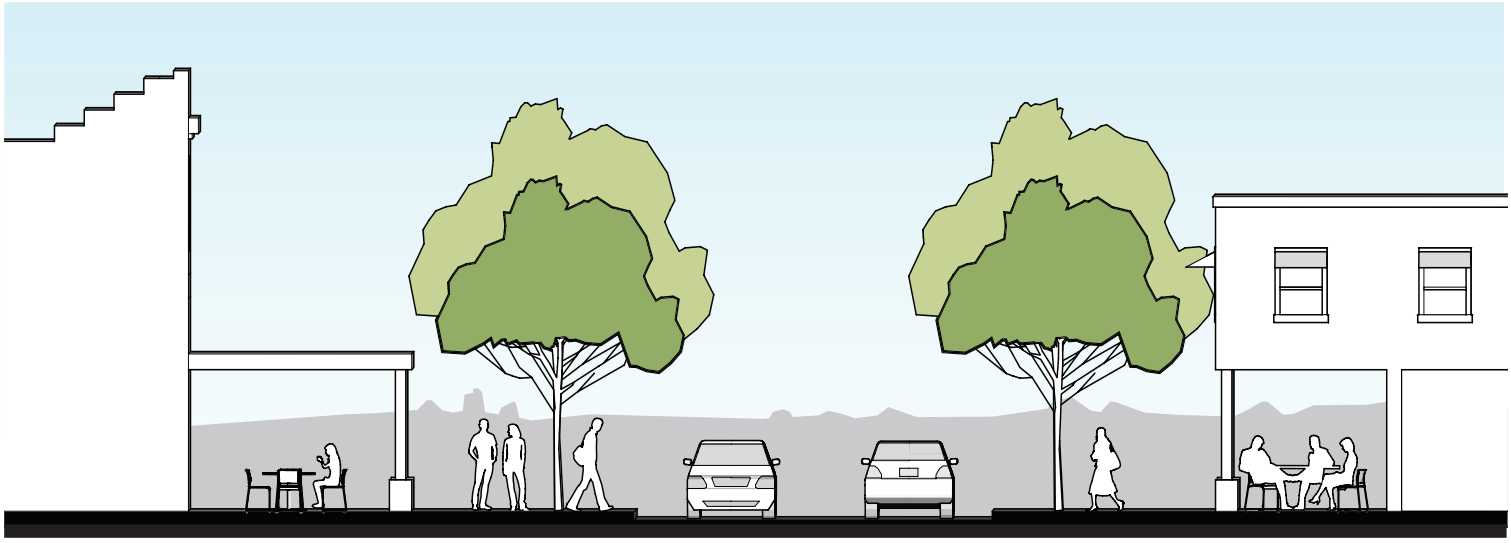

TREE & SHADE

MASTER PLAN

2020

CITY OF Yuma

ACKNOWLEDGMENTS

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WHY?

The intent of the City of Yuma Tree & Shade Master Plan 2020, the first of its kind in the region, is to develop a vision for a healthier, more livable, and prosperous Yuma by investing in the care and maintenance of the urban forest and shade structures. Three goals set at the beginning of the planning process were to accomplish the following:

#1 *Communicate a vision for the urban forest that focuses on the benefits of trees and sustainability.*

#2 *Establish comprehensive policies, procedures, and incentives for tree preservation, planting, and maintenance based on the vision.*

#3 *Establish partnerships and outreach programs to raise awareness about the benefits of the urban forest and the vision to increase the tree canopy.*

WHO?

Public input was critical to plan development. A public survey was conducted to gauge public opinion and a Task Force of community stakeholders was formed to guide the process. The plan was developed as a joint effort between three City departments: Parks & Recreation, Public Works, and Community Development.

445
SURVEY RESPONDENTS

26
ACTIVE TASK FORCE MEMBERS

3
CITY DEPARTMENTS

HOW?

Community involvement in implementation is imperative. The City is committed to planting trees, but a majority of the 100,000 trees will be planted on private property at the discretion of private property owners. The City sets and enforces policies that encourage tree planting and protect our existing tree canopy. A community tree consortium, led by the City, will spearhead ongoing outreach efforts to encourage trees.

STRONG POLICIES

- Landscape Regulations & Guidelines
- Tree Ordinance
- 5-Yr Tree Care & Maintenance Plan
- Complete Streets Policy

20
COMMUNITY TREE PROJECTS

1
COMMUNITY TREE CONSORTIUM

EXECUTIVE SUMMARY

WHAT?

The plan envisions Yuma as a *desert oasis*; an oasis to be enjoyed by residents, visitors, and wildlife. We must wisely prioritize where trees are planted to provide the most benefits and to create shade oases equitably throughout the city. The plan challenges Yuma to effectively double the number of existing trees to increase the canopy from the existing 3.5% to a 7% canopy. This goal can be achieved by planting trees along streets, paths, and rights-of-way; in parks and open spaces; and on private property in neighborhoods and parking lots.

VISION: DESERT OASIS

+100,000

new trees

TO DOUBLE THE CANOPY COVERAGE

3.5% ↗ 7%

MEASURES OF IMPACT

1. Walkability
2. Safety
3. Equity
4. Aesthetics

TREE PLANTING OPPORTUNITY AREAS

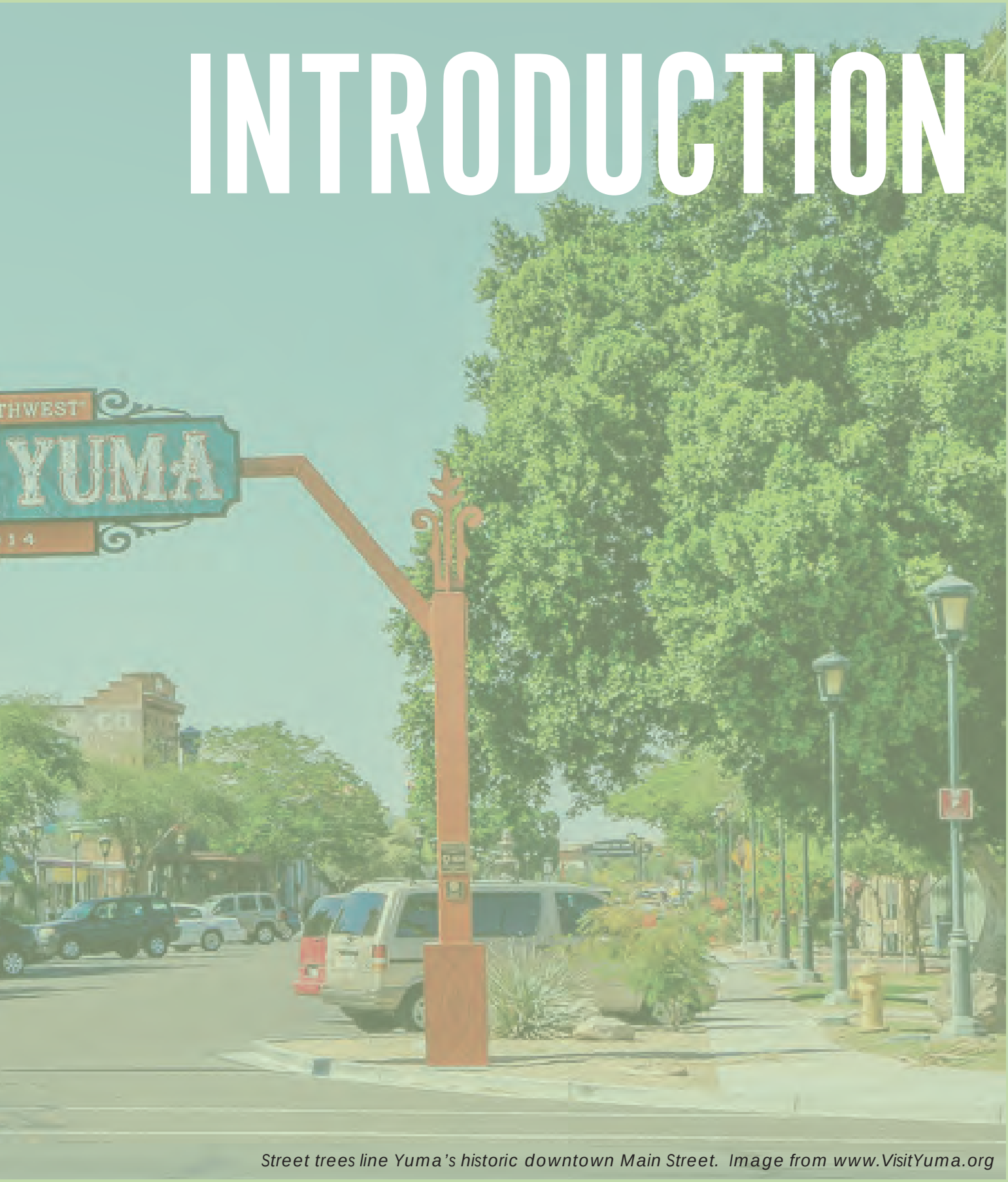
STREETS & RIGHTS-OF-WAY

PARKS & OPEN SPACE

PRIVATE PROPERTY

LEE HOTE
"GATEWAY OF THE GREAT SOUT
DOWNTOWN
INCORPORATED 19

INTRODUCTION



Street trees line Yuma's historic downtown Main Street. Image from www.VisitYuma.org

INTRODUCTION

The best time to plant a tree is twenty years ago.
The second best time is now. ~ Ancient Chinese Proverb

The time is now to start *planning* and *planting* for Yuma's future. This Tree & Shade Master Plan aims to develop a vision for a healthier, more livable, and prosperous Yuma by investing in the care and maintenance of the urban forest and shade structures. Trees in the urban environment offer many benefits that impact the environment, the health and safety of the community, and even the economy. Trees and shade increase the walkability and quality of life of our community, which is important year-round and especially in the heat of the Yuma summer.

The term urban forest encompasses all the trees within the urban area; those planted on both public and private lands. This plan aims to create a vision to expand the entire urban forest, with a particular focus on the portion of the urban forest located in the public rights-of-way and managed by the City. City-managed trees include those lining streets, in parks, retention basins, and on other public properties. To implement the vision, the plan takes a close look at existing policies, procedures, and regulations to ensure the City has a unified approach to encouraging tree plantings and maintaining them following best practices. The final goal is to raise awareness of the importance of trees and form partnerships with community organizations to implement the vision for a sustainable city of trees.

Why do we need this plan?

Guidance for this plan can be found in the City of Yuma's 2012 General Plan, in the State of Arizona's commitment to mitigating drought, and in the federal Surgeon General's Call to Action issued in 2015.

Yuma's General Plan is the primary document guiding decision making in the City. Both the Conservation, Environment, & Energy Element and the Parks, Recreation & Open Space Element explicitly express the need for a Street Tree and Shade Master Plan or an Urban Forestry Master Plan to "guide the overall management and preservation of tree canopy throughout the city" as well as "to promote walkability and mitigate heat islands". The Conservation element stresses the importance of the city to use low water use desert landscaping to increase natural and man-made shading for parking lots, streets, and pedestrian areas. The Transportation Element confirms this goal by advocating for "landscaping guidelines for streets, medians, and parkways that address maintenance, design review, water conservation, and safety factors". The Transportation Element also mentions the importance of traffic calming to provide safe and convenient access for all users. Throughout the General Plan, each element seeks to elevate the quality of life of the community -- a proven benefit of street trees.

In 2019, Arizona's state legislature voted to join six other states in passing the Drought Contingency Plan in response to drought conditions caused by climate change. At

first glance, it seems counter-intuitive to plant trees during drought conditions. But trees, particularly native species, actually serve to mitigate negative conditions caused by drought. Native trees send deep, water-seeking roots into the soil to tap into local groundwater, drawing it to the surface and redistributing it vertically through the root structure thereby making it available for other plants to use. Tree cover slows evaporation of water from soils and nearby bodies of water, mitigating the severity of the drought. Additionally, the process of transpiration by which the water used in photosynthesis is released from the leaves into the air cools the surrounding air. This process, in addition to the shade cast by trees, serves to reduce the urban heat island effect that makes cities hotter.

In 2015, the Surgeon General issued a Call to Action to the nation to promote walking and walkable communities. The Call to Action recognizes the importance of physical activity for all ages as an important way to reduce risk for chronic diseases and related risk factors. One of the strategic goals is to "design communities that make it safe and easy to walk for people of all ages and abilities". Safety concerns posed by traffic create a barrier to walking and the Surgeon General recommends using street design policies to encourage physical activity and walking. Street lighting and landscape, such as street trees, when designed properly can be used to reduce traffic speeds and improve the pedestrian experience. Street trees are an integral part of the pedestrian experience because they provide shade, street enclosure, and aesthetic benefits.

Related City Documents

2012 City of Yuma General Plan

2016 Parks & Recreation Master Plan

Tree Ordinance

Landscape Regulations

Recommended Plants List

5-Year Tree Care & Maintenance Plan

City Landscape Guidelines

City Engineering Standards

Street trees provide shade to the sidewalk, street, and bus stop along Castle Dome Avenue in Yuma.

What have other cities done?

Nationwide, communities are making trees and shade a priority. Some of the biggest cities in the country – including New York City, Los Angeles, Chicago, Houston, and Phoenix – have adopted tree initiatives to promote sustainability and combat climate change. The plans promoted by these cities propose public-private efforts to increase the number of trees. The plans view the urban forest as a critical asset and essential to continued success as leading 21st Century sustainable cities.

Shade and the environmental benefits provided by trees are especially important in arid desert cities. Among Arizona cities, Phoenix, Tucson, Avondale, Gilbert, and Goodyear have adopted plans to guide tree plantings. The City of Phoenix Tree & Shade Master Plan of 2010 emphasizes the benefits of urban trees as a keystone to becoming a 21st century sustainable city. Phoenix's plan also addresses the entire lifecycle of the trees – planting, maintenance, and irrigation techniques – to ensure the maximum return on investment.

Tucson adopted the Downtown Comprehensive Street Tree Plan in 1998 which serves as an urban design guide for street tree plantings in the central business district. The City has followed up on that effort with a city-wide Street Tree Inventory conducted largely by volunteers. According to their website, Tucson Clean & Beautiful Inc. sponsors the Trees for Tucson program to provide "low-cost shade tree planting for homes; street tree planting for neighborhoods; trees available for community sites; and educational presentations and tours. They also started the Trees for Tucson Tree Bank which allows donors to make tax-deductible contributions to help provide "shade trees for community planting projects".

Avondale's Street Tree Master Plan, adopted in 2014, focuses specifically on street trees and their impact on the quality of life and sense of community. The document aims to "help guide the City and provide a strategy for future tree replacement, growth, and … best practices." Other cities, such as Gilbert and Goodyear have defined specific tree species to be planted along certain corridors to create distinct character areas. The plans mentioned, among others, serve as precedents to guide Yuma's plan and valuable lessons can be learned from each.

Who will use this plan?

The plan is intended for use by City staff to guide management of the urban forest within the City's public domain. The planning effort and associated documents encourage consistent maintenance practices for City staff across departments and for landscape contractors who manage public and private portions of the urban forest. It will assist landowners and developers in the selection of tree species appropriate for different locations and purposes. Recommendations will guide future policy and incentive programs to encourage growth of the urban forest. Plans of this nature are a requirement for certain federal and state funding opportunities, so the plan also serves to make Yuma more competitive when seeking funding.

The plan and associated outreach also serve to help the general public develop a better understanding of the importance of the urban forest. The partnerships established during the planning process will hopefully continue to grow stronger and more robust in the future.

How was this plan developed?

Encouraging practices to support and grow Yuma's urban forest has been a topic of discussion in the City for years. The 2012 General Plan officially states the need for such a plan, and staff began research for the project in 2016. In 2017, the City's Landscape Regulations were updated to encourage trees over shrubs, groundcover, or turf. This change was in response to comments from local landscape experts, City maintenance staff, and developers who recognize the benefits trees offer over other types of landscape. In late 2018, a grant application to the Department of Forestry & Fire Man-

agement (DFFM) highlighted the need for a Tree & Shade Master Plan to guide development of the urban forest, and thus the planning process began.

The plan was developed as a joint effort between the public, Parks & Recreation, Community Development, and Public Works Departments. An extensive public outreach effort was conducted to assess public support and input throughout the planning process. In early 2019, a Planning Task Force of residents representing a variety of local organizations was formed. The Task Force met monthly on nine occasions throughout the planning process to provide guidance and input on implementation. Task Force members were challenged to commit to assisting in implementing the goals of the plan by planting trees, volunteering, or educating the broader public.

A public survey designed to gauge public opinion and solicit input was conducted from May to September 2019. The survey was available in print and online formats, in both English and Spanish. The survey received 445 responses and provided critical insight to inform the recommendations of this plan. More information on the survey and public outreach efforts can be found in the Chapter 2 and appendices.

As a joint effort between three departments, this plan has also been reviewed and approved by each departments' associated resident commissions: the Parks, Arts, & Recreation Commission; the Planning & Zoning Commission, and the Clean & Beautiful Commission. In conjunction with this master planning effort, the tree ordinance was reviewed and updated and a 5-Year Tree Care & Maintenance Plan was developed to provide more technical guidance for City maintenance procedures.

KEY TERMS

DFFM Arizona Department of Forestry & Fire Management

landscape regulations Adopted by the City to govern new development by providing minimum standards for the selection, location, maintenance, and installation of landscape materials (including trees) in order to maximize the benefit to the community and property owner.

parkway The area located between the edge of pavement or back or curb and the property line within the public street right of way for which the adjacent property owner is responsible for maintenance.

shade tree A tree that grows to an average mature height of thirty feet or more, an average spread of thirty feet or more, and a dense canopy that provides shade.

street tree A tree planted along the street to provide shade to pedestrians and enclosure to the street; characteristics include an average mature height of 30 feet or more, high branching pattern, and upright or rounded crown form.

tree belt The area between the back of curb or edge of pavement and the sidewalk or trail, typically within the public street right-of-way, where street trees should be located to provide the maximum safety and walkability benefits.

tree canopy The extent of the outer layer of leaves and branches of an individual tree or group of trees; the higher the tree canopy density, the higher the benefits from trees.

tree ordinance Adopted by the City to regulates tree care and maintenance on municipal property.

urban forest All the trees within the urban area, including those planted on public and private property, and actively cared for by people.

xeriscape A water-conserving landscape design technique that takes into account soil and drainage factors, microclimates, groupings of plants with similar water requirements, efficient irrigation systems, native vegetation, paving permeability, and low-water-using and drought tolerant vegetation.

CHAPTER 1

BENEFITS *of the* URBAN FOREST

Stately trees provide shade and beauty to the residential neighborhood along 8th Avenue.

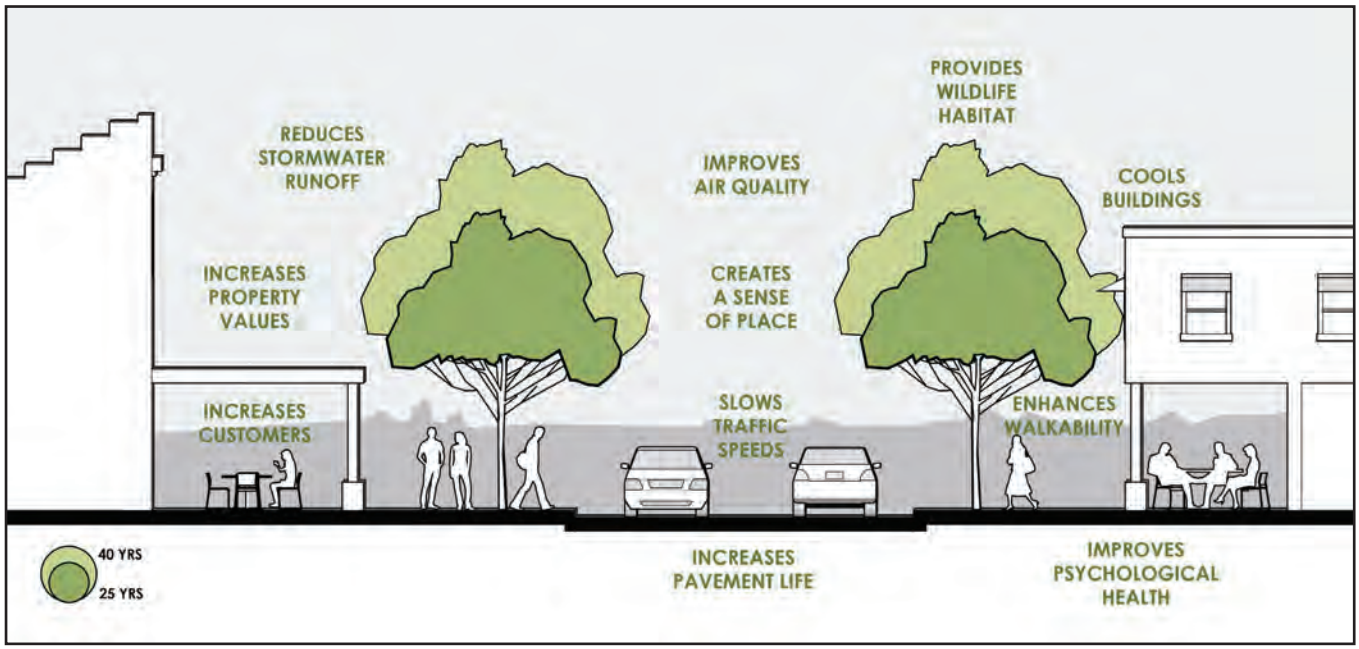
BENEFITS *of the* URBAN FOREST

Trees and shade in the urban environment offer health, safety, environmental, and economic benefits.

Trees play a vital role in making our community more livable and enjoyable. Trees in the urban environment offer a host of benefits for the health and safety of the community, for the environment, and for the economy. Trees and shade increase the walkability and quality of life in our community, which is especially important in the heat of Yuma summers. Tree-lined streets have been shown to calm traffic speeds, increase property values, absorb pollutants, intercept stormwater, lower ambient temperatures, and increase pavement life. Trees that provide shade to buildings lower energy consumption and views of trees improve psychological health.

The benefits provided by trees outweigh their maintenance and associated costs. From a financial perspective, the urban forest is one of the few public infrastructure investments that actually increases in value over time. Planted for a relatively small upfront cost, as the tree ages and grows, the benefits offered increase. A larger tree casts more shade, its leaves sequester more CO_2, and its canopy and roots intercept more stormwater runoff. As with other infrastructure elements (roads, pipes, street lights, etc.), trees require regular maintenance to function properly and provide maximum benefits to the community. Also like other infrastructure elements, trees offer so many benefits that they are considered an essential part of every street.

