## Dennis Swartzell—Tree Protection and Preservation: Removing Turf with Minimal Impact to Existing Trees

[00:00:12] **Olivia Simonton:** Hello and welcome to the ISA Conference Rewind video series. My name is Olivia Simonton, and I'm the Component Specialist at the International Society of Arboriculture. Today, we're excited to bring you a presentation by Dennis Swartzell on Tree Protection and Preservation: Removing Turf with Minimal Impact to Existing Trees. This presentation was originally given at the 2022 Virtual Conference, and the views seen here are those of the presenters. So, if you're interested in the impact on water scarcity, sustainable solutions for tree survival, and alternatives to turf grass, I expect you will like this presentation. Sit back, relax, and enjoy.

**Dennis Swartzell:** Well, good morning. My name is Dennis Swartzell, and I am in sunny Las [00:01:00] Vegas, Nevada. It's a beautiful day here, and we're going to talk a little bit about tree protection and preservation. And this subtitle is removing turf with minimal impact to the existing trees. And you may wonder why we're talking about removing turf grass. Well, that's a good question. Here's the reason why.

This is the intake towers for the Hoover Dam, which is right outside of Las Vegas, and this Lake Mead is behind the dam and it provides water for Arizona, Nevada, and California, as well as Mexico. The drought that we're experiencing has resulted in significant loss of water in the reservoir. As you [00:02:00] Vegas can see it's pretty close to being full in 1999. That's 99 percent capacity. 2004, it was down to 46 percent, and today it's 27 percent. And that's significant loss, and it has a lot of people, including myself, pretty concerned about our water resources.

So, in the Western United States, we are in the midst of a 20-year megadrought, and this affects all of the West in the US and Mexico. It's prompted huge reductions in water use in all of the states but in Southern Nevada in particular, because we get the lowest allocation of all the other states in the Colorado River pack. So, what this has [00:03:00] prompted is a mandate from the state to reduce water use on turf grass in non-residential properties that is watered from the Colorado River, and this mandate must be met by the year 2027. So, they're going to give everyone a bit of time to get that turf grass out and change it over to water efficient landscaping. They anticipate it's going to reduce about 4,000 acres of turf grass in that period of time. And you might ask what is non-functional turf? Well, we'll show you in just a bit. It's that grass that just can't be used for any recreational purposes.

So, in Southern Nevada, we have a concern that turf removal has a huge impact on the existing trees, [00:04:00] and we've experienced this over the years. And we can tell you that landscape contractors do not have any training in tree protection. They just go in and rip the grass out in whatever manner they can to convert it to no-turf landscaping. The fortunate thing is that Southern Nevada has a group of arborists. We call ourselves the Southern Nevada Arborist Group, or SNAG—that's our acronym—and we have started offering training for landscape contractors—we call them water smart contractors—also, for community and building managers, so that those people that are impacted by this mandate have a better understanding of how it should be done with tree preservation in mind.

The issue for our existing trees is that they are in danger. Our message [00:05:00] is that trees are the most valuable component of the landscape. We have to protect them during these projects, and we have to provide enough water to support the trees once the project is completed, and too often we find that they just don't get enough irrigation to supply what they were getting prior to the conversion.

So, this is what is considered non-functional turf. They're usually parkways along the street side. Obviously, there's no recreational function here. It's just a cooling space that requires water maintenance and fertilizer. So, SNAG, as we call ourselves, has developed specifications with tree protection and preservation in mind, and we furnish these specifications to the water authority, [00:06:00] which is the regulatory agency that makes the compliance come to be. We consider the specs to be the best management practices (or BMPs) for turf removal with tree protection in mind. And here's the first page from the specifications.

So, we encourage all of the owners of the turf to utilize something a little more substantial than just a handshake on the turf removal process. So, we recommend creating a checklist, as you see here, before you even start the project. We want to see if the project is qualified for rebates from the water authority—they do allow some monetary compensation for these rebates—the amount of turf that will be removed because there are limits [00:07:00] on the rebate function, and then we really recommend that the trees are inventoried and assessed for health, because not all trees are capable of surviving the transition. Need to have good design, develop a budget from that, and then figure out where our trenching might occur. And then, we're going to develop an action plan.

So, after we get started, we want to maintain and protect those trees that are going to be retained. We're going to take out all those trees that are unsuitable or might be too crowded, diseased, insect infested. And then we start the turf, elimination. We'll put in a new irrigation system, plant any ancillary trees and shrubs, will finish the surface as we do in the west with our inner mulches, and then control the weeds. So, in the assessment, we [00:08:00] proposed that an arborist should be present to make that determination on whether the trees are in good health. The tree inventory should take into account health and condition, and if possible, an appraisal of value. That gives you a starting point or a benchmark for the value of your tree population. And then we make determinations on if we're going to retain the trees, possibly relocate anything, or removal of weaker trees.

