

## Exhibit M

# Tree/Palm Conflicts and Mitigation Procedures

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### Overview

Pelican Sound is a beautiful, highly tree canopied community in Southwest Florida. The canopy street and neighborhood trees, as well as palms within Pelican Sound are an important community asset and part of the green infrastructure. The trees and palms provide the following benefits:

- Reducing surface water runoff
- Lower temperatures
- Decrease air pollution
- Cut down on heating and cooling expenses
- Provide aesthetic benefits
- Reduce atmospheric carbon dioxide
- Boost health and well-being
- Raise property values
- Provide habitats for wildlife to thrive

Pelican Sound is working to retain the community tree canopy now and for the future. Following the lead of other cities and communities that work hard to protect and extend the life of existing trees, Pelican Sound owners and residents are encouraged to use efforts that “mitigate” tree conflicts, rather than remove trees.

As trees and large palms planted within the Pelican Sound community have grown, their crowns (top) and roots (bottom) expand and can create conflicts with surrounding improvements. The improvements include structures, sidewalks, drive and both overhead and underground utilities. Larger maturing trees have bigger structure and conflicts are heightened.

Within the existing Pelican Sound landscapes, the native live oak (*Quercus virginiana*) is the large maturing, dominant tree and the native cabbage or sabal palm (*Sabal palmetto*) is the dominant large palm. These two larger maturing plants create the

natural community beauty and are causing the majority of the tree and palm conflicts within the community.

Pelican Sound has underground utilities and that dramatically reduces tree and palm crown conflicts, however it creates additional root conflicts. Trees around overhead lights need to be pruned to achieve reasonable lighting for safety of the desired area.

### **Tree/Palm Damage and Disease**

Trees and palms are subject to disease, physical damage from human activity and weather.

Human activity tree and palm damage is most frequently caused by landscape maintenance equipment, including lawn mowers and string trimmers. Other human tree and palm damage causes can be construction equipment access or construction methods such as underground trenching or other types of excavation. Vehicle accidents for street trees and palms along roadways can severely impact tree and palms. The use of climbing spikes on trees or palms causes unacceptable damage to the plants and should not occur. Prevention, and minimization of damage, is clearly the best option for human tree and palm damage. Sound tree and palm protection specifications in all construction related projects can dramatically reduce damage.

Weather damage in South Florida is most often associated with summer tropical weather systems, like tropical storms and hurricanes, but tree and palm damaging high winds and larger amounts rain can come at any time of the year. Most recently, Hurricane Charlie (2004) and Hurricane Irma (2017) has impacted millions of tree and palms in most of Florida, especially Southwest Florida. Properly maintained Tree canopies with scheduled pruning to thin the canopy and maintenance of its natural shape can minimize the damaging effects of high winds. Crown damage to trees and palms, especially by high winds, can cause tree branch or palm frond failure. Most often structural pruning can address this damage and make the trees and palms safe again. It is very important to identify broken, but not fallen, branches (hangers) and correctly prune them from the trees. If the tree or palm root system has been compromised through uprooting, careful review is needed to determine if the tree and palm can be reinstalled, staked or needs to be removed.

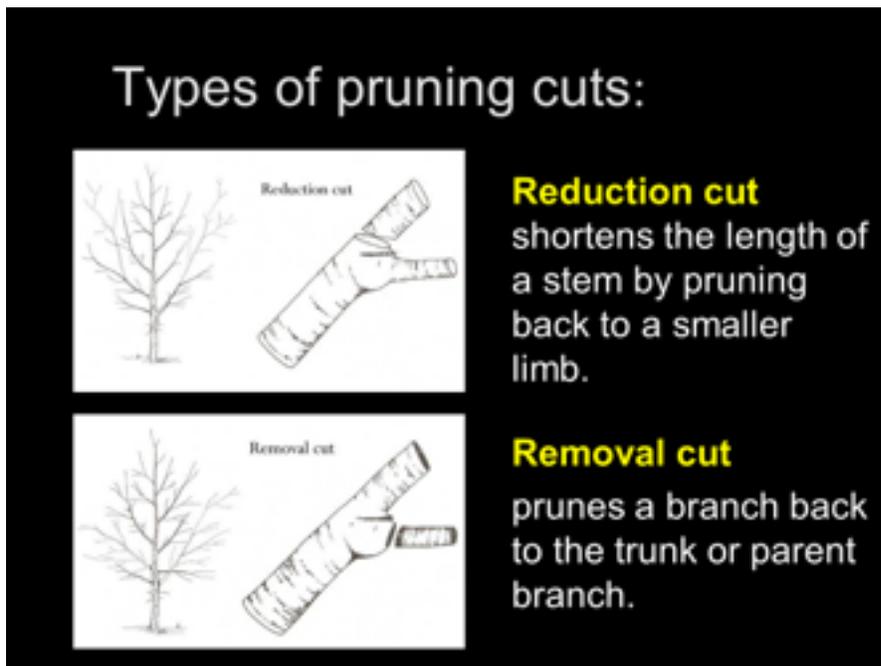
If tree or palm suffers disease, damage from humans or weather has occurred, assessment of the severity and evaluation of corrected actions need to be undertaken. It is recommended a ISA Certified Arborist provide advise under these circumstances.

