



Agenda

Transportation, Infrastructure and Innovation Subcommittee

Wednesday, November 4, 2020

9:00 AM

phoenix.gov

OPTIONS TO ACCESS THIS MEETING

- **Watch** the meeting live streamed on phoenix.gov or Phoenix Channel 11 on Cox Cable.

- **Call-in** to listen to the meeting. Dial 602-666-0783 and Enter Meeting ID 126 930 5461# (for English) or 126 791 2809# (for Spanish). Press # again when prompted for attendee ID.

- **Register and speak during a meeting:**

- **Register online** by visiting the City Council Meetings page on phoenix.gov **at least 1 hour prior to the start of this meeting**. Then, click on this link at the time of the meeting and join the Webex to speak.

<https://phoenixcitycouncil.webex.com/phoenixcitycouncil/onstage/g.php?MTID=ea180feea16d5f08df190900eaab0a317>

- **Register via telephone** at 602-262-6001 **at least 1 hour prior to the start of this meeting**, noting the item number. Then, use the Call-in phone number and Meeting ID listed above at the time of the meeting to call-in and speak.

CALL TO ORDER

CALL TO THE PUBLIC

MINUTES OF MEETINGS

- 1 **For Approval or Correction, the Minutes of the Transportation, Infrastructure and Innovation Subcommittee Meeting on Oct. 7, 2020** **Page 9**

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the City Manager's Office.

CONSENT ACTION (ITEMS 2-8)

- 2 **AerSale, Inc. Amendment to add 12 acres at Phoenix Goodyear Airport** **Page 17**

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval to amend AerSale Inc. (AerSale) Hangar Lease 75812 to add an additional 12 acres of land at Phoenix Goodyear Airport (GYR).

THIS ITEM IS FOR CONSENT ACTION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.

- 3 **Worldwide Flight Services, Inc. Ground Lease at Phoenix Sky Harbor International Airport** **Page 19**

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval to enter into a ground lease with Worldwide Flight Services, Inc. (WFS) at Phoenix Sky Harbor International Airport (PHX) for one year with two, one-year renewal options.

THIS ITEM IS FOR CONSENT ACTION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.

4 Luke Air Force Base 56th Fighter Wing Intergovernmental Agreement Page 21

This report requests that the Transportation, Infrastructure, and Innovation Subcommittee recommend City Council approval to enter into an Intergovernmental Agreement (IGA) with Luke Air Force Base 56th Fighter Wing (Luke) for a term of nine years.

THIS ITEM IS FOR CONSENT ACTION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.

5 Distributed Antenna System Solicitation Request Page 23

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval to authorize the Aviation Department to issue a Revenue Contract Solicitation (RCS) for design, implementation, and ongoing operation and maintenance of an airport Distributed Antenna System (DAS) to improve cellular service at Phoenix Sky Harbor International Airport (PHX).

THIS ITEM IS FOR CONSENT ACTION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.

6 **Airports Council International - North America Membership** **Page 25**

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval of the 2021 annual dues payment for the Aviation Department's membership in Airports Council International - North America (ACI-NA). The annual dues for 2021 are \$149,629.60.

THIS ITEM IS FOR CONSENT ACTION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.

7 **Keep Kids Alive Drive 25 Campaign** **Page 27**

This report provides the Transportation, Infrastructure and Innovation Subcommittee with information on the Keep Kids Alive Drive 25 campaign and requests approval to provide in-kind services in the form of staff hours to collaborate with the campaign.

THIS ITEM IS FOR CONSENT ACTION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Street Transportation Department.

8 **Public Transportation Agency Safety Plan - Request for Approval** **Page 29**

This report requests the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval of the Public Transit Department's Public Transportation Agency Safety Plan (PTASP), a new requirement of the Federal Transit Administration (FTA).

THIS ITEM IS FOR CONSENT ACTION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Public Transit Department.

INFORMATION ONLY (ITEMS 9-14)

9 Metro, Regional Public Transportation Authority, and Maricopa Association of Governments Meetings Page 109

This report provides the Transportation, Infrastructure and Innovation Subcommittee with copies of past and/or upcoming meeting agendas/summaries for METRO light rail, Valley Metro/Regional Public Transportation Authority (RPTA), and the Maricopa Association of Governments.

THIS ITEM IS FOR INFORMATION ONLY.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Public Transit Department.

10 Citizens Transportation Commission Meetings Page 111

This report provides the Transportation, Infrastructure and Innovation Subcommittee with copies of past and/or upcoming meeting agendas/summaries for the Citizens Transportation Commission.

THIS ITEM IS FOR INFORMATION ONLY.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Public Transit Department.

11 Freeway Program Update Page 112

This report provides the Transportation, Infrastructure and Innovation Subcommittee updates on the Arizona Department of Transportation (ADOT) freeway program within the City of Phoenix.

THIS ITEM IS FOR INFORMATION ONLY.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the City Manager's Office.

12 **Better Utilizing Infrastructure Leveraging Development 2020 Grant Award - 35th Avenue Safety Corridor Project** **Page 118**

This report provides an update to the Transportation, Infrastructure and Innovation Subcommittee on the U.S. Department of Transportation Better Utilizing Infrastructure Leveraging Development (BUILD) 2020 Grant Award. Phoenix was awarded nearly \$17.5 million to make safety and technology improvements to the 35th Avenue corridor between Interstate 10 (I-10) and Camelback Road.

THIS ITEM IS FOR INFORMATION ONLY.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Street Transportation Department.

13 **Fiscal Year 2020 Transportation 2050 (T2050) Annual Progress Report** **Page 122**

This report provides information to the Transportation, Infrastructure and Innovation Subcommittee on the status of the Transportation 2050 (T2050) Annual Progress Report for Fiscal Year (FY) 2020.

THIS ITEM IS FOR INFORMATION ONLY.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Street Transportation and Public Transit departments.

14 **Pedestrian Safety Program Update** **Page 163**

This report provides the Transportation, Infrastructure and Innovation Subcommittee with an update on the Street Transportation Department's (Streets) Office of Pedestrian Safety activities.

THIS ITEM IS FOR INFORMATION ONLY.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and Street Transportation Department.

DISCUSSION AND POSSIBLE ACTION (ITEM 15)

15 Light Rail Small Business Financial Assistance Program Pilot

Page 173

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval of a proposed Light Rail Small Business Financial Assistance Program (SBFAP) Pilot working with Valley Metro. Further request recommendation for approval to enter into grant agreements with, and accept and disburse \$500,000 in grant funding from, the Phoenix Community Development and Investment Corp (PCDIC) to supplement funding for the SBFAP Pilot.

THIS ITEM IS FOR DISCUSSION AND POSSIBLE ACTION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Public Transit Department.

INFORMATION AND DISCUSSION (ITEMS 16-18)

16 Downtown Shared Electric Scooter Pilot Program Update

Page 178

This report provides the Transportation, Infrastructure, and Innovation Subcommittee with a summary of the first six months of the Downtown Shared Electric Scooter Pilot Program.

THIS ITEM IS FOR INFORMATION AND DISCUSSION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Street Transportation Department.

17 Concessions Relief Update

Page 183

This report is to provide an update on concessions relief offered to tenants at Phoenix Sky Harbor International Airport (PHX) through Dec. 31, 2020.

THIS ITEM IS FOR INFORMATION AND DISCUSSION.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.

18 Climate Action Planning Update

Page 185

This report presents the proposed City of Phoenix Climate Action Plan (CAP) Framework developed by staff from 28 City departments as well as results from recent community engagement focused on climate action. Staff will continue to work with the community and other stakeholders to develop a climate action plan for approval by City Council in 2021.

THIS ITEM IS FOR INFORMATION AND DISCUSSION.

Responsible Department

This item is submitted by Deputy City Manager Karen Peters and the Offices of Environmental Programs and Sustainability.

CALL TO THE PUBLIC

FUTURE AGENDA ITEMS

ADJOURN

For further information or reasonable accommodations, please call Larry Smallwood, Management Assistant II, City Manager's Office at 602-262-7684. 7-1-1 Friendly.

Persons paid to lobby on behalf of persons or organizations other than themselves must register with the City Clerk prior to lobbying or within five business days thereafter, and must register annually to continue lobbying. If you have any questions about registration or whether or not you must register, please contact the City Clerk's Office at 602-534-0490.

Members:

Councilwoman Thelda Williams, Chair
Vice Mayor Betty Guardado
Councilwoman Laura Pastor
Councilwoman Debra Stark



City of Phoenix

Transportation, Infrastructure and Innovation
Subcommittee

Report

Agenda Date: 11/4/2020, Item No. 1

For Approval or Correction, the Minutes of the Transportation, Infrastructure and Innovation Subcommittee Meeting on Oct. 7, 2020

Summary

This item transmits the minutes of the Transportation, Infrastructure and Innovation Subcommittee Meeting on Oct. 7, 2020, for review, correction or approval by the Transportation, Infrastructure and Innovation Subcommittee.

The minutes are attached (**Attachment A**).

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the City Manager's Office.

Attachment A

Phoenix City Council Transportation, Infrastructure and Innovation Subcommittee Summary Minutes Wednesday, Oct. 7, 2020

City Council Chambers
200 W. Jefferson Street
Phoenix, Ariz.

Subcommittee Members Present

Councilwoman Thelda Williams, Chair
Councilwoman Debra Stark
Councilwoman Laura Pastor*
Councilwoman Betty Guardado

Subcommittee Members Absent

*Councilwoman Pastor joined the meeting during discussion on Item 16.

CALL TO ORDER

Chairwoman Williams called the Transportation, Infrastructure and Innovation Subcommittee to order at 9:01 a.m. with Vice Mayor Guardado and Councilwoman Stark present via Webex.

CALL TO THE PUBLIC

None.

MINUTES OF MEETINGS

1. For Approval or Correction, the Minutes of the Transportation, Infrastructure and Innovation Subcommittee Meeting on Sept. 2, 2020

Councilwoman Stark made a motion to approve the minutes of the Sept. 2, 2020 Transportation, Infrastructure and Innovation Subcommittee. Vice Mayor Guardado seconded the motion, which passed unanimously, 3-0.

CONSENT ACTION (ITEMS 2-11)

Items 2-11 were for consent action. No presentations were planned but staff was available to answer questions.

Councilwoman Stark made a motion to approve consent items 2-11. Vice Mayor Guardado seconded the motion, which passed unanimously, 3-0.

2. Maricopa County Fiscal Year 2021-2022 Small Project Assistance Program

- 3. Shaw Butte Mountain Service Tower Access Road Drainage Improvement Project**
- 4. Applicant Agreement with Department of Emergency and Military Affairs for Palm Lane Storm Drain Mitigation Project**
- 5. Applicant Agreement with Department of Emergency and Military Affairs for Mandan Street Flood Mitigation Project**
- 6. Facility Lease with Civil Aviation Training Solutions, Inc. at Phoenix Sky Harbor International Airport**
- 7. Peak Supply Chain Solutions Inc. Facility Lease at Phoenix Sky Harbor International Airport**
- 8. Traffic Barricade Manual Update**
- 9. Transit Scheduling and Dispatch Software Upgrade**
- 10. Request Authorization to Submit Federal Transit Administration Grant Application and Enter into Grant Agreements - South Central Extension/Downtown Hub Light Rail Project**
- 11. Request Authorization to Submit Federal Transit Administration Grant Application and Enter into Grant Agreements - Northwest Extension Phase II Light Rail Project**

INFORMATION ONLY (ITEMS 12-15)

12. Metro, Regional Public Transportation Authority, and Maricopa Association of Governments Meetings

No Councilmember requested additional information.

13. Citizens Transportation Commission Meetings

No Councilmember requested additional information.

14. Freeway Program Update

No Councilmember requested additional information.

15. LED Streetlight Conversion Project Update

No Councilmember requested additional information.

DISCUSSION AND POSSIBLE ACTION (ITEM 16)

Councilwoman Pastor joined the meeting during discussion on Item 16.

16. Capitol/I-10 West Light Rail Extension Phase I Recommendation

Deputy City Manager Mario Paniagua introduced Light Rail Administrator Markus Coleman to present on the Capitol/I-10 West Extension. Mr. Coleman provided an overview of the light rail extension and introduced Deron Lozano, Project Manager at Valley Metro.

Mr. Lozano provided an overview of the alignment approved by City Council in 2012, explaining that it was organized into two phases: Phase I from downtown Phoenix to the Capitol Area and Phase II from the Capitol to the West Valley along the I-10 Freeway. He provided an update on activity since 2019, including public meetings, a review of other transit types and commuter transit solutions, funding examination, engagement with West Valley cities, and discussion about extending service to Desert Sky Mall.

Mr. Lozano summarized the public outreach strategy, which focused initially on reengaging previous stakeholders. He stated public meetings began in early 2020 to present and gather input on the project history, status, downtown route options, Phase II transit type options, the potential extension to Desert Sky Mall, and options to advance the project to completion.

Mr. Lozano discussed public outreach conducted online due to the COVID-19 pandemic, which included virtual public meetings and opportunities for the public to provide feedback on the Valley Metro website. He shared 1,355 people viewed the public meetings, 57 attendees to the two live call-in sessions, and 334 people who provided feedback through direct communication, the online survey, and meetings.

Mr. Lozano provided an overview of the feedback, stating that 75 percent of respondents preferred the light rail option for Phase II and 77 percent of respondents felt positively about the possible extension to Desert Sky Mall.

Mr. Lozano discussed the Phase I route alignment originally approved in 2012 and presented the revised options that were shown to the public during public meetings. He added the presentations of each alignment option and also shared associated challenges, including the configuration of the alignment from Downtown Phoenix to the Capitol and its connection to the South Central Light Rail Extension.

Mr. Lozano presented the current leading alternative, Concept C, which proposes a single-track loop option operating westbound on Washington Street to 18th Avenue or 19th Avenue, then back eastbound on Jefferson Street. He stated that this concept outperformed the other options due to its impact to transit ridership, economic development, right of way, access to historical and cultural resources, operational efficiency, and mobility. He stated this leading alternative was presented to the public, and he noted that 67 percent of respondents felt positively about the Concept C route option, with 19 percent feeling neutral and 14 percent feeling negatively.

Mr. Lozano discussed feedback received about this concept, including accessibility and traffic concerns. He also mentioned Arizona Department of Public Safety was

conducting its own analysis of the Phase I segment to see how the alignment would impact the State Capitol area.

Mr. Lozano shared some considerations for future evaluation and public input, including the number of stations, detailed alignment of tracks, storage tracks/special trackwork, Traction Power Substation (TPSS) locations, and streetscape elements.

Mr. Coleman discussed the next steps for the project, including requesting action from the City Council, engaging the environmental assessment process and preliminary design for Phase I, and continuing analysis of Phase II.

Mr. Coleman stated the Citizens Transportation Commission voted to approve Concept C as the amended Phase I Locally Preferred Alternative for the Capitol/I-10 West Light Rail Extension, with a 9-1 vote on Sept. 24, 2020.

Mr. Coleman concluded the presentation by requesting Transportation, Infrastructure and Innovation Subcommittee approval to City Council to approve Concept C, 18th/19th Avenue Option as the amended Phase I Locally Preferred Alternative for the Capitol/I-10 West Light Rail Extension.

Vice Mayor Guardado made a motion to approve staff's recommendation. Councilwoman Stark seconded the motion which passed unanimously, 4-0.

INFORMATION AND DISCUSSION (ITEMS 17-19)

17. Active Transportation Program Update

Deputy City Manager Mario Paniagua introduced Street Transportation Director Kini Knudson to present updates to the Active Transportation Program.

Mr. Knudson introduced Assistant Street Transportation Director Briiana Velez and provided an overview of the various transportation modes included in the Active Transportation Program.

Ms. Velez provided an overview of the updates to the Program. She discussed the annual target to increase bike lanes, completed and future canal projects in partnership with Salt River Project (SRP), and outreach on policy changes to the Active Transportation Plan.

Ms. Velez discussed the Citywide bicycle and walking counts, demonstrating changes in recreational and non-recreational bicycling and walking throughout the week. She highlighted the City's bronze designation as a Bicycle Friendly Community for 2020-24 and discussed staff's plans to achieve a silver designation.

Ms. Velez discussed the next steps for the Program, including ongoing implementation of bikeways and infrastructure, buffered and protected bike lanes, Active Transportation Plan, and canal projects.

Mr. Knudson concluded the presentation by providing an update on the e-scooter program, which had been approved for an extension by City Council and restarted on Oct. 1, 2020.

Chairwoman Williams opened the floor for public comment.

Ryan Boyd expressed support for the Active Transportation Plan and advocated for further prioritization of pedestrian and bicycle safety.

Vice Mayor Guardado shared her excitement for the canal projects extending into the West Valley for community recreation and exercise.

18. City's Floodplain Management Plan Update

Deputy City Manager Mario Paniagua introduced Public Works Director Ginger Spencer, Deputy Public Works Director Ray Dovalina, and Civil Engineer Elise Moore to present updates to the city's Floodplain Management Plan.

Ms. Spencer began the presentation by highlighting the city's Class 5 designation in the National Flood Insurance Program (NFIP) Community Rating System (CRS), which provides a discount on flood insurance premiums to residents.

Mr. Dovalina provided an overview of the floodplain plan to reduce future flooding in the City.

Ms. Moore discussed the City's participation in the CRS and discussed the discounts it provides to residents in a flood hazard area. She discussed the flood planning committee's goals and recommended updates, including improvements to public outreach, annual assessment of the level of flood insurance, and increased inspections and maintenance.

Ms. Spencer concluded the presentation by sharing next steps, including conducting additional public outreach and recommended changes to the planning committee, and mentioned there was not currently a bond program in place.

Vice Mayor Guardado expressed her support for additional public input and further progress on the plan.

Councilwoman Pastor asked about the public input process, specifically whether staff would present a plan for public approval or if they will ask questions about the community's experience with floodplain management. She provided an example of the Central City corridor, which was once considered a flood plain area, where residents continue to experience challenges with flooding in that area.

Ms. Spencer responded that staff initially planned to share recommended changes, but she agreed that gathering input on resident impacts and concerns should be involved in the public input process. Mr. Dovalina provided an update on floodplain management efforts in the Central City corridor, sharing that staff was actively working with the flood control district and had engaged Maricopa County to assist in the study area. He further explained there was an active local drainage program that subsequently leverages the flood control district.

Councilwoman Stark asked when staff would present the results of public input to the Subcommittee. Mr. Dovalina responded staff would return next spring to discuss the results of outreach.

Councilwoman Williams expressed appreciation for the work that had been done in her district related to flood plain studies and supported more public meetings, as light rail construction had impacted water flow.

19. Recycling Equipment Upgrade and Market Update

Deputy City Manager Mario Paniagua introduced Public Works Director Ginger Spencer, Assistant Public Works Director Joe Giudice and Jon Powell, Vice President of Closed Loop Partners, to present updates on the recycling equipment upgrade at the North Gateway Transfer Station (NGTS) and the recycling market.

Mr. Giudice described the challenges experienced at NGTS before the upgrades, including obsolete infrastructure, changes in the composition stream, and changes in quality specifications. He provided an overview of the \$4.5 million upgrade investment and timeline, explaining the project was financed through partnerships with the Closed Loop Fund, which funded a \$3 million, zero percent interest loan, and the City of Peoria, which provided a \$1 million investment. He also shared the upgrade goals of meeting new quality specifications and improving operational efficiency.

Mr. Powell provided an overview of Closed Loop Partners, describing their investments in the circular economy, as well as their work providing financial and operational expertise to transform material and recycling handling systems. He explained infrastructure funds, which were below market rate loans to help increase supply, improve sorting, and enable sophisticated material processing.

Mr. Giudice described the capital improvements to the Materials Recovery Facility (MRF) and the facility's new equipment, such as the drum feeder, anti-wrap star screen, and optical sorters, which ensure continuous flow of material and improve material sorting and capture.

Mr. Giudice shared the results of the investments, noting substantial improvements in polyethylene terephthalate (PET) plastic, paper, aluminum, and cardboard recovery. He stated revenue had exceeded forecasts done prior to the upgrade, and that additional revenue was anticipated relative to the payback of principal to the Closed Loop Fund.

Mr. Giudice mentioned obsolete equipment capital improvement needs at the 27th Avenue Transfer Station MRF. He stated staff would return with a plan for updating the facility.

Mr. Giudice provided an update on the recycling market and described an improvement in the sales of cardboard and paper. He stated staff was forecasting an improved year in recycling revenue relative to last year.

Ms. Spencer concluded the presentation by thanking the Subcommittee for their support and the Closed Loop Fund for their investment.

Councilwoman Williams asked if the recycle market was better than it was a year ago. Ms. Spencer stated there were still the same restrictions in place internationally, but the City had been able to improve the quality and capture of recyclables. Mr. Giudice explained staff was seeing an improvement in cardboard and paper markets, but that other markets had remained relatively stable since last year. He added there was an improved domestic market and new international interest outside of China.

CALL TO THE PUBLIC

None.

FUTURE AGENDA ITEMS

None.

ADJOURNMENT

Chairwoman Williams adjourned the meeting at 10:10 a.m.

Respectfully submitted,
Adeoffer-Marie Rabusa
Management Intern



AerSale, Inc. Amendment to add 12 acres at Phoenix Goodyear Airport

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval to amend AerSale Inc. (AerSale) Hangar Lease 75812 to add an additional 12 acres of land at Phoenix Goodyear Airport (GYR).

THIS ITEM IS FOR CONSENT ACTION.

Summary

AerSale currently leases Hangar 52, and approximately 44 acres of land under Hangar Lease 75812 where they conduct maintenance, repair, and overhaul (MRO) operations on commercial aircraft stored at GYR. AerSale has requested to increase their exclusive aircraft storage area with the addition of 12 acres of land to accommodate additional aircraft.

Contract Term

The term of the current Hangar Lease expires on June 27, 2026, and will not be extended by this amendment.

Financial Impact

AerSale pays \$193.69 per month for each airplane stored at GYR. Depending on the size of airplanes stored, the additional 12-acres has the capacity to store up to 12 commercial aircraft, which would generate approximately \$27,891 per year in revenue to GYR if the area is fully utilized.

Concurrence/Previous Council Action

This item was recommended for approval by the Phoenix Aviation Advisory Board by a vote of 6-0.

Location

Phoenix Goodyear Airport - 1658 S. Litchfield Road, Goodyear, Ariz.
Council District: Out of City

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.



Worldwide Flight Services, Inc. Ground Lease at Phoenix Sky Harbor International Airport

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval to enter into a ground lease with Worldwide Flight Services, Inc. (WFS) at Phoenix Sky Harbor International Airport (PHX) for one year with two, one-year renewal options.

THIS ITEM IS FOR CONSENT ACTION.

Summary

WFS currently leases cargo bays at the West Air Cargo (WAC) complex at PHX where they process cargo for Amazon, Inc. WFS has requested to lease approximately one acre in the East Tonto Lot to park trailers used to transport cargo to Amazon's distribution warehouses in Phoenix and surrounding communities.

Contract Term

The term will be one year with two, one-year renewal options to be exercised at the sole discretion of the Aviation Director.

Financial Impact

Rent for the first year of the lease will be approximately \$45,738 per year (\$1.05 per square foot) plus applicable taxes. Rent will be adjusted annually thereafter by the Phoenix-Mesa-Scottsdale Consumer Price Index. Total anticipated revenue over the term of the lease will be approximately \$137,214.

Concurrence/Previous Council Action

This item was recommended for approval by the Phoenix Aviation Advisory Board on Oct. 15, 2020, by a vote of 6-0.

Location

Phoenix Sky Harbor International Airport, East Tonto Lot - 610 S. 24th St.
Council District: 8

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.



Luke Air Force Base 56th Fighter Wing Intergovernmental Agreement

This report requests that the Transportation, Infrastructure, and Innovation Subcommittee recommend City Council approval to enter into an Intergovernmental Agreement (IGA) with Luke Air Force Base 56th Fighter Wing (Luke) for a term of nine years.

THIS ITEM IS FOR CONSENT ACTION.

Summary

Luke, located in Glendale, Ariz., conducts flight training throughout the Southwest and is located at 14185 W. Falcon St. In 2010, the City and Luke entered into IGA 129687 in which the City agreed to authorize aircraft diverted from Luke to land at Phoenix Sky Harbor International Airport (PHX), Phoenix Deer Valley Airport (DVT) and Phoenix Goodyear Airport (GYR). The current IGA is set to expire and included one, five-year extension option. Luke has declined entering into the five-year extension option because they will need a longer overall term. In lieu of entering into the existing option, they have requested to enter into a new IGA that will provide Luke a longer term. The new agreement will continue to authorize diverted Luke aircraft to land at City-owned airports and establish procedures for the recovery of said aircraft for safe and efficient operations.

Contract Term

The term will be nine years with no options to renew.

Financial Impact

This is a non-revenue generating IGA. Luke will be responsible for reimbursement of any damage or removal of debris caused by diverted aircraft.

Concurrence/Previous Council Action

This item was recommended for approval by the Phoenix Aviation Advisory Board on Oct. 15, 2020, by a vote of 6-0.

Location

Phoenix Sky Harbor International Airport - 3400 E. Sky Harbor Blvd.

Phoenix Deer Valley Airport - 702 W. Deer Valley Road
Phoenix Goodyear Airport - 1658 S. Litchfield Road, Goodyear, Ariz.
Council Districts: 1, 8 and Out of City

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.



Distributed Antenna System Solicitation Request

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval to authorize the Aviation Department to issue a Revenue Contract Solicitation (RCS) for design, implementation, and ongoing operation and maintenance of an airport Distributed Antenna System (DAS) to improve cellular service at Phoenix Sky Harbor International Airport (PHX).

THIS ITEM IS FOR CONSENT ACTION.

Summary

The cellular service at PHX is limited and inconsistent because of physical structures in and around the airport campus. Terminal buildings, parking garages, and other structures make it difficult to receive an optimal cellular service inside the terminals and concourse facilities.

On average, approximately 123,000 passengers pass through Sky Harbor facilities on a daily basis (pre-COVID-19). Robust and reliable cellular service is essential to provide passengers a world-class experience that enables them to stay connected while traveling. Passengers need robust cellular service for mobile check-in, in-app upgrades, and timely flight notifications from airlines. Furthermore, COVID-19 has increased the need to carry out traditional transactions in a "touchless" manner, which also requires ubiquitous and strong cellular service for all passengers. Improvement in these services cannot be made by relying on legacy outdoor towers. With the advent of 5G technology, passengers are looking for next-generation wireless experience in our facilities. Because of the Federal Communications Commission's designated 5G frequency spectrum, it is extremely difficult to provide 5G service inside airport terminals and other facilities from outdoor sites.

A DAS will provide the necessary infrastructure to deliver world-class 4G and 5G cellular service to passengers at PHX. It will ensure adequate coverage and capacity that is needed to support a wireless experience (such as streaming media, video, and online gaming) that is ubiquitous in today's world and one that passengers expect while at the airport. The DAS will cover all public access areas of the airport in Terminals 3 and 4, the parking garages and the Rental Car Center and in select

nonpublic areas.

This item has been reviewed and approved by the Information Technology Services Department.

Procurement Information

Aviation Department will issue an RCS to select a service provider to design, build, operate, and maintain the DAS system. Aviation intends to issue the solicitation in mid-December 2020. It is estimated that the contract will be awarded in May 2021.

Evaluation criteria for responsive and responsible respondents include:

- Method of approach;
- Qualifications and experience;
- Revenue to the airport; and
- Business plan and wireless service provider onboarding.

Contract Term

The term of the contract will be 10 years, with two one-year options to extend that may be exercised at the sole discretion of the Aviation Director.

Financial Impact

Revenue will be set at a later date based on market data.

Concurrence/Previous Council Action

The Phoenix Aviation Advisory Board recommended approval of this item on Sept. 17, 2020, by a vote of 7-0.

Location

Phoenix Sky Harbor International Airport - 3400 E. Sky Harbor Blvd.
Council District: 8

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.



Airports Council International - North America Membership

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval of the 2021 annual dues payment for the Aviation Department's membership in Airports Council International - North America (ACI-NA). The annual dues for 2021 are \$149,629.60.

THIS ITEM IS FOR CONSENT ACTION.

Summary

ACI-NA is one of five worldwide regions of Airports Council International and represents local, regional, and state governing bodies that own and operate commercial airports in the United States and Canada. ACI-NA advocates for airports by addressing federal and regulatory issues that impact airports and the aviation industry, including issues such as FAA flight paths, safety and security and FAA funding reauthorization.

ACI-NA is also deeply engaged with the International Civil Aviation Organization (ICAO), a United Nations Specialized Agency with strategic objectives including safety, air navigation capacity and efficiency, security and facilitation, economic development of air transport, and environmental protection. ACI-NA's observer status allows it to place a subject matter expert on the Air Navigation Commission, which allows the airport sector early input into proposed technical recommendations that have direct consequences for airport design and operation.

In addition, Phoenix airports are well represented by staff serving on ACI committees including the Large Hub Airport, Operations and Technical Affairs, US Governmental Affairs, Legal Affairs, Public Safety and Security, Business Diversity, Business Information Technology, Finance, Marketing and Communications, Risk Management, Small Airports, Human Resources, and Commercial Management committees. These committees are charged with the development of recommendations that ACI-NA helps advance on behalf of U.S. airports to regulators in Washington, D.C.

As the owner and operator of Phoenix Sky Harbor International Airport, the City of Phoenix receives great value from the services and industry coordination and

collaboration that are provided/organized by ACI-NA. At the start of 2020, airports were on track for another record-breaking year in air travel. The global spread of COVID-19, however, sparked an abrupt drop in air travel, bringing the aviation industry to a near standstill. ACI-NA continued to support the industry this year by:

- Securing \$10 billion in financial relief for U.S. airports following the virtual shutdown of air travel due to the COVID-19 pandemic;
- Establishing the Airport Industry Recovery Advisory Panel to develop 53 recommendations and priorities to guide the industry through recovery from the COVID-19 pandemic;
- Amplifying our infrastructure message on a national level by hosting a presidential candidate forum on infrastructure;
- Supporting airports by filing amicus briefs in two legal cases that would have restricted airport abilities to operate in a self-sufficient way; and
- Fighting back legislative efforts to increase liability on airports over per- and polyfluorinated alkyl substances (PFAS) rules set by Congress and the FAA.

There are no shortage of challenges as we look toward 2021. In support of the airport industry, ACI-NA will continue to:

- Lead the fight to modernize the Passenger Facility Charge user fee as the industry seeks to recover lost revenue from the COVID-19 pandemic;
- Advocate for the rapid expansion of touchless technology at the TSA checkpoint and biometric entry at Customs and Border Protection (CBP) to enhance passenger facilitation;
- Work to reopen domestic and international travel in a seamless way that prioritizes health, safety, and confidence in air travel; and
- Empower airports to become more sustainable while providing advocacy on environmental issues like noise.

Financial Impact

The annual dues for 2021 are \$149,629.60.

Location

Phoenix Sky Harbor International Airport - 3400 E. Sky Harbor Blvd.
Council District: 8

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.



Keep Kids Alive Drive 25 Campaign

This report provides the Transportation, Infrastructure and Innovation Subcommittee with information on the Keep Kids Alive Drive 25 campaign and requests approval to provide in-kind services in the form of staff hours to collaborate with the campaign.

THIS ITEM IS FOR CONSENT ACTION.

Summary

Keep Kids Alive Drive 25 (KKAD25) is a non-profit traffic safety organization based in Omaha, Nebraska, that was formed in 1998 to "educate motorists, pedestrians, and cyclists to practice behaviors that keep us all safe on and along roadways." KKAD25 campaigns work at the neighborhood level, involving residents in the creation of neighborhood-based plans for traffic safety. These plans may involve private property yard signs, creation of social media campaigns, or messaging actions that promote traffic safety without interfering with a city's established traffic guidelines. KKAD25 has worked with a variety of cities nationwide developing and engaging traffic safety campaigns to promote safe behaviors, including St. Louis, Missouri, and Detroit, Michigan.

KKAD25 recently received a \$3,000 grant from the General Motors Company (GM) to fund a new project in Phoenix to develop grassroots campaigns for neighborhood traffic safety regarding issues like speeding, distracted driving, seatbelt use, and observing traffic signage and signals. KKAD25 contacted the Street Transportation Department to request guidance in approaching appropriate Phoenix neighborhoods interested in developing traffic safety plans. KKAD25 would like to work with under-served neighborhoods where residents do not have the financial resources to create their own neighborhood-based traffic safety campaigns.

KKAD25 is not requesting any financial assistance from the City but is requesting staff support and involvement to guide the actions of their campaigns in Phoenix, so they can be successful. The Street Transportation Department is requesting approval to provide in-kind services in the form of staff hours to collaborate with the KKAD25 campaign's goal of creating neighborhood traffic safety plans in select under-served neighborhoods in Phoenix.

Financial Impact

There is no direct financial impact to the City other than staff hours to assist with the coordination of the KKAD25 campaign.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Street Transportation Department.



Public Transportation Agency Safety Plan - Request for Approval

This report requests the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval of the Public Transit Department's Public Transportation Agency Safety Plan (PTASP), a new requirement of the Federal Transit Administration (FTA).

THIS ITEM IS FOR CONSENT ACTION.

Summary

On July 19, 2019, the FTA published the PTASP Final Rule, requiring public transportation systems that receive federal grant funds to develop safety plans that include Safety Management Systems (SMS) and to set safety performance measure targets by Dec. 31, 2020.

The purpose of the Final Rule is to ensure safety within public transit systems nationwide. SMS elements include:

- Safety Management Policy - A documented commitment to safety defining the system's objectives and its employees' responsibilities to safety;
- Safety Risk Management - An established process for identifying, analyzing, documenting, and mitigating safety risks and hazards;
- Safety Promotion - Establishes a process for safety training and communication; and
- Safety Assurance - Includes safety performance monitoring and measurement, management of change, and continuous improvement.

Safety Performance Measures outlined by the National PTASP include specific definitions for "reportable events" as they pertain to having occurred within the transit environment or are otherwise related to transit service, vehicles, or facilities. Those "reportable events" are as follows:

Fatalities

- Total number of reportable fatalities; and

- Rate per total vehicle revenue miles by mode.

Injuries

- Total number of reportable injuries; and
- Rate per total vehicle revenue miles by mode.

Safety Events

- Total number of reportable events; and
- Rate per total vehicle revenue miles by mode.

System Reliability

- Mean distance between major mechanical failures by mode.

Additional Information

The City's draft PTASP (**Attachment A**) was developed through a collaborative process between staff from PTD and the T2050 project management consultant (PMC) team. The safety plan follows the federally mandated processes and procedures, including Safety Management System (SMS) principles and methods.

In addition, the City of Phoenix worked with the three service providers it contracts with to operate and maintain the City's bus and paratransit services. As a result, each contractor has also developed their respective safety plans unique to their operations, facilities, and workforces. Under the new FTA rule, the Public Transit Department is responsible for overseeing the safety of its transit system, including the oversight of the three service providers under contract with the Department to provide bus and paratransit services.

The Maricopa Association of Governments (MAG) coordinates and provides guidance to the regional transit agencies while the Arizona Department of Transportation (ADOT) provides assistance to transit agencies across the state. The City's regional partners, the Regional Public Transportation Authority (RPTA), Valley Metro Rail (VMR), Scottsdale, Glendale and Peoria, also fall under the new FTA rule and have created PTASPs specific to their transit operations.

Per federal requirements, the PTASP must be approved by the city of Phoenix City Council. Once implemented, the plan will be reviewed annually. The FTA is then requiring each transit system to annually self-certify that they have PTASPs that meet the requirements of the applicable rule; the FTA also intends to use its triennial oversight review program to assess compliance with the requirements of the rule.

Concurrence/Previous Council Action

This item was approved at the Citizens Transportation Commission meeting on Oct. 22, 2020, by a vote of 10-0.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Public Transit Department.



PUBLIC TRANSPORTATION AGENCY SAFETY PLAN

City of Phoenix Public Transit Department

December 2020





City of Phoenix

Public Transportation Agency Safety Plan Executive Summary

The City of Phoenix Public Transit Department (PTD) has prepared the Public Transportation Agency Safety Plan (PTASP, or Plan) to comply with the Federal Transportation Administration's (FTA) PTASP final rule 49 Code of Federal Regulations (CFR) Part 673, published on July 19, 2018. The rule requires public transportation system operators receiving federal Section 5307 funds to develop safety plans with processes and procedures that implement safety management systems (SMS) principles and methods. The SMS includes the PTASP's Safety Management Policy Statement, Safety Risk Management, Safety Assurance and Safety Promotion policies and procedures that encompass a top-down and data-driven approach to safety risk management and ensuring the effectiveness of safety risk mitigation.

Phoenix Transit Operations

PTD operates fixed local bus service, neighborhood bus circulators, commuter bus service, and paratransit services in an area of approximately 518 square miles, with a population of nearly 1.8 million. Transit services are operated in partnership with three contractors (Contractors): First Transit Inc., Transdev Services Inc., and MV Transportation Inc. Day-to-day bus operations and maintenance originate with each contractor, and PTD works with each contractor individually to ensure an effective safety program for the entire Phoenix-operated transit system.



Developed a system-specific safety plan for *motor bus system*.



Developed a system-specific safety plan for *motor bus system*.



Developed a system-specific safety plan for *demand response system*.

Safety Plan Regulatory Background

On July 19, 2019, the FTA PTASP Final Rule (49 CFR Part 673.11(a)(3)) became effective. FTA established the PTASP compliance date to be July 20, 2020 and extended it to December 31, 2020.

PTASP Elements



Safety Management Policy

A documented commitment to safety that defines safety objectives, as well as the accountabilities and responsibilities of employees in regard to safety.



Safety Assurance

A federally mandated process for safety performance monitoring and measurement. As a large transit provider, it is required to develop processes that address management of change and promote continuous improvement.



Safety Risk Management

An established and documented process for identifying, analyzing, assessing, and mitigating safety risks and hazards.



Safety Promotion

A process for safety training and communication.



Key Performance Indicators

Established safety performance targets, including the process and timeline for conducting an annual review and update.

Regional Relationships

PTD is responsible for overseeing the city's transit program and, at the same time, serves as the designated recipient for federal funding under FTA's Section 5307, 5309, 5310, 5316, 5317, 5337 and 5339 programs in the Phoenix-Mesa Urbanized Area. This includes the cities of Phoenix, Tempe, Mesa, Scottsdale, Glendale, Avondale, Fountain Hills, Peoria, Paradise Valley, Goodyear, Litchfield Park, Surprise, Tolleson, Youngtown and areas of Maricopa County.

In addition to managing FTA grant subrecipients, PTD is responsible for ensuring compliance with federal rules and guidelines for itself and the region's subrecipients. Each subrecipient enters into a Grant Pass-Through Agreement with PTD for the receipt of FTA funds.

PTD provides FTA funding for two transit agencies as subrecipients: the Regional Public Transportation Authority (RPTA) and Valley Metro Rail, Inc. (VMR). RPTA is a public agency, duly organized under the laws of the State of Arizona to operate regional bus service and is overseen by a board of its members' elected officials. Membership is open to all municipalities in Maricopa County and to the county government. VMR is a non-profit, public corporation that is responsible for the design, construction and operation of the 26-mile light rail system and future extensions. In addition, Scottsdale, Peoria, and Glendale provide local transit service within their jurisdictions, all as small transit agencies as defined in the PTASP final rule.

The Arizona Department of Transportation (ADOT) serves as the State Safety Oversight Agency for PTD and the Maricopa Association of Governments (MAG) serves the metropolitan Phoenix area as the regional Metropolitan Planning Organization for the agencies within Maricopa County.

Plan Development

PTD requires transit system Contractors to develop and implement safety plans unique to each contractor's system and scope of operation. In addition, PTD coordinated with MAG to develop regional transit system performance targets in the PTASP.

Certification and Implementation

The Phoenix City Council adopted and certified the PTASP. The PTASP was shared with ADOT and MAG and implemented by PTD and Contractors.

Roles Defined in the PTASP



Accountable Executive

An individual who has signing authority for the Plan. Examples of an accountable executive may include a city manager or department director.



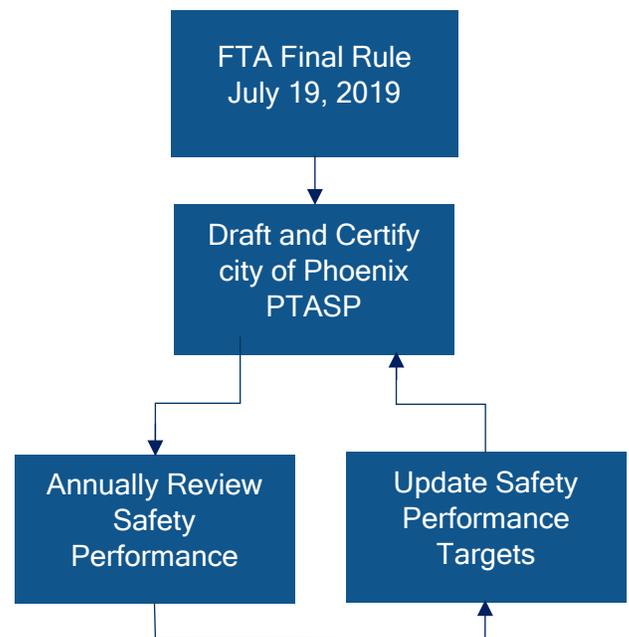
Board of Directors

A board that must approve the Plan. In Phoenix, the City Council is the equivalent authority to the board of directors.



Chief Safety Officer

An individual who is responsible for safety within the transit agency and usually reports directly to the agency's chief executive officer or the equivalent position.



This is the PTASP life cycle from the inception of FTA's mandate to the Plan's annual maintenance and certification.

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Glossary of Terms

49 CFR Part 673: The final rule for the Public Transportation Agency Safety Plan as authorized by the Moving Ahead for Progress in the 21st Century Act (MAP-21). This final rule requires states and certain operators of public transportation systems that receive federal financial assistance under 49 U.S.C. Chapter 53 to develop Public Transportation Agency Safety Plans.

Accident: An event that involves a loss of life, a serious injury to a person, a collision of transit vehicles, an evacuation for life safety reasons or any derailment of a transit vehicle, at any location, at any time, whatever the cause.

Accountable Executive: Typically, the highest executive in the agency. A single, identifiable person who has ultimate responsibility for carrying out the safety management system of a public transportation agency, and control or direction over the human and capital resources needed to develop and maintain the agency's Public Transportation Agency Safety Plan, in accordance with 49 U.S.C. 5329(d), and the agency's Transit Asset Management Plan in accordance with 49 U.S.C. 5326.

Chief Safety Officer: An adequately trained individual who has responsibility for safety and reports directly to a transit department's chief executive officer, general manager, president, or equivalent officer. A Chief Safety Officer may not serve in other operational or maintenance capacity, unless employed by a department that is either a small public transportation provider, or a public transportation provider that does not operate a rail fixed guideway public transportation system.

Critical Incident: An occurrence, natural or human-caused, that requires a response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, civil unrest, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, tsunamis, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response.

Departmental Leadership and Executive Management: Members of an agency who have authorities or responsibilities for day-to-day implementation and operation of an agency's safety management system.

Designated Recipient: An entity that has been designated by the state governor or his/her designee to receive and/or sub-allocate FTA funding.

Equivalent Authority: An entity that carries out duties similar to that of a Board of Directors, for a recipient or subrecipient of FTA funds under 49 U.S.C. Chapter 53, with sufficient authority to review and approve a recipient or subrecipient's Public Transportation Agency Safety Plan.

Event: An accident, incident, or occurrence.

Grant Pass-Through Agreement: A non-federal entity that provides a subaward to a subrecipient to carry out part of a federal program.

Hazard: Any real or potential condition that can cause injury, illness, or death; damage to or loss of the facilities, equipment, rolling stock or infrastructure of a public transportation system; or harm to the environment.

Incident: An event that involves personal injury that is not a serious injury; one or more injuries requiring medical transport; or damage to facilities, equipment, rolling stock or infrastructure that disrupts the operations of a transit agency.

Investigation: Process of determining the causal and contributing factors of an accident, incident or hazard for the purpose of preventing recurrence and mitigating risk.

Key Staff: A group of staff and their direct reporting personnel that support the Accountable Executive, Chief Safety Officer or Safety Management System Executive in developing, implementing, and operating the department's safety management system.

Major Mechanical Failure: Failure caused by vehicle malfunction or subpar vehicle condition that requires that the vehicle be pulled out of service.

National Public Transportation Safety Plan: A plan to improve the safety of all public transportation systems that receive federal financial assistance under 49 U.S.C. Chapter 53.

Occurrence: An event without any personal injury in which damage to facilities, equipment, rolling stock or infrastructure does not disrupt the operations of a transit agency/department.

Operator: Provider of public transportation as defined under 49 U.S.C. 5302(14).

Passenger: A person, other than an operator, who is boarding onto, riding on, or alighting from a vehicle on a public transportation system for the purpose of travel.

Performance Measure: An expression based on a quantifiable indicator of performance or condition that is used to establish targets and to assess progress toward meeting the established targets.

Performance Target: A quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by FTA.

Potential Hazard: Any possible future condition that may cause injury, illness, or death; damage to or loss of the facilities, equipment, rolling stock or infrastructure of a public transportation system; or harm to the environment.

Preventive Maintenance: Regular, scheduled and/or recurring maintenance of assets (equipment and facilities) as required by the manufacturer's or vendor's requirements, typically for the purpose of maintaining assets in satisfactory operating condition. Preventive maintenance is conducted by providing systematic inspection, detection, and correction of anticipated failures either before they occur or before they develop into major defects. Preventive maintenance is maintenance, including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring. The primary goal of preventive maintenance is to avoid or mitigate the consequences of equipment failure.

Public Transportation Agency Safety Plan: The documented comprehensive agency safety plan for a transit agency that is required by 49 U.S.C. 5329.

Rail Fixed Guideway Public Transportation System: Any fixed guideway system that uses rail, operates for public transportation, and serves within the jurisdiction of a state (and is not subject to the jurisdiction of the Federal Railroad Administration), or any such system undergoing engineering or construction. Rail fixed guideway public transportation systems include rapid rail; heavy rail; light rail; monorail; trolley; and inclined plane, funicular, and automated guideway.

Reportable Event: A safety or security event occurring on transit right-of-way or infrastructure, at a transit revenue facility, at a maintenance facility or rail yard, during a transit related maintenance activity or involving a transit revenue vehicle. The following types of events are excluded from reporting requirements: events that occur off transit property where affected persons, vehicles, or objects come to

rest on transit property after the event; OSHA events in administrative buildings; deaths that are a result of illness or other natural causes; other events occurring at bus stops or shelters that are not on transit-controlled property; collisions that occur while travelling to or from a transit-related maintenance activity; and collisions involving a supervisor car or other transit service vehicle operating on public roads.

Risk: The composite of predicted severity and likelihood of the potential consequences of hazards.

Risk Mitigation: A method or methods to eliminate or reduce the effects of hazards.

Root Cause Analysis: A systematic process for identifying root causes of safety events and an approach for responding to them.

Safety Assurance: The process within a transit agency's Safety Management System that functions to ensure the implementation and effectiveness of safety risk mitigation and the satisfaction of safety objectives through the collection, analysis, and assessment of information.

Safety Management Policy: A transit agency's documented commitment to safety, which defines the transit agency's safety objectives and the transit agency employees' accountabilities and responsibilities in regard to safety.

Safety Management System: The formal, top-down, data-driven, organization-wide approach to managing safety risk and ensuring the effectiveness of a transit agency's safety risk mitigation. Safety management system includes systematic procedures, practices, and policies for managing risks and hazards.

Safety Objective: A general goal or desired outcome related to safety.

Safety Performance: An organization's safety effectiveness and efficiency, as defined by safety performance indicators and targets, measured against the organization's safety objectives.

Safety Performance Indicator: A data-driven, quantifiable parameter used for monitoring and assessing safety performance.

Safety Performance Measure: An expression based on a quantifiable indicator or condition of performance that is used to establish targets and to assess progress toward meeting the established targets.

Safety Performance Monitoring: Activities aimed at the quantification of an organization's safety effectiveness and efficiency during service delivery operations, through a combination of safety performance indicators and safety performance targets.

Safety Performance Target: A quantifiable level or condition of performance, expressed as a value for a given performance measure, achieved over a specified timeframe related to safety management activities.

Safety Promotion: A combination of training and communication of safety information to support safety management system as applied to the transit agency's public transportation system.

Safety Risk: Assessed probability and severity of the potential consequence(s) of a hazard, using as reference the worst foreseeable, but credible, outcome.

Safety Risk Assessment: Formal activity whereby a transit agency determines safety risk management priorities by establishing the significance or value of the safety risks.

Safety Risk Management: A process within a transit agency's safety plan for identifying hazards, assessing the hazards, and mitigating safety risk.

Safety Risk Mitigation: Activities whereby a public transportation agency controls the probability or severity of the potential consequences of hazards.

Safety Hazard Risk Probability: Likelihood that a consequence might occur, taking as reference the worst foreseeable, but credible, condition.

Safety Hazard Risk Severity: Anticipated effects of a consequence, should hazards materialize, taking as reference the worst foreseeable, but credible, condition.

Serious Injury: Any injury that:

- Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received
- Results in a fracture of any bone (except simple fractures of fingers, toes or nose)
- Causes severe hemorrhages, or nerve, muscle, or tendon damage
- Involves any internal organ
- Involves second- or third-degree burns, or any burns affecting more than 5% of the body surface

State: A state of the United States, the District of Columbia or the Territories of Puerto Rico, the Northern Mariana Islands, Guam, American Samoa, and the Virgin Islands.

State of Good Repair: Condition in which a capital asset can operate at a full level of performance.

State Safety Oversight Agency: An agency established by a state that meets the requirements and performs the functions specified by 49 U.S.C. 5329(e) and the regulations set forth in 49 CFR Part 674.

