

Sustainable Landscape Development Plan

For Cannon Air Force Base

2012



First impressions are important – and lasting.

Executive Summary

The image of an installation should be one of strength and quality. Its landscape can significantly influence the perceived quality as well as the overall morale and attitudes of people who live and work there. A positive image, achieved through visual compatibility and unity is the result of a comprehensive landscape development planning program that brings together the natural and man-made environments.

The goal of this document is to provide guidance to improve the overall aesthetics of Cannon AFB while decreasing maintenance requirements. The long-term result will be an attractive and cohesive installation landscape that unifies the installation into a sustainable facility with an identifiable eastern New Mexican character.

Properly implemented, the ***Sustainable Landscape Development Plan (SLDP)*** will serve the installation well for decades.

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Introduction

Cannon AFB is located just outside of the community of Clovis in the high plains of eastern New Mexico. At over 4000 feet elevation, the region is subject to winter cold, summer heat, minimal annual rainfall and seemingly ever present moisture-robbing winds. The area is composed of clays and sands over caliche. Natural vegetation is limited and where present is composed almost entirely of monocots such as buffalo grass, blue grama and yucca.

Accordingly, sustainable low-water, low-maintenance landscapes utilizing native or indigenous plant materials will be the backbone of the Sustainable Landscape Development Plan.

Background

In landscape architecture, the application of conservation-oriented ideals has led the profession in diverse directions. The most basic of these are using native, naturally-occurring plant materials in landscape design and highly-efficient water delivery systems in irrigation design. In addition, embracing the creation of sustainable landscapes and the preservation of native and endangered species foster a sense of pride and a deeper understanding of responsible landscape development. An associated phenomenon of this conservation movement was the coining of the term “xeriscape” by the City of Denver, Colorado Water Department. Xeriscape is derived from the Greek work, *xeros*, or dry. The Xeriscape philosophy embodies rudimentary landscape architectural principles regardless of the region or climate. This philosophy challenges the designer to create landscapes that convey a sense of regional context in plant selection and placement with the intent purpose of minimizing supplemental irrigation. This document provides basic guidance and direction to improve the understanding and implementation of the Xeriscape philosophy in landscape design at Cannon AFB.

Sustainable Landscape Development Planning (SLDP) Elements

Elements of the SLDP include:

- Landscape Development Policy Statement
- Landscape Development Concept Statement
- Approved Plant List
- Approved Inert Material List
- Irrigation Standards
- Landscape Development Zoning Plan
- Streetscape Corridor Plan
- Anti-terrorism/Force protection (ATFP) Landscape Guidelines
- Landscape Construction Project Specifications & Details
- Landscape Maintenance Guidelines
- *Cannon Green* Implementation Plan



It is paramount that funding is available to finish important projects.

Policy Statement

As a minimum requirement, projects on Cannon AFB shall conform to the following:

- All projects, roads, parking lots and site modifications shall include compliant ***Cannon Green*** landscape development considerations and budgets consistent with this document
- All landscape development projects or landscape development in other construction or repair projects shall be designed or reviewed by a professional landscape architect or pre-approved landscape designer
- A pre-approved portion of the project funding shall be specifically allocated for landscape development and shall only be used for that purpose
- All landscape development shall only use materials listed in the Cannon AFB Approved Plant List and Approved Inert Material List as provided in this document
- All landscape development shall be irrigated according to the Cannon AFB Approved Irrigation Standards as provided in this document
- All landscape development shall meet AT/FP landscape guidelines provided in this and other guidance documents

Conceptual Statement

Xeriscape is the conservation of water and energy through creative and adaptive landscape design. Xeriscape landscapes provide attractive solutions that save money, water, and maintenance. Since landscape development is a long-term concern, consistent implementation of a well-crafted concept plan is paramount in creating a specific identity across the installation. The Cannon Green SLDP will be based on Xeriscape principles delineated below.

Water budgeting

The concept of budgeting water use in the landscape is integral to Xeriscape design. Concentrating plants with similar water-use requirements or creating hydro-zones, simplifies and economizes irrigation system design and maintenance requirements.

There are three Xeriscape hydro-zones:

- Inner zone
- Intermediate zone
- Outer zone



*Native trees are a mainstay of quality
Xeriscape design.*

Inner zone

The inner zone of a Xeriscape planting is the area which will have high visibility and be significantly important to the facility in terms of appearance, image, and usage. Even though this zone has higher water demand than the other zones, it can still require less irrigation than a traditional landscape. Supplemental irrigation will most likely be required. The inner zone may be a modest entry feature at the Family Support Center, a backyard planting in Military Family Housing, or a special memorial area of a large, multi-use park. Regardless of the overall space being designed, the inner water budgeting zone should be kept proportionately small and functional in size. Water-loving plants can be used in this zone if they are placed where irrigation or other runoff can be collected or redirected. In low rainfall regions, this zone functions as a mini-oasis. The landscape design is generally characterized by increased plant densities and relative lushness.

Intermediate zone

The intermediate zone functions as the transitional area between the inner and outer zones. Plants in this zone may require more water than available from natural precipitation. They probably will require some supplemental irrigation in drier climates. Plant densities are reduced as compared to the inner zone. Overall, maintenance and water use should be minimal. By taking advantage of runoff from paved areas or roof drains, supplemental irrigation can be further reduced.

Outer zone

The outer zone is generally characterized by plants having the least water requirements and lowest intensity of human use. Once established, plants in the outer zone generally require very little to no irrigation or maintenance with the exception of weed control and occasional pruning. Plant materials should be chosen especially for their hardiness and extremely low water requirements.



There are a few examples of appropriate use of Xeriscape principles at Cannon.

Xeriscaping Principles

By applying the following principles of Xeriscape design, installations can use valuable water resources efficiently and lower maintenance requirements while increasing the aesthetic appeal of the landscape:

- Start with a plan
- Minimize turf areas
- Improve the soil
- Irrigate efficiently
- Select water-efficient plants
- Use mulches
- Practice proper maintenance

Starting with a Plan

Imagine beginning a vacation to a remote location with no maps, no hotel reservations, or even an idea how much money or what currency you will need during your trip. A similar type of journey can be taken in the landscape simply by not having a plan. Developing a plan before starting any landscape project is the single most important step in the design process.

