



# **San Juan National Historic Site**

## *Draft Grounds Maintenance Standard Operating Procedures*



Department of the Interior  
National Park Service  
San Juan National Historic Site

Draft Grounds Maintenance Standard Operating Procedures

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Superintendent

Date

## **Grounds Maintenance Standard Operating Procedures**

### **Purpose**

The purpose of this standard operating procedure (SOP) is to establish clear guidelines for the care of the maintained landscape areas at San Juan National Historic Site (SAJU). This SOP will focus on the maintenance of turf and the care of existing trees and shrubs in park jurisdiction. The park will also establish through this SOP limits to where re-vegetation efforts should happen as well as when such efforts will be deemed convenient. The park will also establish guidelines for removing vegetation from an existing maintained landscape area.

### **Authority**

This standard operating procedure follows and supplements the following regulations from the National Park Service:

*2006 Management Policies*, Chapter 5: Cultural Resource Management, Section 5.3.5.2

*2006 Management Policies*, Chapter 9: Park Facilities, Section 9.1.3.2

Director's Order 28: *Cultural Resource Management*

NPS 28: *Cultural Resource Management Guideline*

### **Current Conditions**

The park has several maintained landscape areas with different types of turf, shrubs and trees (see appendix A). There are five areas with high visitation where the park performs grounds maintenance: Esplanade of Castillo San Felipe del Morro, Paseo del Morro National Recreation Trail, the Visitor Center Parking Lot, Bastión de San José de Las Palmas, and the Outer Defenses of Castillo San Cristóbal. There are other maintained landscape areas although visitation is not as high nor are there highly complex maintenance issues. These areas are: grounds of the bastions of the City Wall, and the grounds of Fort San Juan de la Cruz.

Currently there is no consistency in how turf is treated throughout the park, to what extent can trees and shrubs be pruned, when and how can the park make a determination to remove trees or other plantings, or if removed vegetation can be replanted. This SOP will clarify these issues and will set the standard for grounds maintenance.

### **Procedures**

*General recommendations for turf care:*

- Recommended mowing frequency: every 5 – 10 days during the growing season (as needed).
- Remove no more than 1/3 of the leaf blade during a single mowing. Mowing at these heights reduce thatch (partially decomposed organic matter accumulation) No need to pick up clippings, they do not add to thatch buildup and will break down naturally.

- Sharpen mower blades regularly (dull blades tear and bruise grasses instead of cutting and increase the risk of disease infection).
- Periodic dethatching is recommended, this is best accomplished during the growing season due to the damage dethatching can cause to the plant.
- Soil tests should be done prior to fertilization to determine the need and rates. Over application of Nitrogen can increase thatch buildup.
- Water as needed
- Turf will not be allowed to grow more than 3" height

**Zoysia grass** – "*Zoysia japonica*"

- Recommended height: can be maintained between 3/4 and 2.5 inches
- Drought tolerant

**Manila grass** – "*Zoysia. Matrella*"

- Recommended height: between 3/4 and 2.5 inches,
- Builds up thatch faster than "*Zoysia japonica*".
- Drought tolerant

**Carpet grass** - "*Axonopus compressus*"

- Recommended height: between 1 and 2 inches
- Grows well on compacted soils
- Not drought tolerant

*General Tree Care Recommendations:*

Before pruning a tree you should have clearly defined objectives. No more than 25% of live foliage **shall** be removed from a tree in one growing season. When pruning a live branch back to a lateral on that same branch, be sure the lateral you cut back to is at least 1/3 the diameter of the branch part you are removing. Pruning not only removes vegetation from the plant, it also stimulates growth. The more you prune the more you have to prune. All work **shall** be performed in accordance with the ANSI A300 pruning standard, and the ANSI z 133.1 safety standard.

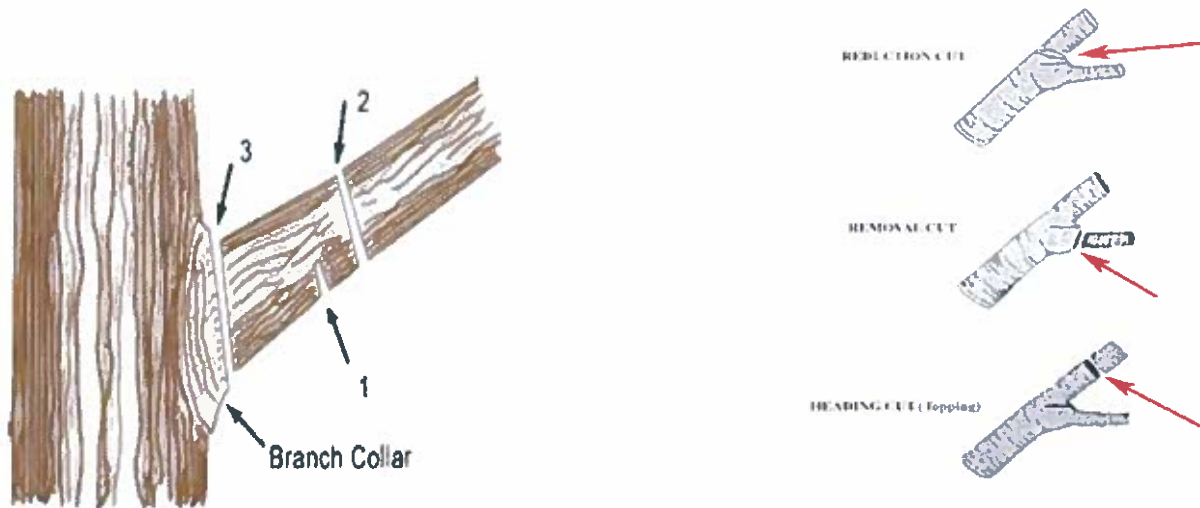
Objectives:

- Reduce the risk of failure – Training of young trees helps to develop a strong architecture. Structure can be corrected on older trees but is better to accomplish on younger trees as it will produce smaller wounds. Trees can be cleaned, thinned, reduced, raised, or restored to manage risk.
- Provide clearance – Raising trees above walk ways and roads, clearing building entrances, etc...
- Reduce shade and wind resistance – Opening tree up so that air and sun can penetrate into the center of the canopy.
- Maintain health – Removing dead, diseased, broken or rubbing / crossing branches.

- Influence flower and fruit production – Removing some fruit can help the remaining fruit to grow larger, removing flowers can reduce the amount of fruit that sets on a tree.
- Improve a view – Enhanced view by removing live foliage from the canopy.
- Improve aesthetics – Improve a trees appearance.
- Pruning Methods (Types):
  - Pruning to clean – Removal of dead, diseased, detached, cracked, and broken. This type of pruning can happen anytime during the year. This type of pruning reduces risk of tree parts failing, reduces the movement of decay, insects, and diseases from dead or dying wood.
  - Prune to thin – The selective removal of live branches to reduce the crowns density, proper thinning retains the crowns shape and size as well as equally distributing the foliage throughout the crown. Thinning Increases light penetration and air movement through the crown, as well as wind resistance.
  - Prune to raise – The selective reduction or removal of branches to provide vertical clearance.
    - Excessive removal of lower limbs can slow the development of trunk taper, cause cracks or decay in the trunk, and can concentrate foliage at the top of the tree. Maintain at least a 50% crown ratio which is the ratio of the live foliage from the top of the tree down to where branching stops. No more than half of the trunk should be exposed when you have completed this type of pruning.
  - Prune to reduce – The selective removal of branches and stems to decrease the height and or spread of a tree. This type of pruning is done to minimize the risk of failure.
  - Structural pruning – The removal or reduction in size of live branches and stems to influence the orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems. Used on young to medium aged trees to help engineer a sustainable trunk and branch arrangement.
  - Pruning to restore – the selective removal of branches, sprouts, and stubs from trees that have been deformed due to topping, vandalism, improper pruning, storm damage, or other types of damage. The goal is to restore the trees structure, form and appearance.
  - Pollarding – a tree training system that involves heading the first year followed by annual sprout removal at the same point, to maintain trees at a pre-determined size or to maintain a formal appearance. Once trees have been headed back that first time the pruning of sprouts at the same location will form knuckles or pollard heads and trees produce sprouts from these heads.
  - Pruning palms – the removal of fronds, flowers, fruit, stems, or loose petioles that may create a hazardous condition. Palms may also be pruned for aesthetics to eliminate sprouts and stems, or dead fronds and seedpods. Live healthy fronds should not be removed. If live fronds are removed avoid removing fronds that start above horizontal.
  - Pruning conifers – Very little pruning needs to be performed on conifers. Mostly crown cleaning to remove dead, diseased, and broken. Pine growth may be reduced by shortening new growth (candles).

#### Pruning Cuts:

- Branch removal cut (thinning cut) – Removal of a branch back to its point of origin on the trunk, stem, or larger branch. This cut should be made as close to the trunk as possible without cutting into the branch bark ridge or branch collar, without leaving a stub.



- Reduction cut (cutting to a lateral, lateral cut, drop crotch cut) – Shortens a limb or branch back to a smaller lateral branch or similarly sized limb. Reduction cuts are commonly used in structural pruning, or when reducing the size of a tree.
- Heading cut (topping cut, or lopping cut) – is made between branches. This type of cut leaves a stub. Heading cuts are rarely appropriate on established trees. They can be used on the current season's growth to remove old flower heads (dead heading) and developing fruit, or to reduce the length of a branch or sprout to improve appearance. (Do Not Use Heading Cuts To Reduce The Height or Size Of A Tree. This is called topping and is extremely damaging to trees.)

