



Norfolk International Airport Tree Report

Phase I

Prepared by Signature Landscapes

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February 18, 2021

Attention: Anthony Rondeau, Deputy Executive Director, Engineering & Facilities

“Ancient trees are precious. There is little else on Earth that plays host to such a rich community of life within a single living organism.”



— *Sir David Attenborough*

Overview: Signature Landscapes was contracted by the Norfolk International Airport to inspect trees located on their property. The inspection was to evaluate the health and current physical structure of the trees and make recommendations respectively. This required on site visual observation and measurements for specific trees located near roadways and infrastructure. These inspection visits commenced in late November and will conclude in early March.

Inspection Protocols: The first inspection was initiated on November 19, 2020. Each tree was measured for Diameter at Standard Height (DSH) which is 4.5 feet above grade, height, and diameter of canopy spread. We, visually inspected the root zone which included the roots and root collar, the trunk, and the crown and branches. In the root zone we looked for cut/damaged roots, decay or fungal fruiting bodies/mushrooms which could indicate decay, girdling roots, buried collars, the root plate lifting or cracking sidewalks, curbs, or roadways and heaved soils.

Trunk inspections included dead/missing bark, included bark, cracks, lightning damage, cankers/galls/burls, codominant stems, decay, sap ooze, heartwood decay, cavities, conks/mushrooms, and lean.

Crown evaluations included unbalanced canopies, live crown ratios, dead twigs/branches, broken limbs/hangers, pruning cuts, lightning damage, cracks, codominant attachments, cavities/nests, weak attachments, cankers/galls/burls, conks, sapwood/heartwood damage or decay and previous branch/limb failures.

Additionally, we examined soil conditions including available volume, compaction, and pavement/concrete over roots. We noted wind exposure, crown density/size, vines/mistletoe, vigor, evidence of

pests/disease and topography. Each tree inspection included potential targets: human, vehicle, or structure.

Trees #1-26:

These trees are located at the entrance to the Departure Terminal along the roadway and adjacent parking lots including a median next to the terminal. All of these trees are Willow Oaks, *Quercus phellos*. At full maturity they can reach a height of 60 feet, have a canopy spread of 30-40 feet and DSH can exceed (24) inches. Of the (26) trees only about seven have the soil volume needed to reach some measure of maturity. Many of these trees exhibit various stages of stress/decline directly associated with limited soil volume and rooting space. This would include dieback in the crown, active disease pathogens, loss of vigor, stunted growth, and incomplete sealing of pruning cuts. Included in the report is a section titled "Special Conditions" where this issue is described in detail and its impact on a tree's longevity. There have already been several trees removed in this area and others have been pruned or the crown has been reduced because of dieback. The median strip has five empty pits where the trees have been removed.

Recommendations: Willow Oaks were not a viable selection for this site because of the soil volume required for them to reach maturity and remain healthy. With the exception of the four trees located in the curve approaching the terminal and maybe three more that may have sufficient soil, the others should be removed.

Currently, we recommend that Trees #'s 14, 15, 23-26 should be removed immediately. All of them are in decline and have dead parts. In an abbreviated time span the others will continue to decline and require parts to be removed for safety concerns. This is a highly trafficked zone with pedestrians and vehicles and their safety is a high priority. Once these trees begin the process of decline they will continue to display dieback and shed limbs/branches. The process may take a few years but the end result will be removal. It seems prudent to remove the entire tree instead of a piecemeal approach that is more expensive in the long term, necessitates an almost constant inspection protocol, and could still cause injury/damage because of falling limbs/branches. Additionally, the narrow strip between the roadway and parking lot restricts root plate development which makes these trees prone to failure in wind events. If removal is not possible at this time all the remaining trees should be crown cleaned (removal of all dead tissue two inches or larger), to minimize potential impact.

Trees #27-39:

These trees are located adjacent to the Skywalk from the Departure Terminal on the south side to the Baggage Claim Terminal and bordered by the entrance/exit road. There are walkways through this area to accommodate pedestrians. It is treed with some mature Loblolly Pines and Oaks. There are some understory trees which are not addressed in our report. The Pines range from approximately 19-29 inches DSH and roughly 75-85 feet in height. Crown spread is between 31-40 feet. General health and physical condition are within normal ranges. One did not observe any significant defects, however some had unbalanced canopies because of the growth habits of other trees.

Specifically #31, a Loblolly Pine with a DSH of 21.4 inches and a height of approximately 80 feet, has its canopy on one side and leans toward the roadway and unloading area for passengers. Pines #27-28 have co-dominant parts. Typically, pines in wind events tend to fail 10-20 feet above grade. Several of these pines, if they failed, could impact the Skywalk, terminal, or the roadway. Trees #34, 35, and 37 are large Oaks. Their DSH all exceed 30 inches, heights above 55 feet and canopy spreads of 47 to 62 feet. All three are adjacent to the roadway/sidewalks and their canopies extend over them. General health and physical condition are within normal ranges for their size. All of them have had some prior pruning and have lost some limbs/branches probably due to wind events.

Tree #37 has a hanger over the roadway which needs to be removed.

Tree #35 has a cavity (1"x 8") approximately 15 feet above grade...unable to determine the extent of cavity because this is a visual evaluation only. No climbing was involved to assess above ground defects. These trees have been able to reach maturity, in part, due to sufficient soil volume.

Recommendations: Due to the walkways and curbside departures the trees need to be crown cleaned (deadwood larger than two inches removed) and some limb/branch structures on the Oaks that overhang the roadway and sidewalk could be reduced to lessen the extended weight load. An aerial inspection should be done by the Arborist doing the crown clean/ limb and branch reductions for any defects not detected by the visual exam from the ground.