Turf Areas

Turf requires the most water and maintenance of all plant types. For example, a 3000 square foot turf area, irrigated 3 to 5 times a week for 10 to 30 minutes each time uses between 9000 to 15000 gallons of water per month. The same area planted with a low-water groundcover requires only about 10% of that amount of irrigation. Therefore, the designer needs to consider size, location, and variety of turfgrass for each project. The following issues on turf areas should be reviewed in creating an efficient xeriscape:

- Select and maintain turf areas where they will be the most beneficial based on local irrigation limitations
- Select turf varieties that will thrive in the local environment and require minimal additional irrigation
- Design larger turf areas in shallow depressions to passively collect rainwater
- Consider using alternative plant materials that may be less water-demanding; or inert materials in place of turf

Soil Improvement

Soils can vary greatly over an installation. A soils analysis will determine exactly what improvements may be required. In general, organic matter and amendments that decrease or increase soil acidity, or pH, are the most common additives used to improve soils. Although native plants in a region may not require soil improvements to thrive, the addition of organic matter allows better absorption of water and improves water-holding capacities while providing beneficial nutrients for the plants.

Most plants seem to thrive in slightly acid or neutral soils, so the addition of lime and sulfur can respectively raise or lower the pH to create a more effective plant growing medium. Improving the soil in xeriscape plantings provides the following benefits:

- Plants will grow better and use water more effectively and efficiently
- Rainfall will more readily be absorbed by the soil surrounding the plants thereby reducing runoff, erosion, and the frequency of supplemental irrigation



There are a few examples of appropriate use of Xeriscape principles at Cannon.

Irrigation

The *Cannon Green – SLDP* discusses several important topics related to efficiently delivering supplemental water to plant material. There are three important practices associated with irrigating a Xeriscape planting – watering slowly, deeply and infrequently.

Water slowly

Never apply water faster than the infiltration rate of the soil. Sandy soils absorb water quickly; clay soils slowly, and loam soils somewhere in between. 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 root zone. Determine depth of water penetration by pushing a metal rod into the wet soil. The rod will stop when it reaches dry soil. Irrigation water should reach at least to 2/3 the actual depth of plant roots for optimum irrigation cycle timing. Record the amount of time it took the system to reach this depth to assist in proper programming of irrigation controllers.

Water infrequently

During the hot eastern New Mexico summer months, plants obviously will require more supplemental water. This does not mean plants should be irrigated every day. A soaking once a week is much more beneficial than several light sprinklings. Slow, deep watering promotes roots that are more capable of withstanding drought while further reducing irrigation requirements by naturally providing more soil between the hot dry sun and tender roots. Never water more than every other day or during periods of high winds.

Selection of Water-Efficient Plants

In most climatic regions there are a number of attractive trees, shrubs, groundcovers, vines, and grasses that require little or no supplemental water to thrive. Cannon AFB has populated their approved installation plant list with natives that have demonstrated their long term landscape value through their hardiness, availability, and minimal maintenance and water requirements. Nursery owners are regularly testing new "discoveries" from the wild that can be used by the designer to create functional, beautiful, and water-efficient landscape solutions.

An important consideration for developing a plant list at a low precipitation installation like Cannon is to ensure a sufficient number of plant varieties for all three hydrozones. Many native, arid region plants will not perform well in shade. The enclosed Cannon Approved Plant List provides for sufficient diversity of shade-tolerant plant materials.



The Modesto Ash is a quality shade tree.

Mulches

Organic or inert mulches applied to proper depths will reduce water needs and weed growth while providing visual interest and surface erosion control. Organic mulches such as pine needles and shredded or chipped bark provide the added benefit of improving the soil through slow decomposition. Inert materials listed in this document also provide mulching benefits.

Mulch should be placed directly on the soil around all plant materials. Avoid plastic sheeting and certain plastic-based fibrous matting. These materials do not prevent weed growth and slowly decompose over time creating maintenance difficulties.

Practice Proper Maintenance

In general, an established, well-designed Xeriscape planting naturally requires minimal maintenance. A Xeriscape planting will save water and require less fertilizer and insecticides. Use of systemic contact herbicides on noxious weeds like Bermuda grass in non-turf areas along with regular applications of pre-emergent herbicides will greatly reduce labor requirements over the long term. Some maintenance practices that can save water are:

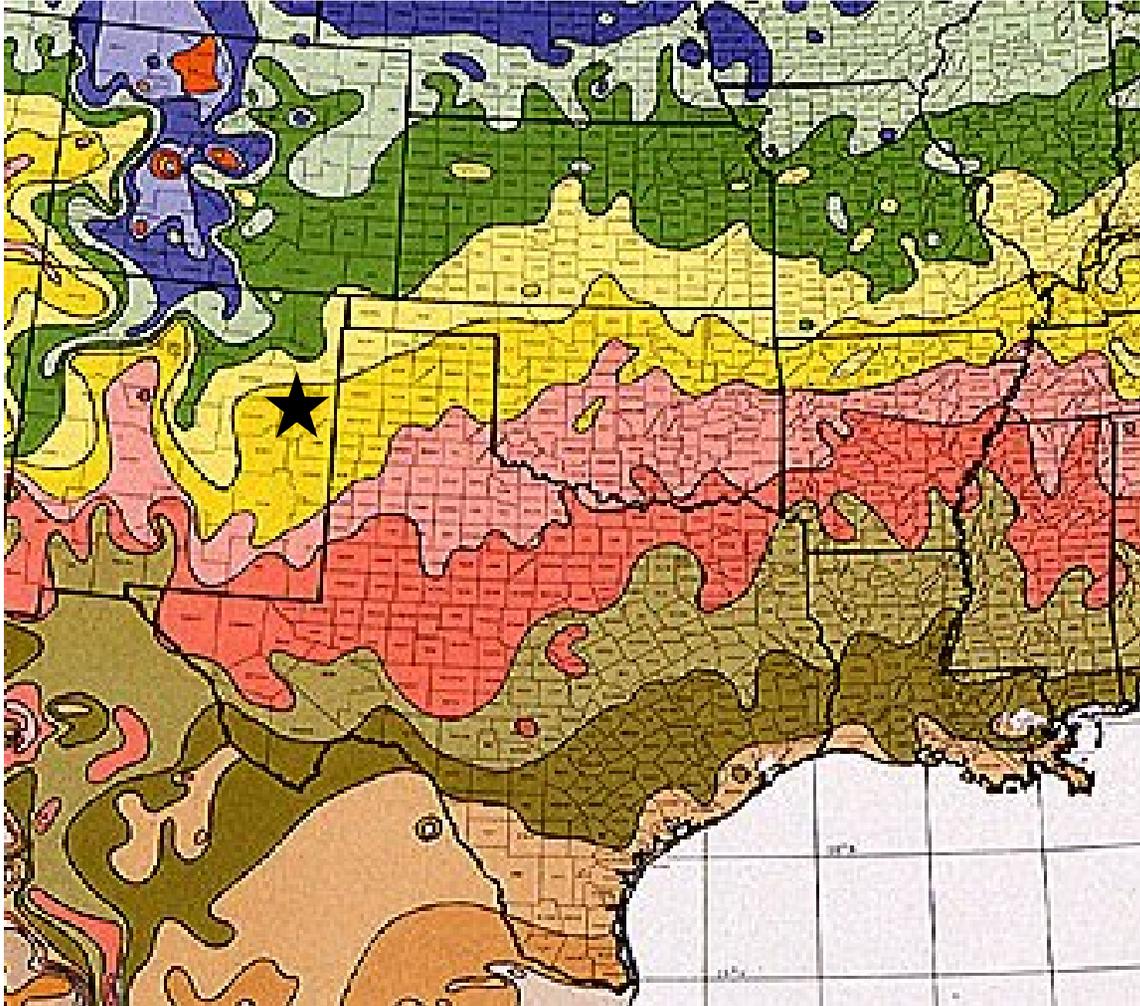
- Raise the height of turf grass mowers

- Regularly inspect irrigation sprinklers for leaks or breaks
- Prune and thin out heavily-foliated trees and shrubs to reduce *evapotranspiration* through the leaves
- Replenish mulch around plants



The golf course has special requirements for tree selection and planting.

Hardiness Zone Map



Graphic credit:

2003 US National Arboretum "Web Version" of the 1990 USDA Plant Hardiness Zone Map

Approved Plant List

An installation's approved plant list identifies readily available and proven plant material for use in facility landscape design. Selected plant materials should complement and reinforce the installation architectural theme. The Cannon AFB Approved Plant List documents trees, shrubs, perennials, grasses and groundcovers for use in landscape development projects. As the backbone of installation planting design, the list provides designers with a palette of desirable plant material that possess the following characteristics:

- Hardy and relatively pest-free
- Regionally native or indigenous
- Minimal maintenance and irrigation
- Readily available

The enclosed list is not intended to be static. Regular review and modification is recommended as new plants are being released all the time. It is important to note, that changes to the list must be made by qualified individuals with extreme care. Just because a plant "works" in a local area or region does not make it worthy of being on an installation's approved list. According to the map below, Cannon AFB is in Zone 6b with the average annual minimum temperature range of -5 to 0 degrees F (-17.8 to -20.5 C).

| Botanical Name | Common Name | Native / Indigenous | Evergreen / deciduous | Mature height (feet) | Mature width (feet) | Min. planting size | Irrigation requirements | Barrier | Screen | Accent | Street tree | AT/FP | Golf course |
|------------------------------------|--------------------|---------------------|-----------------------|----------------------|---------------------|--------------------|-------------------------|---------|--------|--------|-------------|-------|-------------|
| <i>Trees</i> | | | | | | | | | | | | | |
| <i>Acacia farnesiana</i> | Huisache | N | ED | 25 | 25 | 15 | L | | | ◆ | | ◆ | |
| <i>Acer glabrum 'Neomexicanum'</i> | Rocky Mtn. maple | N | D | 35 | 30 | 3" | M | | | | ◆ | ◆ | ◆ |
| <i>Cercis canadensis</i> | Eastern redbud | I | D | 20 | 20 | 15 | ML | | | ◆ | | ◆ | ◆ |
| <i>Chilopsis linearis</i> | Desert willow | N | D | 20 | 15 | 15 | ML | | | | ◆ | ◆ | |
| <i>Cupressus arizonica</i> | Arizona cypress | N | E | 65 | 45 | 15 | L | | ◆ | | | | ◆ |
| <i>Fraxinus velutina 'Modesto'</i> | Modesto Ash | N | D | 50 | 40 | 5 | M | | | | ◆ | ◆ | ◆ |
| <i>Juniperus deppeana</i> | Alligator juniper | N | E | 20 | 15 | 15 | L | ◆ | ◆ | | | | ◆ |
| <i>Juniperus scopulorum</i> | Rocky Mtn. juniper | N | E | 35 | 15 | 15 | L | ◆ | ◆ | | | | ◆ |
| <i>Magnolia grandiflora</i> | Southern magnolia | I | E | 50 | 30 | 15 | M | | ◆ | | | | |
| <i>Picea pungens</i> | Blue spruce | N | E | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---------------------|----|----|----|-----|----|---|---|---|---|---|---|---|
| <i>Pinus edulis</i> | Pinon pine | N | E | 15 | 10 | 15 | L | | ◆ | | | ◆ | |
| <i>Pinus eldarica</i> | Afghan pine | I | E | 45 | 25 | 15 | L | ◆ | ◆ | | ◆ | | ◆ |
| <i>Pinus thunbergiana</i> | Japanese black pine | I | E | 20 | 15 | 15 | M | | | ◆ | | ◆ | |
| <i>Platanus acerifolia</i> | London plane tree | I | D | 65 | 65 | 5 | M | | | | ◆ | ◆ | ◆ |
| <i>Prunus cerasifera</i> | Purpleleaf plum | I | D | 25 | 25 | 15 | M | | | | | ◆ | |
| <i>Quercus shumardii</i> | Shumard red oak | I | D | 50 | 40 | 15 | L | | | | | ◆ | ◆ |
| <i>Quercus texanum</i> | Texas oak | I | D | 25 | 25 | 15 | L | | | | ◆ | ◆ | |
| <i>Salix matsudana</i> 'Navabo' | Globe Navajo Willow | I | D | 20 | 20 | 5 | M | | | | | | ◆ |
| <i>Shrubs</i> | | | | | | | | | | | | | |
| <i>Aucuba japonica</i> | Aucuba | I | E | 4 | 5 | 1 | M | | ◆ | ◆ | | | |
| <i>Berberis fendleri</i> | Colorado barberry | N | E | 6 | 6 | 5 | M | ◆ | | | ◆ | | |
| <i>Berberis thunbergii</i> | Japanese barberry | I | ED | 3 | 4 | 5 | M | ◆ | | | ◆ | ◆ | |
| <i>Buxus japonicum</i> | Japanese boxwood | I | E | 4 | 4 | 1 | L | | ◆ | | ◆ | | |
| <i>Cercocarpus montanus</i> | Mountain Mahogany | N | D | 12 | 12 | 5 | L | | ◆ | | | | |
| <i>Cotoneaster spp.</i> | Cotoneaster | I | ED | V | V | 5 | M | | | | ◆ | | |
| <i>Dasyliirion wheeleri</i> | Sotol/Desert Spoon | N | E | 12 | 8 | 5g | L | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ |
| <i>Ericameria laricifolia</i> | Turpentine bush | N | E | 3 | 2 | 1 | L | | | | | ◆ | |
| <i>Fouquieria splendens</i> | Ocotillo | N | D | 15 | 15 | 7 | L | | | ◆ | ◆ | ◆ | |
| <i>Gaura coccinea</i> | Scarlet gaura | N | E | 3 | 2 | 1 | L | | | | | ◆ | |
| <i>Hesperaloe parviflora</i> | Red yucca | I | E | 3 | 4 | 1 | L | | | | ◆ | ◆ | |
| <i>Ilex vomitoria</i> | Yaupon holly | N | E | 15 | 15 | 5 | L | | ◆ | | ◆ | | ◆ |
| <i>Juniperus chinensis</i> 'Armstrong' | Armstrong juniper | I | E | 5 | 5 | 5 | L | ◆ | ◆ | | ◆ | | |
| <i>Juniperus chinensis</i> 'Pfitzerana' | Pfitzer juniper | I | E | 5 | 6 | 5 | L | ◆ | ◆ | | ◆ | | |
| <i>Juniperus chinensis</i> 'Sea Green' | Sea green juniper | I | E | 6 | 8 | 5 | L | ◆ | ◆ | | ◆ | | |
| <i>Mabonia haematocarpa</i> | Algerita | N | E | 5 | 5 | 5 | L | ◆ | ◆ | ◆ | ◆ | | |
| <i>Mabonia repens</i> | Creeping mahonia | N | E | 1 | 1.5 | 5 | L | | | ◆ | | ◆ | |
| <i>Nandina domestica spp.</i> | Heavenly bamboo | I | E | V | V | 1 | L | ◆ | ◆ | ◆ | ◆ | | |
| <i>Raphiolepis indica spp.</i> | Indian hawthorn | I | E | V | | 5 | M | | | | | | |
| <i>Rosa banksiae</i> | Tombstone rose | I | ED | 12 | V | 1 | L | | | ◆ | | | |
| <i>Salvia greggii</i> | Autumn sage | N | E | 3 | 3 | 1 | L | | | ◆ | | ◆ | |
| <i>Salvia spp.</i> | Sage varieties | NI | E | 3 | 3 | 1 | L | | | ◆ | ◆ | ◆ | |
| <i>Sophora secundiflora</i> | Texas mntn laurel | N | E | 15 | 15 | 15 | L | | ◆ | | | ◆ | ◆ |
| <i>Spirea spp.</i> | Bridal wreath, etc. | I | ED | V | V | 5 | M | | ◆ | ◆ | | | |
| <i>Viburnum opulus</i> 'Roseum' | Snowball | I | D | 10 | 12 | 5 | M | | ◆ | | | | |
| <i>Yucca elata</i> | Soaptree | N | E | | | 1 | L | ◆ | | ◆ | | ◆ | |
| <i>Yucca recurvifolia</i> | Pendulous yucca | I | E | | | 1 | L | ◆ | | ◆ | | ◆ | |