#### Minimum Pruning Specification Requirements:

- Clearly state which trees are to be pruned. Identify the location and the species
- Include a statement that all work **shall** be performed in accordance with the ANSI A300 pruning standard, and the ANSI Z 133.1 safety standard
- Include clearly defined pruning objectives
- Specify the types of pruning to be performed to meet objectives
- State the size specifications of the minimum and or maximum branch size to be removed
- Specify the maximum amount (expressed as a percentage) of live tissue that can be removed. (remember no more than 25% of live foliage **shall** be removed)

## **Removal and Replanting of Vegetation**

If the park decides to remove a tree, it will do so when it has been determined that it is sick and can't be restored to health, has died, when it represents a safety risk, or when there is a risk of resource impairment. The park will consult with a certified arborist and a cultural resource specialist to perform removal minimizing risks to the resource. As a general rule the park will not replant vegetation in those areas where it has been removed either by an "Act of God" (tree, shrub or plant dies, hurricane or any other natural disaster) or where it represents a risk of impairment to a cultural resource. The park however can replant or substitute landscape elements when these are part of an approved landscape treatment plan.

## **Park Housing**

Park housing units (Building 210 and Building 211) will be exempted from this SOP with the exception of tree removals and the planting of trees. Residents should request removal only when it has been determined that the tree has died, when it represents a safety risk, or when there is a risk of resource impairment. The park will consult with a certified arborist and a cultural resource specialist to perform removal minimizing risks to the resource. Removal of trees from the housing units will be consulted with the park's Facility Manager and approved by the Superintendent. Planting of trees will be prohibited unless it is part of an approved landscape plan.

## **Site Specific Landscape Maintenance**

### *Esplanade of El Morro*

- Planting of trees will not be allowed on the esplanade.
- Existing shrubs such as the sea grape trees surrounding the Santa Elena Gunpowder Magazine will be maintained at a height of no more than six (6) feet.
- Pruning of the sea grapes will follow the general tree pruning recommendations (see above).
- Turf in the esplanade will be maintained at no more than three inches high.
- Turf will be replaced in areas where it has been damaged due to erosion, or mechanical removal.

### *San Cristóbal Outworks*

- Planting of trees will not be allowed on the Outworks.
- Existing sea grape trees in the area between the Santa Teresa Battery and La Princesa Battery will be maintained at a height of no more than four feet.
- Pruning of the sea grapes will follow the general tree pruning recommendations (see above).
- Turf in the Outworks will be maintained at no more than three inches high.
- Turf will be replaced in areas where it has been damaged due to erosion, or mechanical removal.

- Any changes to the landscape in the area will follow the recommendations contained in the *Cultural Landscape Report for the Outworks of Castillo San Cristóbal* (2016).

#### *Paseo del Morro National Recreational Trail*

- Planting of trees will not be allowed on the trail.
- Existing sea grape trees along the trail will be maintained at a height of no more than two feet.
- Pruning of the sea grapes will follow the general tree pruning recommendations (see above).
- Turf in the trail will be maintained at no more than three inches (3") high.
- Turf will be replaced in areas where it has been damaged due to erosion, or mechanical removal.

#### *El Morro Scenic Trail*

- Planting of trees will not be allowed on the trail.
- Existing trees along the trail will be maintained at a height of no more than six (6) feet.
- Pruning of trees will follow the general tree pruning recommendations (see above).
- Turf in the trail will be maintained at no more than three inches (3") high.
- Turf will be replaced in areas where it has been damaged due to erosion, or mechanical removal.
- Vegetation will be maintained off the natural trail, which also enables the park to maintain a corridor for performing maintenance on the walls of the San Antonio Bastion.

#### *San José de las Palmas Bastion (Las Palmas)*

- Planting of trees will not be allowed on the bastion.
- Existing trees in the bastion will be pruned regularly following ANSI standards.
- Pruning of the trees will follow the general tree pruning recommendations (see above).
- Pruning of trees will be performed after assessment by a professional arborist.
- Vegetation will be removed from the walls as part of the park's preventive maintenance program.
- Dead trees will be removed from Las Palmas and will not be replanted.

#### *Visitor Center Parking Lot*

- Planting of trees will not be allowed on the parking lot green areas.
- Existing almond tree in the bastion will be pruned regularly following ANSI standards.
- Pruning of trees will be performed after assessment by a professional arborist.
- Pruning of the trees will follow the general tree pruning recommendations (see above).
- Turf in the parking lot area will be maintained at no more than three inches (3") high.
- Turf will be replaced in areas where it has been damaged due to erosion, or mechanical removal.