Trees #40-51:

These trees are located on the north side of the Skywalk and adjacent to the terminal. It is bordered by the roadway and has sidewalks and asphalt walkways for pedestrians. Most of the trees are mature Loblolly Pines that range from 19-28 inches DSH and have heights of approximately 80 feet. Did not detect any significant defects but because of their heights and some unbalanced crowns they could impact the Skywalk if they failed in a wind event. Tree #51, a Loblolly Pine, leans toward the terminal because of the crown of a large Oak on the opposite side. We noted some wounds on surface roots likely caused by mower damage. Trees #46, 48, and 50 are mature Oaks with DSH from 29 inches to 46 inches and heights of 70-85 and significant canopy spreads. Tree #46, a Black Oak, was crown cleaned and had some large limbs/branches removed in December 2020 that were dead or had dieback. The only other tree is a Bitternut Hickory with a DSH of 14 inches and a height of approximately 40-45 feet. Again, these trees have been able to obtain maturity, in part, due to sufficient soil volume.

Recommendations: All the trees should be crown cleaned to remove deadwood as noted previously. Any type of vine should be cut at the base and removed from the trunk to at least 10 feet. English Ivy can conceal defects and should be removed from any tree located near a building, roadway, and pedestrian access. An aerial inspection should be done by the Arborist doing the crown cleans for any defects not detected by a ground observation. Special Note: A large Oak was removed from this area in December 2020 due to significant dead tissue and progressive dieback. The tree was in decline and photos at the end of the report will show the extent of decay.

Trees #52-79:

These trees are located on the north side of the terminal and bounded by the road on one side and a parking lot on the opposite side. It also includes a median with three Willow Oaks. The majority of the trees have significantly restricted soil volumes. Further exacerbating problems, many are growing on slopes which are impacted by runoff. Several trees have been removed from the median, evidence of crown reduction and limb removal from dieback was observed. Trees #52-59 and #65-70 may have sufficient soil volume at this time to sustain them. Several trees have dead tissue and dieback in their tips indicative of poor vigor. Trees #62, 77, 78, have coalescing wounds that weaken the support structure. On Tree #56 we noted the fungi, Candelaria, on the trunk...it is a lichen.

Recommendations: All of these trees are Willow Oaks and should not have been installed in these planting pits and along the roadway and parking lots. The available soil volume is extremely under proportioned for a mature Willow Oak. Per our previous recommendation they should be removed and replaced with an appropriate species for the planting sites. Tree #70 should be removed immediately. It has shelf conks approximately 12 feet above grade indicative of an active decay organism. It has a wound opening 2.5 feet long that exhibits poor sealing indicating reduced vigor and dieback in the crown. Numbers 78 and 79 have dieback in their tops and should be candidates for removal. The trees with coalescing wounds should also be considered for removal. All the remaining trees should be crown cleaned for safety.

Trees #80-98:

These trees are located along the entrance to a parking lot and the exit road from the main terminal. On the north it is bordered by another parking lot and by the tram route to the baggage terminal. With the exception of two Loblolly Pines (#92,93) they are all Oaks. The topography is flat and has a significantly wider planting zone than the other roadways and adjacent parking lots. This provides for a greater soil volume for the trees. There is evidence of minor pruning on some trees. A few trees have a small amount of oak gall and there is evidence of Candelaria on a couple. Trees #89 and 90 have had their root zones impacted by underground utilities (Refer to photo). Some lawnmower damage to surface roots. Tree #91, a 14.7 inch DSH and 40 feet in height has a co-dominant stem and a lean due to a Loblolly Pine #92. Trees 97-98 are two large Oaks on the other side of the tram route and at the beginning of the ring road with some visible defects.

Recommendations: All the trees should be crown cleaned and some raised to avoid contacting vehicles. Mower heights should be adjusted to prevent future damage to exposed roots. Trees #97-98 should have an aerial inspection on some lower limbs and trunk.

Trees in the median

In front of the baggage terminal: There are (18) Willow Oaks located in these 6x9 feet planting pits. Our best estimate is they are approximately two feet deep and provide roughly 108 cubic feet of soil. This is extremely inadequate for healthy growth and longevity.

Recommendations: These planting pits are not sufficient to sustain the health and potential growth of the Oaks. Please refer to the next section on “Special Conditions “ for a more comprehensive evaluation of this issue.

Special Conditions

The infrastructure necessary for an airport requires buildings, roadways, parking areas, above and underground utilities and structures, walkways, and other improvements. Each of these have an impact on the soil. These impacts include compaction, limited soil volume for tree growth and longevity, directional runoff of rainfall which could transport pollutants into the root zone, elevated temperatures due to asphalt, buildings impeding air movement, and removal of the organic mulch layer common in wooded areas. These are some of the limiting factors for trees growing in these conditions.

The design of the entrance to the terminal and the baggage claim facility provided for planting pits in the medium and along the edges of the parking lots. These pits and areas along the parking lots have a limited soil volume which directly impacts the growth, vigor, and longevity of the trees.

Numerous studies have demonstrated that soil volume and tree growth are directly related to several factors. These include available water, nutrients, evaporation affected by atmospheric conditions and heat sources such as asphalt roadways, direct exposure to sunlight without shading from neighboring trees, and sufficient soil to support the tree. Studies have shown that “one to three cubic feet of soil per square foot of canopy.” is necessary for a healthy tree.

The University of Florida recommendations are small trees (less than 30') need a minimum of 300 cubic feet of soil, trees less than 50' need 1,200 cubic feet, and those taller than 50' need 2,700 cubic feet. James Urban, in his book *Up By The Roots*, recommends a 1,000 cubic feet to grow a 16 inch diameter tree with a canopy diameter of 35 feet. All of the trees in these planting pits and along the roadways and parking lots are Willow Oaks, *Quercus phellos*. These trees can reach a height of 60' at full maturity and have a canopy spread of 40'. Using the University's standards this would require 2700 cubic feet of soil to reach full maturity. The planting pits measure 6'x 9' and the depth is unknown. Assuming standard construction protocols were used in installing the sidewalks and roadways the surrounding soil would be compacted adjacent to the pits and inhibit root growth outside the pit. If the planting pits are two feet deep this would provide approximately 108 cubic feet of soil. This soil volume is approximately 4% of what is the minimum requirement for a tree taller than 50 feet.