The improvements in walkability, bikeability, and overall safety provided by trees



Trees offer environmental, health, safety, and economic benefits to the urban environment.

creates secondary benefits by promoting a healthy community. A healthier population equates to less money spent on health-care costs, less time off work, and a happier community overall.

As stated in the previous section, trees also serve to mitigate negative conditions caused by drought. Native tree species send deep, water-seeking roots into the soil to tap into local groundwater, drawing it to the surface and redistributing it vertically through the root structure making it available for other plants to use. Tree cover slows evaporation of water from soils and nearby bodies of water, mitigating the severity of the drought. Additionally, the process of transpiration by which the water used in photosynthesis is released from the leaves into the air cools the surrounding air. This process, in addition to the shade cast by trees, serves to reduce the urban heat island effect that makes our cities hotter.

Common concerns about street trees can be overcome with thoughtful planting, species selection, and maintenance by trained designers and arborists. Careful positioning allows for adequate sight triangles at intersections and driveways, reduces impacts on utilities above or below ground, and reduces interference between trees and street lights. Species with low litter, hardy branch structure, and low water needs are encouraged to be selected to minimize maintenance concerns.

Health & Safety

- #1 **Increases walkability, pedestrian activity, and social interaction.**
- #2 **Calms traffic speeds and improves pedestrian safety.**
- #3 **Provides buffers for unpleasant land uses, deflects traffic noise, and provides privacy.**
- #4 **Improves psychological health.**
- #5 **Improves aesthetics and sense of place.**
- #6 **Lowers residential crime rates.**

Environmental

- #7 **Absorbs CO_2, ozone, and other airborne pollutants and provides oxygen.**
- #8 **Reduces the urban heat island effect by providing shade, which in turn conserves energy.**
- #9 **Reduces stormwater runoff and prevents erosion.**
- #10 **Provides habitat for wildlife.**

Economic

- #11 **Increases property values.**
- #12 **Increases customer traffic to businesses.**
- #13 **Contributes to longer pavement life.**

Health & Safety Benefits

#1 Increases walkability, pedestrian activity, and social interaction.

Trees provide shelter from the elements and create a protective sense of enclosure. Perhaps most important in Yuma's desert climate is the protection from the hot sun that street trees offer pedestrians on the sidewalk. This shade makes walking more pleasant year-round, but it can absolutely make the difference between choosing to walk or not in the summer months. A 2009 study published in the American Journal of Public Health[1] reported that "aside from living close to school, the presence of street trees and living in a mixed land-use neighborhood were the only other physical environmental features that significantly correlated with more children walking and biking to school."

#2 Calms traffic speeds and improves pedestrian safety.

Several studies have shown that tree-lined urban streets are associated with reduced crash rates.[2] The presence of street trees provides an "edge effect" or psychological cue to drivers to slow down. Studies have linked the visual complexity of the surrounding environment to the driver's attentiveness and alertness. When "on alert", drivers tend to proceed more carefully.[3] Fewer crash incidents and less severe injuries are associated with slower vehicle speeds. A 2006 study showed that tree-lined streets brought down average speeds by up to eight miles per hour.[3]

Cars moving at slower speeds equate to a safer environment for pedestrians, but street trees provide yet another benefit to pedestrians. When placed between moving traffic and the sidewalk, trees provide a barrier to protect pedestrians from potential accidents. Pedestrian's perception of safety also increases, which increases the walkability in the city.[4]

A tree never hits an automobile except in self-defense.

American Proverb

#3 Provides buffers for unpleasant land uses, deflects traffic noise, and provides privacy.

Trees and vegetation effectively soften and screen the visually unappealing, albeit necessary, elements of the urban environment such as utility poles, light poles, and parking lots. Trees can also be used between incompatible land uses to reduce light pollution, noise, and provide privacy.

#4 Improves psychological and physical health.

Numerous studies have shown the link between nature and improved health outcomes. Patient views of trees speed healing in hospitals.[5] Greater canopy cover near a mother's home is positively correlated with her baby's birth weight, thus improving lifelong health.[6] Vegetated roadways reduce stress among drivers and diminish the perceived travel time.[3] A 2015 study conducted in Toronto indicated that street trees had a more beneficial effect on overall health than trees located on private property. Street trees are more accessible to all residents and therefore have a greater impact for the public.[7] The City's investment in trees in the public realm can influence secondary cost savings through improved public health.

#5 Improves aesthetics and sense of place.

Trees contribute significantly to aesthetics and sense of place. A sense of place is defined by those elements that make one

Street trees improve safety.

Street trees make roads safer for drivers and pedestrians. Tree-lined streets are more pleasant to walk along and drivers tend to travel slower.

place different from another, and it's what makes our community worth caring about. Studies have shown that trees are an important element that contributes to a sense of pride in our neighborhoods and the built environment.

#6 Lowers crime rates.

Street trees that provide canopy cover are correlated with lower crime rates, particularly in residential neighborhoods. The key is to have well maintained vegetation; dense overgrown shrubbery can actually encourage crime by providing concealment.[8] Tall, mature street trees provide a pleasant setting for folks to congregate while not blocking the views of houses, allowing "eyes on the street" for visual surveillance.

---

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Environmental Benefits

#7 Absorbs CO_2, ozone and other airborne pollutants and provides oxygen.

Trees reduce carbon dioxide directly via sequestration, which helps mitigate global warming. More specifically, trees located within close proximity to streets absorb nine times more pollutants than trees located further away. They convert harmful gases, such as ozone and nitrogen dioxide, back into oxygen and other useful natural gases.[9] Trees also intercept particulate matter such as dust, smoke, and pollen which improves overall air quality.[10] The more mature the tree, the more environmental benefits it provides. Additionally, different species provide varying levels of carbon sequestration and pollutant absorption depending on the density of leaves, root structure, and other biological factors.

#8 Reduces the urban heat island effect and conserves energy.

Urban environments are covered with impervious surfaces – asphalt and concrete streets and parking lots – that increase temperatures by three to seven degrees.[9] This temperature rise, known as the urban heat island effect, increases energy costs to homeowners and consumers. Trees provide shade to combat the urban heat island effect and thereby reduce energy costs. This temperature reduction is increasingly important as climate change brings hotter temperatures worldwide.

#9 Reduces stormwater runoff and prevents erosion.

Trees in the urban environment play an important role in stormwater management by reducing runoff, encouraging stormwater to infiltrate into the soil, and reducing pollutants found in the stormwater. Trees capture the first 30% of precipitation through their leaf structure, intercepting the stormwater before it ever hits the ground.[10] Another 20-30% is absorbed by the trees root system and then transpired back into the air.[9] Urban trees, particularly street trees, reduce the risk of flooding to adjacent properties. Although not often recognized as such, trees are an essential part of the overall stormwater management system.

#10 Provides habitat for wildlife.

Trees provide habitat for vital wildlife such as birds, butterflies, bees, and pollinators within the urban environment. Parks and natural areas provide primary habitat sanctuaries. To promote an overall healthy ecosystem in urban areas, trees should be strategically located between these open spaces to provide corridors and stepping stones to link these habitats.[11]

ANNUAL BENEFITS OF TREES IN YUMA'S *Smucker Park*

+$12,127 PER YEAR

Each year, the 198 trees found in Smucker Park alone offer over twelve thousand dollars of benefits to the city. These benefits come from energy savings, CO_2 sequestration, improvement of air quality, stormwater runoff intercepted, and aesthetics. The five most populous species found in Smucker Park are shown to the right, along with their annual value per tree. The benefits of each species differ based on its leaf, trunk, and root structure, and benefits increase each year as the tree grows.

FICUS

Inventory and analysis of the trees in Smucker Park conducted by the Department of Forestry & Fire Management (DFFM)'s Arizona Urban Tree Map initiative.

Economic Benefits

#11 Increases property values.

Homes and businesses with trees in close proximity consistently have more value. Real estate professionals estimate that tree-lined streets offer a $15,000 to $20,000 increase in property value.[9] A study of houses in Portland, Oregon found that, on average, street trees add 3% to the sales price and reduce time-on-market by 1.7 days.[12] The increase in property value results in an increased tax base for the local government.

#12 Increases consumer traffic to businesses.

Trees increase profitability of business districts. Studies found that tree-lined shopping street increase shoppers willingness to pay for goods by 12 percent.[13] Restaurants benefit from outdoor seating with trees that provide shade and visual relief from the urban environment. Even workers report higher productivity when they have a view of trees from their office space.[13] Street trees improve the shopping experience to offer local business districts a much-needed competitive advantage to win out over internet sales or discount stores.

#13 Contributes to longer pavement life.

Shade cast by street trees helps the underlying roadway last longer. A study conducted in Modesto, California found that asphalt on streets shaded by large canopy trees lasts longer than asphalt on unshaded streets, reducing maintenance costs by 60% over 30 years.[14] Shade reduces daily heating and cooling (expansion and contraction) of the asphalt thereby reducing pavement fatigue such as cracking, rutting, shoving, and other distress. Not only is this significant for our municipal streets, but also for privately owned parking lots.

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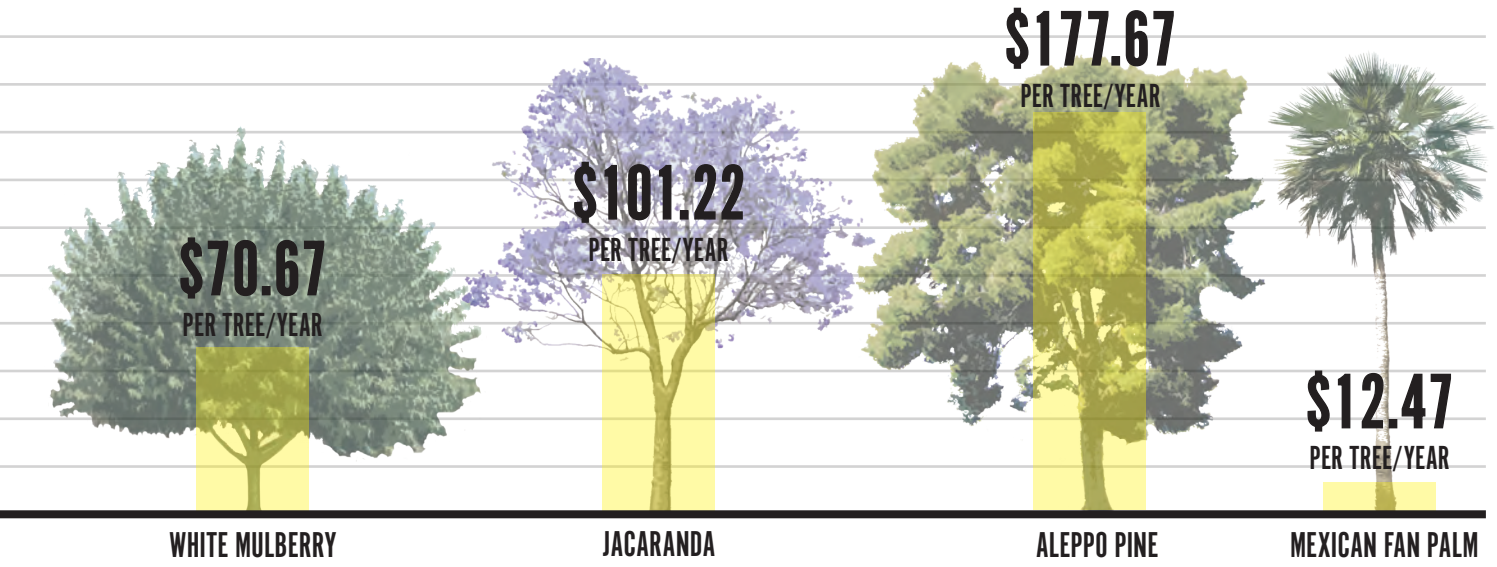
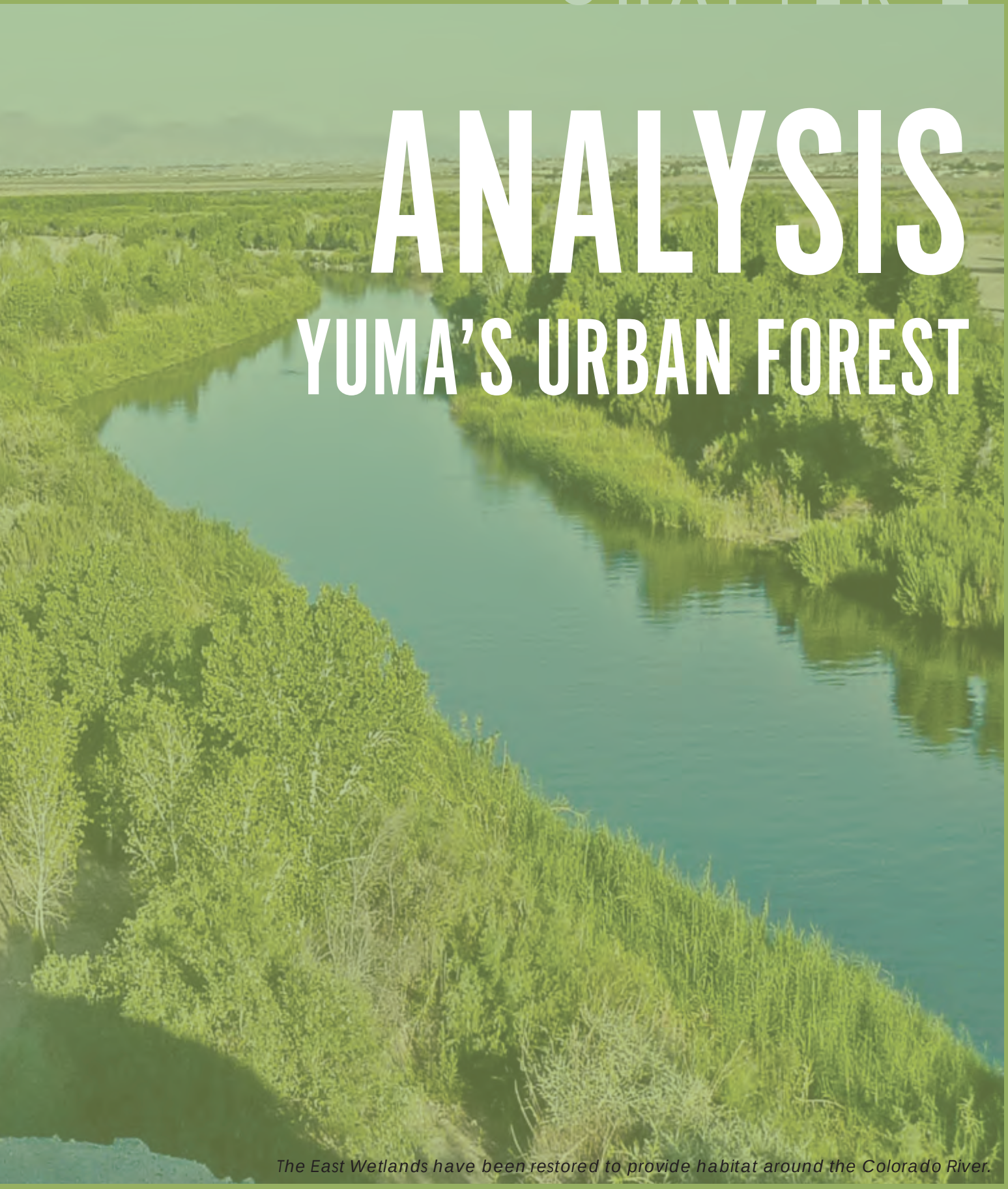


CHAPTER 2

ANALYSIS

YUMA'S URBAN FOREST



The East Wetlands have been restored to provide habitat around the Colorado River.

ANALYSIS *of* YUMA'S URBAN FOREST

To be without trees would, in the most literal way, to be without our roots.

Richard Mabey, *Beechcombings: The narratives of trees*

In order to plan for the future of Yuma's urban forest, we must first understand the important role trees have played in Yuma's history and the current condition of our urban forest. Tree canopy coverage is measured and mapped to compare how the urban forest has changed over the years. Analysis of Yuma's climate and soils gives insight when selecting species that will thrive in Yuma. A well-rounded evaluation of the urban forest also takes into consideration that, despite their many benefits, trees also present some concerns. Common concerns and ways to mitigate each is also addressed. Yuma has many areas where trees are thriving in the urban, desert environment; these examples serve as inspiration when planning for a successful urban forest.

Historical Context

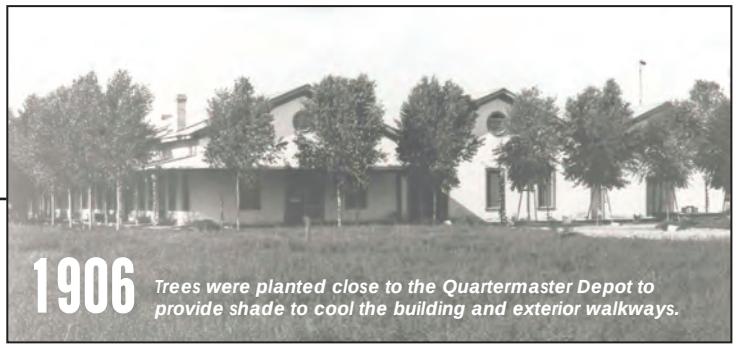
Trees have a long history in Yuma. Before central air conditioning, trees were planted near buildings to provide shade. Trees lined the streets to provide refuge for pedestrians. Date and citrus trees were, and remain, a key component of Yuma's booming agriculture industry.

Date Palms. Yuma has been known for its date farms since 1944 when the first date palms were brought to Yuma County from the Coachella Valley in eastern California. The U.S. Department of Agriculture played a supportive role in bringing dates to Arizona in their efforts to site crops along the Lower Colorado River. The area is now one of the world's largest date producers with over 250,000 acres of date palms. Date production has grown to a $35 million business annually and plays an important role in Yuma's economy.[15] Most farmers in Yuma grow Medjool dates, which are known for their premium quality. As of 2015, there were an estimated 7,500 acres in Yuma County dedicated to date trees.[16]

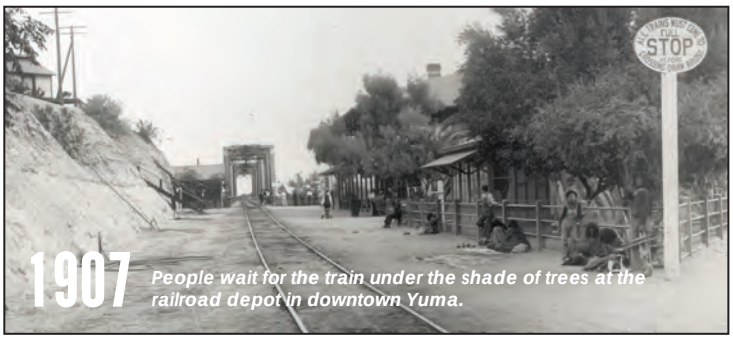
Citrus Trees. Yuma County ranks number one in Arizona for lemon, tangelo, and tangerine production.[17] Lemons are by far the largest citrus crop in Yuma County with over 7,000 acres dedicated to lemon production in 2007. Mature lemon trees may produce between 1,000 and 2,000 lemons each year. Tangelos, particularly the minneola variety, are also grown in Yuma with over 2,500 acres dedicated to their production in 2005. There is minimal grapefruit production in Yuma, totaling about 150 acres in 2005.[18] The height of the citrus industry in the Yuma area was in the 1970s, and although citrus production has declined since then, it is still a key part of Yuma's agriculture industry. Citrus trees are easy to grow at home and require minimal maintenance. Citrus

trees can be found in many Yuma yards and even along City streets, such as the orange trees that line Orange Avenue near City Hall.

Tree City USA. Since 2008, Yuma has earned the prestigious designation as a Tree City USA, awarded by the Arbor Day Foundation. To be recognized as a Tree City USA, a community must have an urban forestry program and proactively plant and care for trees. Other requirements include having a tree board or department, having an adopted tree care ordinance, spending at least $2 per capita on community forestry activities, and holding an annual Arbor Day celebration.[19] In 2007, Yuma adopted its first tree care ordinance and formed a Community Tree Board (Ordinance No. O2007-69). The Community Tree Board was disbanded in 2018 (O2018-040) and its duties were consolidated into the existing and active Parks, Arts, and Recreation Commission (PARC). Based on recommendations stemming from this planning effort, the tree ordinance has been updated with a more robust ordinance providing increased protections for municipal trees (see Chapter 4 for more information). Parks & Recreation staff from the Urban Forestry Division host an Arbor Day celebration each year in conjunction with a local school. Typically, the celebration involves planting trees.