### *Fort San Juan de la Cruz (El Cañuelo)*

- Planting of trees will not be allowed on the grounds of the fort.
- Existing sea grape trees in the grounds will be maintained at a height of no more than four feet.
- Existing palm trees will be pruned according to ANSI standards
- Pruning of the sea grapes will follow the general tree pruning recommendations (see above).
- Turf in the grounds of the fort will be maintained at no more than three inches high.
- Turf will be replaced in areas where it has been damaged due to erosion, or mechanical removal.
- Dead trees will be removed from the grounds of the fort and will not be replanted.

### *City Wall Bastions*

- Planting of trees will not be allowed on the bastions.
- Turf in the bastions will be maintained at no more than three inches high.
- Turf will be replaced in areas where it has been damaged due to erosion, or mechanical removal.

## **Bird Nesting Protection**

When pruning a tree, park employees will take the utmost care in not disturbing bird nests. If they are found while performing work, employees must stop pruning the tree and notify their supervisor. To continue work, bird nest need to be empty. If the nest is not empty then tree should be identified so it is not pruned.

## **Safety Recommendations:**

Employees will follow the recommendations of the *Lawn Mower Safety Plan* (2013) when conducting turf care operations.

## **References:**

*American National Standards Institute (ANSI) A300 for Pruning and Trimming*  
*Lawn Mower Safety Plan* (2013)

## **Appendix A**

### **Map of Maintained Landscape Areas**



# National Park Service

## San Juan National Historic Site











Notes

Legend

0.6  
0  
0.28  
0.6 Miles  
Denver Service Center -- WWW.NPS.GOV/DSC

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.  
THIS MAP IS NOT TO BE USED FOR NAVIGATION

## Legend

	Esplanade of El Morro
	San Cristóbal Outworks
	Paseo del Morro National Recreational Trail
	El Morro National Scenic Trail
	San José de las Palmas Bastion (Las Palmas)
	Visitor Center Parking Lot
	Fort San Juan de la Cruz (El Cañuelo)
	City Wall Bastions

## Appendix B

Trees have a species specific natural form that they tend to grow into. Often times we have trees planted in an area or in a position where that natural form will grow into a conflict with other resources. An example of this would be trees in parking lots where the lower scaffold limbs are in conflict with the cars. In this case we could go in and set our objectives for the job to provide clearance to the cars in the parking lot.

### Example Pruning specification:

#### Pruning specification for parking lot A7

- Located on the northwest side of the park (see map included)
- All trees to be raised have been flagged with blue flagging tape (or use some other identifier)

#### Objectives:

- Crown clean
- The blue flagged trees in Parking lot A7 **shall** be pruned to provide clearance for parked cars
- Trees **shall** be raised to a height of 7 feet of clear trunk above the parking space grade

#### General Procedures:

- Remove all dead, diseased, detached, cracked, and broken branches 1 inch diameter or greater
- Raising of canopies **shall** be done through branch removal and reduction cuts
- Maintain at least a 50% live crown ratio which is the ratio of the live foliage from the top of the tree down to where branching stops, compared to the height of the tree. Example: If a tree is 100 foot tall, and the live crown goes from the top of the tree to 25 feet above the ground, then this tree is said to have a live crown ratio of 75%. 75% of the total tree height has live foliage
- No more than 25% of live foliage **shall** be removed from any tree during the pruning operations

#### Specific Procedures:

- Identify and document tree defect not corrected through pruning operations
- Include any other specific directions for the work to be accomplished such as
  - Arborists **shall** use protection mats if they are to move any equipment off of paved surfaces.

#### Pruning techniques:

- Pruning cuts **shall** be in accordance with ANSI A300 pruning standards.

#### Tools and equipment:

- Climbing spurs **shall not** be used when climbing trees, except to climb a tree to be removed or to perform an aerial rescue of an injured worker.
- Equipment and work practices that damage bark or cambium should be avoided.
- Rope injury from loading out heavy limbs should be avoided.

#### General:

- A certified arborist **shall** be on site at all times during work activities.
- Violation of these procedures and techniques could result in termination of you contract without payment.
- All debris **shall** be removed from the site at the completion of the job.

#### Safety:

- All work **shall** be performed by workers trained in accordance with ANSI Z133.1 safety regulations as required by OSHA.

#### Areas of inclusion:

- Provide a brief description of the trees to be pruned so there can be no confusion. A map is often very helpful.

#### Exclusions:

- Provide a brief description of the trees and large shrub that are not included in the bid

#### Additional Requirements:

- All debris and equipment **shall** be removed from the site by the end of each workday.
- The selected contractor **shall** be required to furnish a certificate of insurance to include liability, automotive, and worker's compensation before commencing work.

With detailed specifications such as these, all firms will be bidding on the same work, and with time, bids will be more competitive and closer to each other in price. These specifications will also scare away the under qualified firms that should not be working on these trees anyway.