| Botanical Name | Common Name | Native / Indigenous | Evergreen / deciduous | Mature height (feet) | Mature width (feet) | Min. planting size | Irrigation requirements | Barrier | Screen | Accent | Street tree | AT/FP | Golf course |
|--|--------------------------|---------------------|-----------------------|----------------------|---------------------|--------------------|-------------------------|---------|--------|--------|-------------|-------|-------------|
| <i>Perennials</i> | | | | | | | | | | | | | |
| <i>Baileya multiradiata</i> | Desert marigold | N | | | | 1 | | | | | | | |
| <i>Aquilegia spp.</i> | Colorado columbine | N | | | | 1 | | | | | | | |
| <i>Ratibida columnifera</i> | Coneflower | N | | | | 1 | | | | | | | |
| <i>Hemerocallis spp.</i> | Daylily | I | | | | 1 | | | | | | | |
| <i>Castilleja integra</i> | Indian paintbrush | N | | | | 1 | | | | | | | |
| <i>Psilostrophe tagetina</i> | Paperflower | N | | | | 1 | | | | | | | |
| <i>Penstemon spp.</i> | Penstemon | N | | | | 1 | | | | | | | |
| <i>Groundcovers</i> | | | | | | | | | | | | | |
| <i>Dalea greggii</i> | Gregg Dalea | N | E | .75 | 3 | 1 | L | | | ◆ | | ◆ | |
| <i>Euonymus fortunei</i> | Creeping euonymus | I | E | .75 | 2 | 1 | L | | | ◆ | | ◆ | |
| <i>Juniperus horizontalis</i> 'Bar Harbor' | Bar Harbor juniper | I | E | 1.5 | 3 | 3 | L | | | | ◆ | | |
| <i>Juniperus horizontalis</i> 'Wiltonii' | Wilton carpet juniper | I | E | 1 | 3 | 3 | M | | | | | ◆ | |
| <i>Juniperus sabina</i> 'Broadmoor' | Broadmoor juniper | I | E | 2 | 5 | 5 | M | ◆ | | | ◆ | | |
| <i>Juniperus sabina</i> 'Tamariscifolia' | Tam juniper | I | E | 3 | 5 | 5 | M | ◆ | | | ◆ | | |
| <i>Sedum spp.</i> | Stonecrop | NI | E | .75 | 2 | 1 | L | | | ◆ | | ◆ | |
| <i>Grasses</i> | | | | | | | | | | | | | |
| <i>Bouteloua gracilis</i> | Blue grama | N | | | | | | | | | | ◆ | ◆ |
| <i>Buchloe dactyloides</i> | Buffalo grass | N | | | | | | | | | ◆ | ◆ | ◆ |
| <i>Cynodon dactylon</i> | Bermuda grass | I | D | | | | | | | | ◆ | ◆ | ◆ |
| <i>Cynodon spp. hybrids</i> | Tifdwarf, Tifsport, etc. | I | D | | | | | | | | ◆ | ◆ | ◆ |
| <i>Festuca caesia</i> | Blue fescue | I | E | | | | | | | | | ◆ | ◆ |

| | | | | | | | | | | | | | |
|---------------------------|-----------------|---|----|--|--|--|--|--|--|---|--|---|---|
| <i>Aristida longiseta</i> | Purple threeawn | N | ED | | | | | | | | | ◆ | ◆ |
| <i>Festuca caesia</i> | Blue fescue | I | E | | | | | | | ◆ | | ◆ | ◆ |
| <i>Aristida longiseta</i> | Purple threeawn | N | ED | | | | | | | ◆ | | ◆ | ◆ |

