Tyndall Air Force Base
Installation of the Future

U.S. AIR FORCE

Landscape Master Plan
D. Long-Term Maintenance

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D01. Landscape Maintenance Approach

D01.1 Purpose

This document uses a Sustainable Landscape Initiative as a guide to maintaining the landscape and hardscape of Tyndall Air Force Base (AFB). It outlines the standards to be followed both by Tyndall AFB maintenance staff and outside landscape contractors engaged to maintain the base's landscape assets.

D01.2 Guideline Alignment

Tyndall AFB has partnered with the Florida Fish and Wildlife Conservation Commission to develop a Sustainable Landscape Plan for the installation that is based on Tyndall AFB's *Integrated Natural Resources Management Plan* (INRMP). The primary objective of Tyndall AFB's Natural Resources program is to ensure continued access to the land and airspace required to accomplish the Air Force's mission while maintaining the natural resources in a healthy condition. The INRMP ensures that natural resources management and mission activities are integrated and align with state and federal mandates. The INRMP integrates and prioritizes wildlife, fire, and forest management activities to sustain and restore the base's ecosystems and ensure "no net loss" in the operational capability of these resources to support the base's mission activity.

D01.3 Sustainable Landscape Initiative

The Sustainable Landscape Initiative is a comprehensive forward-thinking approach to landscape design, maintenance, and operations. The initiative addresses five program categories:

- Sustainable lawn maintenance and landscaping
- Reduction of use of pesticides and herbicides
- Eradication of invasive species
- Selection of native plant species
- Conservation, retention, and recycling of water

D01.4 Growth & Future Development

These maintenance guidelines focus on future activities once rebuild construction is complete and Tyndall AFB has achieved the functionality and aesthetic as the Installation of The Future. The maps in this document represent landscape zones or planning districts and are the best representation of these areas and zones at the time this document was produced. The buildings and other vertical items are also not an exact alignment, or location. The Landscape Master Plan will continue to evolve and modify as Tyndall AFB moves closer to becoming the Installation of The Future.

Tyndall AFB, 2019

D01.5 Landscape Image & Character

The design intent for the landscape at Tyndall AFB is to create a more natural appearance that resembles the native landscape already in existence on a large portion of the base. The shift in approach from large areas of maintained lawns to a more wooded and native shrub and native grass landscape enhances the natural beauty of the native landscape, reduces overall maintenance costs, and establishes a more sustainable and resilient approach to landscaping.

The work of the landscape contractor is primarily maintenance work in the Manicured, Maintained, and Airfield Zones.

Tyndall AFB – Landscape Rebuilt

D02. Maintenance - Authority

Everyone involved with the maintenance of Tyndall AFB needs to be familiar with the following regulations and codes:

D02.1 Air Force Standards

- Air Force Instruction (AFI) 32-7064, *Integrated Natural Resources Management*
- Unified Facilities Criteria (UFC) 3-201-02, *Landscape Architecture,* https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-201-02
- Unified Facilities Guide Specifications (UFGS) https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs
  - 31 32 11, *Soil Surface Erosion Control*
  - 32 96 00, *Transplanting Exterior Plants*
  - 32 92 19, *Seeding*
  - 32 92 23, *Sodding*
  - 32 92 26, *Sprigging*
  - 32 93 00, *Exterior Plants*
  - 32 05 33, *Landscape Establishment*

D02.2 Department of Defense Standards

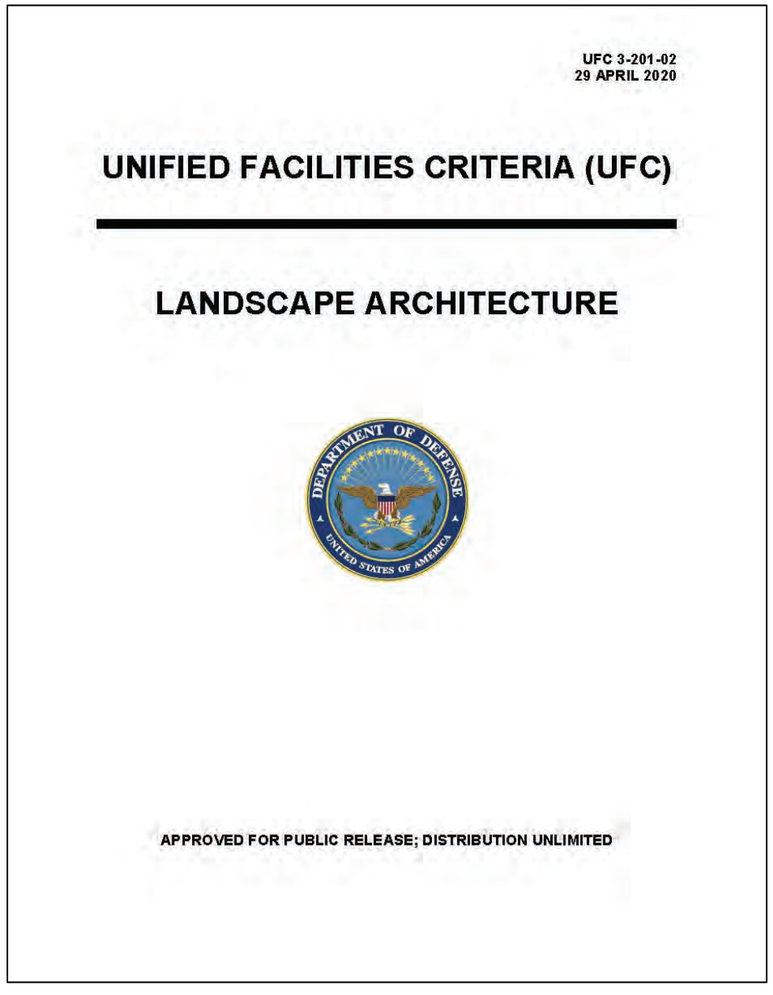
- Protective Coatings: UFC 3-190-06, *Protective Coatings and Paints*
- Asphalt & Concrete: UFC 3-270-01*, O&M Manual: Asphalt and Concrete Pavement Maintenance and Repair*
- Fences: UFC 4-022-03, *Security Fences and Gates*

D02.3 Tyndall AFB Standards

- *Air Force Common Output Level Standards (AF COLS) - Ground Maintenance (Tyndall AFB)*: The current standard under which the base operates for landscape maintenance
- The Master Plant List, which provides a comprehensive list of plants allowed on the base, is available from Tyndall AFB. The complete Master Plant List is provided as an appendix to the *Tyndall AFB Installation Facilities Standards* (IFS) and is included on the IFS website (www.tyndallifs.com).

D02.4 Florida Marine Turtle Protection Act Requirements

Sea turtles are listed as either Endangered or Threatened. They are protected under the Federal Endangered Species Act of 1973 and Florida's Marine Turtle Protection Act (379.2431, Florida Statutes). Florida Statutes restrict the take, possession, disturbance, mutilation, destruction, selling, transference, molestation, and harassment of marine turtles, nests, eggs or habitat.


UFC 3-201-02
29 APRIL 2020

UNIFIED FACILITIES CRITERIA (UFC)

LANDSCAPE ARCHITECTURE

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

D02.5 Antiterrorism Landscape Guidelines

Landscape contractors will require their staff and site managers to follow the guidelines outlined in the most current version of UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*, as it relates to landscape and maintenance.

D02.6 Additional Resources

The following additional resources applicable to Florida and the Southern United States were consulted in the development of the Tyndall AFB Sustainable Landscape Initiative maintenance plan:

- Office of Federal Sustainability, *Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes*, May 2017
- University of Alabama, Landscape and Grounds Strategic Plan, 2018
- University of Florida Extension Florida-Friendly Landscape Program, *Florida-Friendly Landscaping Guidelines for Selecting a Landscape Contractor*
- University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) Extension, various documents are included and cited in this plan

D02.7 Regulated Landscape Maintenance Activities

The following maintenance activities are regulated by the U.S. Air Force as well as the State of Florida:

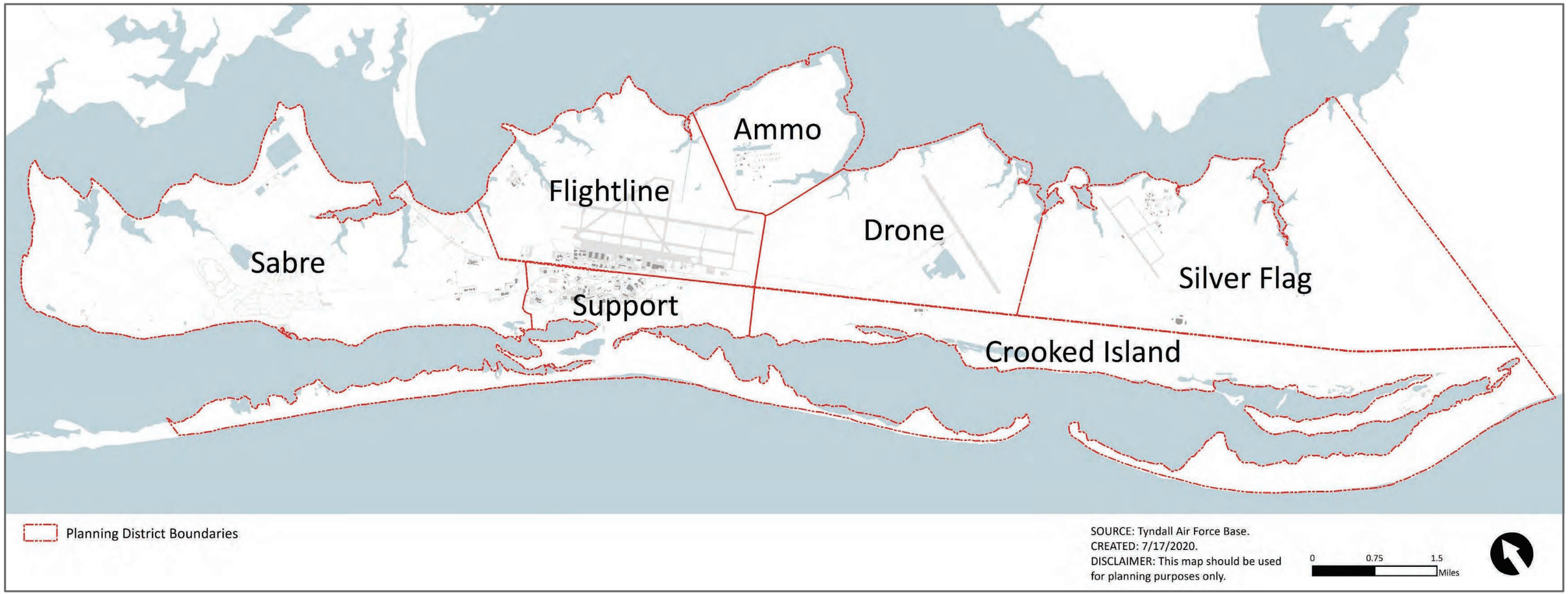
- Adhering to noise ordinances related to motorized equipment
- Applying herbicides, pesticides, and/or fertilizer
- Complying with worker safety requirements (Occupational Safety and Health Administration [OSHA])
- Disturbing areas above a certain size or installing hardscape larger than a certain area
- Installing certain plants known to be invasive
- Removing trees above a certain caliper
- Working in or near wetlands, wet ponds, living shorelines, tidal, or nontidal areas
- Working requiring erosion and sediment control measures, permits, inspections
- Working within a vegetative buffer zone

D03. Land Planning Districts

Tyndall AFB is divided into seven districts that represent specific geographical and mission uses. Understanding the boundaries of these districts is useful when discussing specific areas and maintenance needs of the base:

- Sabre District
- Flightline District
- Support District
- Ammo District
- Drone District
- Silver Flag
- Crooked Island

Exhibit D-1. Planning Districts



Content current as of 20 August 2020. Refer to the Tyndall IFS website (www.tyndallifs.com) for up-to-date information.

D04. Landscape Zone Description

Tyndall AFB is divided into five Landscape Zones: Manicured, Maintained, Managed, Airfield, and Coastal. As described in this section, each zone has specific characteristics and aesthetics related to land management and planning. This translates into different and specific landscape maintenance requirements for each zone. Most of the maintenance work is contained within the Manicured, Maintained, and Airfield Zones.

D04.1 Manicured Zone

The Manicured Zone is the most highly maintained landscape on base and is located between a building's immediate perimeter up to the edge of the Maintained Zone. The Antiterrorism (AT) Zone is a subzone of the Manicured Zone and is located from a building's immediate perimeter outward to a minimum width of 20 feet, as well as at access gates and other areas as prescribed for security reasons. The Manicured Zone may extend beyond the AT Zone's 20 feet, but at a minimum it must include the entire 20-foot width of the AT Zone. Landscape in this zone will have vegetation that meets the AT regulations for the first 20 feet. Vegetation in the Manicured Zone areas that extend beyond the 20-foot AT Zone must be drought-resistant and include native trees for shade and ornamental grasses and native shrubs for color and variety. Different plant lists are used for the Flightline and Support Districts because of their different mission requirements. **All Manicured Zone landscaping must be maintained. The landscape contractor is responsible for all maintenance tasks outlined in the contract for this zone.**

D04.2 Maintained Zone

The Maintained Zone comprises native open upland prairie landscape and areas near buildings such as parking, driveways, and roadways. Maintained Zones reduce the amount of open lawn spaces that need to be mowed. This zone is meant to look native in character and receive minimal maintenance. This zone includes nature-based infrastructure such as vegetated stormwater basins and vegetated swales that are to be maintained on an annual basis, which includes removing all silt accumulation, removing trash or debris, and removing other items that impact the flow of water. This zone also requires annual cleaning of all stormwater drains and structures. Tyndall AFB determines the planting palette. Plantings must comply with AT criteria. The landscape contractor must verify current standards at the time of installation. The contractor will use the Master Plant Palette included in the IFS in consultation with Tyndall AFB 325 Civil Engineer Squadron Operations Flight (325 CES/CEO) Grounds Maintenance. **Maintenance activities by the landscape contractor in the Maintained Zone are limited to yearly mowing to a specified height, annual cleaning, and trash removal.**

D04.3 Managed Zone

The Managed Zone encompasses all perimeter areas upland of the peninsula coastline, as well as large open areas in between the base's facilities. This zone includes areas of wooded pineland plantations, mesic/wet slash pine flatwoods, wet prairie, freshwater wetlands, and inland ponds and lakes. According to the INRMP, this zone requires work to transform Slash Pine areas into native Longleaf Pine plantations. This effort has expanded in size and scope due to the damage from Hurricane Michael. Base-wide landscape will first and foremost aim to restore itself to a condition in which it can sustain the demands of nature and society. Tyndall AFB determines the planting palette. Plantings must comply with AT criteria. This area will be maintained by Tyndall AFB and mainly includes yearly burning. **There is no maintenance requirement in this area by the landscape contractor; the description of this zone is included for information only. Any request for maintenance in this zone must be at request of Grounds Maintenance.**