1906 *Trees were planted close to the Quartermaster Depot to provide shade to cool the building and exterior walkways.*



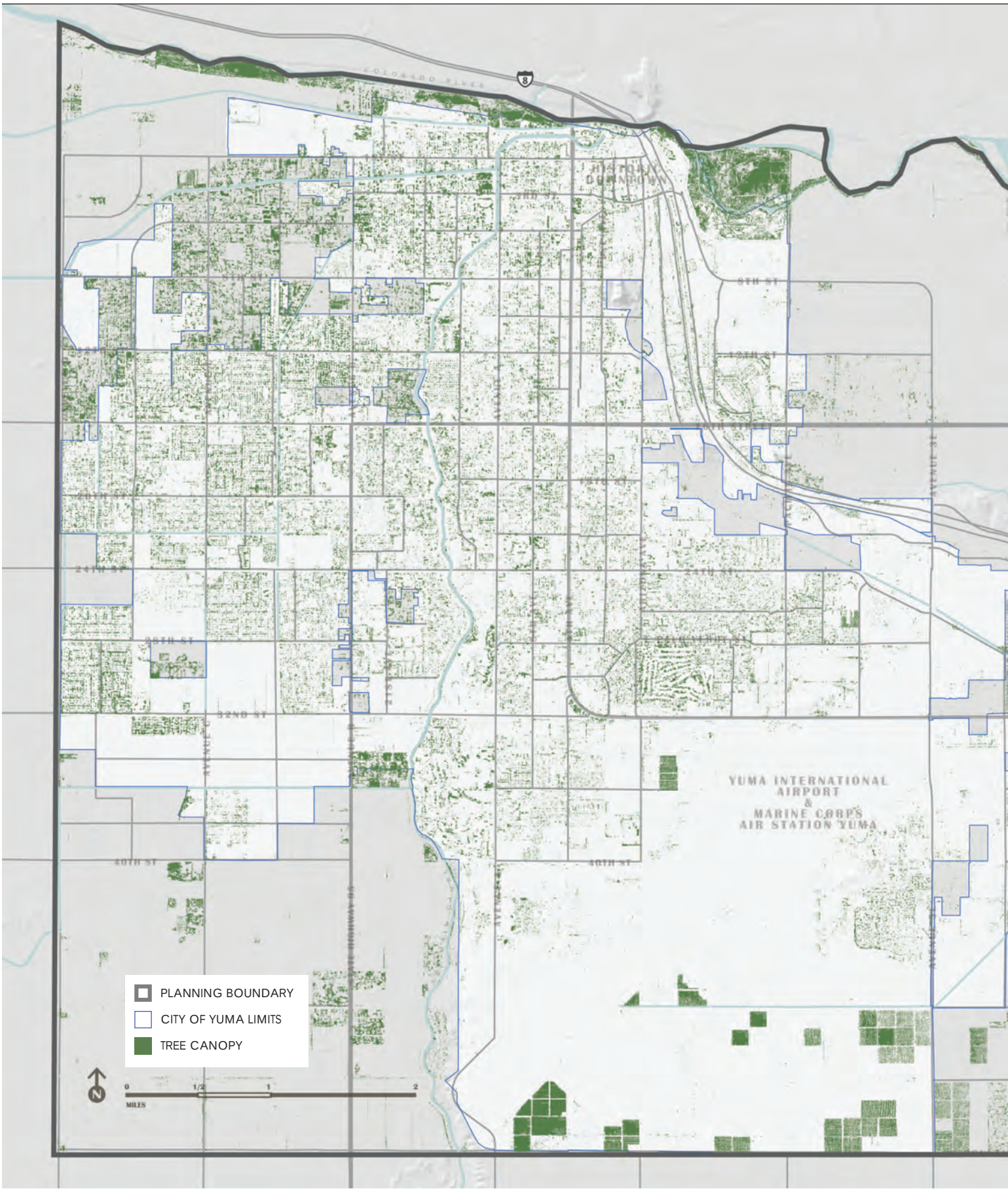
1907 *People wait for the train under the shade of trees at the railroad depot in downtown Yuma.*

1912 *Trees line 1st Street near Avenue A.*

1930 *Palm line 4th Avenue looking south from 16th Street.*

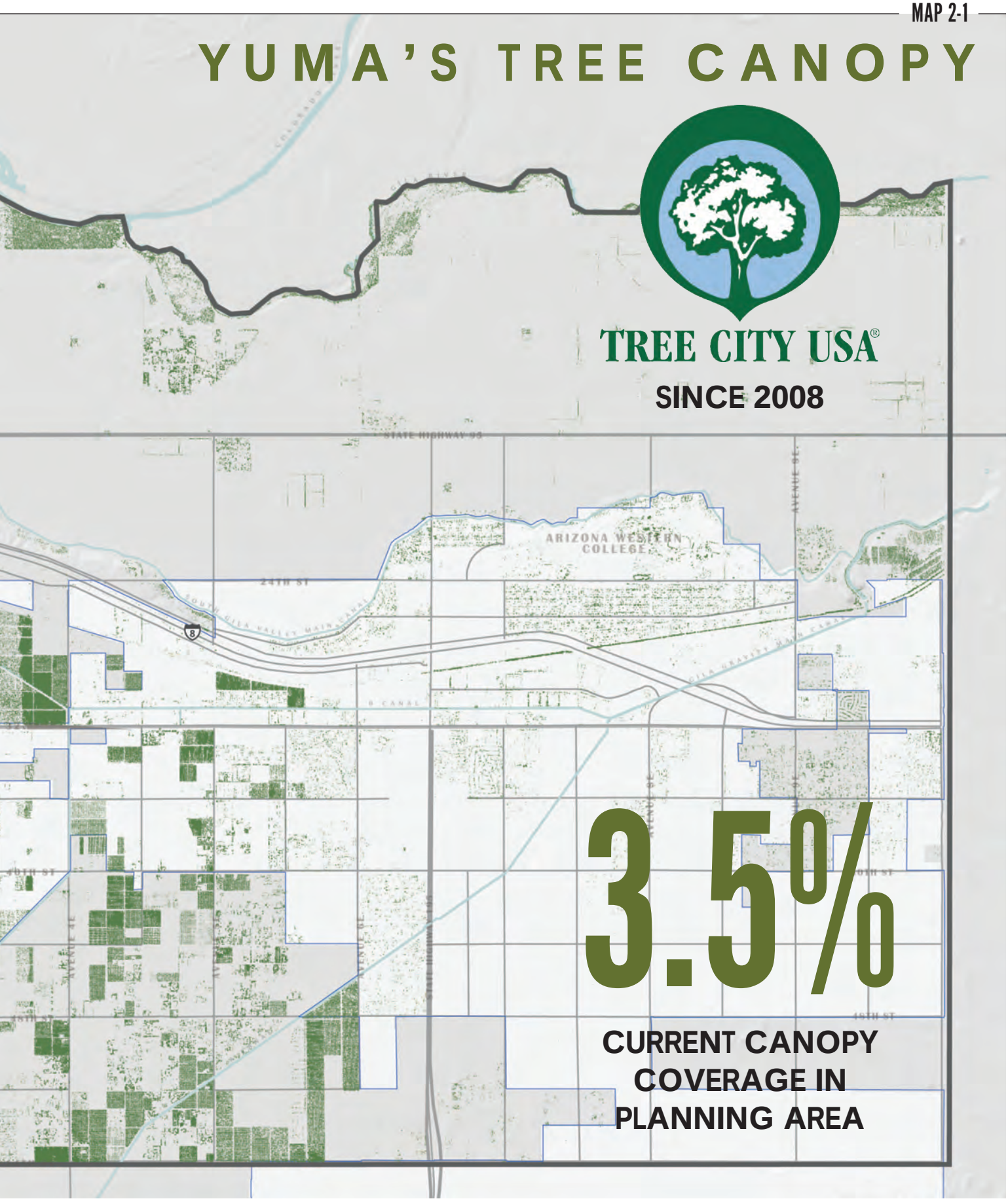
2015 *Local children, assisted by City staff, plant a tree during an Arbor Day celebration.*

[15] Arizona Experience Website. <*arizonaexperience.org/specialty-crops/blogs/dates*>
[16] Agriculture Marketing Resource Center. "Dates". Revised 2018. <*www.agmrc.org/commodities-products/fruits/dates*>
[17] Visit Yuma Website. "Agriculture in the Desert". <*www.visityuma.com/agritourism.html*>
[18] Nolte, Kurt. Yuma Area Agricultural Council Website. May 2015. <*yaac.org/*>
[19] Arbor Day Foundation Website. <*www.arborday.org/programs/treecityusa/about.cfm*>


COLORADO RIVER
8
HISTORIC DOWNTOWN
8TH ST
16TH ST
24TH ST
28TH ST
32ND ST
40TH ST
48TH ST
AVENUE C
AVENUE E
AVENUE G
AVENUE I
AVENUE J
AVENUE K
AVENUE L
AVENUE M
AVENUE N
AVENUE O
YUMA INTERNATIONAL AIRPORT & MARINE CORPS AIR STATION YUMA
PLANNING BOUNDARY
CITY OF YUMA LIMITS
TREE CANOPY
N
0
1/2
1
2
MILES

MAP 2-1

YUMA'S TREE CANOPY



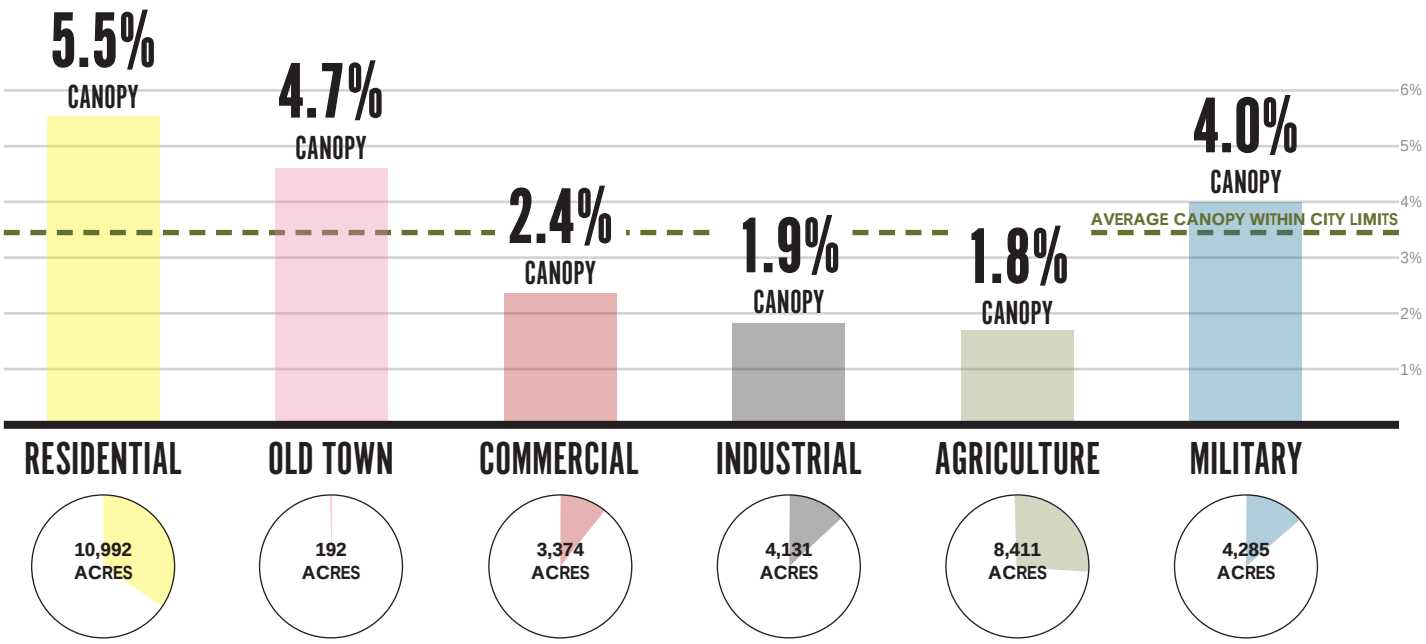
Existing Conditions

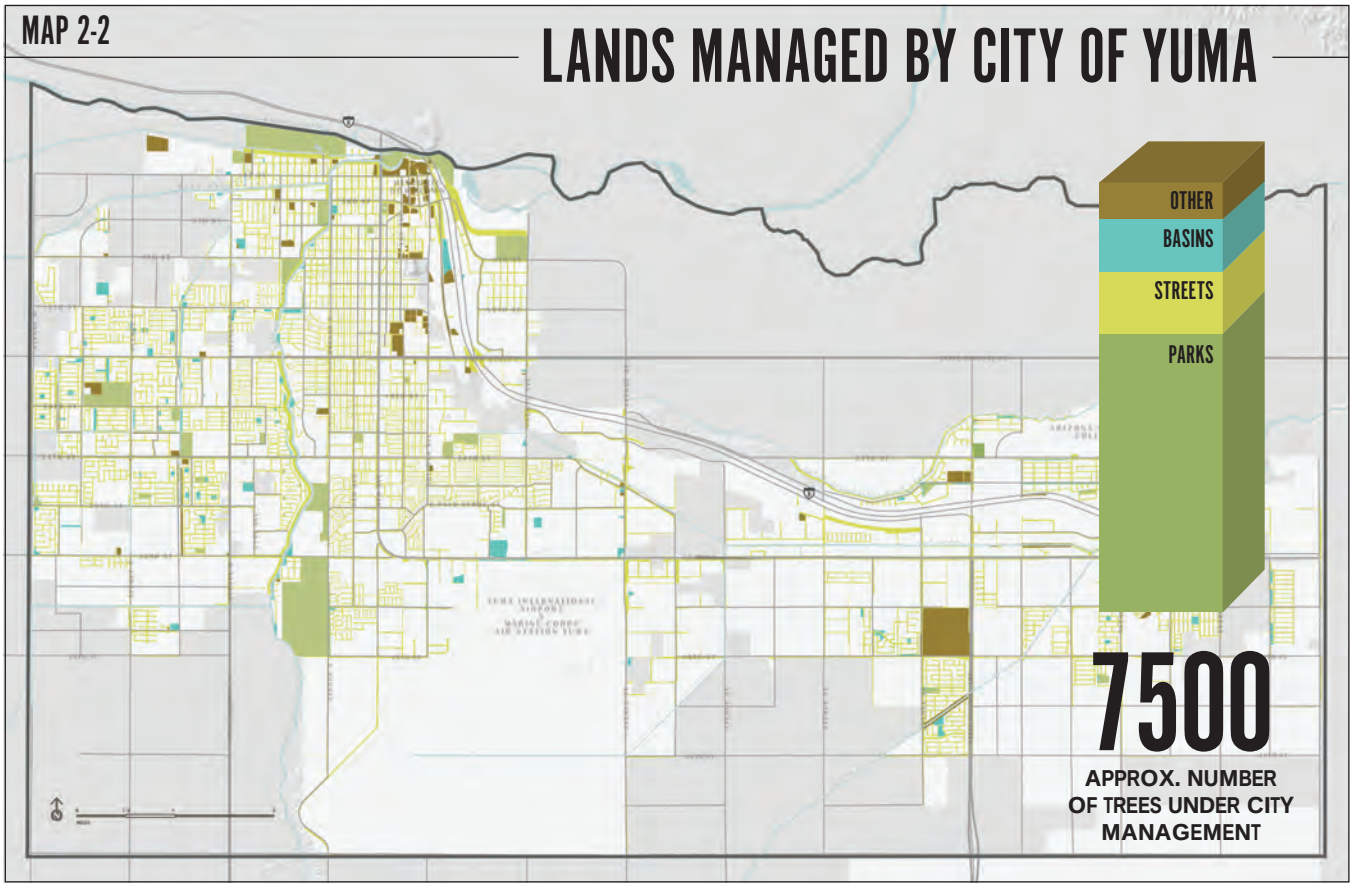
Tree Canopy. The tree canopy map shown on the previous pages illustrates Yuma's existing urban forest. Tree canopy is measured as the extent of the outer layer of leaves and branches of an individual tree or group of trees. The higher the density of the tree canopy, the greater the benefits trees can provide such as cleaning the air, cooling buildings through shading, and providing habitat for wildlife. Monitoring tree canopy distribution over time is one way to measure the health of our urban forest and to plan for equitable distribution of future plantings.

Based on analysis of 2018 aerial images, the overall tree canopy coverage for the portion of the planning area within City of Yuma limits (excluding the Estancia annexation to the south), was 3.5%. In 2015, the Arizona Department of Forestry and Fire Management (DFFM) used the i-Tree Canopy method to estimate the tree canopy at 3.75% for the incorporated places in the Yuma region. In addition to parts of the City of Yuma, the DFFM estimate also included parts of Yuma County, the Foothills, and Somerton. Analysis of canopy coverage on different land uses within the City (based on zoning district and illustrated below) shows that residential areas have the highest canopy density at 5.5%. Canopy coverage in commercial, industrial, and agricultural land uses is less dense than the overall City average. Canopy analysis is one factor used to determine where tree planting efforts should be targeted to ensure equitable distribution of their benefits across the City.

City of Yuma Trees. While this plan aims to encourage trees throughout the city limits on both publicly and privately-owned lands, the property owned and maintained by the City of Yuma represents the largest portion of the urban forest under single ownership. The City of Yuma does not currently have a formal record or detailed inventory of existing trees, but during this planning process, an estimated inventory of City-managed trees was created through a series of site visits and analysis of aerial maps. Estimates show that the City of Yuma manages and maintains approximately 7,500 trees. These trees are found in parks, along streets, in retention basins, and around other facilities maintained by the City (fire stations, City Hall, etc.). This estimate is merely a head count of trees, not a full inventory of their health, exact location, size, and species. Full inventories including such detailed information have been conducted by the

TREE CANOPY BY LAND USE WITHIN CITY LIMITS





An allée of mesquite trees provides shade to a residential street in Texas.

Arizona DFFM for two locations in Yuma: Smucker Park (2015) and the upper bench of the West Wetlands Park (2018). See Appendix A for both inventories. A full inventory including detailed information for the entire City would allow City departments to better manage the urban forest. For more information on the proposed tree inventory, see Chapter 5.

Structure of Tree Care within the City. Tree maintenance is split between the Parks & Recreation Department's Urban Forestry Division and the Public Works Department's Street Maintenance and Basin Maintenance crews. Parks and Recreation has three certified arborists on staff. Their crews maintain all the parks, the historic downtown, and some facilities, totaling about 5,500 trees. Public Works' Streets Maintenance crews maintain about 900 tress found along streets and in medians, while their Basin Maintenance crews are responsible for another 1,000 in the retention basins. Public Works does not have any certified arborists on staff and hires local contractors for intermittent tree pruning and care. When immediate attention is needed for a tree, Public Works staff contacts the Parks and Recreation Urban Forestry Division to conduct a tree hazard analysis to address the problem. To keep maintenance costs as low as possible, both departments use volunteer and inmate labor to assist with landscape maintenance such as clearing debris, but only City employees or local contractors deal directly with tree maintenance such as pruning and planting. Appendix B, the City's 5-Year Tree Maintenance Plan provides more information on the City of Yuma's tree care practices.

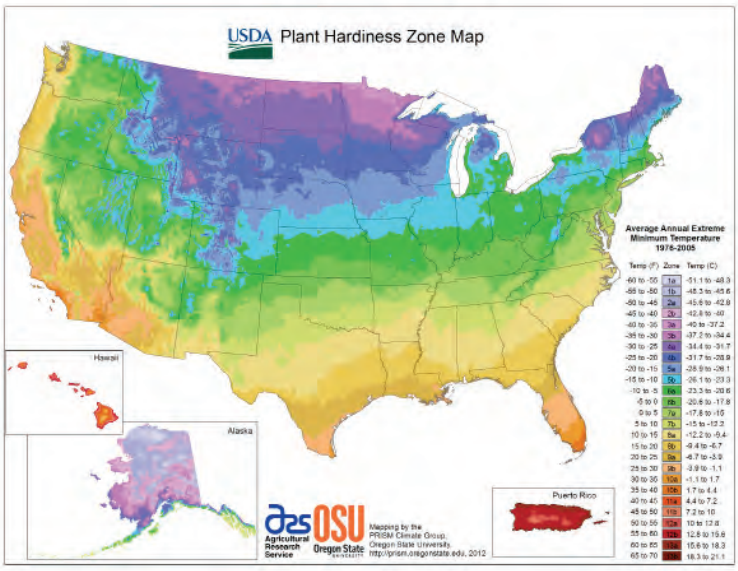
Regulation of tree planting in conjunction with new development is under the purview of the Community Development Department. Landscape regulations in the City of Yuma Code specify where new development plants trees and other landscape. Under a 2017 update, the regulations emphasize the importance of trees along streets, in parking lots, retention basins, and in residential areas.

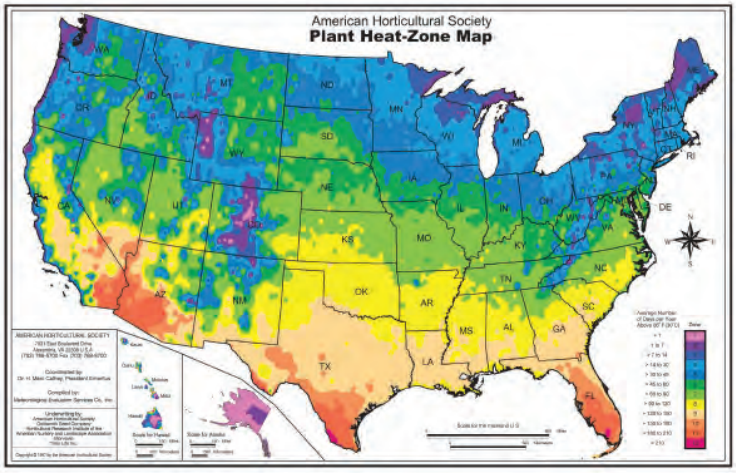
In order to make recommendations about trees that will thrive in Yuma, we must first understand the region's unique desert climate. Choosing trees that can withstand the heat and minimal rainfall is the first consideration; the second is to ensure that the plants are well adapted to the specific soil types found in Yuma. Local experts helped City staff compile a list of recommended plants that flourish in Yuma's unique environmental conditions, which can be found in Appendix C.

Plant Hardiness Zone. The United States Department of Agriculture (USDA) issues the plant hardiness zone map as a guide for landscaping. Yuma is located in Zone 10a with average annual extreme minimum temperatures of between 30 and 35 degrees F. The 2012 Plant Hardiness Zone Map, shown at left, is the standard by which gardeners and growers can determine which plants are most likely to thrive in a particular location.[20] Yuma's plant hardiness is similar to that found in southern California, southern Florida, and the Mediterranean.

It's hot. It's dry. It's salty.

Phill James, local landscape expert, on Yuma's unique environment





Plant Heat Zone. Similar to plant hardiness zones, the American Horticultural Society publishes the Plant Heat Zone Map, shown at left, to classify plants by heat tolerance. Yuma is classified in Zone 11, indicating that there are, on average, 180 to 210 days per year with temperatures above 86 degrees F.[21] By this measure, Yuma is most similar to southern Texas and southern Florida.