This is an unsustainable growing environment for these trees. Not only do they lack sufficient volume but all the attending issues associated with this condition are present. This would include water, oxygen, nutrients, microorganisms, temperature buffers, that would be limited by the lack of soil required for a tree of this size. Additionally, as the tree reaches the threshold of available soil and is unable to continue its normal development its defense system is compromised and disease pathogens and pests can hasten its decline.

This photo is the roadway and median on the Southside of the Departure Terminal.

This has led to the current condition of the trees. Some of the trees have already been removed, some need to be removed, others are in various stages of decline, some are beginning to show early stages



of having exploited the limited soil resource, and a few that may have a sufficient amount of soil still available (these would be the ones located in the curves of the roadway where more soil is available). In time the trees located in the limited soil areas will decline and die. In the picture to the left, in the early years the growth rings are wide, as the soil volume is exploited by the roots the growth rings get smaller until the tree dies.

Disclaimer:

Abnormally extreme storms such as tornadoes, hurricanes and heavy freezing rain are not predictable and in most cases, are not considered for categorizing a likelihood of failure.

The contents of this report are provided "as is, where is", and may change without notice as research and understanding of tree biology, tree mechanics and risk assessment.

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Appendix 1: Image Gallery

TREES 1 - 26



Planting Pit L - Exit Rd, Parking



Planting Pit - R Entry Rd.



Median - Departures

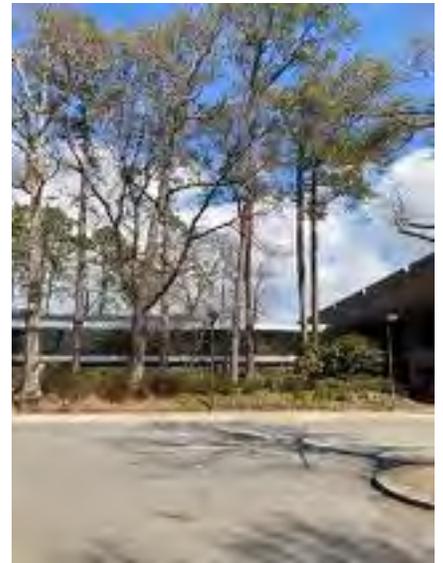
TREES 27 - 39



Terminal, Skywalk South 1



Terminal, Skywalk South 2



Terminal, Skywalk South 3

TREES 40 - 51



Terminal, Skywalk North 1



Terminal, Skywalk North 2

TREES 52 - 79



North Terminal Soil Vol.



North Side Planting Strip

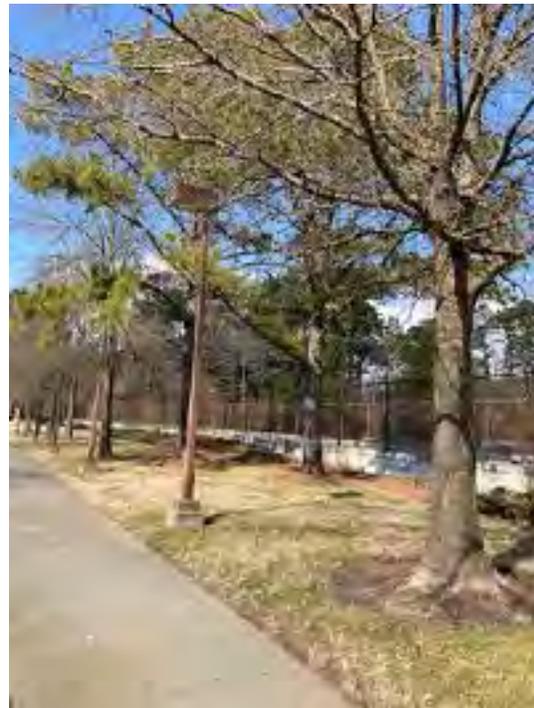


Median, Topped Tree

TREES 80 - 98



Codominant Stem #91



Sufficient Soil Volume

UNNUMBERED TREES



Median Baggage Terminal



Median Baggage Terminal 2

OAK REFERENCE ON PG.5



Oak 1a



Oak 1b



Oak 1c

From: Oscar Richardson
Sent: Wednesday, May 5, 2021 8:25 AM
To: Anthony Rondeau
Cc: Ken Mills
Subject: Re: Additional Trees - Departures North and South Lots

Anthony,

When we inspected the trees last year they were already defoliated and we could not tell whether the buds were new or from the previous year. Now that spring flush is here it is apparent that several of these are in stages of decline due to the limitations associated with limited/restricted soil volume. As noted in the report the available soil volume is not sufficient to sustain a healthy Willow Oak, *Quercus phellos* to maturity and over time these trees will only continue to decline and eventually die. We concur with you that it is prudent and economically beneficial to remove the trees now and not incur additional expenses of safety pruning over a period of years to eventual removal. This species was not suitable for the planting sites and will not survive under the limiting factors imposed by the volume of soil.

Ken Mills: ISA Certified Arborist

Oscar Richardson: Consulting Arborist

From: Anthony Rondeau
Date: Thu, Apr 29, 2021 at 5:34 PM
Subject: Additional Trees - Departures North and South Lots
To: PressuresOnGmail, Oscar Richardson

Ken, Oscar,

Please see the attached document. The trees called out in red are to be removed per your report. I did a walk around today and the trees in blue all look like they should be removed as well. Since the trees have bloomed the ones in blue are looking very bad.

Can you come out and visit these trees and update your evaluation? If you agree that they should be removed the please update your report as necessary.

I would appreciate this being done as soon as possible.