Transit Agency: An operator of a public transportation system.

Transit Asset Management Plan: Strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating and replacing transit capital assets to manage their performance, risks and costs over their life cycles for the purpose of providing safe, cost-effective and reliable public transportation, as required by 49 U.S.C. 5326 and 49 CFR 625.

Vehicle Revenue Mile: The miles that vehicles are scheduled to or travel while in revenue service. Vehicle revenue miles include layover/recovery time and exclude deadhead, operator training, vehicle maintenance testing and school bus and charter services.

Acronyms

ADOT	Arizona Department of Transportation
CFR	Code of Federal Regulations
CSO	Chief Safety Officer
CTC	Citizens Transportation Commission
DASH	Downtown Area Shuttle
FTA	Federal Transit Administration
MAG	Maricopa Association of Governments
NSP	National Safety Plan
NTD	National Transit Database
PTASP	Public Transportation Agency Safety Plan
PTD	Public Transit Department
RPTA	Regional Public Transportation Authority
SMS	Safety Management Systems
TI&I	Transportation, Infrastructure and Innovation Subcommittee
U.S.C.	United States Code
VMR	Valley Metro Rail

1. Plan Adoption and Certification

1.1 Plan Adoption

This Public Transportation Agency Safety Plan (PTASP) is approved by the Phoenix City Council and is hereby adopted, certified as compliant and signed by the Accountable Executive and the Chief Safety Officer:

_____ Jesus Sapien Accountable Executive	_____ Date	_____ Lars Jacoby Chief Safety Officer	_____ Date
--	---------------	--	---------------

1.1 Certification of Compliance

The city of Phoenix certified on **TBD, 2020**, that this PTASP is in full compliance with 49 Code of Federal Regulations (CFR) Part 673, as required by 49 U.S.C. 5329, and is adopted and implemented by the city of Phoenix as evidenced by the Plan adoption signature and necessary Phoenix City Council approvals in **Appendix A** of this Plan.

DRAFT

2. Introduction

This PTASP represents PTD's relationship with its bus transit service contractors and includes safety management as it also relates to PTD employees, particularly those employees in safety-sensitive positions. As such, the preponderance of PTD transit budget is contracted service (89% of PTD's budget is contracted services). No city employees are bus operators; the city does not provide maintenance, fueling or direct management of the contracted bus service. Where applicable, each section of this Plan includes the safety management processes and procedures of PTD and/or the safety management processes and procedures of the contractors. Contractors' abbreviated safety plans are included in Appendices B through D. Their full safety plans are referenced in each abbreviated plan and are available upon request.

The City of Phoenix Public Transit Department (PTD) has prepared the Public Transportation Agency Safety Plan (PTASP) to comply with the Federal Transportation Administration's (FTA) PTASP final rule 49 CFR Part 673. The rule requires public transportation system operators receiving federal Section 5307 funds to develop safety plans with processes and procedures that implement safety management system (SMS) principles and methods. The SMS includes the PTASP's Safety Management Policy Statement, Safety Risk Management, Safety Assurance and Safety Promotion policies and procedures that encompass a top-down and data-driven approach to safety risk management and ensuring the effectiveness of safety risk mitigation.

PTD operates fixed local bus service, neighborhood bus circulators, commuter bus service, and paratransit services in partnership with three Contractors: First Transit, Transdev and MV Transportation, which are all responsible for the day-to-day operations and maintenance, although PTD works individually with each contractor to ensure an effective safety program for the city's transit system.

PTD is also part of an overall regional transit system in partnership with the Regional Public Transportation Authority (RPTA) and Valley Metro Rail (VMR). The City of Phoenix is the designated recipient of FTA funding for the Phoenix-Mesa Urbanized Area, and distributes funds to subrecipients including RPTA, VMR, Tempe, Mesa, Scottsdale, Glendale, Avondale, Fountain Hills, Peoria, Paradise Valley, Goodyear, Litchfield Park, Surprise, Tolleson, Youngtown, and unincorporated areas of Maricopa County. In addition, Glendale, Peoria, and Scottsdale operate bus transit service in their jurisdictions, and PTASP regulations also apply to those transit agencies. This complex regional relationship is illustrated on **Figure 1**.

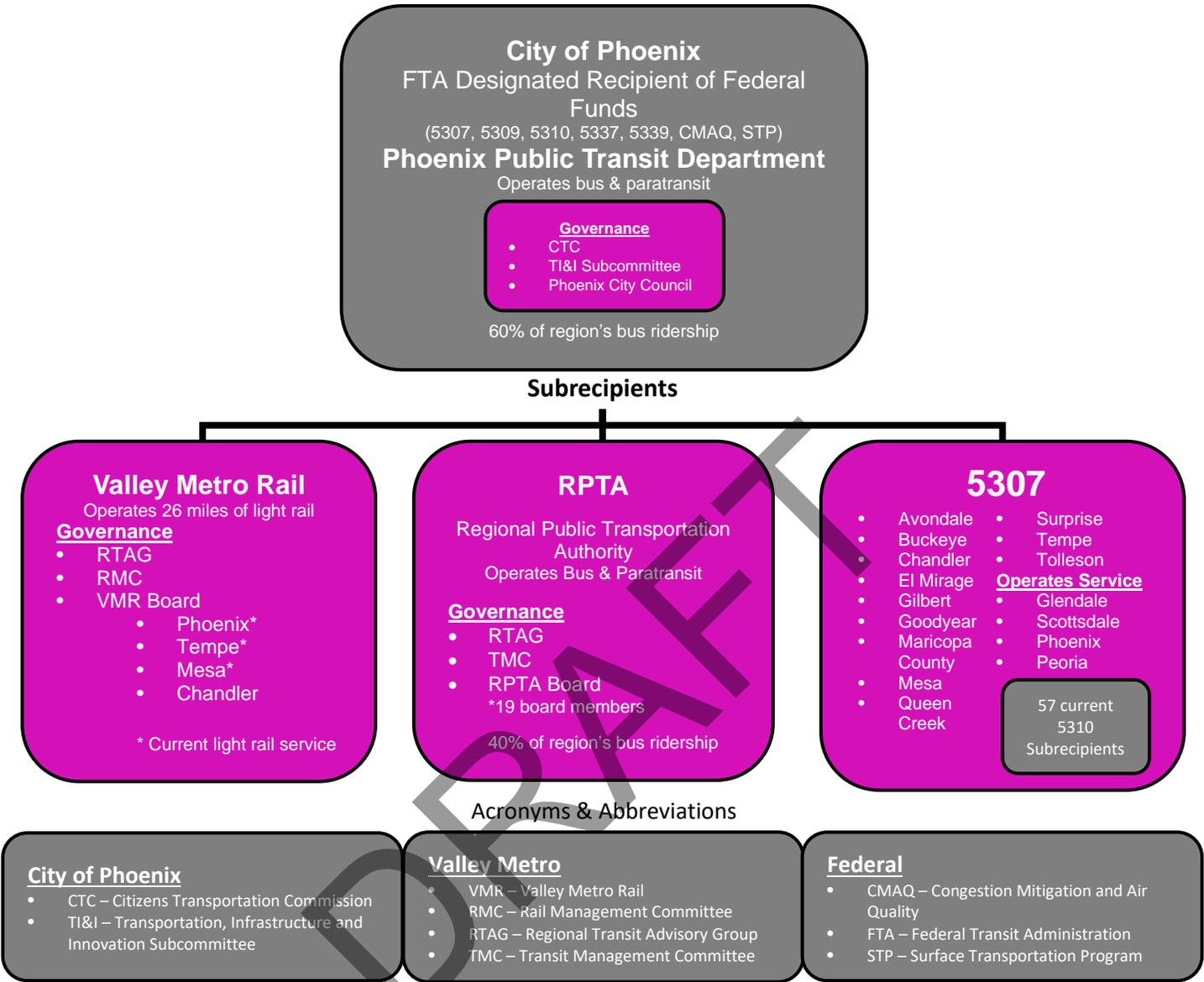


Figure 1. Public Transit Department Regional Chart

3. Safety Plan Regulatory Background

The FTA PTASP Final Rule (49 CFR Part 673.11(a)(3)) became effective July 19, 2019. The rule requires public transportation system operators receiving federal Section 5307 funds to develop safety plans with processes and procedures for implementing the SMS. The PTASP contains the following four SMS elements:

- **Safety Management Policy:** A documented commitment to safety that defines PTD's objectives, as well as the accountabilities and responsibilities of its employees in regard to safety.
- **Safety Risk Management:** An established and documented process for identifying, analyzing, assessing, and mitigating safety risks and hazards.
- **Safety Assurance:** A federally mandated process for safety performance monitoring and measurement. PTD is a large transit provider and therefore required to develop management of change and continuous improvement processes.
- **Safety Promotion:** A process for safety training and communication.

The PTASP also contains established safety performance targets for contracted service operators, including the process and timeline for conducting an annual PTASP review and update.

3.1 Plan Development

PTD requires Contractors to develop and implement safety plans unique to each Contractor's system and scope of operation. The PTASP rule is also applicable to the PTD Contractors.

PTD coordinated with the Maricopa Association of Governments (MAG) to collaborate on regional transit system performance targets in the PTASP.

3.2 Certification and Implementation

The Phoenix City Council adopted and certified the PTASP, which was then shared with the Arizona Department of Transportation (ADOT) and implemented by PTD staff and Contractors.

4. Transit Agency Information

4.1 General Information

General Agency Information

City of Phoenix
Public Transit Department
302 North 1st Avenue, Suite 900
Phoenix, Arizona 85003
Number of Employees: 115

Contractor Information (as of this writing)

Transdev

Number of Employees: 952
Buses (40 and 60 foot): 330
Circulator Cutaways: 10
PTD Fiscal Year Revenue Miles:
2018 - 14,924,290
2019 - 15,191,569
2020 - 13,878,353

First Transit

Number of Employees: 510
Buses (40 and 60 feet): 159
Circulator Cutaways: 6
PTD Fiscal Year Revenue Miles:
2018 - 6,453,377
2019 - 6,274,901
2020 - 6,810,813

MV Transportation

Number of Employees: 249
Dial-A-Ride Cutaways: 123
PTD Fiscal Year Revenue Miles:
2018 - 322,914
2019 - 331,731
2020 - 288,763

Note: PTD's fiscal year is July 1 through June 30, each year.

Accountable Executive

Jesús Sapien
Public Transit Director

Chief Safety Officer

Lars Jacoby
Management Assistant II, Director's Office

Mode Applicability

Operated: Bus and Paratransit
Plan Applicability: Bus and Paratransit

Types of Funding

Section 5307

4.2 Agency Description

The city of Phoenix purchased the Phoenix Transit System from a private company in 1971, and since then is responsible for overseeing the city's transit programs and serves as the designated recipient for federal funding under FTA's Section 5307, 5309, 5310, 5316, 5317, 5337 and 5339 programs in the Phoenix-Mesa Urbanized Area. PTD's service area is 518 square miles, consisting of a population of approximately 1.7 million people.

In addition to managing FTA grants subrecipients, PTD is responsible for ensuring compliance with federal rules and guidelines for itself and the region's subrecipients. Each subrecipient signs a Grant Pass Through Agreement with PTD for the receipt of FTA funds.

PTD contracts the operation of the city's transit network of 38 local fixed routes, four circulator routes and six RAPID (commuter bus) routes, as well as Phoenix Dial-A-Ride, the city's paratransit service.

CITY OF PHOENIX CONTRACTORS

First Transit operates 11 local and one circulator routes from the city's West Transit Facility. For additional information, see the First Transit Abbreviated Safety Plan (**Appendix B**).

Transdev operates 27 local, six RAPID, and three circulator routes. Transdev operates from the city's North and South Transit Facilities. For additional information on Transdev, see the Transdev Abbreviated Safety Plan (**Appendix C**).

MV Transportation operates the Phoenix Dial-A-Ride paratransit service for persons with disabilities certified under the Americans with Disabilities Act of 1990 guidelines. The company operates from an operator-leased facility.

To supplement Dial-A-Ride, PTD's Alternative Transportation Programs are also provided by MV Transportation for transportation assistance via taxi vouchers and to operate a shuttle service for seniors and persons with disabilities or are receiving dialysis treatment. For additional information on MV Transportation, see the MV Transportation Abbreviated Safety Plan (**Appendix D**).

OTHER AGENCIES

PTD provides FTA funding for two transit agencies and three small transit agencies as subrecipients: RPTA, VMR, city of Scottsdale, city of Glendale, and city of Peoria respectively (see **Figure 1**). Each small transit agency maintains a standalone PTASP for their respective programs.

RPTA is overseen by a board of elected officials from member agencies, including Avondale, Buckeye, Chandler, El Mirage, Gilbert, Glendale, Goodyear, Maricopa County, Mesa, Peoria, Phoenix, Scottsdale, Surprise, Tempe, Tolleson and Wickenburg. RPTA is responsible for transit marketing and financial management of the transit component of the Maricopa County regional transportation program. RPTA also contracts for the operation of the local and commuter bus and paratransit services it operates outside of Phoenix.

VMR is a non-profit, public corporation that is responsible for the design, construction and operation of the 26-mile light rail system and future extensions. The board includes representatives from the member cities of Chandler, Mesa, Phoenix and Tempe. The light rail system currently serves Phoenix, Tempe and Mesa.

ADOT is the state's transportation agency responsible for planning, building and operating the highway system, as well as building and maintaining bridges and the operation of the Grand Canyon Airport. ADOT serves as the State Safety Oversight Agency for PTD.

MAG serves the metropolitan Phoenix area as the regional Metropolitan Planning Organization for Maricopa County and its 27 member cities and agencies.

DRAFT

5. Safety Plan Development and Maintenance

5.1 PTASP Development

The PTASP was written and reviewed by PTD subject matter experts and a third-party consultant to ensure it meets current (2020) safety industry standards and follows 49 CFR Part 673.

Through its written agreements with multiple service providers, PTD requires Contractors to develop and implement safety plans unique to their respective scope of operations, while providing oversight and input to ensure compliance. Throughout each process, each Contractor develops and implements safety plans that address safety needs.

As shown in **Figure 1**, the PTASP went through a three-step formal approval process:

1. Phoenix Citizens Transportation Commission (CTC) – a 15-member committee appointed by the Phoenix Mayor and City Council to provide oversight of the Phoenix Transportation plan (T2050).
2. Transportation, Infrastructure and Innovation (TI&I) Subcommittee – a four-member subcommittee of the Phoenix City Council that provides policy guidance on a range of issues, including transit.
3. Phoenix City Council – Comprised of nine members (the Mayor and eight Council members), who provide approval and direction on policies and initiatives citywide.

The Phoenix City Council adopted the PTASP on XXX., XX, 2020.

5.2 Annual Internal Review and Update Process

5.2.1 PTD

PTD management and staff will review the PTASP on an annual basis prior to December 31st of each year beginning in 2021 and make updates to the plan as necessary. Review of the PTASP along with any subsequent updates, addendums, adoption, and distribution activities will be documented in the PTASP Activity Log (**Appendix E**) and tracked through the date and version provided in the header on the individual pages. Approval of each updated Plan will be completed by the Accountable Executive, the Chief Safety Officer (CSO) and the Phoenix City Council; and self-certification will be completed annually by the Accountable Executive and CSO in compliance with 49 CFR Part 673.13.

5.2.2 Contractors

At a minimum, Contractors are required to update their plans annually. Each Contractor has developed their own review process and will submit updates to PTD.

For more details on each contractor's *safety plan review and update process*, see:

- **First Transit – Appendix B.2** (Plan Development, Approvals, and Updates)
- **Transdev – Appendix C.5.1.3** (Agency Safety Plan Review Process)
- **MV Transportation – Appendix D.2** (Plan Development, Approvals, and Updates)

5.3 PTASP Audit Process

Following PTD's annual review and update process, PTD will consult with third-party subject matter experts for independent auditing of the PTD PTASP. Reviews of its three service contractors will occur on

a biennial basis. The auditor will ensure the plan's compliance with 49 CFR Part 673 and any accompanying mandates.

In addition, the VMR and RPTA PTASPs will be independently audited annually, while the Glendale, Scottsdale, and Peoria PTASPs will be audited triennially.

5.4 PTASP Documentation and Recordkeeping

5.4.1 PTD

PTD will maintain the documents set forth in the PTASP, including those documents related to implementation of the SMS (in tandem with operations contractors) and results from SMS processes and activities.

PTD will also maintain documents that are included in whole, or by reference, that describe the programs, policies, and procedures that PTD uses to carry out the PTASP and all iterations of those documents. These documents will be made available upon request to FTA or other federal entity, or ADOT. PTD will, at a minimum, retain these documents as outlined in the federal and local records retention policies and schedules or for three years.

5.4.2 Contractors

Each Contractor maintains individual policies on safety-related documentation and recordkeeping for no less than three years. All Contractors are committed to maintaining documents and records related to their plans, including the safety plan itself and other associated safety records and documentation. For more information about each Contractor's *policy on documentation and recordkeeping*, see:

- **First Transit – Appendix B.4** (Annual Review and Update of the Public Transportation Safety Plan)
- **Transdev – Appendix C.0 - Transdev** (Safety Plan Documentation and Recordkeeping)
- **MV Transportation – Appendix D.4** (Annual Review and Update of the Public Transportation Safety Plan)

6. Safety Performance Targets

The PTASP Final Rule requires public transportation providers to develop a PTASP that includes safety performance targets based on the seven safety performance measures established under the FTA's National Public Transportation Safety Plan (NSP). The safety performance measures outlined in the NSP, which are based on data currently being submitted to the National Transit Database (NTD), are developed to ensure applicability to all modes of public transportation and are based on data submitted using the NTD and are each listed as categories in **Table 1** and **Table 2**. The NTD is maintained by FTA and serves as a reporting system for public transit information tracking, such as agency funding sources, inventories of assets, safety reports and measures of transit service. The safety performance measures included in the NSP are fatalities, injuries, safety events and system reliability.

Given that PTD does not directly operate the Phoenix transit system or other operations in the region, the safety performance baselines and targets presented in the PTASP are established and directly monitored by Contractors across the region.

Each Contractor baseline was established as the actual safety performance value recorded at the end of the federal fiscal year 2019, except for 'System Reliability, which is a contractual performance target. All safety performance metrics use the federal fiscal calendar, which begins October 1 and ends on September 30.

In future versions of the PTASP, a record of prior safety performance baselines and targets will be found in the PTASP Performance Target Log (**Appendix F**).

Table 1 and **Table 2** present the safety performance baselines and targets for bus service and paratransit service, respectively.

Table 1. Bus Service Safety Performance Baseline and Targets

Category	First Transit	Transdev
Fatalities: total number of reportable fatalities	Baseline: 0 Target: 0	Baseline: 0 Target: 0
Fatalities: reportable rate per total vehicle revenue miles by mode	Baseline: 0/100,000 Target: 0/100,000	Baseline: 0/100,000 Target: 0/100,000
Injuries: total number of reportable injuries	Baseline: 31 Target: 28	Baseline: 7 Target: 5
Injuries: reportable rate per total vehicle revenue miles by mode	Baseline: 0.44/100,000 Target: 0.39/100,000	Baseline: 0.05/100,000 Target: 0.03/100,000
Safety Events: total number of reportable events (reportable events are defined in the NTD)	Baseline: 55 Target: 42	Baseline: 39 Target: 34

Category	First Transit	Transdev
Safety Events: reportable rate per total vehicle revenue miles by mode	Baseline: 0.66/100,000 Target: 0.49/100,000	Baseline: 0.26/100,000 Target: 0.22/100,000
System Reliability: mean distance between major mechanical failures by mode	Baseline: 11,000 miles Target: 12,000 miles	Baseline: 11,000 miles Target: 17,000 miles

Table 2. Paratransit Service Safety Performance Baseline and Targets

Category	MV Transportation (Operates Paratransit Service)
Fatalities: total number of reportable fatalities	Baseline: 0 Target: 0
Fatalities: reportable rate per total vehicle revenue miles by mode	Baseline: 0 Target: 0/100,000
Injuries: total number of reportable injuries)	Baseline: 36 Target: 0
Injuries: reportable rate per total vehicle revenue miles by mode	Baseline: 0.87/100,000 Target: 0/100,000
Safety Events: total number of reportable events	Baseline: 176 Target: 140
Safety Events: reportable rate per total vehicle revenue miles by mode	Baseline: 4.26/100,000 Target: 3.28/100,000
System Reliability: mean distance between major mechanical failures by mode	Baseline: 11,000 miles Target: 30,000 miles

Table 1 and Table 2 definitions:

- **Fatality:** A death or suicide confirmed within 30 days of a reported event. Does not include deaths in or on transit property that are a result of illness or other natural causes.
- **Injury:** Any damage or harm to persons as a result of an event that requires immediate medical attention away from the scene.
- **Safety Event:** A collision, derailment, fire, hazardous material spill, act of nature (Act of God), evacuation or OSONOC (other safety occurrence not otherwise classified) occurring on transit right-of-way, in a transit revenue facility, in a transit maintenance facility, or involving a transit revenue vehicle that meets the established NTD reportable thresholds.
- **System Reliability:** The rate of vehicle failures in service, defined as mean distance between major mechanical failures.

7. Safety Management Systems

7.1 Safety Management Policy

7.1.1 PTD

The city of Phoenix is committed to safety management as a systematic, comprehensive, and ongoing approach to identifying hazards and risks associated with transit system operations, facilities and related preventive maintenance activities.

PTD adopted an SMS framework as an element of its responsibility by establishing:

- A safety policy
- Identifying hazards and controlling risks
- Goal setting, planning, and measuring performance.

PTD follows safety management policies as directed in the city of Phoenix's safety program outlined in Administrative Regulation 2.31 (AR 2.31).

See the City of Phoenix Administrative Regulations (**Appendix G.4**).

Contractors

Each Contractor has adopted their own safety management policies that are compliant with 49 CFR Part 673 and are complementary to PTD's policy.

For specific details regarding each contractor's *safety management policy*, see:

- **First Transit – Appendix B.4** (Safety Management Policy)
- **Transdev – Appendix C.1** (Safety Policy Statement)
- **MV Transportation – Appendix D.4** (Safety Management Policy)

7.2 State and Metropolitan Planning Organization Coordination

The city of Phoenix will provide annual PTASP updates to ADOT and MAG, as well as provide ongoing updates to key safety performance targets.

7.3 Safety Goals

To address the ongoing oversight and review required to ensure the proper implementation of this plan, the following safety goals are set:

- Establish a safety and training committee with key representatives from PTD to review policies and procedures related to the PTASP.
- Encourage and improve safety communication strategies and awareness with both internal and external stakeholders.
- Identify roles and responsibilities for the transit system's safety program and develop a training curriculum.

7.4 Safety Management Policy Communication

7.4.1 PTD

Methods used to communicate the safety management policy include the following:

- Safety presentations at quarterly PTD staff meetings.
- Annual safety training with key PTD staff.
- PTASP and safety training information uploaded to PTD's employee-accessible SharePoint site.

7.4.2 Contractors

PTD Contractors have included a Safety Management Policy Communication section in their safety plans regarding their communications to their staff. The Contractors plan to communicate safety information to their employees by creating accessible safety reports, implementing training programs, posting information on general bulletin boards, and sending safety emails.

For more information on each Contractor's individual *policies related to safety communication*, see:

- **First Transit – Appendix B.4** (Safety Management Policy Communication)
- **Transdev – Appendix C.1.1.2** (Communication)
- **MV Transportation – Appendix D.4** (Safety Management Policy Communication)

7.5 Authorities, Roles and Responsibilities

7.5.1 PTD

The key to a successful safety plan is fostering a culture focused on safety. With this philosophy in mind, all PTD employees are responsible for implementing the safety practices and being safe every day.

Figure 2 illustrates the organizational structure for PTD's SMS. **Table 3** defines the specific responsibilities and accountabilities each role has in achieving safety targets, program oversight and implementation.

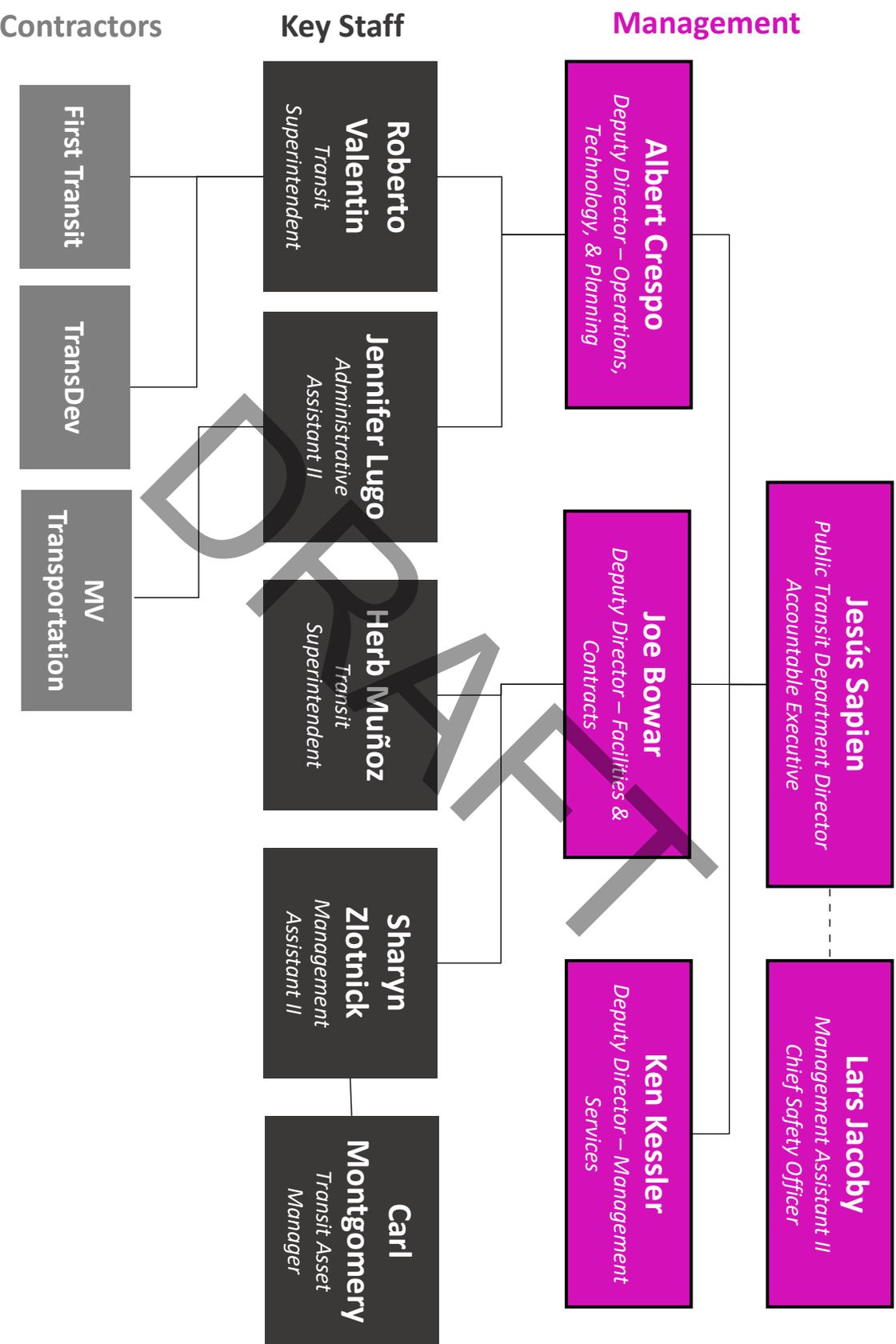


Figure 2. City of Phoenix Public Transit Department Safety Organizational Chart

Table 3. Safety Roles and Responsibilities

Role	Name of Staff Member	Safety Responsibilities
Public Transit Department Director Accountable Executive Management	Jesús Sapien	<ul style="list-style-type: none"> • Ensure compliance with FTA’s safety policies. • Oversee the Plan for PTD. • Control and direct staff and capital resources needed to create and maintain the PTASP. • Create a safety-oriented culture across the department. • Work with the CSO to monitor safety performance. • Ensure that PTD’s Contractors are working toward achieving the safety performance targets. • Periodically review customer comments related to safety concerns.
Management Assistant II - Director’s Office Chief Safety Officer	Lars Jacoby	<p><i>Chief Safety Officer</i></p> <ul style="list-style-type: none"> • Promote safety awareness throughout the organization. • Ensure that safety documentation and training are current. • Communicate changes in safety processes to all applicable personnel. • Monitor the effectiveness of corrective actions. • Provide periodic reports on safety performance. • Render independent advice to managers and other personnel on safety-related matters as needed. • Ensure that safety is a high priority throughout the organization. • Review customer comments related to safety concerns. • Work with other divisions within PTD to implement safety practices. • Promote a safety culture across the department and to contractors. • Provide oversight of contractor safety plans through periodic reviews and audits. • Provide oversight of RPTA, VMR, Scottsdale, Glendale and Peoria safety plans through periodic reviews and formal audits.

Role	Name of Staff Member	Safety Responsibilities
Deputy Director - Facilities & Contracts Management	Joe Bowar	<p><i>Deputy Director – Facilities</i></p> <ul style="list-style-type: none"> • Ensure transit facilities are well-maintained and meet state of good repair requirements. • Implement hazard mitigation strategies related to transit infrastructure. • Collaborate with other divisions to address safety concerns related to facilities and operations. • Review customer comments related to safety concerns. • Communicate safety practices and policies to staff in the Division.
Deputy Director - Operations, Technology & Planning Management	Albert Crespo	<ul style="list-style-type: none"> • Communicate safety practices and policies to staff within the Division. • Ensure Contractor compliance with their safety plan, policies, and training requirements. • Collaborate with other divisions to address safety concerns related to operations and facilities. • Review customer comments related to safety concerns.
Deputy Director - Management Services Management	Ken Kessler	<ul style="list-style-type: none"> • Communicate safety practices and policies to staff within the Division.
Transit Superintendent (Operations, Technology & Planning) Key Staff	Roberto Valentin	<ul style="list-style-type: none"> • Supervise the contract monitoring for bus service Contractors (First Transit and Transdev). • Respond to and communicate safety concerns with bus service Contractors. • Ensure bus service Contractors implement their safety plan and related policies and training. • Track safety performance for bus Contractors. • Monitor the quality of maintenance and repairs performed by Contractors on vehicles owned by PTD. • Oversee the inspection of all transit vehicles for safety and direct corrective action. • Review all customer comments related to safety concerns.

Role	Name of Staff Member	Safety Responsibilities
Administrative Assistant II (Operations, Technology & Planning) Key Staff	Jennifer Lugo	<ul style="list-style-type: none"> • Serve as the contract monitor for the paratransit service Contractor (MV Transportation). • Respond to and communicate safety concerns with paratransit service Contractor. • Ensure paratransit service Contractor implements their safety plan and related policies and training. • Track safety performance of the paratransit service Contractor. • Review all customer comments related to safety concerns.
Transit Superintendent (Facilities & Contracts) Key Staff	Herb Muñoz	<ul style="list-style-type: none"> • Oversee maintenance at all transit facilities. • Inspect transit facilities for safety issues and recommend corrective action. • Incorporate safety requirements for contractors in on-site contracted maintenance and repairs. • Review customer comments related to safety concerns at facilities.
Transit Asset Manager (Facilities & Contracts) Key Staff	Carl Montgomery	<ul style="list-style-type: none"> • Manage PTD's Transit Asset Management Plan. • Provide oversight and technical assistance to regional partners with their own Transit Asset Management Plans. • Oversee the State of Good Repair program.
Management Assistant II (Facilities & Contracts) Key Staff	Sharyn Zlotnick	<ul style="list-style-type: none"> • Support CSO in the review of regional safety plans. • Periodically review bus service Contractor safety plans to ensure they follow FTA's regulations and meet the requirements contained in their respective safety plan. • Provide written feedback on such review to the CSO and respective contract monitor. • Support the CSO in the annual PTASP update.

Role	Name of Staff Member	Safety Responsibilities
Contractors	<p>First Transit</p> <ul style="list-style-type: none"> • Paul Meredith, Senior Director of Safety • Adrian Green, Safety Manager <p>MV Transportation</p> <ul style="list-style-type: none"> • Jon Huynh, General Manager • Victoria Hensley, Safety Manager <p>Transdev</p> <ul style="list-style-type: none"> • Dave Todd, General Manager • Kathleen Webb, Director of Safety and Training 	<ul style="list-style-type: none"> • Update safety plans for compliance with federal regulations. • Update safety plans as necessary in response to safety issues and provide training to facilitate those changes to the safety plan. • Perform regular safety checks. • Implement safety policies applicable to operating and maintaining transit vehicles and maintaining a safe work environment. • Report and investigate safety hazards and safety events. • Implement and track regular safety training for employees. • Receive employee and customer comments related to safety concerns. <p>See Appendices B through D for specific safety practices of each Contractor.</p>

7.5.2 Contractors

Each of the Contractors have identified authorities, roles and responsibilities related to safety within their individual organizations. As part of their safety plans, Contractors identified a Chief Safety Officer, an Accountable Executive, as well as supporting staff. For each role, the Contractors specify the responsibilities that each person has related to safety.

For specific details on each Contractor's *authorities, roles, and responsibilities*, see:

- **First Transit – Appendix B.4** (Authorities, Accountabilities, and Responsibilities)
- **Transdev – Appendix C.2** (Safety Accountability and Responsibility)
- **MV Transportation – Appendix D.4** (Authorities, Accountabilities, and Responsibilities)

7.6 Employee Safety Reporting Program

7.6.1 PTD

Reporting safety observations and safety events is an important part of every employee's role in creating a safe environment. PTD encourages all employees to report potential hazards and any safety events that occur through the safety reporting program. The safety reporting program includes anonymous contact methods such as the city of Phoenix employee-wide integrity hotline (602-262-7555, or email hrc@phoenix.gov), in addition to the PTD employee exclusive work order hotline (602-495-7011) that provides contact information for safety observations and safety events to be communicated to appropriate PTD staff. PTD management also maintains an open-door policy allowing for prompt communication of safety concerns.

PTD utilizes the MPulse work order system to aid in communicating potential safety issues in the transit system. The MPulse program is a computerized work order maintenance management system that centralizes data, organizes maintenance data and facilitates the processes of maintenance operations. Safety issues can be entered into MPulse for mitigation and resolution. Identified PTD staff and

contractors are notified by either email, the Work Order line or in person. The issue(s) are then entered into MPulse as a request for service and tracked through closure.

MPulse tracks the operation and inventory of assets such as equipment, vehicles, machinery, and facility infrastructure. Asset data that are collected via the MPulse program are utilized to determine the transit system's state of good repair condition and potential future asset replacement needs.

For more information on the PTD safety reporting program, see Administrative Regulation 1.2 (Fraud Prevention and Reporting Policy [Integrity Line]) (**Appendix G.4**).

7.6.2 Contractors

Each Contractor has developed and documented an Employee Safety and Reporting Program as a part of their individual safety plan and maintain an open door policy for safety concerns. Contractors additionally utilize their own systems for reporting safety concerns.

For specific information on each Contractor's *employee safety reporting program*, see:

- **First Transit – Appendix B.4** (Employee Safety Reporting Program)
- **Transdev – Appendix C.5.1.8** (Employee Safety Reporting)
- **MV Transportation – Appendix D.4** (Employee Safety Reporting Program)

7.7 Administrative Regulation Reporting Policy

7.7.1 PTD

PTD is committed to providing a safe transit operating environment. To achieve this, PTD maintains unrestricted and confidential reporting of all incidents and occurrences that may compromise the safe conduct of operations. Every employee is responsible for the communication of any information that may affect the integrity of transit safety to management as outlined in AR 2.31 (**Appendix G.4**).

The department's management hold the primary responsibility for providing and maintaining a safe workplace. Any safety problems that are beyond the supervisor's control shall be reported to management immediately upon detection as outlined in AR 2.31 (**Appendix G.4**).

PTD will not retaliate or take punitive actions in any way against an employee, applicant, or former employee who, in good faith, makes a complaint, safety report or report of discrimination/harassment or participates in the investigation of such complaint or report. This policy shall not apply to information that involves an illegal act, or a deliberate or willful disregard of promulgated regulations or procedures.

The PTD method of collecting, recording, and disseminating information obtained from transit safety reports is intended to protect, to the extent permissible by law, the identity of any employee who provides transit safety information and wishes to remain anonymous.

For further information on PTD's reporting policies, refer to the City of Phoenix Administrative Regulations (**Appendix G.4**).

7.7.2 Contractors

Each Contractor has their own administrative regulation reporting policy. All Contractors strive to deliver safe transit service and to accomplish this each Contractor has developed its own system to encourage employees to report safety incidents and observations and determine the necessary actions that need to be taken following an incident.

For more details on each Contractor's *Administrative Regulation Reporting Policy*, see:

- **First Transit – Appendix B.4** (Employee Safety Reporting Program)
- **Transdev – Appendix C.5.1.8** (Employee Safety Reporting)
- **MV Transportation – Appendix D.4** (Employee Safety Reporting Program)

7.8 Safety Risk Management

The safety risk management process is an eight-step process that aims to provide a standard method for identifying, assessing, and mitigating safety hazards in the bus transit system as defined in the NSP (**Figure 3**). Descriptions of each step are detailed in the following sections. The risk management process allows for careful examination of hazards, assessment of existing mitigation sufficiency, and the determination of additional mitigation measures.

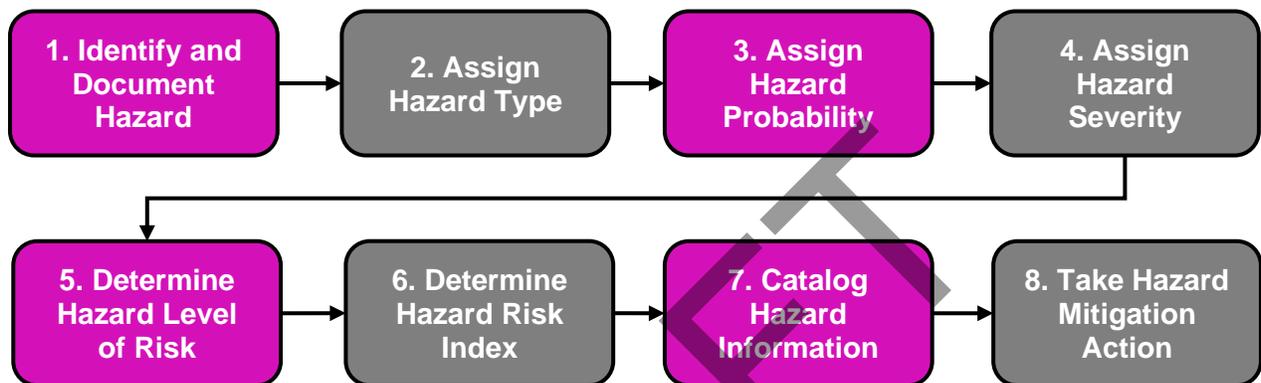


Figure 3. Safety Risk Management Eight Step Process

7.8.1 Safety Hazard Identification

7.8.1.1 *PTD*

An effective hazard identification program is fundamental to safety management.

PTD’s safety risk management process starts with an effort to proactively identify safety hazards that could result in negative safety outcomes.

The first step of the safety risk management process is visualized in the hazard identification and documentation flow chart (**Figure 4**).

First, upon receiving communication from the on-site staff of a potential hazard, the supervisor communicates the hazard to the division safety representative or the CSO for review and formal documentation.



Figure 4. Hazard Identification and Documentation (Step 1)

Hazard identification focuses on conditions that need special attention or immediate action, including new procedures or training to resolve the condition. PTD uses a variety of mechanisms for identifying and documenting hazards, namely:

- Through training and reporting procedures, PTD ensures employees can identify hazards and that each employee understands the responsibility to report any safety hazards to the employee's supervisor or the safety representative. Continued refresher training helps employees improve skills to identify hazards as outlined in AR 2.31 (**Appendix G.4**).

This regulation outlines the responsibility of supervisors to keep informed on safety subjects through training courses, and employees to attend all job required safety training and refresher courses as needed. The regulation also sets operational procedures to ensure employees receive and document the appropriate safety and health training.

- In an effort to identify potential hazard recurrence, PTD uses incident reports and records to determine specific areas of training, whether individually or for a group or common classification, that need to be covered with employees.
- Incident reports are analyzed by safety staff to identify recurring patterns, as well as known patterns or themes that would help identify underlying hazards and root causes of the event to mitigate or prevent recurrence.
- To increase safety knowledge, staff is encouraged to participate in professional development activities, including peer-to-peer exchanges, which are a source to share information on lessons learned and best practices.

Other sources for hazard identification include:

- Employee safety reporting program
- State of Good Repair reports
- Inspections of personnel job performance, vehicles, facilities and other data
- Investigations of safety events
- Lessons learned from root cause analysis after safety incidents
- Safety trend analysis on data currently collected
- Training and evaluation records
- Internal safety audits

External sources of hazard information could include:

- FTA and other federal, state, county, or city authorities, including peer transit agencies
- Reports from the public
- Safety bulletins from manufacturers or industry associations

Following the identification of the safety hazard, the second step of the risk management process determines the hazard by type – organizational, technical or environmental – to assist in identifying the expertise needed to assess the hazard.

Hazard types are also categorized by subcategory as shown in the Safety Hazard Type Identification chart in **Table 4**. For example, organizational hazards can be further detailed in a subcategory as either a resource, procedural, training, or supervisory hazard. Each subcategory helps later define the different types of mitigation strategies and potential effects of the safety hazard in the following steps.

Table 4. Safety Hazard Type Identification (Step 2)

Organizational	Technical	Environmental
Resourcing	Operational	Weather
Procedural	Maintenance	Natural
Training	Design	
Supervisory	Equipment	

Hazard types may be defined using the following descriptions:

- Organizational
 - Resourcing – A hazard that is related to the supply of resources.
 - Procedural – A hazard that is linked to established procedures.
 - Training – A hazard that is related to inadequate or incomplete training.
 - Supervisory – A hazard that is related to ineffective supervision.
- Technical
 - Operational – A hazard that relates to standard operations.
 - Maintenance – A hazard that is linked to asset maintenance.
 - Design – A hazard that is related to inadequate design.
 - Equipment – A hazard that is linked to inappropriate, incorrect, or faulty equipment.
- Environmental
 - Weather – A hazard that is linked to unfavorable weather conditions.
 - Natural – A hazard that is related to unfavorable natural environmental conditions.

In the third step of the safety risk management process, the hazard's probability is then identified by matching the hazard to each probability description shown in the Safety Hazard Risk Probability chart in **Table 5**.

Table 5. Safety Hazard Risk Probability (Step 3)

Probability	Criteria
Not Likely	A hazard that is unlikely to occur but is still possible.
Likely	A hazard that is possible to occur several times.
Imminent	A hazard that is continuously expected to occur.

In the fourth step of the safety risk management process, the hazard's severity can then be categorized with the use of the Safety Hazard Risk Severity Categories chart in **Table 6** by comparing the hazard to the listed severity criteria.

Table 6. Safety Hazard Risk Severity Categories (Step 4)

Severity	Criteria
Not Severe	A hazard that may result in a minor injury, non-life-threatening illness, or system damage.
Severe	A hazard that may cause severe injury, severe illness, equipment failure, or major system damage
Critical	A hazard that may cause death or major system damage.

7.8.1.2 Contractors

To identify safety hazards, Contractors hold monthly safety meetings and facility inspections to identify safety risks and determine if prior issues and risks had been addressed. In addition to these practices, Contractors encourage employees to report safety observations to management so they can be assessed and mitigated before an incident occurs.

For more detail about each Contractor’s *individual policies and procedures for safety hazard identification*, see

- **First Transit – Appendix B.5** (Safety Risk Management)
- **Transdev – Appendix C.4.1** (Safety Hazard Identification)
- **MV Transportation – Appendix D.4** (Safety Risk Management)

7.8.2 Safety Risk Assessment

7.8.2.1 PTD

Identified hazards are assessed to determine the potential consequences of each hazard. Factors that are used in assessing safety hazards are:

- probability of occurrence
- severity of the consequences should there be an occurrence
- level of exposure to the hazard

In the fifth step of the safety risk management process, the Risk Assessment Matrix (**Table 7**) takes identified hazards and assesses the level of risk based on the hazard’s probability and severity of the hazard’s consequences. The results of the risk assessment matrix process aids in determining whether the risk should be managed, controlled, or eliminated in the following safety risk management steps.

Table 7. Safety Hazard Risk Assessment Matrix (Step 5)

Probability	Severity		
	Not Severe	Severe	Critical
Not Likely	Low	Medium	High
Likely	Low	Medium	High
Imminent	Medium	High	High

The sixth step of the safety risk management process is completed by inputting the Risk Assessment Matrix results into the Safety Hazard Risk Index Matrix (**Table 8**). This allows staff to determine the safety hazard’s risk index for each hazard that was identified.

If the risk index is acceptable, the hazard must be monitored. If the risk index is undesirable, the hazard requires careful monitoring and may also require steps taken to lower the risks at the discretion of Executive Management. If the risk index is unacceptable, steps are taken by PTD to lower the risk to an acceptable or tolerable level, or to remove or avoid the hazard.

Table 8. Safety Hazard Risk Index Matrix (Step 6)

Risk Level	Risk Index
High	<u>Unacceptable</u> Risk must be removed or mitigated.
Medium	<u>Undesirable</u> Management is to determine whether additional risk mitigation is required or whether the risk is acceptable with monitoring.
Low	<u>Acceptable</u> Risk is acceptable.

7.8.2.2 Contractors

Each Contractor has developed a procedure to assess safety hazards that includes the use of a Safety Hazard Risk Matrix that determines the severity and probability of the hazard. Based on the matrix, each Contractor has a process to determine the level of risk a safety hazard poses to the organization.

For more information on the procedures each Contractor has on *assessing safety risks*, see:

- **First Transit – Appendix B.4** (Safety Risk Management)
- **Transdev – Appendix C.4.2** (Safety Hazard Assessment)
- **MV Transportation – Appendix D.4** (Safety Risk Management)

A third party may conduct a Contractor's risk assessment review.

7.8.3 Safety Risk Mitigation

7.8.3.1 PTD

The risk assessment process may indicate that certain hazards are low risk, while others require mitigation to achieve an acceptable level. In the seventh step of the safety risk management process, staff catalogue hazard information as illustrated in the Hazard Identification and Risk Assessment Log (**Table 9**). After the completion of the exercises **previously detailed**, the hazard description, type, probability, severity, and risk index information can be populated in the log.

The previous steps of the risk management process are summarized in **Table 9**.

Table 9. Hazard Identification and Risk Assessment Log (Step 7)

Description	Type	Probability	Severity	Risk Index
Step 1	Step 2	Step 3	Step 4	Step 6

The intention of the **Table 9** Hazard Identification and Risk Assessment Log is to ensure that all available safety hazard information is considered when determining the appropriate hazard mitigation measures.

In the eighth and final step of the safety risk management process, PTD may determine and implement safety mitigation actions to reduce or eliminate all identified safety hazards. Mitigation actions that may be taken can be categorized into three broad mitigation action categories as illustrated in **Table 10**.

Table 10. Hazard Mitigation Actions (Step 8)

Category	Mitigation Action
Physical Barriers	Includes objects and technologies that are engineered to discourage, warn against, or prevent inappropriate action or mitigate the consequences of events (e.g., traffic control devices, fences, safety restraining systems, transit controls/signals, transit monitoring systems).
Administrative Actions	Includes procedures and practices that mitigate the probability of accident/incident (e.g., safety regulations, standard operating procedures, personnel proficiency, supervision inspection, training).
Behavior Modification	Includes behavioral interventions through education and public awareness campaigns aimed at reducing risky and reckless behavior of motorists, passengers, and pedestrians; includes factors outside the control of PTD and the Contractors.

Once a mitigation action has been identified, staff will assess all changes that result from the mitigating actions and their impacts to the transit safety performance targets. If existing mitigation measures are sufficient, then no further mitigation actions are necessary. If a change is determined to impact a safety performance target, then the change is evaluated through the safety risk management process.

For clarity, a scenario that properly utilizes the safety risk management process is detailed in **Figure 5**.

DRAFT

Safety Hazard Scenario

Staff discovered that the wheel balancer has not been calibrated since 2017. Although a specialist is brought in to calibrate the machine, a transit safety specialist decides to complete the safety risk management process to determine whether further mitigation is needed on the vehicles the machine directly serves.

- Step 1: The hazard is identified by staff to be “an out of calibration wheel balancer” and is communicated to a safety representative, as depicted on **Figure 4**.
- Step 2: Using **Table 4**, the hazard is determined to be of a “Technical Equipment” type, as the hazard most closely resembles that description.
- Step 3: Using **Table 5**, the probability is determined to be in the “Not Likely” category based on available historical information that most closely resembles that probability criteria.
- Step 4: Using **Table 6**, the severity is determined to be in the “Critical” category, as the worst credible outcome to maintaining the hazard closely matches that criteria.
- Step 5: Using **Table 7**, the risk assessment matrix results in a “High” level of risk after considering the information from **Table 5** and **Table 6**.
- Step 6: Using **Table 8**, the risk index determines the level of risk to be “unacceptable” based on the level of risk determined by **Table 7**.
- Step 7: Using **Table 9**, the relevant information for the determination of the necessary risk mitigation actions, if any, is noted to be the following:
- A wheel balancer is out of calibration.
 - There is a technical equipment hazard.
 - The hazard is not likely to occur.
 - The hazard’s consequences are critical to the transit system’s operation.
 - The risk to the transit system posed by the hazard is determined to be unacceptable.
- Step 8: Staff determined, in part with the use of **Table 10**, that an “Administrative Action” will reduce the level of risk posed by the hazard to an acceptable level. The administrative actions may include the introduction of wheel balancer calibration training and the establishment of routine calibration maintenance procedures, for example.

