MEMORANDUM

TO: Environmental Quality and Sustainability Commission Members and Stakeholders

FROM: Urban Heat Island/Tree and Shade Subcommittee

DATE: January 14, 2021

RE: Urban Forest Infrastructure Manager Position Justification

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The Urban Heat Island/Tree and Shade Subcommittee (UHITS) would like to thank Tabitha Myers, Dwayne Allen, Nicole Rodriguez, David Hondula, Aimee Esposito, and Anna Bettis for their hard work in preparing and authoring this memo. The UHITS voted to approve the contents and for it to be sent to the Environmental Quality and Sustainability Commission on January 12, 2021.

The UHITS Subcommittee tasked this ad hoc workgroup with providing a description of the proposed Urban Forest Infrastructure Manager as well as the cost and benefits to the City of Phoenix, to persuade stakeholders and City Council as to the importance of this role in the City's urban forest future. The information requested is set forth below.

Motivation

Tree canopy in the City of Phoenix must double to achieve the original goals established in the Tree and Shade Master Plan. Many Council-adopted plans and policies that have been approved, and are in development, including the General Plan, Climate Action Plan, Sustainability Plan, Food Action Plan, Reinvent Phoenix, and Walkable Urban Code, speak to and rely upon the successful growth and maintenance of Phoenix's urban forest. Responsibility for this important work is held by a number of different City departments and offices, including Parks and Recreation, Streets, Planning and Development, Water, and Neighborhood Services, but coordination and efficiencies across those units have been difficult to realize. As a hybrid of ecological and engineered systems, the urban forest requires distinct and specialized management to achieve desired goals. These factors—the urgency of action, widespread support in plans and policies, challenge of

coordination, and distinct management challenges, call for a dedicated and permanent staff position.

Benefits to the City

Trees are generally perceived to offer widespread benefits to city residents. Among the most valuable and quantifiable impacts to the residents of Phoenix will be the role of the urban forest in offsetting carbon emissions, generating revenue, increasing efficiency in city hall, and supporting public health and safety.
Urban forests are among a community's most prized assets. Well directed urban tree management services help increase property values and promote community pride. From carbon sequestration and boundless ecological benefits, to beautification and aesthetic appeal, healthy and vibrant urban forests offer enumerable community value.

By investing in trees and the urban forest, the City can reduce its carbon footprint, decrease energy costs, reduce stormwater runoff, increase biodiversity, address the urban heat island effect, clean the air, and increase property values. In addition, trees can help to create walkable streets and vibrant pedestrian places.

However, none of these benefits can be realized without the proper stewardship of a well-supported and empowered Manager. The city would significantly enhance its likelihood of realizing these goals with implementation of a dedicated urban forest manager.

Efficient City Function

- At present, City of Phoenix has numerous programs within multiple departments that are working to improve the urban forest. As part of the City's commitment to addressing the effects of climate change through mitigation efforts, departments have largely developed reasonably effective programs which are showing promising results. However, there are several areas where efforts and resources are being duplicated, in some instances even mollified, primarily as a result of the siloed nature of the functioning of City departments.
- The Manager will ensure efficiency by functioning as the adhesive which ties together tree related programs and like-considerations across all City departments. The official functioning in this capacity will maintain timely knowledge and a keen understanding of all tree related matters specific to each department, and the City as a whole. This holistic approach will provide greater perspective and ensure efficiency by highlighting and addressing areas of replication, inefficacious processes, as well as providing department lever guidance to remedy identified gaps in urban tree management service.