Thanks,

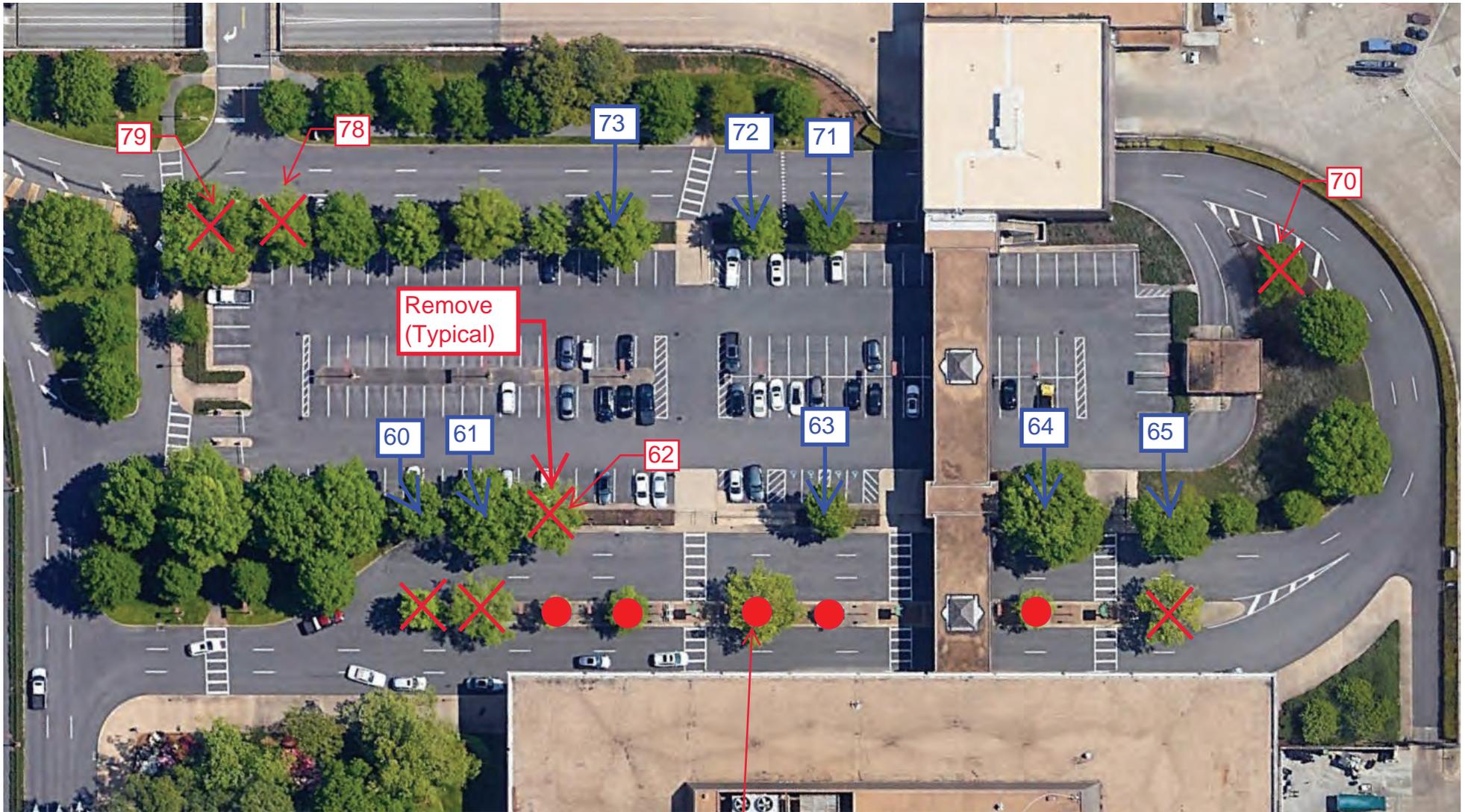
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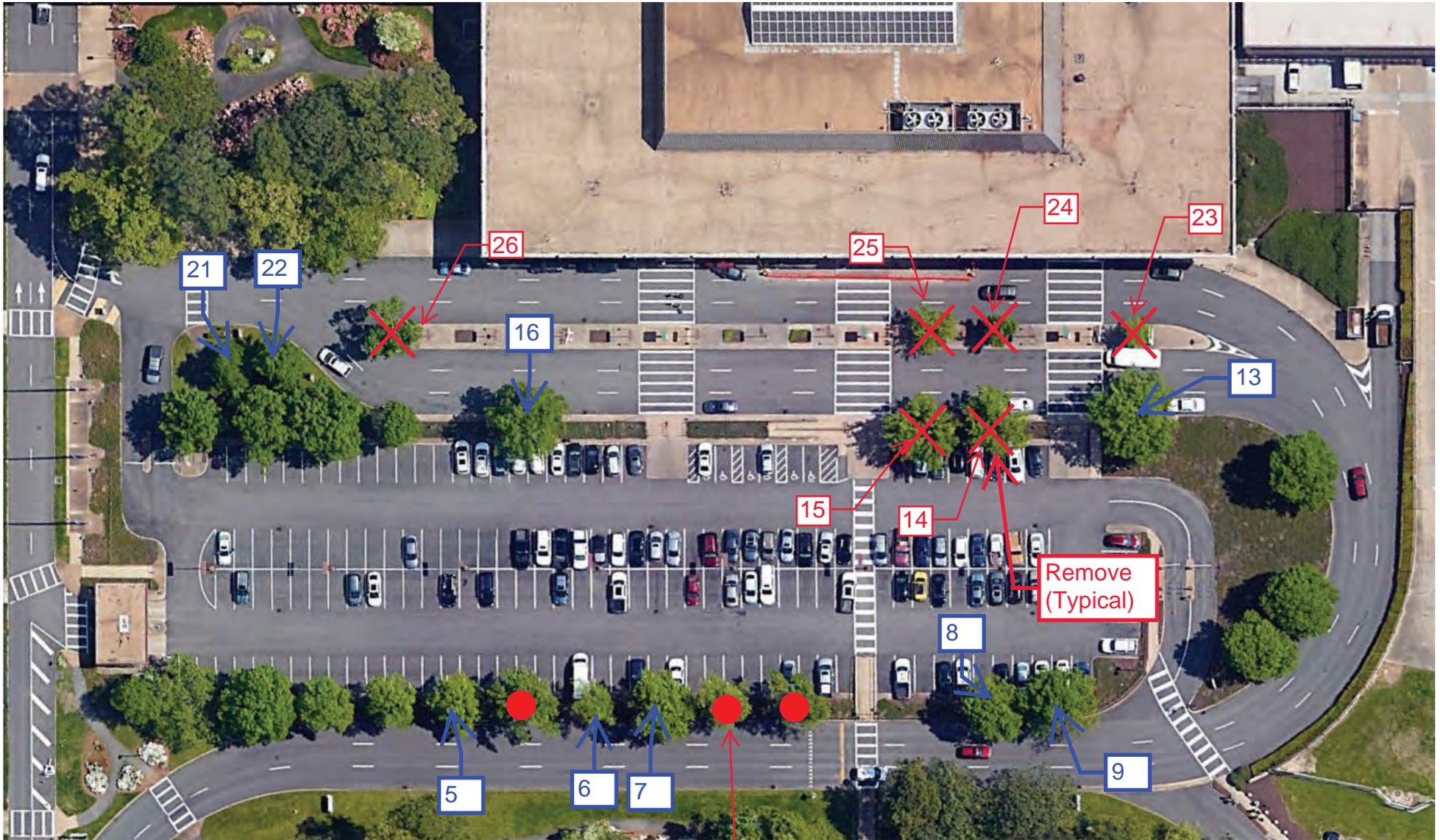
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Phase 1 - Departure North