Figure 5. Safety Risk Management Scenario

7.8.3.2 Contractors

Contractors undergo independent safety risk mitigation of all identified hazards. Contractors utilize, at a minimum, the same hazard information that is illustrated in **Table 7** and **Table 9** to help prioritize all hazards and all safety risks are documented and prioritized according to the level of risks.

Each Contractor outlines their *Safety Risk Management Scenarios* in each of their own safety plans:

- **First Transit – Appendix B.5** (Safety Risk Mitigation)

- **Transdev – Appendix C.4.3** (Safety/Risk Hazard Mitigation)
- **MV Transportation – Appendix D.5** (Hazard Resolution)

7.9 Safety Assurance

Safety assurance is a process that functions to ensure the implementation and effectiveness of safety risk mitigation, and to ensure that PTD meets or exceeds its safety objectives through the collection, analysis, and assessment of information.

7.9.1 Safety Performance Monitoring and Measurement

Contractors collect and monitor data on safety performance indicators through a variety of mechanisms, including collecting data on key metrics on a regular basis and preparing regular reports on safety performance. Contractors then use that data to measure effectiveness of current mitigation strategies, to identify safety problems and track the organization’s overall progress towards meeting their performance targets.

For specific details about each Contractor’s Safety Performance Monitoring and Measurement methods, see:

- **First Transit – Appendix B.6** (Safety Performance Monitoring and Measurement)
- **Transdev – Appendix C.5.1** (Performance Monitoring and Measurement)
- **MV Transportation – Appendix D.6** (Safety Performance Monitoring and Measurement)

7.9.1.1 *Monitoring Compliance and Sufficiency of Procedures*

PTD Employee and Contractor Safety Monitoring

PTD employee compliance with standard safety operating procedures is monitored by department staff through observation and review of information submitted from both employees and customers.

Contractor compliance is monitored by PTD staff through the routine and frequent monitoring activities at transit facilities and in the field. Staff complete inspection reports that include safety reporting (**Appendix G.5**). PTD staff also submits monthly compliance reports to their respective supervisors. This reporting system addresses non-compliance with standard procedures for operations and preventive maintenance activities through a variety of actions, including revising training materials, and when necessary, providing systemwide employee and supervisor training.

When non-compliance is situational, mitigation activities can include individualized training, coaching and heightened management oversight. When non-compliance is determined to be a result of inadequate operations or preventive maintenance procedures, the identified deficient procedures are submitted to the risk management process. At the conclusion of the risk management process, the deficiencies are addressed to resolve the non-compliant issue.

PTD assigns specific staff to the role of a contract monitor. Each contract monitor oversees the Contractors for compliance with PTD contracts, safety performance targets, compliance with NTD safety reporting standards, information accuracy and adherence to operations and safety procedures. In addition, each month, or as needed, Contractors share their safety performance data, incident and safety reports, and safety observations with PTD and hold an Operations meeting as illustrated on **Figure 6**. The performance data is communicated to FTA’s NTD monthly using the Uniform System of Accounts document as circumstances dictate. Samples of these reports are provided in the appendix under NTD Monthly Reports (**Appendix G.1**).



Figure 6. PTD and Contractor Monthly Communication

Contractors

On a monthly basis, Contractors document safety performance data, incident and safety reports, recap reports, and safety observations, and present this information to PTD during the Operations meeting. Contractors also monitor bus and paratransit systems for compliance with PTD and FTA operations and maintenance procedures and communicate findings to PTD monthly. In addition, Contractors are responsible for independently monitoring their employee's compliance with the company's standard operating procedures as outlined in their individual safety plans, found in:

- **First Transit – Appendix B.6** (Safety Performance Monitoring and Measurement)
- **Transdev – Appendix C.5.1** (Performance Monitoring and Measurement)
- **MV Transportation – Appendix D.6** (Safety Performance Monitoring and Measurement)

7.9.1.2 Monitoring Safety Events

PTD

All investigation reports of safety events and risk management resolution reports are monitored by assigned staff and reported to the CSO and the accountable executive. These reports are provided by the Contractor upon the conclusion of a safety event investigation conducted by the Contractor. Additionally, Contractors provide PTD with monthly NTD safety reports that staff use to identify safety risk mitigation measures that may be ineffective, inappropriate or not implemented as intended.

If the safety risk mitigation measure does not bring the risk to an acceptable level or otherwise fails to meet safety objectives, then staff resubmit the safety risk/hazard to the risk management process. The CSO then works with staff, the Contractor, and subject matter experts, to identify and implement additional mitigation measures.

Contractors

Each Contractor develops their own individual procedures for monitoring the effectiveness of safety hazard mitigation measures. The Contractors closely manage their safety performance data and conduct audits to ensure they are effectively addressing safety risks within their organization.

For specific *safety monitoring procedures*, see:

- **First Transit – Appendix B.6** (Safety Performance Monitoring and Measurement)
- **Transdev – Appendix C.5.1** (Performance Monitoring and Measurement)
- **MV Transportation – Appendix D.6** (Safety Performance Monitoring and Measurement)

7.9.1.3 Safety Event Investigation

PTD

PTD employees follow the department's operational safety procedures as outlined in AR 2.31 (**Appendix G.4**). These operational procedures help identify initial information that may be utilized in an internal safety event investigation and include the following:

- Establish and maintain a system for reporting accidents.
- Analyze accidents to learn cause and prevention.
- Solicit suggestions from employees and promptly adopt good ideas that will promote better safety.
- Solicit the advice of the safety committees where applicable.

For example, at the scene of a collision, PTD employees follow the *Action at Scene of Collision* steps that are outlined in AR 2.31 (**Appendix G.4**). Steps to be taken are categorized by severity and include drivable vehicles, non-drivable vehicles, injury accidents, non-injury accidents and general, and vary in their prescribed actions.

If incident is determined to be critical, employees would then take steps to first contact the appropriate emergency services and then their supervisor.

Note: A critical incident as defined in the FTA Critical Management Guidelines is an occurrence that requires a response to protect life or property.

Contractors

Contractors conduct their own investigations of safety events and notify PTD staff. The PTD CSO may assign staff to the event investigation and request a debrief of the safety event investigation, as well as review all related investigation documentation. The objective of the review of the Contractor safety event investigation is to determine whether the event is considered preventable and if there were any policy violations. Additionally, assigned CSO representatives may develop strategies that the Contractor and staff can employ to address the identifiable root cause of any organizational, technical, or environmental hazards.

Each Contractor has created their own procedures and subject matter experts for investigating safety events, and their company practice include using data and statements from the involved parties to determine the cause of the incident, and mitigation measures that need to be taken to ensure the safety event does not reoccur.

For specific details about the Contractors' *safety event investigation procedures*, see:

- **First Transit – Appendix B.6** (Safety Performance Monitoring and Measurement)
- **Transdev – Appendix C.5.1** (Performance Monitoring and Measurement)
- **MV Transportation – Appendix D.6** (Safety Performance Monitoring and Measurement)

7.9.1.4 Monitoring Internal Safety Reporting Programs

PTD

PTD employees are encouraged to report any safety-related issues and incidents to their supervisor or using the department's escalation ladder. However, when an employee wishes to remain anonymous, the

city of Phoenix's City Auditor operates the "Integrity Line," as outlined in Administrative Regulation 1.2 (Fraud Prevention and Reporting Policy [Integrity Line]) (**Appendix G.4**).

Safety reports that are directly communicated to a supervisor for evaluation, and management is informed as prescribed, or when the issue is out of the supervisor's control. When a report is submitted to the city's Integrity Line, it is initially reviewed by the Integrity Line Committee, which is comprised of representatives from offices of the City Auditor, the City Attorney, and the City Manager. The committee then refers the issue(s) to PTD's Director and CSO for review and possible investigation.

Contractors

Through their respective agreements with the city, each Contractor is tasked to identify safety hazards and monitor performance metrics and prepare investigation reports on safety incidents for the city's review. All the Contractors use the data to identify trends of reoccurring safety events that need to be mitigated.

For the specific procedures for *monitoring internal safety reporting programs* for each individual Contractor, see:

- **First Transit – Appendix B.6** (Safety Performance Monitoring and Measurement)
- **Transdev – Appendix C.5.1** (Performance Monitoring and Measurement)
- **MV Transportation – Appendix D.6** (Safety Performance Monitoring and Measurement)

7.9.2 Management of Change

7.9.2.1 PTD

Proposed or future changes in the public transit system may introduce new hazards and safety risk into transit operations. Therefore, staff are charged with identifying system changes and determining when a change must be evaluated through the safety risk management process.

To accomplish this, staff proactively monitor planned changes and utilize PTD and Contractor field monitoring personnel to identify any changes in the transit system. Following the identification of a change, the change is submitted to the risk management process to assess the change and determine whether mitigation measures for newly identified hazards, if any, are appropriate.

7.9.2.2 Contractors

Each Contractor has developed procedures to assess how changes may create new hazards and impact safety performance. The Contractors all have a process to review the proposed change and assess how the change could impact safety. Depending on the level of impact the proposed change is anticipated to have on safety, the Contractors takes actions to minimize and/or eliminate the safety risk associated with the proposed change.

For specific details about each Contractor's *process for reviewing proposed changes*, see:

- **First Transit – Appendix B.6** (Management of Change)
- **Transdev – Appendix C.5.2** (Management of Change)
- **MV Transportation – Appendix D.6** (Management of Change)

7.9.3 Continuous Improvement

7.9.3.1 PTD

Evaluation of the SMS is necessary to ensure that allows PTD to meet safety objectives and performance targets. As a result, PTD reviews the system safety plan during annual self-certification.

PTD also uses this data to assess identified deficiencies in SMS organizational structures, processes and resources. If deficiencies are found as part of the safety performance assessment, staff then develops and implements a plan to address any identified deficiencies.

7.9.3.2 Contractors

Each Contractor has their own procedures to ensure their organizations are constantly striving to improve safety. The Contractors have committed to regularly reviewing and updating their safety policies and procedures, both through the annual review process and other review processes and audits that are specific to each company.

For more detailed information on each Contractor's *process for continuous improvement*, see:

- **First Transit – Appendix B.6** (Continuous Improvement)
- **Transdev – Appendix C.5.3** (Continuous Improvement)
- **MV Transportation – Appendix D.6** (Continuous Improvement)

7.10 Safety Promotion

Management support is essential for developing and implementing SMS. Safety promotion includes all aspects of “who, what, when, where, why and how” PTD and its Contractors communicate safety related topics.

7.10.1 Safety Communication

7.10.1.1 PTD

PTD regularly communicates safety information regarding hazards and safety risks relevant to employee roles and responsibilities and informs employees of safety actions taken in response to all reports submitted. Methods of communication include:

- The Employee Critical & Emergency Incident Communication Map (**Appendix G.2**)
- Safety updates incorporated in quarterly PTD meetings
- Safety information uploaded to PTD's employee accessible SharePoint site
- On-site management and inspections

PTD collects, catalogs and, where appropriate, analyzes and reports safety and performance information to all staff. Staff answer the following questions to help facilitate accurate safety reporting:

- What information does this individual need to do their job?
- How can we ensure the individual understands what is communicated?
- How can we ensure the individual understands what action must be taken because of the information?
- How can we ensure the information is accurate and kept up to date?
- Are there any privacy or security concerns to consider when sharing information? If so, what should we do to address these concerns?

In addition, staff routinely reviews existing communication strategies to determine if additional measures are needed to effectively reach staff and Contractors. As part of this effort, PTD uses a “safety culture survey” to understand how safety is perceived in the workplace and what areas should be addressed to fully implement a culture of safety. The CSO and relevant PTD staff are responsible for preparing and distributing all related safety materials and communications.

7.10.1.2 Contractors

Each Contractor has adopted a comprehensive safety communication program to communicate safety information to their employees. This includes monthly safety meetings to brief staff in safety sensitive positions about safety trends and other safety related topics. The Contractors also have programs where they use various means to promote safety within the company, including having a safety bulletin board and sending out emails about safety.

For specific details about how each Contractor disseminates safety information to its employees, see:

- **First Transit – Appendix B.7** (Safety Communication)
- **Transdev – Appendix C.6.2** (Safety Communication)
- **MV Transportation – Appendix D.7** (Safety Communication)

7.10.2 Safety Training

7.10.2.1 PTD

PTD has a safety training program aimed at informing employees who are directly responsible for safety of potential hazards and understand safety policies. The city's Human Resources Department is responsible for assigning the appropriate training to PTD staff as outlined in the city of Phoenix Administrative Regulation 2.31 (Safety Program) (**Appendix G.4**).

PTD provides safety training for all staff who are directly responsible for safety and/or have safety risks associated with their responsibilities. To develop a safety training program compliant with FTA requirements, PTD:

- Reviewed general staff categories (e.g., administrative, driving position, supervisor, maintenance) and respective safety related responsibilities.
- Assessed the training requirements of 49 CFR 672 and the courses required for different positions.
- Assessed the training material available on the FTA PTASP Technical Assistance Center website.
- Reviewed other training material available from industry sources such as the Community Transportation Association of America and the American Public Transportation Association websites.
- Developed a set of competencies and trainings required to meet the safety related activities for each general staff category.
- Developed expectations for ongoing safety training and safety meeting attendance.
- Adjusted job notices associated with general staff categories to ensure that new personnel understand the safety related competencies and training needs, and the safety related responsibilities of the job.

The following training programs are implemented by PTD:

- Annual training to include new hazards and refresher courses
- Safety meetings
- New hire and orientation safety training

7.10.2.2 Contractors

PTD contract monitors actively monitor each Contractor, which in turn provide their staff with appropriate safety training. Contractors are required to administer the appropriate safety training to their employees, including transit system administrative, operators, mechanics, fuelers, cleaners and other staff responsible for safety within their organization. Each Contractor has developed comprehensive training programs for these employees that include new hire training, as well as ongoing training for their employees.

For details about each Contractor's *training programs*, see:

- **First Transit – Appendix B.7** (Competencies and Training)
- **Transdev – Appendix C.6.1** (Competency & Training Program)
- **MV Transportation – Appendix D.7** (Competencies and Training)

DRAFT

Appendix A.

**City Council Minutes or
Resolution**

DRAFT

To be added

DRAFT

DRAFT

Appendix B.

**First Transit Abbreviated
Safety Plan**

Appendix C.

**Transdev Abbreviated
Safety Plan**

DRAFT

Appendix D.

**MV Transportation
Abbreviated Safety Plan**

DRAFT

Appendix E.

PTASP Activity Log

DRAFT

Appendix F.

**PTASP Performance
Target Log**

- 1. PTASP Performance
Target Log**
- 2. PTASP Baseline
Performance Log**

DRAFT

Appendix G.

PTASP Supporting Documents

- 1. NTD Monthly Reports**
- 2. PTD's Critical & Emergency Incident Communication Map**
- 3. Employee Critical Incident Training**
- 4. City of Phoenix Administrative Regulations**
- 5. Public Transit Department Facility Inspection Report**

DRAFT

1. NTD Monthly Reports

2/4/2020

SS 20

Safety and Security CEO Certification Form (S&S-20)

90032 - City of Phoenix Public Transit Department - Safety CY 2019

Certification Summary

NTD Report Year 2019
 Reporter Name City of Phoenix Public Transit Department
 CEO Name Jesus Sepien NTD ID 90032
 CEO Title Public Transit Director Certification Completion Date Feb 4, 2020

Event Summary

S&S-40 Data (Major)

Please confirm the sum total of each corresponding row. If you disagree with any of the counts displayed below, please contact your analyst.

Reportable Event Data	DR/PT	MB/PT	Total	Confirm
Total events reported for 2019	1	46	47	<input type="checkbox"/>
Total injuries reported for 2019	0	39	39	<input type="checkbox"/>
Total fatalities reported for 2019	0	0	0	<input type="checkbox"/>

S&S-50 Data (Non-Major)

Please confirm the sum total of each corresponding row. If you disagree with any of the counts displayed below, please contact your analyst.

Reportable Event Data	DR/PT	MB/PT	Total	Confirm
Total Non-Major Fire Incidents	0	0	0	<input type="checkbox"/>
Total Non-Major Other Safety Incidents	0	25	25	<input type="checkbox"/>
Total Non-Major Incident Injuries	0	25	25	<input type="checkbox"/>

I hereby certify the Safety and Security data submitted to the NTD in the name of City of Phoenix Public Transit Department for the 2019 calendar year.

CLOSE

Safety Configuration (S&S-30) - MB PT

90032 - City of Phoenix Public Transit Department dba Valley Metro - Safety CY 2020

Personnel Totals

Number of Primary Security Personnel

59

Total Number of Security Personnel

159

Primary and Secondary Security Configuration

	Primary (Check one)	Secondary (Check all that apply)
Dedicated transit police force	XX	
Dedicated (TRANSIT) unit of local police		
Contracted local law enforcement		
Transit agency security force		XX
Contracted security force		XX
Off duty police officers		
Use of local police (non-contracted)		XX

City of Phoenix Deputy Public Transit Director authorization for staff to submit Safety Configuration (S&S-30) in TrAMS:

Ken Kessler

Ken Kessler - Deputy Public Transit Director

2/6/20

Date

City of Phoenix Public Transit Director authorization for staff to submit Safety Configuration (S&S-30) in TrAMS:

Jesús Sepien

Jesús Sepien - Public Transit Director

2/6/20

Date

submitted Skangel 2/11/2020

S&S-50 (Minor Incidents)

Clear Data

*Note: This form is meant to simplify reporting for operators of purchased transportation to reporting agencies. It is not a replacement for submission of reports to the National Transit Database.

Month:

Please see the Thresholds tab for more information on reportable minor incidents. Please note that if the incident involved more than \$25,000 in damage, a fatality, an evacuation, or a mainline derailment, it is to be reported as a major incident on the S&S-40. Also, if a fire met any of these thresholds or caused an injury, it should be reported on the S&S-40.

One or more persons were transported from scene for medical treatment due to a Safety Occurrence	Total Occurrences	Transported Customers	Transported Workers	Transported Others
In Transit Vehicles	0			
while Boarding/Alighting: Stairs	0			
while Boarding/Alighting: Lift or Ramp	0			
while Boarding/Alighting: Other	0			
Other in Vehicle: Securement Issue	0			
Other in Vehicle: Non-Securement Issue	0			
In Revenue Facilities	0			
Ramps	0			
Stairs	0			
Escalators	0			
Elevators	0			
Other	0			
In Non-Revenue Facilities	0			
Other	0			

Number of Occurrences of Fire	
In Transit Vehicles	0
In Revenue Facilities	0
In Non-Revenue Facilities	0
On Right-of-Way	0

The completed form can be copied and pasted into an email to the reporting agency, or saved and sent as an attachment.

Copy Summary

[Click here to copy:](#)

Safety and Security Monthly Summary Report (Non-Major Incidents)
 MV Transportation

Please select the Mode/ Type of Service reported: **DR – Demand Response**

Reporting Period (Month): **April**

No Data to Report (for current reporting period)

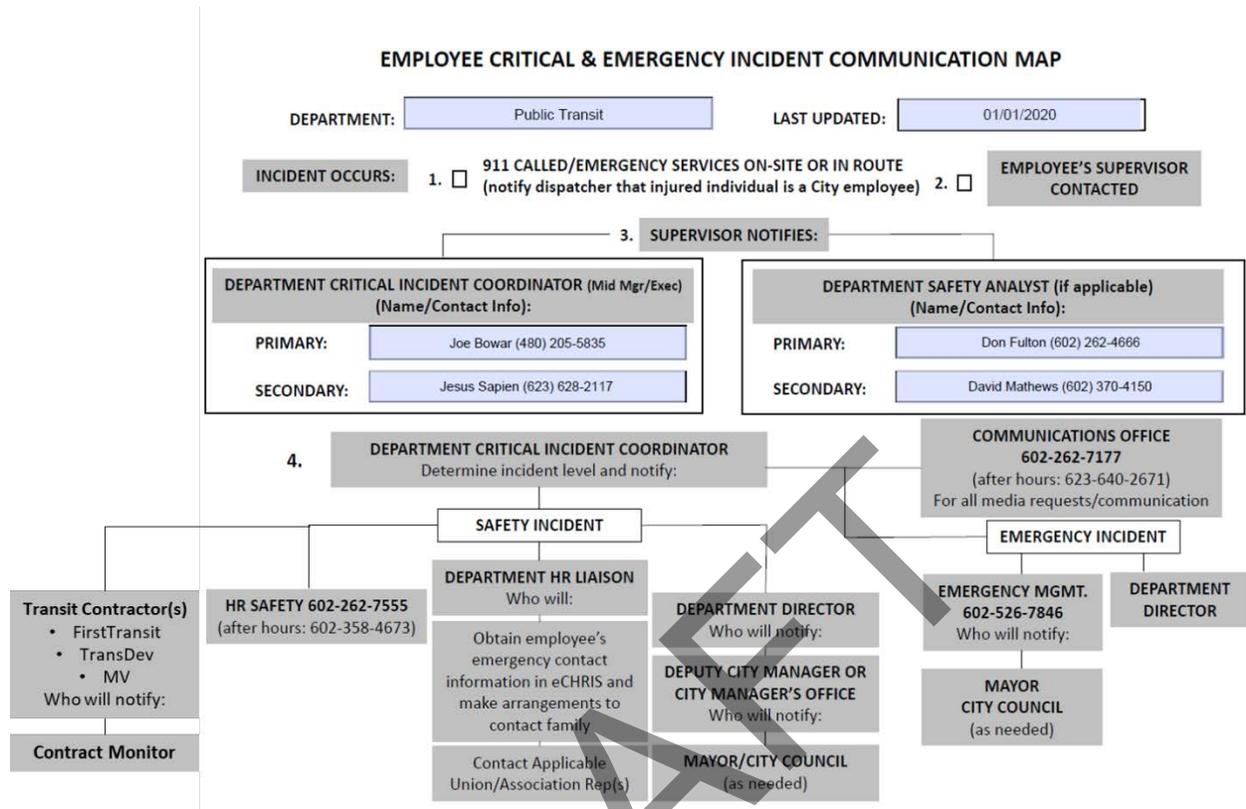
Number of Occurrences of Robbery (confrontational theft)

LOCATION	Occurrences			Victim Type		
	Customers	Workers	Others	Customers	Workers	Others
In transit vehicles						
In transit stations						
In non-revenue facilities						
On roadway/ right-of-way/ parking facility						

Number of Occurrences of Larceny (non-confrontational theft)

LOCATION	Occurrences			Victim Type		
	Customers	Workers	Others	Customers	Workers	Others
In transit vehicles						
In transit stations						
In non-revenue facilities						
On roadway/ right-of-way/ parking facility						

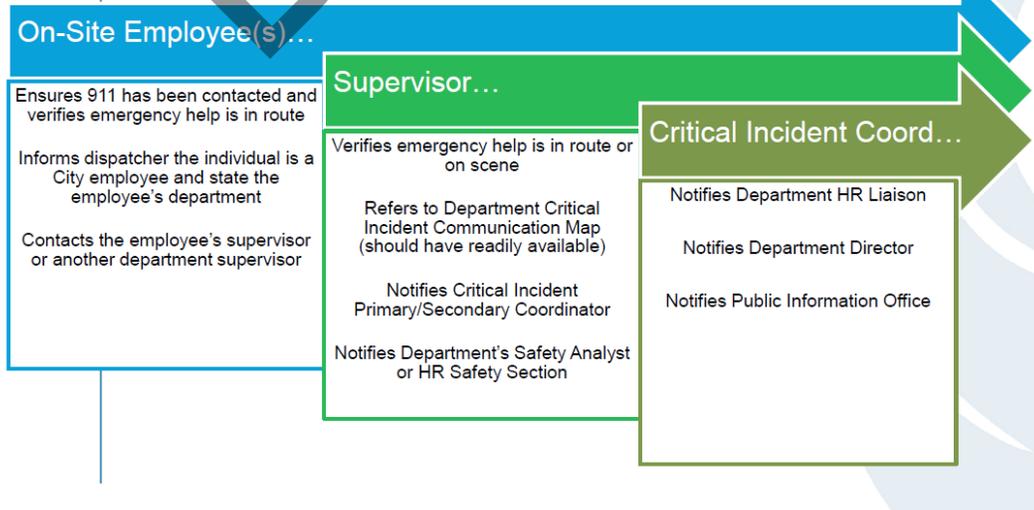
2. PTD's Critical & Emergency Incident Communication Map



3. Employee Critical Incident Training



CRITICAL INCIDENT OCCURS.....



4. City of Phoenix Administrative Regulations



City of Phoenix

ADMINISTRATIVE REGULATION	A.R. NUMBER 1.2 Revised
SUBJECT FRAUD PREVENTION AND REPORTING POLICY (INTEGRITY LINE)	FUNCTION General Page 1 of 6 EFFECTIVE DATE February 9, 2017
<p>I. PURPOSE</p> <p>This A.R. is updated and codifies the existence of the Integrity Line Program (Integrity Line) and the City's policy on preventing and reporting fraud or unethical activity. Integrity, honesty and professionalism in service to the community are important values of employees at the City of Phoenix. Part of maintaining our high ethical standards includes a way for employees or residents to report wrongdoing or bad behavior. Supervisors, managers and department directors are the first lines of reporting, and the Integrity Line provides a valuable secondary resource in the event that reporting to supervisors, managers or department directors is not possible or desired.</p> <p>This fraud prevention policy exists because:</p> <ul style="list-style-type: none"> • The public entrusts us with resources to be used appropriately. • We work to serve the public good, not for personal gain. • Best business practices include a documented fraud prevention policy and an "integrity line" for anonymous reporting. <p>Though individuals are encouraged to make reports to supervisors, managers or department directors, or to the Police Department about illegal activity, the Integrity Line provides a valuable outlet for an individual to make a complaint, anonymous or otherwise.</p> <p>The purpose of this policy is to establish guidelines and assign responsibility for the development of controls and conducting of investigations to aid in the prevention and detection of fraud against the City of Phoenix (City).</p> <p>II. SCOPE OF POLICY</p> <p>This policy applies to any irregularity, or suspected irregularity, involving City employees (employees) as well as consultants, vendors, contractors, outside agencies doing business with the City, and/or any other parties with a business relationship with the City. Any investigative activity required will be conducted without regard to the suspected perpetrator's length of service, position/title, or relationship to the City.</p>	

III. OVERVIEW

Fraud is an ever-present threat, has many forms, and is always damaging. It takes away valuable resources entrusted to the City. Fraud is not only illegal but it also creates a very real threat to the resources available to the City and its residents.

The City requires all employees to act honestly and with integrity, and to safeguard the resources for which they are responsible. Employees at all levels are encouraged to actively participate in protecting public money and property. All employees are responsible for the detection and prevention of fraud, misappropriations, and other irregularities.

By identifying areas where the risk of fraud exists, detecting fraud which has already occurred, taking firm action against the perpetrators and designing systems to prevent the occurrence of fraud, this Anti-Fraud Policy aims to develop a culture within the City which raises the awareness of the risks and consequences of fraud. It provides a framework for promoting the City's policies and measures to prevent and detect fraud and it is an important component to the City's system of internal controls.

IV. ACTIONS CONSTITUTING FRAUD

All employees should be familiar with the types of fraud that might occur within their area of responsibility and be alert for any indication of fraud. For the purposes of this statement, *fraud* is defined as the intentional, false representation or concealment of a material fact for the purpose of gaining an advantage, avoiding an obligation, or causing loss to another party. Fraud may include deception, bribery, forgery, extortion, corruption, theft, conspiracy, embezzlement, misappropriation, false representation, concealment of material facts, and collusion. More specifically, acts of fraud may include, but are not limited to:

- Removal, loss, unauthorized destruction, inappropriate use or waste of funds, supplies, records, furniture, fixtures, equipment, or other City assets
- Impropriety in the handling or reporting of money or financial transactions
- Misuse or misreporting of paid work time or paid time off
- Accepting or seeking anything of value from contractors, vendors, or persons providing services/materials to the City (including vendor kickbacks)
- Use or willful unauthorized disclosure of personal identifying and restricted information for a purpose unrelated to City business
- Violations of laws or regulations
- Contract fraud
- Falsified documents
- Specific danger to public health or safety
- Any similar or related irregularity

V. POLICY

Fraud that is detected or suspected should be immediately reported to appropriate supervisors or managers or through the City's Integrity Line, where investigations are coordinated by the Integrity Committee. The Integrity Committee is comprised of the City Auditor, the City Attorney, and the City Manager or designee. The City recognizes a zero tolerance policy regarding fraud and will investigate any fraud or suspected fraud.

V (1) Responsibilities

a. All Employees

All employees individually have the primary responsibility for the prevention of fraud. Any employee who suspects or detects fraudulent activity must immediately report it to their supervisor, managers, department director, or City Auditor. If reporting to a supervisor, manager, department director or City Auditor is not possible or desired, the employee should report the suspected activity directly to the Integrity Line (see Section V(2)). Employees must not attempt to personally conduct investigations or interviews / interrogations or discuss any details of the suspected fraudulent act with unauthorized personnel. The appropriate law enforcement agency will be involved if illegal activity is being investigated.

Employees will provide unrestricted access to all City records, and property, and provide the necessary assistance, cooperation and support to enable the Integrity Committee and its delegates to properly investigate suspected fraudulent acts. Refusal to cooperate in an investigation may result in disciplinary action, up to and including termination.

b. Management

In addition, Management is also responsible for:

- i. Assessing the types of risk involved in the operations for which they are responsible.
- ii. Developing systems of internal control to minimize the risk of fraud and ensuring that controls are being consistently applied.
- iii. Satisfying themselves that their internal control systems continue to operate effectively.
- iv. Raising fraud awareness amongst staff including knowledge of the City's anti-fraud policy.
- v. Reporting fraudulent or suspected fraudulent activity directly to the City Auditor who will include the report in the Integrity Line process.
- vi. Implementing new internal controls to reduce the risk of similar fraud occurring where frauds have taken place.
- vii. Responding comprehensively in writing to all inquiries made during the course of an investigation, or to recommended corrective actions in connection with the investigation.

c. Integrity Committee

The Integrity Committee is authorized to coordinate the investigation of suspected fraudulent acts as defined in this policy. If the investigation substantiates that fraudulent activities have occurred, the Integrity Committee will notify appropriate designated personnel and, if appropriate, will notify the City Manager, Audit Committee, Mayor, and City Council.

As warranted, the Integrity Committee will coordinate with criminal and regulatory law enforcement agencies in order to facilitate appropriate criminal investigation and prosecution. The law enforcement and/or regulatory agency will make the final decision to investigate a fraudulent act.

V (2) Reporting Fraud to the Integrity Line / Integrity Committee

The City has established the following methods that allow employees to make confidential anonymous reports of fraud, suspicions of fraud, or any other inappropriate action.

- **Telephone:** 602-261-8999 or 7-1-1 Relay. The telephone will be answered by the Secretary to the City Manager whenever possible during normal business hours. A recorded message may be left if no one is available.
- **E-mail:** aud.integrity.line@phoenix.gov
- **Online Fraud Reporting Form:** You may access the Fraud Reporting Form by visiting the PHX AT YOUR SERVICE tool (at www.phoenix.gov/atyourservice) and selecting the **FRAUD REPORTING** button under the Additional Services subsection.

Employees should provide as much of the following information as possible when making a report:

- Circumstances of the incident and details of how the fraud / inappropriate action took place
- Names of all persons involved, including division and department
- Date(s), time(s) and location(s) of the event(s) that took place
- If missing funds, identify source of funds and how much
- Identify any evidence or documentation that is available
- Names of witnesses
- A telephone number where the employee can be reached. In order to assist in the investigation, those reporting potential violations are encouraged to identify themselves. Every reasonable effort will be made to keep the identity of an individual reporting potential fraudulent activity confidential. However, anonymous complaints are accepted.
- Any other information that may be helpful in an investigation.

VI. RETALIATION

Retaliation against a person who initiates a complaint or inquiry or participates in fact-finding is prohibited. Persons found to have engaged in retaliation are subject to the full range of disciplinary actions, up to and including termination.

VII. CORRECTIVE ACTION

The City will take the necessary steps, including legal action, to recover any losses arising from fraud or attempted fraud. This may include action against third parties involved in the fraud whose negligence contributed to the fraud. Employees found to be associated with fraudulent activity will be subject to disciplinary action, up to and including termination and legal prosecution, in accordance with City policies and procedures and applicable laws and regulations.

If an investigation results in a recommendation to terminate an individual, the recommendation will be reviewed for approval by designated representatives from the City Human Resources and Law Departments before any such action is taken. The decision to terminate an employee is made by the employee's management and is subject to the regular appeals process.

VIII. CONFIDENTIALITY

The Integrity Committee and its delegates will maintain strict standards of confidentiality, and will not voluntarily release information about an investigation or inquiry except where examination results are referred to law enforcement and/or regulatory agencies for independent investigation or where required by law. After investigations are complete, it is likely that documentation related to the complaint would become a public record and would require disclosure if requested. Complete anonymity cannot be guaranteed due to public records laws.

IX. OTHER IRREGULARITIES

In cases related to employment, harassment and discrimination please refer to the chart below. While the Integrity Line will accept reports of these cases, the Integrity Committee will refer them as noted below.

Issue	Refer issue to
Hiring process, recruitments, employee qualifications, performance evaluations	Department Human Resources Liaison or Human Resources Department at 602-262-6609
Sexual Harassment (A.R. 2.35A) or Protected Category Harassment (A.R. 2.35B)	Department Human Resources Liaison or Equal Opportunity Department's Compliance and Enforcement Division at 602-262-7486
Discrimination / denial of equal employment opportunities (A.R. 2.35)	Equal Opportunity Department's Compliance and Enforcement Division at 602-262-7486

X. RELATED POLICIES

This policy is designed to augment other City policies and external regulatory requirements, and not to replace or preclude them. Other policies and requirements containing related information include, but are not limited to, the following:

- Ethics Handbook
- Employee Manual
- AR 1.90, *Information Privacy and Protection*
- AR 2.61, *Grievance Procedure*
- AR 2.91, *Conflicts in Employment, Supervisory and Contractual Relationships*
- AR 2.93, *City Employee Gift Policy*
- Fraud Reporting Webpage
- City Charter (various)
- Arizona Revised Statutes (various)



City of Phoenix

ADMINISTRATIVE REGULATION	A.R. NUMBER 2.31 Revised
	FUNCTION Human Resources and Payroll Page 1 of 3
SUBJECT SAFETY PROGRAM	EFFECTIVE DATE September 10, 2012
	REVIEW DATE

INTRODUCTION

Transmittal Message

This AR has been revised to reflect changes resulting from updating terminology and functionality within the Human Resources Department, Safety Section. Questions regarding this AR should be directed to the Human Resources Department, Safety Section at (602) 262-7555.

Summary of Changes

This regulation, last modified in 2008, has been revised to reflect the name change from the Personnel Department to the Human Resources Department; and to add the requirement of providing Personal Protective Equipment where necessary.

Purpose of Safety Policy

The safety and health of each employee is extremely important to both the welfare and happiness of the individual employee and to the efficiency of services provided by City employees to the community. It is the policy of the City to exert every effort to eliminate or reduce the possibility of accidents to people and losses of property. In order to achieve the highest degree of safety, the responsibility, organization, and operational procedures for a safety program must be defined and put into effect.

The statement of this policy is issued to clarify the responsibility for the safety program, establish procedures for implementing and enforcing safety policies, require appropriate corrective measures, and to ensure the development and maintenance of a safe working environment for all employees.

Responsibility for Safety

Department directors and managers, along with all supervisory personnel, have the responsibility of communicating to their employees the safety policy of the City as provided in this regulation.

- A. **Department Management.** The primary responsibility for providing an accident-free workplace shall rest with department directors. Each department and large division must have a definite plan whereby the City's safety program will reach every employee in every job. It is the responsibility of department management to enforce the maintenance of safe work conditions; to encourage development and observance of safety habits; and to expedite removal and correction of safety hazards.

- B. Supervisors. It shall be the responsibility of each supervisor to:
1. Detect and correct unsafe working conditions and practices. Safety problems beyond the supervisor's control shall be reported to management immediately.
 2. Train employees in the correct work procedures and City safety policies.
 3. Ensure each employee knows and follows the safety rules pertaining to their work.
 4. Provide employees all necessary Personal Protective Equipment (PPE) for hazards that cannot be engineered out.
 5. Encourage safety suggestions and discussions; make sure good safety suggestions are used and that all safety questions receive answers; and encourage employees to submit any safety suggestions through the Employee Suggestion Program.
 6. Ensure all accidents are promptly and thoroughly investigated and properly reported.
 7. Keep informed on safety subjects through reading, training courses, and discussions with other supervisors and safety professionals.
- C. Employees. Ultimately, every employee is responsible for his own safety. As a condition of employment, employees are required to observe all safety regulations and requirements given verbally or in writing by the properly constituted authorities. Employees shall attend all job required safety training and refresher courses as needed. In addition to guarding their own safety and the City's property, employees shall do everything possible to safeguard their fellow workers and other people affected by their work. Employees shall report immediately to their supervisor any accident occurring to themselves and shall, if observed, report accidents happening to others. Employees shall also report any unsafe conditions to their supervisor immediately.
- D. Human Resources Department. The Human Resources Director shall be responsible for the coordination of safety activities and safety programs throughout the City of Phoenix.

Organization to Implement and Administer Safety Program

The Human Resources Director shall be responsible for coordinating the development, establishment, improvement, and administration of the City Safety Program. Department directors and their management and supervisory staff, working in conjunction with their department Safety Analysts, are responsible for development, implementation, and operation of the safety programs within their respective departments.

Departmental safety committees may be established within each department and/or large division. Selection of these committees shall be made by the department director. Safety committees may be established in small organizational units at the discretion of department management. Safety committees shall be advisory only.

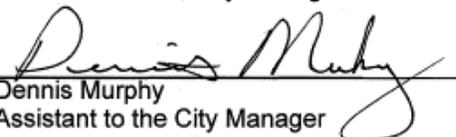
Operational Procedures

The provisions of the above sections clarify the authority, responsibility, and organization of the City's Safety Program.

As the representative of management, the Human Resources Director, in cooperation with the department directors and their staff, shall devise, implement, and through periodic revisions, maintain a comprehensive safety program. The minimum objectives of this program shall be to:

- A. Maintain a safe and healthful work environment
- B. Ensure compliance with occupational safety and health standards, regulations, and policies.
- C. Train supervisors to focus attention on preventing accidents and promoting safety.
- D. Formalize in each City activity a set of safety standards for employees to follow in performing their duties.
- E. Educate and motivate employees through their supervisors to work safely.
- F. Establish for each City activity a complete safety inspection program to remove work hazards and correct unsafe conditions, practices, and habits.
- G. Establish and maintain a system for reporting accidents. Analyze accidents to learn cause and prevention.
- H. Solicit suggestions from employees and promptly adopt good ideas which will promote better safety.
- I. Solicit the advice of the safety committees where applicable.
- J. Assist all administrative and supervisory personnel in developing and maintaining an effective safety program.
- K. Administer corrective action, up to and including disciplinary action for non-compliance with established safety standards, regulations and policies.
- L. Collect and distribute safety training material, safety educational aids, safety posters, and safety literature to supervisors.
- M. Ensure employees receive the appropriate safety and health training necessary for their job and that all safety and health training is properly documented.

DAVID CAVAZOS, City Manager

By: 
Dennis Murphy
Assistant to the City Manager



City of Phoenix

ADMINISTRATIVE REGULATION	A.R. NUMBER
	2.311Revised
SUBJECT VEHICLE ACCIDENT REPORTING PROCEDURES AND ACTION AT SCENE OF COLLISION	FUNCTION
	Personnel and Payroll
	Page 1 of 4
	EFFECTIVE DATE
	January 14, 2003

INTRODUCTION

Transmittal Message

This Administrative Regulation (AR) has been revised to streamline the vehicle accident reporting process. Questions regarding this AR should be directed to the Finance Department – Risk Management Division at (602) 262-5054.

Summary of Changes

This AR was last revised in 1988. The revised AR eliminates references to report forms and employee titles that no longer exist. Additionally, it refers employees to the City's Intranet for completion and submittal of required forms.

The revisions instruct employees involved in an accident to notify the Police Department who will assess the situation and evaluate the scene for a wrecker, paramedics or ambulance. It also eliminates reference to the potentially hazardous practice of using a police car to push a damaged vehicle to the side of the road.

Finally, the revision eliminates confusion between reporting an accident and submitting a claim.

Purpose

This regulation establishes uniform procedures for reporting all accidents involving City-owned or privately-owned motor vehicles used on City business. This regulation further establishes procedures for moving drivable vehicles out of the traveled way following a collision, for calling wreckers to move non-drivable vehicles away from the scene of collision as rapidly as possible, and for moving the vehicle to the Equipment Management Yard for damage inspection.

1. Regulations

A. Reporting Requirements

- i. All motor vehicle accidents involving City-owned or privately-owned motor vehicles while being used on City business occurring on public streets or on private property, inside the City limits, shall be reported immediately to the Police Department and the employee's supervisor. Serious, life threatening accidents should be reported to Police using 911. For minor accidents that are non-life threatening, contact the Police Department at (602) 262-6151.

Advise the Police Department that the accident involves a Phoenix-owned vehicle or vehicle used on City business and relay as clearly as possible the severity of the accident and whether fire or medical services are needed.

The Police Department will respond to the scene and determine whether or not they will make a report. When the Police do not take a report, obtain the following information before leaving the accident scene.

- a. Names, addresses, drivers license numbers and phone numbers of all parties
- b. Make, model, year and license plate number of all vehicles
- c. Damage to all vehicles
- d. Injuries to any parties and where treated if applicable
- e. Insurance company and policy numbers of all parties involved
- f. Names, addresses and phone numbers of witnesses, if available

If outside the City limits, the employee shall report the accident immediately to the local jurisdiction and their supervisor. All other procedures contained in this Administrative Regulation still apply.

- ii. Accidents involving City-owned motor vehicles shall also be reported to Risk Management and Equipment Management within two workdays of their occurrence by use of the Equipment Management Vehicle Damage Report, Form 125-40D (also known as the "Incident Report"). This form is used to report both property damage and bodily injury resulting from a collision. This four-part form must be completed by the employee/driver or supervisor immediately after the accident. At least one copy shall be kept by the employee's/driver's department, and that department is responsible for sending one copy to Risk Management, one copy to Equipment Management and one copy to the Personnel Department, Safety Section.

The Equipment Management Vehicle Damage Report Form may also be submitted electronically via the City's Intranet, e-mail, or hard copy sent through interoffice mail. A copy should be retained for departmental records.

It is important that the report form provide clear and concise information of the facts of the incident, as well as complete and accurate information concerning the person(s) and property involved.

- iii. A supervisor, with the support of the Department Head, should respond to the scene of an accident involving their department personnel to assist the Police in any way possible.
- iv. All accident reports will be reviewed and chargeability determined the Personnel Department, Safety Section, Fleet Safety Specialist. The Police Department shall prepare four (4) copies of the Arizona Traffic Accident Report on all motor vehicle accidents.

The Arizona Traffic Accident Reports will be distributed as follows:

All City Vehicles and All Vehicles Used On City Business:

- a. One copy to Equipment Management (if a City-owned vehicle is involved)
 - b. One copy to Personnel Department, Safety Section
 - c. One copy to Finance Department, Risk Management Division
 - d. One copy (or more copies as desired) to the department involved in the accident
- v. Do not make statements to anyone except your supervisors and the investigating Police Officers. The determination of the cause will be done as part of the investigation process.
- vi. Any person who wishes to make a claim against the City must follow the procedures set forth in A.R.S. 12-821.01. Persons who state that they want to make a claim for injuries or property damage should be given a "Referral Card," Form 45-11D, which provides the Risk Management Division's phone number to call for a claim form. The employee's name and work phone number should be written in the space provided on the Referral Card.

All field supervisors should maintain a supply of Referral Cards.

B. Additional Information

On occasion, additional information may be needed on a particular accident other than what would be needed for normal processing of accident claims. When the need arises, the Safety Section and/or Risk Management Division will request this information from the Department involved.

Department Heads may require their supervisors and/or operators to submit a separate report on accidents involving their personnel for the Department's internal use.

A packet containing the "Equipment Management Vehicle Damage Report" Forms and Referral Cards will be placed in each vehicle by Equipment Management.

C. Fatal Accidents Involving City Vehicles or Equipment

When a City vehicle or private vehicle being used on City business is involved in an accident resulting in a fatality, the Police Department will immediately notify the Personnel Department, Safety Section. If the accident occurs outside of normal duty hours, the notification will be made to the City switchboard operator. The City switchboard operator will maintain a current list of names and telephone numbers of people to contact within the Safety Section. The Police Department will notify the Risk Management Division the next business day.

D. Legal Information

The Law Department shall have access to all accident reports filed with the Safety Section and/or Risk Management Division whenever necessary.

The employee is forbidden to act as an agent of the City under any circumstances. Before an employee releases an insurance company for injuries sustained while in a City vehicle,

the employee must confer with the Law Department to make certain that the release form does not purport to reduce the City's rights to recover damages.

2. Action at Scene of Collision

A. Objective

To minimize traffic congestion or the possibility of contributing to further accidents at the scene, the following procedure is to be followed:

- i. **Drivable Vehicles** Drivable vehicles should be moved to the side of the road out of the way of traffic, prior to arrival of police.
- ii. **Non-Drivable Vehicles** In the event one or more vehicles are non-drivable, the Police Officer(s) responding to the scene will call for a wrecker.
- iii. **Injury Accidents** In a collision in which a person complains of an injury or in which a serious injury exists, the vehicle containing the injured persons should not be moved. When reporting the accident to "911," notify them that an ambulance is needed and how serious the injuries seem to appear.
- iv. **Non Injury Accidents** All non-injured drivers and passengers should move to the sidewalk or other safe location out of the roadway as soon as possible. Employees should not return to the vehicle to retrieve items until clear to do so.
- v. **General**
 - a. Attempt to secure witnesses' names, addresses and phone numbers.
 - b. Do not make statements to anyone except your supervisors and the investigating Police Officers. Avoid getting into arguments with others at the scene.
 - c. Answer the Police Officer's questions honestly and directly. Do not admit any responsibility or guilt for the accident at the scene. Responsibility for the accident will be determined at a later time and place.
 - d. Make arrangements with the Equipment Management Body Shop to have the City vehicle taken to the Equipment Management Yard. The vehicle should be moved to the Equipment Management Yard within two workdays after the accident occurs.

FRANK FAIRBANKS, City Manager

By 

Lisa Takata
Assistant to the City Manager



City of Phoenix

ADMINISTRATIVE REGULATION	A.R. NUMBER
	3.51
SUBJECT	FUNCTION
	Financial and Purchasing Page 1 of 3
RISK MANAGEMENT	EFFECTIVE DATE
	November 20, 2001

INTRODUCTION

Transmittal Message

Questions regarding this AR should be directed to the Finance Department – Risk Management Division at (602) 262-5054.

Summary of Changes

This AR was last revised in 1988. The revisions note a new direct reporting relationship between Risk Management Administrator and the Finance Director. It also clarifies and updates the responsibilities of the Risk Management Administrator.

Purpose

This Risk Management policy has been established to achieve an optimum balance among the various elements of the City's Risk Management Program, such as: self-insured losses, loss control and loss prevention costs, claims control costs, insurance premiums and the cost of administration.

Responsibility

The following people are responsible for the Risk Management Program:

- A. The Finance Director provides overall direction.
- B. The Risk Management Administrator is responsible for general administration such as coordinating, directing and implementing risk management activities, including:
 - 1. Risk identification, analysis and measurement.
 - 2. Risk financing, including the purchase of commercial insurance for all City-related exposures, except group medical, life, disability and Worker's Compensation insurance for City employees.
 - 3. Consulting for risk financing including assisting the Personnel Department in the purchase of insurance for the City's employee, dependent and retiree benefits.
 - 4. Management of 3rd party liability claims and tort litigation in cooperation with the City Attorney's Office.
 - 5. Coordinate and assist in resolution of insurance claims made against property and liability insurance policies purchased by the Risk Management Division.

6. Processing City claims against others and/or their insurance carriers for damage to City property when requested by the department sustaining the damage.
 7. Manage the Self-Insured Retention Funds to assure that adequate funding levels are maintained and insurance and self-insurance costs are allocated to the City departments.
 8. Investigation and settlement of third-party liability claims (except charges filed with the Equal Employment Opportunity Commission) filed against the City and selection and management of a third party claims administrator for the handling of other liability claims.
 9. Liaison for establishing City property conservation standards with City property insurance carriers and departments.
 10. Provide loss control data and loss control consultations to all City departments.
 11. Coordinate and participate on the City's Self-Insurance Retention Claims Committee.
- C. Department Heads are responsible for insuring that risk management related activities are coordinated with the Risk Management Administrator.

Cooperation is needed at all levels to identify risks of loss and reduce or eliminate those risks.

Operational Policy

A. Purchasing Insurance or Other Risk Financing Alternatives

Whenever risks of loss are identified, they shall be reduced or eliminated wherever practical. For risks of a catastrophic nature, insurance or other risk financing alternatives shall be purchased or implemented at the lowest reasonable cost.

B. Risk Retention

In recognition of its financial resources, the spread of its physical assets and prudent municipal practices, the City shall accept self retention of loss up to the limits established by the Finance Director and Risk Management Administrator, based on risk retention analysis. The self-insured retention levels and commercial insurance policy limits shall be established based on prudent judgment and appropriate economic considerations.

In addition, in selecting the actual self-insured retention limit for a specific risk consideration shall be given to the extent such insurance is available at reasonable cost, frequency and severity of loss experience, and the extent and nature that such services as claims handling, legal services, and other specialized services are required and available either in-house or through outside agencies.