Economic Prosperity

- Trees are high-yield assets. Trees have a documented return on investment ("ROI") in Arizona of $2.23 for every $1 invested.[1]
- The urban forest is enormously valuable. "Trees are the only part of infrastructure that actually appreciates in value while the rest depreciates. Dollar for dollar, there is no better investment in the local environment."[2] (Arbor Day Foundation)
- In tree-lined commercial districts, shoppers report: 1) more frequent shopping trips; 2) a willingness to pay more for parking; and, 3) a willingness to spend 12% more for goods.[3]
- Healthy urban forests extend the life of street surfaces through shade.[4]
- More trees mean higher property values. Each large front yard tree adds 1% to the house sales price, and large specimen trees can add 10% to property values.[5]
- Strategically-placed trees can save up to 56% on annual air-conditioning costs.[6]
- Buildings and paving in city centers create a heat-island effect. A mature tree canopy reduces air temperatures. Modeling studies suggest that neighborhood air temperatures could be reduced by at least 4°F with 25% tree canopy cover, compared to contemporary conditions. Tree canopy can also influence the internal temperatures of nearby buildings and reduce cooling costs.[7]
- A Manager can increase efficiency and decrease administrative costs for the City.[8]

<u>Healthy People and Communities</u>

- The MAG Active Transportation Plan[9] recommends a minimum standard of 20% shade coverage on pedestrian corridors and sets the benchmark for excellent shade coverage at 60%.

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[1] https://wheeldeal.org/resources/city_of_phoenix_tree_and_shade_master_plan.pdf; https://www.fs.fed.us/psw/topics/urban_forestry/products/18/803uesd_uep_tpub_DesertSouthwest.pdf

[2] https://wheeldeal.org/resources/city_of_phoenix_tree_and_shade_master_plan.pdf

[3] Wolf, K.L. 1999. Nature and commerce: human ecology in business districts. In Kollin, C., ed. Building Cities of Green: Proceedings of the 1999 National Urban Forest Conference. Washington, DC: American Forests: 56-59.

[4] State of the Trees Report: A Call to Action for the Sacramento Region, Sacramento Tree Foundation, Fall 2002. p.7.

[5] Anderson, L.M.; Cordell, H.K. 1988. Residential property values improve by landscaping with trees. Southern Journal of Applied Forestry 9: 162-166. Neely, D., ed. 1988. Valuation of landscape trees, shrubs, and other plants, 7th ed. Urbana, IL: International Society of Arboriculture.

[6] McPherson, E.G.; Simpson, J.R.; Peper, P.J.; Maco, S.E.; Gardner, S.L.; Cozad, S.K.; Xiao, Q. 2005. Midwest community tree guide: benefits, costs, and strategic planting. NA-TP-05-06. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry.

[7] Center for Urban Horticulture, University of Washington, College of Forest Resources, available at: https://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/Urban%20Forest%20Values.pdf

[8]https://www.phoenix.gov/parkssite/Documents/PKS_Forestry/PKS_Forestry_NOAA_PHX_Urban_Spaces_Report.pdf

[9] https://www.azmag.gov/Programs/Transportation/Active-Transportation/Active-Transportation-Plan/Active-Transportation-Toolbox/Pedestrian-Infrastructure/Shade-and-Thermal-Comfort

- Tree-filled neighborhoods experience lower levels of domestic violence.[10]
- Tree-filled neighborhoods are safer and more sociable.[11]
- It was estimated that trees cleared 17.4 million tons of air pollution annually in the U.S. alone. The benefits on human health were valued at $6.8 billion.[12]
- Every 10 percent increase in overall urban tree canopy generates a 2 °F (0.6 °C) reduction in ambient heat.[13]
- Dense park urban tree canopy can influence nearby surrounding temperatures, and sometimes the temperature reduction impact can reach a distance as great as the diameter of the park.[14]
- Healthy urban forests have a strong correlation in the reduction of mortality rates, and drastically reduce cardiovascular and lower respiratory tract illnesses, regardless of demographic makeups.[15]
- In Phoenix, lower socioeconomic and ethnic minority groups are more likely to live in warmer neighborhoods with greater exposure to heat stress.[16]
- Baltimore experienced a 12-percent reduction in crime in an area that had a 10-percent increase in tree canopy.[17]
- Philadelphia experienced a significant reduction in crime (18-27 percent) in areas improved with an increase in vegetation, compared to a 65-percent increase across the city during the same period.[18]