## Tree Crown Conflicts & Mitigation

Tree and crowns (tops, heads or canopies) can conflict with improvements such as roadways, driveways, sidewalks, buildings, other landscape plants, signage, and lights. Fortunately, most of these relatively minor conflicts can be and are addressed through maintenance and good structural tree pruning.

Tree branches that rub on houses in normal conditions can cause serious damage to those residences in storm conditions. If tree branches are frequently rubbing or are in constant direct contact the house or building, they become a conduit of entry for pests, like squirrels, rats and insects, to enter the building. It is important to address rubbing tree branches as part of tree pruning maintenance. It is acceptable to prune a non symmetrical canopy to avoid contact with a building.

Trees have more flexibility than palms to allow pruning to solve most crown related conflicts. Tree crown pruning can be done through reduction or removal pruning cuts to raise or lift the tree crown to address and maintain minimum roadway, drive and sidewalk height clearances. Carefully conducted tree pruning can be done to achieve longer term conflict solutions.



While some homeowners express concern over the “messiness” of trees, leave (needles with pines) and seed (acorns with oaks) are part of the natural function. These are not valid reasons to remove trees. Those concerns need to be addressed through landscape maintenance.

## **Palm Crown Conflicts & Mitigation**

Most large palms, and certainly cabbage palms, grow from one stem or trunk. This single stem can limit options for pruning to address a conflict. Pruning of palm fronds can temporarily reduce specific building or lighting conflicts. If the trunk or crown of the palm is simply too close to the improvement, other long-term solutions need to be explored. It is acceptable to prune a non symmetrical canopy to avoid contact with a building.

Because palms, including large sized palms, can be transplanted much easier than trees, moving the palm creating the conflict on the site should first be considered as a viable option to removal. Consideration for moving the palm needs to include overall health, size, accessibility for moving equipment and a suitable recipient location to move the palm.

Where it is determined that that a palm need to be removed from a specific location and it is not practical to relocate it on site, then a replacement new palm can be a planted.

## Tree Root Conflicts

Tree roots are the most significant conflict for Pelican Sound trees. Many trees were planted in close proximity to improvements. Tree roots can negatively affect roadway surfaces, curbing, driveways, sidewalks and underground utilities. Large maturing trees, no matter the species, have extensive, large root systems.

Tree roots conflicts can start at the tree's trunk bottom at the root flare. As a tree grows, the trunk grows and the root flare increases in size both up (vertically) and out (horizontally). Large diameter tree roots originate at the root flare as shown in the photo below.



Trees roots provide many vitally important functions for the tree. Woody roots are large lateral roots which form near the root flare. The primary purpose of these roots is support and anchorage for the tree. The woody roots also provide water and mineral transport as well as carbohydrate (food) storage.

## Root Conflicts Mitigation

There are many techniques to address tree root conflicts. The best method is to insure tree installation is done in a manner that provides long-term reduction in root conflicts. Many trees in Pelican Sound exist in great planting locations. Other trees were installed in areas that resulted in various levels of root conflicts. Root conflicts with sidewalks in the easement in Pelican Sound are maintained by the River Ridge CDD.

The first step in addressing tree root conflicts is to evaluate to determine the level and severity of that tree root conflict. Items used for that determination are:

- Tree species
- Current tree size, including trunk measured at diameter breast height (dbh)
- Total available growing area for the tree root system
- Site improvement is being impacted
- Severity of the root conflict to the improvement
- Part of root system is creating the conflict - location of root plate and buttress roots
- Long-term consequences of the root conflict

Once these items are determined, the mitigation plan to address the conflict can be decided.