D04.4 Airfield Zone

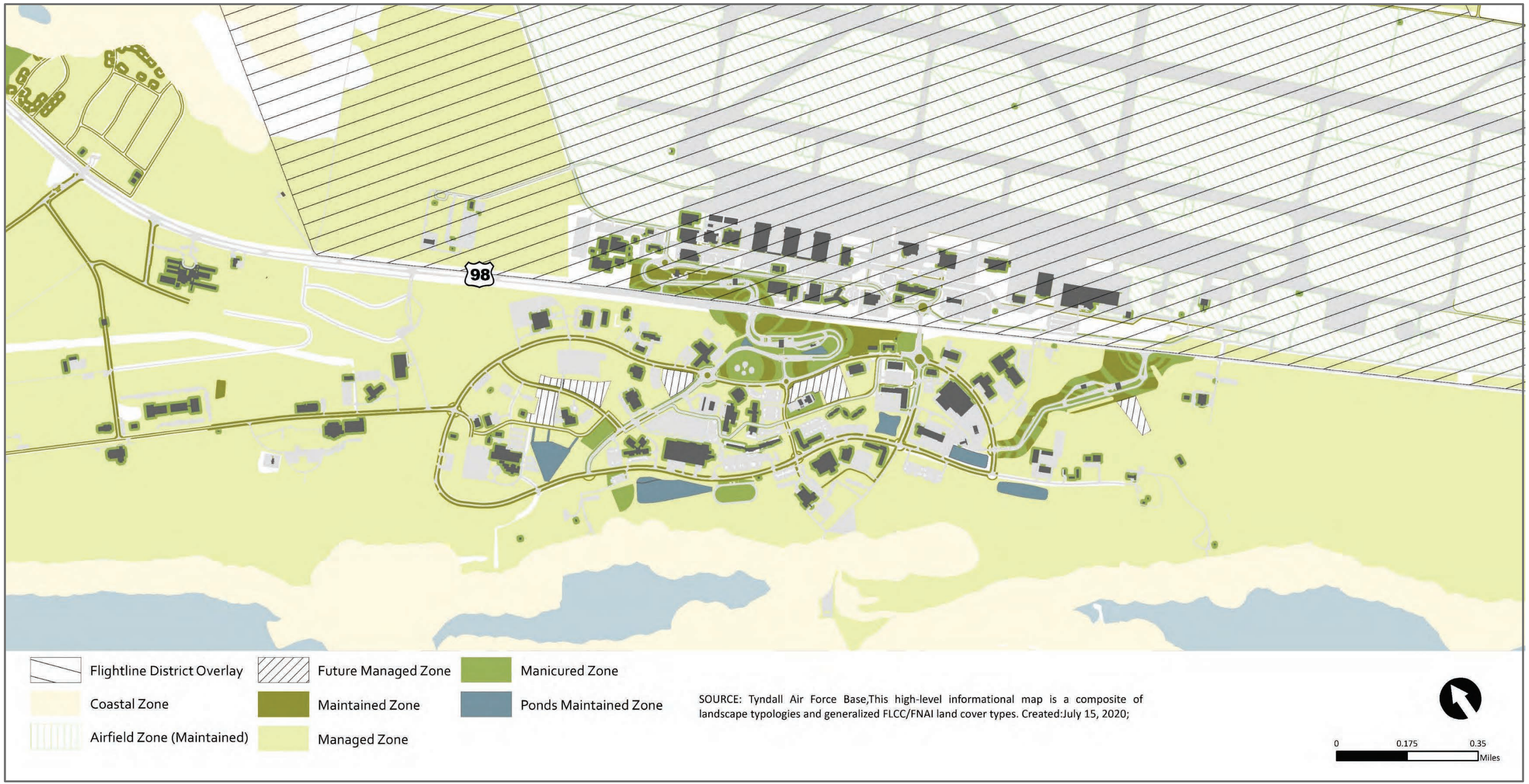
This zone includes the runways in the Flightline District, the natural areas between the runways, and the areas surrounding the perimeter extending to the Longleaf Pine forest. Work in this area also includes the Flightline. The landscape in this zone must not support wildlife, especially birds because they can cause damage to aircraft and present a safety issue. Air Force standards must be met regarding vegetation that is restricted and allowed in this zone.

Grass for use at the Airfield Zone for utility repair will be Bahia grass sod. Use sod or plugs only. No seeding is allowed in this zone due to attracting birds. **The landscape contractor is responsible for mowing the grassed areas at specific times of day and on certain days of a week, as coordinated with the base. Grassed areas in this zone will be mowed on a monthly basis. The landscape contractor is responsible for keeping all drainage channels clear from debris and silting. Cleaning all storm drainage structures on an annual basis is included in the maintenance of this zone.**

D04.5 Coastal Zone

This zone encompasses all areas from the ocean shoreline back to the second line of defense, including beaches, coastal dunes, coastal wetlands, salt marshes, estuaries, coastal dune lakes, and coastal upland. Any work or maintenance proposed in this zone is part of the INRMP or Coastal and Marine Construction Guidelines contained in the IFS. **There is no requirement for maintenance by the landscape contractor as part of maintenance guidelines and is included for information only. Any request for maintenance in this area by the landscape contractor will be an additional service requested by the base.**

Exhibit D-2. Landscape Zones



D05. Maintenance Activities

D05.1 Softscape & Turf Areas

D05.1.1 Turf General

Turf maintenance includes all mowing, edging, trimming, and cleaning up of lawn areas. Whenever possible, turf maintenance operations in each district are to be completed the same day they are started. High traffic and high profile areas such as facility entrances, front doors, main entry gate, and amenity areas will be completely mowed, edged, trimmed, and cleaned up. Mowing is not performed during inclement weather and will be rescheduled as soon as weather and site conditions permit. Inclement weather includes periods of excess rainfall as well as periods of drought, which make the turf susceptible to damage during normal
mowing operations.

Weekly Mowed Areas

Prior to each mowing, all trash, sticks, and other unwanted debris must be removed from lawns and all other areas to be mowed. Manicured lawn areas are to be maintained at a height according to the Air Force Common Output Level Standards (AF COLS). It is not recommended to mow during extremely dry or wet conditions. During the mowing season, all lawn areas will be mowed weekly as weather conditions dictate and as outlined in the Maintenance Schedule. When possible, use mulching mowers on all maintained lawns. Keep mower blades sufficiently sharp so they do not “tear” the grass. Vary the mowing pattern where feasible to prevent rutting and minimize compaction. Avoid using power equipment that is too large or heavy for the task at hand, because it causes soil compaction onsite.

Caution must be used to avoid any flying debris. Safety glasses, ear protection, hard hats, gloves, and steel-toe boots must be worn during this operation by all workers. The mowing operation includes trimming around all obstacles, removing excess grass clippings, and removing debris from walks, curbs, and parking areas.

DO NOT allow string trimmers to come in contact with the bark of the tree. Take special care to prevent damage to plant material as a result of the mowing operations. Any damage caused by the mowing team’s equipment will result in the replacement of damaged material at the landscape contractor’s cost.

UF/IFAS-Recommended Mowing Heights

Suggested mowing heights and mower types for Florida lawns are shown in Exhibit D-3. Frequency of cut varies based on species and time of year.

Exhibit D-3. Mowing Requirements

Grass Type	Mowing Height (in.)	Mower Type
Native grass	4-6	Reel/Rotary
Bermuda grass	0.5–1.5	Reel/Rotary
St. Augustine grass	2.5–4.0	Rotary
Zoysia grass (Coarse types)	2.0–2.5	Rotary
Bahia grass	2.5–4.0	Reel/Rotary

Suggested Mower Types Based on Areas to be Mowed

Riding mowers for majority of open lawn spaces

Tractors for large open fields

Push mowers around trees and for smaller areas

Yearly Mowed Areas

The Maintained Zone includes areas of native grasses that require minimal maintenance during the year. The landscape contractor is responsible for mowing these areas once a year in mid to late winter before the grass starts to reactivate. Walk the area prior to mowing to locate any larger objects that could damage to the mowing equipment or bystanders from flying objects. Mow the grasses to a height of 4 to 6 inches. Use safety equipment, shields, and protective clothing and gear to prevent injury from flying debris or other hidden elements in the vegetation not visible to the operator or others nearby.

Edging

Edge all sidewalks, curbs, and other paved areas once every other mowing. The edging will be between 1 to 1½ inch deep and ¾ inch wide from the sidewalk, curb, or edge of hard surface. After mowing and edging an area, fine-tune by weed-eating any undesirable, unappealing leftover grass, groundcover and weeds in hard-to-get-to areas such as sidewalk and curb cracks, around poles and bollards, and close to buildings and signs. Blow off the entire area to it is clear of debris (such as sidewalks, streets, patio, and steps). Blow toward landscape beds and not into streets or drainage structures.

Mowing and Edging Clean Up

Leave all lawns, walks, trails, plazas, parking lots, and other highly visible use areas in a clean and neat-looking condition from mowing and edging activities. Do not blow debris toward or around pedestrians and vehicles. Blow debris on paved areas in one central location, then rake and/or vacuum and remove the debris from the area. Follow this same blowing and removal process when removing leaves from the grounds. Do not place debris in trash dumpsters. Transport debris to either the city dump or the current compost site on base. Remove debris from the edging operations and sweep or blow the areas clean. Use caution to avoid any flying debris. Safety equipment for protection must be worn during this operation.

Blow off all sidewalks, streets, and other paved areas

Always wear proper safety equipment

Edge all lawn next to curbs, sidewalks, other paved areas

Edge between 1 to 1½ inch deep and ¾ inch wide from the sidewalk, curb, or edge of hard surface

Turf Fertilization

Follow current UF/IFAS guidelines for turfgrass fertilization. Organic fertilizer is preferred but not required. Ensure that the fertilization schedule does not exceed the fertilizer rate prescribed on the label and complies with state and local ordinances. It is important to note that local fertilizer regulations may prohibit the use of nitrogen fertilizers during the summer months. Be aware of local ordinances to avoid fines or citations (https://ffl.ifas.ufl.edu/fertilizer).

Apply the minimal amount of fertilizer needed. Submit a schedule of materials to be used under this program as well as application rates to Grounds Maintenance. A yearly program will include a minimum of 4 pounds of nitrogen per 1,000 square feet. The fall fertilization will include a minimum of 30% slow-release nitrogen and a high potassium blend to promote root development. Do not add phosphorus unless soil samples indicate insufficient phosphorus levels are present. Fertilizer used will contain the following:

- Nitrogen and potassium in equal parts or in a 2:1 ratio
- Very little phosphorus
- Slow-release nitrogen

Include a complete minor and trace element package with each application to ensure that all the requirements of grasses are met. If soil samples indicate a high pH, all fertilizers used will be Sulphur-coated products. Notify Grounds Maintenance of any turfgrass nutrient deficiency symptoms and recommend measures for correction. Treat deficiencies of specific nutrients by applying the lacking nutrient in accordance with UF/IFAS recommendations until the deficiencies are corrected. The fertilizer application rate and number of applications depends on the type of lawn. If the soil in a lawn is compacted, aerate the soil before applying fertilizer.

Application

Use only fertilizers for urban turf that are formulated and have application instructions in accordance with requirements and directions provided by Florida Administrative Code Rule 5E-1.003, *Labeling Requirements for Urban Turf Fertilizers*. Apply fertilizer only when plants are actively growing and according to the Maintenance Schedule.

A soil analysis must be obtained before planting, seeding, or sodding for the area to be impacted. Analyze the soil samples for pH, lime requirement, and available plant nutrients (P, K, Ca, and Mg). A soil pH test will indicate whether pH adjustment is necessary. For more information on soil sampling and testing, go to (http://soilslab.ifas.ufl.edu/ESTL%20Home.asp).

Use deflector shields on all application equipment to minimize inadvertent applications of fertilizer to non-plant areas. Blow, sweep, or wash back into the landscape any fertilizer deposited on paved or impervious surfaces immediately to prevent staining of pavement. Use and enforce the “Ring of Responsibility” around or along the shoreline of canals, lakes, ponds, wetlands, or coastal waterways to reduce risk of fertilizers and other lawn chemicals directly coming into contact with surface waters. This includes complying with all state and local ordinances related to fertilizing close to water bodies and staying a minimum 100 feet away from the edge of the water.

Store nitrate-based fertilizers separately from solvents, fuels, and pesticides, because nitrate fertilizers are oxidants and can accelerate a fire. Grounds Maintenance will work with landscape contractors to secure fertilizers and other chemicals stored at the worksite.

After fertilizing (unless water restrictions are in place or a rain event is predicted), irrigate the area with at least 1/4 inch of water to avoid the loss of nitrogen and increase uptake efficiency. If water restrictions apply, then irrigate the area as permitted, but do not to exceed 1/2 inch of water following fertilization.

All spreaders must have shields to prevent fertilizer from getting on paved areas

Avoid fertilizer stains on concrete

D05.2 Pesticide Application

D05.2.1 Integrated Pest Management

Integrated Pest Management (IPM) is a natural systems approach to seeking the least harmful methods of managing all types of landscape pests, including insects, weeds, plant pathogens, or vertebrates. IPM refers to protecting biodiversity and habitat by minimizing the use of pesticides.

Use pesticide applications in accordance with the rules and regulations governing use of pesticides in the State of Florida. Follow all provisions of Florida Statute 482 and will use IPM principles and methods (http://edis.ifas.ufl.edu/in109). Follow current UF/IFAS pest management recommendations for implementing an IPM program as per IFAS Publication ENY-298, *Landscape Integrated Pest Management* (http://edis.ifas.ufl.edu/in109) as well as other applicable pest-specific information available through UF/IFAS Extension. All landscape workers must wear all required OSHA-standard protection gear while working with pesticides.

Only intervene with chemical pest control when the pest is causing, or is expected to cause, more damage than can be reasonably and economically tolerated. The control strategy must reduce the pest numbers to an acceptable level while minimizing risks to non-targeted organisms.

Post appropriate pesticide application signs following each treatment, in compliance with Florida Department of Agriculture and Consumer Service regulations. Per Florida statutes, the contractor will arrange for all persons living or working on the base to be notified 7 days before treatment.

Keep records of pest problems identified, location, and control treatment applied. Document whether the control measures reduced or prevented pest damage, were economical, and minimized risks. Provide a copy of the records to Grounds Maintenance. Refer to past corrective actions when making similar decisions in the future. Dispose of used containers in compliance with label directions to prevent water contamination.

Treat fire-ant mounds individually with bait formulas as they occur. Surround each mound with fresh bait without disturbing the mound itself. Use broadcast baiting and broadcast treatment in recreation and common areas only as needed.

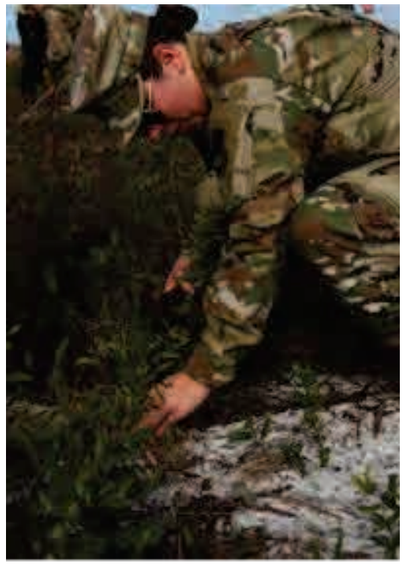
Monitor insects, including southern chinch bug, fall armyworm, tropical sod webworm, hunting billbug, grubs, and mole crickets, using UF/IFAS-recommended soapy water flushes and scouting for symptoms of plant damage. See http://edis.ifas.ufl.edu/ig001 for turfgrass pest-specific recommendations.

D05.2.2 Plant Diseases

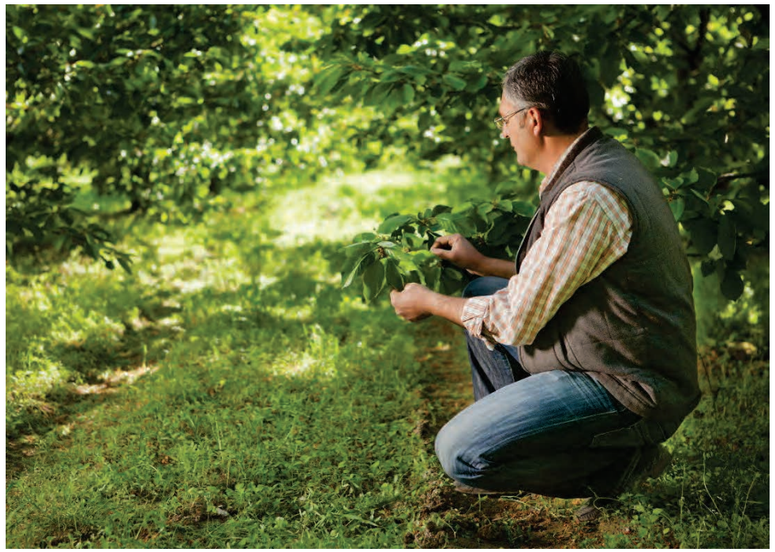
On occasion, plants can become stressed due to natural or unnatural events. If this happens, the competitive edge that the plant once had is given away to such pests as weeds, fungi, and insects. When any of these pests invade a plant, applying the appropriate chemical is necessary to combat the pest and restore the plant's ability to maintain its health. Safety is the upmost importance and the first rule when working with these chemicals. Applying seed and granular fertilizers takes time and skill, but the process for applying pesticides is much more difficult and requires the closest attention to detail by the applicator. There is no room for error, and the application must be done correctly the first time; failure to do so can be disastrous, as well as costly. Along with safety, the timing of pesticide applications is also extremely important. A poorly timed application will, more times than not, fail.