Approved Inert Material List

Inert materials such as gravel, decomposed granite or river run stone are commonly used in the landscape with the intent of lowering maintenance and improving aesthetics. When properly incorporated, these materials work well to create an efficient, economical, and aesthetic design solution. The difficulty arises when these materials are installed without regard to long term maintenance requirements. The following issues must be considered when using the selected inert materials for Cannon AFB:

- Compatibility with architectural theme
- Readily available
- Proper installation and maintenance
- Appropriate use

Compatibility with Architectural Theme

Inert materials should be visually compatible with the installation architectural theme. Color, size, texture and long-term aesthetic value or durability should be primary considerations of inert materials to be included on the installation approved list.

Readily Available

Materials included on the installation inert material list must be readily available. Native or locally occurring materials usually will contribute the most toward preserving the character or image of the final project. Check with local or regional suppliers to ensure materials will be available in sufficient quantities to satisfy future landscape project needs.

Proper Installation and Maintenance

Overuse, misuse, and poor installation techniques hinder the effectiveness of inert material use in the landscape. Mixing different types or colors of similar materials of the same texture generally is inappropriate and detracts from the design composition.

Appropriate Use

Designating inert materials for specific uses throughout the installation is important. For example, 3-8" river run stone may be appropriate for use as an accent in an area of 3/4" decomposed granite or as erosion control in a small swale. In contrast, installing it as the primary groundcover over hundreds of square feet may be expensive, visually overpowering and difficult to maintain.

Suggested Inert Material List*

| Descriptive Name | Trade Name | Size | Color | Depth | Landscape element | Erosion control | Accent | Rip-rap |
|------------------------|-------------------------|-------------------|----------------|------------------|-------------------|-----------------|--------|---------|
| <i>Inert materials</i> | | | | | | | | |
| Decomposed granite | “Jim Bob’s Gold” | 3/4” minus | Gold | 2” min. | ◆ | ◆ | | |
| River rock | Local river run | 3-8” | Various | One layer | | ◆ | ◆ | ◆ |
| Boulder | Local ‘granite’ boulder | 8-27 CF | Natural | As detailed | | | ◆ | ◆ |

* Final selection of inert materials left in the hands of installation.



Many different types of inert materials are currently in use. This example is one of the better ones. Increasing the sizes and minimizing the types to no more than three other than boulders is suggested. Final choices are up to installation – and must be well thought out to be successful.

Irrigation Standards

Along with appropriate landscape development there must be an efficient and fitting irrigation system standards to further ensure a quality installation of the future. Irrigation is the supplemental application of water to support intensive and regular plant growth. Successful irrigation systems consider the unique characteristics of the soil, climate, topography, and the quantity, quality, and availability of water as well as the specific plant material requirements.

There are three steps in determining the irrigation requirements of Cannon AFB landscape development:

- Needs assessment
- Installation
- Establishment

Needs assessment

All turf areas designated to remain should be irrigated with state-of-the-art automatic systems regardless of which landscape development zone. High visibility streetscapes and primary zone landscape developments should be completely irrigated. Secondary zone projects should be assessed for irrigation requirements on a case-by-case basis by an integrated development team.

Installation

There is nothing inexpensive about installing a professionally-designed, modern irrigation system. Specifications and details along with expert construction management teams are the key aspects to ensuring the installation gets its money's worth.

Establishment

After an irrigation system has been installed on a newly planted project, there is an establishment period required. New plantings are in a stressful situation and require additional care, observation, and water to promote growth and vigor. In addition, the irrigation system will need monitoring and evaluation to ensure proper operation and area coverage.

The first several days after a project is completed are vital to a quality irrigation system installation – and the plants they are watering. Not only are the plants trying to adjust to the new environment, the irrigation system itself must be monitored and adjusted to ensure it is functioning as designed and installed. Ensure beds are getting proper amounts of water through the drip emitters, bubblers, or spray heads. Adjust heads to ensure proper coverage and avoid watering undesired areas such as project perimeters and driveways. Ensure turf areas receive enough water and that overspray is sufficient to provide adequate coverage.

Personnel responsible for maintaining the project after installation must be aware of the watering needs of the plants on site as well as the operation of the total irrigation system from controller to individual heads. Adjustments to the irrigation system must be made in a timely and correct manner. Do not hesitate to replace heads not providing adequate coverage. Irrigation establishment greatly increases the chances of the landscape providing years of function and beauty.