## Mitigation Techniques

- Repair Water and wastewater Pipe Leaks
- Grind down or shave concrete or paver tops
- Tree Root pruning - Minimum necessary to achieve needed results
- Installation of Physical Root Barriers
- Slabjacking or Poly Jacking to level Concrete Pad
- Replacement Concrete Strategies
  - Crushed rock underneath Reinforced Concrete
  - Bridging or ramp up to raised surfaces
  - Rerouting
  - Replacing Concrete with Pavers over Sand, Gravel or Stone
- Reroute Water Pipes or Utility Lines
- Relocate Utility in Conflict

### **Concrete or paver top grinding or shaving**

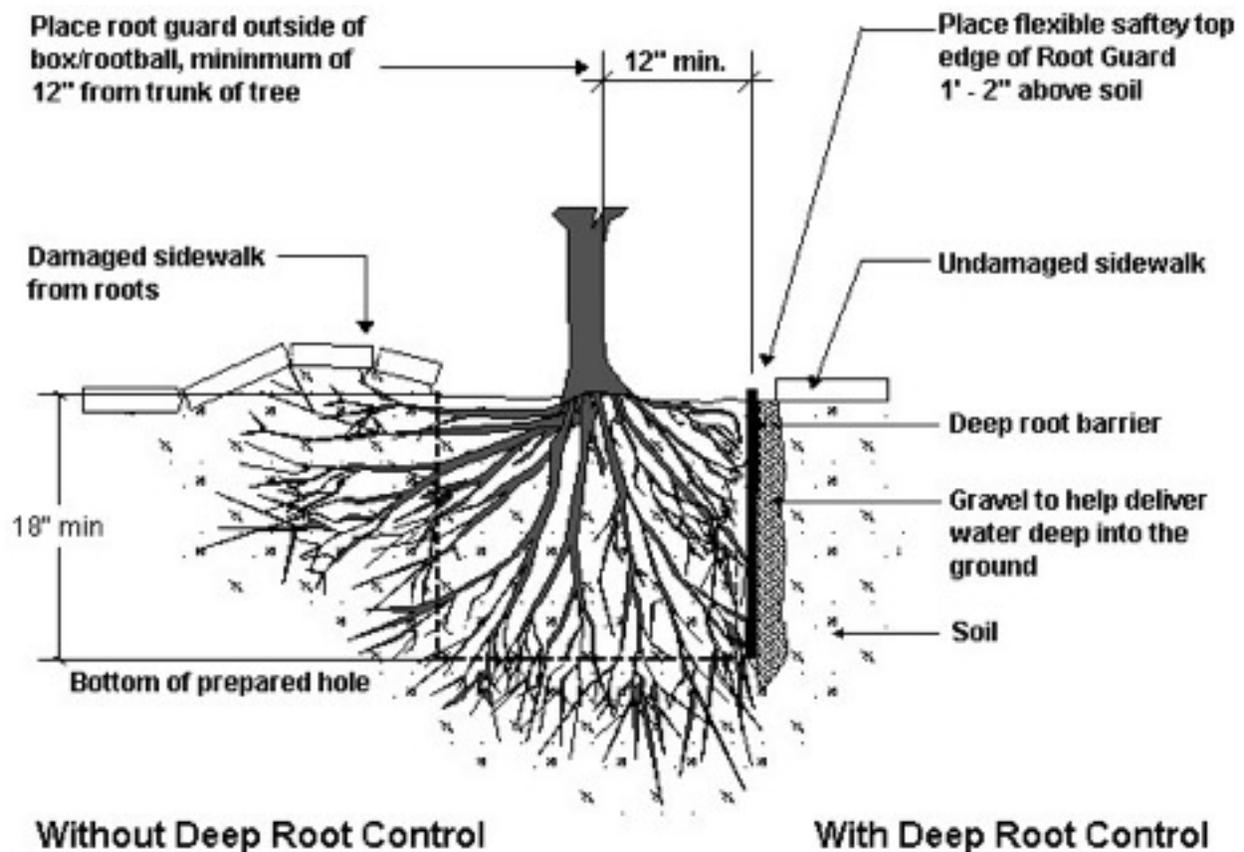
Once a slab is lifted by roots, it can be shaved down several times until the thickness of the sidewalk is too small to support the weight of pedestrians and golf carts using the sidewalk. This relatively inexpensive technique should be used at first to even out lifted sidewalks is typically temporary. Another version of shaving is the use of asphalt to level the sidewalk slabs where they have lifted. Asphalt on a concrete sidewalk is not a very aesthetic alternative.