Notify Grounds Maintenance of any fungal disease outbreaks that occur. If disease is significant and persistent, the contractor may apply an appropriate fungicide if Grounds Maintenance approves. Plant diseases occur when excessive moisture is present for extended periods. Correct cultural practices are the key to control of plant diseases.

All workers must wear OSHA required protection gear



Remove invasive species



The landscape contractor will monitor all plantings for diseases and pests and report issues to Grounds Maintenance

D05.3 Trees, Shrubs, Perennials, Groundcovers, Ornamental Grasses

Although the available sustainability literature does not usually focus on tree maintenance, the International Society of Arboriculture (ISA) offers many helpful brochures on its website relative to tree planting, mulching, and watering. Follow these routine tree maintenance tasks to reduce street tree mortality:

- Remove stakes from newly planted trees after one season, or no later than 1 year after planting. If not removed in time, wires on new fast-growing trees will girdle and kill young trees. Most new urban trees do not need staking at all except in high wind areas.
- Mulch properly. Never practice “volcano mulching” and keep mulch at least 3 inches from the trunk. Mulch so water is directed to the tree, not shed away from it.
- Check for girdling roots at the tree’s base and remove them before they harm the tree, taking care not to damage the trunk.
- Fill slow-release watering bags regularly during the growing season and remove them after the growing season. The warm damp space between the bag and the tree trunk can attract damaging insects.
- Keep mowers and string trimmers away from all tree trunks, no matter how large the tree.
- Provide newly planted trees with at least 25 gallons of water per week for the first two growing seasons.

Remove old mulch around trees before adding new to avoid "volcano mulching"

Keep crown of tree roots exposed

D05.3.1 Approved Master Plant Palette

Tyndall AFB’s approved Master Plant Palette lists the only species allowed to be planted on the installation. The palette was developed to meet the goals of the INRMP. The palette’s lists consist of native and adapted native plants that have proven to grow in the area. **Section C06, Landscaping**, includes sample lists of approved palette plants that are appropriate use in the Manicured, Managed, and Maintained Zones. Because of the specific mission requirements in the Flightline District, the Master Plant Palette includes a list of approved plants that may be used in the Flightline and Airfield.

The comprehensive Master Plant Palette is provided as an appendix to the IFS and is included on the IFS website (www.tyndallifs.com).

D05.3.2 Undesirable Plant Species

The Master Plant Palette includes a list of invasive, noxious weed, non-native, and undesirable plant species that should not be used on Tyndall AFB. If any of the listed undesirable plant species are located during the course of the work, the landscape contractor will notify Grounds Maintenance as to their location and will request direction on how to proceed.

Avoid getting mowers close to trees and damaging the bark

Keep water bags filled with water

D05.3.3 Pruning

Tree Pruning

All pruning and trimming will conducted be under the direction of a Florida-certified arborist. When pruning, the landscape contractor will use current techniques and standards approved by UF/IFAS and the International Society of Arboriculture. Prune selectively to improve the tree's structure and health and to enhance fruiting, flowering, or appearance. When preforming corrective pruning, maintain the structural integrity, natural shape, and characteristics of the species. Disinfect pruning tools before and after each property and plant to prevent disease transmission.

Maintain the central leader (trunk) of each tree (no topping/heading, hat-racking, or shearing). Remove interfering or crossed limbs and remove all branches using "collar cuts." Follow UF/IFAS pruning recommendations.

Use pruners (not herbicides) to remove sucker growth at the base of. Perform aesthetic pruning by removing dead and broken branches as often as necessary so that trees always appear neat and remain safe. Maintain branches and limbs a minimum of 2 feet away from all buildings, especially roofs. Maintain trees near sidewalks and parking lots to provide clearance for pedestrians and vehicles. Follow FDOT pruning recommendations.

The landscape contractor will inform Grounds Maintenance of trees that are diseased or dying and need to be considered for removal.

Hardwood Trimming

Correct pruning of trees includes removing weak branching patterns and providing corrective pruning for proper development, and cutting back to branch collar without leaving stubs. Proper pruning provides a clean and flush cut with no tearing of the tree bark. Tree trimming includes all trees taller than 12 feet in height. Maintain any tree shorter than 12 feet in overall height during the regular maintenance activities.

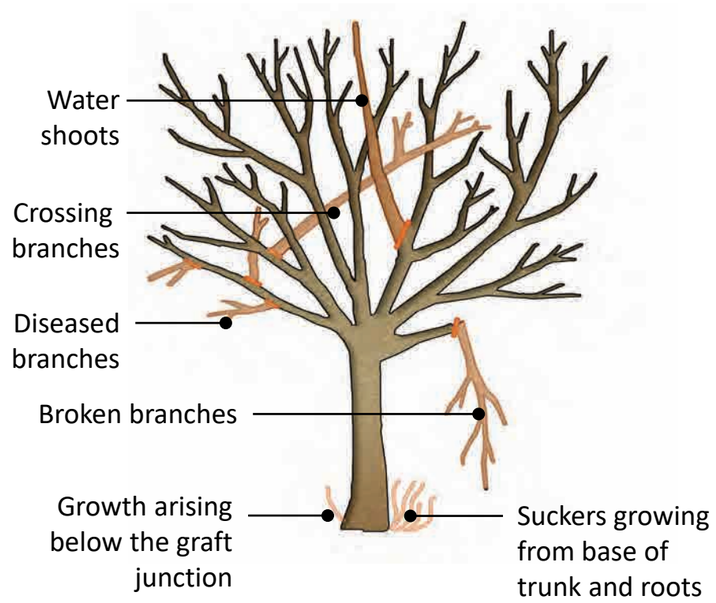
Shrub Pruning

Lightly prune shrubs based on the need of each species. Pruned shrubs must look natural in character and not be trimmed into balls, flat tops, or square shapes. Certain flowering shrubs have specific times when they should or should not be pruned. Use hand pruners to prune shrubs as needed to provide shape and fullness and promote flowering. Do not prune spring-flowering shrubs until after the bloom period. Maintain shrubs to avoid contact with structures and provide clearance of 12–18 inches from any vertical wall or element. Power shears may be used to prune formal hedges. Ensure the top of the hedge is maintained at a width that is narrower than the bottom to allow sunlight to reach lower foliage. Remove dead or broken branches when noted. Selective removal of small sections of branches as a form of insect pest control is also acceptable, providing the natural shape of the shrub is maintained. Do not prune during or immediately after growth flushes.

Groundcover Pruning

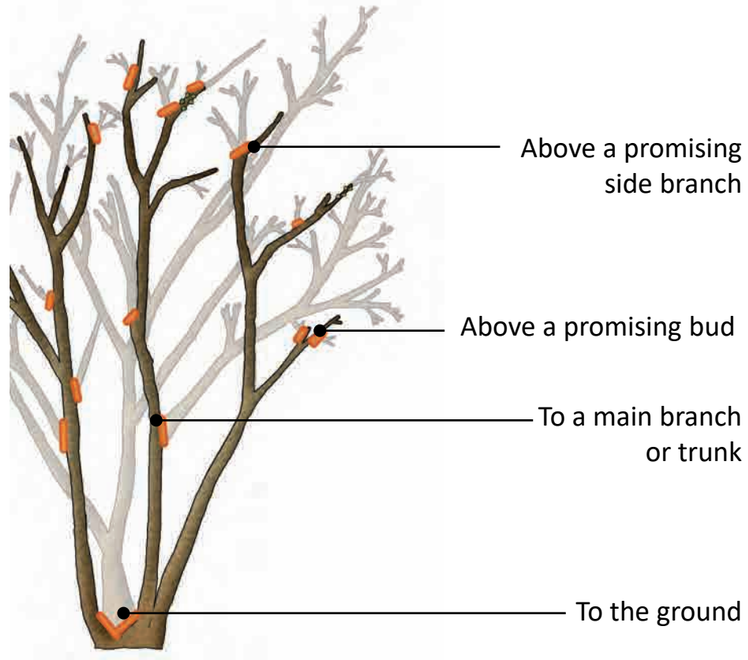
Groundcovers require minimal pruning. Use plant beds to confine and maintain groundcovers. Do not allow groundcover to grow over paved areas. After all pruning operations make all reasonable efforts to remove all cuttings and debris relative to groundcover type and ensure an aesthetically clean appearance.

Exhibit D-4. Where to Make Cuts when Pruning Trees



Avoid severe pruning or topping of Crape Myrtles which only weaken the shrub and can lead to disease and rot

Exhibit D-5. Where to Make Cuts when Pruning Shrubs



Tree pruning must be done only by certified arborist

D05.3.4 Trees

Tree Removal

Specific criteria are established and applied to the removal and/or pruning of trees, shrubs and/or vegetation located on the base within the Manicured and Maintained Zones. The criteria are used to evaluate the overall public benefit of the proposed work. In all cases, safety concerns receive the highest priority. Priority will be given to limiting removal, increasing forest canopy, and preserving appropriate vegetation on the base. In order for a tree to be removed, it must meet the following criteria:

- Is in either the Manicured or Maintained Zone
- Is dead or have reached or exceeded their useful lifespan and may present danger to life and property
- Poses a safety hazard
- Poses a hazard to utility lines
- Interferes with construction of facilities
- Is growing in an inappropriate place, such as too close to structures, sidewalks, or parking lots
- Is damaged from natural causes
- Is inconsistent with the master plan
- Can be replaced with an equal number of caliper inches

Hazardous Tree Management

Public health, safety, and general welfare will be maintained using generally accepted professional practices of evaluation and treatment to reduce risks to people and property from hazardous trees. Pay attention to proper selection, planting, and maintenance of new trees to reduce long-term risk.

Topping Disallowed

"Topping" destroys the natural appearance of a tree and does not contribute to the base aesthetics. Because topping trees can cause permanent damage by promoting decay and causing an unnaturally dense and weak branching structure, it is prohibited except under special circumstances.

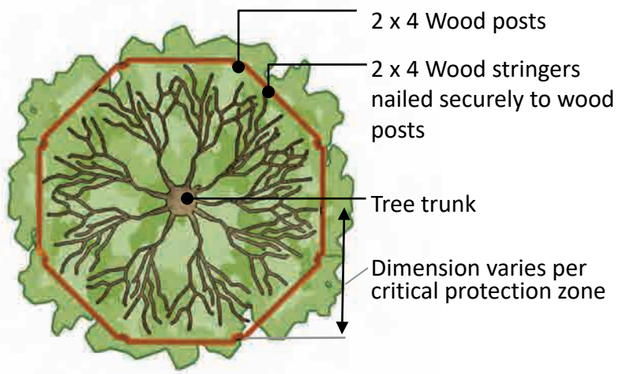
Tree Retention and Protection On Construction Sites

Having healthy trees is a top priority to keep Tyndall AFB beautiful. Misuse of all trees is prohibited. Examples of misuse include, but are not limited, to climbing, use of ropes, wire, hammocks, slack-lines, zip-lines, nails, tape, and signage. These issues cause stress, scaring and, often broken branches, which can lead to disease and/or death of an otherwise healthy tree. In addition, it is strictly prohibited to intentionally climb in or on base trees, break off limbs, and branches for personal convenience (such as for setting set up a tent or placing other equipment on a tree on base).

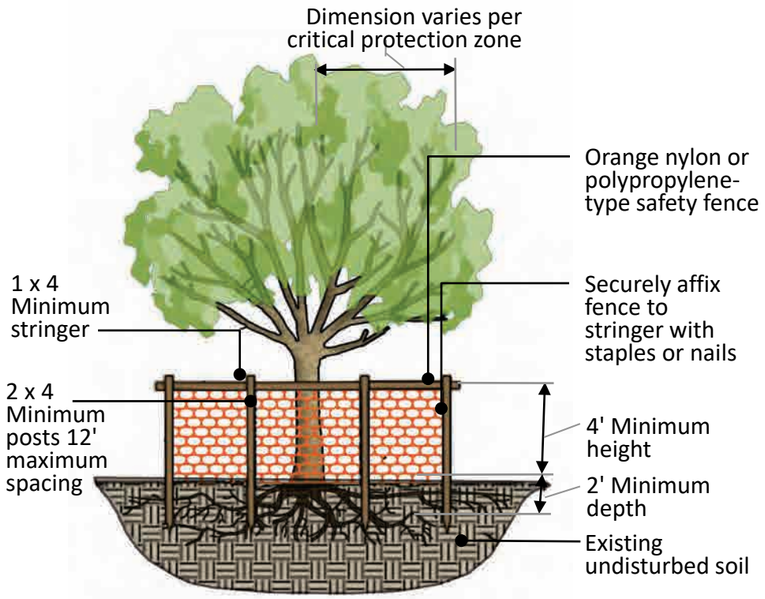
Conserve trees on construction sites wherever possible. Protect trees designated for retention from construction impacts according to standard plans and specifications. No equipment or vehicle will be parked, or construction materials stored, or substance poured or disposed within the tree protection area (known as the drip line). Contractors will comply with construction and grounds management practices (fencing, feeding, watering, and limiting traffic over roots) throughout the entire construction process. Once construction projects are complete, provide deep root fertilization treatments for all trees designated for protection for 2 years after project completion (once during the spring and again during the fall for 2 years). Damage to tree roots on a construction site often does not show up until years later. These fertilization treatments help ensure the overall health of the tree following any construction activities.

Storing dirt piles or having equipment under trees will kill them

Exhibit D-6. Tree Protection Barricade



Note: For groups of trees, place barricades between trees and construction activity



Notes: The "critical protection zone" is the area surrounding a tree within a circle described by a radius of 1 foot for each inch of the tree trunk diameter at 54 inches above finished grade. For groups of trees, place barricades between trees and construction activity.

Tree protection barricades must be located to protect a minimum of 75% of the critical protection zone.

Conservation of Rare Specimens

Individual trees that are considered rare because of size, species, or historical significance will be given extra protection and consideration for retention.

Diseased or Infested Plants That Pose Risk to Trees

Whenever possible, take action to effectively decrease risk to other trees from pests and diseases. This may include removal and destruction of infected materials, pesticide treatments and/or alternative cultural practices. Other knowledgeable agencies, such as Local and State Cooperative Extensions, may be consulted as needed.