Maintenance

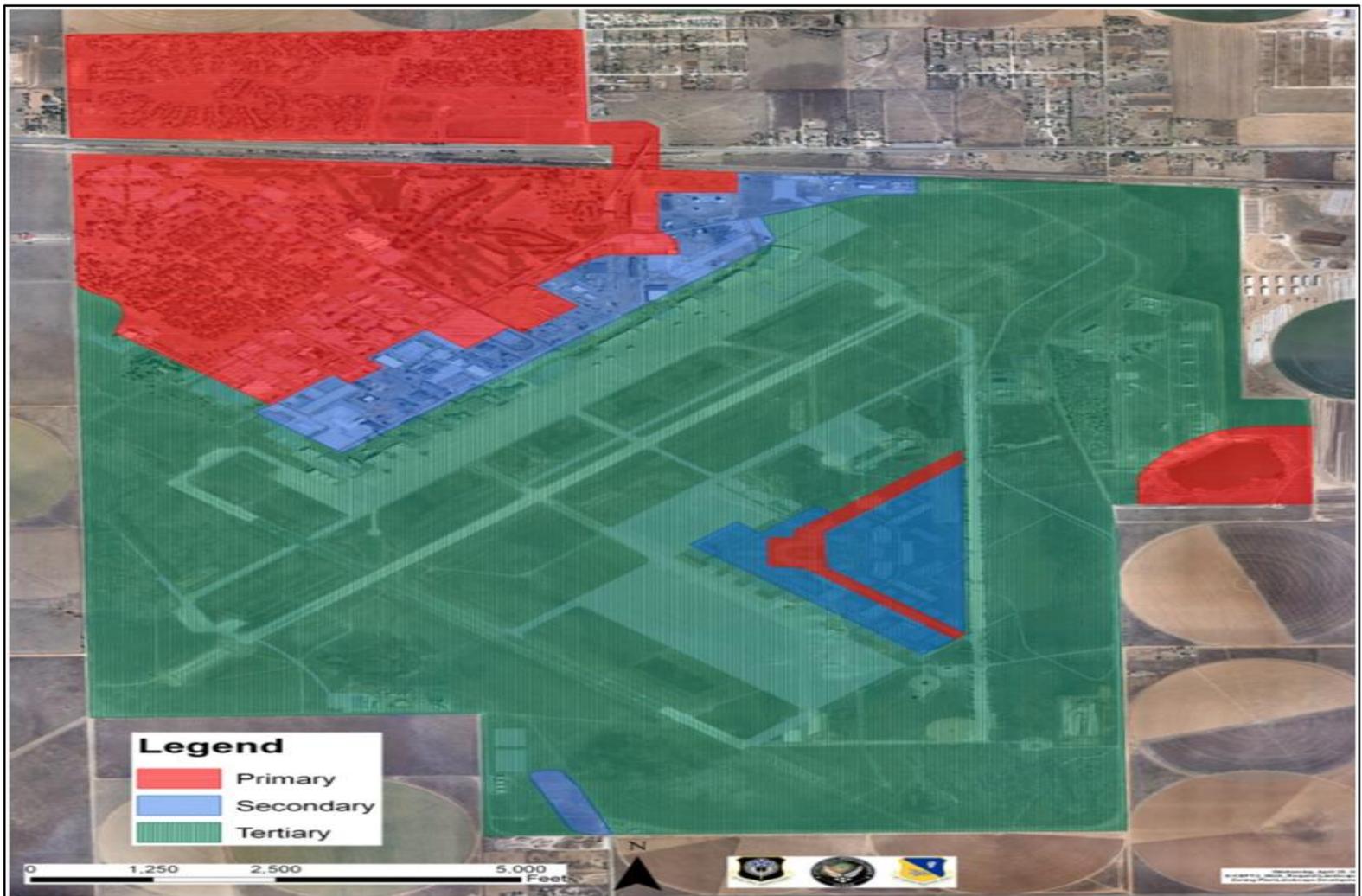
Immediately following installation of an irrigation system, maintenance of that system begins. Numerous operations and tasks are required to ensure proper and optimum system operation. The design, installation and operation of an irrigation system is a costly undertaking. It is therefore wise to immediately establish a comprehensive and aggressive maintenance program to ensure lasting results on the investment. The following are some actions recommended for maintaining Cannon AFB irrigation systems:

- Ensure controllers are operating correctly by checking them at least weekly
- Regularly check the connections and fuses and test the rechargeable program back-up battery, too
- Manually start the zones and walk the area covered by the individual zones

- Ensure delivery devices are properly adjusted ensuring adequate coverage
- Check spray and rotary head spray patterns are not spraying undesired areas such as driveways or open areas
- Test backflow prevention devices operate correctly at least twice a year
- Establish a schedule to clean all filters and strainers for the entire system
- Educate grounds maintenance personnel to ensure they minimize lawnmower and string trimmer damage to risers and delivery devices
- During inspection tours of the project site, look carefully for dry or overly wet spots and adjust components as necessary
- Open plastic box covers and inspect the general condition of the enclosed component
- Establish a schedule to clean all delivery device orifices annually
- In cold winter areas, establish dates to purge and drain the irrigation system and ensure the components are protected
- Adjust the controller program as seasonal changes necessitate
- On drip systems, ensure the narrow "spaghetti" tubes with the emitters on the end are protected and those installed in the ground remain covered

Landscape Development Zoning Plan

Landscape development zoning defines the level of landscape treatment a particular area or facility should receive. It is the basis for budgeting for future landscape development. There are three zones of landscape development: *Primary*, *Secondary* and *Tertiary*.





Housing areas are important primary landscape development zones.

Primary zone

The primary zone is defined as an area of the installation that is highly significant to the perceived visual quality and image of the installation. Facilities such as those listed below warrant additional funds in landscape design, construction and maintenance:

- Entry gates
- Command/headquarters
- Administrative offices
- Community Center
- Main roadways
- Static displays
- Hospital
- Clubs
- Golf course & clubhouse
- Billeting/DV Suites
- Military Family Housing



This secondary zone facility needs large evergreen shrubs to enhance its appearance during the winter and early spring months.

Secondary zone

The secondary zone contains most of the remaining developed areas of the installation. Many facilities in this area are important in the daily lives of the installation community but extensive development may not be essential due to decreased visibility & limited maintenance budgets:

- Squadron operations
- Family Support Center
- Undeveloped areas near primary zone facilities
- Publicly visible areas of perimeter fence
- Arterial roadways
- Dining halls



Fencing standards become important in the secondary and tertiary zones where screening is both an aesthetic and functional requirement.

Tertiary zone

The tertiary zone encompasses those areas that will require little to no long-term landscape development. Many of these areas can be close to flight line, in or near clear zones, minimally-altered natural vegetation or serve as force protection setbacks:

- Munitions storage
- Airfield facilities
- Administrative offices
- CE storage & shops
- Service roads
- Water treatment facilities
- Test cells

Streetscape Corridor Plan

Air Force installation streetscapes can include trees, shrubs, and site amenities such as lighting, screen walls, signage, sidewalks, flag displays, and bike paths. Properly developed, an installation's streets can be a subtle visual indicator of the hierarchy of the transportation network and will contribute to the overall appearance and function of the installation.

The Streetscape Corridor Plan directs proper landscape development of installation roadways to maximize utility, beauty, and safety. It will provide valuable insight to new or street project upgrades by documenting pedestrian, vehicular, utility, and aesthetic needs of the installation's streets.



Formal street tree plantings are impressive and should be only used sparingly to maximize visual effect while minimizing long-term potential of pattern.

The process of compiling a Streetscape Corridor Plan is comprised of three steps:

- Analysis
- Needs assessment
- Implementation

Analysis

A detailed study usually is required to summarize existing conditions to include vegetation, circulation, infrastructure, physical elements, safety and visual quality to enable a comprehensive needs assessment.

Needs Assessment

Using data collected above, the aesthetic and functional needs of the installation's roadways is determined in concert with Landscape Development Zoning Plan and other concerns.