C. Claims Management

1. Claims for damages arising out of injuries to the public, including personal injury, or damage to private property are administered by the Risk Management Division. The City Attorney's Office and Risk Management Division coordinate the management of cases in litigation. The objective is to minimize the financial loss to the City, recognizing both the well-being of the public and the need for financial stability of the City. The Risk Management Administrator shall coordinate claims management with the City Self-Insurance Retention Claims Committee in accordance with Chapter 42 of the City Code.

- A. All City employees are responsible for reporting incidents promptly in accordance with Administrative Regulation 2.311 and 2.317 and assisting the Risk Management Division in investigation.
 - B. Legitimate liability claims are to be settled equitably and promptly. Claims believed to be without merit will be vigorously defended.
2. Employee Worker's Compensation insurance claims are administered by the Safety Administrator in the Personnel Department.

D. Loss Control

It is the policy of the City of Phoenix to preserve City-owned property through the implementation of sound property loss prevention practices and to control, reduce and eliminate exposure to loss from liability risks to the extent possible. The Risk Management Administrator is responsible for:

- 1. Coordination of the City's efforts toward the prevention of property loss, and control and reduction of liability risks.
- 2. Coordination of the efforts of City property and liability insurance carriers with City departments in performing insurance loss control surveys and implementing insurance carrier recommendations.
- 3. Coordination and implementation of local, state and federal regulations related to property loss prevention and control and reduction of liability risks.

FRANK FAIRBANKS, CITY MANAGER

BY 
Lisa Takata
Assistant to the City Manager

5. Public Transit Department Facility Inspection Report



Public Transit Department Facility Inspection Report				
Date:	Facility			
Inspector –				
FACILITY EXTERIOR	MET	NOT MET	N/A	COMMENTS (general cleaning/safety attire/spills/restrooms)
Employee/Support Vehicle Parking Lots				
Fare Collection Building				
Landscaping				
Security Kiosk				
Bus Wash Area				
Fuel Island/Building Dispensing Equipment Condition				
Bus Parking Lot				
Maintenance Area/Building				
Warehouse				
Loft				
HR Area/Building				
Revenue/Video Surveillance				
FACILITY INTERIOR				(water fountains/storage areas)
Visitor Reception Area				
Conference Room				
Printer Room				
Individual Offices/Cubicles				
Restrooms				
Driver's Lounge				
Locker Area				
Dispatch Area				



Metro, Regional Public Transportation Authority, and Maricopa Association of Governments Meetings

This report provides the Transportation, Infrastructure and Innovation Subcommittee with copies of past and/or upcoming meeting agendas/summaries for METRO light rail, Valley Metro/Regional Public Transportation Authority (RPTA), and the Maricopa Association of Governments.

THIS ITEM IS FOR INFORMATION ONLY.

Summary

Within Maricopa County, there are several agencies with different charges relating to public transit and transportation planning.

Valley Metro/RPTA: In 1993, the Regional Public Transportation Authority Board adopted the name Valley Metro as the identity for the regional transit system in metropolitan Phoenix. Under the Valley Metro brand, local governments fund the transit system which the public sees on Valley streets today. Valley Metro Board member agencies include Avondale, Buckeye, Chandler, El Mirage, Gilbert, Glendale, Goodyear, Maricopa County, Mesa, Peoria, Phoenix Queen Creek, Scottsdale, Surprise and Tempe.

METRO: METRO is the brand name for Valley Metro Rail Inc., a nonprofit, public corporation charged with the design, construction and operation of the light rail system. The cities that participate financially in the light rail system each have a representative on the METRO Board of Directors. Cities on the board include Chandler, Glendale, Mesa, Phoenix and Tempe. METRO is structured on a "pay to play basis," with voting power allocated based on investment in the system.

The Maricopa Association of Governments (MAG): MAG is a council of governments that serve as the regional agency for the metropolitan Phoenix area. When MAG was formed in 1967, elected officials recognized the need for long-range planning and policy development on a regional scale. Issues such as transportation, air quality and human services affect residents beyond the borders of individual jurisdictions. MAG is the designated metropolitan planning organization (MPO) for transportation planning in

the Maricopa County region.

The goal of staff is to provide the Transportation, Infrastructure and Innovation Subcommittee with agendas for future meetings of these bodies. At times, meeting dates do not coincide and agendas are not available until close to the meeting date. However, prior to reach each Board of Directors meeting, most agenda items are reviewed by staff committees which include City of Phoenix members.

Meeting agendas and/or additional information for previous and upcoming METRO, RPTA and MAG meetings will be distributed to Transportation, Infrastructure and Innovation Subcommittee members at the meeting.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Public Transit Department.



Citizens Transportation Commission Meetings

This report provides the Transportation, Infrastructure and Innovation Subcommittee with copies of past and/or upcoming meeting agendas/summaries for the Citizens Transportation Commission.

THIS ITEM IS FOR INFORMATION ONLY.

Summary

The Citizens Transportation Commission advances transparency, public input, and government accountability by reviewing appropriations provided by the Phoenix Transportation 2050 plan (T2050), as approved by the voters on Aug. 25, 2015.

The Commission reviews T2050 appropriations and program recommendations of the Public Transit Department and the Street Transportation Department; annually review the revenues and expenditures of T2050 funds, as well as funding from other sources; conducts public meetings; and formulates and presents recommendations to the Phoenix City Council related to revenues, expenditures, projections, programs and major projects as called for by T2050.

Meeting agendas and/or additional information for previous and upcoming Citizens Transportation Commission meetings will be distributed to Transportation, Infrastructure and Innovation Subcommittee members at each Subcommittee meeting.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Public Transit Department.



Freeway Program Update

This report provides the Transportation, Infrastructure and Innovation Subcommittee updates on the Arizona Department of Transportation (ADOT) freeway program within the City of Phoenix.

THIS ITEM IS FOR INFORMATION ONLY.

Summary

The Maricopa Association of Governments (MAG) Regional Transportation Plan reflects numerous freeway construction projects and studies underway within the City of Phoenix. These projects are funded from the voter approved priorities in the Proposition 400 half-cent sales tax as well as from state and federal revenue sources. City of Phoenix staff are embedded with ADOT on these major construction projects to ensure coordination of all construction activities with City departments. This report is an overview of the current major freeway projects. A monthly report will be provided to the Transportation, Infrastructure and Innovation Subcommittee reflecting project changes as well as new projects.

South Mountain/Congressman Ed Pastor Freeway

The South Mountain/Congressman Ed Pastor Freeway is the last piece in completing the Loop 202 system. The 22-mile South Mountain Freeway runs east and west along Pecos Road and then north and south between 55th and 63rd avenues, connecting with Interstate 10 (I-10) on each end. This is the single largest freeway project in Arizona history - built at one time. The entire freeway is within the City of Phoenix.

Key elements of this project are 40 bridge structures, 15 traffic interchanges, 11 miles of sound walls, 5 multi-use crossings, 4.5 miles of improvements at I-10, a six-mile shared use path, and a pedestrian bridge.

Construction began in early 2017 and the freeway was opened to traffic in December 2019.

Update:

- **The new traffic interchange at 32nd Street and the 6-mile shared use path**

between 40th Street and 17th Avenue are expected to open on Oct. 30, 2020. The completion of the pedestrian bridge north of Broadway Road, additional quiet pavement, and final landscaping are planned to be completed by mid-November.

Interstate 17 - Pinnacle Peak and Happy Valley Road

This project is rebuilding the traffic interchanges on Interstate 17 (I-17) at Happy Valley and Pinnacle Peak roads to improve safety and traffic flow as population growth and development in this area continues.

The bridge reconstruction at Pinnacle Peak Road will have two through lanes in each direction, bicycle lanes and pedestrian walkways. The bridge reconstruction at Happy Valley Road will remove the existing roundabouts and construct a Diverging Diamond traffic interchange with three through lanes in each direction, bicycle lanes and pedestrian walkways.

Construction began in November 2018 and is scheduled for completion in winter 2020.

Update:

- **The new Happy Valley Road Diverging Diamond Interchange is now open to traffic.**

Loop 101 - Interstate 17 To Pima Road

This project is widening and improving the Loop 101 (Pima Freeway) from I-17 in Phoenix east to Pima Road in Scottsdale. The improvements are needed to address growing traffic demands in the northeast Valley and relieve traffic congestion on the Loop 101 during the morning and evening peak travel periods.

The major elements of this project include adding one general purpose lane in each direction between I-17 and Pima Road, adding an auxiliary lane in each direction between Seventh Street and Cave Creek Road, and modifying freeway ramps and frontage road connections at 11 interchanges. Additional components include construction of noise or retaining walls where warranted, improvements to drainage and pavement markings, and noise reduction features.

Construction began in February 2019 and is scheduled for completion in spring 2021.

Update:

- **The project is on schedule for completion in spring 2021. There will be a number of closures and restrictions during fall and winter.**

- **ADOT is using a new technique called diamond grinding to replace older rubberized asphalt overlays in this corridor. The rubberized asphalt pavement has been in place well beyond its planned service life, resulting in rough highway surface conditions. Diamond grinding will provide a much improved, smooth concrete driving surface with decreased noise levels.**

Interstate 17 Frontage Road Drainage Improvement

This ADOT project will replace the existing pump stations at the I-17 traffic interchanges at Greenway Road, Thunderbird Road, Cactus Road and Peoria Avenue with a gravity storm drain system that will discharge the storm water into the Arizona Canal Diversion Channel (ACDC). The purpose of the project is to improve the drainage facilities that remove storm runoff from the cross streets, helping to reduce the potential for flooding at the I-17 overpasses.

The project includes the installation of 30- to 90-inch diameter reinforced concrete pipe along the I-17 frontage road, two detention basins at the I-17 and Thunderbird Road traffic interchange, pavement replacement on the frontage road, signing, striping, improvements to ADA features within the project area, and removal of the four existing pump stations.

Construction began in January 2020 and is expected to take two years to complete.

Update:

- **The ADOT project team is maintaining access to homes and businesses while the frontage road closures are in place. If a section of frontage road is closed, alternate routes may include travel on local streets in the area.**

Interstate 17 - Indian School Traffic Interchange Study

ADOT has completed an environmental study and Design Concept Report (DCR) for a project to improve traffic flow and safety at I-17 and Indian School Road. The study area encompasses Indian School Road between 19th and 31st avenues and I-17 from approximately one-half mile south and one-half mile north of Indian School Road

Approximately 50,000 vehicles use east- and westbound Indian School Road at I-17 per day. This volume is 40 percent higher than on Thomas Road at I-17 (one mile south) and 25 percent higher than on Camelback Road at I-17 (one mile north). Traffic congestion levels on Indian School Road at I-17 are projected to continue increasing.

After evaluating options for a new traffic interchange in this location, a three-level diamond interchange was advanced as the Recommended Build Alternative. If

constructed, this interchange would include:

- A flyover bridge along Indian School Road to allow east-west through traffic to bypass the intersections at the I-17 ramps and frontage roads
- New roadways approaching the flyover bridge with embankments and retaining walls
- A reconstructed and widened Indian School Road to accommodate the flyover bridge and new approaches
- Two new pedestrian bridges - one north and one south of Indian School Road - to allow pedestrians to cross I-17 safely

Construction is scheduled to begin in late summer 2021 and last 18 to 24 months.

Interstate 10 - Broadway Curve

The I-10 Broadway Curve project is planned to improve a segment of I-10 between the I-10/I-17 Split Traffic Interchange and the South Mountain Freeway/Congressman Ed Pastor Freeway State Route 202 near Pecos Road. The project encompasses one of the most heavily traveled segments of freeway in the Valley. Traffic volumes within this 11-mile section of I-10 exceed 250,000 vehicles per day and include vital connections to I-17, State Route 143, US-60, and State Route 202.

The proposed improvements being studied include:

- Adding general purpose and high occupancy vehicle (HOV) lanes
- Adding a collector-distributor road system to reduce the number of lane changes on the freeway
- Improving connections between I-10 and the State Route 143 and Broadway Road to improve HOV lane connections
- Improving connections of I-10 and US 60 (Superstition Freeway)
- Constructing new bridges to accommodate new interchange facilities and additional lanes
- Building retaining and sound walls
- Constructing pedestrian bridge crossings to improve pedestrian access across the freeway

Construction is scheduled to begin in summer 2021.

Update:

- **City of Phoenix technical staff is participating with ADOT in reviewing and ranking the three project proposals from Kiewit/ HDR, Pulice/FNF/Flatiron (PFF), Granite/Sundt/Parsons (AZ Mobility Partners). It is expected that a preferred proposer will be selected in October/November 2020.**

Interstate 10 Deck Park (Hance Park) Tunnel Repair

The Deck Park Tunnel is an underpass that carries the I-10 freeway beneath downtown Phoenix between 3rd Avenue and 3rd Street. The tunnel consists of a series of nineteen side-by-side bridge structures. Construction of the facility began in 1983 and opened to traffic on Aug. 10, 1990. The tunnel carries approximately 230,000 vehicle trips per day and provides a critical link for regional connectivity and mobility.

Leaks in the ceiling structure of the Deck Park Tunnel have occurred in the past and continue to appear. The water infiltration caused by the leaks can lead to deterioration of the tunnel infrastructure and impacts the ventilation and electrical systems, which could force closure of the tunnel to traffic. There is also concern that any damage could produce a need for repairs that would require excavation of Margaret T. Hance Park, which is undergoing a major, \$100 million revitalization expected to begin in March 2020.

ADOT, MAG and the City of Phoenix initiated an I-10 Deck Park Tunnel Waterproofing Study in May 2019 because of concern with the integrity of the tunnel. The goal of the study was to evaluate the current water-tightness of the tunnel structure and provide recommendations that minimize the potential for significant leak-related problems for the next 25 years.

The study concluded in August 2019 and recommended that all joints that have not been repaired in the last five years be replaced, which comprises 15 of the 19 total joints. ADOT intends on working closely with the City of Phoenix to coordinate construction activities of the joint work with the Hance Park revitalization project to minimize cost and public disturbance.

Construction began in March 2020.

Update:

- **Repairs to Interstate-10 tunnel joints located under the west side of the park property are complete, and crews continue the process of installing geofoam to develop the escarpment that borders the play area and curves through this side of the park. Geofoam provides a lightweight fill that is necessary to change the park's elevation, while managing weight restrictions for the portions of the park that are over the I-10 tunnel.**

Interstate 17 - Central Avenue Bridge Reconstruction

The scope of this project is to replace the existing I-17 and Central Avenue bridge. The

bridge was constructed in 1962 and is nearing the end of its useful service life. The existing vertical clearance of 13 feet, 11 inches over Central Avenue does not meet current design standards, prohibiting high-profile vehicles from using Central Avenue beneath the bridge, and cannot accommodate the Valley Metro South Central Light Rail Extension. The bridge will be widened to accommodate auxiliary lanes between successive ramps on I-17. The project includes new I-17 roadway approaches, retaining walls, FMS improvements, lighting improvements, drainage improvements, and signing and striping.

Construction began in April 2020 and is expected to be completed in fall 2021.

Update:

- **Currently, there are lane restrictions on I-17 in both directions as work continues on the bridge replacement at Central Avenue. North and southbound I-17 are narrowed to two lanes (left lane closed) between Seventh Street and Seventh Avenue.**

US60 (Grand Avenue) - 35th Avenue - Indian School Road Study

ADOT and the Federal Highway Administration (FHWA), in coordination with the BNSF Railway, City of Phoenix and MAG, are initiating a Draft Environmental Assessment (EA) and initial Design Concept Report (DCR) for the US 60 (Grand Avenue), 35th Avenue and Indian School Road intersection.

The study proposes that improvements need to be made to the US 60 corridor functionality, arterial street network multimodal opportunities (e.g., expansion of bicycle lane network), and BNSF Railway corridor capacity. These improvements would reduce traffic congestion, improve pedestrian and vehicular safety and enhance multimodal transportation options.

Update:

- **A number of residents and businesses attended an ADOT virtual public scoping meeting on Oct. 22, 2020. Meetings were conducted in English and Spanish. A formal presentation was given with information about the study background and goals (including existing and projected traffic operations, as well as crashes at the intersection), options being considered to improve traffic flow, the study process and timeline and how to provide comments.**

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the City Manager's Office.



Better Utilizing Infrastructure Leveraging Development 2020 Grant Award - 35th Avenue Safety Corridor Project

This report provides an update to the Transportation, Infrastructure and Innovation Subcommittee on the U.S. Department of Transportation Better Utilizing Infrastructure Leveraging Development (BUILD) 2020 Grant Award. Phoenix was awarded nearly \$17.5 million to make safety and technology improvements to the 35th Avenue corridor between Interstate 10 (I-10) and Camelback Road.

THIS ITEM IS FOR INFORMATION ONLY.

Summary

The BUILD grant is an extremely competitive process. Receiving a national grant to improve multimodal safety on one of Phoenix's busiest roadways by implementing innovative technology is an exciting opportunity for the City of Phoenix. The Project area, 35th Avenue between I-10 and Camelback Road, serves students and families that walk, bike and use transit daily.

This highly utilized 3.2-mile section of roadway has between 24,000 and 35,000 vehicles per day. The 35th Avenue corridor currently serves about 250 small businesses and 8,000 employees across a wide spectrum of business sectors, including manufacturing and distribution. It is also one of the City's highest transit ridership areas with an average of 5,200 daily riders. Diverse land uses across the 35th Avenue corridor include multi-family residential, commercial and industrial developments, multiple K-12 schools, two community parks and the campus of Grand Canyon University.

Receiving this BUILD grant award leverages and supports the City's Transportation 2050 (T2050) Plan since this portion of 35th Avenue has been identified as a T2050 Safety Corridor and is also a major public transit corridor. Between I-10 and Camelback Road, 35th Avenue has been identified as a pedestrian safety 'hot spot' where a higher number of pedestrian-related collisions and injuries have occurred in recent years. Project improvements will include increased lighting, signalized mid-block crossings and raised medians, which will contribute to overall safety, especially for pedestrians.

Further, with the population of residents adjacent to the 35th Avenue corridor being predominantly young (33 percent of the population is under the age of 18) and likely to attend one of the 10 K-12 schools in the corridor, the project improvements will also address providing safe access to schools in the area.

The BUILD grant requires a local match of \$7.5 million, which the City will fund using a combination of T2050 revenues and Arizona Highway User Revenue Funds (HURF). The initial grant award triggers a series of next steps, including environmental surveys and pre-design activities. Design of the project is anticipated to start in spring 2021, with construction anticipated to start in late 2022 with a goal of completing construction in early 2025.

35th Avenue Safety Corridor Project Improvements

The 35th Avenue Safety Corridor Project consists of improvements that advance safety, mobility and economic development in the project area. A visual overview is included in **Attachment A**. Targeted improvements include:

- Installing three new pedestrian hybrid beacons (illuminated pedestrian-activated signals) along 35th Avenue at or near the Coronado Road, Grand Canal Multi-Use Path and Turney Avenue intersections to increase mid-block pedestrian crossing opportunities;
- Installing raised medians at various locations throughout the project corridor to provide greater vehicle separation and a safe refuge to pedestrians without restricting existing traffic movements;
- Rebuilding nine signalized intersections to modern standards that allow for support of new traffic technologies and safer operations;
- Installing LED street lighting along the west side of 35th Avenue, completing dual-sided lighting throughout the corridor and improving safety for drivers and pedestrians;
- Milling and overlaying the pavement between McDowell Road and Camelback Road to provide a smooth driving surface and reduce future maintenance needs;
- Installing broadband fiber optic cable to improve the corridor's capacity for data sharing and allowing for the future integration of autonomous and innovative technologies; and
- Updating traffic signal programming to improve roadway efficiency. Traffic signal optimization can reduce travel times by nearly 20 percent, potentially saving 90,000 hours for commuters annually.

Financial Impact

The BUILD grant requires a local match of \$7.5 million, which the City will fund using T2050 revenues and HURF.

Concurrence/Previous Council Action

The City Council authorized the application for and acceptance of the 'Better Utilizing Investments to Leverage Development' Grant (Ordinance S-46531) on April 15, 2020.

Location

35th Avenue between I-10 and Camelback Road
Council Districts: 4 and 5

Responsible Department

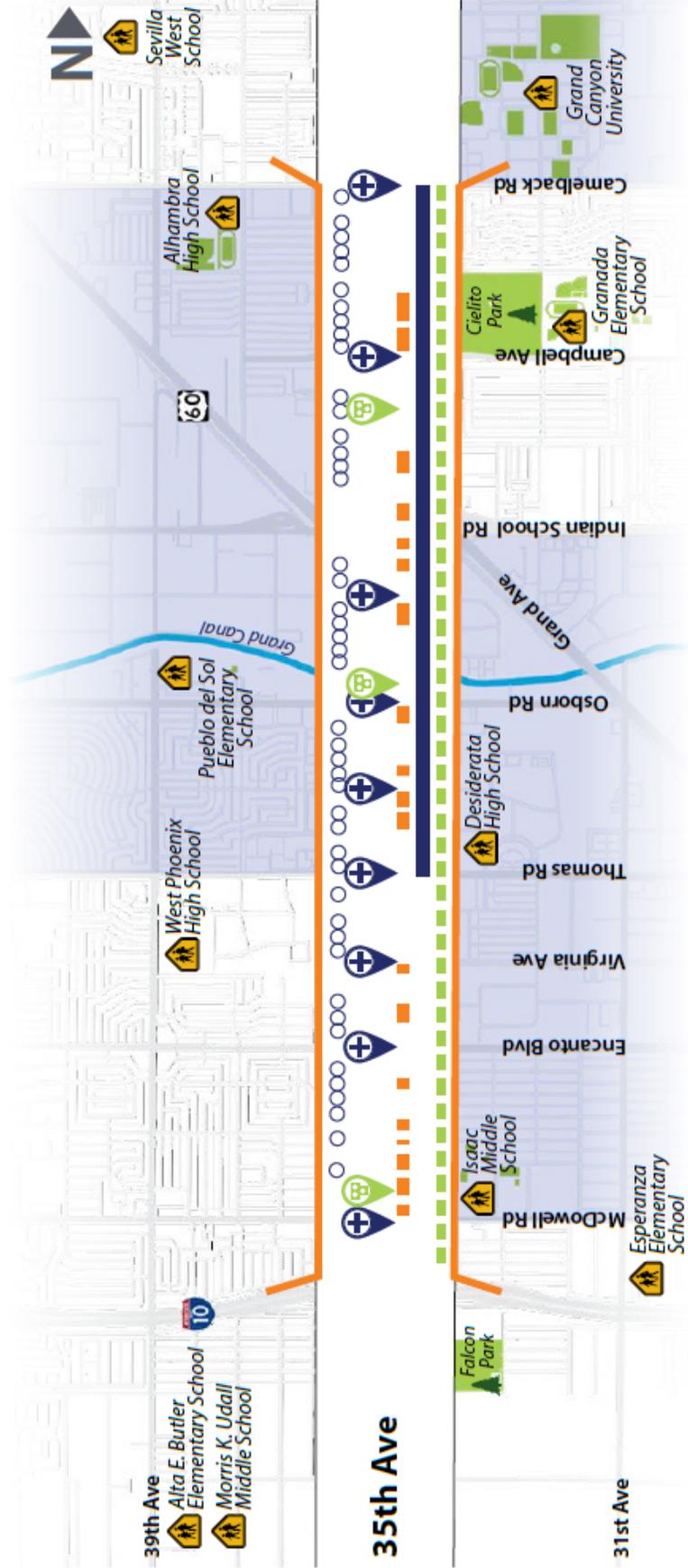
This item is submitted by Deputy City Manager Mario Paniagua and the Street Transportation Department.

Attachment A

OVERVIEW OF 35TH AVENUE SAFETY CORRIDOR PROJECT IMPROVEMENTS

Legend	
	Project Length
	School
	Opportunity Zones

Project Goals	* Proposed PHB Location	Raised Center Median	Intersection Rebuild	Street Lighting	Pavement Mill & Overlay	Install Fiber Optic Cable
	✓	✓	✓	✓	✓	
	✓		✓		✓	✓
			✓			✓



* PHB = Pedestrian Hybrid Beacon

Similar to a HAWK, this is a type of pedestrian-activated signal at a crosswalk that alerts drivers to stop when someone intends to cross.



Fiscal Year 2020 Transportation 2050 (T2050) Annual Progress Report

This report provides information to the Transportation, Infrastructure and Innovation Subcommittee on the status of the Transportation 2050 (T2050) Annual Progress Report for Fiscal Year (FY) 2020.

THIS ITEM IS FOR INFORMATION ONLY.

Summary

Beginning in 2017, the T2050 Annual Progress Report was developed each year to report the progress of the T2050 35-year initiative. Progress Report #1 covered the period from Jan. 1, 2016 to June 30, 2017, Progress Report #2 covered FY 2018, and Progress Report #3 covered FY 2019.

This is the fourth Phoenix T2050 Annual Progress Report. It covers FY 2020 and includes program status, financial information, annual and inception-to-date accomplishments, one- and five-year plans, and the status of major projects within the program. Like the first three progress reports, this report covers the various funding sources contributing to the T2050 program, the assumptions used in the development of the overall financial plan, and the status of the 35-year goals.

Staff has worked with the Program Management Consultant (PMC) to develop the FY 2020 T2050 Annual Progress Report. The complete report will be available online in an interactive format, with a print version shown here as **Attachment A**. The report includes:

Chapter 1 - Program Overview

Provides an overview of the development of the T2050 program, a dashboard comparison of current progress and expected 10 percent completion, and oversight.

Chapter 2 - Bus and Dial-a-Ride Service

Discusses the projects, programs and activities of the bus and Dial-a-Ride service including FY 2020 accomplishments, cumulative inception-to-date accomplishments, and goals.

Chapter 3 - High Capacity Transit

Discusses the projects, programs and activities of the high capacity transit service including FY 2020 accomplishments, cumulative inception-to-date accomplishments, and goals.

Chapter 4 - Street Maintenance and Improvements

Discusses the projects, programs and activities of street maintenance and improvements service including FY 2020 accomplishments, cumulative inception-to-date accomplishments, and goals.

Appendices

Provides tables of the T2050 sales tax projected revenue stream, FY 2020 financial overview, and five-year implementation plan. Covers the various funding sources contributing to the T2050 program, the assumptions used in the development of the overall financial plan, and the status of the 35-year life-cycle program.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Street Transportation and Public Transit departments.



**ANNUAL
PROGRESS
REPORT
FY 2020**

JULY 1, 2019
THROUGH
JUNE 30, 2020

MESSAGE FROM LEADERSHIP



Mayor Kate Gallego

"T2050 is more than just a plan; it's an investment in our community, to get our residents more connected. Phoenix is one of the fastest-growing cities in the country and we show that through our investment in building a multimodal transit plan that is reflective of our residents and the needs of every individual to thrive. While 2020 has been a different year than most, our progress has not slowed – we have added more bus stop shelters for shade, started our cool pavement pilot project, used recycled asphalt and continued to grow our light rail. Robust, inclusive transportation options for Phoenix are becoming a reality with the help of the smart, long-range planning of T2050."



Councilwoman Thelda Williams
Chair, Transportation, Infrastructure and
Innovation Subcommittee

"Transportation infrastructure is vital not only because it moves people from place to place, but it supports public safety, economic development and education. Since the passing of T2050, transportation and transit infrastructure in Phoenix continues to make great strides. In 2019, Phoenix underwent the largest street paving season in the city's history, treating more than 290 miles of roadways. Construction on several major light rail projects began and a study on neighborhood circulators is underway – these investments are key for improving connectivity and accessibility for our residents."



Commissioner Jennifer Mellor
Chair, Citizens Transportation
Commission

"T2050 was a voter-approved ballot initiative to enhance Phoenix's transportation infrastructure, including bus, rail and streets. Since its inception in 2016, members of the Citizens Transportation Commission have made it a priority to ensure that the vision of the voters is carried forward. Although 2020 has brought new challenges, the CTC remains committed to delivering on this vision and continues to monitor funding and other impacts as a result of COVID-19. T2050 will continue to provide much-needed transportation solutions to support Phoenix's continued economic growth."

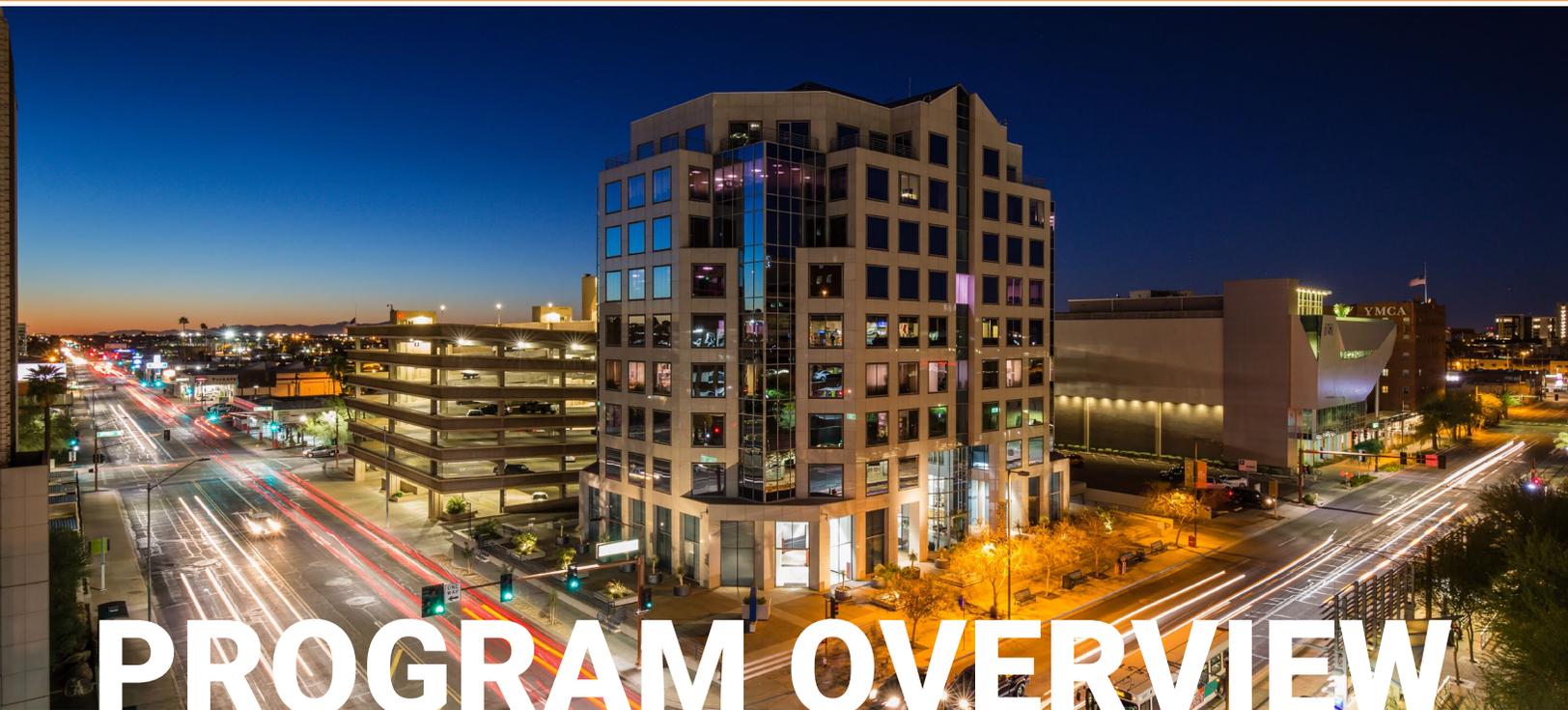
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Annual Progress Report – Fiscal Year 2020
Interactive features may be found throughout the document in [orange](#).

1.0



Program Overview



PROGRAM OVERVIEW



Phoenix's 35-year Transportation 2050 (T2050) plan dedicates revenue to improving transit service and the street network throughout

the city. On Aug. 25, 2015, Phoenix voters approved Proposition 104, which replaced the previous 0.4% sales tax with a 0.7% sales tax. The new sales tax became effective Jan. 1, 2016 and allocates 70 cents of each \$100 spent to the city's transportation needs. Approximately 86% of funds are dedicated to public transit and 14% to supplement street maintenance and improvement funds.



T2050 revenues supplement other sources of transportation funding, allowing the city to accomplish more. This report identifies T2050 accomplishments for fiscal year (FY) 2020 – July 1, 2019 to June 30, 2020 – plus cumulative progress and an overview of improvements planned for the next five years.



On Dec. 3, 2019, Mayor Gallego, Councilwoman Williams, City Manager Ed Zuercher, Deputy City Manager Mario Paniagua, Street Transportation Director Kini Knudson and the project team and contractors celebrated Phoenix's most successful paving season in history. During FY 2020, the Street Transportation Department completed 296 miles of mill and overlay treatment on all streets and 686 miles of other pavement treatments such as microsurfacing, fog sealing and crack seal.

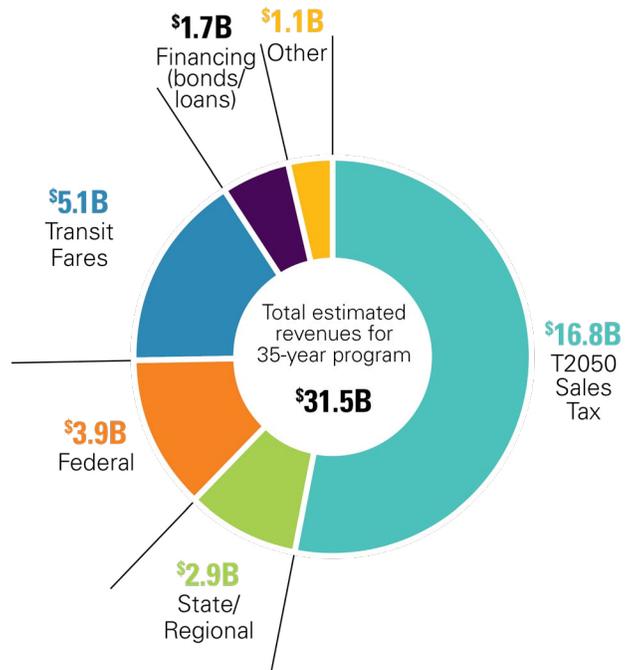
Lifecycle Revenues

Over the course of 35 years, a little over half of the estimated \$31.5 billion in overall T2050 funding is expected to be generated from the sales tax. The remaining funds will be comprised of federal, state, regional and local funding sources. shows funding sources as established at the program's launch.

In addition to these funds, the staff of the Public Transit and Street Transportation departments pursue opportunities to reduce costs through innovation and efficient project delivery methods.

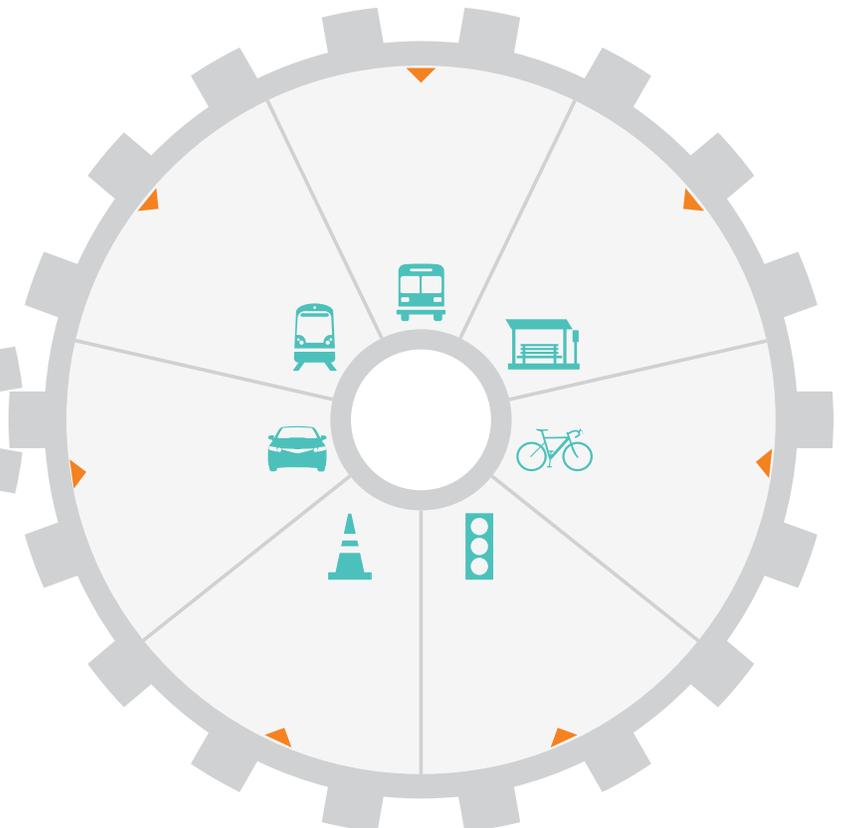
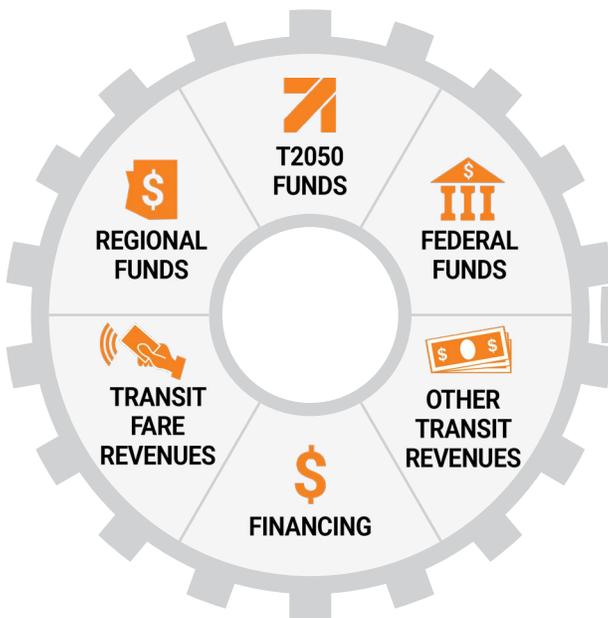
More information on program assumptions can be found in the appendix, with projected and actual sales tax revenue shown in [Table A.1](#). Additional regional and federal funding information is also available at phoenix.gov/T2050/Funding.

Figure 1.1 Sources of Funds



T2050 PROGRAM AREAS

T2050 FUNDING

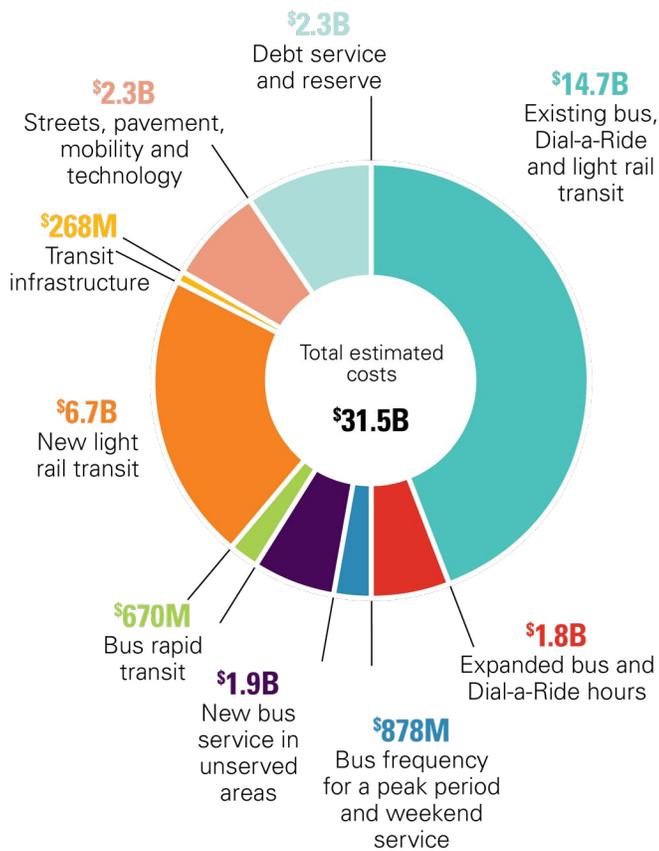


Lifecycle Expenditures

At times, T2050's projected revenue will exceed projected expenditures for a given year. This deliberate strategy helps ensure that the plan has available funds in future years for large expenses, such as light rail projects and park-and-ride facilities.

shows planned uses of funds as established at the program's launch.

Figure 1.2 Planned Uses of Funds



Impact of COVID-19

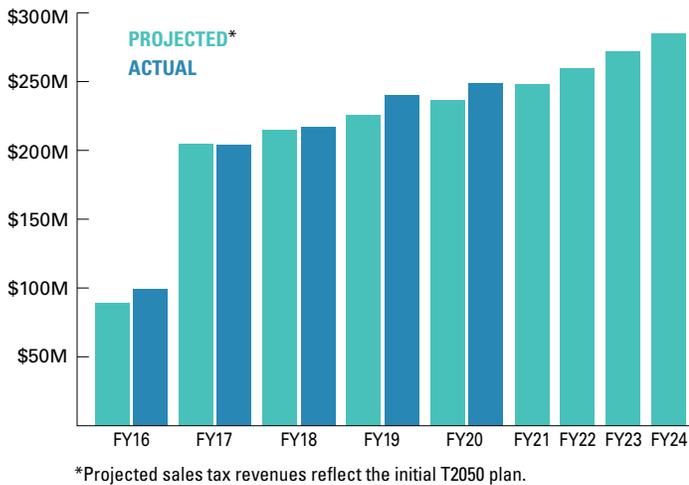
The COVID-19 pandemic has resulted in a great deal of economic uncertainty, which will likely negatively affect previous revenue projections. On March 30, 2020, *Executive Order 2020-18* was issued in Arizona to promote physical distancing and limit individuals' time away from their residences, with the exception of essential activities. Effective June 20, 2020, a *declaration* was issued in Phoenix requiring people to utilize face coverings that cover their noses and mouths.

The effects of changes due to the pandemic are noted within each program area of this report.

FY 2020 Financial Summary and Projection

The total budget for FY 2020 was \$752.2 million. Table A.2 in the appendix provides details of budgeted and actual revenue and expenditures. Projected and actual sales tax revenue, as well as short-term projected revenue figures, are shown in The FY 2020–2024 five-year financial plan is provided in Table A.3 in the appendix.

Figure 1.3 T2050 Sales Tax Revenue Summary



Public Outreach

Engaging with the public is vital to understanding residents’ transportation needs. Staff members host open houses and public meetings, and attend community events to provide information and gather input. Public input is sought on a variety of topics such as planning bus routes and extensions, future station locations for light rail, potential bus rapid transit routes, building and improving roads, and creating and improving bike lanes.

Beginning in March 2020, in-person public outreach meetings were temporarily suspended and staff members were directed not to attend community meetings due to the pandemic; however, many outreach events occurred prior to this time. Staff members also adapted to a new way of conducting business by hosting virtual public meetings accessible by phone or computer — complete with presentations, a variety of speakers and public question-and-answer segments.



Transportation, Infrastructure and Innovation Subcommittee Members (top row, left–right): Councilwoman Thelda Williams, Chair; Vice Mayor Betty Guardado; (second row, left–right): Councilwoman Laura Pastor, Councilwoman Debra Stark.

Formal Oversight

The Citizens Transportation Commission (CTC) was established in 2015 by the mayor and Phoenix City Council for the T2050 program. Fifteen commissioners are appointed by the Phoenix City Council to address street and transit needs, provide oversight on the expenditure of funds and make recommendations on plan elements. Current members include Chairwoman Jennifer Mellor, Vice Chairman Rick Naimark, David Adame, Sue Glawe, Luis Heredia, Gail Knight, Gabriel Loyola, David Martin, Roy Miller, David Moody, Alex Navidad, Brookelynn Nisenbaum, Phil Pangrazio, David Siebert and William Smith.

The Phoenix City Council’s Transportation, Infrastructure and Innovation subcommittee provides guidance, approvals and recommendations on policies related to infrastructure, transportation, transit, streets, aviation/airport, water, technology, smart cities, innovation and sustainability.

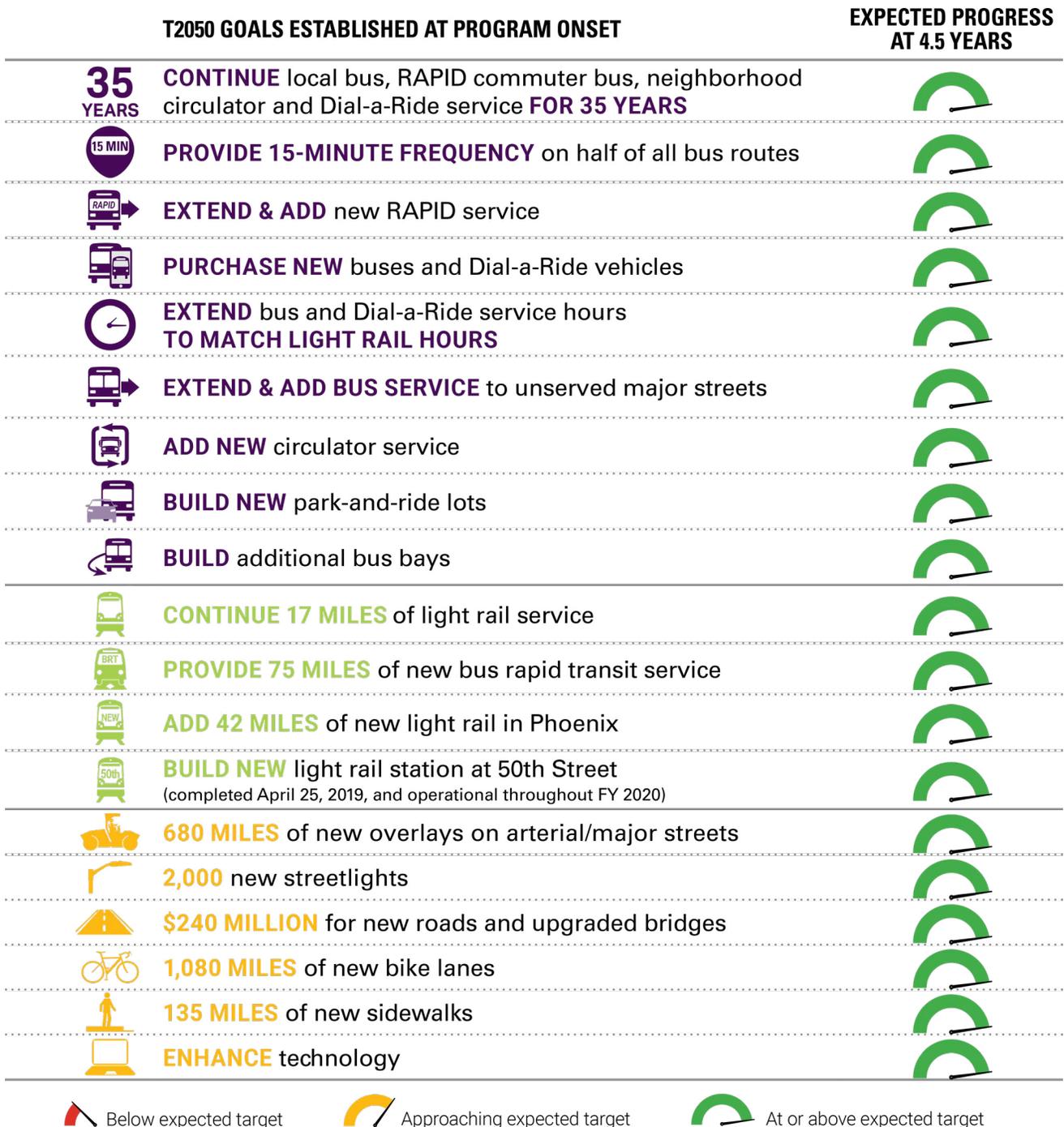
Additional oversight is provided through the Phoenix City Council, and opportunities for public input occur at these meetings as well.

35-Year Goals Established at the Onset of T2050

On Jan. 1, 2016, the voter-approved 35-year sales tax became effective. A dashboard comparing the progress expected at four-and-a-half years to the progress made since the inception of the program is provided below. City leaders established the program goals based on the [Proposition 104](#) ballot language. These goals are expected to evolve as the program progresses. Additional

information is available through the interactive links and included throughout this report.

Please note that this dashboard represents progress from Jan. 1, 2016 through June 30, 2020. Beginning in the third quarter of FY 2020, effects of the COVID-19 pandemic began and resulting impacts remain in flux at the time of publishing this report.