Trees previously removed due to very poor condition (Typical)

Phase 1 - Departure South



Trees previously removed due to very poor condition (Typical)



Norfolk International Airport Tree Report

PHASE 2

Prepared by Signature Landscapes

Ken Mills, Certified Arborist, #ISA 200922

Oscar W. Richardson III, Consulting Arborist

April 29, 2021

Attention: Anthony Rondeau, Deputy Executive Director, Engineering & Facilities

Overview: Signature Landscapes was contracted by the Norfolk International Airport to inspect trees located on their property. The inspection was to evaluate the health and current physical structure of the trees and make recommendations respectively. This required on site visual observation and measurements for specific trees located near roadways and infrastructure. These inspection visits commenced in late November and will conclude in early March.

Phase 2:

Our inspection protocol shifts from numbering individual trees to identifying trees with specific issues in specified zones that contain a high number of trees. We did this for two reasons. First, the count of trees in the zones numbered in the hundreds and the time required to tag each tree was prohibitive and secondly, many of these trees do not pose an immediate problem because they are located in areas where the potential for a human or physical target is at a minimum or does not exist. We identified trees that are located along the roadways and portions of the interior of the zones that could impact a vehicle or pedestrian. Additionally, we noted trees adjacent to structures that were potential problems. At the end of this report several recommendations are included to reduce and minimize risks associated with people and trees.

Zone A: is located on the right side of the exit road from the Departure Terminal to the blinking light located at the exit of the parking garage. It is bordered by the Botanical Gardens and is separated by a chain link fence.

- Tree #1: 36" DSH Pine, 85' Ht.: tree has a large hanger and rubbing limbs from an adjacent Oak. Remove hanger and reduce rubbing limbs/branches.
- Tree #2: 22" DSH Pine adjacent to Rental Car Return entrance: (1) large broken hanger that is approximately 8-10" in diameter and roughly 20-25' in length. Remove hanger.
- Tree #3: uprooted Oak: tree fell on fence between the Botanical Gardens and the Airport property damaging the fence. It is located 30-40' from the sign noted above.
- Tree #4: Cedar tree next to Parking Garage besides retention pond: prune back from structure.

Following trees are located from the entrance to the Rental Car return parking garage to the front of the Baggage Claim building.

- Tree #5: 26" DSH Pine: remove large hanger and deadwood.
- Tree #6: Pine with top broken out and a 16-18' pole adjacent to each other. Remove both.
- Tree #7: 31" DSH Sweetgum: has several broken limbs/branches, hangers. Remove and safety prune.
- Tree #8: large Pine and Oak: located near electrical transformer housing, Pine has large hanger and deadwood and some limbs/branches for Oak are rubbing on the trunk. Remove hanger and deadwood and reduce interfering limbs/branches from Oak.
- Tree #9: large Sweetgum located 15-20' back from curve in roadway: has a large dead section and broken section from limb loss. Remove both.

Zone B: is located along the right side of the road from the flashing light (exit from parking garage) to the Garage Long Term Parking sign on the same side.

- Tree #1: 26" DSH Red Oak: tree has multiple stems which are dead. Remove.
- Tree #2: 20.3" DSH Sweetgum: canopy extends over roadway and the trunk has a significant lean in that direction. Recommend removal.
- Tree #3: 21.5" DSH Sweetgum: has an approximately 15' cavity in trunk but leans away from roadway. Remove or inspect semi-annually or after any major wind event to assess condition.
- Tree #4: 31" DSH Pine: located approximately 60' from LTP sign, tree has a cavity roughly 35-40' above grade. Needs an aerial inspection to determine extent of cavity and any necessary action.

Following trees are located from entrance to LTP garage to the flashing light on the garage side of the roadway.

- Tree #5: 24" DSH White Oak: tree has decay in its base otherwise appears to be healthy. Needs a semi-annual inspection and after any major wind event.
- Tree #6: 20.3" DSH Sweetgum: tree has some cavities on one side approximately 45-50' above grade. Needs an aerial inspection to determine extent of cavities and any necessary action.
- Tree #7: 14" DSH Oak: tree has extensive decay at 20-25' above grade. Remove.
- Tree #8: 18.5" DSH Tulip Poplar: large wound at base with decay. Remove.
- Tree #9: 27" DSH Pine: estimated diameter because of extensive poison ivy vines. Tree leans toward parking garage. Difficult to assess condition because of vines. Cut vines and then inspect.