So, we want to note the location of the trees in proximity to other utilities, other trees, structure. Look at health and condition. Look at any defects, diseases, insects. Look at potential longevity. Some trees don't last that long, especially in our desert region. Select the best for retention, appraise that value, [00:09:00] and then take those weaker trees out before we start any other work. All the trees that are to be saved should be prominently marked, and then those that are to be removed should be eliminated before we do any other construction. In that manner, we know that all the remaining trees are to be preserved and protected. And the flagging tape can be whatever color scheme you want. Typically, we use green or blue for those that are retained and red for those to be removed, but there's all kinds of color schemes out there. You just pick the one that seems the most appropriate for your activity. We want to think about those utilities and other trees, structures, disease, insects, overly mature trees that are near utilities, and that sort of thing.

[00:10:00] So, tree species are not the same when it comes to turf conversions. We have found that most of the desert species like mesquites and palo verdes do just fine, pines and conifers as well, oaks,

olives, and pistaches moderately so. Palms are tolerant, but the ash, elms, and plums, pears, and sycamores are fairly intolerant of these turf conversions, and we should be mindful of that.

This process is very stressful on trees, and the way we take the turf out is super critical. We want to minimize any damage or loss of tree roots. More so, we want to prevent soil compaction, because that's significant. And then we want to keep the trees from being damaged by any equipment that might be close by. Keeping the trees hydrated during the project is super important, because remember, [00:11:00] they're coming out of turf grass and going into what is typically drip irrigation, and that has to be sufficient. So, here's a project that was recently completed in our area, using heavy equipment to take the grass out, and that pile there next to the sign is soil, but it also contains a significant number of tree roots. And this is the kind of damage that can occur to trees when heavy equipment is used to remove the turf, and this is very critical the way this is done. If we use skid steer loaders, front-end loaders, even sod cutters, this kind of damage can occur, and it's fairly permanent. It's hard for the trees to recover from this. Remember tree roots are very shallow, [00:12:00] typically in the top 18 to 24 inches of soil. So, any kind of equipment that gets in there will result in either root damage or compaction, both of which are injurious to trees. Tree and turf roots are intertwined in the soil surface. That's why we want to minimize this disturbance.

Remember that turf buffers the surface temperature and provides a consistent even water source for the trees. So, we need to mimic that when we are complete with our project. So, what we recommend is that the trees get protected with temporary fencing out to the drip line, if at all possible. Remember the tree protection zone is typically one to one and a half feet for each inch of diameter trunk. We want to avoid compaction. We call it the silent killer. We want to install [00:13:00] signs, if possible, to denote that this is a tree protection area. Maybe put the value on the sign. Mulch all those areas outside the fence. We're going to have repeated traffic, and then overall manage that moisture level. So, these are examples of temporary fencing. Again, out to the drip line at a minimum, if at all possible. You can group trees and collections. There's no reason to have to fence just individual trees. Actually, this is far better. If you can do a full collection of trees in your temporary fencing. And again, if you can put the signage up, place the value on the tree, that just gives some impact to that importance.

So, the contractor needs to be responsible for executing the contract. So, they need to know what is in the contract. Any [00:14:00] requests for information should be in writing. Both parties should take photos prior to starting work to document the condition of the trees. And then if there are penalties for damage, the contractor needs to be aware of that, and that's where that appraisal comes in to become important. So, the values for damage should be determined according to the appropriate guide from the Council of Tree and Landscape Appraisers.

When we're putting our new utilities in, we should determine where they're located and avoid any installations close to trees. Reroute these, if possible, and tunneling under tree roots is far less injurious if we can't reroute. We want to prevent damage to the trunk. Keep from getting these gouges, as depicted. We want to avoid compaction. [00:15:00] We don't want any parking or storage around the existing trees, during the conversion process. Storage often equals compaction, and that's because you have repeated traffic, potential spills also.

We want to make sure that we have temporary irrigation in place during the construction process. We have to keep the trees hydrated. If we are totally reliant on water trucks, now we have that issue with compaction. It's better to install a temporary irrigation system that utilizes cisterns to be the reservoir

for the water. And here's an example of temporary irrigation system. This is an in-line drip just placed on the soil surface, and you can see it covers a significant amount of area. The way these should be designed is that the irrigation goes out [00:16:00] to the drip line, which is that outermost ring, and then the small circle over on the left, is a 55-gallon drum. That's our cistern. So, this is designed here with the in-line drip irrigation, but it can also be done with point source emitters as well.

Okay, the turf removal process is critical. So, we want to identify the type of turf that is present. If we have warm season grasses, they're a little more difficult to kill. Cool season grasses are far, far easier, like fescue and rye. Most of the contractors use heavy equipment. We think that non-selective herbicides might be a better alternative. We want to use the lightest type of equipment as possible, like a dethatcher or flail mower, because this minimizes compaction. [00:17:00] It requires a little longer period of time to do the chemical kill and the dethatch than it does with a backhoe or a skid steer loader, but it's less injurious.