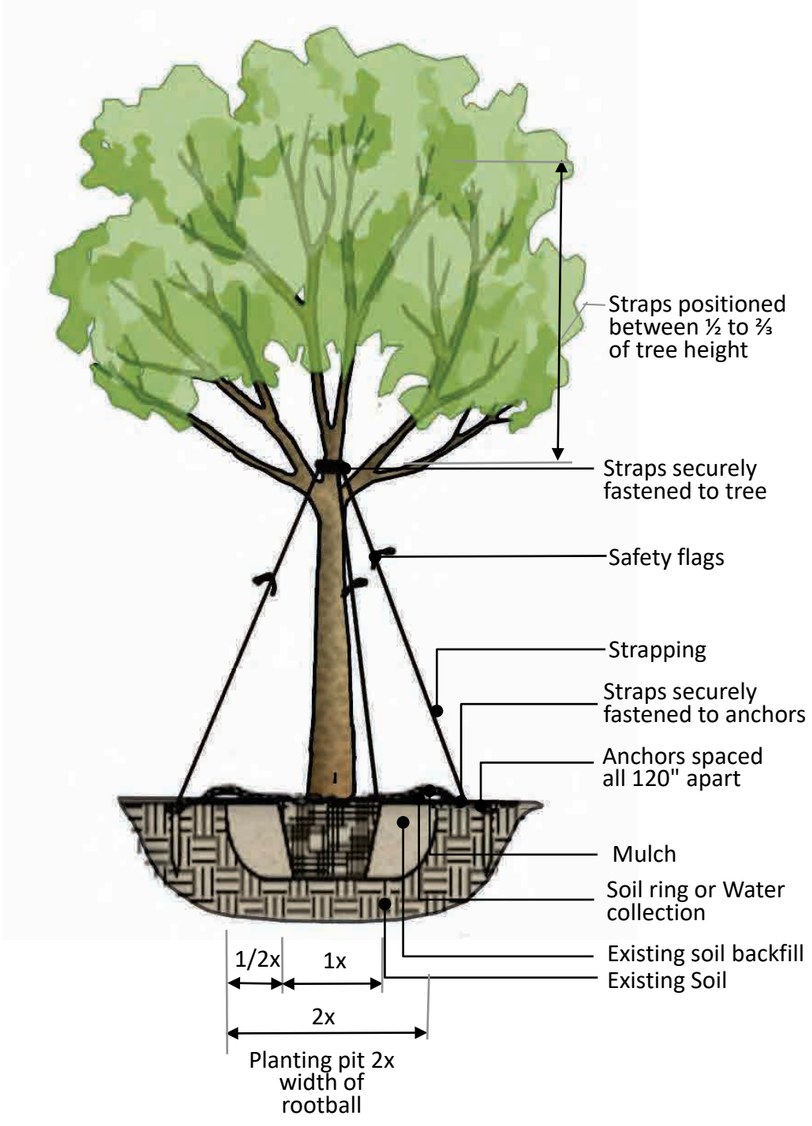
Tree Replacement

Existing trees that must be removed for construction from the Flightline or Support Districts must be replaced in kind. However, the location of the replacement tree(s) may not always be the same as the location of the removed tree. Replace any trees that are to be removed in construction areas, so that the tree volume is equal to the existing replacement tree(s)/species. Measure trees to be removed at breast height to determine the caliper inches of the tree. Replace the removed trees using a 1-inch to 1-inch ratio. For example, if an 8-inch caliper tree is to be removed it must be replaced with 8 inches of tree caliper; either in one tree or more that equal the 8 inches being removed. Locations will be selected to maintain the overall mature canopy volume, to coincide with the overall landscape and building/facility needs, or to maintain the overall aesthetics of the base.

Tree Planting/Transplanting

Plant or transplant trees in a manner that ensures the overall health of the tree. The best time to plant or transplant trees is from September to the end of February. This gives the tree the best chance of survival. Not all instances occur where trees will be able to be planted or transplanted during this timeframe. In these instances, monitor any tree planted or transplanted on a regular basis and water daily until tree has established its root system. Trees that are staked when planted will have stakes checked in 6 months after installing to ensure cables are not cutting into tree bark. If cables are no longer needed for the tree, remove them. Where cables are still needed, loosen them so they do not cut into the tree bark and reevaluate the need for cables in 6 months.

Exhibit D-7. Trees Planted 4-inch Caliper and Larger



Transplanting trees will be done using a tree spade to prevent damaging the tree roots

D05.3.5 Tree & Shrub Fertilization

Follow current UF/IFAS guidelines for tree fertilization. Organic fertilizer is preferred but not required. All contractor employees who specify, handle, or apply fertilizer must have a valid FDACS LUFAC. Fertilization scheduling must not exceed the fertilizer label rate prescribed and must comply with state and local ordinances. Local fertilizer regulations may prohibit the use of nitrogen fertilizers during the summer months. Be aware of local ordinances to avoid fines or citations (https://ffl.ifas.ufl.edu/fertilizer).

Trees and shrubs are a valuable asset to any landscape and when properly selected, planted, and taken care of by watering, pruning and fertilizing they can be expected to last many years. Many native plants do no need the same amount of watering and fertilizing like some other non-native plants.

Fertilizer should not be mistaken as plant food. Plants produce food in the form of sugars through photosynthesis. Fertilizer provides minerals that are deficient and needed for photosynthesis and growth. Fertilizer must only be used when plants are showing signs of decline. An arborist should be consulted to make sure the plant in question is not in decline due to disease or pest, but is a lack of a proper mineral that needs adjustment in the soil. Fertilizer should only be applied in the right amount and the right time to avoid further damage to the plants.

The contractor will notify Grounds Maintenance of any tree or shrub that exhibits symptoms of a nutrient deficiency and will recommend measures for correction.

Treat specific nutrient deficiencies by applying the lacking nutrient in accordance with UF/IFAS recommendations until deficiencies are corrected. The fertilizer application rate and number of applications depends on the type of plant material. Apply the minimal amount of fertilizer needed and adjust fertilizer rates according to the health, maturity, and desired growth patterns.

Need For Fertilizing

The contractor must consider the following conditions before deciding to fertilize trees and shrubs:

Soil Test: Have a sample of the soil tested through the University of Florida Extension Service or other certified testing lab. Follow the recommendations for the testing lab for adding soil amendments. A soil test determines the acidity or alkalinity (pH) of the soil as well as the levels of nutrients that are present and what may be missing or need boosting.

Growth: Watch for plants that show signs of poor growth, yellow leaves, turning color early before fall, or dieback of twigs or ends of branches. These symptoms are not always signs of a plant's need for fertilizer; other conditions can cause these symptoms, as well. Consult with an arborist before taking any action.

Planting Age: Fertilize new trees when they planted to help to speed their growth. Use slow-release fertilizers as recommended.

Location: Trees located in lawns do not need fertilizing because they get the nutrients they need from the lawn when it is fertilized. Only fertilize trees and shrubs that are located in planting beds.

Commonly Applied Nutrients

The most commonly applied nutrients are nitrogen (N), phosphorus (P) and potassium (K.) Sometimes iron deficiency can be a problem. Only apply the nutrient that is deficient.

Type of Fertilizer to Use

Use a typical blend such as 16-4-8, 12-6-6, or 12-4-8, unless the soil test reveals that phosphorus and potassium are adequate and don't need to be applied. Some fertilizers called "weed-and-feed" contain herbicides that can damage groundcovers, vines, shrubs, and trees. Read the labels and follow the directions.

Amount of Fertilizer to Apply

Only apply fertilizer at the recommended rate as noted in the soil testing recommendations. Do not guess about the amount and frequency of fertilizer application. Shrubs and trees can receive up to 2 to 4 pounds of nitrogen per 1,000 square feet of root spread area per year. The root spread area occupies 1½ times the area of the crown spread (3.14 x radius^2). Do not exceed the amount of fertilizer recommended for a year. Fertilizer should be applied in regular intervals over the time period recommended by the soil analysis. Avoid misapplication, which can harm the tree or shrub as well as adjacent plantings or lawn—it can even contaminate a nearby water source. Be cautious around wetlands. Never fertilize within 100 feet of a wetland.

Fertilizer for trees is not food. Only fertilize when determined by professional that it is needed

Smaller areas like shrub beds can be fertilized using hand spreaders

Application Methods

Most plants root zones are located within the first 12 inches of soil. Apply fertilizer to entire root zone not just near the tree trunk. Many roots are located just beneath the mulch on the soil surface. Apply fertilizer to the surface of the soil or mulch. Irrigate immediately after applying fertilizer to wash any misdirected fertilizer from the leaves and to help nutrients dissolve and penetrate through the mulch and soil to the roots.

Direct Fertilization: The most effective method of directly fertilizing trees is broadcasting. Use a cyclone or drop-type spreader, scatter the recommended amount over the entire root zone area. Apply half of the recommended amount in one direction and then the other half in the other direction.

When to Apply

The optimal time to apply fertilizer coincides with active root growth and adequate soil moisture. Fertilize trees and shrubs in early spring. Avoid fertilizing trees and shrubs stressed by drought during the summer. If water is unavailable, do not fertilize at all because plants will not be able to absorb the nutrients.

D05.3.6 Maintaining Landscape Beds

Mulching

The proper technique and process of applying mulch to trees, shrubs, and beds on base adds beauty to the landscape, provides extra moisture during period of high heat, and protects plants during inclement weather. Applying a protective cover is one of the most beneficial processes that can be accomplished for the health of plants, especially trees and shrubs. However, all plant material, including flowers, can benefit from mulching.

Mulch materials can help keep plants healthy, maintain the correct amount of and reduce plant stress, especially for young plants. Applied at the proper thickness, mulch insulates soil, retains moisture, prevents weeds, averts soil compaction, reduces lawnmower damage to the plant, and improves the landscape aesthetic. In addition, it improves soil structure, oxygen levels, surface/ground temperature and moisture availability for the plants it surrounds. To prepare all on-base beds (including trees, shrubs, and flowers) for mulch application, install a trench-cut border on the outer-side perimeter of the bed. This style deep trench cut/edge will be a depth of approximately 4 inches. It will provide a trough or moat that will serve as a catch basin to keep debris (such as mulch, dirt, and leaves) from spreading sporadically on streets, drives, sidewalks, and surrounding landscape after heavy winds or rain. It also makes it easier to place the material back into the beds after inclement weather.

This outer side edge around trees and shrub/flower beds must be a clean, straight cut that follows the outline of the bed. The goal is to apply mulch to all necessary beds, shrubs, and trees on a yearly basis. The technique to accomplish this added plant protection is as follows:

- Remove any grass or weeds within the mulch area
- Place the mulch material (bark, chip, or pine needles) around the root zone of the shrub/tree
- Ensure the mulch does not touch the shrub's trunk
- Layer the mulch material up to 3 inches in depth and slope toward the trunk to leave crown of tree exposed
- Water to maintain adequate moisture

Maintain mulch at a depth of at least 3 inches after settling. When additional mulch is necessary, the contractor must present a separate bid for Tyndall AFB approval.

USE mulches made from sustainable materials:

1. Hardwood mulch
2. Pine needles
3. Pine bark

DO NOT USE mulches made from inert materials:

1. Grade B cypress mulches made from whole-tree wood
2. wood containing remains of wood pallets
3. Gravel of any type.
4. Volcanic Rock

Apply mulch to bedded areas and around trees and palms, leaving a 2-inch space between the trunks of plants and the mulch. Mulch within at least a 12- to 18-inch radius from the trunk for any size of tree. Avoid creating volcano mounds around tree; remove old mulch build up before applying new mulch.

Apply new mulch in a level profile consistent with pre-existing grades so the final uniform mulch depth comprised of both existing and new layers is a minimum of 2 inches but does not exceed 3 inches. Do not apply new mulch material against trunks or plant stems but tapers down to the soil at those locations. In all locations where the existing mulch bed is in contact with a paved surface (such as sidewalks, roadway edges, or curbing and driveways), lightly trench the bed line between the mulch and the hard surface to better contain the existing and applied mulch.

Rake or sweep mulch off paved areas and turfgrass into beds as the mulch application progresses. Rake smooth any mounded areas so depth does not exceed 3 inches.

If mulch is installed improperly, the contractor will correct any problems at no additional charge to Grounds Maintenance.

Weeding

Weed shrub and groundcover beds weekly to remove all unwanted weeds according to the Maintenance Schedule. Pull weeds by hand and dispose.

Leaf Removal

Remove all leaves according to the Maintenance Schedule. Remove leaves from all lawn areas and shrub beds within the Manicured Zone. Leaves will be raked and collected to be disposed of at compost area on the base.

Tree Staking/Guying

Stake all trees subject to a windy conditions at time of planting. Remove all staking after the first growing season. For staking details, see Planting Details.

Spread mulch by hand to a 3-inch depth.

D05.3.7 Temporary Irrigation

Temporarily irrigate all lawns, shrub beds, groundcovers, and trees within the Manicured Zone. The water can be part of an overall rain water harvesting system designed to supply the water required to run the system and be supplemented by base water at times when water reserves are low.

This temporary system must be capable of keeping all lawns and plants alive for a period of one year until they are established. Do not cut off irrigation in the middle of a hot or dry period.

Set the controller to provide only as much water as the plants need. Different plants have different water needs. In Florida, this is generally equivalent no more than 3/4 to 1 inch total precipitation per week.

Make sure the run times do not exceed the soil infiltration rate. If available, use cycle and soak to apply water deeply and not cause runoff.

Change the controller settings with the seasons so plants are watered at the correct frequency for the time of year. Plants tend to need less water during cooler weather, when their growth has slowed, and water evaporates more slowly. Turn off the controller during the rainy season.

If possible, set the controller to run any overhead sprinklers in the early morning or overnight.

- **Water Slowly:** Never apply water faster than the infiltration rate of the soil. Slow and even irrigation allows for proper soil moisture to be maintained in the root zone, providing for the best growing conditions for plant material while eliminating or minimizing runoff and potential erosion.
- **Water Deeply:** Irrigate each plant variety long enough for water to reach the full depth of the root zone.
- **Water Infrequently:** Deep watering promotes deeper roots, further reducing irrigation requirements.

Example of temporary irrigation

Gray Water System

Tyndall AFB has an existing gray water system used to supply non-potable water for various uses. Landscape contractors should be familiar with the workings of the system before working on it.

Maintenance

To keep a gray water system working properly, all treatment and reuse systems require some level of operation and maintenance. Grounds Maintenance will provide specific guidelines for maintaining their system. Some general guidelines follow:

- Clean the effluent screen at least annually
  - Remove the screen and spray residuals off into a large bucket
  - Once the effluent screen has been replaced into the settling tank outlet, slowly pour wash water back into the settling tank
- Remove accumulated solids from the settling tank
  - Contact a wastewater pumper to pump out the solids
  - Remove solids when they occupy about 25% of the tank's depth or about every 3 to 5 years
- The gray water system may not be needed during the entire year; during seasons it is not used, set the diversion valve to direct flow to the onsite wastewater treatment system or to the municipal sewer
- If a laundry/gray water surface-discharging system is used, periodically move the drag hose to prevent gray water from ponding in the landscape
- If a pressurized system is used, periodically replace the pump as it fails
- The particular technology used to distribute gray water will have specific operation and maintenance requirements; coordinate with Grounds Maintenance
- Waste characterization should be conducted for solids removed from gray water systems

Gray water must be stored in tanks that meet the structural standards of the 2004 American Water Works Association (AWWA) standards (Look for the AWWA stamp) and have the following attributes:

- Are labeled clearly as non-potable
- Have restricted access
- Eliminate habitat for vectors
- Can be cleaned

Gray water systems for irrigation use purple pipe to identify them as using non-potable water; the heads, valves, and valve boxes will use the same purple color for identification

The gray water system must use piping that identifies the water as non-potable; such piping may be purple pipe, pipe painted purple, or pipe taped with purple metallic tape.

Do not apply gray water at a rate that may result in ponding, pooling, or runoff across property lines or onto paved surfaces.

Do not use gray water in a manner that creates a nuisance or damages the quality of surface water or groundwater.

D05.4 Planting Soil

Use modified planting soil for tree and shrub bed plantings only in the Manicured Zone.

Soils that meet this soil specification are combinations of native loam, clay loam, or sandy loam soils, mixed with ASTM C-33 concrete sand and Seal of Testing Assurance (STA) certified compost. As a guideline, a general mix ratio that often meets this specification would be a “by volume” mixture of 50% sand, 25% soil, and 25% compost. These ratios can vary depending upon the ingredients being used. The final mix will conform to the specified sand, silt clay, organic matter, infiltration rates, and other parameters. Acceptable Organic Soil Amendments are to be used in existing soils if needed to achieve soil criteria as set within these requirements. Composted organic matter will be STA certified and have the following criteria:

- Percentage of organic matter by weight: 5 to 8%
- Soil reaction: pH of 6 to 7.5
- CEC of total soil: Minimum 10 meq/100 mL at pH of 7.0
- Nutrients:
  - Nitrogen: 10-20 mg/kg nitrate-nitrogen (medium fertility levels)
  - Phosphorus: 20-40 mg/kg using Mehlich III test
- Soil infiltration rate: 2-6 inches per hour per ASTM F1815
- Material will be thoroughly, mechanically mixed to create a uniform, homogeneous soil

Modified planting soil will be used for tree and shrub bed plantings only in the Manicured Zone

Exhibit D-8. Planting Soil Composition

Compost Quality Characteristic	Test Method*	Value
pH	TMECC 04.11-A	6.5–8.5
Soluble salts (dS/m)	TMECC 04.10-A	0-10
Moisture content (% wet weight)	TMECC 03.09-A	40-60
Organic matter content (% dry weight)	TMECC 05.07-A	35-60
Maturity (seed emergence) (% relative to positive control)	TMECC 05.05-A	80 or above
Maturity (seedling vigor) (% relative to positive control)	TMECC 05.05-A	80 or above
Stability (mg CO_2-C/g OM per day)	TMECC 05.08-B	5 or below
Pathogen Salmonella (most probable number per 4 grams dry weight basis)	TMECC 05.08-B	< 3
Pathogen Fecal coliform (most probable number per gram dry weight basis)	TMECC 07.01-B	<1,000
Physical contaminants (% dry weight) Plastic, glass, and metal	TMECC 02.02-C	Combined total: <0.5
Physical contaminants (% dry weight) sharps	TMECC 02.02-C	None detected

*TMECC refers to Test Methods for the Examination of Composting and Compost, published by the U.S. Department of Agriculture and the U.S. Compost Council (USCC).