Soils. An ecological divide exists in Yuma between the mesa and the valley, which is evident in the types of soils found in each environment. Map 2-3 shows the difference between the predominately sandy soils found on the mesa (shown in tan color tones) and the richer clay and silt soils (shown in green color tones) found in the valley.[22] Soil types are an important consideration when selecting tree species that will thrive. Sandy soils are loose and hold less nutrients and water than clay and silt soils. On the mesa in sandy soils, native desert plants are most hardy, while more species are able to thrive in the richer soils found in the valley. Additionally, Yuma's soils have a high salt content. Plants struggle to grow in salty soils; salinity increases plants' susceptibility to drought and harms the soil structure and microbiology. In Yuma's heat, irrigation water evaporates quickly, leaving salt

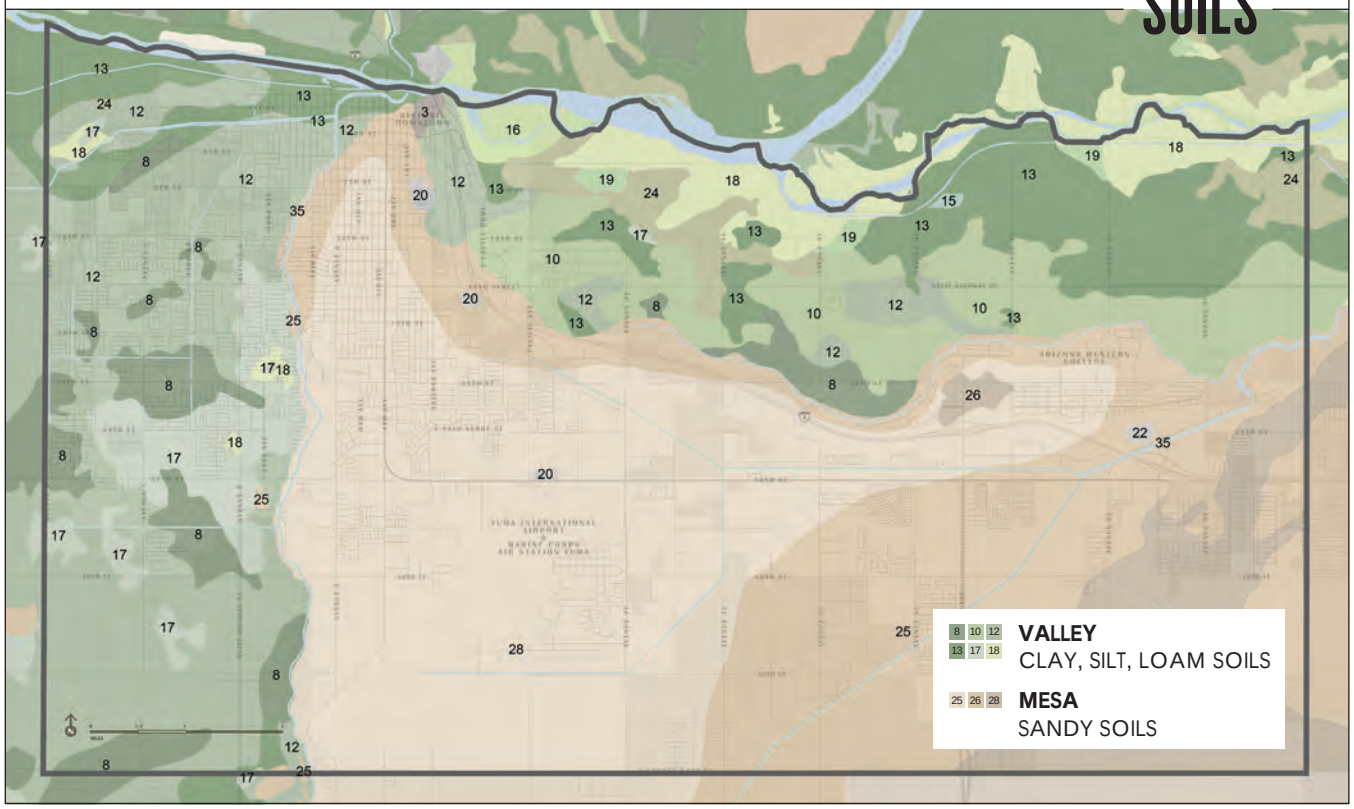
[20] 2012 USDA Plant Hardiness Zone Map. USDA Agricultural Research Service. <*planthardiness.ars.usda.gov/PHZMWeb/DownloadsPublic.aspx*>

[21] American Horticultural Society Plant Heat Zone Map. <*www.ahsgardening.org/gardening-resources/gardening-maps/heat-zone-map*>

[22] Web Soil Survey. USDA Natural Resources Conservation Service Website. <*websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx*>

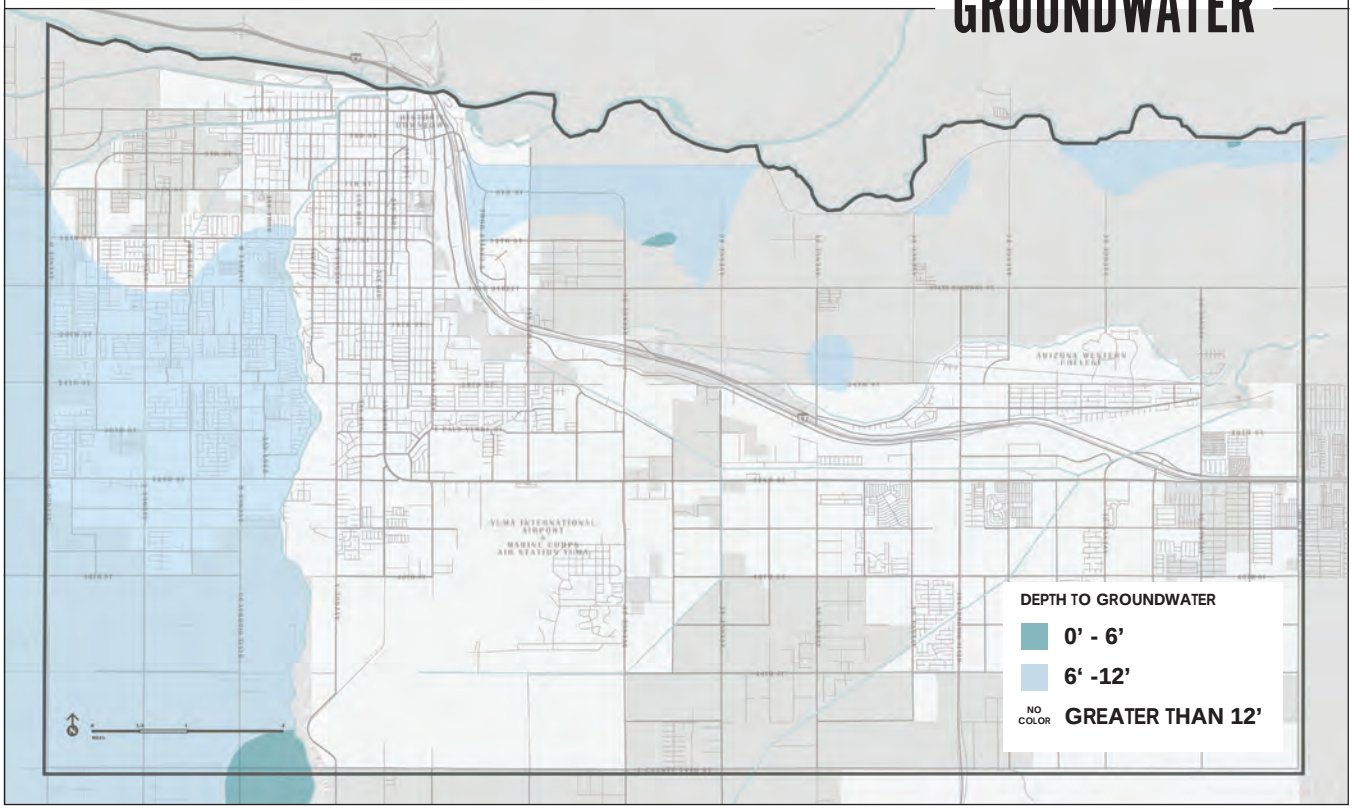
MAP 2-3

SOILS



MAP 2-4

GROUNDWATER



deposits near the surface.[23] Soils can be particularly salty in areas formerly used for agriculture. See Appendix D for detailed descriptions of soil types.

Groundwater. Groundwater is found in the saturated zone of the soil below the unsaturated soil that lies on near the surface. In Yuma, the groundwater is recharged from "downward percolating irrigation water, as seepage from a losing reach of the Colorado River, or from one of the many unlined irrigation canals".[24] Map 2-4 shows groundwater depths throughout Yuma, highlighting areas where the depth to groundwater is 6 to 12-feet and areas where it is less than 6-feet.[24] Trees in areas with high water table tend to grow larger than those in areas with a low water table because their roots can tap into this source of water. Groundwater depths change over time, so the most recent groundwater maps should be consulted when making specific decisions on tree plantings.

Anticipated Impacts of Climate Change. Over the coming decades, climate change is expected to impact Yuma. Climate change refers to the negative effects of the build-up of certain gases in our atmosphere, carbon dioxide being the most abundant of these gases. According to a report by the United States Environmental Protection Agency issued in August 2016, Arizona's climate has warmed about two degrees in the last century. Rising temperatures increase the rate at which water evaporates into the air from soils, plants, and surface waters. Therefore, soils are likely to be drier, and periods without rain are likely to be longer, making droughts more severe.[6] Hot days can be dangerous to people, especially those who live in urban environments. High air temperatures can cause heat stroke and dehydration, and affect people's cardiovascular, respiratory, and nervous systems. Rising temperatures can increase the formation of ground-level ozone, a key component of smog.[25]

Urban forests combat the effects of climate change in several ways. Trees, and some large shrubs, are unique among plants in that they have a woody stem and roots that is made from carbon that the plant converts from carbon dioxide in the air via photosynthesis. Trees remove this carbon dioxide from the atmosphere and store it for decades or even centuries in their trunk, branches, and roots. When planted to shade buildings, trees help reduce greenhouse gas emissions by reducing energy needs. When planted near streets, trees reduce the formation of ground-level pollution and help cool the air via transpiration to make the environment more comfortable and safe for humans.[26]

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[23] "Home Grown: Studying soil salinity." KYMA. Sept 30, 2019. *<https://www.kyma.com/news/home-grown-studying-soil-salinity/112707030 7>*

[24] United States Bureau of Reclamation Website & Groundwater Map, April 2018. *<www.usbr.gov/lc/yuma/programs/YAWMS/GROUNDWATER.html>*

[25] *What Climate Change Means for Arizona*. United State Environmental Protection Agency. EPA 430-F-16-005. August 2016.

[26] Kuhns, Michael. "Landscape Trees and Climate Change." Utah State University Forestry Extension. *<forestry.usu.edu/trees-cities-towns/urban-forestry/landscape-trees-climate>*

Stately trees create a shady environment for residences along 8th Avenue in Yuma.

Mitigating Concerns

Trees offer a myriad of benefits, but we also must recognize that they present some concerns, costs, and risks. Most, if not all, concerns can be mitigated through best planning, planting, and management practices. The table below gives examples of some common concerns and best practices to address each. It is important to note that trees in the urban environment need continual maintenance and will eventually need removal and replacement. An aging or hazardous tree cannot be left until it completely falls, as in natural forests.

CONCERNS	MITIGATION MEASURES
Cracking or lifting pavement	Damage to surrounding pavement or sidewalks is often caused by the tree growing too large for the planting space. Selection of the proper species for the growspace is imperative. New roads can be designed with curb extensions to allow more growspace.
Interference with infrastructure	Interference with underground and overhead infrastructure can be limited by selecting the proper species for the space. Some species have invasive and aggressive root structures, such as ficus, that should be avoided near underground infrastructure. Arizona Public Service (APS) has published a list of small trees that will not interfere with overhead power lines.
Obstruction of views or signage	Proper site selection, species selection, and adequate pruning prevents trees from growing too large and blocking views. Trees along the streets should be trimmed up to allow clear sight lines and should not be placed in visibility triangles.
Shedding debris or branches	Frequent street sweeping can mitigate leaf and flower debris. Species with low litter should be selected for locations near streets and sidewalks. Likewise, species that are known to have a weak branching structure and therefore likely to shed branches on a semi-regular basis should be avoided.
Allergies	Yuma's adopted Landscape Regulations prohibit new development from installing common allergenic plants such as the female mulberry and fruiting olive trees. Generally, species that rely on wind pollination create more pollen, which can be an irritant.
Attracting pests that leave a mess	Some species attract birds that leave droppings. This is typically a seasonal annoyance and the benefits the tree provides generally outweigh any annoyance. Proper placement away from eating areas will mitigate the worst case scenarios.
Irrigation	Due to the low amount of rainfall Yuma gets, most trees will need irrigation during the summer months. Yuma's Landscape Regulations require all new development to provide a permanent, water-efficient, underground irrigation system controlled by automatic valves. Deep and infrequent watering helps promote strong, deep roots, rather than shallow roots that might interfere with infrastructure.

Public Input

Extensive public outreach efforts and public input form the foundation of this plan. Public input is critical to every planning process, and the public was invited to engage on this project in a number of ways throughout the planning process, via the following methods: a public survey, a Planning Task Force, community meetings, and opportunities to review the plan at various stages online.

Public involvement allows citizens to voice ideas, discuss information, and ask questions about City policy and investment. A rigorous public input process was especially important for this Tree & Shade Master Plan for two reasons: 1) the City had never had a plan of this nature in the past, and 2) this plan relies heavily on community support to achieve the vision.

Planning Task Force. To provide specific guidance on the plan, staff reached out to stakeholder groups, subject matter experts, and local organizations to form a Planning Task Force. The Task Force had 26 active members who represented various community groups such as local arborists, landscape professionals, garden clubs, community service organizations, health professionals, education professionals, development professionals, and City-appointed commissions. Each group brought a unique perspective about how and where trees could be planted; recommendations that are reflected in the plan. The Task Force met monthly for a total of nine meetings over the course of the year. At the meetings, the plan's purpose, vision, priority areas, and implementation strategies were discussed. Based on the Task Force's recommendations, 20 implementation projects were developed, as described in Chapter 4. Task Force members were challenged to help with implementing the plan by committing to one or more of these projects that aligned with their personal or organizational interests and expertise. A complete list of Task Force members and activities is available in Appendix E.

Community Meetings. The public was also invited to attend community meetings to voice their opinions and learn more about Yuma's urban forest. A plan kickoff meeting was held June 6, 2019 at the Yuma Art Center and drew about 50 attendees. Community Development staff presented

Members of the Task Force gathered to plant a tree at Parks & Recreation's annual Spruce Up Your Park Day.

an overview of the plan and then opened the floor to an informative discussion about the urban forest. Attendees emphasized the importance of planting the right tree for the location, choosing native and well-adapted tree species, and properly maintaining trees and xeriscape to maintain aesthetic benefits. The importance of educating the public on various tree care and maintenance topics such as pruning, irrigation, and planting techniques was also mentioned.

In conjunction with the June 6 Community Meeting, a display targeted at children was included in the Yuma Children's Museum, which was held at the Yuma Art Center during the summer months. The display included an exhibit demonstrating the cooling effects of a tree's shade, an introduction to native plant species, and the benefits of trees in the urban environment. Plan brochures and surveys were available for adults.

Public involvement continued throughout the planning process and the public was invited to comment on the plan at the Planning & Zoning Commission and City Council meetings held in January and February of 2020. Due to the inter-departmental nature of the plan, before the plan was introduced to City Council, each department's respective citizen commission was given the opportunity to review the plan: the Parks & Recreation Department's Parks, Arts, & Recreation Commission (PARC); the Public Works Department's Clean & Beautiful Commission; and the Department of Community Development's partner commission, the Planning & Zoning Commission.

Online Information. Draft versions of the plan were available to the general public on the City's website throughout the planning process. Also available on the webpage dedicated to the Tree & Shade Master Plan (*www.yumaaz.gov/community-development/tree-shade-master-plan/tree-and-shade-master-plan*) was a schedule of all meetings and events, a summary of the project, access to the online survey, and links to other supporting materials.

Community Meeting, June 6, 2019

Public Survey. From mid-May through mid-September of 2019, a survey open to the general population was conducted for a period of four months. The survey, presented in both online and paper versions and in both English and Spanish, had a total of 445 respondents. Print versions of the survey were available at the Community Meeting on June 6, at the main desk in the City Hall lobby, at the Parks & Recreation Department's front desk, and at the Department of Community Development's front desk. Surveys were distributed at several events sponsored by Parks & Recreation: Back to School Rodeo, Come Out and Play Day, and by their Parks, Arts, & Recreation Commission. Additionally, approximately 450 copies were distributed to local fifth grade students at the following schools (one from

each district): Desert Mesa Elementary, Gary A. Knox Elementary, G.W. Carver Elementary, Jame B. Rolle Elementary, and Palmcroft Elementary. Because of the long-term impacts and benefits of trees, it was especially important to get input and involvement from Yuma's youth. Students were encouraged to take the survey home and fill it out with their parents. Students who returned the completed survey were rewarded with a free pool pass to one of the City's pools managed by the Parks & Recreation Department.

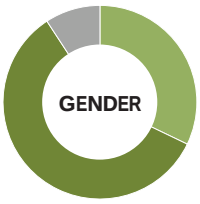
The survey assessed four topics: preferences and values about trees; opinions and knowledge of trees in the public realm; opinions of trees on private property; and demographics. Approximately 59% of respondents were female, 32% male, and 9% chose not to answer. Almost half (46%) of respondents were between the ages of 21 and 40 years old. Approximately 69% owned their homes. Survey results are summarized below and a full report of results can be found in Appendix F.

Seventy percent of respondents answered that there were too few trees in their neighborhoods. When given a choice between images of streets with varying levels of tree canopy, respondents consistently preferred streets with more trees. They also responded that they felt safer walking along streets with more trees. Bus stops with shade, provided either by tree canopy or by a shade structure, were preferred over bus stops without shade.

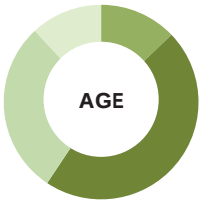
Sixty-six percent of respondents stated they

SUMMARY OF PUBLIC SURVEY RESULTS

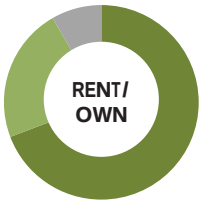
RESPONDENT DEMOGRAPHICS



59% Female
32% Male
9% No answer

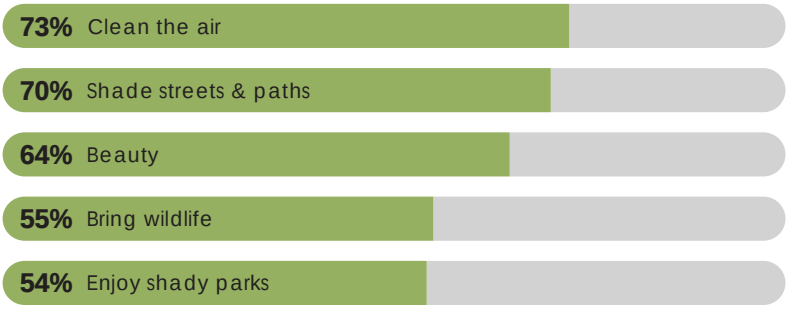


13% <20
46% 21-40
29% 41-60
12% 61+

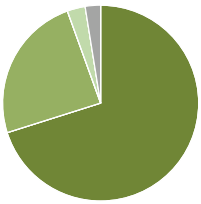


69% Own
23% Rent
8% No answer

TOP 5 REASONS PEOPLE VALUE TREES



WHICH BEST DESCRIBES THE NUMBER OF TREES IN YOUR NEIGHBORHOOD?



70% Too few trees
24% Enough trees
3% Too many trees
3% I don't know

TOP 5 TOPICS FOR PUBLIC EDUCATION

58% Free trees

46% Planting trees

45% Caring for trees on my property

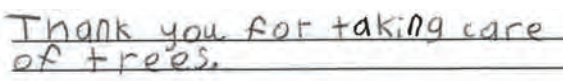
44% Properly watering during drought

41% Different kinds of trees

were unaware of the City's program for planting and caring for public trees and only eight percent were aware of the City's Tree Ordinance. This indicates the need for the City to provide more information to the public regarding trees, tree programs, and efforts to preserve and increase the tree canopy.

When asked what would inspire them to plant more trees on their property, respondents overwhelmingly pointed to free or low-cost trees as the best incentive. Nearly three-quarters of respondents indicated they were willing to pay to have trees in their neighborhood's common areas, which could be funded through a maintenance improvement district (MID), a type of special taxing district described in further detail in Chapter 5. Thirty-six percent were willing to pay $5 to $10 per month and 8% were willing to pay $10 or more each month. When asked what topics they would like to learn more about, the top five answers included: free trees; planting trees; caring for trees on my property; properly watering trees during drought; and different kinds of trees.

Respondents were also invited to comment on Yuma's urban forest and many expressed their support for trees in Yuma, like this comment from a 5th grade student.


Thank you for taking care of trees.

While a majority of the comments expressed support for planting more trees, some also mentioned the need for increased maintenance and expressed concerns over the cost of adding trees. All comments can be viewed in Appendix F.

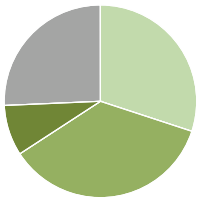
INCENTIVES TO INSPIRE PEOPLE TO PLANT TREES ON THEIR PROPERTY

69% Favored free or low cost trees as the best incentive to inspire them to plant more trees on their property.

42% Rebate

42% Free classes

WILLINGNESS TO PAY FOR TREES IN NEIGHBORHOOD COMMON AREAS



30% <$5/month

36% $5-$10/month

8% $10+/month

26% None

74% Willing to pay for trees in their neighborhood's common areas, which could be funded through a maintenance improvement district (MID).

VISUAL PREFERENCE

When asked to rate a series of images by preference, respondents preferred streets lined with trees and bus stops with shade structures or tree canopy over those without trees.