- Tree #10: 16” DSH Sweetgum: tree has an old lightning strike wound exhibiting sound wound closure. Needs semi-annual and after any major wind event.
- Tree #11: 29” DSH Pine: has a 5-6’ wound approximately 25-30’ above grade. Leans toward parking garage. Aerial inspection to evaluate extent of cavity and recommend needed action. There is a 40” stump located roughly 25’ to one side.
- Tree #12: 24” DSH leaning Oak: has basal decay but leans toward interior of wooded area. (Refer to recommendations at end of Report)
- Tree #13: 25” DSH Pine: has a possible heaved root plate. It leans toward the guardhouse that appears to be not in use due to the automated ticket entrance. Needs semi-annual inspection and after any major wind event. Located in the interior.
- Tree #14: 22” DSH Oak: tree has several burls and one area of decay from prior limb failure approximately 20’ above grade. Recommend semi-annual inspection. Located in the interior.

Zone C: is located on the right side of exit road from the LTP sign to the bridge.

- Tree #1: 38” DSH Pine: located just past sign, has damage to roots from lawnmower and it is located on a slight slope. Correct mower height to eliminate future damage.
- Tree#2: 24” DSH Pine: basal decay about 8-10” located from grade to approximately 2’. Recommend semi-annual inspection and after any major wind event.
- Tree#3: 16” DSHOak with broken top. Remove.
- Tree#4: 26” DSH Oak: tree has a small opening at base with an approximate depth of 3”. Recommend semi-annual inspection and after any major wind event.
- Trees located from retention pond to bridge.
- Tree#5: 20” DSH Pine: has decay at base 2-3” wide to a height of 3’ above grade. Recommend semi-annual inspection and after any major wind event. Located along drainage ditch.
- Tree#6: fallen Sweetgum: root crown/basal decay.
- Tree#7: 23” DSH Pine: has a wound at approximately 30’ above grade. Recommend aerial inspection.
- Tree#8: 38” DSH Pine: located near stoplight and 25’ from sign. Tree has a decay area 10-12’ long and 6” wide. The wound/callus tissue is sealing well. Recommend semi-annual inspection and after any major wind event.
- Tree#9: 42” DSH Oak: remove lowest limb toward road.
- Tree#10: 27” DSH Pine: top broken out. Drop remaining trunk in natural area.
- Tree#11: 32.5” DSH Oak: has a 4-5’ column of decay in upper canopy on an approximately 12” limb that leans toward road. Remove limb. Has sign embedded in trunk.

Zone D: located between parking garages and area around retention pond.

- Tree#1: 31.5” DSH Oak: it forks at approximately 40-50’ above grade, has a wound about 6-8’ in length with good callus tissue. Has another cavity on trunk with an 8-10” opening 25-28’ above grade. Aerial inspection and if found to be sound remove large limb structure over road. If not, remove tree.
- Tree#2: 22” DSH Sweetgum: covered with poison ivy, the top is dead, and it has several dead stubs from broken limbs. Located in bed with azaleas. Remove.
- Note: there are several trees in this area that need to be crown cleaned.

Trees located around retention pond to exit road behind new parking garage under construction.

- Tree#3: 22" DSH Water Oak: decay in stem approximately 15-20' above grade with fruiting body. Located between planting bed and retention pond in natural area. Aerial inspection to determine extent of decay.
- Tree#4: 17" DSH Sweetgum: has a basal cavity. Recommend semi-annual inspection or after any major wind event.
- Tree#5: 16" DSH Oak: has decay approximately 20' and 28' above grade. If area is posted for no foot traffic the tree can remain because human targets do not have access.
- Tree#6: 18" DSH Oak: cavity located in lower trunk but leans over road. No visible cracks on opposite side. The opening is about one foot in length and seven inches wide and has a depth of approximately one foot. Recommend removal if cavity enlarges, semi-annual inspection and after any major wind event to see if any seams have opened on opposite side.

Zone E: located between the entrance and exit roads adjacent to stoplight, shaped like a triangle.

- Tree#1: 38.6" DSH White Oak: it is approximately 75-80' in height and has a double stem. Recommend the installation of two cables to stabilize canopies.
- Tree#2&3: Oak and Tulip Poplar: both have hangers and large decayed limb. Inspect Tulip Poplar for wound.
- Tree#4: 12" DSH Maple: has a 4" limb approximately 20-25' in length with decay growing toward exit road. Located next to a large Oak. Remove limb.
- Tree#5: 20" DSH Pine: it is 75-85' in height and has a column of decay 3-10' in length above grade. Recommend semiannual inspection and after any major wind event.
- Tree#6: 25" DSH Oak: has possible two trunks to 7-7.5' above grade. Reduce limb load toward light and entrance road.
- Tree#7: 7" DSH Oak: it is rubbing adjacent Pine. Located adjacent to entrance road. Remove.

Zone F: located opposite of Departure Terminal and bordered by parking lots and road to abandoned rental car return office.

- Tree#1: 11" DSH Maple: has significant decay in canopy. Located adjacent to LTP entrance and road to Departure Terminal. Remove.
- Tree#2: 16" DSH Sweetgum: top has broken out. Located by sidewalk next to road to Departure Terminal. Safety prune.
- Tree#3: 8" DSH Hickory: broken limb in canopy. Remove.
- Tree#4: 16" DSH Pine: has a wound approximately 20-25' above grade, has sound callus tissue. Located next to light adjacent to sidewalk. Aerial inspection to determine extent of decay.
- Tree#5: 16.3" DSH Pine: has a defect approximately 20' above grade. Located right of sidewalk next to concrete bike bollards. It leans toward defect. Recommend semi-annual inspection and after any major wind event.
- Tree#6: 16.5" DSH Pine: has a wound approximately 25' above grade, it is roughly 80-85' in height. Recommend semi-annual inspection and after any major wind event.
- Tree#7: 29" DSH Pine: has defect about 5-7' in length located about 10-15' above grade. Tree is approximately 80-85' in height and it leans in the direction of the defect. Located next to Departing Flights sign. Recommend semi-annual inspection and after any major wind event.