Particle size for compost must comply with the requirements shown in the following table.

Particle size distribution according to ASTM D6913 (Standard Test Method for Particle-Size Analysis of Soils):

- Coarse Sand (2.0 to 4.75 mm) 15% maximum (percent by dry weight).
- Medium Sand (0.425 to 2.0 mm) 60 - 85% (percent by dry weight).
- Fine Sand (0.075 to 0.425 mm) 10-20% (percent by dry weight).
- Silt/Clay (less than 0.075 mm) 10% maximum (percent by dry weight).

Acceptable Organic Soil Amendments are to be used in existing soils, if needed to achieve soil criteria as set within these requirements. Composted organic matter will be STA certified and have the following criteria:

Exhibit D-9. Composted Organic Matter

Quality Characteristic	Test Method*	Percent Passing	
		Min.	Max.
Fine Compost (dry Weight)	TMECC 02.02-B		
2-inch Sieve		98	
3/8-inch Sieve		95	

D06. Maintenance of Specific Areas

D06.1 Streetscape Corridors

If a trail or sidewalk is adjacent to a Maintained or Managed Zone, maintain a minimum 5-foot-wide area of turf on both sides of trail or sidewalk by mowing and edging the turf along the pathway. If the path is located in the Manicured Zone, then mow and edge all turf.

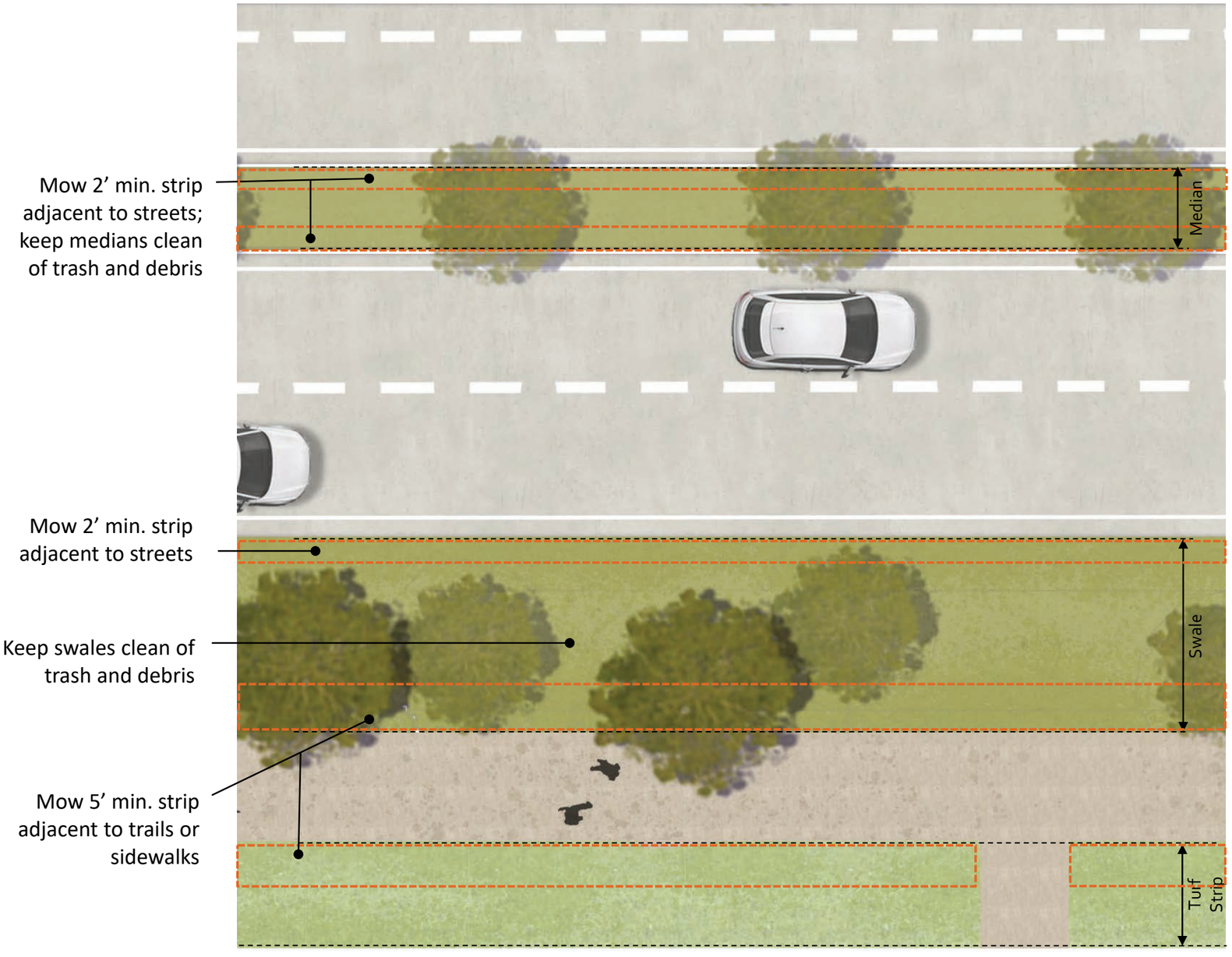
Keep all swales next to roadways clean of trash and debris and receive other periodic maintenance as outlined in this document. Mow the edge of the vegetation along the roadway edge in a 2-foot-wide strip.

D06.2 Medians

Mall turf in medians between roads unless told otherwise. If instructed not to mow, then at a minimum mow a 2-foot-wide strip next to each curb edge and edge between the lawn and the curb. If the area is planted in groundcover, then leave as is and trim any overhanging groundcover on top of curb.

Mow medians between curbs and sidewalks if they are less than 10 feet; otherwise mow a 2-foot strip along walks and curbs

Exhibit D-10. Maintenance of Streetscape Corridors and Medians



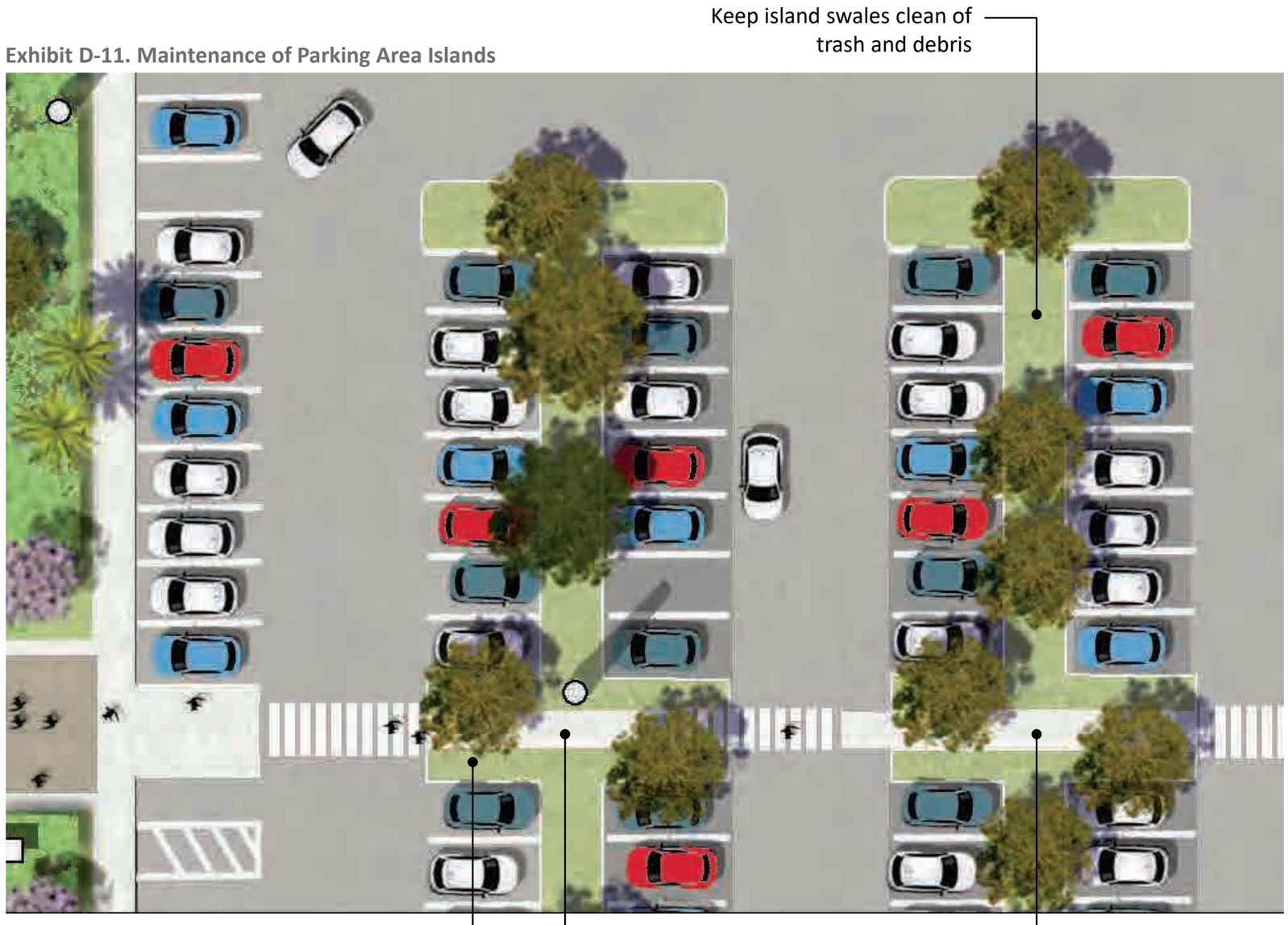
D06.3 Parking Area Islands

If a trail or sidewalk is located in the parking area island and the island is planted with native grass, then maintain a 2-foot-wide minimum area of turf on the side facing vegetation or both sides facing vegetation by mowing and edging the turf along the pathway. If the island is planted with native grasses or shrubs, then keep a 2-foot-wide zone along curb edges mowed to a 6-inch height to accommodate car bumper overhangs.

Keep all swales located in islands clean of trash and debris and perform other periodic maintenance as outlined in this document. Keep trees limbed up a minimum of 7 feet from the ground plane.

Keep native plantings in islands free from trash and weeds

Exhibit D-11. Maintenance of Parking Area Islands

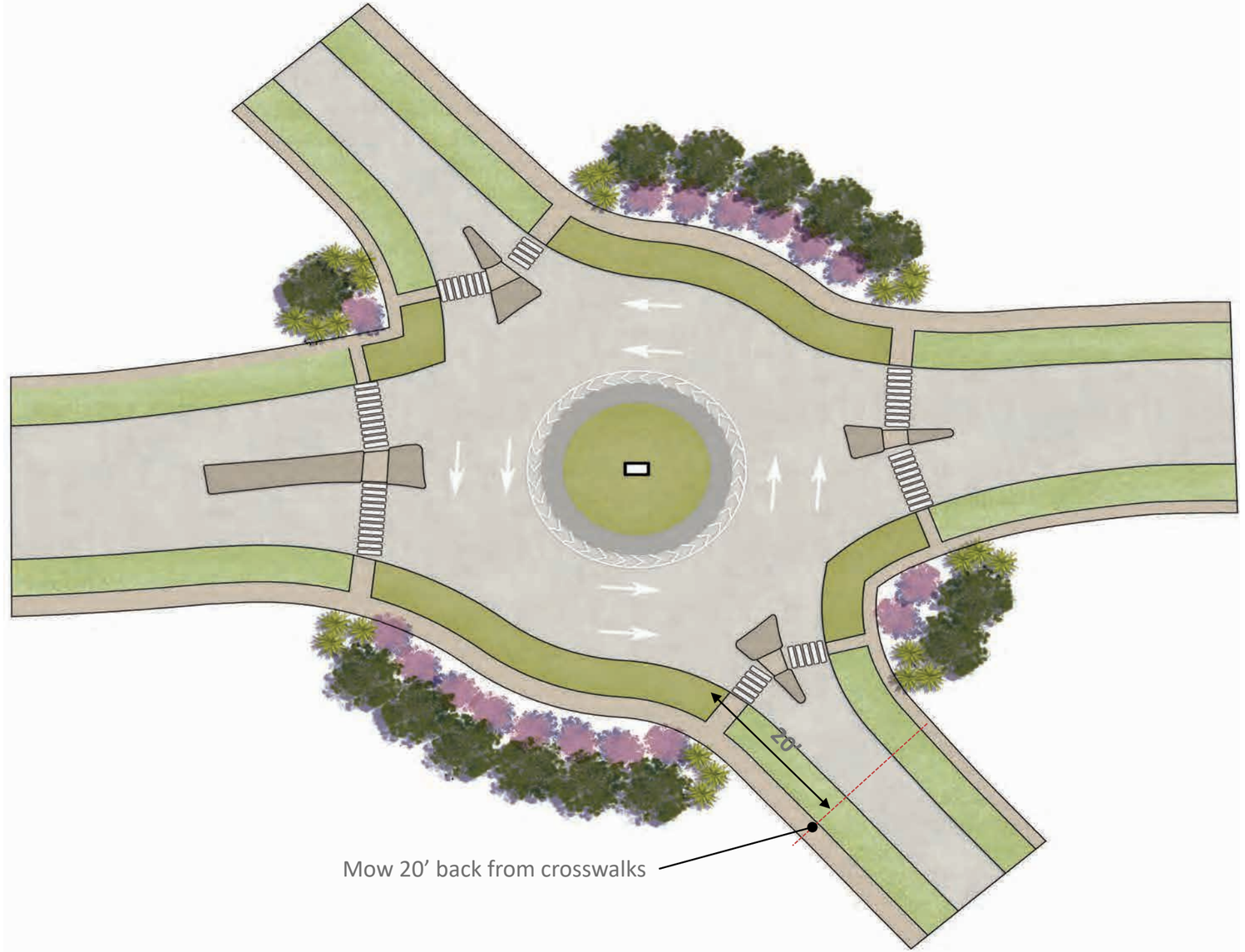


Do6.4 Roundabouts

Mow all turf in the center circle of roundabouts unless they are planted with shrubs or ornamental grasses. If that is the case, keep them trimmed back so they do not stick out over curb edge.

Mow all turf between trails or sidewalks and the faces of street curbs. Start mowing at 20 feet back from crosswalks.

Exhibit D-12. Maintenance of Roundabouts



Do6.5 Other Areas

D06.5.1 Playgrounds

The landscape contractor is responsible for inspecting playgrounds weekly for any malfunction of equipment or failures of equipment that would pose a danger to a child. Report any needed repairs to Grounds Maintenance. If the item poses a danger, then use yellow warning tape to tape off the piece of equipment in question. General maintenance will include removing any trash or storm debris, emptying trash receptacle, mowing any grass, and edging all edges.

D06.5.2 Boardwalks

Visually inspect the boardwalks located in the Coastal Zone for any damage to the boardwalk or railings and report all damage to Grounds Maintenance for repair.

D06.5.3 Trails/Trailheads

The landscape contractor is responsible for performing weekly inspections of the trails and trailheads. Remove any trash or storm debris along the route, empty trash receptacles, mow grass 2 feet wide on both sides of trails, and edge all edges. Blow paths clean.