LEAST PREFERRED RESIDENTIAL STREETS

MOST PREFERRED RESIDENTIAL STREETS

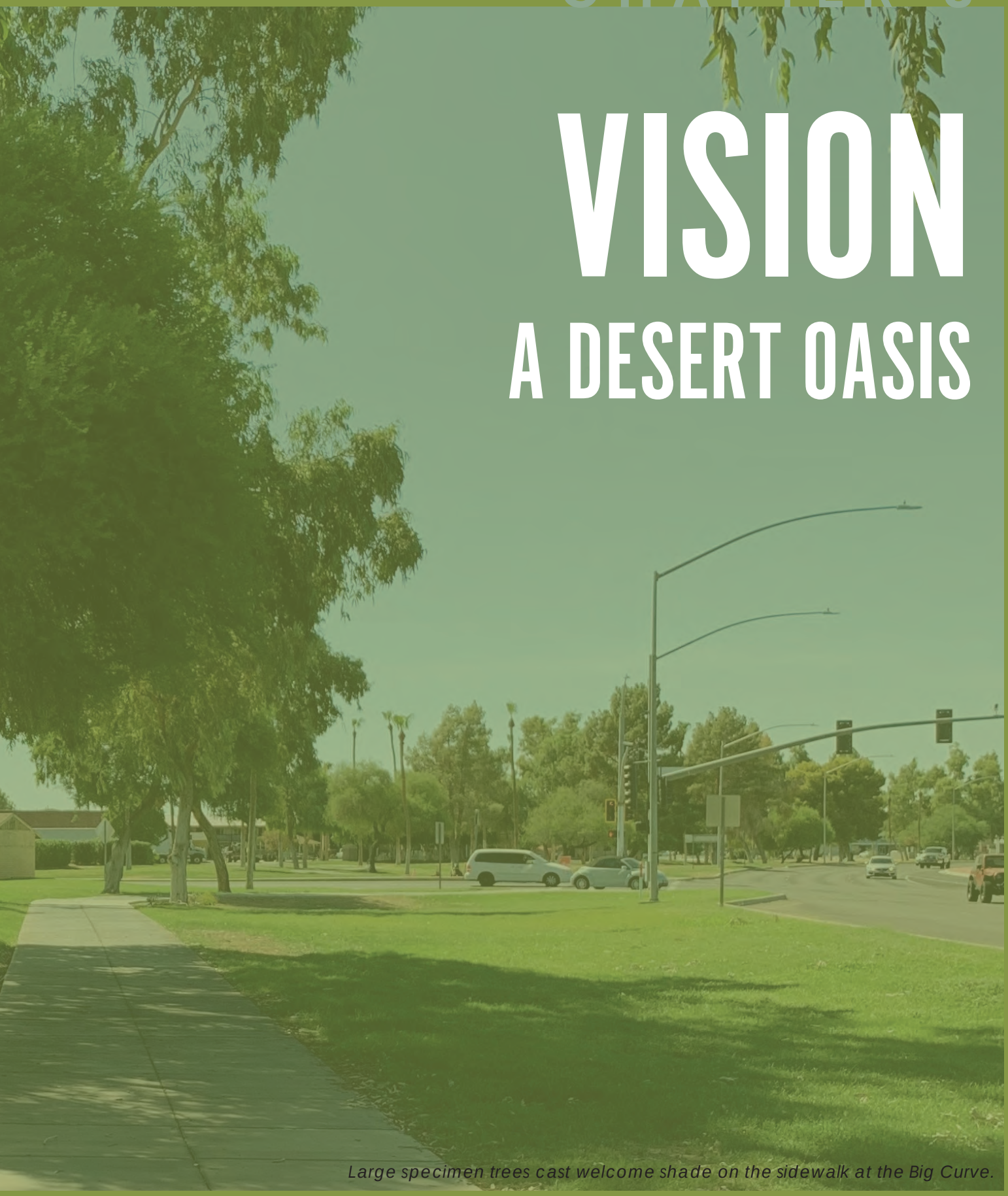
LEAST PREFERRED BUS STOP

MOST PREFERRED BUS STOPS

CHAPTER 3

VISION

A DESERT OASIS



Large specimen trees cast welcome shade on the sidewalk at the Big Curve.

VISION *for* A DESERT OASIS

A society grows great when old men plant trees whose shade they know they shall never sit in. Greek Proverb

In the heat of the Sonoran Desert, there is hardly a more welcome respite than a shady oasis of trees. This plan envisions Yuma as a *desert oasis*; an oasis to be enjoyed by residents, visitors, and wildlife. The metaphor of a *desert oasis* is fitting because it recognizes that our intense desert climate and limited resources would not support a continuous forest canopy, despite even our best efforts. It is simply not feasible to plant trees everywhere, so we must wisely prioritize where trees should be planted to provide the most benefits and to create these oases equitably throughout the city. Native, drought-tolerant trees and shrubs provide a shade oasis not only for people, but also a habitat oasis for wildlife to flourish. The plan challenges Yuma to effectively double the number of existing trees to reach a seven percent canopy. This goal can be achieved by planting trees along streets, paths, and rights-of-way; in parks and open spaces; and on private property such as neighborhoods and parking lots.

Increasing Yuma's Tree Canopy

As outlined in the previous chapter of this plan, the existing tree canopy in Yuma is approximately 3.5%. The goal set by this plan, through a rigorous public input effort, aims to increase the canopy to 7% by 2030; effectively doubling the existing urban forest. For desert cities, American Forests recommends that a 15% canopy coverage as an attainable target, with "higher percentages possible through greater investment and prioritization".[27] Considering Yuma's uniquely hot and dry climate -- unlike most other cities in the nation -- and the currently low canopy coverage, Yuma's goal of 7% aims to be both reasonable for the climate limitations and achievable. Other cities in Arizona have set canopy targets higher than Yuma's target, but their baseline canopy coverage is also higher than Yuma's starting point. Progress toward the canopy goal will be reassessed in 2030 and new canopy targets set as Yuma's tree canopy continues to increase.

In order to achieve a 7% canopy by 2030, the Yuma community as a whole (public and private entities) must plant approximately 10,000 trees each year for a total of 100,000 trees over the next ten years.[28] Based on data from i-Tree Tools, at maturity the average desert-adapted shade or street tree will provide approximately $125 in annual benefits to the Yuma community. Costs of initial tree installation and ongoing maintenance vary widely based on species, location, and other factors. More information on the impacts of the vision for 100,000 trees can be found in Chapter 4 and Appendix G.

[27] American Forests Blog, January 12, 2017 <*www.americanforests.org/blog/no-longer-recommend-40-percent-urban-tree-canopy-goal/*>

[28] Based on an average canopy cover per tree of 531 square feet, which is based on the average mature size of trees found on Yuma's Recommended Plants List, published by the City of Yuma.

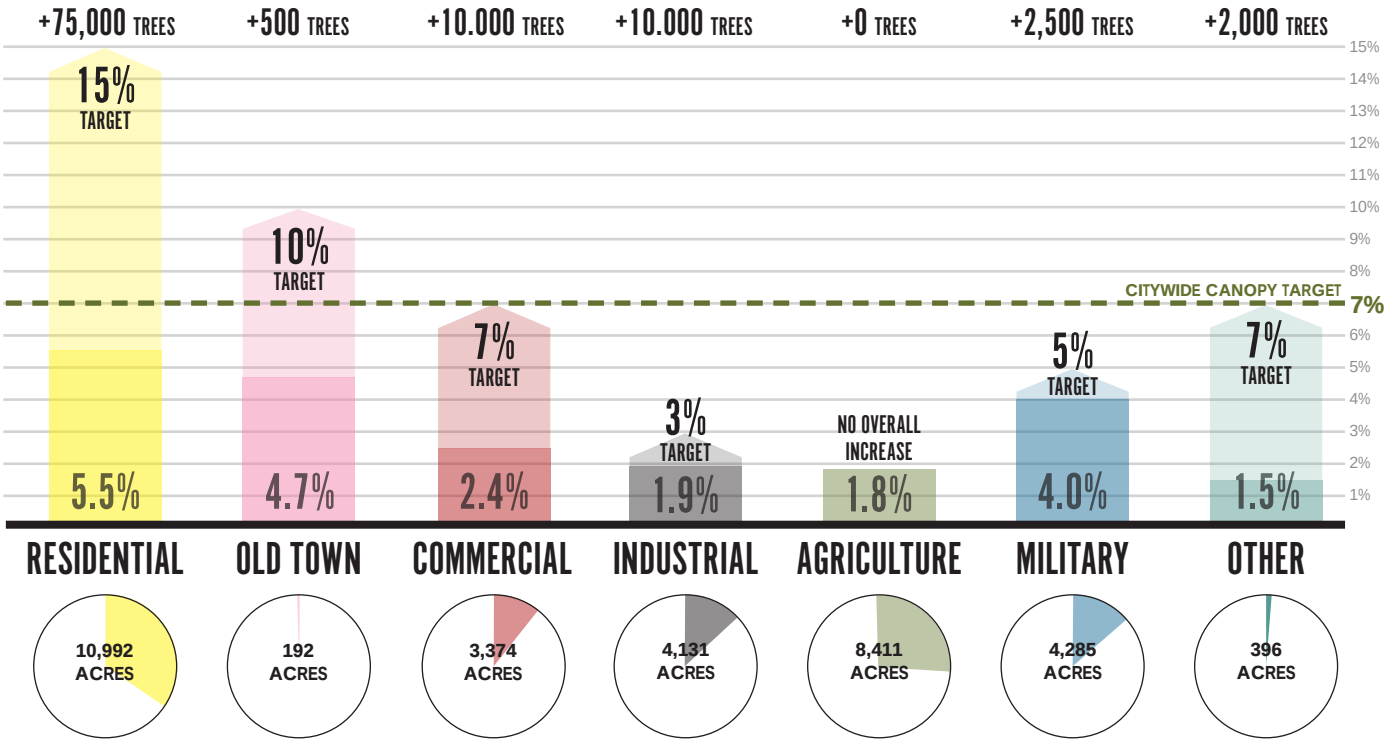
2030 GOAL:

+100,000 *new trees*

TO DOUBLE THE CANOPY COVERAGE TO 7%

Tree Canopy Targets by Land Use. As mentioned in the previous section, the tree canopy varies based on land use, which is evaluated using the current zoning district. Some land uses, like residential, offer more potential for adding tree canopy than others, like agricultural lands. Yuma values agricultural lands and seeks to preserve use for agriculture, so no overall increase in tree canopy is recommended for agricultural zones. Residential zones offer great potential to increase tree canopy coverage, largely because the ratio of pervious to impervious surface is high. The more pervious surface (areas that allow water to infiltrate into the ground) the more potential for adding trees. Commercial and industrial zones,

2030 TREE CANOPY TARGETS BY LAND USE



by nature of their land uses and need for a higher percentage of impervious surfaces such as large building footprints, parking lots, and loading zones, have a lower potential for adding trees and therefore a lower target tree canopy. Despite the different overall canopy targets between residential and commercial lands; both land uses are challenged to triple their existing canopy coverage. Defining different canopy targets for each land use helps identify and quantify different strategies for different land use types.

There's no question that a majority of trees will be planted on sites that are already developed. In the vast majority of instances, trees can be added in existing impervious areas for a relatively low investment. In some cases, however, planting trees may require removing impervious surfaces (asphalt, concrete, etc.). It is also important to ensure newly developed sites contribute to increasing the tree canopy by designing spaces for trees from the initial development phase. Chapter 4 addresses City policies, such as the Landscape Regulations, that regulate how new development adds to the tree canopy.

City of Yuma's Tree Planting Goal. The goal of planting 100,000 trees is shared between private land owners and the City of Yuma. Currently, the City maintains about 8% of Yuma's overall urban forest, with a large portion of those trees found in parks. Doubling the number of trees on City property would mean planting an additional 7500 trees over the next ten years, or 750 each year.

Tree Planting Opportunities

There are many places within the city that offer opportunities to plant trees. Opportunity areas can be categorized in three groups: streets and rights-of-way; parks and open spaces; and private property. Each of the areas offers different benefits to the community. The twelve opportunity areas identified in the chart on the facing page represent where we can plant trees and was developed in response to the comments from the public survey and input from the Task Force. The following section on prioritization offers ways to gauge the impact each tree planting project has on the community. Overlapping tree planting opportunity areas and areas with the greatest need for trees will help the community identify and execute the most impactful projects.

Members of the Clean & Beautiful Commission plant a street tree to celebrate Arbor Day 2019.

Streets & Rights-of-Way. Trees planted along streets and rights-of-way offer walkability, safety, and aesthetic benefits. Street trees are planted within four to eight feet of the sidewalk and aim to provide protection and shade to pedestrians. In some cases, these trees will be maintained by the City, but in many cases, street trees can be planted on private property and maintained by private owners. Street trees near schools and commercial businesses are especially encouraged. Many of the bus stops in Yuma do not have any shade; planting trees and installing shade structures at these stops will provide shade and comfort to those waiting for their bus. Trees can also be planted along pathways, such as the East Main Canal, to provide shade for recreational users. Residents also identified the desire to have

TREE PLANTING OPPORTUNITY AREAS

STREETS & RIGHTS-OF-WAY

PARKS & OPEN SPACE

PRIVATE PROPERTY

more trees and landscape at the interstate interchanges to improve the aesthetic appeal of the city.

Parks & Open Space. Planting trees in parks and open space is one of the easiest places to add trees because there is plenty of pervious surface. It is particularly important to plant trees near playgrounds to provide shade. Elementary students from the Gowan Achievement Program highlighted the need for shade near playgrounds in their April 2019 presentation to City Council. Trees can also be planted in retention basins to beautify the basins and help uptake stormwater. Trees in parks and open space are most likely to provide habitat areas for wildlife, although trees in your own backyard can serve that purpose as well.

Private Property. Private property offers the greatest opportunity for planting trees. Residential yards in particular offer great potential. If each household added one more tree in their yard, we'd have over 40,000 more trees. On commercial and industrial properties, trees can be added in parking lots to provide shade. School property also offers an opportunity: trees can be planted along sidewalks to encourage walkability or near playgrounds to provide shade.

Map 3-1 on the following pages identifies opportunity areas within each land use type to help focus tree planting efforts to reach the tree canopy targets set in this plan.

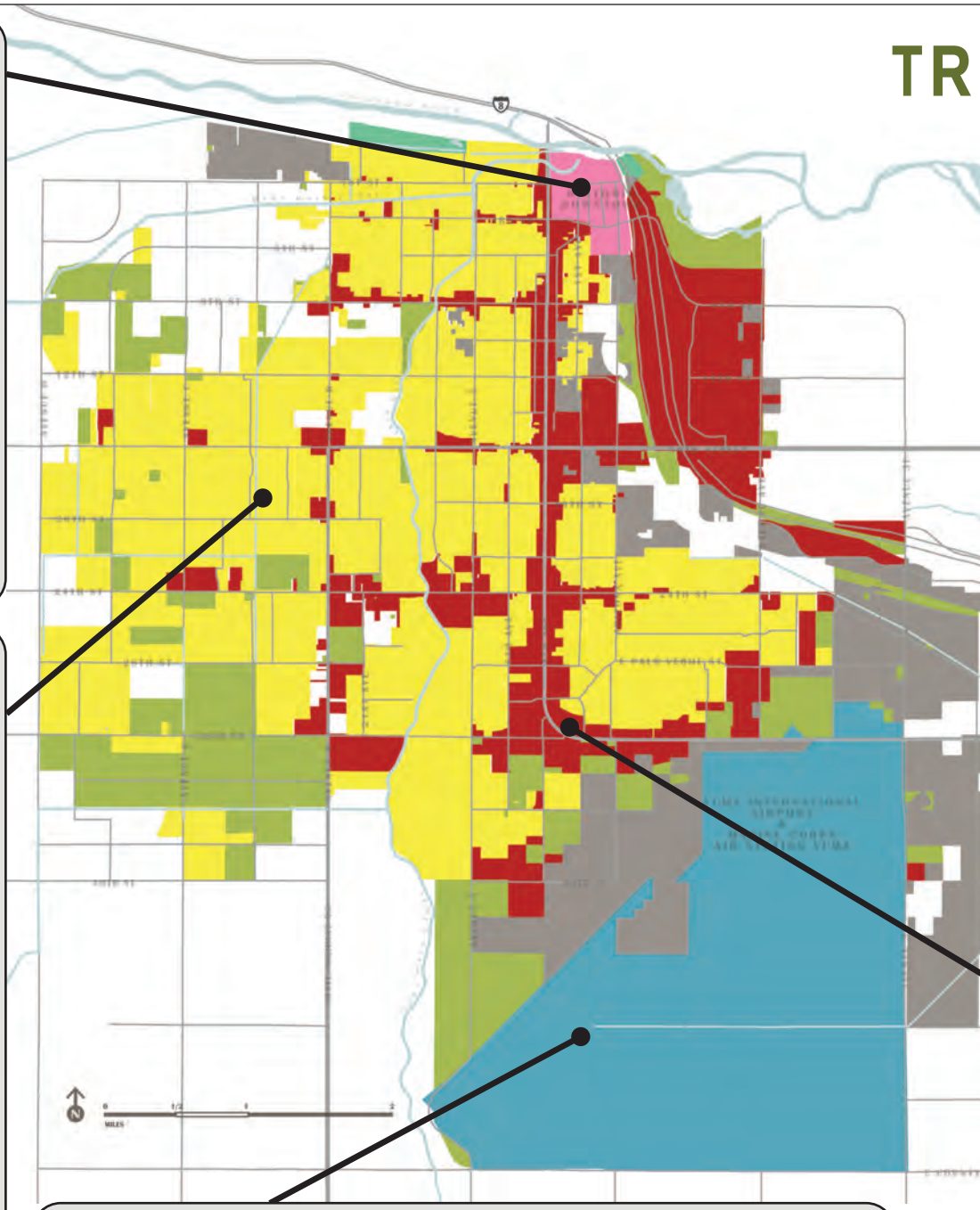
TR

OLD TOWN

The Old Town district is a mixed-use zone characterized by a walkable urban form of smaller lots. The zoning code allows 100% lot coverage in this district. While nearly all of this area is developed, opportunities include:

RESIDENTIAL

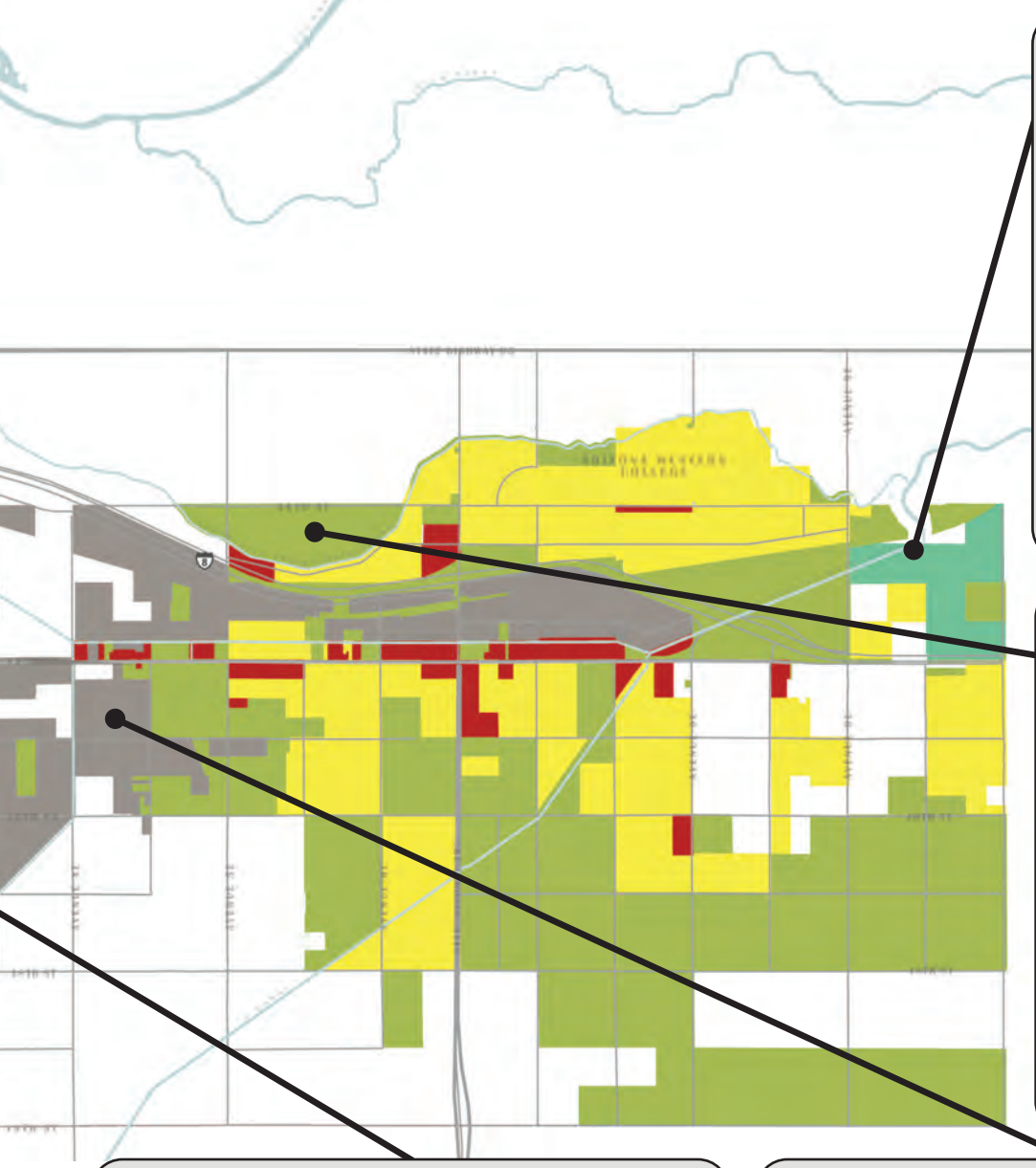
Residential districts (High Density, Medium Density, Low Density, Manufactured Housing, and Recreational Vehicle zones) offer the most potential for tree planting because it is the largest land use and has the highest amount of pervious surface. Most neighborhood parks, schools, and retention basins are located in residential zones.



MILITARY

The Military Reservation (MR) zoning district is reserved for federally owned lands used for military purposes. Due to the nature of activities on the air station, the need for impervious paved surfaces and height restrictions apply, which limits the area available to plant trees. Regardless, opportunities exist to plant trees in the commercial and residential areas of the base. Approximately a third of the land zoned MR is currently being used for agriculture, 330 acres of which is citrus groves.

EE PLANTING OPPORTUNITY AREAS



OTHER

A small portion of the City is zoned as Recreation & Open Space (RO) and Historic Park (HP). The RO district is intended to conserve and protect lands that encompass natural resources. The HP district is intended for parks with historic value. Some of the West Wetlands Park is zoned RO and Yuma Territorial Prison State Historic Park is zoned HP, although the Colorado River State Historic Park is not zoned as such but is rather part of the Old Town district. On the east side of town, a 300-acre parcel zoned RO is owned by Arizona Game & Fish. Opportunities exist to add trees, particularly in the West Wetlands Park.

AGRICULTURAL

No net increase in tree canopy is anticipated for lands being used for agriculture, although existing trees should be preserved whenever possible. Citrus groves contribute to Yuma's overall tree canopy. The East Wetlands Park, currently zoned as Agriculture although it is used as a park, contains nearly 200,000 trees. A majority of the land located southeast of Araby Rd (SR 195) and zoned for agriculture is currently not being farmed and much of it is natural desert that transitions into a military range. Based on the land use designations in the General Plan, some of the agricultural lands are anticipated to be rezoned for residential use in the future. After transitioning to residential, opportunities for planting trees increase.

COMMERCIAL

There are several opportunities to plan trees in commercial districts (General Commercial, Limited Commercial, Business Park, Transitional, Planned Shopping Center) despite the fact that commercial areas are typically allowed a higher lot coverage.

INDUSTRIAL

Similar to commercial districts, industrial districts (Heavy Industrial, Industrial Park, Light Industrial) are allowed a higher percentage of impervious surface, which limits the area where trees can be added. New sites can be designed to accommodate more trees.

NOTE: This map depicts zoning districts which, in some cases, do not match the current or future land use.

Tree Planting Prioritization

The benefits of trees are well understood and the community-wide goal of planting 100,000 trees is established. Now the question is how does the community decide where to plant these trees where they will have the most impact? Tree planting projects can be assessed using four measures of their impact on the community: walkability, safety, equity, and aesthetics. Each of these impact measures correlates with a map on the following pages; each map shows that tree planting projects in certain areas of town will have a greater impact than a similar project would in other areas.