Photo by Foam Tech

## Tree Root Pruning and Root Barriers

Pruning tree roots in combination with other preventative procedures, can be a successful root conflict solution. The “dose” or amount of root pruning needed is critically important to evaluate. Root pruning alone, without other preventive techniques, may only be temporary conflict solution. Other preventative root conflict procedures include the placement of or addition of barriers to tree root intrusion. The illustration below demonstrates deep root control with the installation of a root barrier versus the shallow root growth without a barrier.



A problem with root pruning can be the loss of tree stability. Trees have stability against wind throw because of the lateral roots. Tap roots are rare and quite small in most broadleaf trees and provide virtually no support. When the important lateral roots are pruned, tree stability can be reduced.

Research at the Bartlett Tree Research Laboratories has demonstrated that cutting large lateral roots within the root plate, which is a distance from the trunk of three times the trunk diameter, can destabilize a tree. For example, a 20-inch diameter tree should not have roots cut closer than 60 inches from the tree ( $3 \times 20 = 60$ ). Root pruning should only be done when all other methods have been judged as not feasible.

This photo shows two very large cuts through the root flare and large roots at the base of the trunk. This severe cutting will initiate massive decay in the major roots and trunk base. The trees will likely become unstable as a result of this type of treatment. This is not an acceptable mitigation technique.



Photo from UF - Dr. Ed Gilman

### **Slabjacking (Concrete) or Poly (Foam Jacking)**

This is a process where concrete or foam is injected under high pressure beneath the low side of a lifted slab causing the slab to lift upward to match the lifted section of the adjacent slab. This does not negatively affect the lifted slab



Photo by Foam Tech

### **Reinforced concrete as replacement**



Photo by Garden Gates

**Crushed rock underneath creating rooting expansion space**

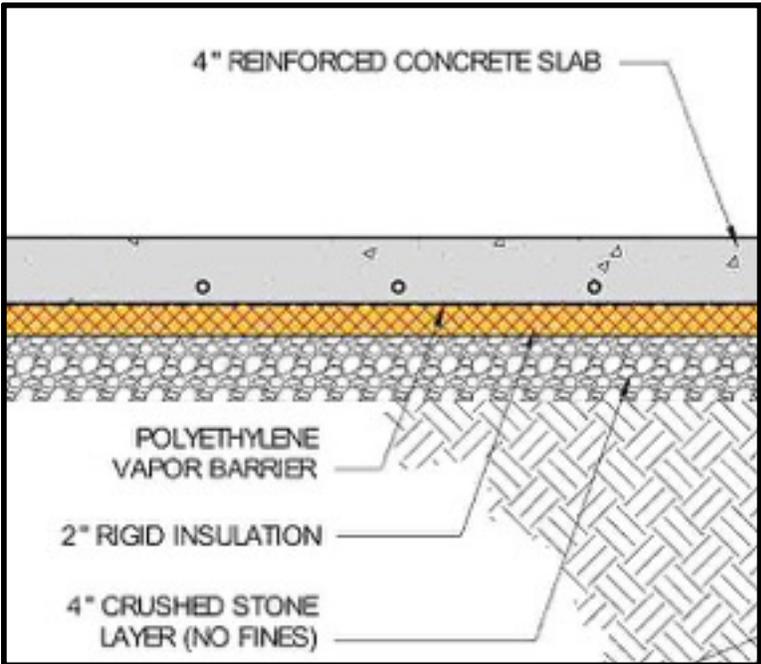


Photo by Green Building Advisor

**Bridging over tree roots**



Photo from Eco-Terra Landscape Consultants

### **Ramp up to risen surface**

In lieu of cutting roots, raise the replacement sidewalk or driveway over the offending roots.



Photo by GlibneyCE

### **Reroute sidewalk or add cut out in driveway**



Photo by The Columbia Heart Beat newspaper