D06.5.4 Vegetative Waste Disposal

Federal sustainable landscaping guidelines say, “The site maintenance plan will incorporate composting and/or recycling 100% of vegetation trimmings and appropriate compostable organics on-site, where feasible.” The SITES™ v2 Rating System offers a credit for recycling organic matter on site or within 50 miles, with the intention to, “support nutrient cycling, improve soil health, and reduce transportation costs and materials going to landfills.” Include a the strategy for dealing with organic waste sustainably. One exception to organic matter recycling is diseased or toxic plants, which, depending on the disease, must be bagged separately as trash; if they are regulated, like emerald ash borer, take diseased plants to the appropriate facility. Giant hogweed disposal may also be regulated by your state or jurisdiction. Never compost poison ivy, which poses a health risk to humans. Some toxic plant materials may need to be treated as hazardous waste. Always check for guidance from local public officials.

Composting or recycling vegetative waste should be quantified and reported to the base recycling program for diversion reporting.

Keep areas in Manicured, Maintained and Airfield Zones clean of trash and debris

Sanitize playground equipment with anti-bacterial spray

Sanitize playground equipment with anti-bacterial spray

Use pavement sweepers sized for area – smaller sweepers for paths and trails

D07. Hardscape Maintenance Activities

D07.1 Porous Pavement

D07.1.1 Porous Pavement Vacuuming

Porous pavement vacuuming is done in order to remove sediment that may lead to a clogging of the porous surface, preventing water from infiltrating through the pavement into the stone reservoir. Porous pavement vacuuming applies to several types of porous pavements described below.

Porous Pavers: An alternative to traditional hardscape paving that allows water to infiltrate between the pavers and through permeable layers below ground. When vacuuming porous pavers, adjust the setting to a lower power in order to prevent complete removal of aggregate between voids (unless more intensive vacuuming is required to alleviate clogged areas).

Porous Concrete: A type of concrete that has a high porosity due to an increased void space to facilitate water infiltration through the porous concrete into a stone reservoir and then into the ground.

Porous Asphalt: A type of asphalt that has a high porosity due to an increased void space to facilitate water infiltration through the porous asphalt into a stone reservoir and then into the ground.

Frequency: Annually - Vacuum porous concrete, porous asphalt, and for porous pavers each spring.

Porous Pavement Vacuuming Maintenance Procedure

1. **Safety set-up:** Set up safety perimeter. Ensure no vehicles are parked in the vicinity of the location and that area is closed to the public. Public notice announcing area closing needs to be posted per base standards of notification.
2. **Inspect:** Visually inspect porous pavement for damage, including holes, cracks, excessive scuffing, settlement, and areas of standing water. Inspect status of aggregate between voids in porous pavers before and after vacuuming to see if additional replacement aggregate is needed. Record observations/damage in the Maintenance Report Log, include photos if possible, and report as necessary.
3. **Prepare site for vacuuming:** Remove (by hand) bulky debris and waste materials from surface of porous pavement that may be too large to be picked up and/or block/clog the vacuum hose (litter, tree branches, wire, car parts) prior to using vacuum. Use a rigid street broom to loosen debris as needed. Pay attention to pavement edges and heavily loaded areas.
4. **Vacuum:** Vacuum porous pavement per the vacuum manufacturer recommendations. If vacuuming porous pavers, set the vacuum at a lower power in order to prevent complete removal of aggregate between voids (unless more intensive vacuuming is required to alleviate clogged areas). Adjust the vacuum machine speed so the vacuum draws out the first inch or so of stone and dirt in the openings between porous pavers, because this is where most unwanted sediment/debris typically collects. Follow all steps in the Manufacturer's Operation Checklist for the specified vacuum. Engage the Water Feature/ Water Dust Control Option of the vacuum (or equivalent on specific vacuum model). Drive the vacuum over the porous pavement, operating at a slow speed setting not greater than 5 miles per hour. Overlap the edges of the vacuum runs and make two passes over the entire porous pavement area. Frequently check and empty the filter bag (located above the debris bag) when vacuuming areas with excessive sediment.
5. **Post-vacuuming inspection:** After two passes, visually inspect porous pavement to ensure adequate debris removal. Any areas with visible debris/ sediment still present must be vacuumed again until debris is removed. If the surface of the porous pavement becomes clogged with fine dirt or sand, follow maintenance tasks outlined in **Section D07.1.2, Porous Pavement Power Washing**. Record observations in the Maintenance Report Log.
6. **Review checklist:** Follow all steps in the post-operation checklist for the specified vacuum.
7. **Measure debris removal prior to disposal:** Remove material/debris from vacuum bag and hopper and put into a labeled trash bag. Label bag with date and project location and note the weight on the Maintenance Report Log.
8. **Clean up:** Clean work area and vacuum equipment (per Manufacturer's Operation Manual).

Vacuum trucks specifically made to clean porous pavements

D07.1.2 Porous Pavement Power Washing

Porous pavement power washing applies to several types of porous pavements described below. Power wash if porous pavement surfaces become clogged with fine dirt or sand. Power washing the pavement surface allows partial restoration of the original void space and, therefore, permeability and must immediately follow the porous pavement vacuum task (once every three years or more often as necessary). Never power wash of porous pavers because it may damage the pavers and/or remove aggregate between pavers.

Porous Concrete: A type of concrete that has a high porosity due to an increased void space to facilitate water infiltration through the porous concrete into a stone reservoir and then into the ground.

Porous Asphalt: A type of asphalt that has a high porosity due to an increased void space to facilitate water infiltration through the porous asphalt into a stone reservoir and then into the ground.

Frequency: Once every three years (perform immediately after thorough vacuuming) or more frequently if necessary. Spring is the recommended time.

Wear OSHA-required clothing and equipment to power wash pavement surfaces

Porous Pavement Power Washing Maintenance Procedure

1. **Safety set-up:** Set up safety perimeter. Ensure no vehicles are parked in the vicinity of the location and that area is closed to the public. Public notice announcing area closing needs to be posted per City/County standards of notification.
2. **Inspect:** Visually inspect porous pavement for damage, including holes, cracks, settlement, excessive scuffing/raveling and areas of standing water. Record observations/damage in the Maintenance Report Log, include photos, if possible, and report as necessary.
3. **Prepare site for power washing:** Remove (by hand) bulky debris and waste materials from surface of porous pavement that may block or impede power washer access to the surface (litter, tree branches, wire, car parts). Use a rigid street broom to loosen debris as needed. Pay particular attention to pavement edges and heavily loaded areas.
4. **Power wash:** Follow manufacturer's recommendations for use of the power washer unit with the clarifications noted below. Ensure the water inlet valve and pump are both on. Set the pressure levels to be no greater than 500 pounds per square inch. Perform two passes over surface of pavement, with wand spraying at a 45-degree angle. Do not keep water flow on one location for longer than 5 seconds.
5. **Vacuuming:** Power washing may need to be followed immediately by vacuuming. Refer to Porous Pavement Vacuuming for detailed instructions. If sediment is exposed (brought to the surface) during power washing, this sediment must be immediately removed through vacuuming instead of allowing the sediment to migrate and re-enter the porous pavement.
6. **Post-power washing inspection:** Visually inspect porous pavement to ensure adequate sediment/debris removal. Any areas with visible debris/sediment still present must be washed again until debris is removed. Note if water remains ponded in any areas of the porous pavement. Record observations in the Maintenance Report Log.
7. **Safety completion:** Remove safety perimeter and re-open lot for parking/public access.

D07.1.3 Porous Paver Aggregate Maintenance (Restoring Aggregate)

Safety set-up: Set up safety perimeter. Porous pavers are an alternative to traditional hardscape paving which allows water to infiltrate between the pavers and through the permeable layers below them. Pavers are laid out on the surface and clean-washed aggregate material (also called screening or gravel) are placed in the spaces (voids) between paver units to provide stability and surface drainage while keeping unwanted debris out of the system. Refill the voids between pavers with additional aggregate material to replace any material that has been lost by vacuuming and/or due to natural migration, settlement and erosion.

Frequency: As needed and when gravel infill is not within 1/2 inch of the paver surface. Immediately after vacuuming.

Porous Paver Aggregate Maintenance Procedure

1. **Safety set-up:** Ensure no vehicles are parked in the vicinity of the location and that area is closed to the public. Public notice announcing area closing needs to be posted per City/County standards of notification.
2. **Inspect:** Visually inspect porous pavers for damage, including broken pavers, cracks, settlement, and any areas of standing water or evidence of standing water. Inspect status of aggregate infill material in the voids between porous pavers to see if additional replacement aggregate is needed. Evaluate if voids (joints) between porous pavers are clogged or not. Inspect to see if pavers themselves are missing from any areas and note need for replacement pavers. Record observations/ damage in the Maintenance Report Log, include photos if possible, and report as necessary.
3. **Prepare site:** Remove (by hand) bulky debris and waste materials from surface of pavers.
4. **Cleaning Clogged Voids:** If voids (joints) between porous pavers are still clogged even after area has been vacuumed (Porous Pavement Vacuuming), use a manhole pick to tool out joint until clean aggregate is found. Follow aggregate replacement instructions below.
5. **Add aggregate:** Using a shovel, spread aggregate over the surface of the pavers. Using a broom, sweep aggregate into the voids between porous paves, taking care to fill in any obvious holes. Once the aggregate has been added to the pavers, and the voids have been filled, perform a final sweeping pass with the hand broom to remove any excess gravel from the paver surface.
6. **Clean up:** Clean-up work area.
7. **Safety completion:** Remove safety perimeter and re-open area for parking/public access.

Clean joints between porous pavers and replace aggregate as necessary

D07.2 Pressure Washing Concrete or Other Solid Pavers

Perform visual survey of hardscape pedestrian surfaces for spills and stains. Identify necessary cleaning method and perform work as needed. Schedule deep cleanings in designated locations based on volume of foot traffic, gum removal on plazas, walkways, and patios.

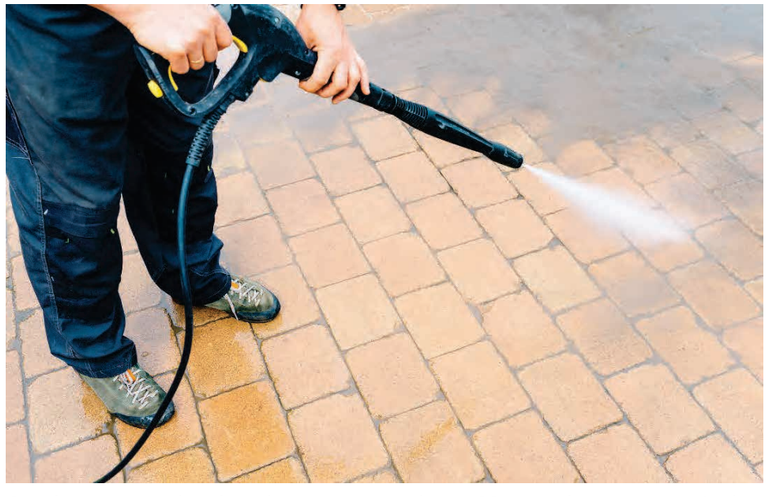
Frequency: Quarterly – react swiftly to clean up spills and stains throughout property. Clean highly used areas such as building entrances every 6–8 weeks.

D07.3 Asphalt & Concrete Pavement Maintenance & Repair

UFC 3-270-01, *O&M Manual: Asphalt and Concrete Pavement Maintenance and Repair*, provides information on materials, equipment, and procedures for repairing and maintaining hot mix asphalt and portland cement concrete (PCC) pavements. Typical maintenance and repair (M&R) methods, and problems that might be encountered in using these methods, are discussed. Guidance is provided for using each of these M&R methods.

This UFC is intended for use as a field UFC for airfield and roadway pavement repair for all U.S. Navy, Army, and Air Force pavements. The described techniques are applicable for airfields, roads, parking lots, and other pavement uses. Probable causes of pavement problems are discussed, and suggested M&R measures described in order to correct pavement surface problems at the source.

Not covered in UFC 3-270-01 are maintenance and repairs of surface water drainage systems, pavement markings, ground lighting, and unpaved margins.



Set the pressure levels to be no greater than 500 pounds per square inch; perform two passes over surface of pavement, with wand spraying at a 45-degree angle

D07.4 Security Fences & Gates

UFC 4-022-03, *Security Fences and Gates*, provides information for a unified approach for the design, selection, and installation of security fences and gates for Department of Defense (DoD). This document applies to all construction, renovation, and repair projects including expeditionary or temporary construction that include security fencing and gates for DoD. Consult with current Service policies, location of facility, and threat level for specific requirements.

Maintenance Procedure: As noted in UFC 4-022-03, also reference UFC 3-190-06, *Protective Coatings and Paints*.

D07.5 Site Furnishings

Perform visual survey of site furnishings for spills and stains. Includes elements such as benches, picnic tables, seat walls, bollards, signage, and trash receptacles. Identify necessary cleaning method and perform work as needed. Schedule power-wash deep cleanings in designated locations based on volume of use.

D07.5.1 Light Pole Cleaning

In addition to routine lamp replacement in light poles the overall fixture requires cleaning and maintenance. This includes cleaning the luminaire and pole, painting nicks or chips in the finish coating, and clearing debris from the fixture.

D07.5.2 Building Façade Cleaning

The landscape contractor will hire an experienced and trained professional to power wash the outside of each building once per year to remove all dirt, grime and algae that has accumulated. All procedures must be according to State of Florida standards and in compliance with use of chemicals and safety equipment, and OHSA procedures as to working above one level. Use the proper pressure rating to avoid damaging the building exterior materials. Provide protection for any element within the spray zone surrounding the building.

Prior to starting work cover all plants to protect them during washing process. Pre-soak the surface with a low-pressure spray to loosen dirt before pressure washing. Pre-treat bad mildew spots by scrubbing with a solution of bleach and commercial mildewcide in water. Use hot water instead of cold water for pressure washing. Hot water cleans more effectively with less detergent. Always rinse detergent off the wall before it dries. Move the nozzle closer or further from the wall surface to adjust the cleaning force and water heat.
Spider webs are nearly impossible to remove with a power washer spray. Use a broom instead.

When using a pressure washer, wash the walls from the bottom up with a high-pressure spray of detergent solution. Flush the machine and rinse the walls with plain water from the top down. When washing, work in sections, moving the water stream from side to side. Spray the water at an angle to the wall surface, not straight up or straight on. In heavily soiled areas, use a water-powered scrub brush attachment, if available, for scouring such areas. If the area is within reach, scrub it by hand.

Use proper lift equipment to clean building face

Remove mold from building faces

D08. Stormwater Maintenance of Specific Areas

D08.1 Stormwater Structure

D08.1.1 Stormwater Structure Cleaning

Stormwater structures capture runoff, connect pipes, provide access, control the water level in stormwater management systems, and/or allow excess runoff to discharge or overflow in a controlled manner.

Stormwater structures may include the following:

- Catch basin
- Inlet
- Sediment trap
- Maintenance hole
- Overflow structure with or without removable weir
- Observation well
- Clean-out
- Domed riser

Frequency: Semiannually (spring and fall)

D08.1.2 Stormwater Structure Maintenance Procedure

1. **Safety set-up:** Set up safety perimeter.
2. **Inspect:** Visually inspect stormwater structure and adjacent area for any immediate damage or potential problems, including any upstream pollution sources or locations of existing or potential vegetation debris. Inspect stormwater structure for signs of accumulated sediment, leaf litter, and/or debris. Look for signs of settlement and/or washout around structures and attached pipes. Record all observations in the Maintenance Report Log and report as necessary. If possible, take photographs to document site conditions.