FOUR MEASURES OF IMPACT

Every tree planted helps reach our goal of 100,000 trees. But how do we plant trees to maximize their benefits in order to have the greatest impact on the community? Focus on the following:

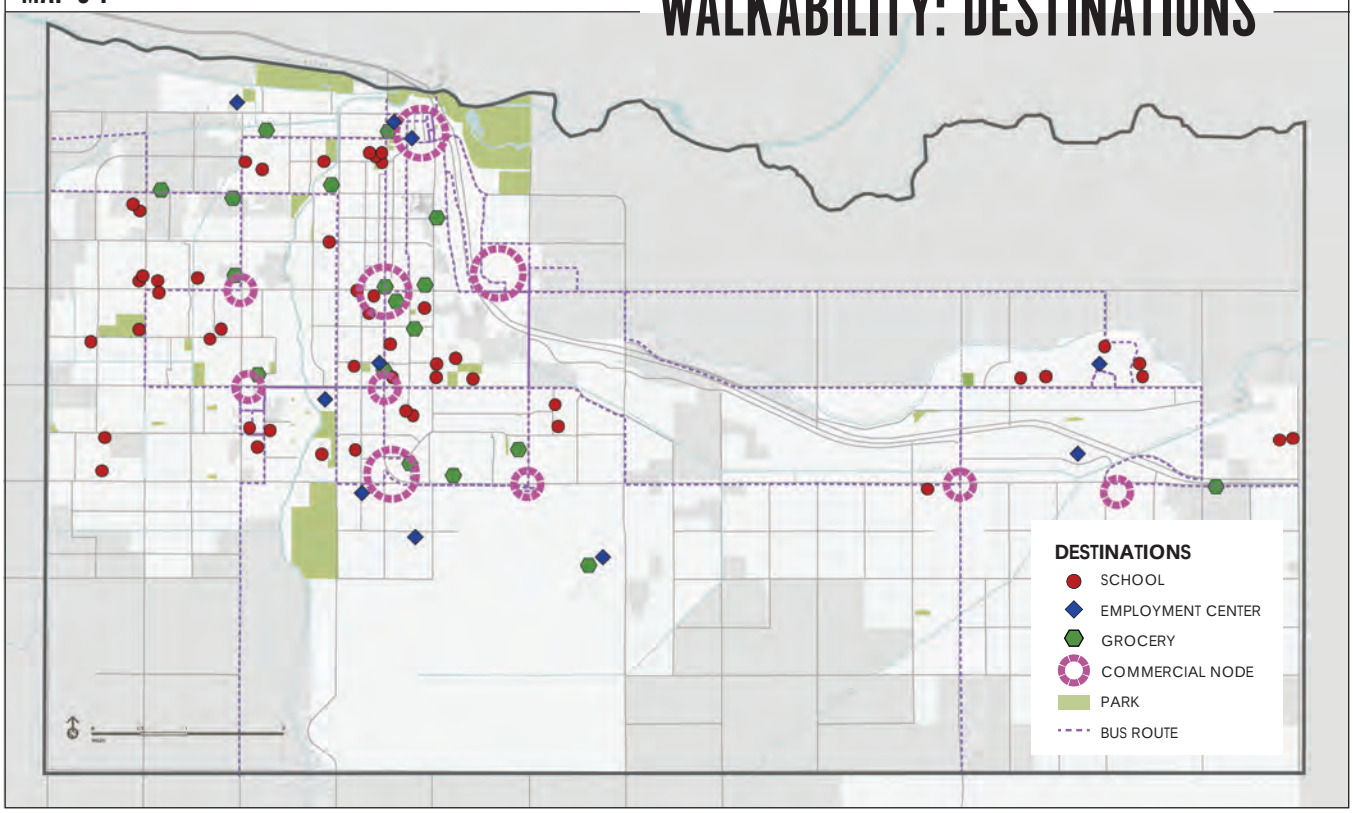
1. **Walkability**
2. **Safety**
3. **Equity**
4. **Aesthetics**

Walkability. Tree-lined streets and sidewalks create a more pedestrian friendly city. Temperatures are 5 to 15 degrees cooler under the shade of a tree.[31] When planted between the street and sidewalk, trees create a buffer to protect pedestrians. Tree-lined streets create a sense of enclosure that makes drivers travel slower.[3] Map 3-1 shows destinations where people are likely to be walking: schools, employment centers, groceries, commercial areas, and parks. It also shows the local bus routes; the last leg of most bus trips is usually a walk. Planting trees along streets and pathways where people are walking improves Yuma's quality of life and creates a healthier city for all.

Safety. Trees improve pedestrian safety by improving walkability and neighborhoods with tree-lined streets have been linked to lower crime rates.[8] The impact trees have on safety are measured in through two data sets: location of pedestrian accidents and incidence of crime.

MAP 3-1

WALKABILITY: DESTINATIONS



Map 3-2 shows where collisions involving pedestrian(s) and car(s) occurred in the five-year period from 2013 through 2017.[29] The map indicates the most dangerous road segments and intersections for pedestrians. Red triangles indicate where collisions resulted in fatality for the pedestrian. During this five-year timeframe, there were a total of 120 accidents involving pedestrians, or about 24 each year. There were 13 fatal accidents; 10% of the overall accidents which is a much higher risk factor than a collision with two vehicles. 95% of accidents resulted in possible injury or worse to the pedestrian. Clearly, pedestrians are vulnerable and more likely to be injured or killed in an accident involving a vehicle. It is imperative to make our streets safer for all users, not just the cars. Map 3-2 indicates the most dangerous roads for pedestrians are 24th Street, 4th Avenue, segments of 16th Street, 3rd Street, 8th Street, 32nd Street near the Big Curve, 20th Street, and segments of Avenue C and A. Street trees alone cannot solve the dangerous conditions of these streets, but they are an essential element to improve safety.

The second part of measuring the safety impacts of trees is the correlation between neighborhoods with trees and lower crime rates. Tall, mature street trees provide a pleasant setting for residents to congregate while not blocking the views of houses, allowing for visual surveillance.[8] Map 3-3 shows the density of incidences of crime over the past year (2018-19), as reported by the Yuma Police Department and mapped on the LexisNexis Community Crime Map.[30] The areas shown in red/orange have the most crime; areas shown in blue have the least. Street trees have been shown to have a greater association with crime reduction than trees in private yards.[8]

Equity. Trees, particularly street trees and shade in parks, are a civic resource and an essential part of the infrastructure that mitigates extreme heat. Extreme heat is not a equal opportunity hazard; vulnerable populations like the elderly, children, low-income, and homeless people are most at risk.[31] These vulnerable populations often have the least access to shade. For example, two Phoenix neighborhoods just a few miles apart have measured temperature differentials of up to 13 degrees F. For every $10,000 increase in the average income of the neighborhood, the average outdoor temperature drops half a degree, making the equity implications all too clear.[?]

To measure and map equity impacts, this plan borrows analysis from the 2017 Shade Tree Planting Prioritization analysis of the Urban and Community Forestry Program (UCF) at Arizona DFFM.[32] Their analysis identifies shade tree planting needs based on seven criteria: population density, lack of canopy cover, low income, traffic proximity, sustainability, air quality, and urban heat effect. The seven sub-indices were combined into the Shade Tree Planting Priority Index; Yuma's prioritization index is shown in Map 3-4, where the darker the shade of red indicating a greater need for canopy cover.

Aesthetics. Trees and shrubs make our environment more beautiful and contribute to the sense of place. Trees contribute to a sense of pride in our neighborhoods and city. The beauty they provide adds real value; realtors estimate that tree-lined streets increase property values by $15,000 to $20,000.[9] The aesthetic impact of trees is measured in two ways: Gateway and Scenic/History Routes designated in the General Plan and traffic volumes (Map 3-5). The Gateway Routes designated in the General Plan are Yuma's "front door" and are the first thing visitors and residents see of our City. Beautifying these areas makes a good first impression and engenders community pride among residents. The second measure of aesthetics is the most traveled streets, based on traffic counts.[33] Planting trees in these areas will reach the largest audience and therefore have the greatest impact. Map 3-5 highlights streets with over 10,000 vehicles per day.

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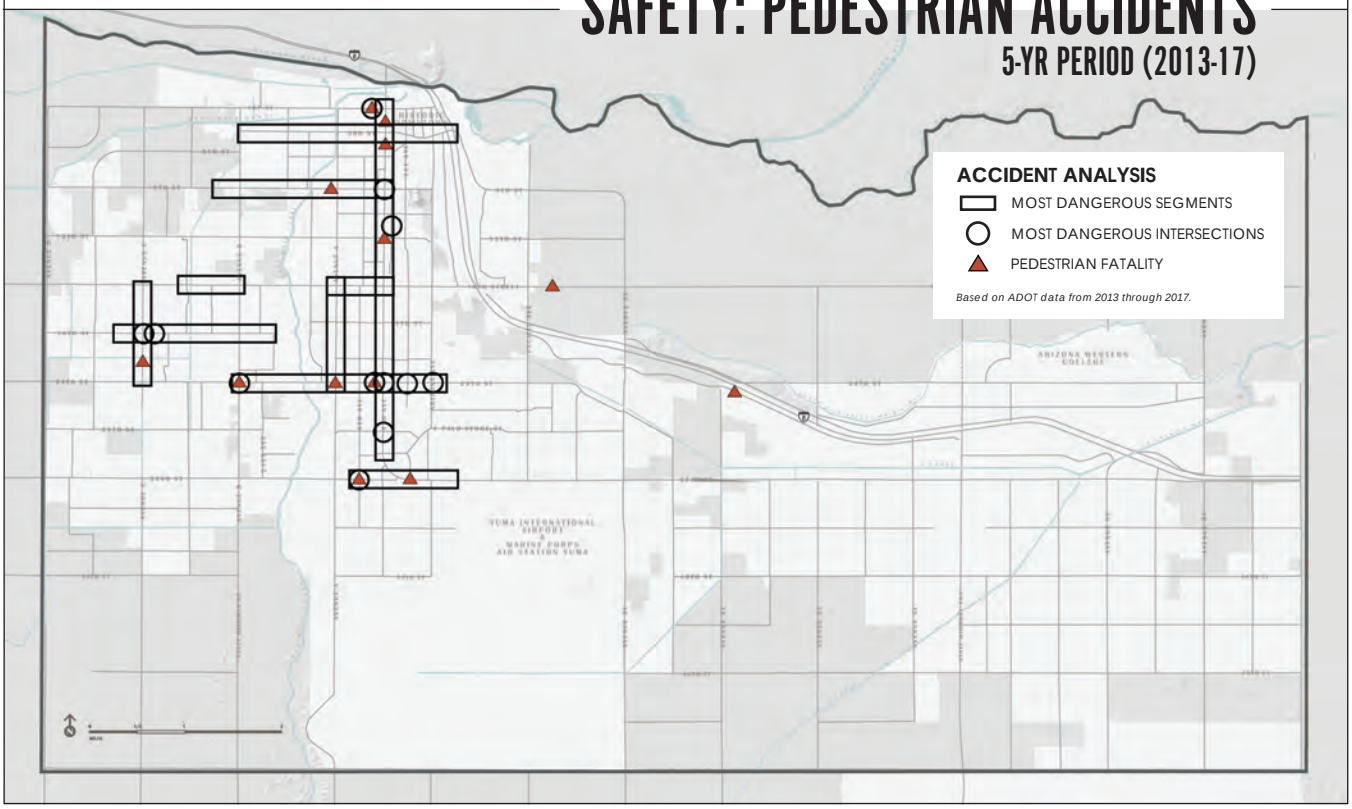
[29] Arizona Department of Transportation, 2013-2017 accident data.
[30] LexisNexis Community Crime Map. *<communitycrimemap.com>*
[31] O'Brien, Casey. "Extreme Heat Poses Urban Equity Issues." Planning Magazine, May 2019.
[32] 2017 Shade Tree Planting Prioritization Report (STPP). Updated 9/24/2018. Arizona Dept of Forestry & Fire Management. *<dffm.az.gov/2017-shade-tree-planting-prioritization>*
[33] 2014 Traffic Count Map, Yuma Metropolitan Planning Organization (YMPO) *<ympo.org/maps-more/trafficcounts/>*

MAP 3-2

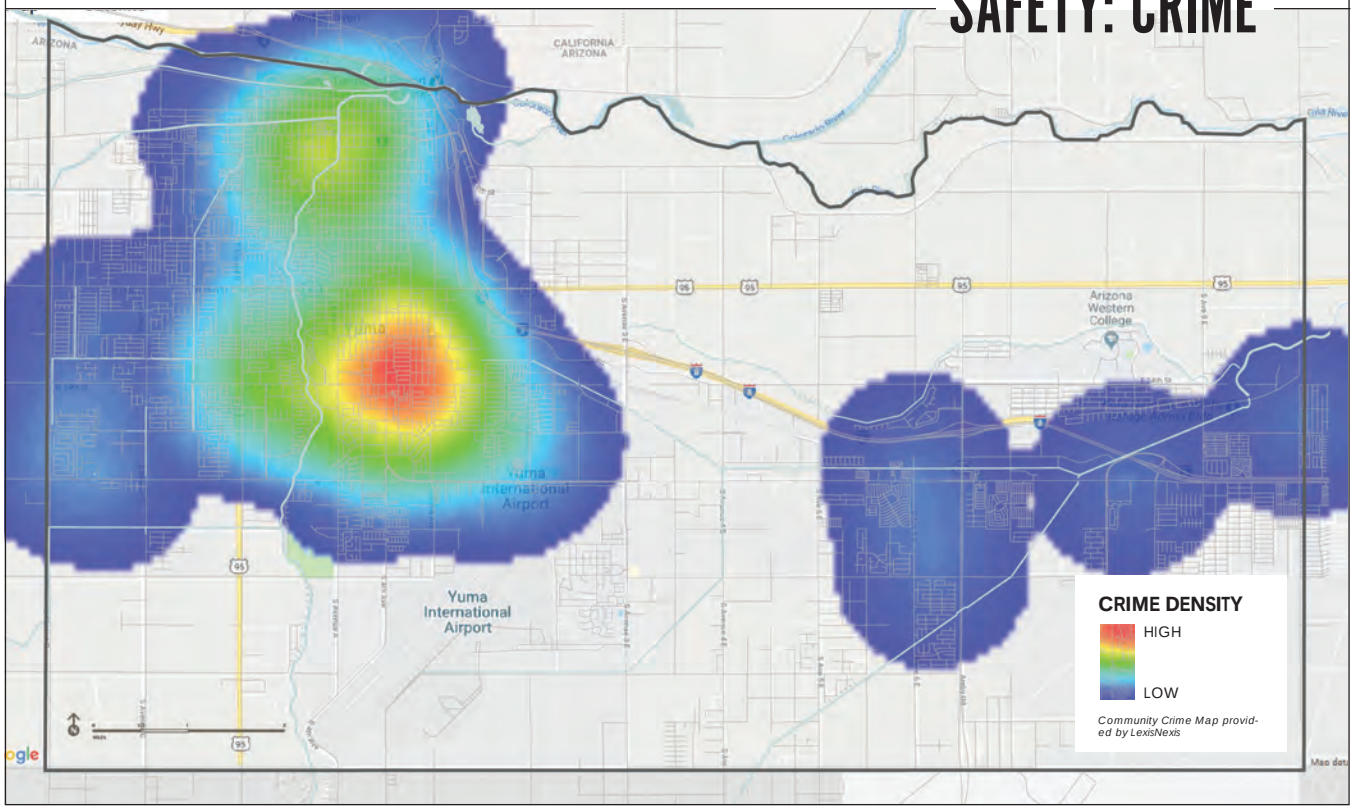
SAFETY: PEDESTRIAN ACCIDENTS

5-YR PERIOD (2013-17)