Implementation

Execution is the key to any good plan. All newly created streets should comply with the plan through detailed programming. Existing streets should be prioritized and upgraded along with each new or renovation project.



D.L. Ingram is a primary zone streetscape corridor and deserving of high level landscape development planning.

Over time, installation managers should determine the appropriate designations for their vehicular circulation network based on the analysis and needs assessment procedures explained above and implement improvements accordingly.

Anti-Terrorism / Force Protection Landscape Guidelines

Security has become a primary consideration in every aspect of life on federal properties. Ensuring that our landscape development plans coincide with Department of Defense requirements, SLDP will include AT/FP landscape guidelines.

- UFC 4-010-01 compliant
- Incorporate 10m or 25m standoffs
- Identify plants that satisfy 6” cube explosive device criteria
- Compile AT/FP Landscape Guideline checklist for use in new or repair construction

The following is an excerpt from *DoD Minimum Antiterrorism Standards for Buildings*:

**Table B-1 Minimum Standoff Distances
for New and Existing Buildings**

| Location | Building Category | Standoff Distance or Separation Requirements | | | |
|---|----------------------------|--|---|--|--|
| | | Applicable Level of Protection | Conventional Construction Standoff Distance | Effective Standoff Distance ⁽¹⁾ | Applicable Explosive Weight ⁽²⁾ |
| Controlled Perimeter or Parking and Roadways without a Controlled Perimeter | Billeting | Low | 45 m ⁽³⁾ (148 ft.) | 25 m ⁽³⁾ (82 ft.) | I |
| | Primary Gathering Building | Low | 45 m ⁽³⁾⁽⁴⁾ (148 ft.) | 25 m ⁽³⁾⁽⁴⁾ (82 ft.) | I |
| | Inhabited Building | Very Low | 25 m ⁽³⁾ (82 ft.) | 10 m ⁽³⁾ (33 ft.) | I |
| Parking and Roadways within a Controlled Perimeter | Billeting | Low | 25 m ⁽³⁾ (82 ft.) | 10 m ⁽³⁾ (33 ft.) | II |
| | Primary Gathering Building | Low | 25 m ⁽³⁾⁽⁴⁾ (82 ft.) | 10 m ⁽³⁾⁽⁴⁾ (33 ft.) | II |
| | Inhabited Building | Very Low | 10 m ⁽³⁾ (33 ft.) | 10 m ⁽³⁾ (33 ft.) | II |
| Trash Containers | Billeting | Low | 25 m (82 ft.) | 10 m (33 ft.) | II |
| | Primary Gathering Building | Low | 25 m (82 ft.) | 10 m (33 ft.) | II |
| | Inhabited Building | Very Low | 10 m (33 ft.) | 10 m (33 ft.) | II |

(1) Even with analysis, standoff distances less than those in this column are not allowed for new buildings, but are allowed for existing buildings if constructed/retrofitted to provide the required level of protection at the reduced standoff distance.

(2) See UFC 4-010-02, for the specific explosive weights (kg/pounds of TNT) associated with designations – I and II. UFC 4-010-02 is For Official Use Only (FOUO)

(3) For existing buildings, see paragraph B-1.1.2.2 for additional options.

(4) For existing family housing, see paragraph B-1.1.2.2.3 for additional options.

Figure B-1 Standoff Distances and Building Separation – Controlled Perimeter

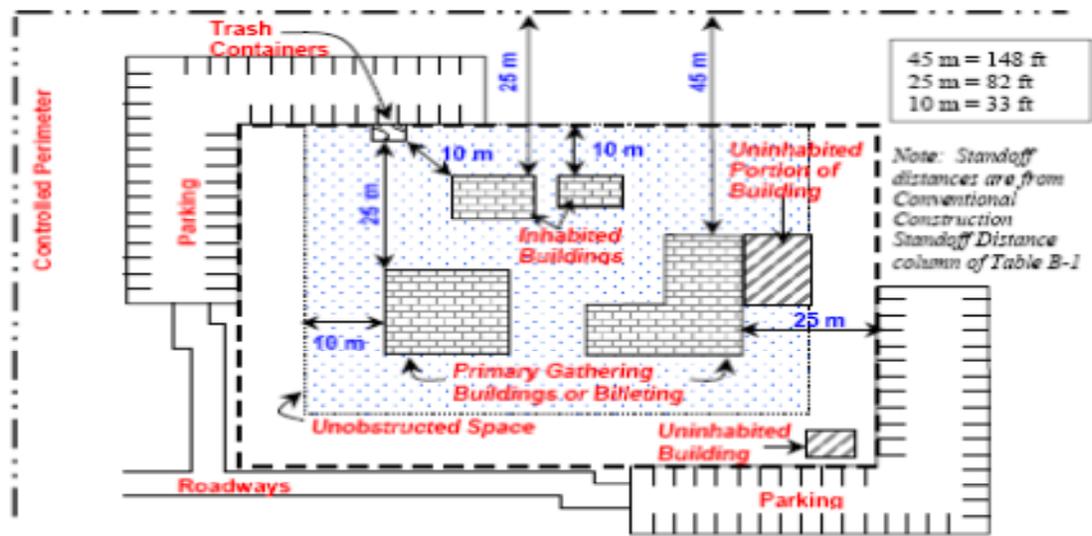
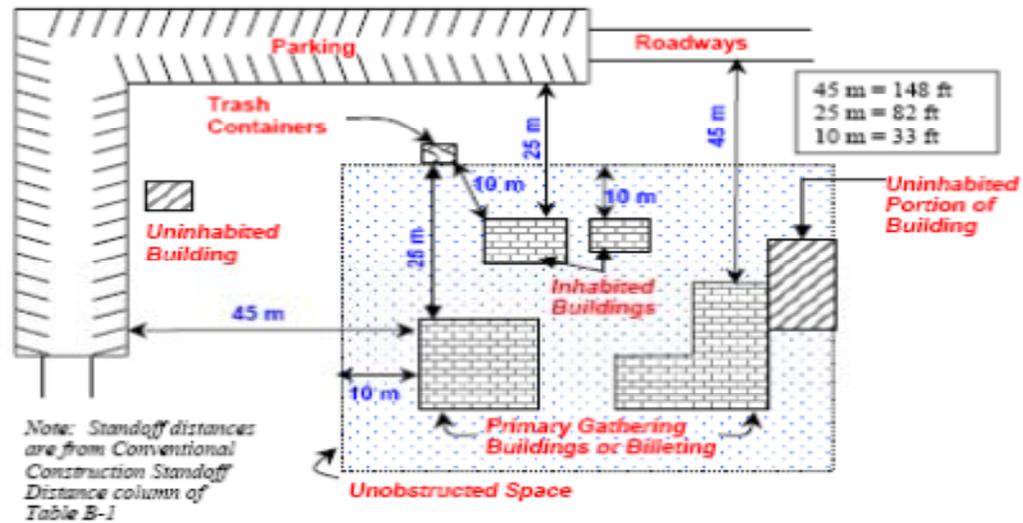


Figure B-2 Standoff Distances and Building Separation – No Controlled Perimeter



From DoD Minimum Antiterrorism Standards for Buildings.