Inspect structures at least annually

3. **Prepare site for servicing:** Remove any debris that has accumulated on top of the structure. Remove structure lid (inlet grate, manhole cover, or observation well cover) and set aside. Visually inspect interior of the structure for defects and evidence of illegal dumping. If illegal dumping has occurred, notify the proper authorities as necessary. Record observations/ damage in the Maintenance Report Log, include photos if possible, and report as necessary.
   - » Examine structure for any unintended or excessive standing water. Inspect for signs of mosquito larvae. If sediment trap is in place and contains standing water, inspect the drainage orifices for signs of clogging. These orifices are usually 1-inch diameter and located at the base of the structure. Remove any and all material clogging these orifices.
   - » Observe if the structure has a filter insert and follow separate guidelines in Inlet Filters for maintenance and replacement of filter insert.
4. **Cleaning:** If using a vacuum truck, clean the interior of the structure and remove all debris or sediment contained in sump. Leave the weir in place. Properly train employees in use of the vacuum truck and follow all vacuum truck manufacturer recommended guidelines. If a removable weir is present and not sufficiently cleaned, use wrench/screwdriver or other tool to remove the bolts, lift it up and out of the structure, and set it to the side and repeat cleaning.
5. **Disposal:** Ensure that the removed waste/sediment is properly disposed of and securely contained as to not run back into the stormwater system. Follow guidelines for disposal of waste/sediment on the local, state, and federal levels.
6. **Record:** Make a note of any recorded observations in the Maintenance Report Log.
7. **Replace:** Replace the stormwater structure cover and confirm it is tightly secured.
8. **Safety completion:** Remove safety perimeter.

Inlet Filter Insert Cleaning

Manufactured filter inserts are designed to trap sediment, debris, trash, oil and grease. Filter inserts are located inside a catch basin or stormwater inlet. Clean filter inserts quarterly. Replace the filter insert pouch at least annually, or as necessary, during a cleaning task.

Frequency: Quarterly, unless established that a particular inlet requires less frequent cleaning.

Inlet Filter Insert Maintenance Procedure

1. **Safety set-up:** Set up a safety perimeter.
2. **Inspect:** Remove catch basin lid/grate with manhole pick and set safely aside. Visually inspect filter insert for evidence of defects and deterioration. Extensive damage to the filter (torn liner or mesh) requires immediate replacement. Record all observations in the Maintenance Report Log and report as necessary.
3. **Clean filter liner/mesh:** Use an industrial vacuum or vacuum truck hose to remove any collected materials from the liner. Follow vacuum manufacturer's directions for operation of the vacuum.
4. **Inspect filter hardware:** After removal of collected materials from the filter, remove the filter insert as per manufacturer's instructions. In many filters, this is done by unsnapping the tether from the D-ring. Set inlet filter insert to one side. Inspect the filter liner, gaskets, stainless steel frame, and mounting brackets, etc. for continued serviceability. Refer to the manufacturer's manual to assist in locating these items. Correct minor damage and/or defects found during inspection. Record all damage and corrective actions undertaken in the Maintenance Report Log.
5. **Insert filter:** After thoroughly inspecting the filter insert pouch for damage and continued serviceability, reattach the pouch tethers to the liner's D-ring (or equivalent part).
6. **Replace grate/lid:** Replace the catch basin grate/lid and make sure it is secure.
7. **Safety completion:** Remove safety perimeter.

Inlet Filter Insert Pouch Replacement

Manufactured filter inserts are designed to trap sediment, debris, trash, oil and grease. Filter inserts are in the interior of a catch basin or inlet. Replace the filter insert pouch least annually, or as necessary, in conjunction with cleaning task.

Frequency: Annual check, replace as needed.

Annually:

1. **Safety set-up:** Set up a safety perimeter.
2. **Remove lid/grate:** Remove catch basin lid/grate with maintenance hole pick and set safely aside.
3. **Remove and replace pouch:** Remove and replace filter insert pouch. Properly dispose of removed pouches and debris according to local, state and federal regulations. Record observations in the Maintenance Report Log, include photos if possible, and report as necessary.
4. **Replace lid/grate:** Replace the catch basin grate/lid and make sure it is secure.
5. **Safety completion:** Remove safety perimeter

D08.2 Swales/Rain Gardens/Open Channels

Bioswale failure rates within the first 5 years are very high due to insufficient maintenance. Since bioswale's function is an important component of every jurisdiction's watershed improvement plan, or Watershed Implementation Plan (WIP), more frequent and higher quality maintenance is sorely needed. Some common and easily controlled performance issues affecting vegetation are unwanted standing water in a BMP, water not reaching certain parts of the Best Management Practices (BMP), side slope sedimentation, inlet clogging, etc. Mandated periodic BMP inspection is required to be aware of the needed maintenance issues and respond as appropriate. The following charts have common failures or problems that can occur in bioswales or raingardens and provide suggested maintenance activities and tasks.

Exhibit D-13. Typical Maintenance Activities for Vegetated Filter Strips Bioswales, Open Channels, and Grass Channels

Frequency	Maintenance Tasks
As Needed	• Mow grass channels and dry swales during growing season to maintain grass heights between 4-6 inches. • Look for and stabilize any bare soil or sediment sources in contributing drainage area (CDA).
4 Times a Year	• Keep CDA, Inlets and facility surface areas clear of debris. • Keep CDA stabilized. Spot seed where needed. • Remove sediment and oil/grease from inlets, pretreatment devices, flow diversion and overflow structures. • Repair undercut and eroded areas at inflow and outflow structures.
Annually	• Add reinforcement planting to maintain 90% turf or vegetative cover. Re-seed any alt killed vegetation. • Remove accumulated sand or sediment deposits behind check dams. • Inspect upstream and downstream check dams for undercutting or erosion. Remove trash or blockages at weep holes. • Inspect channel bottom for erosion, braiding, excessive ponding or dead grass. • Inspect inflow points for clogging and remove any sediment. • Inspect side slopes and grass filter strips for evidence of any rill or gully erosion and repair as needed. • Inspect elevation of turf as related to the inflow surface to ensure turf doesn't block inlet.

Remove all slit and trash from swales and channels

Remove all trash and debris from channel

Exhibit D-14. Typical Maintenance Bioretention Practices

Frequency	Maintenance Tasks
Upon Establishment	• During the first 6 months after installation inspect at least twice after storm events greater than 1/2 inch of rainfall. Conduct needed repairs or stabilization. • Water as needed during plant establishment phase. • Remove and replace dead plants, checking warranty periods.
4 Times a Year	• Mow grass filter strips and bioretention with turf cover. • Check curb cuts and inlets for accumulate debris, trash, leaves that impede or prevent infiltration. • Weed by hand as needed. • Remove trash, debris, sediment. • Perform maintenance inspection.
2 Times During Growing Season	• Rake mulch
Annually	• Conduct a quality control inspection (independent of crew) • Cut back herbaceous vegetation only in early spring (Feb-March) • Remove sediment in pretreatment cells, inlets, and outlets.
As Needed	• Add plants to maintain vegetation density. • Remove dead, diseased, and/or invasive plants. • Stabilize the Contributing Drainage Area to prevent erosion.

Do8.3 Inlet Filter

D08.3.1 Maintenance Procedure

1. **Safety set-up:** Set up a safety perimeter
2. **Inspect:** Visually inspect the stone edge/stone gutter for any areas that are bare and/or need to be replenished or replaced. Inspect for signs of weed growth, dumping of debris, or plow damage. If possible, take photographs to document site conditions.
3. **Remove trash/debris:** Remove any large debris and trash that has accumulated in the stone edge/stone gutter
4. **Remove trash/debris:** Remove any large debris and trash that has accumulated in the stone edge/stone gutter area.
5. **Weed:** Remove any obvious weed growth that has established itself within the limits of the stone edge/stone gutter. The edge must be free of vegetative growth.
6. **Rake:** Gently rake stone edge/stone gutter to re-establish an even surface and even out any irregular depressions or high points (stones may have moved or shifted during the year).
7. **Replenish:** Add new stone only if shallow and/or bare areas exist after raking has been completed. Add only enough stone to bring it to a consistent and level grade.
8. **Record:** Make note of any unrecorded observations in the Maintenance Report Log.

Exhibit D-15. Typical Wet Pond Maintenance Activities

Frequency	Maintenance Tasks
During first year as needed	• Inspect at least twice after storm events greater than 1/2 inch of rainfall • Plant the aquatic benches with emergent species • Stabilize any bare or eroding areas in the CDA or pond bugger • Water during growing season as needed to establish plants
4 times a year (or after major storms)	• Remove debris and blockages • Repair undercut, eroded, and bare soil areas • Mow embankment
Twice a year	• Mow buffer and pond embankment
Annually	• Shoreline cleanup to remove trash, debris, and floating items • Complete maintenance inspection • Open riser to access and test valves • Repair broken mechanical components, if needed
Once during second year after construction	• Add pond buffer and aquatic bench reinforcement plantings as needed

Do8.4 Wetlands

The successful long-term function of constructed wetlands and wet ponds requires a combination of periodic inspections, routine maintenance, and corrective actions. This is beyond the inspector's ability and must be reported to Grounds Maintenance. Structural issues requiring further inspection and/or action by an engineer or specialized contractor may be encountered.

Permanent pools may be too low or too high. Vegetation may require managing. Excessive quantities of mosquitoes may be encountered requiring further action by a certified pesticide applicator. Always check local regulations before taking corrective measures involving chemicals. Detailed guidance may be found in the U.S. EPA Stormwater Wet Pond and Wetland Management Guidebook. Table 2.2 in this publication presents a useful list of both inspection maintenance items. Unlike many BMPs, constructed wetlands are designed to be wet most of the time. Constructed wetlands that are maintained regularly can remain healthy and functional for many years. Exhibit D-17 indicates the typical maintenance tasks for constructed wetlands.

Vacuum truck for cleaning porous pavement

Removing silt and debris from channel

Exhibit D-16. Typical Constructed Wetlands Maintenance Activities

Frequency	Maintenance Tasks
During first year as needed	• During first 6 months inspect site twice after storm events greater than 1/2 inch of rainfall. • Stabilize bare or eroding areas in the CDA around the wetland buffer with grass cover. • Water plants weekly or more often depending on weather conditions. • Replant dead or diseased plants.
Quarterly	• Mow embankments • Inspect low flow orifices and other pipes for clogging. • Check area for floating debris and undesirable plants and remove.
Twice a year	• Measure sediment accumulation in forebays and micro pools. • Remove sediment deposits as needed. • Monitor growth and survival of emergent wetland, tree and shrub species and note presence of invasive species • Inspect stormwater inlets for damage, eroding, and under cutting. • Inspect upstream and downstream banks for sloughing, erosion, or conditions undermining embankment integrity. • Inspect outfall channel for erosion and undercutting. • Inspect principal spillway and riser for evidence of spalling, joint failure or leakage. • Ensure maintenance access is free of woody vegetation and that manholes and locks can be opened and operated. • Inspect side slopes for evidence of sparse vegetation, erosion or slumping. • Remove large stands of reeds and seek outside professional help to remove invasive species. • Remove trash, debris, and floatables. • Ensure mechanical components are functional. • Inspect riser, barrel, and embankment for damage. • Inspect all pipes.

D09. Maintenance Management

D09.1 Equipment List

The equipment list must include equipment name, size, type, and quantity. The list will demonstrate the landscape contractor's ability to meet Grounds Maintenance's requirements.

Sustainable tools and equipment reduce environmental impact and cause no physical harm to landscape maintenance workers or site inhabitants. To accomplish this, select or phase in vehicles and equipment that:

- Reduce fossil fuel use by increasing fuel efficiency
- Use hybrid or electric power
- Are water-efficient, when applicable
- Rely more on hand tools than power tools
- Mulch grass clippings in place, rather than bag and remove them

Office of Federal Sustainability's *Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes* (May 2017), Section XII, Operations and Maintenance (items e, f, and g), contains a detailed list of energy efficient qualities to select for in tools and equipment. A more concise list may be found in the SITES™ v2, rating system checklist, Section 8.1 Operations + Maintenance, item 6.

D09.2 Maintaining Tools and Equipment

Establish routine periodic equipment monitoring and documentation that maintains the following:

- Keep tires properly inflated
- Lubricate moving parts
- Keep blades sharp
- Keep combustion engines tuned up
- Maintain combustion engine fluid levels

No landscape maintenance can be performed correctly without properly functioning equipment. All Tyndall AFB contractor-leased landscape and grounds equipment (the term "equipment" includes vehicles in this document) will be maintained in an efficient and safe operating condition while performing work on the base. All equipment, without exception, will have proper safety devices maintained at all times. If any equipment does not contain proper safety devices, that equipment will be removed from service, without delay, until the deficiency is corrected to the satisfaction of the Grounds Maintenance. The same is true for the unsafe operation of any equipment by personnel employed or contracted by Tyndall AFB when working on the base.

D09.3 Quality Control

Landscape contractors will submit an effective and complete Quality Control Plan that adequately addresses requirements needed to ensure quality service. The plan will include as a minimum:

- The roles and authorities of the Quality Control personnel
- Methods to be used to identify and prevent defects before non-conforming performance occur.
- Procedures used to identify, prevent, and ensure non-recurrence of non-conforming services to include root cause analysis processes used and how corrective action plans will be developed

D09.4 Extra Work

D09.4.1 Notification and Proposal Regarding Need for Extra Work

"Extra Work" means any work that is not set forth in the Contract. If Landscape contractor discovers that any Extra Work is necessary to maintain in a superior condition any landscape areas, irrigation systems, or drainage systems, then the contractor will notify Grounds Maintenance of the need for Extra Work as soon as is practically possible after the contractor's discovery. If Grounds Maintenance notifies the contractor that Extra Work is necessary, the contractor may submit to Grounds Maintenance an itemized, written cost proposal relating to the Extra Work. Grounds Maintenance retains the right to reject any cost proposal and to perform any Extra Work through Grounds Maintenance's forces or other contractors.

Perform routine equipment maintenance

D09.4.2 Approval Regarding Performance of Extra Work

Only if the total charge to Grounds Maintenance for Extra Work is less than $_____ during a month, the contractor will perform the Extra Work without first getting Grounds Maintenance's approval. If the total charge to Grounds Maintenance for Extra Work is more than $_____ during a month, the contractor will not perform the Extra Work unless Grounds Maintenance approves the Extra Work in advance and in writing.

D09.4.3 Time Frame for Beginning and Completing Extra Work

If Grounds Maintenance approves any Extra Work and unless the parties agree to a different deadline for the contractor's beginning the Extra Work, the contractor (1) will begin the work no later than _____ days after the date that the contractor receives the written approval from Grounds Maintenance and (2) complete the work in a reasonable amount of time.

D09.4.4 Coordination of Extra Work with Other Contractors

If Grounds Maintenance contracts for Extra Work to be done by someone other than the contractor, then the contractor will coordinate with the new contractor to ensure that the work is performed in a timely manner.

D09.5 Emergency Work

D09.5.1 Emergency Contact Information

The contractor will supply to Grounds Maintenance the name and appropriate contact information, including phone numbers, of any employee responsible for emergencies. Grounds Maintenance will provide the contractor with emergency numbers for Grounds Maintenance's personnel who are fluent in English.

D09.5.2 Notification Regarding Need for Emergency Work

If the contractor discovers that Extra Work is required at the Worksite due to an emergency (Emergency Work), then the contractor will notify Grounds Maintenance of the need for the Emergency Work as soon after the contractor's discovery as is practically possible.

D09.5.3 Performance of Emergency Work

If Grounds Maintenance notifies the contractor of the need for Emergency Work, the contractor will make reasonable efforts to perform the Emergency Work in a timely manner or will notify Grounds Maintenance as soon as possible of the contractor's inability to timely perform the Emergency Work.

D09.6 Program Management

The contractor will submit a Program Management Plan to describe the proposed management approach to the entire contract effort inclusive of a staffing plan and equipment plan. The contractor will also submit a yearly Maintenance Schedule (see sample at end of document) for approval by Grounds Maintenance.

D09.6.1 Function & Qualifications of Supervisor

The contractor will assign a supervisor to oversee any work performed at the Worksite and to act as contractor's liaison with Grounds Maintenance. The contractor will ensure the supervisor (a) inspects the Worksite daily (Monday through Friday) except on legal holidays and (b) provides direction to the contractor's employees and subcontractors. The contractor will ensure any supervisor (a) speaks, writes, reads, and understands English and (b) is capable of writing schedules and monthly reports and of noting any deficiencies that need correcting. The contractor will ensure that any supervisor has at least 3 years of landscape maintenance supervision experience.