- Tree#8: 27” DSH Oak: has large broken limb lodged in canopy. Located on left side of abandoned rental car return building. Remove broken limb.
- Tree#9: 29” DSH Oak: has opening in top section. If the area is posted to prevent pedestrian access the defect does not pose a threat to a human target. However, if it allows ingress the top should be removed or the complete tree.
- Tree#10: 20” DSH Pine: has a co-dominant top at approximately 45-50’ above grade and the remaining two sections above the split are approximately 25-30’. Located next to second Departing Flights sign approaching Departure Terminal. Recommend two cables to reduce stress on the connection at the split.
- Tree#11: 36” DSH Oak: has three leads off main trunk. One has a wound about two feet in length. Recommend aerial inspection to determine extent of decay.
- Tree#12: 32” DSH Oak: has a coalescing column of decay approximately 15-18’ in length. Located approximately 30’ from Departing Flights sign. Recommend aerial inspection to determine extent of decay.
- Tree#13: 12” DSH Maple: top is decayed/dead. Located near abandoned rental car return building. Remove.
- Tree#14: 7” DSH Maple: broken at base and lodged in adjacent Oak. Located to right of worker’s path. Remove.
- Tree#15: Multi-stem Cherry: two large dead stems. Located by utility boxes at entrance to old rental car return road. Remove dead stems.

Trees next to Baggage Terminal and parking garage under construction.

- Tree#16: 30” DSH Tulip Poplar: has basal defect. Located in azalea bed. Recommend semi-annual inspection and after any major wind event.
- Tree#17: 8” DSH Cherry: limbs touching building. Prune away from building.
- Note: several trees with dead limbs, trees should be crown cleaned.

Zone G: located between old and new entrances to airport. Starting at bridge at new road entrance.

- Tree#1: 31” DSH White Oak: tree is dead/declining. Located approximately 40-50’ from the bridge. Drop and leave in natural area or remove.
- Tree#2: 18” DSH Sweetgum: leans toward the road and has a significant angle of lean at its base. It is touching a Pine at grade and is located approximately 20’ from in-ground box. Remove.
- Tree#3: 17” DSH Pine: has two wounds roughly 15-20’ above grade and its canopy extends toward the access road. Located opposite light pole. Recommend semi-annual inspection and after any major wind event.
- Tree#4: 18.3” DSH Oak: it is dead. Located opposite second light pole and in the interior of the zone. Drop and leave or remove.
- Tree#5: 16” DSH Oak: has a basal cavity. Located in the interior. Recommend semi-annual inspection and after any major wind event.
- Tree#6: 23.5” DSH Pine: has a defect/wound that is 6’x8” approximately 28-32’ above grade. It’s canopy leans toward the road. Recommend aerial inspection to determine extent of decay.
- Tree#7: 27” DSH Oak: trunk/root flares are covered by extensive leaf debris. Located about 15’ from access road. Remove leaves from around trunk to expose the base.
- Trees#8&9: unusual configuration...the Tulip Poplar had fallen, and a lead grew upward from this position, has an extensive decay cavity. The Oak measures 20” DSH and also has decay. Both trees are located in the interior and if they failed would not reach either road. If pedestrian is prohibited, they do not pose a threat to human targets.

- Tree#10: 34” DSH Pine: has a basal defect to about 5’ above grade. Located in the interior, it is approximately 100’ from the new entrance road and 60’ from the old entrance. If it fails it is unlikely to impact the roadways. Recommend semi-annual inspection and after any major wind event.
- Tree#11: 39” DSH Pine: has a basal defect. Located approximately 60’ from old entrance road in the interior. Recommend semi-annual inspection and after any major wind event.
- Tree#12: triple trunk Cherry: it is dead. Remove.

RECOMMENDATIONS

Zones should be posted to restrict pedestrian access where possible. This will eliminate or minimize the likelihood of human targets in the interior area of these zones and greatly reduce the potential for injury. Trees shed parts during their lifetime and restricting access reduces the exposure of people to this natural process. In zones which may allow ingress/egress all the trees should be safety pruned and inspected on a semi-annual schedule and after any major wind event to remove any damaged limbs/branches.

1. Special attention should be given to all trees that are adjacent to roadways, parking lots, and physical structures. In the report we identified trees that should be removed as well as limbs/branches on specific trees to be removed. Also recommended cabling for some. This will initially remove specific hazards and minimize the potential for impact to humans, vehicles, and structures. As noted, trees shed parts and can do so at any time. The goal is to reduce the likelihood to a minimum utilizing an inspection schedule that identifies specific issues and initiating a removal/pruning protocol to remedy these concerns. This is a proactive posture juxtaposed to a reactive one.
2. Special weather concerns such as ice storms and heavy, wet snows pose particular problems for trees. Whole trees could fail, or major limb/branch failure is possible. As experience shows it is not possible to remedy the potential for impact in these conditions. The purpose of the inspection schedule is to reduce the likelihood of these failures under extreme weather events. Additionally, the Atlantic Seaboard is prone to high winds from hurricanes, tropical storms, nor’easters and wind events generated by the Gulf Stream and the warm waters of the Chesapeake Bay. All of these pose a threat to trees and the only process to eliminate all potential conflicts is to remove the trees. Thus, the necessary implementation of an Inspection Protocol to address these potential conflicts.

Disclaimer:

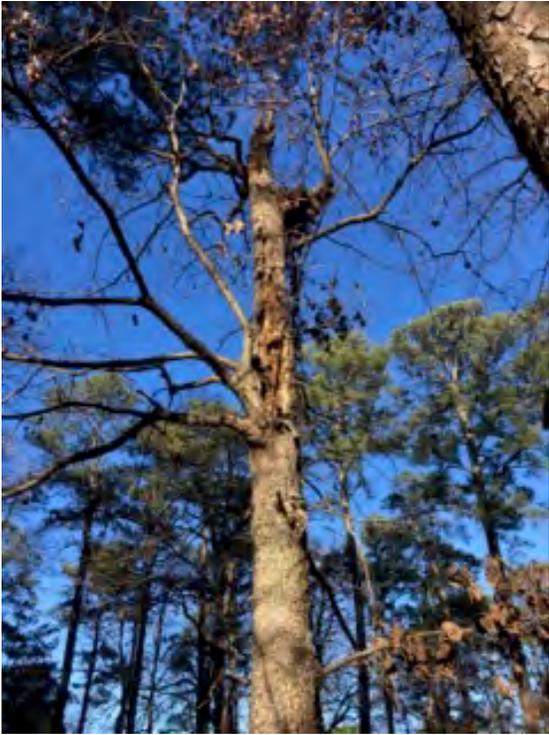
Abnormally extreme storms such as tornadoes, hurricanes and heavy freezing rain are not predictable and, in most cases, are not considered for categorizing a likelihood of failure. The contents of this report are provided “as is, where is”, and may change without notice as research and understanding of tree biology, tree mechanics and risk assessment. Pressures On Inc., does not accept any responsibility explicit or implied for liability, loss, or consequential damage arising from the manner in which the materials presented by this report are used in the field.