So, this is what we're trying to avoid. This is not an acceptable loss of roots. And these are from ash trees. These trees will not survive this kind of treatment when you have this number of roots removed. Minimal use of skip loaders, backhoes, skid steer loaders. Even sod cutters, we want to keep that to a minimum. Ripped and torn roots die and do not regenerate. Sod cutters can damage tree roots as well. If you're away from the tree, certainly use any equipment at your disposal. We don't like to lose this soil. [00:18:00] It takes a long time to build this kind of soil in the desert. So, we recommend not even using the sod cutter if possible. Even hand tools are damaging to roots, little less so than the heavier equipment, but it takes a toll on the trees.

One of the better alternatives is to use an air knife (or spade) or HydroJet to loosen the soil over the root plate, and then you just rake the grass out. This is certainly more acceptable than the other equipment that you've seen. One of the most effective methods for eliminating, especially Bermuda grass, which is difficult to control, is using non-selective herbicides. There are many out there. There are other alternatives, like horticultural vinegars and salts. It's best to do some research and pick the best turf eliminator [00:19:00] for your region. That's the most acceptable.

The non-selective herbicides usually have a quick and reliable knockdown. Sometimes it takes multiple applications for Bermuda, but for cool season grasses, one application is generally sufficient. And then once the grass is dead, we recommend removing the thatch with a piece of equipment like this, sometimes known as a verticutter. This minimizes the damage to the tree roots and effectively removes the grass. Once this is done, then you just come in and scout the soil surface down to bare dirt, and this effectively removes the grass but does no damage to the trees. Then we can put our irrigation down, and we're good to go.

This is not acceptable. This is an irrigation line that was installed, [00:20:00] and it's caused significant damage to tree roots. They were putting in a three-quarter-inch line. That's just insane. They should have just moved the line over closer to the sidewalk on the right and then brought in smaller tubes on the soil surface. Tunneling is always a better option than trenching. Sometimes, it appears to be daunting, but actually, it's pretty easy to do if you have a HydroJet or an air knife. If you use the HydroJetting or the Air Spade, then you can actually weave the new utility in underneath the roots and then backfill, and this minimizes the amount of tree damage. If you do have to cut roots, make sure that the cut is cleanly conducted with a sharp tool. Hand saws, loppers, sharpshooters, they all can cut,

[00:21:00] but let's avoid trenchers, axes, and mattocks, because they do not cut cleanly. This is avoidable.

When we put our irrigation system, we need to ensure that we get about 70% of what was provided from the turf grass to support the trees. We want to extend the irrigation out to the drip line to ensure there's adequate moisture, and we want to have enough emitters so that there's no dry spots in between the source of water.

So, this is a photo depiction that a colleague of mine did up for us. This is Russ Thompson's, and this is the typical placement for emitters, three or four right near the trunk. This is unacceptable. What we really want to have is something more along these lines, where we have drip emitters out to the edge of the canopy, or the drip line, [00:22:00] and sufficiently placed so that we don't have a lot of dry spots in between. So, these are examples of in-line drip. One is a semicircular on the left. The one on the right is an in-line drip system in a grid pattern, and Bradley Hill took those photos.

Once we have the project done, we want to make sure that we troubleshoot all the issues. We want to manage the irrigation system. We want to manage the irrigation controller to make sure that we have the right timing. We want to monitor for any tree stress, be prepared for potential losses, and then keep those weeds in check. We want to keep a stockpile of mulch on hand so that we can do patching, and then be very observant. We expect weeds to show up. If you have turf grass and you convert it, [00:23:00] you're going to have issues with weed emergence and that could include the original grass which might have been Bermuda. We get occasional bleed throughs, and then we just typically use a post-emergent herbicide to control these in our new landscape. We want to watch out for stressful conditions. We may see some dieback in the crown. We want to do deep watering periodically to avoid leaf scorch, and then remove any branches that might become disease or insect infested as a result of the stress, and then conduct any necessary treatments, if needed. We want to avoid fertilizing our stressed trees for 6 to 12 months after the operation, because we do not want to fertilize stressed trees. We want to let them get stabilized, and if possible, [00:24:00] we want to conduct a soil analysis to determine the exact nutrients that are needed and then apply those appropriately in spring and fall. We know all about prescription fertilization. Let's practice it.

So, the take home message for tree preservation and protection: we want to plan ahead to protect our trees, avoid the use of heavy equipment, if possible, we want to minimize root loss, provide sufficient irrigation for our matures trees at the size that they will become, monitor the trees for signs of any stress, and then conduct procedures only if they're needed, no pre-emptive strikes.

Okay, there's a huge opportunity for arborists in the West to realize the potential here to do a lot of work to protect trees. [00:25:00] The current drought is likely to continue. They're predicting a potential 40-year cycle here. The issues we are currently facing in Nevada with this mandated turf removal is likely to occur in adjacent states like California, Arizona, New Mexico, Utah. So, we anticipate the need for tree preservation protection in all of those areas, and this creates a real niche operation for tree protection. So, you arborist should be mindful of this. There's opportunities to implement best management practices, and then we will all work together to eliminate water wasteful turf but save our trees.

So, I hope this has been helpful for you today. Remember trees are good, and we want to keep as many as we can for as long as we can. Thank you very much. My name is Dennis Swartzell [00:26:00] and hope to see you soon.