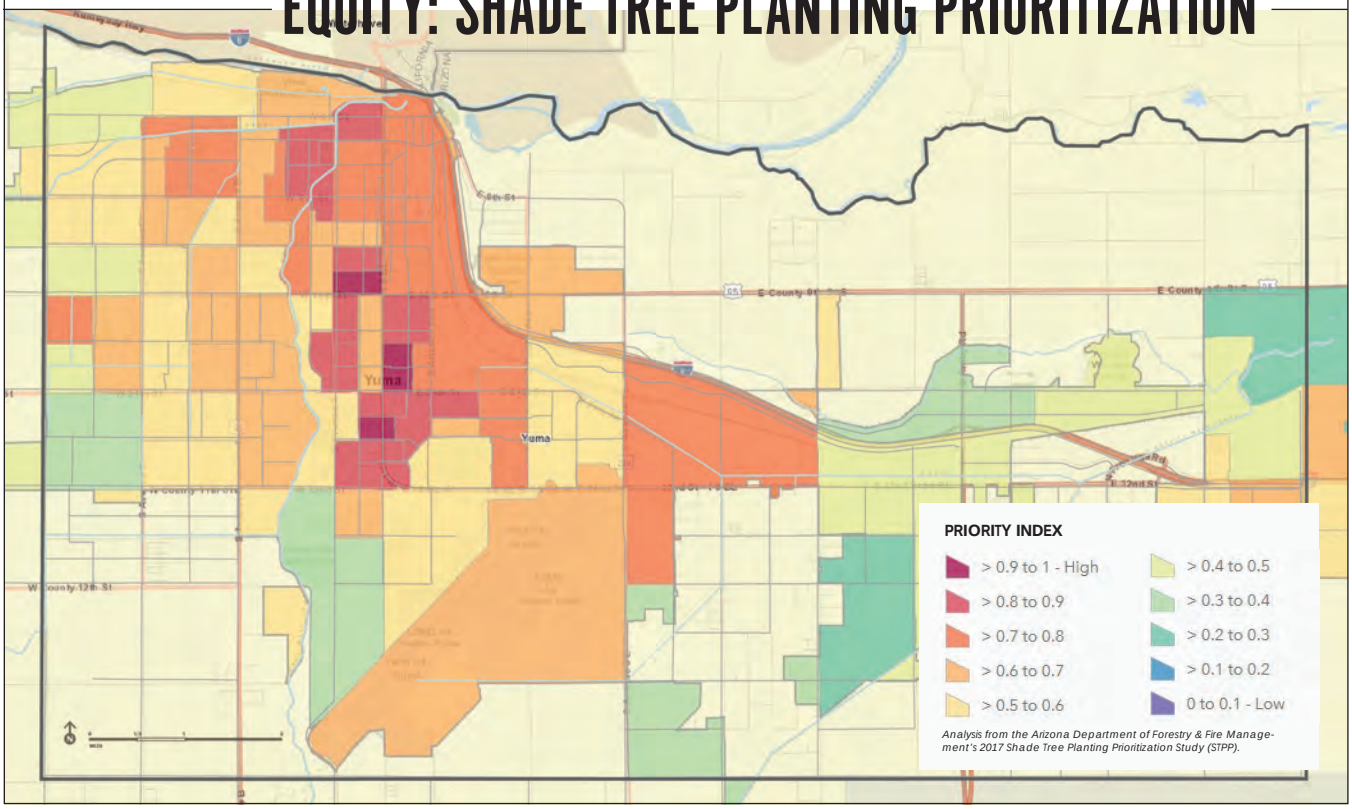
MAP 3-3

SAFETY: CRIME



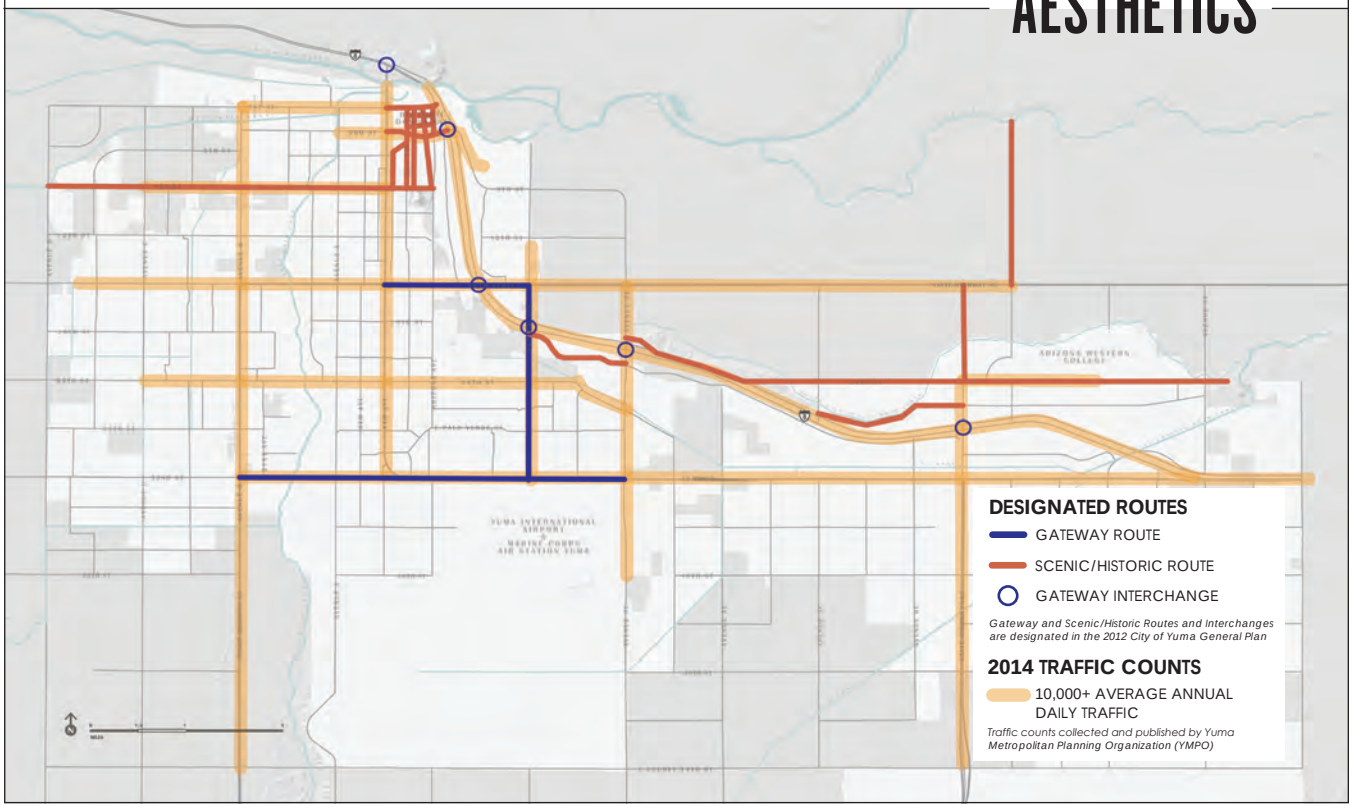
MAP 3-4

EQUITY: SHADE TREE PLANTING PRIORITIZATION

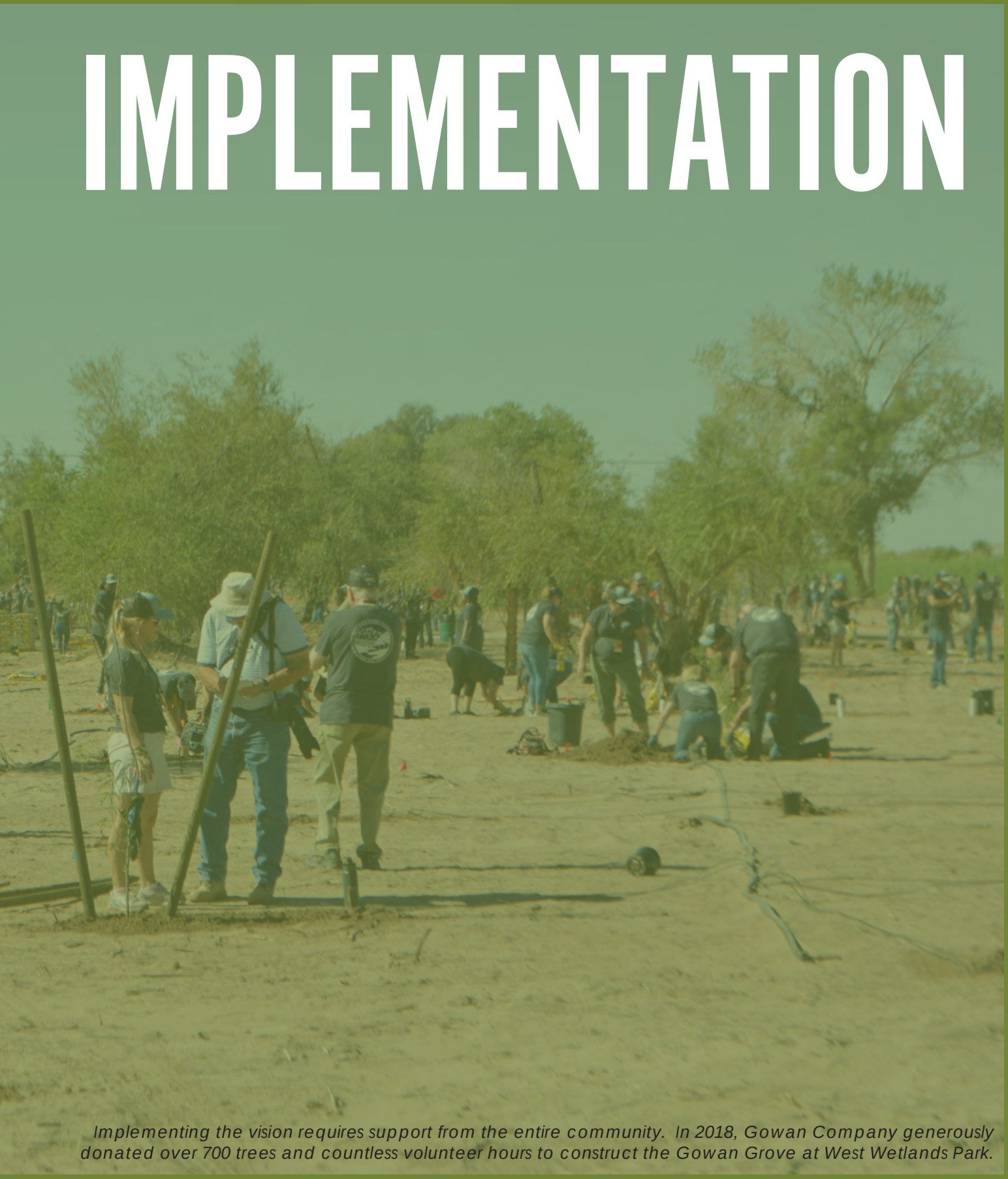


MAP 3-5

AESTHETICS



IMPLEMENTATION



Implementing the vision requires support from the entire community. In 2018, Gowan Company generously donated over 700 trees and countless volunteer hours to construct the Gowan Grove at West Wetlands Park.

IMPLEMENTING *the* VISION

If a tree dies, plant another in its place.

Linnaeus

To reach the goal of planting 100,000 trees, community involvement in implementation is imperative. The City is committed to planting trees, but a majority of the 100,000 trees will be planted on private property at the discretion of private property owners. In addition to leading by example, the City plays an important role in setting and enforcing policies that encourage trees and protect our existing tree canopy. There are many funding sources available to support tree planting projects: donations, grants, City funds, and special taxing districts, to name a few. Planting an additional 100,000 trees does not come without impacts, and the short and long-term impacts of increasing Yuma's tree canopy need to be well understood.

Community Tree Projects

One of the most important assignments of the Task Force was to advise staff on projects to implement the plan. Based on recommendations from the Task Force, twenty unique tree planting and outreach projects were developed. Each project is outlined on the following pages.

The twenty tree projects reflect the priority and impact areas mentioned in the previous chapter. Each project is intended to be a partnership between a City department (Parks & Recreation, Public Works, and Community Development) and a community partner. City-initiated projects are made stronger with public input and vice versa. Most of the twenty projects are intended to be multi-phase and ongoing for the next decade. For example, the Safe & Shady School project can address many different schools over the coming years. It is certainly not an exhaustive list of tree projects, but is intended as a starting place to inspire the community.

Members of the Task Force, many of whom were representatives of community organizations, were challenged to commit to assisting with implementation of at least one project that aligned with their interests and expertise. Many residents and organizations offered up their help, and some of those projects that have committed partners and are currently being implemented are highlighted in further detail throughout this chapter. The City will continue to seek partners for projects that don't already have a committed community partner.

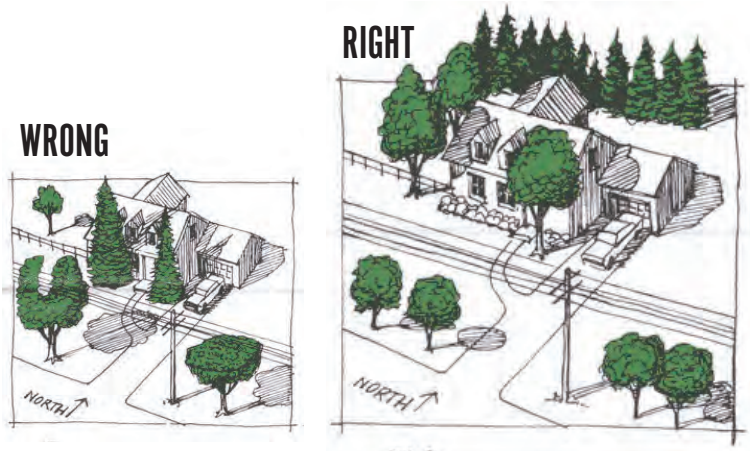
Trees for Yuma Consortium. In order to continue the efforts to implement this plan, a consortium of local organizations and residents interested in trees will be formed. The consortium, known as *Trees for Yuma,* will be open to any organization, business, utility, resident, and City department that "takes the pledge" to plant or protect trees in Yuma.

The *Trees for Yuma* website serves as the repository for all tree-related projects and information in the community. Information about the tree projects from this plan will be displayed and updates published as trees are planted and ideas implemented. Consortium members can reach out to other members to find volunteers, funding, or expertise.

Trees for Yuma accepts donations to be used specifically for supporting Yuma's urban forest. Donors and consortium members are recognized for their efforts and donations on the website and through occasional press releases. Information on tree care and maintenance is available on the website as well as a community calendar of tree-related events.

Policy

Increasing Yuma's tree canopy will require more than just planting trees; City policies that support trees and encourage proper maintenance will also help grow the canopy. The City has established comprehensive policies and regulations for tree preservation, planting, and maintenance; all guided by the overarching "Right Tree, Right Place" principle. The Landscape Regulations guide new development; the Tree Ordinance protects existing municipal trees; and the *5-Year Tree Care & Maintenance Plan* guides the City's management of municipal trees.



Examples of the "Right Tree, Right Place" principle from the Arbor Day Foundation.

Right Tree, Right Place. The City of Yuma's guiding arboriculture principle is "right tree, right place." It is the strategic foundation of all forestation, care, maintenance, and sustainability efforts in the City. According to the Arbor Day Foundation, the "right tree, right place" philosophy is a clear directive to plan all forestation activities, by considering the long-range implications of a tree's mature height, canopy spread, nature (deciduous or evergreen), shape/form, growth rate, natural elements (soil, sun, and moisture) requirements, fruit, and hardiness zone and how those elements relate to the tree's location and intended purpose. Commitment to this principle is reflected in the City's Landscape Regulations, in the Recommended Plants List, in the Tree Ordinance, and in the 5-Year Tree Care & Maintenance Plan.

1 Shady Pathways

Plant trees along pathways, like the East Main Canal, to provide shade for the cyclists, joggers, and pedestrians who use the path. Trees could be concentrated near benches to provide shady places to rest.

PUBLIC WORKS — LOCAL ORGANIZATIONS

2 Walkable Streets

Plant trees along roadways to make streets more walkable and safer for pedestrians. Street trees can be planted in public rights-of-way or on private property. Target areas with a high density of destinations and areas that are currently the least safe for pedestrians.

COMMUNITY DEVELOPMENT — LOCAL ORGANIZATIONS

3 Shady Bus Stops

Identify frequently used bus stops with no shade and plant trees or erect shade structures to protect riders waiting for buses. Organizations, businesses, or residents could sponsor improvements at a specific bus stop.

COMMUNITY DEVELOPMENT — LOCAL ORGANIZATIONS

4 Tree-Lined Neighborhoods

Encourage trees to be planted in Yuma's neighborhoods with wide (>8-ft) tree belts. Tree-lined streets are safer, more beautiful, and increase property values for adjacent properties.

COMMUNITY DEVELOPMENT — LOCAL ORGANIZATIONS

5 Attractive Interchanges

Work with Arizona Department of Transportation (ADOT) to plant trees at Interstate 8 interchanges. Explore potential for local organizations to volunteer to plant trees and provide donations to fund ongoing maintenance.

PUBLIC WORKS — LOCAL ORGANIZATIONS

6 Welcoming Gateway Routes

Plant trees along the Gateway Routes identified in the General Plan: 16th Street, 32nd Street, and Pacific Avenue. Gateway Routes are the "front door" of our community. City-developed landscape plans can be supported by partnerships

COMMUNITY DEVELOPMENT — LOCAL ORGANIZATIONS

7 Planting a Warm Welcome

Trees would further enhance the unique and artistic welcome signs that were recently installed through a partnership between e Public Works, the Clean & Beautiful Commission, and local schools. Local organizations could provide funding for irrigation and trees.

PUBLIC WORKS — LOCAL ORGANIZATIONS

8 Memorial Tree Program

Offer residents the opportunity to plant memorial trees. Develop a brochure and conduct outreach to inform the community of this program. Each memorial tree will be denoted in City asset management software.

PARKS & RECRATION — LOCAL ORGANIZATIONS & RESIDENTS

9 Attractive Xeriscape Basins

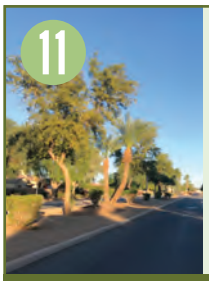
To reduce costs and increase levels of service, Public Works is transitioning basins with grass to xeriscape landscape with desert-friendly, low-water use plants. Trees are an important component of xeriscape and converted basins will include trees.

PUBLIC WORKS — LOCAL ORGANIZATIONS

10 Improving Subdivision Entrances

Improve the aesthetics of subdivision entrances by planting trees and xeriscape. Trees will be added to sites maintained by Public Works that currently have irrigation. Local organizations provide support by donating trees or funds for irrigation.

PUBLIC WORKS — LOCAL ORGANIZATIONS



11 Promote MIDs

Subdivision residents can petition the City to form a maintenance improvement district (MID), a special taxing district that can fund tree and landscape maintenance in their neighborhood. The City will disseminate information to residents about the option to form a MID.

PUBLIC WORKS + COMMUNITY DEVELOPMENT — RESIDENTS

12 Shady Playgrounds

Plant trees or shade structures near playgrounds to provide shade. The Parks & Recreation Department will determine in which parks the playgrounds need shade. Local organizations could donate trees, volunteers, or work with students to host fundraisers.

PARKS & RECREATION — LOCAL ORGANIZATIONS

13 Tree Incentives

Incentivize the private property owners to plant more trees on their property. Responses from the public survey indicate that the most effective incentive would be to give away free trees. Partner with local businesses and organizations to provide free trees.

COMMUNITY DEVELOPMENT — LOCAL ORGANIZATIONS

14 Planting Wildlife Habitats

Inform the public about the benefits of planting trees to provide wildlife habitat. Encourage utilization of educational materials on the types of trees and landscape that provides the most habitat and what types of animals it attracts.

PARKS & RECREATION — MASTER GARDENERS + YCNHA

15 A Shady Place to Park

Trees in parking lots combat the urban heat island effect and provide people a shady place to park. Target tree plantings in large parking lots where people frequently walk, like grocery stores. Partner with property owners to design landscape plans to plant trees.

COMMUNITY DEVELOPMENT — LOCAL BUSINESSES

16 Trees Combating Crime

Residential neighborhoods with trees are shown to have lower crime rates. Sponsor tree planting events in high-crime neighborhoods as a way to combat crime and increase equity. City-designated Revitalization Areas could be the subject for pilot projects.

COMMUNITY DEVELOPMENT — LOCAL ORGANIZATIONS

17 Safe & Shady Schools

Plant trees on and near school property to improve walkability and provide shade. Use the planting effort to teach students about the importance of trees. Partner with local organizations and schools for funding.

PARKS & RECREATION — PECAN GROVE GARDEN CLUB, APS, YUMA COUNTY PUBLIC HEALTH

18 Tree Care Classes

Offer a variety of free and paid classes on tree care topics. Target different demographic groups to reach a wide audience, particularly people who might not otherwise self-select to learn about trees. Tree giveaways or other incentives could be offered to attendees.

PARKS & RECREATION — LOCAL ARBORISTS

19 Information Campaign

Provide information on tree topics to the general public via social media, print/online brochures, and public service announcements (PSA) on radio & television.

COMMUNITY DEVELOPMENT — LOCAL ORGANIZATIONS

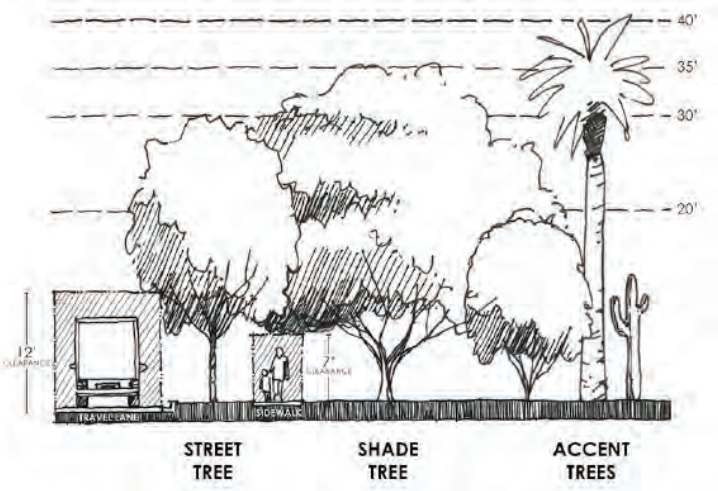
20 Ask the Arborist Radio Show

Host a recurring radio show on tree care topics such as planting, pruning, and irrigation. Listeners could call in or post questions to Facebook in advance of the show to guide discussion topics.

PARKS & RECREATION — LOCAL ARBORISTS

Landscape Regulations & Guidelines. In 2017, the Mayor & City Council adopted an update to the Landscape Regulations (Chapter 154 Article 20) that determine what types of landscape is installed in conjunction with new development or redevelopment. The purpose of the code amendment was to emphasize the importance of trees to provide shade, reduce energy consumption, absorb stormwater runoff, and improve air quality; to encourage xeriscape, low-water use landscape design; and to improve aesthetics throughout the community. Landscape is an integral part of the community's infrastructure. Overall, the goal of the changes adopted in the amendment was to reduce the cost of landscape while increasing the benefits to the community, which was largely accomplished by focusing planting efforts on trees over other types of landscape such as groundcover. The update also enhanced the section on landscape design to distinguish between types of trees (street, shade, and accent), to include more detailed descriptions of xeriscape and hydrozones, and to clearly define the purpose of each type of landscape.

Landscape Regulations require landscape in four areas of the site: around the perimeter, in off-street parking lots, in retention basins, and in other areas. The amendment introduced the streetscape zone, which emphasizes street trees along the street to provide shade for pedestrians and visual enclosure to the street which calms traffic speeds. Many of Yuma's neighborhoods established in the pre-WWII era have large "tree belts", the space between the back of the curb and the sidewalk where trees were historically planted. In these areas, new development requires trees be planted and irrigation provided within this tree belt.



The Landscape Regulations define three different classes of trees.

Another important addition was the inclusion of regulations for single-family residential lots, which were previously not addressed in the code. In accordance with many other municipalities, these residential requirements, which apply to lots over 5000 square feet, require one tree to be planted on each lot within the front yard setback. This requirement ensures that all new residential lots within the City add to the canopy coverage.

For off-street parking lots, the updated increased the number of required trees from 1 per 15 spaces to 1 per 8 spaces. This is in line with other municipalities' requirements and aims to achieve 30% shade coverage at maturity for the parking lot. The focus of landscaping within parking lots is trees to provide shade, while shrubs and vegetative groundcover are less important. Each tree will also be required to provide adequate uncompacted soil to ensure the health of the tree in the long term.

In conjunction with the amendment to the Landscape Regulations, the City published a Recommended Plants List (available in Appendix C) to identify and encourage appropriate, low-water use plants for Yuma's desert climate. This list, created by Community Planning staff in conjunction with the Public Works Department, Yuma County Water Users' Association, and APS, is available to the public at City Hall and online. It is provided to designers and landowners as they develop their landscape plans, typically during the pre-development meeting process.

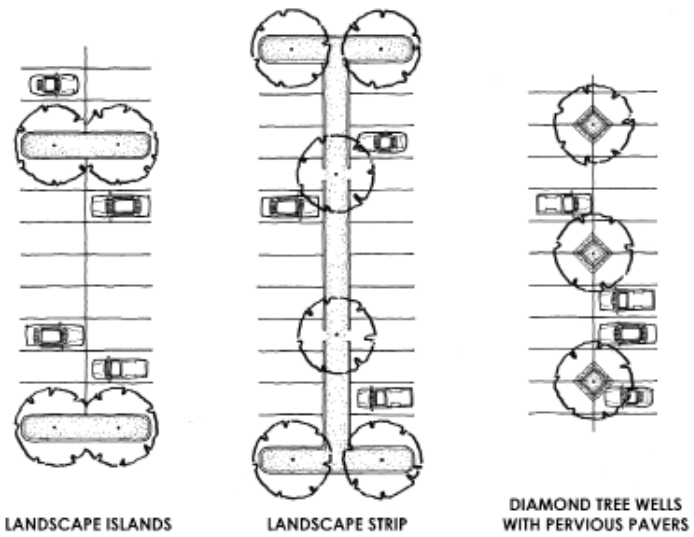
The Recommended Plants List is the first in a series of documents that make up the City of Yuma Landscape Guidelines (Appendix C). The Landscape Guidelines will be developed further as part of the outreach section of this plan and will serve to help the entire community better care for trees

and landscape in our desert environment. In addition to the Recommended Plants List and Residential Tree Requirement documents that have been published, the Landscape Guidelines will include the following: Xeriscape Principles, Recommended Plant Palettes, Landscape Plans Submittal Checklist, Pruning Guidelines, and Irrigation Guidelines.

Tree Ordinance. The purpose of the City's tree ordinance is to provide protections for Yuma's existing tree canopy. The City first adopted a tree ordinance on November 20, 2007 to recognize the value of trees in our community, to instate maintenance standards for trees owned or maintained by the City, and to form a Community Tree Board. Adoption of the Tree Ordinance was a critical step toward the City being recognized by the Arbor Day Foundation as a Tree City USA, a designation the City continues to maintain.

During this comprehensive planning process, City staff from an interdepartmental team (Parks & Recreation, Public Works, and Community Development) reviewed and edited the tree ordinance to provide further protections for Yuma's municipal trees, to clarify the applicability of the ordinance to municipal trees, and to add requirements for removal and replacement of municipal trees. Municipal trees are those owned or maintained by the City of Yuma, including those growing in City rights-of-way, parks, retention basins, and other facilities. The ordinance does not regulate trees on private property, although it does impact municipal trees located in rights-of-way maintained by private residents. See Appendix G for the full text of the Tree Ordinance.

As in the 2007 Tree Ordinance, the updated ordinance, adopted in December 2019, sets out maintenance standards to be followed for all municipal trees and prohibits anyone from causing damage to municipal trees. Tree-topping noted as a banned practice for municipal trees. Revisions to the code add requirements for tree removal, replacement, and penalties for not following the requirements. Yuma City Streets & Traffic Code § 210-20 requires any person doing work within the City right-of-way, including



The Landscape Regulations provide examples of how to achieve 1 tree per 8 spaces in parking lots.

work to trees, to obtain an encroachment permit. The revisions to the Tree Ordinance clarify and reiterate the need for a permit when removing a municipal tree. When a permit is submitted, the City Arborist will be notified to conduct an assessment of the tree in question. If a permit is granted for tree removal, the property owner is responsible for replacing the tree. The replacement factor is based on the value the tree is bringing to the community; the larger the tree and it's canopy, the more benefits it provides. Therefore, a small tree needs to be replaced with one tree; a medium size tree with two trees; and a large specimen tree replaced with three trees. The size of the tree and therefore it's replacement value, is determined by the diameter at breast height (DBH). Replacement trees must be species listed on the City of Yuma Recommended Plants List that was developed in conjunction with local experts and City staff.

If the City Arborist deems the replacement trees cannot be accommodated on the site, he or she may require in-lieu fees to be paid into a Municipal Tree Fund. In-lieu fees shall be determined by the City Arborist based on the estimated replacement value of the tree to be removed. The revisions to the Tree Ordinance also seek to create the Municipal Tree Fund in which fees would be deposited and funds used for care and maintenance of municipal trees and to off-

set the loss of municipal trees due to removal, destruction, or natural death.