2.0



Bus and Dial-a-Ride

BUS AND DIAL-A-RIDE

 **CUMULATIVE PROGRESS** JAN. 1, 2016–JUNE 30, 2020

EXTENDED SERVICE HOURS

for bus and Dial-a-Ride to **MATCH LIGHT RAIL HOURS (FY 2017)**



INCREASED FREQUENCY*

off-peak to **15 MIN** on five routes:



41

Indian School Road
(FY 2019)

19

19th Avenue
(FY 2018)

3

Van Buren Street
(FY 2018)

50

Camelback Road
(FY 2018)

29

Thomas Road
(FY 2018)

Weekday service levels on five holidays reinstated
(previously on a Sunday schedule)

RAPID service
frequency increases

Weekdays and weekends
to 30 MIN or better

ORDERED

 **319** Local Buses

 **37** Rapid Buses

 **97** Dial-a-Ride Vehicles

 **3** Circulator Buses

INSTALLED

 **6** Bus Bays

 **49** Bus Stops

 **257** Bus Shelter Shade Structures

EXTENDED BUS ROUTES

51 51st Avenue Lower Buckeye Road to Baseline Road (FY 2017)

60 16th Street Bethany Home Road & 16th Street to Camelback Road & 24th Street (FY 2018)

19 23rd Avenue Happy Valley Road to Pinnacle Peak Road (FY 2018)

39 Shea Boulevard Dreamy Draw Park-and-Ride to 40th Street (FY 2017)

122 Cactus Road ASU West Campus to 19th Avenue/Dunlap Avenue Light Rail (FY 2017)

ADDED BUS ROUTES

32 32nd Street Camelback Road to Baseline Road & Priest Drive (FY 2017)

140 Ray Road 48th Street to Gilbert Road (FY 2018)

** On May 4, 2020, service was temporarily reduced due to the COVID-19 pandemic and its impact on transit demand.*

BUS AND DIAL-A-RIDE

 **CUMULATIVE PROGRESS** JAN. 1, 2016–JUNE 30, 2020

OTHER IMPROVEMENTS COMPLETED

\$123 MILLION RECEIVED
in Federal Transit Administration (FTA) formula grants for Phoenix transit (4.5-year total)

\$9 MILLION RECEIVED
in competitive grant funding to purchase buses (4.5-year total)

 **LIQUEFIED NATURAL GAS**
contract saves \$2 million in fuel costs each year (FY 2018)

 **WEST TRANSIT FACILITY**
awarded contract (FY 2019)

 **NORTH AND SOUTH FACILITIES**
awarded contract (FY 2020)

 **ALTERNATIVE TRANSPORTATION SERVICES**
technology enhancements include: ADA Ride, Senior Ride and Senior Center Shuttle, Employment Transportation and Medical Trip (FY 2019)



TRIPSPARK
customer web portal for Dial-a-Ride reservations (FY 2018)



SECURITY
K-9 Security Unit Grant (FY 2017)



REGIONAL DIAL-A-RIDE IMPLEMENTED
eliminating transfers (FY 2017)



SOUTH TRANSIT FACILITY
refurbished (FY 2019)



COMPUTER AIDED DISPATCH/ AUTOMATED VEHICLE LOCATION
upgrades installed (FY 2020)



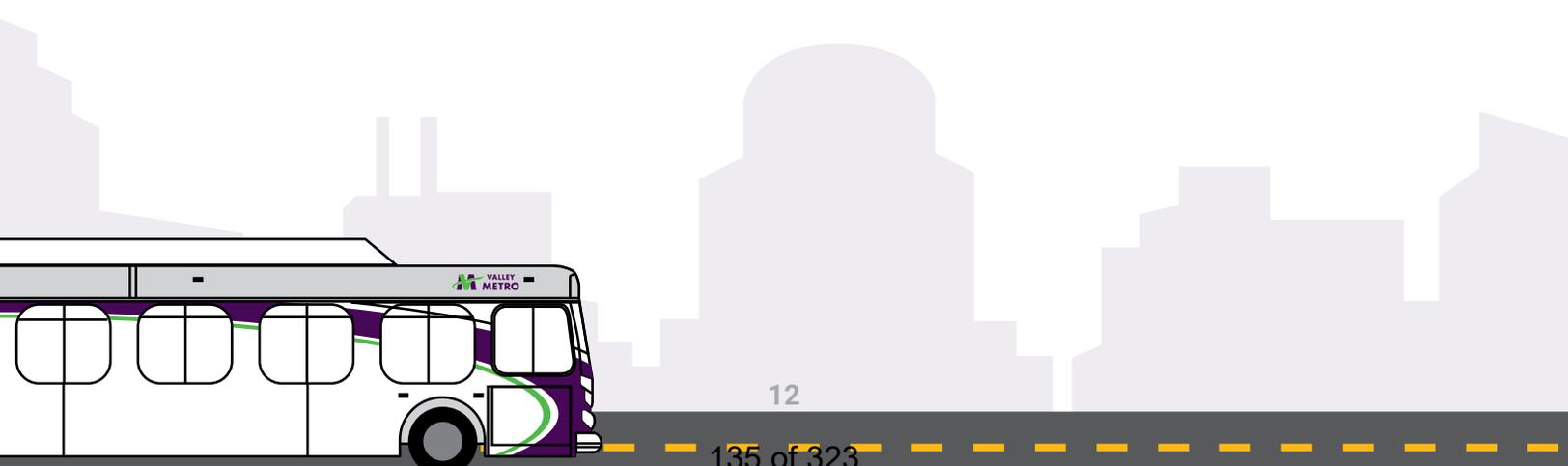
AUDIO ON DIGITAL BUS SIGNS
(FY 2018)



FARE COLLECTION SYSTEM
awarded contract (FY 2020)



OPERATIONS CONTROL CENTER
awarded contract (FY 2020)





BUS AND DIAL-A-RIDE



Phoenix residents have access to an array of public transportation services. In addition to fixed route bus and light rail service, transportation options include neighborhood circulators, express commuter buses and alternative transportation services such as Dial-a-Ride (DAR) for people with special needs.

The Phoenix Public Transit Department (PTD) coordinates with Valley Metro, the regional public transportation agency that provides coordinated transit services to riders in the metro area. Additional transit information is available at phoenix.gov/publictransit.

Funding and Budget

In addition to T2050 sales tax revenues, Phoenix's T2050 plan utilizes federal grants, fare revenues, transit advertising and the Regional Public Transportation Fund for bus and DAR.

Funding of \$248 million was utilized in FY 2020 to support ongoing operations and system improvements, which included greater bus frequency, additional and extended bus routes, new vehicles, shaded bus stops, and security and technology enhancements. Phoenix's T2050 plan for the next five years includes funding of \$1.5 billion to continue bus and DAR operations and provide for additional capital investments to maintain the system in a state of good repair and further expand and enhance the system.



Since T2050's inception, 257 new shade structures have been installed at transit stops. By the end of FY 2025, transit riders should expect to find 400 more shade structures.

COVID-19 Response

On March 30, 2020, [Executive Order 2020-18](#) was issued in Arizona limiting the use of public transportation to when absolutely necessary to conduct or participate in essential activities or attend work in an essential function. Public transit was identified as a critical service, which provides transportation to essential service workers in the community. Staff members and contractors have been informed about current health and safety protocols. The health and safety of staff members, contractors, community members and the traveling public are a top priority for PTD.

The PTD, Valley Metro and other transit partners implemented a variety of safety measures designed to protect passengers and employees, which include the following:

- As a result of stay-at-home orders and increased teleworking, Express and RAPID bus service schedules were reduced on April 6, 2020, to ensure that resources could be allocated to service needs with the greatest demand.
- Effective April 13, 2020, maximum seating on buses was limited to accommodate social distancing measures recommended by national and local health agencies.
- Beginning May 4, 2020, Phoenix implemented bus service reductions as approved by the Phoenix City Council in response to the pandemic's impact on the transit workforce and lower ridership. The reduced service day begins at approximately 5 a.m. Monday through Friday and at 6 a.m. Saturday and Sunday. Service is also reduced for trips beginning after 11 p.m.
- Effective June 20, 2020, passengers were required to wear face coverings while riding transit in Phoenix. The use of face coverings was also strongly encouraged while waiting at bus stops or other transit areas where social distancing may not be possible.
- Face masks for riders were available at the Central Station, Ed Pastor, Metrocenter and Sunnyslope transit centers, as well as at the Burton Barr, Cesar Chavez, Desert Sage, Harmon, Palo Verde, Saguaro and Yucca libraries.
- PTD staff worked with its contracted service providers on options for a temporary barrier between the operator and passengers on buses. The temporary barrier was designed to be kept in place until a permanent barrier could be installed.
- PTD and Valley Metro promoted social distancing by placing signs on buses and bus stops, and messages on websites and social media, that recommend transit use for essential trips only, note passenger limits and the use of rear-door boarding procedures and urge riders to use a mask or cloth face cover.
- Additional preventive measures have included the availability of hand sanitizer on buses, visual fare inspections and enhanced cleanings of transit vehicles and assets throughout the transit environment.



Local Fixed Route



Local fixed route bus service is the foundation of the public transportation network. Routes operate on a grid and provide transportation for riders traveling throughout the Valley. Prior to reductions in service due to the pandemic, bus services were available nearly 24 hours per day.

Last year, there were more than 43 million passenger boardings in Phoenix. Since the onset of the pandemic, bus and light rail continue to be utilized by riders performing essential services, recognizing that safety measures have been put in place throughout the transit environment.

Dial-a-Ride and Alternative Transportation Services



Phoenix provides a variety of alternative transportation options including DAR, ADA Ride, Senior Ride and Senior Center Shuttle, Employment Transportation and Medical Trip.

DAR service complements fixed route bus service and operates during the same service hours. DAR is a federally required paratransit service that provides a convenient transportation option for those unable to ride the bus or light rail. Trips can be scheduled by phone or through TripSpark, the online reservation tool launched in 2018.

Circulator Service



Four circulator routes – ALEX (Ahwatukee Local Explorer), DASH (Downtown Area Shuttle), MARY (Maryvale Area Ride for You) and SMART (Sunnyslope Multi-Access Residential Transit) – connect area residents with key neighborhood destinations such as libraries, grocery stores and community centers.

In the past year, the project team began a study on the role of circulators and other forms of small-scale services within the transit network. The team will examine and evaluate the current circulator routes and identify opportunities for service improvements. Additionally, areas that might benefit from other small-scale transit service are being investigated. The team will seek public input on possible locations for new service.

RAPID Commuter



Phoenix offers six RAPID routes that provide residents in suburban areas with another option for commuting to downtown Phoenix. A new RAPID route to service southwest Phoenix and the planned Laveen Park-and-Ride is anticipated in 2024.

Table 2.1 T2050 Bus and Dial-a-Ride Progress

Completed FY 2020 (July 1, 2019–June 30, 2020)
Fund existing bus, RAPID commuter bus, neighborhood circulator and Dial-a-Ride service for 35 years <ul style="list-style-type: none"> Continue to provide safe and reliable services. Maintain bus and Dial-a-Ride service hours to match light rail hours. (Note: On April 11, 2020, light rail hours were adjusted in response to the COVID-19 pandemic.)
Improve bus frequency <ul style="list-style-type: none"> Due to the COVID-19 pandemic and its impact on transit demand and the transit workforce, transit services were temporarily reduced effective May 4, 2020.
New buses and Dial-a-Ride vehicles <ul style="list-style-type: none"> Ordered 61 buses, three circulator buses and 25 Dial-a-Ride vehicles.
Extend and add bus service to unserved major streets <ul style="list-style-type: none"> Adjusted routing of Routes 7 and 60 in April 2020.
Circulator service <ul style="list-style-type: none"> Adjusted routing of SMART circulator in April 2020. Began study of circulators and other small-scale transit services.
Bus bays <ul style="list-style-type: none"> Installed one bus bay (Bethany Home Road and 7th Street).
Bus stops <ul style="list-style-type: none"> Installed nine new bus stops. Installed 35 new shade structures at existing bus stops.
Incorporate technology <ul style="list-style-type: none"> Installed Computer-Aided Dispatch/Automated Vehicle Location (CAD/AVL) upgrade on entire fleet. Awarded contract for Regional Fare Collection System (FCS) Improvement Project on March 18, 2020.
Increase security <ul style="list-style-type: none"> Due to the pandemic and the related decreased bus span of service, security hours at transit centers were reduced.
Other progress <ul style="list-style-type: none"> Awarded contracts for North and South facilities fixed route service on May 6, 2020. Awarded contract for Operations Control Center on March 18, 2020.

Park-and-Ride



The Public Transit Department operates and maintains nine park-and-ride facilities, which provide free parking for transit users, and include the Sunnyslope, Metrocenter and Desert Sky transit centers. Currently, Valley Metro manages five light rail park-and-ride locations along the Phoenix portion of the light rail alignment. A new park-and-ride facility is anticipated to open in Laveen near Baseline Road and the South Mountain Freeway in 2024.

Bus Stops and Shelters



Nine new bus stops were added to the Phoenix transit network and shade structures were installed at 35 existing bus stops during the past fiscal year. Future plans include installing additional shade structures at 80 existing bus stops for each of the next five years – totaling an additional 400 new shade structures by FY 2025.

Security



Beginning in March 2020, security hours at transit centers were reduced due to the decreased span of bus service hours related to the pandemic. Security hours were not reduced at the Central Station. Security remained present at transit centers during the hours of bus operation. As bus service is expanded, security staffing levels will increase.



The Phoenix Public Transit Department was awarded Employer of the Year by the Phoenix chapter of WTS International, an organization dedicated to advancing women in transportation.



As the largest member of the Valley Metro regional transit system, Phoenix provides local and commuter bus service as well as Dial-a-Ride service for individuals with special needs.

Table 2.2 T2050 Bus and Dial-a-Ride

Planned for FY 2021
<p>Fund existing bus, RAPID commuter bus, neighborhood circulator and Dial-a-Ride service for 35 years</p> <ul style="list-style-type: none"> Continue to provide safe and reliable services. Maintain bus and Dial-a-Ride service hours to match light rail hours.
<p>Improve bus frequency</p> <ul style="list-style-type: none"> Due to the pandemic, the goal to introduce peak service to three routes in October 2020 is on hold. Due to the pandemic, the goal to add weekend frequency to top ridership routes is on hold.
<p>New buses and Dial-a-Ride vehicles</p> <ul style="list-style-type: none"> Order 30 buses, three circulator buses and 25 Dial-a-Ride vehicles.
<p>Extend and add bus service to unserved major streets</p> <ul style="list-style-type: none"> Implement necessary routing changes in response to the South Central Extension/Downtown Hub light rail construction in October 2020.
<p>Bus stops</p> <ul style="list-style-type: none"> Install 80 new shade structures at existing bus stops.
<p>Increase security</p> <ul style="list-style-type: none"> Increase security as service expands.
<p>Incorporate technology</p> <ul style="list-style-type: none"> Implement full CAD/AVL operation by April 2021 due to delays associated with the pandemic. Complete FCS project design.

Technology



The entire regional transit fleet has been converted to the new Computer-Aided Dispatch/Automated Vehicle Location (CAD/AVL) system supplied by Clever Devices Ltd. Features of this upgraded system include remote radio management and redundancy, HASTUS schedule integration, automated passenger counters, ridership analysis, SmartYard (garage scheduling and dispatching system) and Google Transit Feed Specification (real-time bus data). System integration and refinement are in process. Due to delays associated with the COVID-19 public health crisis, final implementation is expected in April 2021.

Another technological enhancement on the horizon is the Regional Fare Collection System (FCS) Improvement Project. FCS will offer transit customers improved fare payment options such as the ability to store value and use mobile passes for increased flexibility. The system also enables innovative options such as fare capping, mobile ticketing and time- and location-based fare products.

The mobile application is expected to launch in February 2022, with reloadable smart cards and reduced fare registration available in February 2023.

Operations and Maintenance Facilities



Bus maintenance, fueling and cleaning take place at three facilities to serve Phoenix bus routes efficiently. On May 6, 2020, the Phoenix City Council approved a five-year, \$790 million contract with Transdev Services, Inc. to provide services at the north and south facilities.

Additionally, the Operations Control Center is crucial to delivering continued bus service and is the nexus of dispatch operations. On March 18, 2020, the Phoenix City Council awarded a five-year, \$14 million contract to Transdev Services, Inc. to provide services at the Operations Control Center.

Table 2.3 T2050 Bus and Dial-a-Ride

Planned for FY 2022–2025
Fund existing bus, RAPID commuter bus, neighborhood circulator and Dial-a-Ride service for 35 years
<ul style="list-style-type: none"> Continue to provide safe and reliable services. Maintain bus and Dial-a-Ride service hours to match light rail hours
New buses and Dial-a-Ride vehicles
<ul style="list-style-type: none"> FY 2022 and FY 2023: Order 40 buses, three circulator buses and 25 Dial-a-Ride vehicles. FY 2024 and FY 2025: Order 60 buses, three circulator buses and 25 Dial-a-Ride vehicles.
Extend and add bus service to unserved major streets
<ul style="list-style-type: none"> FY 2022: Extend two regular fixed routes to unserved markets (pending impacts related to the pandemic). FY 2024: Provide new RAPID service to the planned Laveen Park-and-Ride.
Circulator service
<ul style="list-style-type: none"> FY 2022: Improve MARY and ALEX service to every 30 minutes (pending impacts related to the pandemic)
Build new park-and-ride lots
<ul style="list-style-type: none"> FY 2024: Open Laveen park-and-ride
Bus stops
<ul style="list-style-type: none"> Install 24 new bus stops. Install 320 new shade structures at existing bus stops.
Increase security
<ul style="list-style-type: none"> Increase security as service expands.
Incorporate technology
<ul style="list-style-type: none"> FY 2022: Launch FCS mobile application. FY 2023: Launch reloadable smart cards and reduced fare registration program.



3.0

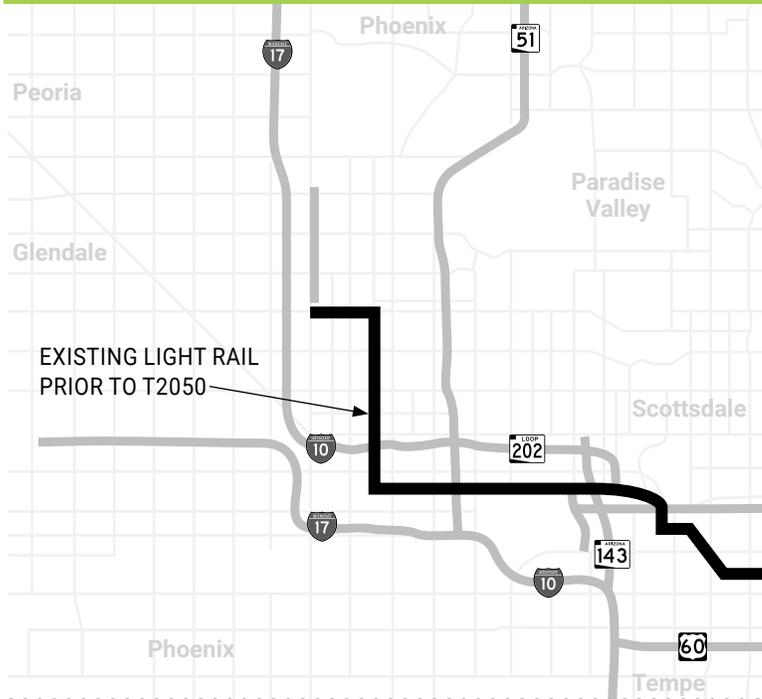


High Capacity Transit

HIGH CAPACITY TRANSIT



CUMULATIVE PROGRESS JAN. 1, 2016–JUNE 30, 2020



LRT Ongoing Projects

CAPITOL/I-10 WEST EXTENSION

- Conducted public meetings for input on options for the downtown route, potential extension to Desert Sky Mall and potential project phasing options
- Continued preparing the federally required Environmental Assessment
- Awarded \$2 million federal transit-oriented development grant

NORTHWEST EXTENSION PHASE II

- Completed design and began the engineering phase
- Continued surveying to identify underground utilities

SOUTH CENTRAL EXTENSION/ DOWNTOWN HUB

- Completed final design and began the engineering phase
- Began construction in October 2019 and began utility relocation
- Completed street improvements at three intersections to help avoid future traffic impacts
- Opened South Central Extension Community Office (2018)
- Awarded two allocations of \$100 million each from the FTA (2019/2020) and a \$2 million federal business assistance grant (2016)

Light Rail Transit (LRT) Completed Projects

50TH STREET STATION

- Opened April 25, 2019
- Received Sustainable Infrastructure Award from Arizona State University's Metis Center



NORTHWEST EXTENSION PHASE I

- Service began March 19, 2016

LRT Deferred Projects

NORTHEAST EXTENSION

- Deferred to end of T2050 program by Phoenix City Council (2018)

WEST PHOENIX TRANSIT CORRIDOR STUDY

- Deferred to end of T2050 program by Phoenix City Council (2019)

Bus Rapid Transit (BRT) Ongoing Projects



BRT SERVICE

- Began extensive public education and outreach for input on six potential corridors





HIGH CAPACITY TRANSIT



High capacity transit (HCT) offers faster travel for more customers than traditional bus service. HCT bypasses vehicular traffic and provides more frequent service using larger-capacity vehicles.

Phoenix currently offers light rail service that operates in exclusive rights of way, at faster travel speeds and with prioritized traffic signaling. With 16.5 miles of light rail service – a substantial portion of the existing 28.2-mile Valley Metro Rail light rail system – the system connects people to the downtown areas of Phoenix, Tempe and Mesa, as well as Sky Harbor Airport and many other key destinations in between.

In addition to light rail, Phoenix is investing in bus rapid transit (BRT), which was identified as a key component of T2050 to continue expanding the city's HCT network. The BRT program is in the planning stages and will offer many of the same amenities light rail riders enjoy, including improved speed, reliability and convenience. Where feasible, BRT is anticipated to provide transit signal priority and queue jump lanes, which give buses a “head start” at intersections. There is also the potential to provide dedicated bus lanes throughout the corridor or in selected areas.

Proposition 105

In November 2018, an initiative was filed that sought to amend the city charter to terminate “the furtherance of any light rail extension or any other fixed rail line transit system.” The Phoenix City Council referred the initiative to Phoenix voters, which became Proposition 105 on the Aug. 27, 2019, ballot. Voters defeated this proposition, reaffirming their support to continue expanding light rail in Phoenix.



In May 2020, the city of Phoenix and Valley Metro conducted a virtual public meeting to gather input on the Capitol/I-10 West Light Rail Extension.

Funding and Budget

The cities of Phoenix, Tempe and Mesa share the funding obligations for the ongoing operations and maintenance of light rail through the unified regional transit system, Valley Metro. These expenses include vehicle operations, security and fare collection, and vehicle and system maintenance and administration costs.

Funding of \$137 million was utilized in FY 2020 to support ongoing light rail operations and expansion. Phoenix's T2050 plan for the next five years includes an investment of more than \$2 billion to expand and improve the city's HCT network. The plan includes light rail improvements and expansion, and development of Bus Rapid Transit (BRT). In addition to revenues generated by the city's T2050 sales tax, other funding sources include federal grants, the Regional Public Transportation Fund, fares and advertising.

COVID-19 Response

On April 11, 2020, light rail hours were modified in response to the COVID-19 pandemic. The first full trip on light rail began at approximately 4:45 a.m. with the last trip starting at 11 p.m. Adjustments included a 15-minute frequency from 5 a.m.–6 p.m. with no late-night service on Friday or Saturday. Sunday service remained the same.

Additional measures affecting public transit and implemented by the Phoenix Public Transit Department, Valley Metro and other transportation providers are identified in Section 2 of this report, Bus and Dial-a-Ride.

As public works construction is an essential service, construction activities were able to progress as planned.

Table 3.1 T2050 High Capacity Transit Progress

Completed FY 2020 (July 1, 2019–June 30, 2020)
Increase light rail in Phoenix
Capitol/I-10 West Extension
<ul style="list-style-type: none">Conducted public meetings for input on options for the route to the Capitol, potential extension to Desert Sky Mall and potential project phasing options.Continued preparing the federally required Environmental Assessment.
Northwest Extension Phase II
<ul style="list-style-type: none">Completed 100% design and began the engineering phase.Continued surveying to identify underground utilities.Conducted public meetings to gather input on the design, station artwork and traction power stations.
South Central Extension/Downtown Hub
<ul style="list-style-type: none">Completed final design and began the engineering phase.Completed street improvements at three intersections (7th Avenue and I-17, 7th Avenue and Southern Avenue, and 7th Street and I-17) in advance of the project to help avoid traffic impacts related to project construction.Began construction in October 2019 and began utility relocation.Awarded two \$100 million allocations from U.S. Department of Transportation's Federal Transit Administration Capital Investment Grants program.Conducted public meetings to gather input on final design, station artwork and traction power stations.Selected Construction Advisory Board.
Begin Bus Rapid Transit program
<ul style="list-style-type: none">Began public education and outreach for input on potential corridors



Light Rail Service

Capitol/I-10 West Extension



The Capitol/I-10 West light rail extension will add 10 miles of light rail service and connect downtown Phoenix to the 79th Avenue Park-and-Ride in Maryvale.

In 2016, the project was split into two phases for design and construction. The first phase, from downtown to the state Capitol, is currently planned for 2024. The second phase, from the Capitol building to the 79th Avenue/I-10 Park-and-Ride, is anticipated to be completed in 2030.

In January and June of 2020, the project team conducted public meetings to gather input on options for the downtown section of the light rail route, the potential extension of the end-of-line from the 79th Avenue Park-and-Ride to Desert Sky Mall and potential phasing options to accelerate completion of the project.

The project team also has continued to prepare the Environmental Assessment (EA) to comply with federal requirements. The EA includes an evaluation of the environmental aspects of the project and a detailed analysis of how light rail would operate along the route.

In June 2020, the Federal Transit Administration (FTA) announced selection of the project for a \$2 million Transit-Oriented Development Grant.

Next steps will include early design work, identification of station locations and continued community outreach.

Table 3.2 T2050 High Capacity Transit Progress

Planned for FY 2021
Increase light rail in Phoenix
Capitol/I-10 West Extension
<ul style="list-style-type: none"> Initiate Environmental Assessment for Phase I of project; confirm transit type for Phase II of project.
Northwest Extension Phase II
<ul style="list-style-type: none"> Continue utility relocation and rail construction.
South Central Extension/Downtown Hub
<ul style="list-style-type: none"> Continue utility relocation and rail construction.
Begin Bus Rapid Transit program
<ul style="list-style-type: none"> Select three BRT corridors as the foundation of the BRT network.

Northwest Extension Phase II



Phase II of the Northwest Extension will extend light rail west on Dunlap Avenue from 19th Avenue, north on 25th Avenue and west of Mountain View across I-17 to terminate near Metrocenter.

In 2016, the Phoenix City Council approved accelerating segments of the project. Northwest Extension Phase II is currently scheduled to open in 2023, three years earlier than originally anticipated.

In August 2019, the project team held a public meeting to provide the community with an opportunity to learn about the project's current design and meet the artists designing public art that will be incorporated at the stations, power substation and Park-and-Ride.

The project design is complete and engineering plans are underway. The project team continues to survey to identify underground utilities.

Next steps include hosting public meetings to share final design and beginning construction in August 2020.

South Central Extension/Downtown Hub



This five-mile project will extend to Baseline Road, connecting South Phoenix residents to downtown Phoenix and the light rail network.

The project also includes a hub in downtown Phoenix, nine new stations and public art.

In September 2019, the project team held public meetings to gather input on the final design, station artwork and traction power stations.

Construction began in October 2019 and the South Central Extension is expected to be operational by 2024.

In the past year, the final project design was completed. Roadway improvements to increase vehicle flow at three intersections (7th Avenue and I-17 freeway, 7th Avenue and Southern Avenue, and 7th Street and I-17 freeway) were completed in advance of light rail construction to help avoid traffic impacts. Other construction activities included relocating utilities in downtown Phoenix.

Other progress includes selecting Construction Advisory Board members, composed of residents, property owners and business representatives from the community adjacent to the project route, to serve as a voice for the community during construction.

In May 2020, the FTA announced the second \$100 million allocation to the project through the Capital Investment Grants Program.

Table 3.3 T2050 High Capacity Transit Progress

Planned for FY 2022–2025
<p>Increase light rail in Phoenix</p> <ul style="list-style-type: none"> South Central Extension: Complete construction, with anticipated opening in 2024.
<p>Begin Bus Rapid Transit program</p> <ul style="list-style-type: none"> Begin planning, design and construction of one or more BRT corridors. Timing and schedule to be determined by the CTC and Phoenix City Council.

Bus Rapid Transit



The BRT program will be developed based on where current and future transit riders need service. The project team reevaluated potential locations based on three factors – demographic and socioeconomic data, transit performance and forecasted ridership. As a result, six potential BRT corridors were identified:

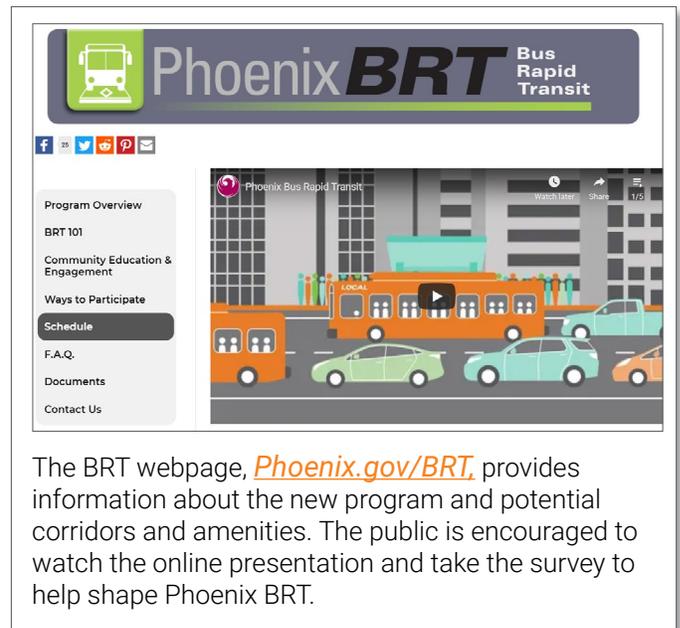
- Camelback Road and 24th Street
- Indian School Road and 24th Street
- Thomas Road and 44th Street
- McDowell Road and 44th Street
- 19th Avenue and Van Buren Street
- 35th Avenue and Van Buren Street

The project team began public education and outreach efforts to gather input on BRT network options and to help select the three corridors that will serve as the foundation of the program. In addition to in-person meetings conducted prior to pandemic meeting restrictions, virtual public meetings are scheduled and an ongoing, open, web-based online meeting and survey are accessible through Dec. 18, 2020.

In February, the project team launched a BRT webpage (phoenix.gov/brt). This site is continually updated and includes an array of educational information such as a BRT 101 video, fact sheet, frequently asked questions, potential BRT corridor maps, meeting opportunities, an online meeting and a survey.

BRT branding efforts kicked off in March 2020. Branding plays an important role in the development of the BRT system as it creates a distinctive identity, which results in positive public recognition and differentiates the system from other services. Partner agencies include the Maricopa Association of Governments (MAG) and Valley Metro. The project team will also seek public input on branding at future milestones.

Public outreach will continue through the end of 2020, after which there will be a recommendation to the Citizens Transportation Commission and Phoenix City Council on the three corridors that will form the foundation of the BRT network.



The BRT webpage, Phoenix.gov/BRT, provides information about the new program and potential corridors and amenities. The public is encouraged to watch the online presentation and take the survey to help shape Phoenix BRT.

4.0



Street Maintenance and Improvements

STREET MAINTENANCE AND IMPROVEMENTS



CUMULATIVE PROGRESS JAN. 1, 2016–JUNE 30, 2020

49 MILES OF NEW SIDEWALKS

IMPROVED/INSTALLED

16,616

ADA RAMPS





STREET MAINTENANCE AND IMPROVEMENTS



The Street Transportation Department is responsible for maintaining the city's roadways, bridges, dams and levees and works to provide a safe and sustainable transportation network for everyone – including pedestrians, bicyclists and motorists.

The core of the department's work includes the pavement preservation program, asphalt and pothole repair and installation of street signs, traffic signals, streetlights, bikeways and Americans with Disabilities Act (ADA)-compliant ramps and sidewalks.

Typically, street improvement projects, such as resurfacing and striping changes, have a well-defined scope and are planned and executed within the Street Maintenance Division. However, larger-scale projects with a wide array of components, such as turn lane improvements, lane additions or drainage studies, go through a project assessment phase prior to design and construction.

Other behind-the-scenes functions include plan review for private development projects, construction inspection, materials testing and implementation of technology enhancements such as Geographic Information Systems (GIS). Additional information is available at phoenix.gov/streets.



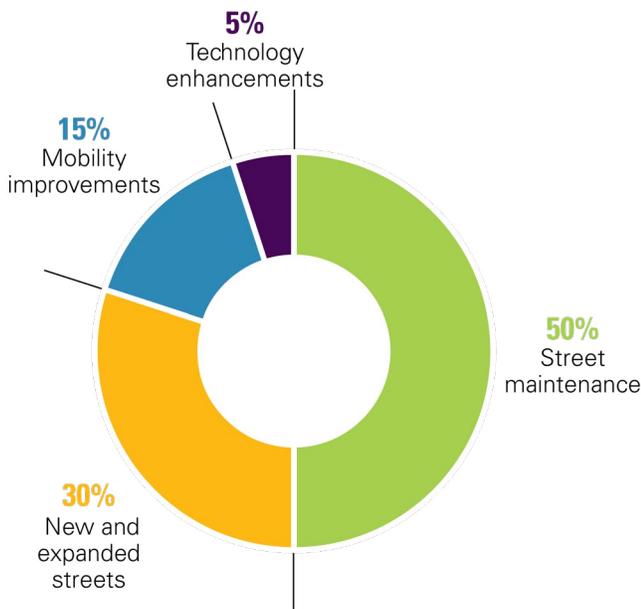
In the past year, Phoenix streets received more than 500,000 tons of asphalt, which is equal to paving about 710 NFL football fields.

Funding and Budget

In addition to T2050 funds, other sources of funding include the state-collected motor fuel tax, city's general fund, regional/MAG funds, federal funds, grants and impact fees. shows the distribution of T2050 funds within the Street Transportation Department.

The FY 2020 budget earmarked about \$134 million in T2050 funding for street construction and maintenance projects. This figure includes \$77 million allocated through the Accelerated Pavement Maintenance Program. Phoenix's T2050 plan for the next five years includes nearly \$285 million to improve traffic system infrastructure, make ADA improvements, assess and address mobility needs and continue maintenance of city streets.

Figure 4.1 T2050 Funds for Street Improvement



COVID-19 Response

The Street Transportation Department's primary duties are considered essential city services and most activities continued despite COVID-19. Street paving continued, as did pothole patching, sign replacement, lane striping, traffic signal servicing and installation, streetlight repair and more.

The pandemic forced adjustments to schedules and changes to the ways crews carried out their work, but the work continued. Crews utilized the opportunity to work on major roads during the weeks with fewer travelers on the roads.

Project teams and road crews have been informed about current health and safety protocols. The health and safety of staff members, construction crews, community members and the traveling public are a top priority for the department.

Accelerated Pavement Maintenance Program

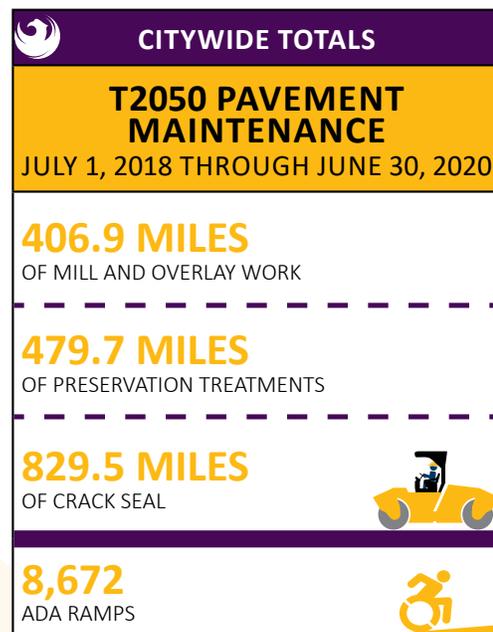


Typically, about \$16 million per year is allocated for pavement maintenance. However, in 2018, the Phoenix City Council allocated additional funding of \$200 million over five years, creating the Accelerated Pavement Maintenance Program (APMP).

This funding boost of \$77 million in FY 2019 resulted in Phoenix's most successful paving season to date. The department performed mill and overlay treatment on 62.5 miles of major streets, along with 35.8 miles of pavement preservation and 128.6 miles of crack seal in preparation for future work – essentially completing three years of work in just 10 months.

Although weather, utility coordination and other factors can affect pavement maintenance schedules, the 2020 paving season currently has over 200 miles of overlay planned.

In June 2020, the project team developed a comprehensive Pavement Condition Report, which details the paving assessment process, pavement treatments and current conditions. This report is available on the city's website.



Active Transportation Program



The Active Transportation Program (ATP) strives to create a connected and comfortable network where residents can enjoy options such as walking and bicycling as part of their daily lives. Investments in light rail, BRT and buses make active transportation even more essential for people making their way to or from transit locations.

As streets are repaved, the ATP looks for opportunities to update striping plans to add or widen bike lanes, add buffers to existing bike lanes and add markings in the intersections on major bikeways. Bike lanes, especially buffered bike lanes and protected bike lanes, also improve the walking experience by creating more space between sidewalks and vehicle travel lanes.

The ATP also focuses on multi-use paths and street crossings to help all road users. Off-street trails, such as projects along canals, bolster the active transportation network and create enjoyable routes for everyone.

Looking forward, the program will be launching the Active Transportation Plan, which includes a Bicycle Master Plan update. This will be an opportunity to hear from residents about their priorities in enhancing the active transportation network.

City of Phoenix Employee Excellence Awards

Of the more than 14,000 people employed by the city of Phoenix, only eight teams received Team Excellence Awards.

The 2019 Accelerated Pavement Maintenance Program team received this award for delivering outstanding results to the community in a short timeframe through hard work, collaboration and innovative thinking. Team members included Perfect Arroyo, Sam Enmon, Rick Evans, Dominic Galaviz, Matthew Glock, Seng Hkawn N-Sang, Rubben Lolly, Richard Lujan, Andrea Lynch, Chris Manno, Cole Mohr, Chris Nipar, Curtis Pulford, Joseph Rodriguez, Julian Sanchez III, Ruben Somoza, Ryan Stevens, Kyle Vance and Robert Walsh.



In June 2020, Phoenix earned a Bicycle Friendly Community bronze award from the League of American Bicyclists. The award recognizes Phoenix's commitment to improving conditions for bicyclists. Additional information is available at bikeleague.org/community.

Mobility Studies



Because people travel to neighborhood destinations by foot and bicycle, mobility studies are conducted to identify barriers faced by pedestrians and bicyclists.

The studies recommend solutions that will improve safety, convenience and quality of life. Options include opportunities for constructing new sidewalks, installing or improving ADA curb ramps and installing streetlights, bicycle facilities, traffic signals, shade trees and connections to transit stops.

While significant progress is being made, much work still needs to be done. For example, an estimated \$2 million is required each year to bring the city's ADA curb ramps to current standards.

Thirty-nine locations were identified for study at the inception of T2050. Of the initial 12 studies launched, all but one are complete. The final study will be completed in 2020. Next steps involve completing the remaining studies and scheduling and installing recommended improvements.



In February 2020, the mayor and city officials hosted the Grand Canal Grand Celebration to mark the completion of the Grand Canalscape project. This is an award-winning, fully ADA-accessible, 12-mile multiuse trail stretching from the I-17 to the Tempe city limits. Additional information is available at phoenix.gov/streets/grandcanalscape.

Pilot Programs

In March 2020, Phoenix launched the Recycled Asphalt Pavement (RAP) Program. Asphalt millings generated from mill and overlay projects are crushed and screened to an engineered specification for reuse. RAP can be used in resurfacing projects, such as slurry seal and microsurfacing, to replace 100% of the aggregate. By using RAP, the city reduces the use of mined materials. The project team also expects to realize cost savings through these sustainable practices.

Another test program, Phoenix’s Cool Pavement Pilot Program, debuted at Esteban Park at 32nd Street and Roeser Road on June 11, 2020 (pictured below). The water-based asphalt treatment is applied on top of the existing asphalt. Nine areas across the city will receive cool pavement. In collaboration with Arizona State University, the new treatment will be studied to see how well the product helps mitigate the heat island effect and whether those effects are sustainable over time. For more information, please visit phoenix.gov/streets/coolpavement.

Table 4.1 T2050 Street Maintenance and Improvements

Completed FY 2020 (July 1, 2019–June 30, 2020)
Street projects <ul style="list-style-type: none"> • 12 major street projects in the project assessment phase, with three assessments completed. • 35 major street projects in design. • 71 major street projects in construction. • 38 major street projects completed.
Street pavement and overlays <ul style="list-style-type: none"> • Continued the Accelerated Pavement Maintenance Program, for which the Phoenix City Council authorized an additional \$200 million to fast-track pavement maintenance through 2023. • 65.8 miles of new asphalt pavement on major streets. • 214.0 miles of other pavement treatments, such as crack and fog sealing, on major collector streets. • 230.3 miles of local street paving. • 471.7 miles of other pavement treatments, such as crack and fog sealing, on local streets.
Bicycle lanes <ul style="list-style-type: none"> • Installed 40.4 miles of lanes.
Streetlights <ul style="list-style-type: none"> • Installed 862 new streetlights.
Sidewalks <ul style="list-style-type: none"> • Constructed 22.5 miles of sidewalks.
Mobility studies <ul style="list-style-type: none"> • Completed four mobility studies.
Intersection technology enhancements <ul style="list-style-type: none"> • Replaced 483 street signs at major intersections with illuminated signs. • Repainted all signal poles at 79 major intersections to extend their lifecycles. • Installed 44 new left-turn arrows at warranted intersections. • Installed 16 pedestrian High-intensity Activated crossWalks (HAWKs).



Intersection and Technology Enhancements

Street technology enhancements range from repainting traffic signal poles to extend their lifecycles to installing High-intensity Activated crossWalks (HAWKs) to enhance pedestrian safety at busy intersections and mid-block locations. Other T2050 technology enhancements include improving and maintaining traffic control equipment, adding left-turn arrows at warranted intersections, replacing street name signs with retroreflective signs that feature light-emitting diode (LED) lighting and installing updated signals, signage, detection equipment and traffic management and monitoring systems.

January 2020 marked the completion of the citywide conversion of nearly 100,000 high-pressure sodium streetlights to energy-efficient LED fixtures. This conversion is one of the largest completed by any U.S. city. The new LED streetlights are anticipated to reduce electricity needed to illuminate the streets by approximately 53% and save the city approximately \$3.5 million annually. LED streetlights also have longer lifespans, produce better light quality and are expected to reduce maintenance costs over their service life. More information is available at phoenix.gov/streets/led.



The Street Transportation Department dispatches crews to fill about 21,600 potholes each year.

Information Technology and GIS



The Information Technology Division digitizes, validates and reports on assets. Location data on bikeways, pavement, lighted street signs and ADA curb ramps, for example, is catalogued using geographic information system (GIS) technology.

During the past year, new tools have been added to create more effective asset management. Traffic signal and streetlight data tracking now records the scope and type of asset. Other new GIS tools provide the ability to link the asset location and maintenance records, which results in more efficient planning, analysis and reporting.

Areas where GIS is improving department decision-making include:

- Reworking existing traffic signal data to make it more accurate, useful and available to the entire department.
- Creating tools that leverage pavement condition data, which, when combined with underlying soil condition data, provides engineers with a broader understanding of any problematic areas.
- Updating bikeway data to give the Active Transportation Program team accurate information to use for planning and implementing improvements.
- Researching and editing thousands of ADA ramp records to build and update the database.

Residents also can access map services and applications such as a live active [HAWK traffic signal web map](#), [the pavement maintenance dashboard](#), [bikeways map services](#) and [e-scooter facilities mapping](#).

As more live updates are made by staff members in the field, efficiencies in workflow occur and allow for near real-time analysis and reporting.



On June 25, 2020, Phoenix's 66th HAWK pedestrian crossing signal was activated at 18th Street and Roosevelt Street. HAWKs make streets safer for people who walk, bike and drive by providing clear alerts when people intend to cross the road.

Table 4.3 T2050 Street Maintenance and Improvements

Planned for FY 2022–2025
Street projects
<ul style="list-style-type: none"> • Conduct 12 major street project assessments. • Design six major street projects. • Continue construction on 29 major street projects.
Street pavement and overlays
<ul style="list-style-type: none"> • Pave at least 78 miles of new pavement on major streets.
Bicycle lanes
<ul style="list-style-type: none"> • Install 123 miles of bike lanes.
Streetlights
<ul style="list-style-type: none"> • Install 240 new streetlights.
Sidewalks
<ul style="list-style-type: none"> • Construct 15 miles of sidewalks.
Intersection technology enhancements
<ul style="list-style-type: none"> • Repaint all signal poles at 550 major intersections.

Table 4.2 T2050 Street Maintenance and Improvements

Planned for FY 2021
Street projects
<ul style="list-style-type: none"> • Conduct three major street project assessments. • Design seven major street projects. • Continue construction on 43 major street projects.
Street pavement and overlays
<ul style="list-style-type: none"> • Pave 19 miles on major streets.
Bicycle lanes
<ul style="list-style-type: none"> • Install 30 miles of bike lanes.
Streetlights
<ul style="list-style-type: none"> • Install 60 new streetlights.
Sidewalks
<ul style="list-style-type: none"> • Construct four miles of new sidewalks.
Mobility studies
<ul style="list-style-type: none"> • Complete one mobility study.
Intersection technology enhancements
<ul style="list-style-type: none"> • Repaint all signal poles at 110 major intersections. • Install five left-turn arrows at warranted intersections.

5.0



Appendix



APPENDIX

Lifecycle Programming Assumptions

As with any long-term plan, preparation of the financial model for the T2050 program required many assumptions for estimated costs, revenues and timing of projects and new services. Key assumptions of the T2050 program include:

- The implementation of projects and new services is projected to occur over the course of the 35-year plan as funding allows and service demand dictates.
- Capital and operating costs are estimated to grow at average inflation rates of 3–4% annually over the life of the plan. These inflation rates are somewhat higher than the typical annual increases the city has experienced in the large transit contracts, and provide for more conservative cost estimates.
- T2050 sales tax revenues are estimated to grow at an average annual rate of 4.75%, which is slightly lower than the 5.2% average annual growth rate in the Arizona Department of Transportation's most recent forecast prepared in September 2019 for the Proposition 400 Maricopa County Transportation Excise Tax.

- The existing 0.5% Proposition 400 regional tax, currently in place through Dec. 31, 2025, is assumed to be extended for at least 20 years.
- Federal transit formula funds are assumed to continue through the life of the plan, with very modest increases over time, and are consistent with Maricopa Association of Governments' long-term Regional Transportation Plan.



The T2050 team received an Award of Merit from the Public Relations Society of America for the 2019 T2050 Annual Progress Report.

- The financial model is consistent with Valley Metro assumptions, ranging from 0% to 39%, for the funding level from discretionary federal Capital Investment Grants for light rail capital costs. Discretionary federal Capital Investment Grants, on average, fund more than 40% of total project costs for current rail projects across the country.
- Transit fares are assumed to continue to be lower than the regional fare policy goal of 25% recovery of direct transit operations costs, reflecting the current fare recovery rate.
- Some capital funding is assumed to be provided through financing, as needed, with the corresponding costs estimated using typical municipal bond offerings. Less expensive and more flexible types of financing will be explored to minimize financing costs.
- Other revenues, such as transit advertising and interest earnings on fund balance, are forecasted using very low growth rates.
- An operating reserve equivalent to 15% of annual public transit operating costs is assumed to be maintained throughout the life of the plan.



Over 43 million bus and light rail boardings occurred within Phoenix last year.

Impact of COVID-19

While economic variations are expected over time, the COVID-19 pandemic altered a multitude of processes. Many of the effects are not yet completely determined, but it is apparent that there will be a downward correction to the revenue projections for the coming years.

Changes experienced due to the pandemic are noted within each program area of this report and are anticipated to be reflected in the upcoming FY 2021 Annual Progress Report (July 1, 2020 through June 30, 2021) as well.



T2050 Sales Tax Projected Revenue Stream

The following table includes the projected sales tax revenue for each year of the T2050 plan. Additionally, the table shows the anticipated allocation to the Public Transit and Street Transportation departments.

Table A.1 T2050 Sales Tax Projected Revenue Stream

Fiscal Year	Overall T2050 (2015 Forecast)	Actual Overall	Forecasted Public Transit (86.2%)	Actual Public Transit	Forecasted Street Transportation (13.8%)	Actual Street Transportation
2016	\$89,125,000	\$98,593,240	\$76,826,000	\$85,095,392	\$12,299,000	\$13,497,848
2017	\$204,006,000	\$203,352,480	\$175,853,000	\$175,430,201	\$28,153,000	\$27,922,279
2018	\$213,696,000	\$215,805,685	\$184,206,000	\$185,998,894	\$29,490,000	\$29,806,791
2019	\$224,401,000	\$239,179,006	\$193,434,000	\$206,200,341	\$30,967,000	\$32,978,665
2020	\$235,642,000	\$247,592,555	\$203,123,000	\$213,437,765	\$32,519,000	\$34,154,790
2021	\$246,835,000		\$212,772,000		\$34,063,000	
2022	\$258,559,000		\$222,878,000		\$35,681,000	
2023	\$270,841,000		\$233,465,000		\$37,376,000	
2024	\$283,706,000		\$244,555,000		\$39,151,000	
2025	\$297,182,000		\$256,171,000		\$41,011,000	
2026	\$311,298,000		\$268,339,000		\$42,959,000	
2027	\$326,085,000		\$281,085,000		\$45,000,000	
2028	\$341,574,000		\$294,437,000		\$47,137,000	
2029	\$357,799,000		\$308,423,000		\$49,377,000	
2030	\$374,794,000		\$323,072,000		\$51,722,000	
2031	\$392,597,000		\$338,419,000		\$54,178,000	
2032	\$411,245,000		\$354,493,000		\$56,752,000	
2033	\$430,779,000		\$371,331,000		\$59,448,000	
2034	\$451,241,000		\$388,970,000		\$62,271,000	
2035	\$472,675,000		\$407,446,000		\$65,229,000	
2036	\$495,127,000		\$426,799,000		\$68,328,000	
2037	\$518,646,000		\$447,073,000		\$71,573,000	
2038	\$543,281,000		\$468,308,000		\$74,973,000	
2039	\$569,087,000		\$490,553,000		\$78,534,000	
2040	\$596,119,000		\$513,855,000		\$82,264,000	
2041	\$624,435,000		\$538,263,000		\$86,172,000	
2042	\$654,095,000		\$563,830,000		\$90,265,000	
2043	\$685,165,000		\$590,612,000		\$94,553,000	
2044	\$717,710,000		\$618,666,000		\$99,044,000	
2045	\$751,801,000		\$648,052,000		\$103,749,000	
2046	\$787,512,000		\$678,835,000		\$108,677,000	
2047	\$824,919,000		\$711,080,000		\$113,839,000	
2048	\$864,102,000		\$744,856,000		\$119,246,000	
2049	\$905,147,000		\$780,237,000		\$124,910,000	
2050	\$948,142,000		\$817,299,000		\$130,844,000	
Total	\$16,679,368,000		\$14,377,615,000		\$2,301,753,000	

FY 2020 Financial Overview

The FY 2020 Financial Overview table summarizes the budgeted and actual revenue and expenditures during FY 2020.