[10] Sullivan, W.C.; Kuo, F.E. 1996. Do trees strengthen urban communities, reduce domestic violence? Arborist News 5: 33-34.
[11] Sullivan, W.C.; Kuo, F.E. 1996. Do trees strengthen urban communities, reduce domestic violence? Arborist News 5: 33-34.
[12] Nowak, Hirabayashi, Bodine, Greenfield. 2013. Tree and Forest Effects on Air Quality and Human Health in the United States, available at: https://www.fs.fed.us/nrs/pubs/jrnl/2014/nrs_2014_nowak_001.pdf
[13] Wolf, K.L. 2008a. Metro nature services: functions, benefits and values. In: Wachter, S.M.; Birch, E.L., eds. Growing greener cities: urban sustainability in the twenty-first century. Philadelphia: University of Pennsylvania Press: 294–315
[14] Nowak, D.J.; Heisler, G.M. 2010. Air quality effects of urban trees and parks. Ashburn, VA: National Recreation and Park Association. 6 p.
[15] Donovan, G.H.; Butry, D.T.; Michael, Y.L. [and others]. 2013. The relationship between trees and human health: evidence from the spread of the emerald ash borer. American Journal of Preventive Medicine. 44(2): 139–145.
[16] Harlan, S.L.; Brazel, A.J.; Prashad, L. [and others]. 2006. Neighborhood microclimates and vulnerability to heat stress. Social Science and Medicine. 63(11): 2847–2863.
[17] Troy, A.; Grove, J.M.; O'Neil-Dunne, J. 2011. The relationship between tree canopy and crime rates across an urban– rural gradient in the greater Baltimore region. Landscape and Urban Planning. 106: 262–270.
[18] Kondo M.C.; Low, S.C.; Henning, J.; Branas, C.C. 2015. The impact of green stormwater infrastructure installation on surrounding health and safety. American Journal of Public Health. 105: e114–e121.

- Trees and other green spaces increase self-discipline[19] and reduced attention deficit disorders in children.[20]
- Trees contribute to stronger ties among neighbors, with a greater sense of safety for urban residents.[21]

Carbon Action

- Maintaining and expanding a healthy urban forest, and demonstrating the sequestration benefits provided by those trees, can reduce the need for the city to purchase carbon offset credits on the market to achieve its Council-approved sustainability goals related to greenhouse gas emissions. [22]
- Urban forestry directly and indirectly impacts greenhouse gas concentrations and greenhouse gas emissions attributable to the City of Phoenix.
- Reducing net greenhouse gas emissions is a key goal of the Council-approved Sustainability Plan, which includes the long-term goal of becoming a carbon-neutral city operating on 100% clean energy.[23]
- Trees reduce atmospheric carbon dioxide through the process of sequestration: converting atmospheric carbon dioxide into biomass in the plant structure, where it is stored as carbon.
- For example, one hundred trees remove 53 tons of carbon dioxide per year and 430 pounds of other air pollutants per year.[24]
- Trees can also impact greenhouse gas emissions in the warm season by reducing demand for cooling resources, as a consequence of the cooling and shading services provided by the urban forest.
- Because of the resources that can be required to grow and transport trees for urban forestry, urban trees can be net emitters of carbon dioxide for the first few