D09.6.2 General Protection Efforts

The contractor will use reasonable efforts to protect the worksite from damage, including all existing plant materials, structures, facilities, utilities, and natural areas, both above and below ground. As soon as possible after the contractor discovers any damage to the worksite, the contractor will report the damage to Grounds Maintenance. If the contractor causes any damage to the worksite, the contractor will, at the contractor's expense, ensure that the damaged object or area is restored to the state that it was in before the contractor caused the damage.

D09.6.3 Air Force Common Output Level Standards Transition Management

Offerors must be prepared to transition between AF COLS Levels annually and will submit a transition management plan which outlines their strategy for transitioning between levels of service. This plan will include as a minimum a detailed description of the strategy for adjusting both staffing and equipment to adjust to an increased or decreased level with approximately 6 months' notice. For instance the U.S. Government could require the contractor to transition from AF COLS Level 4 in FY19 to AF COLS Level 1 in FY20, and back to AF COLS Level 4 in FY21, or any other levels at the U.S. Government's sole discretion. As a reminder, the U.S. Government anticipates notifying the contractor of the new AF COLS Level at least 6 months prior to a level of service change via contracting officer memorandum and will formally follow up with a task order at the new level.

D09.6.4 Contaminant Spills

The contractor will use best efforts to protect Grounds Maintenance's property from chemical, fuel, oil, or other contaminant spills. If a spill occurs, the contractor will notify Grounds Maintenance and seek direction. No spill will be touched or remedy attempted without proper safety equipment, clothing, masks, or other items as required by OSHA.

Chemicals

Herbicide use is regulated and will be done with care and by certified individuals. Two of the most common herbicides are glyphosate and triclopyr (sold under a variety of brand names). Application of chemicals on woody plants is done in various ways depending on the plant. Three methods are: (1) the basal bark method, (2) the cut stem method, and (3) the foliar spraying method. Herbicide and pesticide certifications and permits may be required depending on the situation.

Environmental Cleanup

The contractor will conduct any environmental cleanup needed as a result of any chemical or fuel spill that occurs in the course of business

Blowing & Washing of Materials

The contractor will not blow or otherwise place into any storm water drain or structure any soil, chemicals, litter, mulch, soil amendments, or other materials.

D09.6.5 Policing/Morning Cleanup

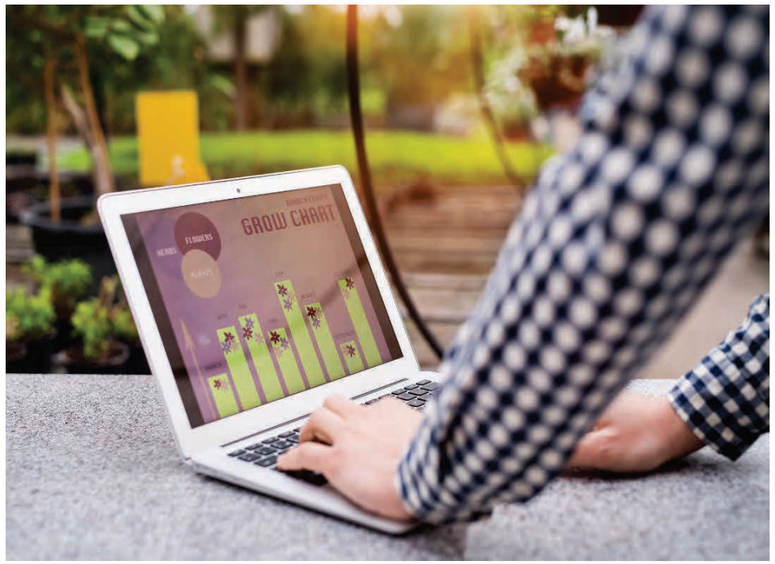
The contractor will scout grounds for trash and leaf debris around all walkways, courtyards, landscape beds, lawns, and parking lots If necessary, blow or sweep debris into a pile and remove from site.

Inspect all palm trees for seedpods and palm fronds in need of removal using a pole saw. Taking care not to damage understory plantings. Sweep up debris as needed. At this time scout for spider webs in the landscape beds and trees, on lampposts and buildings.

Scout all landscape beds, brick paver walkways, and parking lots for weeds and remove them by hand.

D09.6.6 Protection of Contractor's Property

The contractor understands that Tyndall AFB is not an insurer and that the contractor is responsible for securing, safeguarding, and protecting against damage and theft the contractor's and any of the contractor's employees' or subcontractors' material and operations. Some states have their own OSHA-approved plans, which may have different or more stringent requirements.



Perform routine quality site assessments

D09.6.7 Quality Site Assessment

Weekly, the contractor's Account Manager will communicate with the property representative on any landscape issues requiring immediate attention. Standard practice is for the contractor to perform monthly inspections of the property to ensure that performance of this agreement meets the standards required by the contractor's Scope of Work and protects the overall wellbeing of the property's landscape. These inspections are called the Quality Site Assessment (QSA). The standard QSA will include maintenance tasks to be completed with completion dates along with photo-documentation. There will be no carryover items from month to month. QSA inspections will include a representative of the property.

D09.6.8 Staffing Plan

The contractor will provide a staffing plan with proposed workforce composition (to include seasonal hiring) showing labor category, contractor manning equivalents (CMEs), and associated number of hours for each functional area to meet all Grounds Maintenance requirements for the base period and all option years. The contractor may provide a staffing matrix which includes labor category descriptions and, if applicable, include information on cross utilization of CMEs across functional areas. The staffing plan will also outline what steps the contractor will take to ensure qualified personnel with the required clearance/investigations are available to satisfy the contract security requirements by for the duration of the contract vehicle.

Safety Measures and Programs

The contractor will comply with all applicable federal and state laws, ordinances, rules, regulations, and orders of any public authority, including OSHA, related to the safety of persons and protection of property. The contractor will initiate, maintain, and supervise all safety precautions and programs in connection with the landscaping services.

General Safety Resources

Avoid toxic landscape products or materials whenever possible. Crew leaders will carry documentation on emergency contacts for all crewmembers, including themselves, in the event of a medical emergency, including any known drug allergies.

Worker Safety

Every landscape maintenance worker, whether a full-time or temporary worker, has the federally protected right to a safe work environment. OSHA is the agency that sets and enforces safety standards and has specific standards for landscape and horticultural services. The contractor will adhere to personal safety standards to include ear, hand, and foot protection, power tools, respiratory protection, and more. OSHA stipulates that training must be conducted in the language spoken by workers, which means Spanish for a large segment of the local workforce.

Safety Data Sheets

Safety Data Sheets (SDSs), which were called Material Safety Data Sheets (MSDSs) until 2015, are designed to provide workers and emergency personal with the proper procedures for handling or working with a particular substance. Any chemical used in the landscape industry will have an online searchable SDS. A brief by OSHA, Hazard Communication Standard: Safety Data Sheets, explains how to read an SDS. All chemicals used for landscaping are required to be tracked through the base Hazardous Materials Office.

Dig Safe - 811

The three-digit hotline, 811: Know what's below. Call before you dig, was created to provide a nationwide, easily accessible resource for contractors, home owners, farmers, and landscape maintenance crews. The 811 call center manages requests in all 50 states.

Uniforms and Vehicles

The contractor will ensure that the contractor's employees wear uniform shirts with the contractor's name or logo clearly visible, proper shoes, and equipment required by State Safety Regulations. The contractor will ensure that uniforms are maintained in a neat and presentable condition. The contractor will ensure that each of contractor's vehicles has a readable sign stating the contractor's (a) telephone number and (b) name or logo. The contractor will ensure that all the contractor's vehicles at the worksite are in a clean and presentable condition.

Function and Qualifications of Supervisor

The contractor will assign a supervisor to oversee any work performed at the worksite and to act as the contractor's liaison with Grounds Maintenance. The contractor will ensure that the supervisor (1) inspects the worksite daily (Monday through Friday) except on legal holidays, and (2) provides direction to the contractor's employees and subcontractors. The contractor will ensure that any supervisor (1) speaks, writes, reads, and understands English and (2) is capable of writing schedules and monthly reports and of noting any deficiencies that need correcting. The contractor will ensure that any supervisor has at least 3 years of landscape maintenance supervision experience.

Use of Subcontractors

The contractor may subcontract a portion of the work once approved by Grounds Maintenance and provided security access. The contractor will ensure any subcontractor's name and qualifications are submitted to Grounds Maintenance no later than 5 days before the date the subcontractor begins working at the worksite. The contractor will supervise any subcontractor and guarantee the subcontractor's work quality and safety pursuant the Contract.

All workers are required to wear OSHA approved protective gear and clothing

D09.7 Maintenance Program Schedule

This Maintenance Schedule is intended to assist both contractors and Tyndall AFB Maintenance Crew in meeting its standards and guidance for maintaining the base. This form lists all required activities to maintain the base's landscape and hardscape as outlined in this section. Each line corresponds to the various required tasks and is based on number of times per week the task would be performed per month in a typical calendar year. Because each year the number of weeks vary from month to month the times per month will change each calendar year.

Each contractor is expected to complete the following actions in addition to the guidance provided in **this Landscape Master Plan**:

1. Comply with all other regulations and policies defined by the UFC, IFS, AFICS, IDP, and other documents and procedures provided by Tyndall AFB staff
2. Coordinate all maintenance work with Tyndall AFB to ensure compliance with current and future planned improvements and to reduce re-work due to lack of coordination

Exhibit D-17. Tyndall AFB Monthly Maintenance Program Schedule

Softscape Service Description	Visits	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mow Turf Areas (Weekly)	42	2	3	4	4	4	4	4	4	4	4	3	2
Mow Native Planted Areas (Annually)	4	0	0	0	0	0	0	0	0	0	0	2	2
Mow Strip (5 ft sides of Trails, Walks; 2 ft Roads, Medians)	20	1	1	2	2	2	2	2	2	2	2	1	1
Edge Sidewalks, Curbs, Building mow strips	40	2	2	3	4	4	4	4	4	4	4	3	2
Back Pack Blow/Clean-up Vegetative Debris	40	2	2	3	4	4	4	4	4	4	4	3	2
Ballfield Maintenance	38	1	2	4	4	4	4	4	4	4	4	2	1
General Site Litter Control	48	4	4	4	4	4	4	4	4	4	4	4	4
Weekly Weed Control Shrub and Planting Beds	32	0	0	2	4	4	4	4	4	4	4	2	0
Shrub Pruning	8	0	0	1	1	1	1	1	1	1	1	0	0
Turf Fertilization	3	0	0	1	0	0	1	0	0	1	0	0	0
Pre-emergent Turf Weed Control	3	0	1	0	0	0	1	0	0	0	0	1	0
Tree & Shrub Fertilization	2	0	0	1	0	0	0	0	0	0	1	0	0
3 inch Mulch Application Shrub Beds, Tree Rings	2	0	1	0	0	0	0	0	1	0	0	0	0
Spot-Treat Fire Ant Control	4	0	0	1	0	1	0	1	0	1	0	0	0
Ground Cover Fertilization	1	0	0	1	0	0	0	0	0	0	0	0	0
Cut Back Ornamental Grasses	1	0	0	0	0	0	0	0	0	0	1	0	0
Cut Back Perennials	1	0	1	0	0	0	0	0	0	0	0	0	0
Seasonal Color Planting	3	0	1	0	0	0	1	0	0	0	1	0	0
Leaf Removal	6	1	1	1	0	0	0	0	0	0	0	2	1
Disease Control Lawns, Trees, Shrubs	3	0	0	1	0	0	1	0	0	1	0	0	0
Limb Up Tree Canopies to 7 ft.	2	0	0	0	1	0	0	0	0	0	1	0	0

Exhibit D-17. Tyndall AFB Monthly Maintenance Program Schedule (continued)

Softscape Service Description	Visits	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Plants Insect Control	7	0	0	0	1	1	1	1	1	1	1	0	0
Spray for Mosquitoes	4	0	0	1	0	1	0	1	0	1	0	0	0
Litter Pickup	15	2	1	1	1	1	1	1	1	1	1	2	2
Clean & Sweep Parking Lots	12	1	1	1	1	1	1	1	1	1	1	1	1
Weed Control for Aquatic Planting Zones	10	0	1	1	1	1	1	1	1	1	1	1	0
Maintain Security Fences/Firebreaks	24	2	2	2	2	2	2	2	2	2	2	2	2
Lawn Renovation (as requested)	0	0	0	0	0	0	0	0	0	0	0	0	0
Emergency Tree and Stump Removal (as requested)	0	0	0	0	0	0	0	0	0	0	0	0	0
Emergency Tree Pruning (as requested)	0	0	0	0	0	0	0	0	0	0	0	0	0
Emergency/Special Event Services (as requested)	0	0	0	0	0	0	0	0	0	0	0	0	0
Weekly Quality Control Inspections by Manager	44	2	2	3	4	5	4	4	5	4	5	4	2
Hardscape Service Description	**Visits**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Porous Pavement Vacuuming	1	0	0	0	1	0	0	0	0	0	0	0	0
Porous Pavement Power Washing	0.3	0	0	0	0.3	0	0	0	0	0	0	0	0
Porous Paver Maintenance (Restoring Aggregate)	0.3	0	0	0	0.3	0	0	0	0	0	0	0	0
Stormwater Structure Inspection and Cleaning	2	0	0	1	0	0	0	0	0	0	1	0	0
Inlet Filter Insert Cleaning or Filter Insert	4	0	1	0	0	1	0	0	1	0	0	1	0
Swale, Ditch, Channel, Dry Pond Cleaning	1	0	1	0	0	0	0	0	0	0	0	0	0
Site Furnishings Cleaning	4	1	0	0	1	0	0	1	0	0	1	0	0
Concrete Paver Pressure Washing	4	1	0	0	1	0	0	1	0	0	1	0	0
Security Fencing and Gates	0	As noted in UFC											
Asphalt and Concrete Pavement Maintenance and Repair	0	As noted in UFC											
Light Pole Cleaning	1	0	0	1	0	0	0	0	0	0	0	0	0
Power Wash Building Facades	1	0	0	0	1	0	0	0	0	0	0	0	0
Clean Signs	2	0	0	0	1	0	0	0	0	1	0	0	0
Total Visits	**515**												

Do9.8 Sample Maintenance Report Log

The contractor must submit weekly report logs to Grounds Maintenance Manager for all items in the Monthly Master Schedule completed each week. Below is a sample of what will be submitted.

Exhibit D-18. Sample Maintenance Report Log

Maintenance Task Name: Porous Pavers

Task Number: _____ Weather Conditions: _____

Location Name: _____ Location Address: _____

Task Code: _____ Task Description: _____

Task Start Date: _____ Personnel/Task Start Time: _____

Task End Date: _____ Personnel/Task End Time: _____

Labor Personnel Name: _____

Tools Used: Item No: _____

Broom ☐

Flat ☐

Shovel ☐

Rake ☐

Dust Pan ☐

Other: _____

Other: _____

Materials Used: Plastic Bag

Other: _____ Item No. _____ Qty: _____

Other: _____ Item No. _____ Qty: _____

VACUUMING *(Please submit photos if necessary)* Task Code: _____

Vacuum Type/Manufacturer _____

Hour Meter Start: _____ Hour Meter End: _____ Number of Passes: _____

Weight/Amount of Material Collected (# bags x pounds or gallons/bag): _____

Description of Collected Materials: _____

Description of Vacuumed Materials: _____

Notes: _____

REFILLING VOIDS WITH AGGERGATE *(Please submit photos if necessary)* Task Code: _____

Type/Specification of Aggregate Used: _____

Amount of Aggregate Used to Refill Voids: _____

Notes: _____

REFILLING EDGE MAINTENANCE *(Please submit photos if necessary)* Task Code: _____

Existing Conditions of Riverstone and Amount of Weed Growth: _____

Weeds Removed from Riverstone? (YES/NO): _____

Type/Specification of Riverstone Used to Replenish Riverstone: _____

Amount of Riverstone Used: _____

Notes: _____