Table A.2 FY 2020 Financial Overview (July 1, 2019–June 30, 2020)

	Budget	Actuals	Amount Over/ (Under Budget)	Percent Over/ Under Budget	Footnotes
Source of Funds					
Dedicated Sales Tax – T2050	\$240,578,000	\$247,593,000	\$7,015,000	2.9%	
Local Transportation Assistance	4,300,000	4,220,217	(79,783)	-1.9%	
Bus Fare Revenue	30,069,412	20,498,807	(9,570,605)	-31.8%	1
Dial-a-Ride Fare Revenue	986,340	793,439	(192,901)	-19.6%	2
Rail Fare Revenue	7,400,000	5,127,519	(2,272,481)	-30.7%	3
Federal Transit Funds	224,125,984	153,907,515	(70,218,469)	-31.3%	4
Regional Transportation Tax	21,646,921	6,964,429	(14,682,492)	-67.8%	5
Debt Proceeds	-	200,000,000	200,000,000	0.0%	6
Other Revenue*	8,512,794	24,908,434	16,395,640	192.6%	7
Fund Balance	140,004,843	(126,133,671)	(266,138,514)	-190.1%	
Total Revenues	\$677,624,294	\$537,879,688	\$(139,744,606)	-20.6%	
Use of Funds					
Transit Operations					
Local Fixed Route Bus	\$147,890,068	\$137,974,086	\$(9,915,982)	-6.7%	
RAPID Commuter Bus	4,124,027	3,847,512	(276,515)	-6.7%	
Neighborhood Circulator	3,840,325	3,582,833	(257,493)	-6.7%	
Dial-a-Ride Operations	19,827,161	18,664,827	(1,162,334)	-5.9%	
Light Rail Operations	39,455,449	36,342,398	(3,113,051)	-7.9%	
Bus Rapid Transit	-	-	-	0.0%	
Security	11,836,389	11,646,637	(189,752)	-1.6%	
Administration & Support	22,492,403	21,969,503	(522,900)	-2.3%	
Total Operations	\$249,465,822	\$234,027,796	\$(15,438,026)	-6.2%	
Debt Service	\$70,789,000	\$70,687,109	\$(101,891)	-0.1%	
Capital Projects					
Bus and DAR Vehicles	\$45,482,337	\$45,200,866	\$(281,471)	-0.6%	
Bus Passenger Facilities	6,852,961	722,273	(6,130,688)	-89.5%	8
Bus O & M Facilities	5,503,907	2,745,157	(2,758,750)	-50.1%	9
Bus and DAR Technology	60,059,874	78,546	(59,981,328)	-99.9%	10
Other Bus Capital	15,064,364	1,601,547	(13,462,817)	-89.4%	11
South Central LRT	82,831,479	79,723,220	(3,108,259)	-3.8%	
Northwest Phase II LRT	36,995,797	20,648,819	(16,346,978)	-44.2%	12
Capitol/I-10 West Phase I LRT	30,000	-	(30,000)	-100.0%	13
50th Street LRT Station	20,000	24,374	4,374	21.9%	14
LRT Other	1,491,789	26,511	(1,465,278)	-98.2%	15
Bus Rapid Transit	4,966,976	-	(4,966,976)	0.0%	16
Streets – Major Maintenance	90,087,000	92,411,555	2,324,555	2.6%	17
Streets – Major Transportation Projects	4,828,473	4,309,851	(518,622)	-10.7%	18
Streets – Mobility Projects	1,850,515	1,711,268	(139,247)	-7.5%	19
Streets – Other	507,000	347,543	(159,457)	-31.5%	20
Streets – Technology	797,000	1,147,131	350,131	43.9%	21
Total Capital Projects	\$357,369,472	\$250,698,662	\$(106,670,810)	-29.8%	
Total Expenditures	\$677,624,294	\$555,413,567	\$(122,210,727)	-18.0%	

Footnotes detailing the FY 2020 Financial Overview table found on the preceding page include:

1. Rear door boardings and fareboxes not being used since March, and reduced ridership due to COVID-19.
2. Reduced ridership due to COVID-19.
3. Reduced ridership due to COVID-19.
4. Decrease due to capital project deferrals.
5. Decrease due to capital project deferrals.
6. Finance Department issued short-term debt near the end of the fiscal year.
7. Reinstatement of the Alternative Fuel Tax Credit and prior year expenditure recovery.
8. Laveen Park-and-Ride deferred.
9. Various 302 Building project budgets over-programmed.
10. Fare Collection System Replacement project delays. Funds were carried over to FY 2020-21.
11. Unused contingency.
12. Project deferred.
13. Project deferred.
14. Testing, land acquisition settlement and other internal costs were higher than budgeted.
15. Over-programmed budget for disposal of remnant properties, Business Assistance Program and other LRT-related projects.
16. Project deferral. Funds were carried over to FY 2020-21.

17. Bond program was priority; funds were carried over.
18. Unused capacity for contracted services. Funds were carried over to FY 2020-21.
19. Unused capacity for contracted services. Funds were carried over to FY 2020-21.
20. Unused capacity for contracted services. Funds were carried over to FY 2020-21.
21. Unused capacity for contracted services. Funds were carried over to FY 2020-21.



To see when and where Phoenix will be paving, visit the interactive dashboard at phoenix.gov/PavementProgram. Select "Treatments Dashboard," then either click on the magnifying glass to enter an address or zoom in on the map.



Five-Year Implementation Plan

The Five-Year Implementation Plan table summarizes the projected distribution of funds collected over the next five years. The table does not include actual collections. *Note:* Bus Rapid Transit (BRT) capital and operations expenditures are planned to be incurred during this five-year plan, and the amounts reflected are preliminary, pending the results of the BRT study.

Table A.3 Five-Year Implementation Plan (FY 2021–2025)

	FY 2020–2021	FY 2021–2022	FY 2022–2023	FY 2023–2024	FY 2024–2025
Source of Funds					
Dedicated Sales Tax – T2050	\$249,230,000	\$260,433,000	\$271,850,000	\$283,851,000	\$297,011,000
Local Transportation Assistance	4,300,000	4,300,000	4,300,000	4,300,000	4,300,000
Bus Fare Revenue	10,928,000	17,580,000	22,145,000	30,163,000	38,037,000
DAR Fare Revenue	375,000	1,046,000	1,046,000	1,046,000	1,150,000
Rail Fare Revenue	1,672,000	4,795,000	5,960,000	9,280,000	14,847,000
Federal Transit Funds	387,644,000	224,298,000	190,652,000	234,843,000	175,215,000
Regional Transportation Tax	156,242,224	164,643,730	63,084,472	52,594,966	39,996,745
Debt Proceeds	83,043,000	45,356,000	218,204,000	135,620,000	75,989,000
Other Revenue	8,305,078	8,429,654	8,556,099	8,684,440	8,814,707
Fund Balance	127,935,017	115,813,359	8,091,307	(36,877,771)	(58,826,548)
Total Revenues	\$1,029,674,318	\$846,694,743	\$793,888,879	\$723,504,636	\$596,533,904
Use of Funds					
Transit Operations					
Local Fixed Route Bus	\$143,257,689	\$147,538,835	\$152,008,650	\$156,492,442	\$161,164,901
RAPID Commuter Bus	7,674,375	7,903,733	8,143,983	10,799,949	11,122,937
Neighborhood Circulator	5,119,455	5,274,967	5,826,105	5,999,620	6,179,809
Bus Rapid Transit	-	-	2,119,360	2,181,520	7,441,200
DAR Operations	20,158,130	20,762,874	21,385,760	22,027,333	22,688,153
Light Rail Operations	40,217,631	41,555,619	42,802,288	48,992,938	60,320,098
Security	12,173,570	12,538,777	12,914,940	13,302,389	13,701,460
Administration & Support	22,792,376	23,476,147	24,180,431	24,905,844	25,653,020
Total Operations	\$251,393,225	\$259,050,952	\$269,381,519	\$284,702,035	\$308,271,577
Debt Service	\$8,074,000	\$25,418,000	\$27,230,000	\$35,958,000	\$44,497,000
Capital Projects					
Bus and DAR Vehicles	\$26,122,960	\$43,020,000	\$46,046,000	\$44,622,000	\$45,945,000
Bus Passenger Facilities	12,538,861	4,392,000	6,125,000	3,830,000	3,830,000
Bus O&M Facilities	26,579,551	1,850,000	1,850,000	1,850,000	1,850,000
Bus and DAR Technology	70,124,235	1,750,000	1,500,000	1,200,000	8,000,000
Other Bus Capital	9,866,722	2,012,000	1,530,000	1,530,000	1,463,000
South Central LRT	392,355,000	288,529,000	205,894,000	103,181,000	34,587,000
Northwest Phase II LRT	92,654,000	78,084,000	73,775,000	35,346,000	-
Capitol/I-10 West Phase I LRT	12,282,000	38,441,000	50,885,000	60,851,000	64,440,000
Other Light Rail	1,841,457	-	-	-	-
Bus Rapid Transit	7,567,700	18,250,000	79,750,000	123,750,000	61,500,000
Total Public Transit T2050 Capital Projects	\$651,932,486	\$476,328,000	\$467,355,000	\$376,160,000	\$221,615,000
Streets – Major Maintenance	\$91,263,000	\$55,053,000	\$18,130,000	\$19,790,000	\$19,790,000
Streets – Major Transportation Projects	21,190,862	16,083,654	2,834,000	2,247,000	1,315,000
Streets – Mobility Projects	2,719,745	10,714,137	6,536,360	3,697,601	\$95,327
Streets – Other	240,000	240,000	240,000	240,000	240,000
Streets – Technology	2,861,000	3,807,000	2,182,000	710,000	710,000
Total Streets T2050 Capital Projects	\$118,274,607	\$85,897,791	\$29,922,360	\$26,684,601	\$22,150,327
Total Capital Projects	\$770,207,093	\$562,225,791	\$497,277,360	\$402,844,601	\$243,765,327
Total Expenditures	\$1,029,674,318	\$846,694,743	\$793,888,879	\$723,504,636	\$596,533,904
Fund Balance: Public Transit	\$86,136,453	\$38,085,886	\$40,203,938	\$31,398,310	\$38,191,185
Fund Balance: Streets	60,280,712	(7,482,079)	(17,691,439)	27,991,960	80,025,633
Total Fund Balance	\$146,417,165	\$30,603,806	\$22,512,499	\$59,390,270	\$118,216,818

More information about T2050 is available at <https://www.phoenix.gov/t2050>.



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Pedestrian Safety Program Update

This report provides the Transportation, Infrastructure and Innovation Subcommittee with an update on the Street Transportation Department's (Streets) Office of Pedestrian Safety activities.

THIS ITEM IS FOR INFORMATION ONLY.

Summary

To address pedestrian fatalities in Phoenix, the City Manager's Office created the Pedestrian Safety Task Force in 2018. Streets' Office of Pedestrian Safety leads and participates in the interdepartmental Pedestrian Safety Task Force, which includes representatives of the Street Transportation and Police departments, the Communications Office, and the City Manager's Office.

The Office of Pedestrian Safety has continued to seek funding for pedestrian safety related grant opportunities, provide increased educational outreach to neighborhood groups and residents, collect data on existing pedestrian safety infrastructure, increase collaboration with outside agencies, and prioritize capital improvement projects with an emphasis on pedestrian safety.

Pedestrian Fatalities

Preliminary numbers from the Arizona Department of Transportation (ADOT) show the City of Phoenix experienced 86 pedestrian fatalities on its roads in 2019. These preliminary numbers represent an increase of 28 percent over the past five years (2015 to 2019) and an increase of 91 percent over the past 10 years (2010 to 2019). Yet these numbers also show a decrease of 17 percent in pedestrian fatalities between 2018 and 2019.

Preliminary partial year data for 2020 indicates that Phoenix has seen a decrease in pedestrian fatalities compared to a year ago. The Phoenix Police Department Vehicular Homicide Unit has reported 37 fatalities from Jan. 1 to Aug. 31, 2020. This is a 36 percent decrease from the 58 fatalities reported during the same time period in 2019.

Pedestrian Safety Funding and Improvements

To address the increase in pedestrian fatalities throughout the City of Phoenix, City Council authorized Streets to allocate \$2 million in ongoing, annual Capital Improvement Program (CIP) funding to the Office of Pedestrian Safety to provide continuous funding to implement pedestrian-related safety improvements. Fiscal Year (FY) 2020 was the first year these funds were programmed.

Streets' Office of Pedestrian Safety utilizes the four "E"s of traffic safety to continue to enhance pedestrian safety in Phoenix: Evaluation, Engineering, Education, and Enforcement. In reference to Evaluation, Engineering, and Education, the following provides an overview of the activities undertaken by the Office of Pedestrian Safety to date and future activities. It should be noted that Enforcement activities are conducted by the Police Department with input from Streets.

FY 2020 Accomplishments

The Office of Pedestrian Safety funded and worked on several pedestrian safety improvements in FY 2020. Highlights are summarized below, but additional details on the accomplishments of the Office of Pedestrian Safety, including progress and projects, are detailed in **Attachment A**.

Engineering

HAWK Timing Adjustments

The Streets traffic signal team completed adjustments to the timing of all HAWK signals throughout Phoenix to provide shorter wait times for pedestrians during non-peak traffic hours. During peak hours, HAWK signals are synchronized with nearby traffic signals, but these timing adjustments allow for HAWK signals to be activated without delay during non-peak traffic hours.

Pedestrian Safety Devices

The Office of Pedestrian Safety developed a plan for the installation of new pedestrian safety devices to create a more seamless design and construction process. As these projects are typically implemented over multiple fiscal years, this part of the plan involves utilizing funds from one fiscal year for design and funds from the next fiscal year for construction.

In FY 2020, the Office of Pedestrian Safety prioritized the design of eight HAWK signals and one traffic signal in high, mid-block pedestrian collision locations. The locations are shown in **Attachment A**. The design and construction of these signals are in various stages of design and construction, but all are anticipated to be completed by the end of FY 2021. In addition, pedestrian safety funding was also used for the construction of a traffic signal at 57th Drive and McDowell Road at the Academy

of Math and Science - Desert Sky.

Streetlighting

The Office of Pedestrian Safety completed design of new streetlighting for a critical half-mile segment along 27th Avenue between Bethany Home Road and Maryland Avenue. Construction is planned for later this fiscal year. The team also began designing an additional half-mile segment along Thomas Road between 32nd and 36th Streets for construction in FY 2022. Both segments have a high incidence of pedestrian collisions over the past five years.

Pedestrian Refuge Median Islands

The Office of Pedestrian Safety designed two pedestrian refuge median islands. The first location at 43rd Avenue south of Baseline Road was installed in May 2020. This location aides school crossings at Legacy Traditional Charter School. The second location on Buckeye Road just east of Sky Harbor Circle was designed, with installation scheduled for completion in December 2020.

Crosswalk Upgrades

The Office of Pedestrian Safety upgraded 85 unsignalized crossing locations to improve driver visibility of these crosswalks. Staff utilized resident requests and field observations to add high visibility striping and yield lines, double-sided street signs, and in some locations, additional streetlights and/or ADA ramp upgrades.

Education

Pedestrian Safety Activity Book

In FY 2020, the Office of Pedestrian Safety designed a Pedestrian Safety Activity Book for children in grades three to six, which was also translated into Spanish. The team printed 13,000 copies in English and 10,000 copies in Spanish.

Educational Events and Materials

The Office of Pedestrian Safety completed the Spanish translation and printed 10,000 copies of the Pedestrian Safety Activity Book, which is geared to elementary school-aged children (in third through sixth grades).

The Office of Pedestrian Safety developed a six-week curriculum for pedestrian safety to be delivered at elementary schools. This curriculum was provided for approximately 100 third graders at Mitchell Elementary School in Maryvale. Additional classes were scheduled at other schools but were canceled due to COVID-19. Class sessions will resume as soon as it is safe to do so.

Evaluation

Partnerships for Research

As part of its evaluation efforts, Streets partnered with the Design Studio for Community Solutions at Arizona State University (ASU). This partnership aims to create a multi-pronged, interdisciplinary, and solutions-oriented engagement between both institutions on the issue of curtailing pedestrian fatalities and serious injuries in the City of Phoenix. This collaboration involved a variety of expert researchers from ASU who conducted two research studies analyzing Phoenix's pedestrian collision data. The findings and recommendations of these studies are currently being reviewed by Streets staff.

FY2021 Recommended Improvements

The Office of Pedestrian Safety's plan for utilizing its FY 2021 funding is included in **Attachment B**. The plan will continue to be focused on Engineering, Evaluation, and Education, and highlights of the FY 2021 projects and efforts are shown below:

- Improving pedestrian visibility by adding streetlights on both sides of a street where only one-sided lighting exists;
- Addressing gaps in pedestrian safety by adding single streetlights at existing crosswalks, or in roadway segments, and improving crosswalk infrastructure;
- Constructing five HAWK signals and one traffic signal at high pedestrian activity and/or collision locations;
- Designing six new HAWK signals and one traffic signal;
- Installing raised pedestrian refuge median islands at locations with high pedestrian activity;
- Improving signalized crosswalk visibility and standardize citywide details for pedestrian infrastructure;
- Funding a safety analysis tool to aid in the identification, evaluation, and prioritization of infrastructure installation projects; and
- Creating educational videos to raise awareness of pedestrian safety.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and Street Transportation Department.

Attachment A

FY 2020 Office of Pedestrian Safety Budget Accomplishments

ENGINEERING

Streetlighting: \$250,000

The Office of Pedestrian Safety completed the design of new streetlighting for a critical half-mile segment along 27th Avenue between Bethany Home Road and Maryland Avenue. Design has been completed, with construction planned for later this fiscal year.

The Office of Pedestrian Safety also initiated design of new streetlighting for an additional half-mile segment along Thomas Road between 32nd Street and 36th Street. In the last five years, there have been three pedestrian fatalities and four incapacitating injuries during the nighttime hours in this segment of Thomas Road. Construction is anticipated using FY 2021 funding and should be completed in FY 2022.

HAWK and Traffic Signals: \$780,000

The Office of Pedestrian Safety initiated the design of HAWK and traffic signals at nine high-crash locations.

Design work has been completed for three of these locations. Construction is scheduled to be completed later this fiscal year using FY 2020 funding.

- 7th Avenue and Cocopah Street (HAWK signal)
- 27th Avenue and Rovey Avenue (HAWK signal)
- 41st Street and McDowell Road (HAWK signal)

Design work is underway at six additional locations and is scheduled to be completed later this fiscal year. Construction is scheduled to be completed later this fiscal year using FY 2021 funding.

- 7th Avenue near Pima Street (HAWK signal)
- 7th Avenue and Turney Avenue (HAWK signal)
- 20th Avenue and Indian School Road (Traffic signal)
- 43rd Avenue near Pinchot Avenue (HAWK signal)
- 43rd Avenue south of Rose Lane (HAWK signal)
- Indian School Road near Amelia Avenue (HAWK signal)

The Office of Pedestrian Safety also constructed a traffic signal to signalize the crosswalk at the Academy of Math and Science – Desert Sky campus at 57th Drive and McDowell Road. Construction has been completed and the signal was activated in October 2020.

Pedestrian Refuge Median Islands: \$100,000

The Office of Pedestrian Safety designed two pedestrian refuge islands. Installation has been completed at one location, with the other planned for later this fiscal year.

- 43rd Avenue south of Baseline Road (completed)
- Buckeye Road east of Sky Harbor Circle (installation in December 2020)

Crosswalk Upgrades: \$607,000

The Office of Pedestrian Safety initially planned to upgrade 55 unsignalized crossing locations to improve driver visibility. However, through resident requests and field observations, the Office of Pedestrian Safety upgraded 85 locations. The upgrades included high visibility striping and yield lines; double-sided street signs; and in some locations additional streetlights and/or ADA ramp upgrades.

EDUCATION

Pedestrian Safety Activity Book Design and Printing: \$38,000

The Office of Pedestrian Safety designed, translated to Spanish, and printed copies of our Pedestrian Safety Activity Book geared to elementary school-aged children (in third through sixth grades). Staff printed 13,000 copies of the book in English and 10,000 copies in Spanish.

Pedestrian Safety School Outreach: \$0

The Office of Pedestrian Safety developed a six-week school curriculum focused on the use of and teaching around the Pedestrian Safety Activity Book. Staff prioritized schools within ¼-mile of pedestrian “hotspot” locations in Phoenix to provide pedestrian safety education classes.

In January 2020, the Office of Pedestrian Safety provided this curriculum for approximately 100 third graders at Mitchell Elementary School in Maryvale. Additional teaching was scheduled at other schools, but due to COVID-19 were canceled. Staff will work to reschedule with other schools as soon as it is safe to do so.

EVALUATION

Arizona State University Research: \$50,000

The Office of Pedestrian Safety worked with Arizona State University (ASU) to undertake two research studies investigating pedestrian crashes in Phoenix. ASU has finalized studies with summaries of findings and recommendations. These are currently under review by Office of Pedestrian Safety staff.

UNOBLIGATED FUNDING

FY 2020 Funds Carried Over to FY 2021: \$175,000

These funds were not obligated in FY 2020 but were carried over for use in FY 2021. The funds will be utilized for street lighting, pedestrian refuge median islands, and educational outreach materials.

Attachment B

FY 2021 Office of Pedestrian Safety Budget

ENGINEERING

Streetlighting for Half-Mile Single-Sided Segments: \$250,000

The Office of Pedestrian Safety is planning to fund the design of new streetlighting along 51st Avenue from Campbell Avenue to Camelback Road. In the last five years, two pedestrian fatalities and three incapacitating injuries have occurred during nighttime hours in this segment of 51st Avenue. Construction is anticipated to be funded and completed in FY 2022.

The Office of Pedestrian Safety will fund installation of new streetlighting along Thomas Road between 32nd Street to 36th Street. In the last five years, there have been three pedestrian fatalities and four incapacitating injuries during the nighttime hours in this segment of Thomas Road. Construction would utilize FY 2021 funding and should be completed in FY 2022.

HAWK and Traffic Signals: \$939,000

The Office of Pedestrian Safety will fund construction of HAWK and traffic signals at six high-crash locations.

- 7th Avenue near Pima Street (HAWK signal)
- 7th Avenue and Turney Avenue (HAWK signal)
- 20th Avenue and Indian School Road (Traffic Signal)
- 43rd Avenue near Pinchot Avenue (HAWK signal)
- 43rd Avenue south of Rose Lane (HAWK signal)
- Indian School Road near Amelia Avenue (HAWK signal)

The Office of Pedestrian Safety will also fund the design of six new HAWK signals and one traffic signal at high-crash mid-block locations. The locations will be determined and studied this fiscal year. Construction is anticipated using FY 2022 funding and should be completed in FY 2022.

Pedestrian Refuge Median Islands: \$50,000

The Office of Pedestrian Safety will fund design and construction of one pedestrian refuge median island at a location with high pedestrian activity. The location will be determined later this fiscal year.

Rectangular Rapid Flashing Beacons Upgrade: \$200,000

The Office of Pedestrian Safety will upgrade rectangular rapid flashing beacons (RRFBs) at eight existing crosswalk locations with circular beacons. Circular beacons are larger and more visible to drivers. The upgrade locations are:

- 3rd Avenue and Merrell Street
- 7th Street and Monroe Street
- 12th Street and the Grand Canal
- 15th Avenue and the Grand Canal
- 40th Street and Danbury Road
- 48th Street and the Grand Canal
- Oak Street and the Grand Canal
- 3221 West Van Buren Street

Crosswalk Upgrades: \$146,000

The Office of Pedestrian Safety will fund crosswalk location safety upgrades to enhance pedestrian infrastructure. These upgrades will include building or relocating ADA ramps, improving street markings and signage, and installing additional streetlights. Locations will be determined throughout this fiscal year.

Safety Standards: \$50,000

The Office of Pedestrian Safety will fund improvements to standard City details applicable to pedestrian crossing infrastructure, which will ensure consistency in how drivers and pedestrians see and interpret safety infrastructure.

EDUCATION

Outreach Videos: \$50,000

The Office of Pedestrian Safety will fund the development of four pedestrian safety educational videos.

EVALUATON

Safety Analysis Tool: \$200,000

The Office of Pedestrian Safety will fund the development of a traffic safety analysis tool. This tool will assist staff in the identification, evaluation, and prioritization of locations for pedestrian safety infrastructure improvements.

OTHER

Additional Pedestrian Safety Funding for Unanticipated Needs: \$115,000

The Office of Pedestrian safety will maintain funding to be initially set aside to address additional pedestrian safety needs that may come up during the fiscal year.



Light Rail Small Business Financial Assistance Program Pilot

This report requests that the Transportation, Infrastructure and Innovation Subcommittee recommend City Council approval of a proposed Light Rail Small Business Financial Assistance Program (SBFAP) Pilot working with Valley Metro, and to enter into grant, and other, agreements, as necessary, for the Phoenix Community Development and Investment Corp (PCDIC) to supplement the SBFAP Pilot with \$500,000 in grant funding. Further request to authorize the City Treasurer to receive, and the City Controller to disburse, all funds related to this item.

THIS ITEM IS FOR DISCUSSION AND POSSIBLE ACTION.

Summary

The South Central Extension/Downtown Hub (SCE/DH) and Northwest Extension Phase II (NWEII) projects are both currently under construction, which combined will expand the light rail system in the City by nearly nine miles.

Early-action business assistance within the SCE/DH corridor began in May 2018 through a Federal Transit Administration (FTA) Transit Oriented Development (TOD) Grant. Using funding from the SCE/DH TOD Grant, the City and Valley Metro worked with a consulting team to complete an inventory of more than 472 businesses along the SCE/DH corridor (from Van Buren Street to South Mountain Avenue, between 3rd Street and 3rd Avenue).

Currently, the City works with Valley Metro to provide a comprehensive business assistance program, utilizing individual business assessments, best practices, and work plans that address the unique needs of the affected businesses. The current business assistance program provides technical assistance to provide guidance and support in areas such as marketing and advertising programs and strategies, financial accounting and bookkeeping, website and e-commerce development and deployment, human resources, diversification of revenue streams, and other assistance that could improve business efficiencies.

The SBFAP Pilot would add a new element to light rail business assistance by providing financial assistance to help offset economic impacts to locally-owned small

and micro businesses determined to have been directly impacted by construction along the SCE/DH and NWEII light rail extension corridors. This is proposed as a one-year pilot program, but if successful and sustainable, could be extended for the duration of construction of both projects. This pilot program is proposed only to apply to light rail projects with construction of three years or more with impacts to businesses located directly along, or accessed directly from, the alignment. The aim of the proposed pilot program is to help mitigate financial impacts and support business retention of directly affected small and micro businesses. The pilot program would have a two-tiered approach, as outlined further in this report.

Several factors went into the creation of the proposed SBFAP Pilot, including but not limited to:

- Feedback and input received from impacted local business owners;
- Feedback from Phoenix business owners impacted by previous light rail projects;
- The unique nature and duration of construction for light rail projects and their impact on businesses directly located along the affected corridor;
- Research of business assistance programs for similar transportation projects in other cities;
- Recommendations from the TOD Business Assistance Grant Consultants;
- Staffing levels;
- Legal requirements/considerations; and
- Availability of funds.

This Pilot will be assessed to evaluate participation levels, funding availability, effectiveness, and other considerations.

Funding

Tier I

The first tier of financial assistance would offer \$1,000 in financial assistance to offset operational costs for small and micro-businesses that meet the eligibility criteria, as outlined further in this report. If the SBFAP Pilot is approved to continue after the first year, the amount would be available annually for the duration of construction impacts to the businesses. Tier I does not require businesses to be able to provide detailed financial records demonstrating lost business revenue due to construction impacts. Due to the lower amount of less-restrictive funding currently available, Tier I provides a lower level of financial assistance. However, if additional funding resources, such as grants or donations, become available to help fund this program, those funding resources would increase the amount available to businesses and potentially raise the

level of Tier I financial assistance.

Tier II

The second tier of financial assistance would offer up to \$5,000 in financial assistance to offset operational costs for small and micro-businesses that meet the eligibility criteria, as outlined further in this report. If the SBFAP Pilot is approved to continue after the first year, the amount would be available annually for the duration of construction impacts to the businesses. The amount awarded under Tier II will be based on the business' revenue reduction up to the maximum. Tier II funding includes the use of T2050 funds currently allocated for light rail business assistance. Although a higher assistance amount is available through Tier II, these City funds have more stringent legal requirements, which is why a review of financial records is necessary for businesses to access these funds.

Eligible business expenses for the SBFAP Pilot funds under both Tiers I and II will be specifically for the business' operational costs, including: (1) utilities; (2) rent or mortgage payments; (3) insurance; and (4) other types of documented business-related operational expenses, which may be requested and considered. Local, state, and federal taxes are not eligible operating expenses for the purposes of the SBFAP Pilot's assistance.

In addition to the financial assistance provided by the SBFAP Pilot, businesses will continue to be eligible to receive technical assistance for guidance and support in areas such as financial accounting/bookkeeping, marketing and advertising programs and strategies, website and e-commerce development and deployment, human resources, diversification of revenue stream, and other assistance that could improve business efficiencies.

Eligibility

Businesses seeking financial assistance grants will be required to apply to the program. To receive a financial assistance grant, a business must meet the following eligibility criteria.

Tier I

- Affected business location must be physically located on, or directly accessed from: (1) Central Avenue, between Jefferson Street and Baseline Road (for SCE/DH); (2) Dunlap Avenue, between 19th and 25th Avenues (for NWEII); (3) 25th Avenue, between Dunlap Avenue and Mountain View Road (for NWEII); (4) Mountain View Road, from 25th Avenue to former Metrocenter Mall property (for NWEII); or (5) the

Metrocenter Mall property, as eligible businesses in the former Metrocenter Mall property are also within the program boundaries (for NWEII);

- Be a locally-owned business with 15 or fewer employees and \$500,000 or less in annual revenue for the overall business;
- Be currently open and operational on the affected light rail construction alignment with posted hours of operation, as well as open and operational for at least 24 months prior to: (1) June 19, 2020 (for SCE/DH); and July 28, 2020 (for NWEII);
- Conduct business directly with consumers where transactions primarily take place at the location on the affected construction alignment;
- Be able to provide all necessary documents to verify program eligibility;
- Be in good standing with all local, state, and federal taxing and licensing authorities; and
- Sign a waiver releasing the City, Valley Metro, and any contractors selected to run the SBFAP Pilot from any claims related to revenue impacts arising out of light rail planning, design, and construction activities in order to receive this Pilot's funding support.

Tier II

- Meet all the requirements of Tier I; and
- Demonstrate, via financial business records, a loss in revenue after the commencement of construction and related activities in comparison with the same period in the year prior to the start of construction.

Staff estimates there are approximately 145 businesses in the SCE/DH corridor and about 60 businesses in the NWEII corridors that may be eligible under this program.

Ineligible Businesses

Businesses that would not be eligible include: residential property(ies); places of worship; schools; banks; hotels; government agencies; utility companies; businesses generating over 60 percent of revenues from the sale of alcoholic beverages; businesses generating revenues from the sale of marijuana; sexually oriented businesses or topless bars (as defined in the Phoenix City Code); and unoccupied buildings.

Program Administration

Valley Metro will implement program operation in conjunction with a Program Administrator. The Program Administrator will be responsible for reviewing applications, determining and monitoring eligibility, processing payments, providing overall customer service to businesses interested in this program, as well as thorough program documentation and regular financial and programmatic reporting. The City will

ensure regular audits of the program are conducted by the City Auditor and/or Valley Metro Auditor.

Financial Impact

The Phoenix Community Development and Investment Corporation (PCDIC) recently awarded a \$500,000 grant to assist with funding the SBFAP Pilot. Combined with \$1.86 million of T2050 funds currently allocated and available for light rail business assistance, the total budget currently available for distribution to businesses, including program administration, is approximately \$2.36 million. Efforts are also underway to seek additional financial support from various community, private, and philanthropic organizations.

Concurrence/Previous Council Action

This item was approved by the Citizens Transportation Commission on Oct. 22, 2020, by a vote of 11-0.

Location

The Northwest Extension Phase II will run along Dunlap Avenue to 25th Avenue, then north to Mountain View Road, and then west across Interstate 17, via an elevated structure over the freeway, to its terminus adjacent to Metrocenter Mall.
Council Districts: 1, 3 and 5.

The South Central Extension Downtown Hub will run along Central Avenue, from Jefferson Street to Baseline Road.
Council Districts: 7 and 8.

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Public Transit Department.



Downtown Shared Electric Scooter Pilot Program Update

This report provides the Transportation, Infrastructure, and Innovation Subcommittee with a summary of the first six months of the Downtown Shared Electric Scooter Pilot Program.

THIS ITEM IS FOR INFORMATION AND DISCUSSION.

Summary

On June 26, 2019, City Council unanimously approved the Downtown Shared Electric Scooter (eScooter) Pilot Program, which allowed eScooter vendors to obtain a permit to operate within the City of Phoenix. As part of the Pilot Program, City Council approved Ordinance G-6602, amending the Phoenix City Code to allow eScooters to operate on public streets. The Ordinance amendment also included definitions for an electric standup scooter and authorized the City of Phoenix Police Department or peace officer to issue civil traffic citations for, among other things, speed limit violations, yielding the right-of-way, parking violations, and riding on the sidewalk. Additionally, the Ordinance amendment included a one-year sunset provision, which would effectively repeal the Code changes on June 25, 2020, one year from the Ordinance effective date of June 26, 2019.

The City of Phoenix issued permits to three vendors (Bird, Lime, and Spin) to deploy eScooters as part of a six-month Downtown Shared eScooter Pilot Program. The pilot program began on Sept. 16, 2019. During the pilot, staff collected performance data, which included fleet information, ridership, violations, program fees and revenues, public and stakeholder comments, and general observations to assess user demand; monitored vendor operations; and evaluated the impacts to the City.

On Jan. 7, 2020, the Street Transportation Department (Streets) presented a three-month update on the Pilot Program to the Transportation, Infrastructure and Innovation Committee. Based on the preliminary results of the Pilot Program, on Feb. 19, 2020, City Council approved the extension of the Pilot Program for an additional six months and to re-open the permit application process to allow new vendors to apply for the Pilot Program (G-6676). City Council also amended Ordinance G-6602 to extend the sunset provision for an additional six months.

Streets is now providing an update on the Pilot Program following its first six months of operation, including fleet information, ridership, violations, program fees and revenues, public and stakeholder comments, observations and challenges, and information on the Pilot Program's six-month extension.

Fleet Information

At the launch of the Pilot Program, each vendor was authorized to deploy a maximum of 300 scooters each per day. Spin deployed 300 scooters, Lime deployed 150 scooters, and Bird deployed approximately 50 scooters. After the first week, Bird removed all its scooters and cited the lack of availability of their next-generation scooter, which was necessary to comply with the program's geo-fencing requirements. Lime temporarily removed its scooters at the end of the first week due to an issue with its mobile application but quickly resolved the issue the following week and redeployed its scooters. Because only two vendors deployed scooters for the pilot, on Nov. 25, 2019, the City approved an increase in the total number of scooters authorized per vendor to 450 scooters. In response, Spin increased its deployment to 450 scooters and Lime increased to approximately 300 scooters. Bird was inactive and cited the program's designated parking locations and nightly retrieval requirements as reasons for its decision to not redeploy scooters.

Based on company-wide deployment considerations across the country and internationally, Lime stopped operations and retrieved their scooters in January 2020. This left Spin as the only operating vendor from January to March 2020. Because of Lime's departure from the Pilot Program, the City approved Spin to increase the total number of its fleet to 900 scooters in February 2020. Spin maintained approximately 900 scooters until March 2020.

Ridership

As part of the Pilot Program, vendors were required to provide monthly data on ridership, including the number of daily trips, average ride time, distance, and number of scooters deployed. The information reflected below is ridership data for all three vendors combined over the six-month period.

- Total trips (September 2019 to March 2020): 101,476.
- Average trips per week: 3,922.
- Average trips per day: approximately 600.
- Average trips per scooter: 1.43 trips taken per deployed scooter per day.
- Average trip length (Spin data only): approximately 1.5 miles.
- Average trip duration (Spin data only): approximately 7 minutes.

- Saturdays are the most popular riding day with 20,379 total Saturday trips.
- November 2019 was the popular month with 19,794 trips.

Violations

Under the vendor permits, the City charged the vendors an \$80 relocation fee for violating parking requirements. The vendors were only authorized to deploy scooters at the parking locations each day during the hours of 5:00 a.m. and midnight, and were required to pick up all scooters each night by midnight. Any scooters not picked up by midnight were temporarily impounded by the City contractor until the vendor retrieved them, and the vendors were charged an \$80 fee. The City rescinded this nightly removal requirement in January 2020 and allowed the vendors to leave scooters at authorized designated parking locations overnight. However, the operational hours still applied. The vendors were also required to relocate improperly parked scooters to an authorized parking location within two hours of being notified. If the vendors did not relocate the improperly parked scooters within the two hours, the City contractor relocated them to a designated parking location, and again, the vendor was charged an \$80 fee.

At the end of the six-month Pilot Program, there have been a total of 308 violations among the three vendors as shown below. The City contracted with a scooter retrieval company, SWEEP, to monitor, report, and correct any vendor violations and is available 24 hours a day, seven days a week. SWEEP has stated that the level of violations for the Phoenix program is well below those of other municipalities they serve and provided the following violation data to the City:

Total Scooters Relocated: 308

- Bird Scooters: 2 scooters
- Lime Scooters: 244 scooters
- Spin Scooters: 62 scooters

Program Fees and Revenue

The established fees are intended to recover the costs associated with administering the program and were evaluated during the six-month pilot. Each vendor was required to pay a \$500 application fee and a \$5,000 permit fee to participate in the Pilot Program. In total, the City collected \$16,500 in application and permit fees prior to the launch of the program. Vendors are invoiced monthly for a \$0.10 surcharge fee per trip. To date, the City has invoiced a total of \$10,148 in surcharge fees from all three vendors. Vendors are also invoiced monthly for violation fees at the rate of \$80 per scooter. At the end of the six months, the 308 violations resulted in \$24,640 in total fees. The City invoiced the vendors a total of \$51,288 for all associated fees.

During the initial three months, staffing to administer the program required two staff: one person working approximately 15 hours per week and one person working approximately 8 hours per week. However, the final three months only required one staff member at approximately eight hours per week, for an estimated cost of \$38,000 for the first six months. The contract with SWEEP has cost \$44,881 for six months. Therefore, the administration costs for the program are higher than the funding recovered from the fees. Additionally, as part of the permit requirements, the vendors are required to reimburse the City the cost to install the designated parking infrastructure. The total cost to install the designated scooter parking infrastructure was \$61,076; therefore, each vendor received an invoice for \$20,359.

Public Information and Community Outreach

To collect comments and address concerns regarding the program, staff created a dedicated email account, phone number, and webpage. Staff received and responded to approximately 30 emails and phone calls regarding the program. Eighteen were received in the first month, eight in the second month, and four in the third month. The highest frequency of comments were related to improper scooter parking, abandoned scooters, and sidewalk riding. Vendors have also provided feedback, including some users reporting difficulties ending rides in designated parking locations, and users reporting lack of availability of scooters in specific areas or after 10:00 p.m.

Staff corresponded frequently with internal and downtown stakeholders to provide updates and to address any concerns. Several adjustments were made to the program based on this collaboration, including the relocation of several designated parking areas, working with vendors to strategically stage scooters during special events, working with vendors to make modifications within each vendor mobile application based on complaints, and increasing the maximum number of scooters allowed.

Observations and Challenges

The Pilot Program had an unexpected pause within the first six months. Bird stopped operations and retrieved their scooters within the first week of the start of the program. Lime stopped their operations in January 2020. Spin retrieved its scooters in March before the Pilot Program ended due to the COVID-19 pandemic.

There are challenges associated with the accuracy of the Global Positioning System (GPS) to identify and regulate parking locations, No Ride Zones, and program boundaries. This can be challenging for the riders by impacting their trip and vendors trying to comply with the regulations. However, riders adapted quickly to starting and ending their rides at the designated parking locations.

Staff received five reports of scooter-related incidents that involved the rider being injured. However, no collisions with motor vehicles have been reported. Staff has been able to effectively administer the Pilot Program, and overall feedback from both the public and downtown stakeholders has been favorable.

Pilot Program Updates

Before the end of the first term, City Council approved the extension of the Pilot Program for another six months in February 2020. Staff contacted potential eScooter companies to apply for the extended program. Spin and Razor expressed interest and submitted permit applications for the second term. The City intended to seamlessly begin the six-month extension at the end of the first six-month pilot on March 16, 2020. However, due to the COVID-19 pandemic, the eScooter companies were reluctant to deploy scooters at the time. Staff decided to delay the start of the Pilot Program extension in order to resume operations when feasible.

Staff and vendor representatives corresponded throughout the COVID-19 pandemic to prepare for the necessary six-month permits. Spin and Razor completed their permit applications and provided the required fees to the City. The City finalized and issued a six-month permit to Razor on Sept. 29, 2020, which officially restarted the Pilot Program on Oct. 1, 2020. Razor is deploying approximately 100 scooters and intends to increase its scooter fleet up to a maximum of 300 scooters. Spin is obtaining its program permit and anticipates deploying approximately 300 scooters and will also increase its fleet size based on ridership demand. The Pilot Program will end on March 31, 2021.

Location

The main boundary of the Pilot Program is from 7th Avenue to 7th Street and from Buckeye Road to McDowell Road. The Pilot Program boundary includes an extension of the area bounded by Roosevelt Street and Grand Avenue, and a reduction of the northern boundary to Portland Street between 7th and Central Avenues.

Council Districts: 4, 7 and 8

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Street Transportation Department.



Concessions Relief Update

This report is to provide an update on concessions relief offered to tenants at Phoenix Sky Harbor International Airport (PHX) through Dec. 31, 2020.

THIS ITEM IS FOR INFORMATION AND DISCUSSION.

Summary

The COVID-19 global pandemic created a downturn in airline passenger travel by over 93 percent at PHX. In direct correlation to the reduced passenger activity, concession sales plummeted for PHX's concessionaires. As a result, established rents were unsustainable for the concessionaires in the Terminals. On April 4, 2020, the Federal Aviation Administration (FAA) provided guidance to airport sponsors encouraging them to consider the business circumstances created by the public health emergency and assist tenants in staying solvent so they can resume normal operations when the emergency ends. The Aviation Department (AVN) requested approval to provide financial relief for concessionaires which included prime operators and Airport Concession Disadvantaged Business Enterprise (ACDBE) business partners to mitigate the effects of the decrease in passenger activity related to COVID-19.

On June 3, 2020, Council approved relief from paying Minimum Annual Guarantee (MAG) for concessionaires at PHX and percent rent only effective April 1, 2020 through June 30, 2020. On July 1, 2020, Council approved an extension of the percent rent only through Dec. 31, 2020.

All concessionaires that received relief were required to adhere to the following requirements:

- Pass financial relief on to all joint venture partners and sub-concessionaires;
- Recall and reemploy furloughed or laid off employees;
- Provide two months medical benefits for furloughed or laid off employees (applicable only April 1 - June 30, 2020);
- Work with Community Economic Development on other relief and employment opportunities;
- Submit weekly sales reports; and

- Provide notice of any Coronavirus Aid Relief and Economic Security Act relief received.

As a result of the pandemic:

- Travelex closed all operations in North America;
- XpressSpa closed all operations, furloughing 21 employees;
- Approximately 50 terminal advertising contracts were cancelled;
- Host furloughed 756 associates and has recalled 172;
- SSP furloughed 550 associates and will recall employees based on seniority; and
- Stellar furloughed 72 associates and has recalled 25.

As passenger loads have gradually increased, the Concessionaires have started re-opening closed units, extending hours of operation, and recalling furloughed personnel. Of the 136 total concessions operating out of PHX, 53 (39 percent) are currently open for business. This is up from 31 percent in May of 2020. While passenger traffic is picking up, it is not tracking at the same rate it was prior to COVID-19 and as a result, Food & Beverage and Retail gross sales remain down approximately 50 percent and gross revenue for Terminal advertising is down approximately 25 percent, compared to 2019.

Contract Term

Relief is effective through Dec. 31, 2020.

Financial Impact

Minimum Annual Guarantee (MAG) has been waived and tenants will pay percent rent based on their lease agreement.

Location

Phoenix Sky Harbor International Airport - 3400 E. Sky Harbor Blvd.
Council District: 8

Responsible Department

This item is submitted by Deputy City Manager Mario Paniagua and the Aviation Department.



Climate Action Planning Update

This report presents the proposed City of Phoenix Climate Action Plan (CAP) Framework developed by staff from 28 City departments as well as results from recent community engagement focused on climate action. Staff will continue to work with the community and other stakeholders to develop a climate action plan for approval by City Council in 2021.

THIS ITEM IS FOR INFORMATION AND DISCUSSION.

Summary

The City recognizes the impacts of climate change and has done significant work prior to development of the current CAP. In 2009, a climate action plan was developed for City operations along with the first City operations Greenhouse Gas (GHG) emissions inventory for calendar year 2005. In 2012, the first community-scale GHG emissions inventory was conducted. Inventories have been conducted at regular intervals since then, with 2018 being the most recent year available. In 2016, the City Council approved 2050 Sustainability Goals in categories including buildings and land use; transportation; waste; water; parks and open space; air quality; and food systems. In 2020, Phoenix became a member of the C40 Cities Global Climate Leadership Group and the Climate Mayors Steering Committee. C40 Cities is a global network of major cities committed to tackling climate change to increase the environmental and economic wellbeing of their residents. As a member of C40, Phoenix has committed to developing a CAP that will achieve net-zero GHG emissions by 2050.

The results from the 2018 Community-Scale GHG Emissions Inventory, completed in conjunction with the Arizona State University Walton Sustainability Solutions Initiative, show that GHG emissions on a community-scale were 0.5 percent lower than 2012's baseline levels. This decrease in GHG emissions occurred during a period when the City's population grew 12 percent and the metro area economy grew 26 percent. Per capita emissions fell from the 2012 baseline of 11.33 MT CO₂e to 10.00 MT CO₂e in 2018. Phoenix must consider and implement additional actions to meet our GHG emissions goals as climate change continues to impact Phoenix.

City of Phoenix Climate Action Plan Framework for Public Input

The City's CAP Framework for Public Input (Framework) was prepared by staff from the following departments and offices: Arts and Culture, Communications, Environmental Programs, Government Relations, Retirement, and Sustainability offices, and the Aviation, Budget and Research, City Clerk, Community and Economic Development, Convention Center, Equal Opportunity, Finance, Fire, Information Technology Services, Housing, Human Resources, Human Services, Law, Library, Neighborhood Services, Parks and Recreation, Planning and Development, Police, Public Transit, Public Works, Street Transportation, and Water Services departments. A Climate Liaison was designated from each department to contribute departmental goals and actions that are included in the CAP Framework. The CAP Framework aims to address emissions reductions and resiliency goals and provide a snapshot of current action underway.

Community Outreach

The City's commitment to include equity principles in its plans and actions plays an integral role in all phases of development and implementation of this climate action plan and requires partnerships and dialogue with everyone, including traditionally under-represented groups. The CAP Survey conducted this summer garnered 846 responses, with 605 of those from Phoenix residents. The results indicated many concerns surrounding extreme temperature and heat waves, prolonged and extreme drought conditions, decreased air quality and increased risks of wildfires. Respondents also indicated the top three major barriers to addressing climate change were lack of government-mandated regulations/support, difficulty in changing behavioral habits, and lack of business or industry support. The top recommended actions were transitioning to renewable energy and increasing transportation options. The first Climate Action Planning Virtual Workshop was conducted on Oct. 14, 2020, with 54 participants. Attendees provided input for the following focus areas: air quality, energy, heat, transportation, and waste. Comments during the workshop included support for increased shade (both trees and structural shade); support for progress updates on plans that have already been approved; support for net-zero emissions by 2030; support for existing eco-stations and recycling efforts; and support for continued involvement with community-based organizations and residents. Additional virtual workshops are scheduled for December 2020 with more workshops in Spring 2021. The CAP Framework is available for public comment until Dec. 31, 2020 on <https://www.phoenix.gov/oep/cap>.

Additionally, Mayor Gallego requested that the Environmental Quality and Sustainability Commission engage businesses to seek their input in creating the CAP, specifically in areas that will keep Phoenix competitive, attract talent, and ensure a vibrant and healthy future.

The CAP Framework document provides the basic structure for the CAP. This structure includes emissions reductions goals for the following sectors:

1. Stationary energy, where ninety-one percent of GHG emissions in this sector are from electricity use;
2. Transportation, where seventy-six percent of GHG emissions in this sector are from the use of gasoline fuel;
3. Waste sector, where ninety-three percent of GHG emissions comes from the disposal of solid waste; and
4. Resiliency goals for air quality, local food systems, heat, and water.

The CAP Framework's sector goals for the short-term, medium-term, and long-term are similar to the 2050 Sustainability Goals previously established. Each sector includes quick start action examples, which are actions currently being taken by the City or proposed that will be completed by 2025. Each sector in the CAP Framework also includes key achievements.