Cannon AFB Landscape Construction Specifications & Details

Designers must ensure project construction documents convey the necessary information to successfully implement the design. They are responsible for designing the project; the landscape contractor is responsible for the actual implementation, installation, and establishment of the design. Following installation, maintenance personnel are responsible for the various landscape elements of the project to maturity. Between the design, implementation, and establishment phases is a need for clear, understandable communication.

Specifications

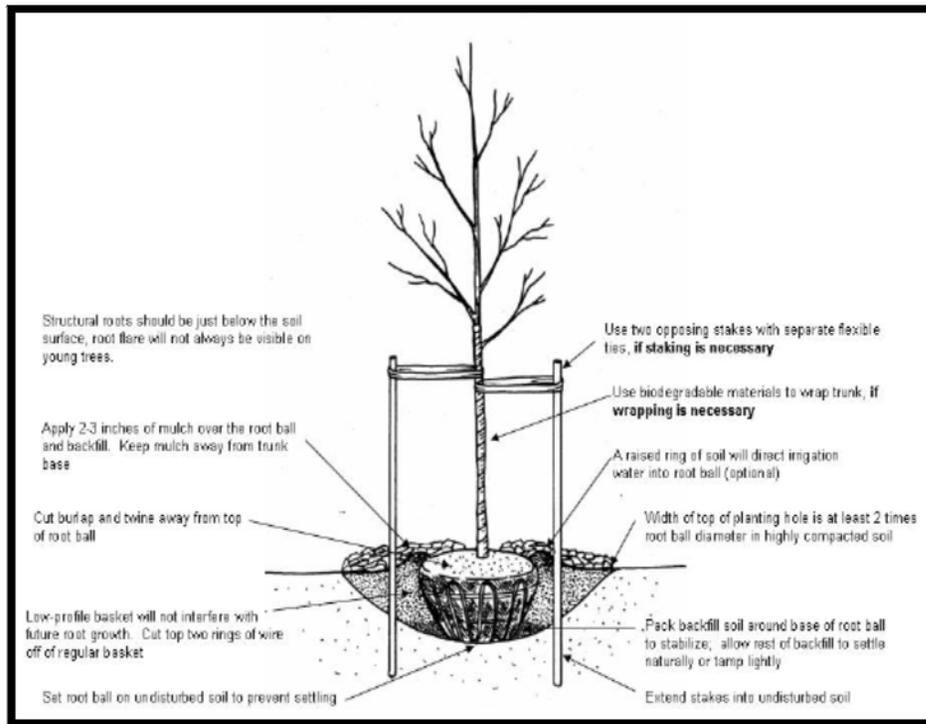
Landscape construction specifications define the type and quality of materials and equipment and specify the required construction standards necessary to ensure satisfactory design implementation. Specifications are highly organized design execution instruments. They should be written clearly and concisely, leaving little room for misinterpretation or misunderstanding. Since specifications supersede drawings and details in implementing a construction document package, they perform a valuable role in producing a quality landscape development product. A consistent format and clarity are probably the two most important traits of good specification writing.



Construction of new facilities is happening at a staggering pace. All the more important that standardized specifications and details be implemented directly.

Details

Landscape construction details provide this link by establishing a clear understanding of the design and construction requirements. An integral part of any project design is the landscape construction details. Details, along with specifications and plans, are ways designers communicate their design intent to the project contractor. Landscape details convey the precise way to implement elements of a landscape project. Details must be coordinated with specifications. It is important to remember in contracted work that specifications are the final word if there are contradictions between the other various project implementation documents.



Standard details can save time and increase consistency and quality.

Over time, installation managers should collect pertinent, locally-appropriate details for use in all construction projects.



Other than design and installation, maintenance is probably the most important aspect of successful long-term landscape development.

Cannon AFB Landscape Maintenance Guidelines

Timely and proper maintenance is the cornerstone of a quality installation landscape. Proper landscape maintenance starts with quality design, material selection, and construction methods.

Landscape maintenance is the regular care of plant material, site amenities, and other outdoor elements required to ensure an area functions and appears as it was designed. Time-proven and modern landscape maintenance procedures and practices, together with experienced inspectors and crew supervisors, are the keys to establishing a quality installation landscape.

Landscape maintenance includes trimming, fertilizing, mowing, pest control, and numerous other tasks necessary to ensure an appealing installation landscape. Proper landscape maintenance is often overlooked or taken for granted. Sound landscape maintenance guarantees design objectives are achieved as conceived by the designer.

The Air Force Landscape Design Guide provides descriptions and definitions of the elements necessary to maintain the Cannon AFB landscape. The emphasis on increasing the quality of life on Air Force installations while decreasing funding for maintenance continues to gain momentum. It is important that every installation ensure funding for landscape maintenance is spent constructively and wisely.



Quality facilities are not an accident. Implementation of the right materials in the right style can over time result in a quality installation.

Cannon Green Implementation Plan

Execution is the key to any good plan. Execution is accomplished by action. The following is a list of suggested actions for the near future:

- Finalize, approve and implement Cannon Green – SLDP and its requirements
- Require programmers to include landscape development requirements for every project in the primary and secondary development zones at a minimum
- Require establishment for every landscape development project to be built to ensure proper installation by making contractor responsible for its success
- Compile AT/FP Landscape Guideline checklist for use in new or repair construction projects
- Regularly inspect irrigation systems to ensure efficient operation
- Assess all turf areas to determine long-term compliance with this plan

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This document is the result of an AFSOC assistance team request largely due to the quality input of a number of dedicated Cannon AFB civil engineering professionals. We appreciate the opportunity to serve. Please do not hesitate to ask for our help on furthering your quest of installation excellence.