APPENDIX1: PICTURES

ZONE A



ZONE B





ZONE C



ZONE D and E

No Photos.

ZONE F



ZONE G

No Photos.

Phase 2 Zone Map





Norfolk International Airport Tree Report

PHASE 3

Prepared by Signature Landscapes

Ken Mills, Certified Arborist, #ISA 200922

Oscar W. Richardson III, Consulting Arborist

Monday, May 24, 2021

Attention: Anthony Rondeau, Deputy Executive Director, Engineering & Facilities

Overview: Signature Landscapes was contracted by the Norfolk International Airport to inspect trees located on their property. The inspection was to evaluate the health and current physical structure of the trees and make recommendations respectively. This required on site visual observation and measurements for specific trees located near roadways and infrastructure. These inspection visits commenced in late November. This is the third and final phase report.

Phase 3

This covers the portion of road from Miller Store Rd. to the end of trees alongside the lake on Robin Hood Rd. (Old entrance to Airport) It also includes the parking lot and Gurley Rd. to the west of Miller Store Rd.

Trees between lake and road up to entrance to Fed Ex.

- Tree#1: 13" DSH Water Oak: it has two wounds at 7' and 9' feet above grade. Recommend a semi-annual inspection or removal.
- Tree#2: 20" DSH Black Cherry: tree has basal decay. Drop in natural area.
- Tree#3: Multi-stem Live Oak: located opposite entrance to Fed Ex, has broken limbs/branches to be removed, remove ivy from base and elevate to 16 Feet over road for large trucks and trailers.
- Tree#4: Multi-stem Live Oak: located approximately 40 Feet from #3. Same recommendation as #3.

Trees from radio cell towers to 90 degree turn near observation site.

Tree#1: Leaning Mulberry opposite large multi-stem Sweetgum located at service entrance to catering service. Elevate for road clearance to 16 Feet above road.

Tree#2: 18-22" Oak: located opposite Gourmet Gang facility. Tree has sparse growth and has evident dieback. Recommend removal.

Trees along Robin Hood Rd. from Observation Site to Miller Store Rd.

Tree#1: Water Oak: located opposite Observation Site. Has dead top, drop in woods.

Tree#2: Dead stem approximately 15-20 Ft. inside tree line. Drop in woods.

The remaining trees in this section are approximately 25-30' from the edge of the roadway. Power lines maintained by Dominion Power run the entire length of Robin Hood Rd. Dominion has regular pruning cycles that addresses potential conflicts with trees and power lines to reduce the likelihood of power outages during storms, wind events, and ice/snow storms.

Trees located adjacent to off-site parking lot and Gurley Rd. Also includes short portion of Miller Store Rd.

There are several trees that would need to be crown cleaned because of deadwood and limb structures that extend into adjacent properties. Adjacent property owners could remove limbs that extend into their properties if desired. Recommend the Airport Authority post signage prohibiting pedestrian access and vehicle traffic to the parking lot and just past the private residence on Gurley Rd. A barrier could be installed on Gurley Rd. to prevent access by vehicles. By prohibiting access by pedestrians and vehicles the Authority would significantly reduce the potential for targets in this area. Trees adjacent to Miller Store Rd. should have all deadwood removed and elevated to 16Ft. above roadway for trucks/trailers.

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Phase 3 Limits





Typical Short Term Lot Trees to be Removed



Typical Departures Median Trees to be Removed



West Garden: Existing



Opinion of Probable Cost

Norfolk International Airport - Landscape Improvements

6/9/2021

Phase 1

Demolition / Site Preparation	Quantity	Unit	Cost	Extension
Cut, Grind, Dispose of Trees - Immediate Per Report	44	ea	600.00	26,400.00
Cut, Grind, Dispose of Trees - Proactively Per Report	20	ea	600.00	12,000.00
Cut, Grind, Dispose of Trees - Proactively at Pedestrian Bridge	27	ea	900.00	24,300.00
Landscape preparation, renewal of grades at Pedestrian Bridge	1	ls	12,500.00	12,500.00
Excavate Treewells - In Arrivals and Departures Medians	350	cy	20.00	7,000.00
Imported Clean Fill - For Treewells in Medians	350	cy	40.00	14,000.00
			10% Contingency	9,620.00
			Total	105,820.00

Phase 2 - Per Report

Demolition / Site Preparation	Quantity	Unit	Cost	Extension
Cut, Grind, Dispose of Trees	29	ea	600.00	17,400.00
Canopy Clearing	1	ls	15,000.00	15,000.00
			10% Contingency	3,240.00
			Total	35,640.00

Phase 3 - Per Report

Demolition / Site Preparation	Quantity	Unit	Cost	Extension
Cut, Grind, Dispose of Trees	4	ea	600.00	2,400.00
Canopy Clearing	1	ls	5,000.00	5,000.00
			10% Contingency	3,804.00
			Total	11,204.00

Totals for All Phases **152,664.00**

Muskogee Crape Myrtle



Location: South and North Departures Loop Medians

Large flowering Crape Myrtle

Mature height: 20' high x 16' wide

Bloom: July to September (lavender-pink)

Attractive lavender flower summer and fall, low maintenance, easily pruned, mildew resistant



**Departures Curbside: New Planting
New Trees at Departures & Arrivals Medians**