Next Steps

Continue to engage the community to build upon the work being done and propose further climate action. This engagement includes community workshops like the one scheduled in December 2020 and those to be scheduled in early 2021. Proposed actions will be evaluated for their contribution to the GHG emissions pathway to zero using a model provided by C40 Cities, as well as to their feasibility and cost-effectiveness. The CAP Framework and proposed additions to the plans will be formed into a CAP and will be presented to the Transportation, Infrastructure, and Innovation Subcommittee for recommendation for approval in 2021.

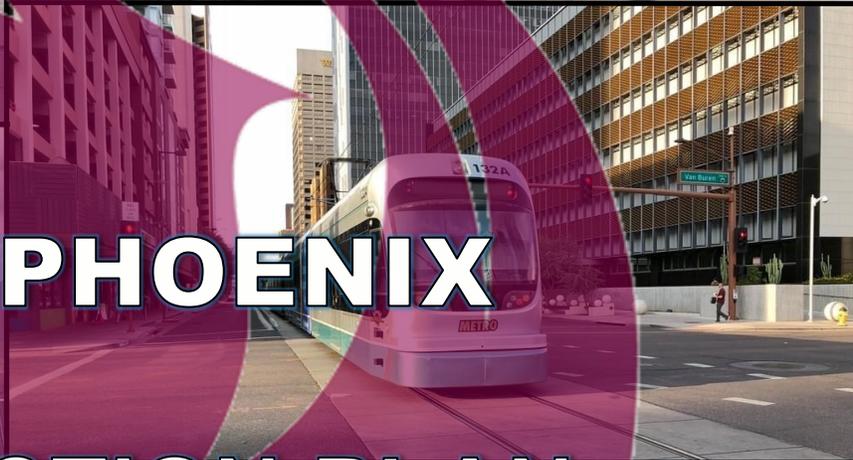
Attachments

- Attachment A - The City of Phoenix CAP Framework
- Attachment B - The 2018 Community-Scale GHG Emissions Inventory
- Attachment C - The CAP Survey Results

Responsible Department

This item is submitted by Deputy City Manager Karen Peters and the Offices of Environmental Programs and Sustainability.

Attachment A



CITY OF PHOENIX CLIMATE ACTION PLAN FRAMEWORK FOR PUBLIC INPUT

October 2020

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LETTER FROM MAYOR

Climate action is an environmental, public health, and economic imperative. Phoenicians understand the inherent value of reducing our impact on the beautiful Sonoran Desert that we call home, and voters declared their commitment to making Phoenix the most sustainable desert city on the planet in the 2015 General Plan. The global challenge of climate change demands local action, and as a member of the C40 Cities Global Climate Leadership Group and the Climate Mayors Steering Committee, I am committed to doing our part to usher in a healthier, more equitable, and more sustainable future.

Doubling down on meaningful action now is not only the right thing to do—our continued prosperity depends on it. The coronavirus pandemic has dramatically altered the lives of Phoenix residents, exacerbating health issues and economic insecurities and underscoring the importance of clean air and water. Climate action is an essential component of the effort to restore our economic security, modernize our economy, and enhance the well-being of our residents and our environment.

There is incredible enthusiasm for climate action across the community and among residents of all ages and backgrounds. This enthusiasm must be harnessed to drive collaborative, tangible action toward a shared vision for the future of our great city. Every day, companies in Phoenix are committing to cleaner energy, establishing climate goals, and developing the technologies that will power a low-carbon economy. The City of Phoenix aims to lead in the development and implementation of the goals and actions that will move us forward.

This framework provides an outline and overview of the proposed Climate Action Plan, charting the path to carbon neutrality by 2050 or sooner. It consolidates plans and goals previously approved by the City Council and proposes additional actions and projects. The success of this plan depends on the continued commitment of all collaborators, both within the City of Phoenix and throughout the community.

I'd like to acknowledge the energy and effort that city staff across departments have already dedicated to this project. In a tumultuous year, Phoenix is proud to have dedicated public servants who are committed to our shared success.

We invite feedback and ideas from residents and representatives of all sectors. This plan will be made by and for all of us. Throughout the remainder of this year and next, there will be a variety of opportunities to get engaged in its development. It will be designed as a living document—with regular progress reports and updates—able to continuously respond to the ever-changing and unique needs of our city.

We're facing a big challenge, but Phoenix has the ingenuity, resilience, and courageous spirit to create a better city, and a better world, for future generations to come.



Phoenix Mayor Kate Gallego

ACKNOWLEDGEMENTS

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Arizona Public Service
Arizona State University
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City of Peoria
City of Tucson
First Southern Baptist Church
Grand Canyon University
Greater Phoenix Economic Council
Maricopa County Flood Control
Mr. Bults Inc.
Pueblo Grande Museum
Resource Innovation Campus
Salt River Project
Secretary of State's Office
U.S. Environmental Protection Agency
U.S. Army Corps of Engineers

Special thanks to Joe Gibbs, Retired

Thank you to Joe Gibbs, recently retired Air Quality Specialist, who devoted many years to both the city of Phoenix and the ADEQ. He initiated many programs that have made our city better. We want to recognize Joe and thank him for all the climate-related work he did previously that have allowed us to reach this point, where we can now develop a climate action plan for the city of Phoenix.

EXECUTIVE SUMMARY

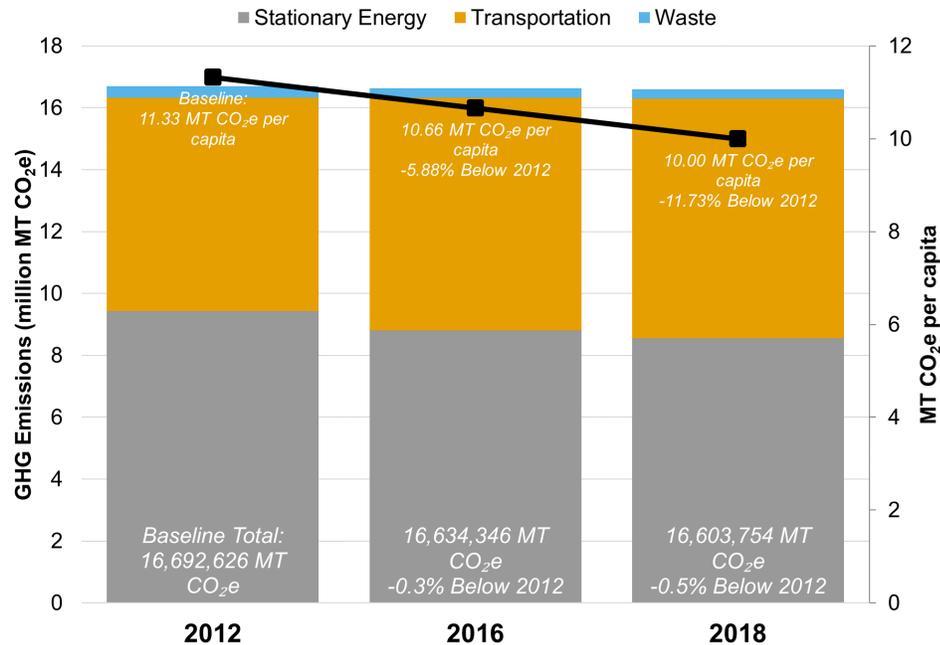
The City of Phoenix (city) has developed this climate action plan framework to seek public and stakeholder input on potential content for its Climate Action Plan. The purpose of the proposed plan is to address the challenges posed by climate change and to help make Phoenix the most sustainable desert city on Earth. Phoenix recently became a member of the C40 Cities Climate Leadership Group, a network of the world's major cities committed to addressing climate change. **As a C40 city, Phoenix is committing to a target of net-zero greenhouse gas (GHG) emissions by 2050 and to conform to the Paris Agreement.** The Paris Agreement is an ambitious effort to keep global average temperature rise below 2 degrees Celsius (C) or 3.6 degrees Fahrenheit (F) above pre-industrial levels, and to limit temperature rise to 1.5 degrees C or 2.7 degrees F.

Additionally, this plan will increase the city's resilience through mitigation and adaptation actions. Mitigation actions are those that reduce GHG emissions, while adaptation actions address the change in climate and adapting to it. This opportunity to develop a plan comes after Phoenix just experienced the hottest summer on record, a drier than normal monsoon season and smoke-filled skies from wildfires within Arizona and all along the West Coast. Events like these are predicted to increase in frequency over the coming decades.

The city has completed community-scale greenhouse gas emissions inventories for 2012, 2016 and 2018 using the Global Protocol for Community-Scale GHG Emission Inventories (GPC). The GPC categorizes GHG emissions into three sectors: Stationary Energy, Transportation and Waste. The Stationary Energy Sector includes GHG emissions that occur from energy used in residential buildings, commercial buildings and facilities, manufacturing industries, agriculture, forestry and fishing energy use, and electricity transmission and distribution energy losses. GHG emissions from the Stationary Sector continue to decrease as the electricity grid increasingly relies on natural gas and renewable sources. The Transportation Sector includes GHG emissions from commercial and civil aviation, on-road transportation, non-road vehicle use, freight and light rail. GHG emissions from this sector continue to increase along with population growth, with the majority of emissions resulting from the use of gasoline-fueled vehicles. The Waste Sector includes GHG emissions from solid waste disposal, the biological treatment of waste (composting), and wastewater treatment. The GHG emissions from waste have decreased over time with the installation of landfill gas capture systems and decreasing emissions from decommissioned landfills.

In 2018, GHG emissions were 16,603,754 metric tons of carbon dioxide equivalents (CO₂e), down 0.5% from the baseline year of 2012. This decrease occurred during a period where the city's population grew 12% and the metro area economy grew 26%. Per capita emissions have decreased from 11.33 MT CO₂e in 2012 to 10.00 MT CO₂e in 2018.

As actions are proposed, they will be evaluated for their effectiveness at reducing GHG emissions. These reductions will be modeled to determine those actions that will accelerate the reduction in emissions in the near future and determine the most effective pathway to net-zero GHG emissions by 2050.



Phoenix GHG emissions by sector.

Emissions reductions will be targeted in the following sectors:

Stationary Energy

Electricity and natural gas provide the energy that lights buildings, cools our homes and businesses, and powers industry. Together, these power sources comprise 51 percent of GHG emissions in Phoenix. Most of the electricity that is used in Phoenix comes from combustion of fossil fuels, like natural gas and coal. Maximizing renewable sources of energy will help reduce these emissions.

Primary Goals:

- Carbon neutral electricity city-wide by 2050.
- Net positive new construction by 2050 in terms of both energy use and the embodied energy in building materials.

Transportation

Forty-six percent of GHG emissions in Phoenix are from transportation. These GHG emissions are increasing as the population grows and the city is built out to accommodate this growth. Over one-third of all GHG emissions in Phoenix are from gasoline-fueled vehicles. Developing communities and transportation infrastructure that provide modes of travel other than the single occupancy, fossil-fueled vehicle will decrease GHG emissions.

Primary Goals:

- Launch an electric vehicle public education & awareness campaign and incentive program in partnership with utilities by 2022.

- Carbon-neutral transportation by 2050 through electrification of transportation and the use of carbon neutral fuels, such as hydrogen and biodiesel.
- Achieve 40% mode share of more sustainable modes of transportation such as walking, biking, transit and car-share.

Waste

Most residential and commercial waste ends up in landfills, left to decompose over decades, producing methane—a greenhouse gas 28 times more potent than carbon dioxide. Phoenix residents generate more than one million tons of solid waste each year. Although a small source of GHG emissions for Phoenix, at two percent, work will be done to reduce these emissions by diverting waste from the landfills and capturing the resulting methane gas.

Primary Goals:

- Divert 40% of waste by 2020.
- Incubate new businesses at the Resource Innovation Campus that can accelerate the move to a circular economy.
- Zero Waste by 2050 through waste reduction and diversion of materials from the landfill for use in the circular economy.

Phoenix Resilience

This climate action plan will also include adaptation actions to address events and issues residents experience every day related to air quality, access to healthy foods, heat, and water security.

Primary Goals:

- Improve air quality by promoting activities that reduce emissions of ozone precursors.
- Create a local food system to increase access to affordable, healthy, and local food, and reduce food waste.
- Complete pilot certification of Phoenix as a HeatReady city by 2022.
- Engage in water conservation and infrastructure projects to ensure water security.

Equity and Engagement

The city strives to improve quality of life for Phoenix residents through the efficient delivery of outstanding public services. In so doing, the city endeavors to be respectful of equity and diversity and be responsive to community needs. The city continually works to engage more, listen more, and be more transparent in delivery of public services.

Primary Goals:

- Increase community input from underserved communities by engaging with residents and organizations that are trusted by underserved communities to seek community input on major climate policy and related budget decisions made by City Council.

Next Steps

Pathway to Net-Zero Modeling

Actions will be evaluated using the C40 Pathways model. The model will assist in determining those measures that will result in GHG emissions reductions. This model will be used to propose different action scenarios that can then be evaluated for cost-effectiveness and provide decision-makers the opportunity to select the actions most suited to reducing GHG emissions in Phoenix.

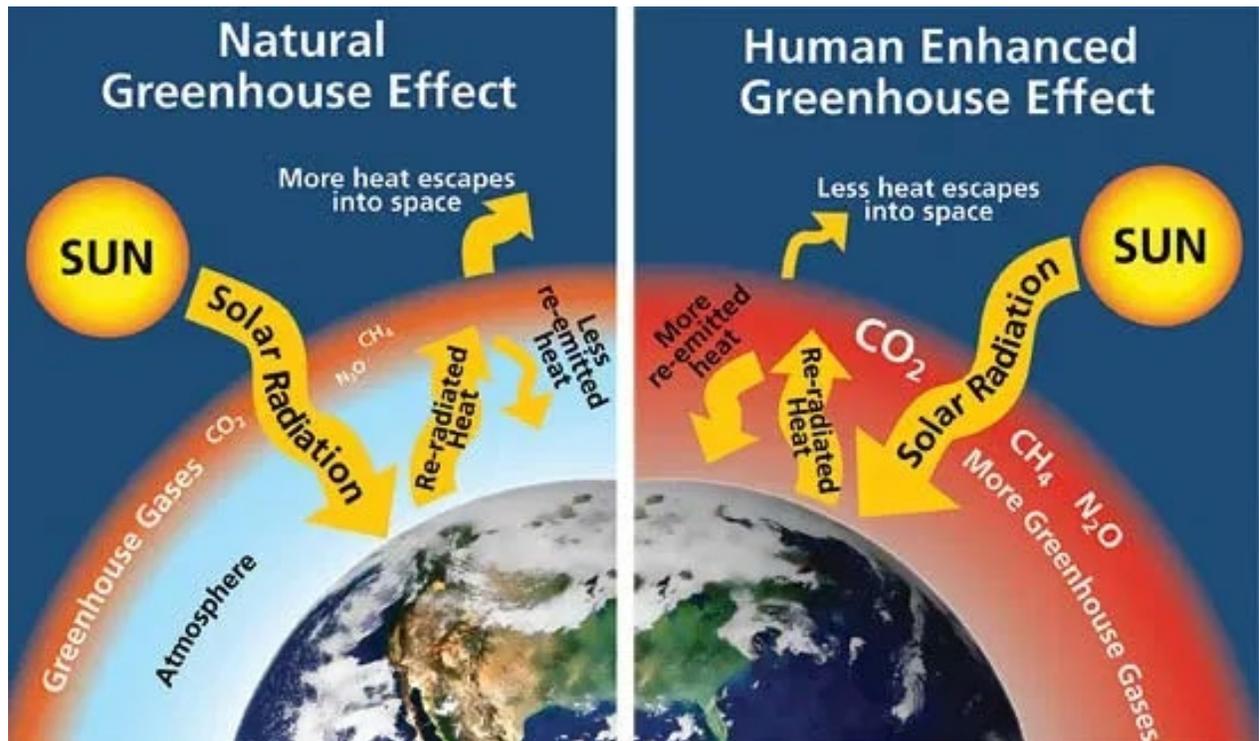
Primary Goals:

- Determine which actions will accelerate GHG emissions reductions by 2030.
- Determine most effective pathway to reach net-zero GHG emissions by 2050.

2021 Update

The city will continually engage residents and businesses to determine priorities, needs, and opportunities. This will especially be true for 2021. Plans will consider the pandemic and whether in-person, virtual engagements or mix of both will be most appropriate.

INTRODUCTION



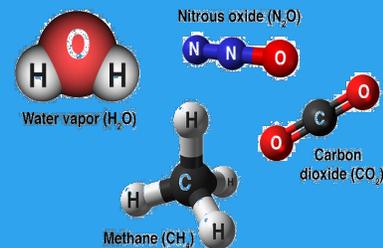
(Source: National Park Service)

Greenhouse Gases

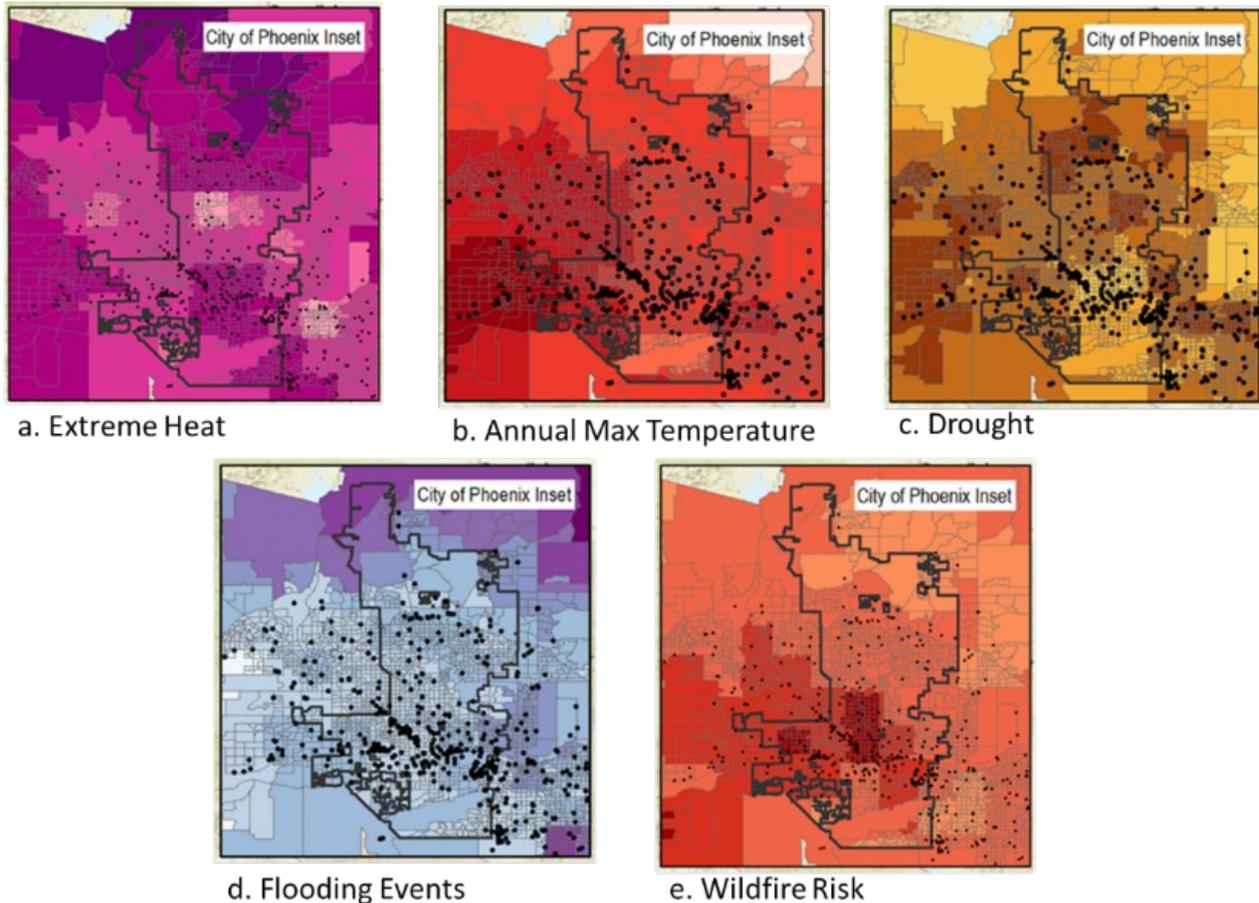
GHG emissions from human activities have increased dramatically over the past century and a half. These emissions, primarily the burning of fossil fuels for electricity, heating, and transportation, are accelerating climate change. Sunlight warms the atmosphere containing GHGs and the surface of the Earth. GHGs absorb the heat and make the Earth suitable to sustain life. With an increase in GHG concentrations from human activities, more heat is absorbed and retained, rather than being released back into space.

This changes our climate, affecting infrastructure, public health, and management of natural resources.

GHGs include water vapor (H₂O), carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and fluorinated gases.



Climate Hazard Assessment



Maps of the city of Phoenix showing waste sites and facilities (black dots) and areas of the city that will have an increased risk (darker shaded areas) by inaction (business as usual emissions) in the following areas: a. Extreme Heat, b. Annual Maximum Temperatures, c. Drought, d. Flooding Events, and e. Wildfire Risk. (Source RTI International)

Recent global human-caused emissions of GHGs are the highest in history and their effects on climate are already being observed. Surface-water availability has declined during droughts that have been caused in part by human-caused GHG emissions. Higher temperatures are creating a “hot drought” in the Colorado River Basin and scientists predict that its flows may diminish by as much as 25 percent in the future - a significant problem for Phoenix, other cities, Indian communities, major industries, and agricultural users, all of whom depend on water from the Colorado River.

In addition, Arizona’s average monsoon rainfall is expected to be reduced by 30-40 percent by the end of the century. Exposure to hotter temperatures and longer heat waves has increased heat-associated deaths in Arizona. During high-ozone, pollution-advisory days, mortality risk is increased if concurrent with a heat wave. Extreme heat, drought, heavy-precipitation events, and increased wildfires in Arizona will be significantly exacerbated by climate change. The

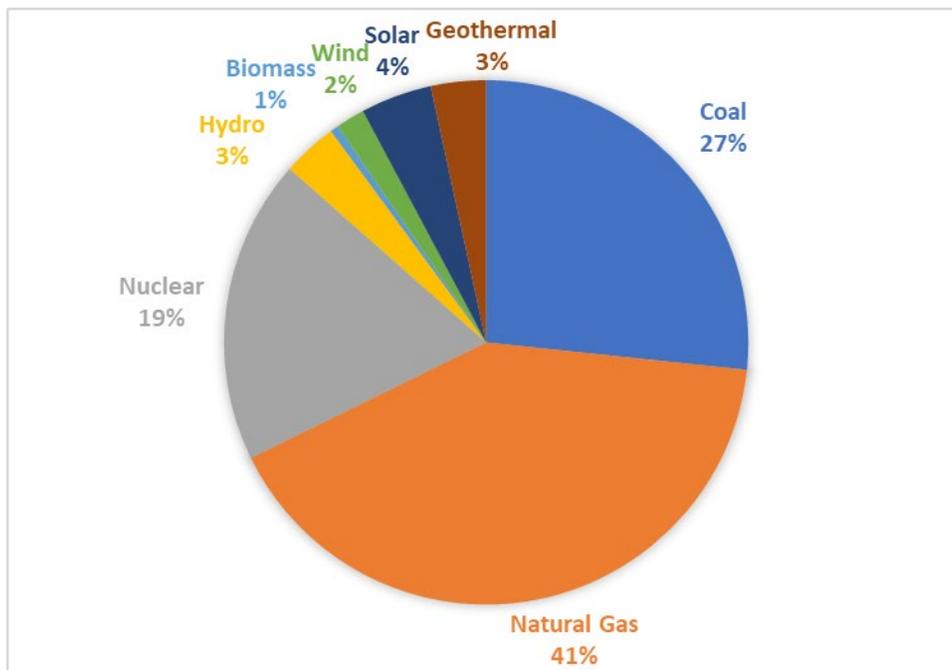
predicted GHG emissions vary over a wide range and are dependent upon socio-economic development and global climate policy.

CLIMATE ACTION PLAN FRAMEWORK – FOR PUBLIC INPUT

The city envisions a continual review, engagement, and revision process for climate action planning, using the best and latest data to guide this process, and continually improving the city's Pathway to Zero. At a minimum, these actions and plan will be reviewed every two years at the same time as the city updates its municipal operations and community-scale GHG-emissions inventories. Depending on the results of the inventories, the GHG emissions reduction pathway model will be revised. Based on the updated model and the continual input from the community and city departments, adjustments will be made to the plan to ensure that the city will achieve its goal of becoming a net-zero GHG-emissions city by 2050.

STATIONARY ENERGY SECTOR (SES) GOALS

According to the 2018 GHG Community Inventory, 51 percent of GHG emissions in Phoenix come from the stationary energy sector. Electricity and natural gas provide the energy that lights buildings, cools our homes and businesses and powers industry. Currently, most of the electricity that is used in Phoenix comes from combustion of fossil fuels, like natural gas and coal. Generation of electricity from these fuel types releases GHGs that contribute to climate change. Maximizing energy efficiency and using renewable sources of energy will reduce the community's emissions.



2018 Resource mix for Phoenix electricity grid. (Source U.S. EPA AZNM WECC Southwest eGRID Subregion.)

2050 GOAL

All buildings will be powered with net-zero GHG sources of energy. All new buildings will be “net-positive” in terms of energy and materials. At the community scale, we will enhance 15 compact centers where the services are provided locally. Residents will be able to live, work and play, all within walking or biking distance.

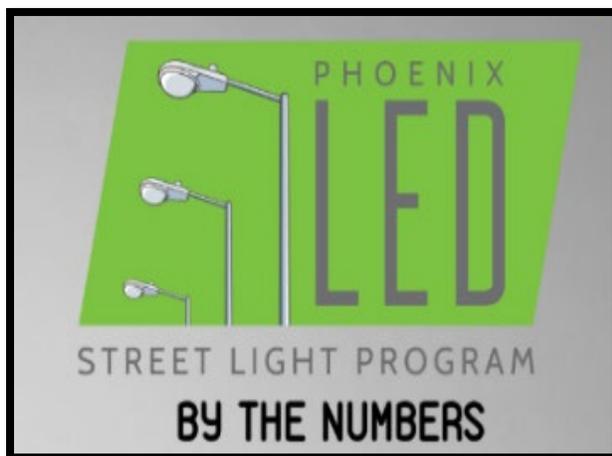
QUICKSTART ACTION EXAMPLES

- Action SES1.5: Install solar panels on carports at 7 city housing sites for a total of 872 kW by 2021.
- Action SES2.1: Replace 100 percent of high-demand lighting fixtures in water and wastewater facilities with LED by 2022.
- Action SES2.2: Continue to replace 50 HVAC units per year until all units that use R-22 refrigerant are replaced.

SHORT, MID AND LONG-TERM GOALS

- Goal SES1: Add 50 MW of renewable energy projects on city-owned buildings by 2030.
- Goal SES2: Perform deep-energy retrofits to lower total energy use in city-owned and operated buildings 25 percent from 2010 levels by 2025.
- Goal SES3: Offset 100% of municipal electricity use through 200MW of new renewable energy projects by 2030.
- Goal SES4: Support energy-efficiency upgrades to existing buildings by developing three new community-wide conservation and renewable-energy programs by 2025.
- Goal SES5: Promote development of community-energy projects, including microgrids, that improve the sustainability and resilience of the surrounding community's electricity grid.
- Goal SES6: Design and construct all new buildings to Living Building Challenge, Net-Positive Design, or equivalent design standards by 2050.
- Goal SES7: Obtain electricity from an electricity grid that is net-zero by 2050.

Key Achievement



LED Streetlight Conversion

The city replaced all of its about 100,000 existing streetlight fixtures with energy-efficient, light-emitting diode (LED) fixtures. The new fixtures feature a 2,700-kelvin LED, the city's new color standard for streetlights. **By converting approximately 100,000 streetlights to LED, the city estimates it will save approximately \$3.5 million in annual energy costs and reduce streetlight electricity use by up to 53 percent.** LED streetlights also offer maintenance savings and come with a 10-year warranty.

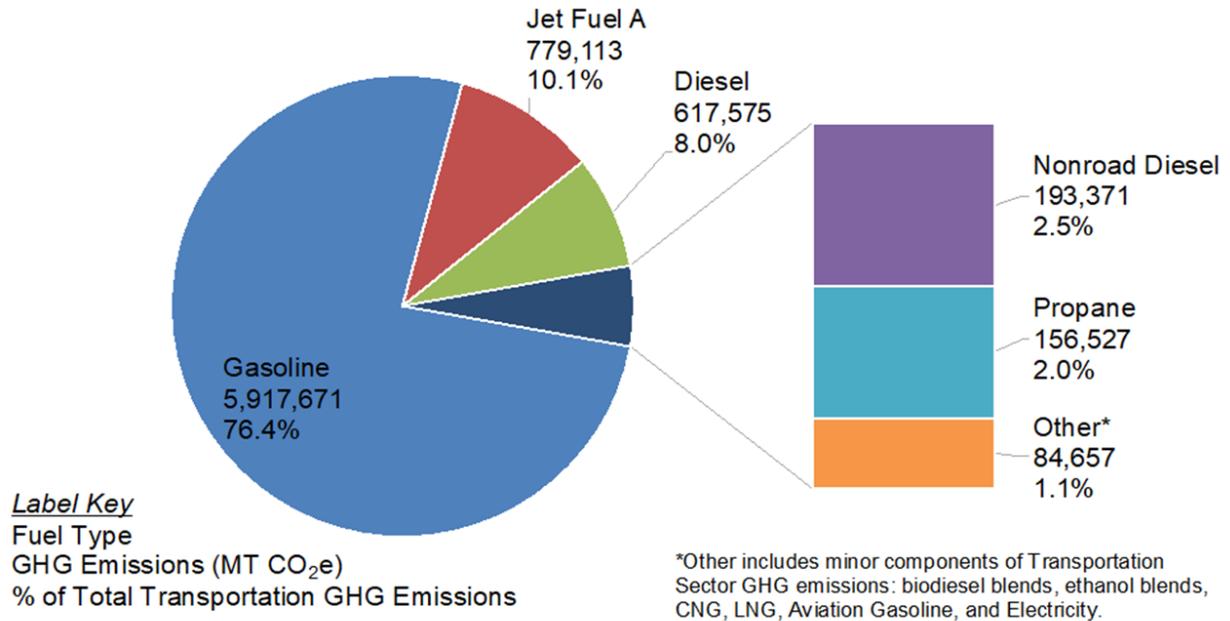
TRANSPORTATION SECTOR (TS) GOALS

A well-connected city drives innovation. Cities must provide a transportation system that gets residents to where they want to go without needing to jump into a car alone or to travel long distances to get to their destination. Currently, GHG emissions from transportation are increasing as the population grows and the city is built out to accommodate this growth. Forty-six percent of all GHG emissions in Phoenix are from transportation. **Thirty-six percent of all GHG emissions in Phoenix is from just gasoline-fueled vehicles.** To become a net-zero GHG-emissions city, significant reductions need to be made in this sector through development of communities and transportation infrastructure that allows for modes of travel other than the single occupancy, fossil-fueled vehicle. This can be achieved by designing Complete Streets to accommodate multimodal travel, an increase in consumption of non-conventional fuels or alternative fuels and eventual transition to vehicles powered by electricity or other carbon-free fuel. In addition, efforts must be made to limit trips when possible, without affecting economic growth. By pursuing these goals, Phoenix can reduce its GHG emissions from transportation by 2050.



2050 GOAL

All forms of transportation will be fueled with net-zero GHG sources of energy. Make walking, cycling, and transit commonly used, enjoyed, and accessible for every Phoenix neighborhood, including our disabled community. This goal will result in 90% of the population living within one-half mile of transit, and projects 40% of the population will choose to commute by walking, biking, transit or car share.



GHG emissions by fuel type from the 2018 GHG emissions inventory.

QUICKSTART ACTION EXAMPLES

Action TS1.4: Complete Key Corridor Master Plan by 2021.

Action TS2.1: Complete transition of the Public Transit fixed route fleet to 100% alternative fuel by 2020.

Action TS3.3: Complete construction of the Phoenix Sky Train® by 2022.

SHORT, MID AND LONG-TERM GOALS

Goal TS1: Implement the city's Complete Streets Policy and Active Transportation Program to encourage multiple modes of transportation.

Goal TS2: Increase the use of alternative fuels (i.e., fuels other than gasoline and diesel).

Goal TS3: Increase the adoption and rollout of electric vehicles and electric-vehicle charging stations.

Goal TS4: Reduce the number of vehicle trips taken, while maintaining a thriving economy.

Key Achievement

Transportation T2050



Transportation 2050 (T2050) is a 35-year initiative to improve streets and transit service, including bus service and light-rail construction, throughout the city. The approval of Proposition 104 by voters in 2015 resulted in a 0.7 percent sales tax that replaced a 0.4 percent sales tax. This is supplemented with federal and county funds, passenger fares and other sources. Approximately 86 percent of funds are dedicated to public transit and approximately 14 percent to streets. Through T2050, Phoenix's arterial-street maintenance cycle will be cut nearly in half, from 65 years to 33 years. T2050 will provide an estimated \$240 million for major street-improvement projects, such as new bridges and new roads, to help connect and complete the city's roadway network. Transit improvements entail tripling the number of light rail miles in Phoenix by adding 42 miles of high-capacity corridors to the Valley's current 20-mile light-rail line. In addition to new light-rail corridors, T2050 will build out the majority of the city's bus service network and introduce new bus rapid-transit corridors.

WASTE AS A RESOURCE (WR) GOALS

2050 Goal

Phoenix will create zero waste through participation in the Circular Economy where recycled materials are repeatedly used in products, instead of using raw materials.



Most residential and commercial waste ends up in landfills, left to decompose over decades, producing methane—a GHG 28 times more potent than carbon dioxide. Phoenix residents discard approximately one million tons of solid waste each year. This waste, along with the waste already in the landfills, produced approximately 304,000 metric tons of CO₂e per in 2018—an amount equivalent to emissions from 65,700 cars.

Technologies, such as methane gas capture systems, are used to decrease the amount of GHG gases released to the atmosphere, but ultimately, limiting the amount of waste that enters the landfills is the best way to reduce or eliminate GHG emissions from waste.

QUICKSTART ACTION EXAMPLES

Action WR1.3: Complete Recycled Asphalt Pavement project by 2025.

Action WR2.2: Complete SR-85 Landfill gas capture project by 2025.

Action WR3.2: Increase number of Green Organic Roll Off Pulls by 5 percent annually.

SHORT, MID AND LONG-TERM GOALS

Goal WR1: Implement programs to increase the reuse and recovery of waste materials and promote social and economic value.

Goal WR2: Reduce GHG emissions resulting from the degradation of waste by increasing landfill gas capture.

Goal WR3: Increase waste-diversion participation by all residents and businesses.

Goal WR4: Transition to green alternatives from environmentally hazardous materials.

Goal WR5: Expand brownfield redevelopment along the Rio Salado in Phoenix.

Goal WR6: Reduce greenhouse gas emissions from water and wastewater treatment by capturing biogas from treatment processes and increasing renewable sources of energy.

Key Achievement

Oops or Shine on? Program

“Oops or Shine on?” provides residents feedback on what can and cannot be recycled. In 2019, the Public Works Zero Waste Team interacted with approximately 23,500 community members through outreach programs, including tours of facilities and presentations to schools, businesses, and neighborhoods. City of Phoenix employees participate in a yearly recycling competition to increase awareness about proper recycling.

PHOENIX RESILIENCE

FINANCIAL SUSTAINABILITY INITIATIVES

The city of Phoenix manages nearly \$2.3 billion to cover its financial responsibilities and invests these funds in compliance with all state and federal regulations as well as the city's Investment Policy. The current Investment Policy includes:

- Safeguarding public funds;
- Ensuring liquidity necessary to support city operations and capital programs; and,
- Earning a rate of return.

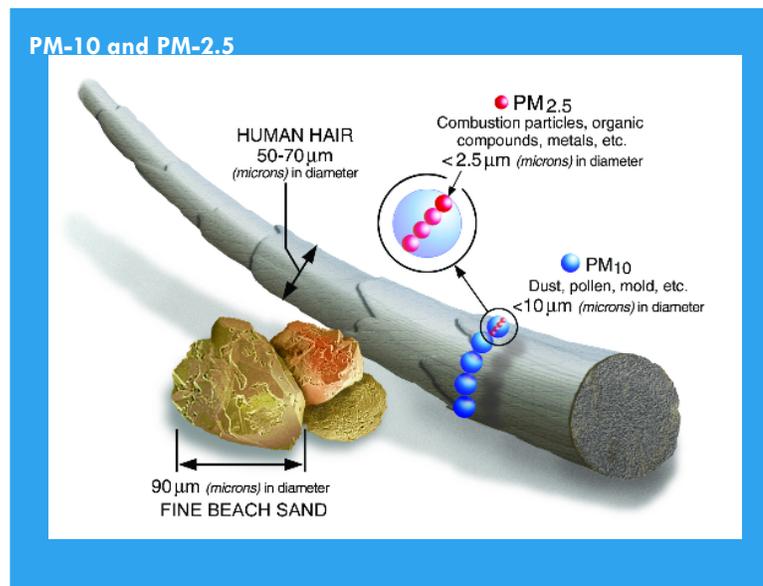
In accordance with the city's Investment Policy, the city has invested \$27.2 million in green bonds fully backed by the United States government. Currently the city of Phoenix does not have any investments in fossil fuel companies. The city is actively monitoring green bond opportunities that meet the criteria stated in the Investment Policy.

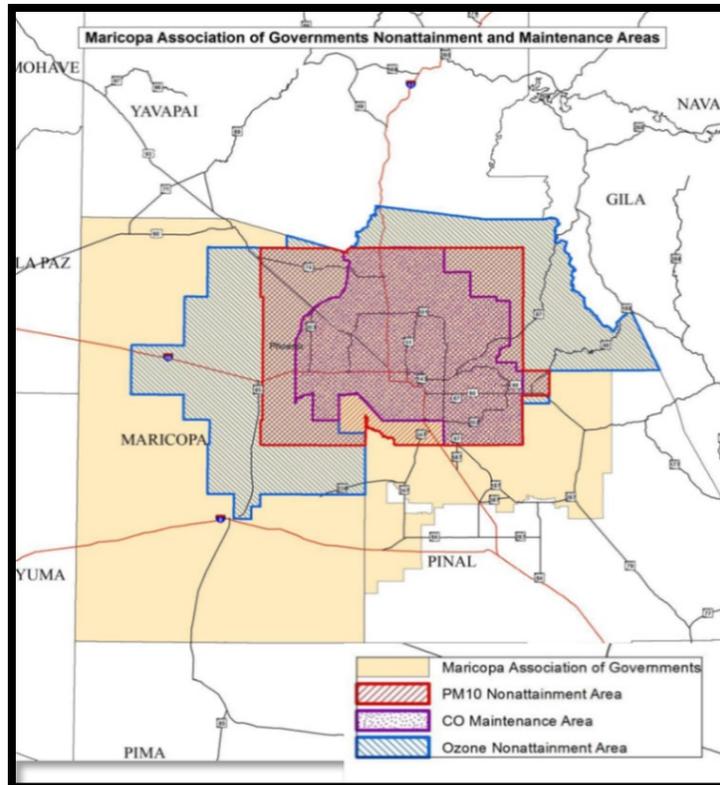
AIR QUALITY (AQ) GOALS

Poor air quality impacts every resident in the city of Phoenix. The federal Clean Air Act (CAA) requires Arizona to create a state implementation plan (SIP) aimed at meeting National Ambient Air Quality Standards (NAAQS) for including carbon monoxide, ozone, particulate matter with a diameter smaller than 10 micrometers (PM-10), particulate matter with a diameter smaller than 2.5 micrometers (PM-2.5), lead, nitrogen dioxide, and sulfur dioxide.

These air quality standards must be met within the Maricopa

Nonattainment Area, which includes the city of Phoenix (see map below). Of course, air is not contained by city limits so actions directed at improving air quality must be considered at a regional level. Phoenix partners with other governmental entities, including Maricopa County Air Quality Department (MCAQD), Arizona Department of Environmental Quality (ADEQ), and Maricopa Association of Governments (MAG) to work toward meeting these standards.





As a C40 City, Phoenix will work toward meeting World Health Organization (WHO) air quality standards for particulate matter, nitrogen dioxide, ozone, and sulfur dioxide. This will be done by including relevant top pollution-reducing actions into the plan, which includes expanding public transit, increasing active transport options, modeling air pollution reduction as a result of actions, and monitoring air quality.

2050 GOAL

Phoenix will achieve a level of air quality that is healthy for humans and the environment. Air quality will meet or exceed U.S. EPA NAAQS and WHO standards, and will achieve a visibility index of good or excellent on 90 percent of days or more.

QUICKSTART ACTION EXAMPLES

Action AQ1.1: Obtain a new DERA grant by 2025.

Action AQ2.1: Ensure city-owned vacant lots remain stabilized to prevent dust and PM emissions.

SHORT, MID AND LONG-TERM GOALS

Goal AQ1: Decrease ozone precursor emissions, including nitrogen oxides (NO_x) and Volatile Organic Compounds (VOCs) from municipal vehicles by 10% by 2025.

Goal AQ2: Decrease emissions of dust/particulate matter (PM-10 and PM-2.5).

Key Achievement

City of Phoenix Dust Reduction Task Force

In 2011, the city of Phoenix was experiencing high levels of particulate air pollution. This dust contributed to the infamous “brown cloud,” increased risk for individuals with respiratory diseases, and continued high levels would have led to a loss of billions of dollars in Federal funding for streets and highway projects needed throughout the region. To address this class of pollutants, the city manager established the Dust Reduction Task Force, which consisted of various city departments. The Task Force produced detailed maps of targeted areas, changes to city code for dust reduction, an enforcement strategy for the Code focused on education, dust awareness, response training for staff, and various multimedia items for outreach. An example of the work being conducted to reduce dust creation is seen in the before and after photographs of the surface stabilization on the shoulders of Broadway Avenue. Many residents use the shoulders of this street and the surface was stabilized to allow continued use by residents and limit the formation of dust. Due to the success of the Task Force, Maricopa Association of Governments has recognized Phoenix as a regional leader and the Task Force as a model for other cities in the region.



Before and after of surface stabilization on the shoulders of Broadway Avenue.

LOCAL FOOD SYSTEM (LFS) GOALS

The food system produces and delivers food from a farm or producer to the consumer. A healthy food system increases Phoenix resident's ability to access healthy, affordable food – food that is fresh, nutritious, and grown without harming its producers or our environment. A healthy food system contributes to economic growth, health, and community by:

- Encouraging consumers to grow their own food and providing opportunities for urban farmers to sell their food locally.
- Supporting all options for furthering access to healthy food including community gardens, urban farms, farmers markets, community supported agriculture, healthy food retailers, and new innovative means.
- Creating a strong community network of successful and culturally appropriate businesses that produce, process, cook, transport, and sell food with the goal of preventing food loss and waste.

The goals and actions identified here are included in the 2025 Phoenix Food Action Plan that was approved by Phoenix City Council in March 2020. Implementation of the actions identified is scheduled for completion no later than December 2025.

2050 GOAL

Maintain a healthy, sustainable, equitable, and thriving local food system.

QUICKSTART ACTION EXAMPLES

Action LFS 2.2: Incorporate agriculture, food processing, and distribution into existing and future economic development plans by 2020.

Action LFS 5.2: Convene local food producers with city staff, leaders, and elected officials to build trust and understanding by 2020.

Action LFS 3.1: Update codes and ordinances where appropriate to eliminate barriers and encourage developing a healthy food infrastructure, including food waste diversion by 2021.

Action LFS 3.3: Complete an inventory of city-owned parcels as opportunities for urban agriculture, focused on food deserts within irrigation districts by mid-2021.

Action LFS 5.4: Complete a GHG Emissions Inventory for the local food system, defined as Maricopa County by 2023.

SHORT, MID AND LONG-TERM GOALS

- Goal LFS1: All people living in Phoenix should have enough to eat and have access to affordable, healthy, local, and culturally appropriate food.
- Goal LFS2: Businesses that produce, process, distribute, and sell local and healthy food should be recognized as integral to the economy and encouraged to grow and thrive in Phoenix.
- Goal LFS3: Growing food in Phoenix and the region should be easy and valued, for personal or business use.
- Goal LFS4: Food-related waste should be prevented, reused, or recycled via sustainable food production practices that maintain a healthy environment.
- Goal LFS5: Develop food policies and actions that address local and global challenges posed by climate change, urbanization, political and economic crises, population growth and other factors.

Key Achievement



Maricopa County Food System Coalition

The city is a founding member of the Maricopa County Food System Coalition (MarCo) established in 2015. Several organizations focused on improving the local food system gathered to explore the viability of creating a food policy council/coalition for the region. The city's Office of Environmental Programs was eager to learn and listen to stakeholders to better understand the challenges faced in providing access to healthy food for everyone living in Phoenix.

Coincidentally, the two groups of stakeholders came together, and the city committed to help create the coalition. The city continues to have a strong relationship with MarCo and has successfully won a grant award to complete a Community Food Assessment for Maricopa County, the first of its kind. The data collected was integral to the city's own Food Action Plan and continues to provide valuable information to educate others on the importance of an equitable, healthy, thriving, and sustainable local food system.

HEAT (H) GOALS

Climate change is leading to increases in average temperatures and increased possibilities of severe prolonged heat waves. Extreme heat can have dangerous and deadly health consequences, including heat stress, illness, and heatstroke.

Phoenix is in the northeastern Sonoran Desert. On average, Phoenix has 110 days each year with a high temperature over 100 degrees F and 19 days with high temperatures exceeding 110 degrees F. July and August of 2020 were the hottest on record, and the summer of 2020 saw 54 days over 100 degrees F, breaking the previous record of 26 days. Unlike many other U.S. cities that only have a small percentage of homes with air conditioning, almost all dwellings in Phoenix have some form of mechanical cooling, making it more prepared overall for heat waves and extreme-heat events than many other cities.

However, heat does not affect all residents equally--outdoor workers, those experiencing homelessness and other vulnerable populations, such as low-income residents living in poorly insulated homes, are more impacted by heat. Successful heat programs and policies must address this disparity and focus on those most vulnerable.

2050 GOAL

Reduce urban heat-island effect through green infrastructure as well as doubling the current tree and shade canopy to 25 percent. Have all residents within a five-minute walk from a park or open space by adding new parks or open space in underserved areas, adding 150 miles of paths, greenways, and bikeways throughout the city, and transforming an additional 150 miles of canals into vibrant public space.

QUICKSTART ACTION EXAMPLES

Action H1.2: Complete walkshed mapping tool pilot by 2020.

Action H5.1: Complete pilot certification as a HeatReady city by 2022.

Action H2.6: Provide shade at all 4,050 bus stops by 2025.

Action H4.2: Complete street cool seal pilot project by 2025.

SHORT, MID AND LONG-TERM GOALS

Goal H1: Create a network of cool corridors in vulnerable communities to facilitate movement from residents' homes to their places of employment, education and play.

Goal H2: Increase shade provided by trees or constructed shade in parks, streets and rights-of-way.

Goal H3: Provide resources and services to residents to manage heat.

Goal H4: Increase the use of high albedo, or reflective, materials in infrastructure projects.

Goal H5: Develop HeatReady certification for cities.

Key Achievement

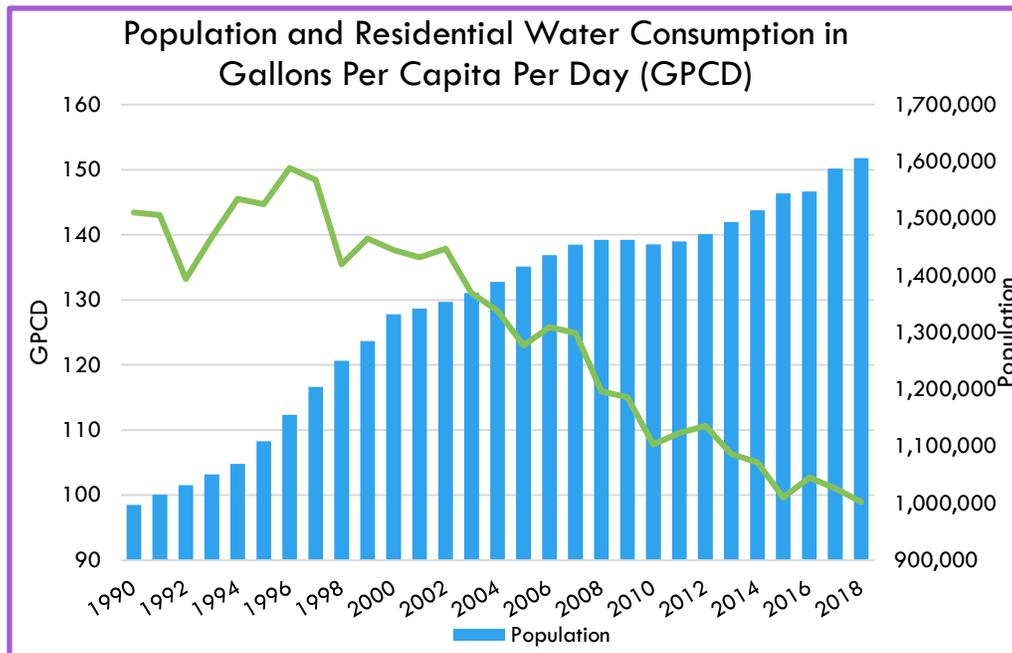


Heat Relief Network

In 2005, after a weeklong heat wave that resulted in about 30 deaths in the homeless population, the Maricopa Association of Governments (MAG) created the Heat Relief Network. The Heat Relief Network is a regional partnership between MAG, local municipalities, nonprofit organizations, the faith-based community, and businesses. Each year, MAG coordinates mapping of the Heat Relief Network, a network of partners providing hydration stations, refuge locations, and water-donation sites throughout Metropolitan Phoenix with the goal of educating the community about heat dangers and preventing heat-related illnesses and deaths among vulnerable populations.