5-Year Tree Care & Maintenance Plan. The *Tree Care & Maintenance Plan*, developed in conjunction with this master planning process, is used by City staff to prioritize, schedule, and financially plan for municipal trees as well as maintain the health of municipal trees. Although the City has been practicing urban forestry stewardship for many years, this type of comprehensive document summarizing the strategies and budgetary requirements had yet to be codified in written format. The *Tree Care & Maintenance Plan* primarily serves the Parks and Recreation and Public Works Departments' staff, as it describes current practices and outlines current and future strategies for municipal tree care and maintenance. See Appendix B for the complete *5-Year Tree Care & Maintenance Plan*.

The *Tree Care & Maintenance Plan* stresses the need for a complete inventory for all municipal trees. A complete inventory will aid in the implementation of the recommended Tree Replacement Program. The Public Works and Parks & Recreation Departments have recently adopted use of GIS-based asset management software, *Lucity*. With all departments using this software, *Lucity* has the potential to greatly enhance the ability of City staff to monitor and understand the health of the urban forest.

Xeriscape Conversion Program. In 2017, the Public Works Department instituted a program for converting grass retention basins to xeriscape plantings that use native and low-water use plants, including trees. Trees are an integral part of xeriscape landscape design and are included in the converted designs at the rate specified in the City's adopted Landscape Regulations. To date, fourteen basins have been converted.

Complete Streets Policy. In 2014, the City adopted a Complete Streets Policy, as outlined in the Transportation Master Plan. The objective of Complete Streets is to "develop integrated, connected networks of streets that are safe and accessible for all people". It requires a "focus on making it possible for motorists, pedestrians, bicyclists, and transit riders to travel together safely" and "incorporates attention to safety, mobility, accessibility, quality of life, and sustainability as street design is conceived and streets operations are evaluated". Trees, particularly used in a tree belt to separate sidewalks from moving traffic, and transit shelters are integral elements of building Complete Streets. As part of the City's commitment to Complete Streets, trees are viewed as an essential element of infrastructure and should be installed during road construction.

Shade Structures. The City has yet to adopt a policy on engineered shade structures. Engineered shade is appropriate in certain instances, such as at playgrounds and bus stops, but preference is given to trees over engineered shade because of all the benefits trees offer in addition to just shade.

9 Attractive Xeriscape Basins

To reduce costs and increase levels of service, Public Works is transitioning grassy retention basins to xeriscape landscape using desert-friendly, low-water use plants. Trees are an important component of xeriscape and converted basins will include trees at the rate required by the Landscape Regulations.

The conversion of the Rancho Viejo II basin, the pilot project for this program completed in 2017 and shown to the left, added 12 street trees along 16th Street.

PUBLIC WORKS **LOCAL ORGANIZATIONS**

Impacts of 100,000 Trees

Planting an additional 100,000 trees will provide considerable benefits to the community, but those benefits don't come without costs and impacts. In addition to the initial investment to plant the trees and ensure care to establish them, there are the ongoing maintenance costs to keep them healthy and safe. Overall, the benefits of trees outweigh the maintenance costs, and as the trees grow, so too do their benefits.

Installation. The initial investment of planting a tree can be divided into three factors: the cost to purchase the tree, the cost to install irrigation, and the labor costs of installing the tree. It is difficult to estimate the exact cost of installing a tree because each of these factors will vary based on the site and circumstances of the tree planting. Installation costs for a tree could be as low as $0 (free tree, irrigation in place, volunteer labor) or as high as a few hundred dollars if an expensive species is selected or more extensive irrigation installation is needed.

Irrigation. Irrigation is a critical component of tree planting; most trees in Yuma's urban environment would not survive without irrigation. High-efficiency irrigation systems, such as drip irrigation systems on an automated timer are preferred, although other methods of irrigation, such as hand watering, sprinklers, flood irrigation, or water trucks are also options. Regardless of the method, deep and infrequent watering is preferred over frequent and shallow watering and will produce healthier, hardier trees.

Based on water use recommendations from Landscape Watering by the Numbers[34], an irrigation guide designed for the Arizona desert, the average mature desert-adapted tree with a canopy of 20 feet in diameter needs approximately 4,500 gallons of water each year. The average resident or commercial property owner in City limits would pay approximately $10 annually to irrigate this tree. Adding 100,000 trees would equate to approximately an additional 450 million gallons of water needed annually for irrigation, which is approximately 1.6% of the City's total water supply allocation. See Appendix H for additional information on irrigation and water use.

Maintenance. To ensure long-term health and growth of the trees planted, adequate maintenance must also be considered. While the trees are young and becoming established, they will need to be pruned to correct branch structures that could lead to potential problems. For example, lower limbs on street trees should be pruned to create the desired upright form. Once established, trees should be kept on a regular pruning cycle, when they will be assessed and pruned if needed. Different species of trees will require different levels of pruning. Occasional repairs to the irrigation system should also be considered. As the City-managed tree canopy increases, additional staff and maintenance will be required. Both the Public Works and Parks & Recreation Departments' budgets will need to grow accordingly.

Green Waste. As the tree canopy increases, pruning increases, thereby creating additional green waste that will need disposal. Branches and landscape trimmings are typically too large to fit in the standard trash container for regular pickup. Public Works sponsors a Neighborhood Cleanup program once each year to collect oversize waste, including green waste. Each neighborhood is designated a four-day period each year when Public Works will pick up large trash items at no cost. The green waste is then taken to the landfill, as is most of the community's green waste not collected as part of this program. A more sustainable alternative to sending green waste to the landfill is to compost or mulch it. Yuma County's North Gila Solid Waste site currently offers a grinder to mulch green waste. Other cities in Arizona have been investing in large-scale composting facilities to accept green waste and prevent it from entering the landfill. Recent changes in California's recycling laws offer opportunities for Yuma to support a composting facility.

[34] "Landscape Watering by the Numbers, A Guide for the Arizona Desert". *<https://wateruseitwisely.com/100-ways-to-conserve/landscape-watering-guide/plant/>*

Funding

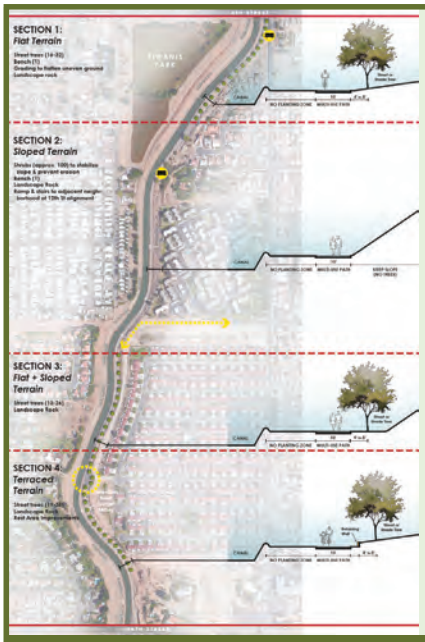
Implementation would not be possible without adequate funding; funding to plant trees and funding to maintain those trees in the long term. Yuma residents value trees. According to the public survey, seventy-five percent of respondents are willing to pay to have more trees in their neighborhood's common areas. Forty-one percent are willing to pay $5 or more each month for these trees. Voluntary community support is essential to funding the trees and maintenance needed to achieve the goal of 100,000 trees. Generally speaking, the goal equates to one tree per person in Yuma. Community support and donations for tree projects will be supplemented by grant funding, incentives, city funding, and special taxing districts.

Community Sponsorship & Support. To reiterate a key point, the goals of this plan will not be accomplished without the help of the entire community. Local organizations, companies, and residents will have the greatest impact on increasing the tree canopy. The *Trees for Yuma* consortium outlined previously will serve as the primary avenue to accept donations, find volunteers, and organize fundraisers.

Incentives. The public survey also indicated that incentives such as free trees, rebates, and free tree care classes would incentivize residents to plant trees on their property. Community Development will take the lead on developing and implementing community-wide incentive programs. Examples proven successful in other communities and currently being explored by City staff include: partnerships with utility companies to provide free or reduced price trees for customers; a program for new homebuyers to get free or reduced price trees; and rebates for irrigation water for native trees planted in conjunction with this plan.

Grants. Grant funding will be sought to kick-start projects. Grants are most likely to fund tree planting efforts, while grants that will allow use of funds for irrigation installation and ongoing maintenance will be more difficult to secure. Many grants will require matching funds, provided by the City or by donations collected from the community.

In general, there are two types of grantors: state or federal agencies and foundations or nonprofits. The following agencies are anticipated to provide grant-funding for ur-



1 Shady Pathways

The goal of this project is to plant trees along pathways, like the East Main Canal, in order to provide shade for the cyclists, joggers, and pedestrians who use the path. Trees could be concentrated near benches to provide shady places to rest.

In April of 2018, a local resident and business owner, Juli Jessen, signed a Memorandum of Understanding (MOU) with the City to improve the landscape along a portion of the East Main Canal between 8th Street and 16th Street. Following private installation of the landscape and irrigation, the City agreed to maintain the landscape.

Other local organizations and companies are welcome to sponsor trees along other sections of the East Main Canal (from the Colorado River Levee Path south to 8th Street and from 16th Street south to 40th Street) or along other paths such as the West Main Canal and the Colorado River Levee. Public Works maintains the pathways and landscape as part of an agreement with the landowner, Yuma County Water Users' Association.

PUBLIC WORKS **GOWAN & LOCAL ORGANIZATIONS**

2 Walkable Streets

2019 SUCCESS
$1500
+20 TREES
FUNDED BY DFFM

The Walkable Streets project aims to make streets safer and more comfortable for pedestrians. Two successful projects were implemented in 2019.

With funds provided by DFFM and a match from Public Works, they were able to plant 20 trees along Redondo Center Drive in September 2019. Public Works anticipates planting more trees along Redondo Center Drive.

As of the time of writing, Lowe's is partnering with a local Girl Scout chapter to plant trees along a collector roadway to improve walkability for our community. Public Works will accept long-term maintenance of these trees. The preliminary goal of this project is to plant approximately 35 trees.

PARKS & RECREATION **LOCAL ARBORISTS & ORGANIZATIONS**

ban forestry initiatives in the coming years: Arizona Department of Forestry & Fire Management (DFFM), Arizona State Parks and Trails (ASP), Arizona Game and Fish Department (AGFD), Arizona Land and Water Conservation Fund (AZ LWCF), U.S. Department of Interior/National Park Service/Land and Water Conservation Fund (US LWCF), and U.S. Department of Housing and Urban Development (HUD). Several foundations and nonprofit organizations offer grants that could be used for tree-related efforts, including: the Alliance for Community Trees, One Tree Planted, the Arbor Day Foundation, the National Recreation & Park Association, the TREE Fund, the Fruit Tree Planting Foundation, the Lowe's Charitable & Educational Foundation, and the Home Depot Community Impact Grants Program. The list of potential grantors is not meant to be exhaustive; rather it is a starting point for future reference and serves as an example of the breadth of funds available.

Tree planting projects impact diverse groups and address a myriad of issues (walkability, safety, health, etc.), so other funders focused on particular demographics and issues may also be available. For example, the Community Change grant offered by America Walks seeks to award projects focused on improving walkability, which could include some of the tree planting projects proposed in this plan.

Although grant funding can vary widely year to year, the City has already had success securing funding for tree planting projects since this planning effort began in 2019. One Tree Planted, a nonprofit focused on global reforestation, awarded $1,000 to the Parks & Recreation Department to plant twelve trees at the West Wetlands Park as part of the annual Spruce Up Your Park Day on October 19, 2019. Public Works was awarded a $1,500 TREE (Tree Resource Enhancement & Engagement) Grant by DFFM. Public Works, by providing a match to the grant and was able to plant 20 trees and make irrigation improvements along Redondo Center Drive in September 2019. A third success, anticipated to be completed in early 2020, was the result of public outreach efforts and involvement of the Task Force. Lowe's is working on a partnership with the Girl Scout chapter to provide a $3,500 grant and volunteers to plant trees along a collector roadway to improve walkability. Public Works will accept long-term maintenance of the trees.

Municipal Tree Fund. Revisions to the Tree Ordinance created the Municipal Tree Fund in which fees collected from tree removal permits would be deposited. Funds are restricted for care and maintenance of

municipal trees and to offset the loss of municipal trees due to removal, destruction, or natural death. Individuals are welcome to donate to the Municipal Tree Fund.

Maintenance Improvement Districts (MID). Under provisions of the City Code, all developers are responsible for landscaping their development projects and subdivisions, to include trees. In particular, subdivisions are required to provide landscaping along certain streets and in other locations as provided in the zoning requirements, approval stipulations, engineering requests or subdivision requirements. Pursuant to Arizona Statute, a Municipal Improvement District (MID) can be created to provide a dedicated funding stream for maintenance, repair, and improvements of these landscaped areas. Since 2017, newly formed subdivision

12 Shady Playgrounds

2019 SUCCESS
$1000
+12 TREES
FUNDED BY ONE TREE PLANTED

With funding from One Tree Planted, 12 trees were planted by Parks & Recreation staff and volunteers at the West Wetlands Park near the Stewart Vincent Wolfe Creative Playground in October 2019.

The children have spoken and they want shady playgrounds (Yuma Sun, April 29, 2019, "Kids: Parks need shade, drinking fountains")! This project focuses on planting trees or constructing shade structures around playgrounds. The Parks & Recreation Department will determine the parks in which playgrounds need shade. Local organizations can work with students and volunteers to conduct fundraisers for improvements at playgrounds.

PARKS & RECREATION **LOCAL ORGANIZATIONS & VOLUNTEERS**

17 Safe & Shady Schools

The goal of this project is to plant trees on and near school property to improve walkability and provide shade. To date, the Pecan Grove Garden Club, Arizona Public Service (APS), and the Yuma County Public Health Services District have committed to helping implement this project.

The Pecan Grove Garden Club plans to plant trees and teach a class called "Our Amazing Trees" at several schools in low-income area of the City. Schools identified in the City's Revitalization Areas include: McGraw Elementary, Gila Vista Jr. High, Harvest Prep, Amerischools, Yuma High, Fourth Avenue Jr. High, Roosevelt Elementary, and G.W. Carver Elementary Schools. They anticipate the project to be ongoing for several years and will seek grant funding to help cover the cost of the trees.

Several groups (APS, Yuma County Public Health, Vertical Church, Bose Corporation, and Sunset Nursery) have partnered to implement a tree planting project at Gila Vista Jr. High and McGraw Elementary. The group plans to plant approximately 40-50 trees on school grounds to provide shade and citrus trees in conjunction with Gila Vista's student-led community garden. The City's Parks & Recreation Department has offered to provide an educational component for students.

PARKS & RECREATION **PECAN GROVE GARDEN CLUB, APS, YUMA CO. HEALTH**

In the City of Yuma have formed MIDs to fund landscape maintenance and provide local control over landscape maintenance. Residents within the MID pay a special assessment on their property tax bill and, in turn, they gain a direct decision-making role in the level of landscape maintenance within their community. The City outsources maintenance to local landscape maintenance contracting companies and the amount of the assessment directly reflects the cost of maintenance. Resident input on the level of maintenance and proposed improvements, which could include trees, is reviewed and approved on an annual basis.

Per statute, the Mayor and Council can initiate the formation of a MID or property owners can petition to form a MID. With a majority of neighbors' signatures on the petition, a neighborhood could form a MID to fund landscape maintenance and improvements. MIDs are a specialized form of funding that could support the planting and maintenance of additional trees.

Departmental Funding & Capital Improvement Projects. Some funding for trees and maintenance will come from the City, primarily through the funds budgeted to the Parks & Recreation Department and the Public Works Department. In order to plant more municipal trees and to maintain those trees in the long-term, departmental funding is anticipated to increase. The *5-Year Tree Care & Maintenance Plan* outlines specific funding needs.

Some tree planting projects, particularly along gateway routes or those done in conjunction with roadway reconfigurations, will be funded through the Capital Improvements Program (CIP). New roads built by the CIP program should always have adequate budget to include street trees, as required in the Engineering Standards and by the City's Complete Streets policy.

Urban Forestry Asset Management. With the City's recent departmental-wide adoption of the asset management software called Lucity, the City has the ability to better manage all its assets, including its urban forest. Across the country, many municipalities have begun to recognize the value of the urban forests they manage by adding it to their balance sheets as a separate asset class, much like other capital investments such as roads, sewer, water, and other types of infrastructure. Trees provide real value and naming it as an asset class recognizes the value in a tangible way, as with other infrastructure systems. It will also ensure that the urban forest is properly analyzed and budgeted for each year.

A complete inventory of municipal trees is a prerequisite to including the urban forest as an asset class. The inventory and asset management approach will allow the City to shift from reactive to proactive management of trees. Chula Vista, CA's urban forestry management system and asset management plan provides an excellent example in how to measure the value of the urban forest and how to estimate life cycle costs into the future.

Outreach & Education

The work of the plan does not end at adoption. For implementation to be successful, the City and community need to continue efforts to spread the word about the importance of trees. One of the goals of this planning process was to establish partnerships and outreach programs to raise awareness about the benefits of the urban forest and the vision for the future and to increase the canopy. Involvement of the Task Force from the beginning stages of the plan laid the groundwork for the *Trees for Yuma* consortium that will be the focus of many of the ongoing outreach efforts. City staff will take the lead in organizing and administrating *Trees for Yuma* to ensure its success. The consortium and its members will form the foundation for donations, volunteers, and activism to guide tree planting and awareness efforts in the future.

Survey Information. The public survey was the first outreach tool. It introduced basic tree topics and raised awareness of the importance of the urban forest. Survey results indicated that the public values trees and is interested in learning more about tree care and maintenance. The most frequently cited topics of interest were free trees, planting trees, caring for trees, properly watering trees during a drought, different kinds of trees, and how to recycle or dispose of green waste. The survey also indicated that a majority of people were unaware of the City's urban forestry activities and policies. More outreach will be done to inform the public about the City's role in caring for the urban forest.

Tree Outreach & Education Projects. Three of the projects identified by the Task Force (outlined previously in this chapter) focus on outreach and education: conducting an information campaign, providing classes on tree care; and hosting a regular radio show on tree topics.

Community Development staff will lead the effort to provide information on tree topics to the general public via social media, print and online brochures, and public service announcements on radio & television. Part of this effort will include expanding the City Landscape Guidelines to include information on pruning and irrigation best practices. Targeted outreach will also be conducted to inform residents about the updated Tree Ordinance and how it impacts municipal trees. Arborists and local tree care professionals will assist in creating these materials. Additionally, the City will seek partners to create a public service announcement about tree care and maintenance which can be aired on City television and radio.

Parks & Recreation Department will take the lead on producing a recurring radio show called "Ask the Arborist" during which a local arborist will be interviewed and can answer questions about trees and tree care. Listeners can pose their questions in advance of the show on social media to guide specific discussion topics. The Parks & Recreation Department, in partnership with local arborists and organizations, will coordinate classes on tree care and maintenance. The first class was held on October 19, 2019 and more are being planned.

18 Tree Care Classes

2019 SUCCESS
+1 TREE
CLASS HOSTED BY PARKS & RECREATION TAUGHT BY FRANK SALDANA

The first tree care class, hosted by Parks & Recreation and taught by local arborist Frank Saldana (pictured at left), was held on October 19, 2019. The topic was "Right Tree, Right Place" and eight people attended. To demonstrate best practices, Mr. Saldana led the group in planting a tree near Riverside Cottage.

The Pecan Grove Garden Club, who has committed their group to working on the Safe & Shady Schools project, is also planning to conduct tree classes for students when they plant trees at local schools.

Parks & Recreation will continue to offer a variety of classes on tree care topics. One goal will be to target different demographic groups to reach a wide audience, particularly those who might not otherwise self-select to learn about tree care and maintenance.

PARKS & RECREATION **LOCAL ARBORISTS & ORGANIZATIONS**

14 Planting Wildlife Habitats

All planting efforts can take into consideration creating habitat oases for wildlife. According to the National Wildlife Federation, "wildlife need our help. Human activity has changed and eliminated habitat.. and birds, butterflies, and other wildlife are pushed into ever shrinking wilderness areas." Wildlife habitats can be created by planting an appropriate mix of native trees, shrubs, and groundcovers. Trees and shrubs provide a diversity of wildlife with food, cover, and nesting sites. When planted in clusters, trees and shrubs provide a more vibrant and vigorous habitat than trees alone. The National Wildlife Federation has a program, Certified Wildlife Habitat, to guide individuals in creating and certifying their yard or garden as a wildlife habitat.

It is important to choose native plants, particularly when creating wildlife habitats. Native plants provide more benefits for the local environment, more habitat opportunities for local fauna, and they typically require less maintenance than exotic plants. Exotic plants can become invasive species that can take over the environment and become difficult to eradicate.

This project, which is being spearheaded by the Master Gardeners, the Yuma Crossing National Heritage Area (YCNHA) and other local partners, will focus on informing the public about the benefits of native plants and wildlife habitats and encouraging them to choose natives. Existing educational materials on the topics will be further disseminated to the public.

PARKS & RECREATION **MASTER GARDENERS + YCNHA**

Measuring & Tracking Success

Tracking, measuring, and publishing progress toward the goals of this plan is essential to its long-term success. City staff and *Trees for Yuma* consortium representatives will provide the City Council an annual update on plan implementation efforts. An annual report of key metrics will be published on the City website and *Trees for Yuma* website for the public to view.

Key metrics for the annual report include: the number of trees planted, funds raised, outreach efforts, and community tree project progress. The number of trees planted will be the sum of trees planted in conjunction with community projects spearheaded by *Trees for Yuma* consortium members, by citizens self-reporting trees planted on private property, trees planted in conjunction with new development as required by the Landscape Regulations, and trees planted by City departments on City-managed property. The *Trees for Yuma* consortium website will include a form for residents to self-report trees planted on private property, similar to a system currently being used in Tucson. Funds raised will be measured as a sum of donations, grants, City investment, and any other sources of funding for tree projects.

As with most facility master plans developed by the City, an thorough update to the plan will be completed in 10 years. The 10-year update will include a full analysis of the tree canopy map to measure change over time as well as a complete update and analysis of the impact maps (walkability, safety, equity, and aesthetics). At this time, progress toward the 7% canopy goal will be reassessed. New targets and implementation methods will be proposed.

APPENDICES

A Tree Inventories (Smucker Park & West Wetlands Park)

B 5-Yr Tree Care & Maintenance Plan

C Landscape Guidelines

D Yuma Soil Maps

E Planning Task Force

F Public Survey & Results

G Tree Ordinance (2019)

H Water Use of Trees

Appendices are available for download on the City of Yuma website at
www.yumaaz.gov/community-development/tree-shade-master-plan/tree-and-shade-master-plan