prohibited from removal. Exceptions may be granted if determined necessary by the Facilities Services AVP or the VP for Capital Planning & Campus Operations. If an exception is granted, tree values will be assessed at 1.5 times their DBH where deciduous or ponderosa pine, or 1.5 times their height where evergreen. Mitigation fees are calculated based on DBH x 1.5 less the total DBH of replacement trees.

Exceptions:

Exceptions for mitigation will be made by NAU landscape architect or arborist where:

- Removal is considered beneficial to the health of the campus tree canopy such as in instances of overcrowding or dense ponderosa pine tree stands;
- Tree is in an unhealthy condition and cannot be reasonably treated for survival;
- Tree species is classified as a noxious weed by the Arizona Department of Agriculture, such as Siberian Elm or Russian Olive: <https://agriculture.az.gov/pestspest-control/agriculture-pests/noxious-weeds>;
- Tree is deemed to pose a hazard to buildings or pedestrians due to leaning trunks, weak branching or structural instability;
- Tree is not of significant size (DBH is less than six inches);
- Tree is able to be salvaged and transplanted in accordance with NAU Technical Standards Section 32 96 00 Transplanting; or
- Tree is dead (less than 25% live limbs).

Replacement Canopy and Implementation

Replacement will be achieved by replanting with species similar to those removed, with preference for native plant materials, or as otherwise approved by the NAU landscape architect. All replacement tree species shall be consistent with the palettes in the Landscape Master Plan. Tree replacements will be in accordance with NAU Technical Standards Section 32 93 00 Planting, including required two (2) year warranty.

Replacing trees on a 1:1 basis does not reflect the value of large established trees. However, attempting to replace the actual DBH or footage of canopy removed would place an undue hardship on a construction project budget. Therefore, the intent is to establish a compromise between replacement costs that can reasonably be born as part of a construction project budget and the true value of mature trees. It is expected that as a percentage of construction budgets, implementation of the Tree Bank will result in an increase between 0.5%-5.0% of total costs for projects of varying scales and scopes. At the same time, implementation of the Tree Bank can encourage the evaluation of sites and designs to minimize disturbance and effect as few trees as possible.

Locations for Replacement Trees:

Location of replacement trees are evaluated on a case-by-case basis by the NAU landscape architect. Replacement trees generally should be planted as near as possible to the area that was disturbed, to either create a new treed or forested area, expand an existing forested or treed area, or to enhance an existing treed or forested area. In some circumstances it may not be possible or desirable to plant the replacement material at the same location, such as in the instance of an existing dense canopy. In these situations replacement trees may be installed in another area on the Flagstaff campus with suitable conditions, or the NAU landscape architect may approve installation of non-similar species at alternate locations to enhance other areas of campus.

Mitigation Fees:

In instances where project limitations such as schedule or seasonal timing preclude replacement plantings, payment is to be made from the construction project budget to the Tree Bank account. Costs are based on recent campus construction projects, and would be adjusted annually for inflation (method is conceptually based on the Replacement Cost Basis as outlined in the Guide for Plant Appraisal prepared by the Council of Tree and Landscape Appraisers (CTLA) 10th edition, which includes tree purchase, delivery, installation and establishment/warranty). In some instances, mitigation fees may also be calculated based on DBH less the total DBH of replacement trees. Tree fees for 2025 are as follows:

- 2” caliper deciduous tree: \$1,350
- 6’ height evergreen tree: \$1,400
- 10’ height evergreen tree: \$3,250

Example Implementation:

As an example, applying the replacement formula to the ARD Chilled Water Line project (total budget of \$1.105 million), mitigation is calculated as follows:

- Removal of one (1) ponderosa pine less than 6” DBH = no mitigation required.
- Removal of seven (7) ponderosa pines 6” or greater but less than 15” DBH = seven (7) new 6’ height evergreen trees required.
- Mitigation fees total \$9,800 or 0.9% of the total budget.

As an additional example, for the recent Bus Storage and Maintenance Facility phase one project, mitigation would have added approximately \$201,600 or 4.1% to the \$4.961 million total project cost (Note that 106 tree removals are shown on the construction documents, however since their sizes were not documented, this estimate is based on the assumption that the size categories of the ponderosa pines removed was: 20% - less than 6” DBH, 35% - 6” or greater but less than 15” DBH, 35% - 15” or greater but less than 24” DBH, and 10% - 24” DBH or greater.)