[19] Taylor, A.F., F. E. Kuo, and W.C. Sullivan. 2002. Views of Nature and Self-Discipline: Evidence from Inner-City Children. Journal of Environmental Psychology, Special Issue: Environment and Children 22: pp.49-63.
[20] Taylor, A.F., F. E. Kuo, and W.C. Sullivan, 2001, Cooping with ADD: The Surprising Connection to Green Play Settings. Environment and Behavior 33, 1: pp.54-77.
[21] Kuo, F. E. 2003. The role of arboriculture in a healthy social ecology. Journal of Arboriculture 29, 3: pp.148-155.
[22] Roman, L. A., Conway, T. M., Eisenman, T. S., Koeser, A. K., Barona, C. O., Locke, D. H., ... & Vogt, J. (2020). Beyond 'trees are good': Disservices, management costs, and tradeoffs in urban forestry. Ambio, 1-16;
https://www.fs.fed.us/psw/topics/urban_forestry/products/CUFR_778_UrbanFor_ArbNews_2008_12.pdf
[23]https://www.phoenix.gov/sustainabilitysite/Documents/Final%20COP%202015-16%20Sustainability%20Brochure%2003.27.17.pdf
[24] McPherson, E.G.; Simpson, J.R.; Peper, P.J.; Maco, S.E.; Gardner, S.L.; Cozad, S.K.; Xiao, Q. 2005. Midwest community tree guide: benefits, costs, and strategic planting. NA-TP-05-06. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry.

years of their life. As such, ensuring that trees can grow in a healthy manner for several years—which is a particular challenge in urban settings—is critical to ensuring that they achieve intended carbon sequestration goals.

- Many individuals, municipalities, corporations, and other entities are purchasing carbon offsets through third-party providers. Purchasing these offsets intends to reduce net emissions from organizations. For example, Arizona State University charges each traveler using air transportation a fee of $12; these fees are collectively pooled to purchase carbon offsets that ultimately result in trees being planted in the greater Phoenix area that will sequester an equivalent amount of carbon to what is generated from ASU-based air transportation.

Position Description & Requirements

The Urban Forest Infrastructure Manager (hereafter, "Manager") position shall be a full-time staff member, housed in the City Manager's office, tasked with external and cross-department authority to advance the City of Phoenix's tree and shade goals, including those articulated in the Tree and Shade Masterplan (2010), in a demonstrable and meaningful way, and in an accelerated timeline. This position will be a champion for the City's tree infrastructure inside and beyond City Hall, and will enable the City to provide a consistent message, approach, and ethos to permeate all facets of the City.

The Manager shall be charged with implementing the City's Tree and Shade Masterplan and maintaining the Urban Forest as well as:

- ❖ Maintain an International Society of Arboriculture ("ISA") Certified Arborist Municipal Specialist Certification;
- ❖ Maintain an ISA Tree Risk Assessment Qualification (TRAQ);
- ❖ Coordinating the City's Urban Forest Infrastructure Team;
- ❖ Serving as key staff liaison to Environmental Quality and Sustainability Commission and other citizen commissions;
- ❖ Developing and updating City's Urban Forest Design Guidelines and Best Practices;
- ❖ Raising awareness of the Tree and Shade Masterplan and Urban Forest Design Guidelines and Best Practices through articles in *PHX AT YOUR SERVICE*, features on PHXTV and other broadcast and written media outlets, posts in social media, and other earned media;
- ❖ Engaging businesses, utilities, non-governmental organizations, private individuals and others in supporting the Tree and Shade Masterplan through monetary and in-kind donations and other means;

- ❖ Supporting the implementation of the Maricopa Association of Governments Active Transportation Plan, particularly elements related to shade and pedestrian comfort; and supporting other regional initiatives and plans relevant to growing and maintaining a healthy urban forest that provides services to residents;
- ❖ Coordinating efforts with the Maricopa County Air Quality Department, Maricopa County Flood Control District, and other county, regional, and state agencies whose work intersects with urban forestry;
- ❖ Coordinating with other Maricopa County municipalities to implement tree and shade masterplans;
- ❖ Pursuing and coordinating funding opportunities to support the urban forest and related initiatives, via local, state, and federal grant programs, philanthropic organizations, individual donations, corporate partnerships, and other mechanisms;
- ❖ Liaising with local and regional educational institutions to help promote urban forestry efforts to the full spectrum of lifelong learners, and identify relevant research opportunities to advance urban forestry science and best practices

Budget Impact

New Hire

Salary: $70,000 - $100,000 annually
Benefits: Approximately $20,000

Internal Hire

Salary: $70,000 - $100,000 annually
Benefits: Approximately $50,000