WATER (W) GOALS

The city's Water Services Department is more than 110 years old and is responsible for treating and distributing tap water to 1.7 million customers daily. Today, it also manages the city's sewer system and handles wastewater treatment operations for 2.5 million residents in five valley cities. Infrastructure includes 7,000 miles of water lines, 5,000 miles of sewer lines, eight treatment plants, 50,000 fire hydrants, and 90,000 manholes. Phoenix's water and sewer rates are among the lowest of comparable-sized cities nationwide. Our tap water supply is secure due to decades of planning and multiple water sources. The city reuses nearly all its wastewater on crops, wetlands, and energy production. Moving forward, the city's water and wastewater utilities are committed to energy efficiency that will pave the way to accomplishing their immediate, mid-term, and future goals in sustainability and emission reductions. We are taking action to increase water security and mitigate GHG emissions by banking water, using wastewater, increasing renewable sources of energy to power the water treatment processes, and capturing GHG emissions from these processes.



2050 GOAL

Provide a clean and reliable 100-year water supply.

QUICKSTART ACTION EXAMPLES

Action W1.2: Complete construction of Drought Pipeline Project by 2025.

Action W5.1: Implement Greater Phoenix Green Infrastructure and Low Impact Development Details for Alternative Stormwater Management handbook by 2025.

SHORT, MID AND LONG-TERM GOALS

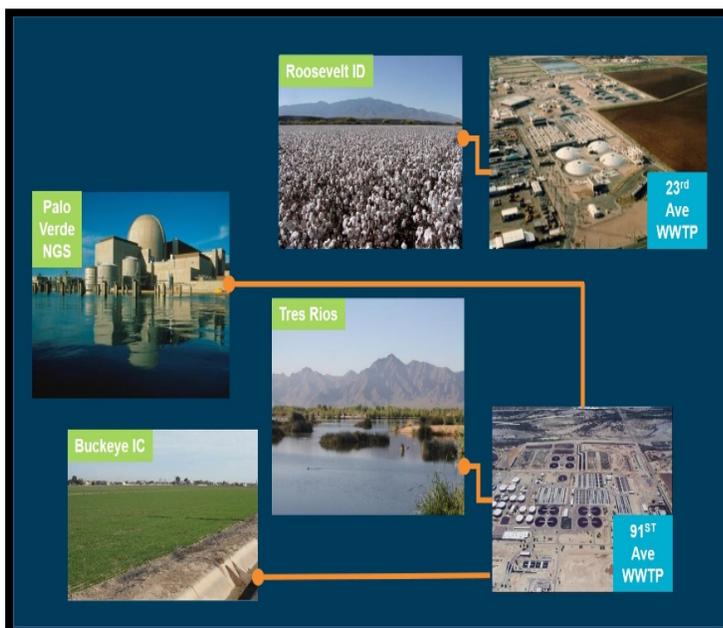
Goal W1: Identify and implement infrastructure projects to ensure water security.

Goal W2: Improve conservation of water resources by improving stormwater management, optimizing water use, conducting water audits, and utilizing wastewater.

Goal W3: Increase outreach and provide programs to residents and businesses to reduce water use.

Goal W4: Reduce GHG emissions from water and wastewater treatment by capturing biogas from treatment processes and increasing renewable sources of energy.

Key Achievement



Sustainability Bond Sale for Colorado River Resiliency Projects

On March 26, 2020, the city of Phoenix issued its first-ever sale of Sustainability Bonds. The bonds will fund Colorado River resiliency-related projects by the Water Services Department. One of these resiliency projects includes building a pipeline supplying North Phoenix residents (approximately 400,000 people) that are served exclusively by Colorado River water treated at two water treatment plants. The proposed 66-inch pipeline will be used to alleviate the effects of drought, by ensuring that water supplies from the Salt and Verde Rivers are available to North Phoenix during future shortage on the Colorado River.

Verde Rivers are available to North Phoenix during future shortage on the Colorado River.

EQUITY AND ENGAGEMENT

The city strives to improve quality of life for Phoenix residents through the efficient delivery of outstanding public services. In so doing, the city endeavors to be respectful of equity and diversity and responsive to community needs. The city continually works to engage more, listen more, and be more transparent in delivery of public services.

Climate change impacts every aspect of the Phoenix community. Every action the city takes has some degree of climate impact associated with it, therefore, every action is a climate action. The city's commitment to include equity principles in its plans and actions plays an integral role in all phases of development and implementation of this climate action plan and requires partnerships and dialogue with under-represented groups.

Plan for Ongoing Community Engagement

Continual and active community engagement is essential to successful climate planning. Community engagement for this climate action planning process will strive to be purposeful, inclusive and respectful of the needs of the community. At times, this engagement may be more intensive than at others and includes engagement conducted for an individual element of the plan, such as Cool Pavements, Walkable Urban Code, or Trees and Shade. Engagement will continue beyond 2020 and will include virtual and in person workshops and meetings; webinars and seminars to provide information virtually; online surveys and a comprehensive online presence.

This community engagement aims **to inform, engage and be responsive to** the community. At any given time, the city has numerous projects underway, in planning stages, and in construction and implementation. It is a difficult to keep up with all the activity that occurs daily in a city as large as Phoenix. The city's community engagement can always improve.

Phoenix will, as part of its Climate Planning:

- endeavor to post more to social media about projects,
- advise in timely fashion methods of feedback for specific city activities, and
- promote success stories from the city.

While the city is committed to keeping the community informed, it is also vital **to listen** and **to consult** with the community. Phoenix is committed to listen, actively, through workshops, meetings, one on one meetings, and surveys. In consideration of the limitations presented by the Coronavirus pandemic, the city will use appropriate means to present the plan for continued community engagements to further amend and improve the plan throughout 2021.

Identifying Stakeholders

We are all stakeholders in climate action planning. Identifying individuals who can share lived experience, expert knowledge, insight, and connections to the community at large will be an ever-evolving process. Engaging a diverse set of stakeholders offers greater range of innovation and greater potential for achieving these goals. Phoenix will continue to engage those stakeholders in a process that is transparent and equitable.

Pathway to Net-Zero Modeling in Communities

GHG emissions are not produced equally by all residents of Phoenix. To ensure that GHG reductions are equitable across the different communities in Phoenix, emissions inventories will be developed across different communities. These inventories will be combined with proposed GHG emissions reduction community-specific actions and will be evaluated using a model to assist residents in determining the pathway most appropriate for their own communities.

ATTACHMENT 1 – CLIMATE ACTION PROJECTS TO DATE

STATIONARY ENERGY

2018 International Energy Conservation Code Adoption – Planning and Development Department

On July 6, 2018, the Phoenix City Council adopted the 2018 International Energy Conservation Code (2018 IECC), as part of the adoption of the 2018 City of Phoenix Building Construction Codes (PBCC), which is a model code that establishes minimum design and construction requirements for energy efficiency. 2018 IECC has prescriptive and performance-based provisions for both residential and commercial construction for energy efficiency that are used to address minimum requirements for heating, ventilating and cooling, lighting, water heating, and power usage for appliances and building systems. The program is overseen by the Planning & Development Department. The city is committed to keeping the city building codes current to maximize energy efficiency and water conservation.

2012 Phoenix Green Construction Code – Planning and Development Department

The city of Phoenix is proud to announce the adoption of a voluntary Phoenix Green Construction Code (PGCC) effective July 1, 2011. The Phoenix Green Construction Code will take a "whole project" approach to promoting safe and sustainable construction. The PGCC incorporates standards to reduce embodied carbon emissions.

23rd Ave Wastewater Treatment Plant Power Redundancy Study – Water Services Department

During the 23rd Ave WWTP Power Redundancy study, Phoenix partnered with APS to install a microgrid that would serve both the city's power redundancy needs and APS's long-term goals. A microgrid is a local energy grid that can disconnect from the traditional grid and function autonomously without disrupting operations. In times of crisis, this capability is important to the continued operation of water and wastewater treatment plants. During these times, the microgrid can use its own local energy generation from solar energy generation systems, emergency generators or an on-site battery system. Once the crisis is resolved, the microgrid can then be connected to the traditional grid. This is also useful if energy generation in the surrounding community is disrupted and can provide resiliency and stability to the grid. As part of the installation, Tier 2 generators were replaced with more stringently regulated Tier 4 generators which will significantly reduce emissions.

Choice Neighborhoods Energy-Efficient Housing – Housing Department

As part of the Choice Neighborhoods redevelopment of the Edison-Eastlake Community, a community-driven redevelopment effort will include a "LEED for Neighborhood Design (LEED ND) Master Plan and architectural guidelines to create "Enterprise Green Communities" (a green building certification program administered through

enterprisecommunity.org) to provide a new mixed-income, energy efficient housing development that will become a showcase of sustainable development. The Aeroterra Community is a HOPE VI redevelopment project that replaced obsolete public housing units with mixed-income energy efficient, Enterprise Green Communities-certified buildings with solar panels. In addition, APS Multifamily Solar Program Partnership will see new carports and solar panels be installed at Monroe Gardens, Fillmore Gardens, Marcos de Niza Apartments, Monroe Gardens, Summit Apartments, Sunnyslope Manor and Washington Manor Apartments.

Emergency Housing Rehabilitation Program – Neighborhood Services Department

The Emergency Housing Rehabilitation program, which includes Emergency Home Repair and Remodel, the Hardship Assistance Program, and the HOME Program, has assisted over 425 residential structures, most in dire life-threatening situations, ensuring safe and healthy houses to maintain healthy and safe homes to live in. The Lead Hazard Control and Healthy Homes Program has assisted over 200 eligible residential structures reducing lead hazards to ensure safe areas for children under 6 years of age, grow and develop in healthy and safe households. The Community/Housing Development Section has completed 126 new build homes under the South Phoenix Village Single-Family Infill Redevelopment Project. These single-family houses have been built with the highest expectation of energy efficiency and sustainability results in mind.

Emerging Technologies Program – Public Works Department

Services are provided to departments to reduce energy consumption and determine project feasibility and cost savings. As part of this initiative, the Emerging Technologies program looks at new and innovative ways to save energy and reduce GHG emissions by evaluating technologies that reduce cooling loads in a facility, lower utility demand, provide more efficient building envelopes, and create an overall cost savings with a positive effect on the environment.

Energy Use Reduction – Aviation Department

The Aviation Department reduced energy use by 17.28 percent between 2009 and 2018 to meet the Better Building Challenge adopted by the city of Phoenix. (Note: PHX Sky Train® is not included, as it was not in service in 2009). ASHRAE Level II Energy Audits completed in 2015 were the basis of the Strategic Energy Management Plan and additional Investment Grade Energy Audits have been done. Plans to update the Aviation Department Design and Construction Services - Design Standards will focus on procuring more energy efficient equipment during new construction. Recent projects include: New HVAC control system with optimization at 44th St. Sky Train Station® Chiller Plant; Variable Frequency Drive Installation for Condenser Pumps at the Rental Car Center. Conversion to LED: North Runway and high-speed turn-offs, Terminal 4 Departure /Arrival street lighting and High-Profile Parking Lot light, at East Economy Garages A & B, and the Terminal 4 Garage.

Energy Use Reduction – Phoenix Convention Center

Phoenix Convention Center (PCC) staff began evaluating potential areas for energy reduction improvements in 2015. Partnering with APS to capture the benefit of its Rebate Program, PCC has completed seventeen projects of which thirteen were eligible for rebates. Over the past 5 years, electrical staff and contractors have replaced or upgraded lamps and lighting equipment, saving approximately \$700,000, reducing usage by 1.84M kWh, and earning rebates totaling \$170,000. Based upon the US Energy Information Administration's annual average for residential electricity usage, the PCC reduced its electricity usage equivalent to that of 170 homes. From stairwells, garages, meeting rooms and food court area over 7,725 lightbulbs and lighting fixtures have been installed, all while planning, ordering materials and completing projects around event activity, other priority facility requests, routine and preventative maintenance tasks. Based upon a recently completed energy audit, the Phoenix Convention Center will continue to implement energy reduction materials and systems over the next 2-5 years.

LED Streetlighting and Traffic Signals Conversion – Street Transportation Department

The Street Transportation Department replaced approximately 100,000 existing streetlight fixtures with energy-efficient light-emitting diode (LED) fixtures. Over time the full [LED streetlight conversion initiative](#) will reduce streetlight electricity use by up to 53 percent and save approximately \$3.5 million in annual energy costs. LED streetlights also offer maintenance savings and come with a ten-year warranty. The city began testing LED energy efficient streetlights in 2007 throughout various locations. In 2013 the city adopted LED technology as the new standard for all public roadway lighting, then in 2015 began planning a citywide effort to convert all streetlights to LED. After an extensive public input process, in 2016, the City Council revised the city's standard kelvin level for streetlights from 4,000 kelvin to 2,700 kelvin, which is considered a “warmer” color temperature. (A light bulb’s color temperature indicates what the look and feel of the light produced will be. The color temperature of a light bulb is measured in degrees of kelvin on a scale from 1,000 to 10,000.) The new 2,700 kelvin LED lights may appear brighter at the source; however, they do not increase the measurable light levels on the street, compared to those produced by the high-pressure sodium light fixtures that were in place.

Low-Income Weatherization Assistance Program – Neighborhood Services Department

The Low-Income Weatherization Assistance Program focuses on decreasing energy consumption and improving indoor air quality for residences within the 200% Federal Poverty Level. Between 2015 and 2020, the Low-Income Weatherization Assistance Program has provided energy efficiency assistance to over 500 residential structures, with an average expenditure per residence of \$12,200.

Neighborhood Commercial Revitalization Programs – Neighborhood Services Department

Commercial neighborhood revitalization programs (NCR) encourage neighborhood revitalization. NCR and Operation Patch and Paint (OPP) provide financial and technical assistance to existing business and commercial property owners along targeted city of Phoenix business corridors. Program support, through capital improvements, ensure the long-term sustainability of the community and structures.

Solar Energy Generation Systems at Phoenix Sky Harbor International Airport – Aviation Department

Placing solar energy generation systems on city-owned facilities, like the Phoenix Sky Harbor International Airport, provide a great opportunity to take advantage of the large amounts of space available. Section 512 of the FAA Modernization and Reform Act (FMRA) encourages Department of Transportation to consider grants for projects that increase the efficiency of airport power sources, including solar energy generation systems. Two examples of large solar energy generation systems on Aviation property are the installations at the Rental Car Center (RCC) and the East Economy Parking Garages. These provide 4.1 MW and 1.29 MW of power, respectively, and were completed in 2011. According to the 2017 Aviation Department Strategic Energy Management Plan, the solar panels at RCC generate about 43 percent of the total RCC energy consumption. In 2019, a 580 KW solar array was installed at the Consolidated Office Building. Possible future solar energy system installations are being considered through a partnership with APS or through solar service agreements (SSA). However, there are limits to the amount of solar energy generation systems that can be placed due to regulations from the Federal Aviation Administration, to minimize glare caused by the panels that can affect airport operations.

Solar Energy Program – Public Transit Department

Placing solar energy generation systems on city-owned facilities, like parking lots, provides a great opportunity to take advantage of the large amounts of space available above the vehicles while also providing shade. There are many of these systems in place around the city, including installations at Burton Barr Library, conferencing facilities, office buildings, parking garage structures, and other facilities. In addition, many of these solar energy generation systems are located at Park-and-Ride facilities. Park-and-Ride facilities are parking lots with public transport connections that allow residents the opportunity to leave their vehicles and head to points of interest by bus, light rail or carpool for the rest of the trip. All new Park-and-Rides built by the Public Transit Department will have solar panels, water conserving fixtures, extensive landscaping and shade structures (including covered parking). All Public Transit Department Park-and-Rides built after 2003 have solar panels. All park-and-rides have covered vehicle parking. Public Transit owns 8 park-and-rides; 4 of the 8 have solar panels. The Solar Energy Program has a goal of putting into place an additional 5 MW of behind the meter solar capacity by 2025, which includes parking infrastructure.

Solar Power Facility at the Lake Pleasant WWTP – Water Services Department

The largest solar energy generation installation on any city property is the 7.5 MW solar power facility at the Lake Pleasant WWTP that was completed in 2013 in partnership with SunPower Corp. through an SSA. The installation is on 30 acres and has 22,936 solar panels saving \$4.2 in cost savings over the 20-year life of the system. The overall reduction of GHG emissions was primarily due to the on-site solar power generation by Water Services.

Sonoran Studio Building – Planning and Development Department

The Sonoran Studio Building will be Arizona's first Certified Living Building. It is designed by Architectural Resource Team and will be the future home of their architectural offices. It will be located in the heart of Phoenix at 1055 East Indian School Road. The building is one-story with 4,488 square feet of space. This building will be on the leading edge of regenerative design. This is a project that will generate all of its own energy with renewable resources. It will capture and treat its water on-site, meeting the important implementation targets outlined in Phoenix's climate action goals. The Building shall be net-zero energy and incorporate no toxic materials in its construction. Building design features include solar photovoltaic panels, Zero Mass Water hydrological panels, composting toilets, a rainwater harvesting system and grey water recycling system. The intent of the design is to meet all water demands within the carrying capacity of the site and mimic natural hydrological conditions, using appropriately sized and climate-specific water management systems that treat, infiltrate or reuse all water resources on site. Project water use and release must work in harmony with the natural water flows of the site and its surroundings. One hundred percent of the project's water needs must be supplied by captured precipitation or other natural closed loop water systems, and/ or by recycling used project water, and must be purified as needed without the use of chemicals.

TRANSPORTATION

Comprehensive Bicycle Master Plan – Street Transportation Department

Phoenix City Council adopted the [Comprehensive Bicycle Master Plan](#) in November 2014. This plan will help develop a comprehensive bicycle network that is fully connected with the Phoenix community and other transportation networks. Bicycle facilities already exist in Phoenix and represent only a small fraction of the nearly 5,000 miles of street network in the city. The Comprehensive Bicycle Master Plan is intended to make Phoenix a part of the regional bicycle network throughout the metropolitan area through coordination with MAG and ADOT. The plan also provides new policies for bicycle facility design, traffic control practices and facilities at destinations, such as parking or shower facilities.

Fleet Replacement – Public Works Departments

Public Works is participating in the U.S. Environmental Protection Agency (EPA) national Cleaner Trucks Initiative, a program that aims to establish more stringent emissions standards to reduce nitrogen oxide (NOx) and other pollutants from heavy-duty truck engines. Phoenix has been at the forefront of cleaner air initiatives, demonstrated by Public Works' commitment to replacing its fleet of diesel-engine solid waste trucks with CNG-fueled ones. The Public Works Department was recently awarded \$1 million in Diesel Emissions Reduction Act (DERA) grants by EPA to replace some of the department's diesel-fueled trucks. The grant money will be combined with matching funds of \$2.1 million from Public Works and its private partner, Mr. Bults Inc., to purchase nine new solid waste collection trucks and one long-haul truck fueled by compressed natural gas (CNG) to replace old, diesel-fueled vehicles. Public Works has 153 solid waste trucks using CNG fuel; 59 of those use low NOx CNG. The department's long-range plan is to fuel 97.5% of its 250 solid waste trucks with CNG by 2024, as part of department's commitment to sustainability.

Grand Canalscape – Street Transportation

In 2020, the city of Phoenix opened the initial 12 miles of shared use path along the Grand Canal in Central Phoenix from Interstate 17 to the city of Tempe. With limited resources and a growing city that requires alternative mobility improvements for a vital transportation network, the city of Phoenix Street Transportation Department partnered with the Salt River Project (SRP) to create a safe and continuous commuter route for bicycle and pedestrian traffic along the Grand Canal bank from the city of Tempe to Interstate 10. The overall goal of the [Grand Canalscape](#) is two-fold. The primary intent was to develop a continuous low-stress active transportation route for bicycle and pedestrian traffic along the Grand Canal bank. This shared use path provides safe and convenient walking and biking access between neighborhoods, transit corridors, local employment, shopping, education and recreation centers. The route also includes safe crossing facilities at arterial and collector street/trail intersections. The secondary intent

of this project is to re-integrate the canals into the surrounding communities by incorporating public art, landscaping in areas of opportunity, and neighborhood access points to the path which provide better visibility, access, and ultimately appreciation of the extensive canal system in the Phoenix area. These projects will provide a safe route for bicycle and pedestrian traffic away from arterial streets and integrate the canals into the surrounding communities through improved access, public art and landscaping – with the goal of increasing usage and appreciation of one of our unique assets, the canal system in the Phoenix area. The designs, lessons learned, and experience gathered during this project provide a blueprint for further development of the Grand Canal along with other canals in the system such as the Western and Highline canals. The next segments will be under design in late 2020 with implementation by late 2023.

PHX Sky Train® – Aviation Department

Providing a vital transit link to the region, the automated PHX Sky Train® connects travelers between the METRO Light Rail 44th Street and Washington stop and the airport. The PHX Sky Train® people-mover system allows one of the country’s busiest airports to alleviate roadway congestion and enhance customer service. The initial 1.9-mile-long PHX Sky Train® segment transports users to Phoenix Sky Harbor’s East Economy Lot and Terminals 3 and 4 in less than 5 minutes. This convenient multi-modal connection improves ridership on the METRO Light Rail by both the traveling public and airport employees, further connecting our community with sustainable transportation options. Currently under construction, the final phase of the PHX Sky Train® will add 2.5 miles of guideway and connect to the Rental Car Center, completing the circuit and allowing the airport to retire its CNG bus fleet to the Rental Car Center. Completion of the final segment of the PHX Sky Train® in 2022 and construction of the West Ground Transportation Center at PHX will reduce an additional 69,000 metric tons CO₂e per year.

Reinvent PHX – Planning and Development

[Reinvent PHX](#) is a collaborative partnership committed to developing walkable, opportunity-rich communities connected to light rail. Five Transit oriented development (TOD) districts were identified and sustainability, health impact, and economic assessments were produced to create action plans for each district through district steering committees. This process establishes a new, transit-oriented model for urban planning and development along the city’s light rail system.

Transportation 2050 – Public Transit Department

[Transportation 2050](#) (T2050) is a 35-year initiative to improve streets and transit service, including bus service and light rail construction, throughout the city. The approval of Proposition 104 by voters in 2015 resulted in a 0.7 percent sales tax that replaced a 0.4 percent sales tax. This is supplemented with federal and county funds, passenger fares and other sources. Approximately 86 percent of funds are dedicated to public transit and approximately 14 percent to streets. Plan elements are decided through public outreach

and recommendations from the Citizens Transportation Committee, the Transportation, Infrastructure and Innovation City Council Subcommittee, and ultimately by City Council. Outreach activities occur throughout the year for the planning and development of new bus routes and extensions; high-capacity transit options, such as light rail and bus rapid transit; building and improving roads; creating bike lanes; and installing ADA ramps. The citizen-led committee is composed of transportation experts and community advocates and addresses a wide array of concerns expressed by residents who drive, bike, walk and ride transit service.

Voluntary Airport Low Emissions Program – Aviation Department

More than 100 fossil fuel-driven ground support equipment units - belt loader, bag tugs, aircraft pushbacks - have been retired and replaced with electric units by the airlines at Phoenix Sky Harbor International Airport. Phoenix Sky Harbor International Airport (PHX) has requested and received two grants from the Federal Aviation Administration under the Voluntary Airport Low Emissions (VALE) program to develop electric ground support equipment charging infrastructure. Forty charging stations have been installed by the Airport and additional infrastructure will be installed in future terminal construction projects. In support of the Airport's grant request, Southwest, Airlines, American Airlines and United Airlines have retired and replaced 100 fossil fuel-powered units with electric models. Other examples of air quality improvements made by the Aviation Department include the Trip Fee Program, in which drivers of alternate fuel vehicles receive a discount, and Cell Phone Lots where drivers wait for arriving friends and loved ones. Both initiatives reduce airport roadway congestion and air pollution from vehicles circling airport grounds while waiting for passengers. Aircraft ground policies at PHX, such as the use of "one engine taxi" when aircraft move off the airfield after landing, reduces emissions while aircraft are on the ground. The 2019 conversion from turf to desert landscaping decreased emissions from mowing and gas-powered trimming while saving 5 million gallons of water annually in lawn maintenance.

Walkability – Street Transportation Department, Office of Arts & Culture

Passage is a collaborative, multi-faceted work of public art that completes the series of improvements the Street Transportation team began in 2003 to improve pedestrian comfort and trail connectivity in the South Mountain community. The first project in the series was the 2005 Baseline Road Public Art Project (with Ten Eyck Landscape Architects), which improved the multi-use trail system of the area and added shade enhancements for transit riders along the Baseline corridor. The second was the 2009 Zanjero's Line - Highline Canal Public Art Project (also with Ten Eyck Landscape Architects), improving four miles of trail and crossings on the historic irrigation lateral along the base of South Mountain. Passage bolsters South Mountain Community Library's connection to its surroundings by fusing poetry and place with public art. It combines "acoustic" chairs, plaza enhancements, poetry trellises and a new pedestrian crossing of the Western Canal. The library plaza and trellis enhancements were developed in partnership with the South Mountain Community College District and

Phoenix Library Department. The final project component is a new bridge across the Western Canal. It was designed to link the library and South Mountain Community College campus with the Arizona Agribusiness and Equine Center commercial complex to the south. The immovable wheels flanking the bridge entrances are a visual play on the history of movable bridges that once spanned the Salt River Valley canals. The bridge was designed by Harries and Heder with percent-for-art funds administered by the Phoenix Office of Arts and Culture Public Art Program. It was built using Federal transportation enhancement moneys administered by the Phoenix Street Transportation Department. Combined with the public art of plaza and walkway, it strengthens pedestrian pleasures and access in a community of increasingly connected trails.

Walkable Urban (WU) Code – Planning and Development

As part of the Reinvent PHX project, a new urban and transit-oriented zoning code, the Walkable Urban (WU) Code, was adopted by City Council on July 1, 2015 (Ordinance G-6047). The [Walkable Urban \(WU\) Code](#) is Chapter 13 of the city of Phoenix Zoning Ordinance. The code regulates development in proximity to light rail stations and is envisioned to replace existing zoning for properties within the Interim Transit-Oriented Zoning Overlay Districts (TOD-1 and 2, Sections 662 & 663 of the Zoning Ordinance). One of the standards that will be maintained is a minimum of 75 percent of the sidewalk should be shaded. Properties within the five Reinvent PHX Transit Oriented Districts (Gateway, Eastlake-Garfield, Midtown, Uptown, and Solano) will still need to go through a rezoning process, with extensive public hearings, to establish the WU Code on a specific property.

WASTE

Ameresco, Inc. Partnership – Water Services Department

Biogas that is produced as a result of treatment at the wastewater treatment plants contains methane. As part of the city's pledge to be a sustainable and cost-effective utility, a renewable energy project at 91st Avenue Wastewater Treatment Plant treats, transfers and sells biogas as a renewable green energy commodity. Through the Sub-Regional Operating Group's partnership with Ameresco, SROG is expected to reduce the equivalent of 44,671 metric tons of CO₂e per year. The green benefit from this carbon reduction is roughly equal to taking 70,452 cars off the road for one year.

Adaptive Reuse Program – Planning and Development Department

The city of Phoenix's Adaptive Reuse Program was created in 2008 to assist with streamlining the process and steps required to repurpose existing buildings for new business uses. A task force consisting of community and business leaders and representatives from various arts organizations helped the city of Phoenix review existing codes and identify ways to streamline processes, relax code requirements for new development, utilize existing infrastructure and provide business opportunities by repurposing and reusing existing buildings without compromising public safety. The task force identified about 30 policy areas to assist and support the Adaptive Reuse Program. Some of the most popular policy areas include providing regulatory relief (not requiring all of the regulations associated with new build projects), providing projects with a designated point-of-contact (a designated staff member from the Office of Customer Advocacy is assigned to each project), focusing on speed-to-market opportunities (streamlining measures are in place to help businesses open their doors sooner) and providing financial incentives (qualifying projects can benefit from up to \$7,000 in incentives to cover expenses such as plan review and inspection fees). During the past five years, the city of Phoenix has assisted 151 qualified adaptive reuse projects by providing over \$450,000 in Adaptive Reuse Incentives. Repurposing existing buildings for new uses can be challenging. Phoenix's Adaptive Reuse Program encourages the reuse (recycling) of buildings to promote business uses and offers incentives that help bring life to underutilized buildings, supports local businesses, takes advantage of existing infrastructure and supports our neighborhoods.

Green Business Leader Program – Public Works Department

The [Phoenix Green Business Leader Program](#), initiated in 2017, recognizes Phoenix businesses that are passionate about sustainability. Once certified as a Green Business, businesses receive many different marketing benefits including a window decal to display in their business, invitation to an annual recognition event, and a plaque recognizing their excellence. Businesses can achieve higher certifications by completing more sustainable actions. Higher certifications also come with more benefits. The program initially focused on waste diversion-related activities such as recycling or composting. To improve the program and provide additional value to Phoenix

businesses, the Public Works Department partnered with the Water Services Department, the Office of Sustainability, and the Office of Environmental Programs in 2019 to expand the GBL program to recognized businesses for efforts around water conservation, energy efficiency and sustainable purchasing, in addition to waste diversion. The expansion also includes a three-tiered certification system of green, gold or platinum level, depending on the number of sustainable actions a business achieves within their business practices.

Number of Certified Green Businesses: 103

- 43 Platinum Certifications
- 16 Gold Certifications
- 44 Green Certifications

The city launched the Diversion Tracking Tool in mid-2018 which measures waste diversion related to Green Businesses. The cumulative tonnage from 14 of the 103 that record their tonnage:

- 5,295 tons recycled
- 12 tons composted
- 54 tons donated

Green Organics Residential Collection Program – Public Works Department

Through the Green Organics Residential Collection program, organic material, like yard trimmings, untreated wood, tree fruit, and cactus, is collected from residential properties. Currently, there are six green organic material collection routes collecting residential organic material each week. This organic material is then transported to the 27th Avenue Compost Facility to be processed.

Make Ready Program – Public Works Department

Make Ready has been actively recycling auto parts for the past four years including body panels, interior components, lighting, engines, transmissions, control units and accessories. For fiscal year 19-20 Make Ready has reused \$120,000 worth of parts in the first 11 months and expects to close out the year at over \$130,000. Using recycled parts from the city fleet saves the money in parts purchasing and reduces the demand for those parts, which in turn reduces production and decreases landfill waste. Due to the age of the city's fleet, older units can be maintained and provide services to both internal and external customers.

Oops or Shine on? Recycling Program – Public Works Department

The Phoenix Public Works Department implemented a new recycling program that gives residents individualized feedback on what can and cannot be recycled. The city launched a pilot program with 1,200 households in southeast Phoenix with historically high contamination. The city monitors data from each recycling route to determine which neighborhoods have the highest contamination rates. At the beginning of the program, about 72 percent of residents had recycling contamination and received an "Oops" tag. At the end of the program, five weeks later, 73 percent of residents received "Shine on"

tags. Recycling contamination significantly impacts the success of a recycling program and contaminated materials end up in the landfill. Phoenix has an average recycling contamination rate of 30 percent. Unclean food containers, lawn clippings, old clothes, wooden items and greasy pizza boxes cannot be recycled, yet people regularly put these items in their recycling bins. Other non-recyclables, such as plastic bags and wrappings, can cause mechanical malfunctions that slow down the sorting process.

Reclaimed Asphalt Pavement Project – Street Transportation Department

Reusing materials increases the rate of waste diversion and may bring cost savings and reductions in GHG emissions. One of the largest costs of street paving operations is the cost of materials. These costs may be reduced by reusing the asphalt. The Reclaimed Asphalt Pavement (RAP) Project is assessing the cost effectiveness and performance utilizing different proportions of RAP on Phoenix streets as part of traditional paving materials. Phase II was recently completed, which involved performance tests on a road section within the city. An estimated 10 percent reduction in GHG emissions per mile is possible through this program.

Reimagine Phoenix – Public Works Department

In 2013, the Phoenix City Council adopted the goal of diverting 40 percent of trash from the landfill by the year 2020. In April 2016, this goal was expanded to Zero Waste by 2050. To achieve these goals, the Public Works department implemented the Reimagine Phoenix Initiative with a focus on new programs, enhanced education and community outreach and public/private partnerships.

One way the city is accomplishing this goal is by developing the Resource Innovation Campus (RIC) on underutilized city property at the 27th Avenue Solid Waste Campus site, located between 27th Avenue and 35th Avenue south of Lower Buckeye and north of the Salt River as a hub for innovators building Phoenix's circular economy and generating economic development. The RIC Master Plan identifies parcels of land that the city may choose to lease out for development in support of the initiative. In 2017, the city opened the Envision-Silver certified compost facility that can process up to 55,000 tons at the RIC. The facility goes hand in hand with the city's Green Organics curbside bin program implemented in 2016 that is designed to divert residential green waste from the landfill.

Two material recovery facilities (MRF), process roughly 169,000 tons of recyclables per year. In FY 2019-20, a \$4.5 million investment was made for infrastructure upgrades to one of these MRF's. The upgrades to the North Gateway Transfer Station MRF were completed to improve recovery of materials and to meet new quality specifications required by the recyclables market. For example, the facility receives more cardboard than newspaper than it did 10 years ago. The retrofit has improved the capture rate of recyclables, decreased contamination in outbound bales, and increased production speed. The upgrade has improved the capture rate of recyclables, decreased

contamination in outbound bales, and increased production speed. By including new technologies like optical sorters in the upgrade, we are now estimated to capture 70% more plastic bottles, 41% more cardboard, 54% more paper and 52% more aluminum at the North Gateway MRF.

The Reimagine Phoenix Initiative not only educates residents on the importance of waste reduction but demonstrates how trash can be viewed in a different light – as resources that have value. In 2017, the city of Phoenix was honored at the C40 cities Bloomberg Philanthropies Awards ceremonies in the Cities4ZeroWaste category. In addition, in 2018, Reimagine Phoenix was also recognized as a Finalist at The Circularity Awards 2018, an initiative of the World Economic Forum and The Forum of Young Global Leaders, for The Award for Circular Economy Public Sector.

As part of the Reimagine Phoenix Initiative, the Public Works Department partnered with Community and Economic Development Department to implement an economic development approach to engage with entrepreneurs and manufacturers to develop Phoenix's circular economy. Based on the results of a Waste Characterization study, the city issued a Request for Innovators (RFI) in 2015 designed to identify what items in the waste stream may have value to manufacturers and innovators. Based on the results of the RFI, the city issued a series of Requests for Proposals (RFP) to match items in the city's waste and recycling streams to create economic development opportunities and support the use those items as feedstock to develop products. In addition to engaging the private sector, the city and Arizona State University established the Resource Innovation and Solutions Network (RISN) partnership to advance collaboration, research, innovation and application of waste resources to create economic value and drive a sustainable circular economy.

Rio Salado Habitat Restoration Project - Parks and Recreation, Water Service Department, Office of Environmental Programs

The Rio Salado Habitat Restoration Project is 40 years in the making and the first of its kind in the desert southwest. Phoenix Rio Salado is a community-inspired plan to restore part of the once-flowing Salt River from a blighted corridor into an environmental and recreational amenity for the community. Phoenix Rio Salado is a 595-acre area located two one-miles south of downtown Phoenix and north of South Mountain Park near Central Avenue at the Salt River. Thousands of residents and many government agencies were involved with shaping and funding this habitat resource that spans five miles in length from 19th Avenue to 24th Street. The landscape incorporates lush marshy wetlands of which 90% of these types of habitats have been lost in Arizona since the 1900's, native cottonwood and varieties of willows, which are among North America's rarest forest type and Mesquite woodlands or bosques as they are referred to, are the fourth rarest plant community of 104 types identified in the United States other native-desert plants. All plant material was contract grown and required seed collection of within a 1/2 mile of the Salt River to ensure true seed source to restore the

environment of Rio Salado. The Rio Reimagined Project will revitalize the Rio Salado (Salt River), Aqua Fria and Gila Rivers, and the region by transforming over 45 miles of the river stretching from the Salt River Pima Maricopa Indian Community at the eastern most boundary to the city of Buckeye to the west and encompassing more than 78,000 acres.

Brownfields Land Recycling Program – Office of Environmental Programs and Community and Economic Development Department

The [Phoenix Brownfields Land Recycling Program](#) provides financial and technical assistance for brownfields cleanup and redevelopment city-wide. To date, more than \$330 million in private investment has restored more than 320 acres of previously contaminated and has created or maintained approximately 3,000 jobs.

In 2020, the city of Phoenix received a \$600,000 Brownfields Assessment Coalition grant for the Rio Reimagined Project with the cities of Avondale, Tempe, and ASU. The target area for the grant is within 1.0 mile of the Salt River (Rio Salado), Agua Fria and Gila Rivers within the cities of Tempe, Phoenix and Avondale, Arizona.

Transition to Electronic Delivery from Paper-Based – City Clerk Department

The City Clerk Department has focused on eliminating paper-based workflows wherever possible and implemented methods of engaging and servicing customers more efficiently with environmentally friendly service delivery methods. Electronic delivery of information and other tools will be implemented for the upcoming November 2020 Mayor and Council Election. For the candidate nomination petition process, the City Clerk Department offered candidate packet information online. This is more cost effective and provides candidates and other interested parties access to the most up-to-date information daily. Increased resources are available to our November 2020 Mayor and Council candidates through a partnership with the Secretary of State's Office (SOS). City Clerk Department worked with the SOS to modify the SOS's E-QUAL (electronic candidate nomination petition system) for use by local candidates for the November 2020 election. This system allows candidates to collect the required nomination signatures online minimizing the need for distribution of paper nomination petitions in person. Additionally, in December 2012, the Department implemented the Campaign Finance e-filing system that allows candidates and Political Action Committees to submit campaign finance reports online. Working with ITS, the City Clerk Department implemented the ability to accept contracts and other documents electronically using Adobe Sign or similar software to obtain electronic signatures. Implementation of this electronic process minimizes the strain on natural resources by decreasing the use of paper, ink printers and other resources thereby minimizing the overall environmental impact and making the document routing process more efficient and economical. More recently, the City Clerk Department in conjunction with ITS implemented a new eComments and Request to Speak system that allows residents to provide comments and submit requests to speak on Council agenda items electronically, giving them an alternative to in-person participation at Council meetings. This system not only

minimizes the environmental impact of the need for physical appearance at City Council Meetings, it also offers an additional opportunity to enhance citizen engagement in public meetings. The City Clerk Department's commitment to offering electronic services allows the Department to provide services to more customers in an efficient manner while continuing to meet and sustain environmental goals.

AIR QUALITY

Dust Reduction Task Force - Neighborhood Services, Parks and Recreation, Planning and Development, Police, Public Information Office, Public Works, Street Transportation, and Water Services Departments, Office of Environmental Programs

In 2011, the city of Phoenix was experiencing high levels of particulate air pollutants. This dust contributed to the infamous “brown cloud,” increased risk for individuals with respiratory diseases, and continued high levels would have led to a loss in billions of dollars of Federal funding for streets and highway projects needed throughout the Valley. To address this class of pollutants, the city manager established the Dust Reduction Task Force, which consisted of various city departments, including Neighborhood Services, Office of Environmental Programs, Parks and Recreation, Planning and Development, Police, Public Information Office, Public Works, Street Transportation, and Water Services. Due to the success of the Task Force, Maricopa Association of Governments has recognized Phoenix as a regional leader and the Task Force as a model for other Valley cities. An integrated, comprehensive high-risk dust advisory strategy was developed to implement a consistent city-wide response procedure and increase outreach to residents. The Task Force produced detailed maps of targeted areas, changes to city code for dust reduction, an enforcement strategy for the Code focused on education, dust awareness, response training for staff, and various multimedia items for outreach. Many residents utilize the shoulders of this street and the surface was stabilized to allow continued use by residents and limit the formation of dust. The work done by the Task Force was in partnership with various regional entities. ADEQ produces high-risk dust advisories that are used to prepare for dust events and adjust city work schedules. MCAQD assists by providing air quality monitor data that is used to assess the effectiveness of the program.

Trip Reduction Program – Office of Environmental Programs

Arizona does have ozone reducing programs in place that include a Trip Reduction Program (TRP), lawn garden tool replacement, voluntary vehicle repair, industry control measures, alternative fuel stations, idle reduction program and local fuel blends to decrease vehicle emissions. City employees participate in the Trip Reduction Program with the goal to decrease the number of trips taken, especially trips taken in a single occupancy vehicle. In 2019, 25 million miles of commuting were reduced, preventing 143 tons of pollution, solely by city of Phoenix employees.

Many activities have changed or halted since COVID-19. As a result, the number of trips taken by residents has decreased. Teleworking has allowed some to work from home, when possible. Approximately 3,000 of the 15,000 city of Phoenix employees have been teleworking during the pandemic. Altogether, this results in decreased emissions from passenger vehicles and, more noticeably on a personal level, less traffic.

LOCAL FOOD SYSTEM

2025 Phoenix Food Action Plan – Office of Environmental Programs, Community and Economic Development, Housing, Parks and Recreation, Planning and Development, Public Works, Neighborhood Services, Water Services

Phoenix has made a healthy food system a priority. In March 2020, Phoenix City Council supported this effort, and approved the [2025 Phoenix Food Action Plan](#) (2025 FAP) that outlines short term goals, strategies and actions to achieve access to healthy food for everyone in Phoenix by 2050. As the actions outlined are implemented along with the collection of new data, technology improvements and continued collaboration with stakeholders, OEP expects to develop an updated plan in 2025-2026 that continues movement toward the 2050 goal. The plan was developed with an interdepartmental team and external stakeholders, including residents most impacted by food insecurity.

Brownfields to Healthfields Initiative – Office of Environmental Programs

Phoenix has recognized there is an opportunity to cleanup and redevelop brownfields that directly impact public health through the reuse of these sites for food and healthcare assets. The [Brownfields to Healthfields \(B2H\) Initiative](#) targets areas with inadequate health care, food deserts, and designated infill incentive, neighborhood initiative, and redevelopment areas. Focusing on these areas within Phoenix addresses sustainable and equitable development, in addition to building upon existing brownfields efforts. To date, 10 properties have been cleaned up and redeveloped as urban farms, community gardens, school gardens, farmer's market, and a food hub. The work was initiated as a result of award of a \$400,000 community-wide brownfields assessment grant from the U.S. Environmental Protection Agency in 2015. The impact of this project results in improved community health due to the elimination of exposure to hazardous substances and creation of opportunities for improved access to healthcare and healthy foods, which positively impacts environmental and health equity.

Maricopa County Food System Coalition Partnership – Office of Environmental Programs

The city is a founding member of the [Maricopa County Food System Coalition](#) (MarCo) established in 2015. Several organizations focused on improving the local food system gathered to explore the viability of creating a food policy council/coalition for the region. The Office of Environmental Programs was eager to learn and listen to stakeholders to better understand the challenges faced in providing access to health food for everyone living in Phoenix. Coincidentally, the two groups of stakeholders came together, and the city committed to help create the coalition. The city continues to have a strong relationship with MarCo and has successfully won a grant award to complete a Community Food Assessment for Maricopa County, the first of its kind. The data collected was integral to the city's own Food Action Plan and continues to provide valuable information to educate others on the importance of an equitable, healthy, thriving, and sustainable local food system.

South Phoenix Food Action Plan – Office of Environmental Programs

The importance of understanding the food system at a neighborhood level, particularly areas that faced high rates of food insecurity was important, which includes the South Phoenix area. Through a grant received from the U.S. Environmental Protection Agency (EPA) Local Foods, Local Places program, OEP was able to conduct a two-day workshop in South Phoenix to identify challenges and opportunities for improving the food system in the South Mountain Village Planning Area. Community outreach for this work was focused on engaging residents that were most impacted by food insecurity and hunger, including low income populations and people of color. **A food-focused Community of Practice** made up of women of color was initiated to develop a greater understanding of food challenges and to establish collaborative relationships for making improvements. The results of the Local Foods, Local Places workshop and community engagement was [a South Phoenix-specific Food Action Plan](#) that details recommended actions targeted for the unique and rich history of this geographic area. This place-based plan was included in the city-wide plan and was approved by Phoenix City Council for implementation as well.

Phoenix Food Day & Healthfest - Office of Environmental Programs

Phoenix has hosted the annual [Phoenix Food Day & Healthfest](#) event since 2013 to change the way people look at food and to promote healthy eating, to teach residents how to grow food, cooking, nutrition, and the importance of overall well-being. Since 2019, Phoenix has partnered with the Junior League of Phoenix to add a Healthfest component to the event, adding health screenings, and fitness activities. The event is hosted for 2-3 years in a community that is experiencing food insecurity and is challenged with access to healthy food in partnership with schools, local business and other institutions. More than 14,000 adults and kids educated and 160 partners engaged.

HEAT

Cool (Energy Star) Roofs – Public Works Department

Roofs are exposed to sunlight during the day and absorb heat. By using a coating on the roofs, the amount of sunlight reflected is increased. Coating the roof reduces the amount of energy needed to cool the building, reducing GHG emissions. Cool (Energy Star) Roofs is the standard for all departments that work with the Public Works Department (PWD) to handle their roof replacement, as well as for those buildings owned by PWD. This type of roof has been implemented for PWD-owned buildings since 2005.

Heat Relief Network – Human Services Department, Communications Office, Library Department

In 2005 after a weeklong heat wave that resulted in about 30 deaths in the homeless population the Maricopa Association of Governments (MAG) created the Heat Relief Network. The Heat Relief Network is a regional partnership between MAG, local municipalities, nonprofit organizations, the faith-based community, and businesses. Each year, MAG coordinates the mapping of the Heat Relief Network, a network of partners providing hydration stations, refuge locations, and water donation sites throughout the Valley with the goal to educate about heat dangers, preventing heat-related illnesses and deaths among vulnerable populations (people experiencing homelessness, older and/or disabled adults, homebound persons). Heat relief sites in Phoenix include Phoenix libraries, recreation centers, and senior centers. There are also heat relief sites at the Salvation Army - Phoenix Maryvale Corps, Phoenix Citadel Corps, Phoenix Kroc Center, Family Services Center offices.

Summer Safety Campaign – Communications Office, Parks and Recreation, Fire, Human Services, and Public Works Departments

Each summer, the Communications Office promotes Summer Safety via a dedicated website, social media and traditional media coverage. This is a comprehensive program that provides heat- and water-safety information across departments, including Parks and Recreation, Fire, Human Services, Public Works, among others. The city also conducts outreach to our most vulnerable communities, such as people experiencing homelessness and home-bound seniors. This involves handing out printed cooling center maps and heat-safety materials directly to those in need during extreme heat events. During the past six years, the city has increased coordinated outreach and communications related to rising urban temperatures. Electronic communications will likely continue to be the preferred method for sharing information in the future. There is still a need for printed materials. The city has communicated to communities across the city related to climate change and extreme heat with materials in Spanish and engagement from the Spanish-language media. Research from Arizona State University and data from Maricopa County Department of Public Health show that low-income areas often have the least amount of tree shade to mitigate the urban heat island effect and reduce CO2 levels. The city continues to provide general messaging and provide

targeted messages. Heat data and transit data are used to determine areas with the greatest need for heat relief during extreme weather events.

Take a Hike. Do it Right. - Parks and Recreation Department

More than 200 hikers annually are rescued from Phoenix desert and mountain parks and preserves. The city created a simple checklist of general hiking tips, including hiking during the early morning or evening hours; always hydrating before, during and after a hike; monitoring the local forecast and understanding that all trail difficulty ratings are raised one level when the temperature is 100 degrees or warmer. In 2019, Phoenix Parks and Recreation Board implemented a rule stating dogs are prohibited on city of Phoenix hiking trails when the temperature is 100 degrees or warmer.

Right Tree, Right Place training – Parks and Recreation Department

Increasing the tree canopy of the urban forest requires planting more trees. “Right tree, right place” is considered for each new tree placement. The right tree should be a drought-tolerant tree that is ideally a native species. The right tree will also emit lower amounts of volatile organic compounds which are precursors to ozone. The right place will be a place where the tree can fully mature without disturbing powerlines, right of way, or damaging other infrastructure. Recently, in order to increase the success rate of planting, a method was piloted to use tall pots to increase the number of plants that survive.

Tree and Shade Master Plan – Parks and Recreation, Street Transportation Departments

The [Tree and Shade Master Plan](#) is the product of the Tree and Shade Task Force, a multi-department committee. The Master Plan was adopted by the City Council on January 5, 2010 with a vision to double the average tree and shade canopy by 2030 to 25%. Although many actions were taken related to education and awareness campaigns and development of resources, the number of trees planted in the early years was limited given the context of the Great Recession. However, after a groundswell of community support, City Council dedicated \$450,000 in additional annual tree funding leading to 4,000 trees now being planted annually on city streets, parks and rights of way.

The Tree and Shade Master Plan implementation is supported by over \$5 million in annual funding to city departments as part of a city-wide program that includes the following initiatives:

- **The Urban Forestry Roundtable** established in 2019 by the city of Phoenix, American Forests and Arizona Sustainability Alliance, is represented by over 30 entities including non-profits, community groups, and city and county representatives united under the following vision: *“Over the next five years, we will work collaboratively to improve tree care and planting in Metro Phoenix in ways that will measurably mitigate urban heat island, improve local air quality and prioritize environmental and social justice outcomes through municipal and*

private investment in trees — particularly in vulnerable neighborhoods currently lacking tree canopy.”

- The **Urban Forest Implementation Team (UFIT)** is a working group of city staff from many departments to coordinate tree plantings efforts city-wide and monitor progress toward the goal to double the tree and shade canopy. Departments include Streets, Parks, Neighborhood Services, Planning & Development, the Office of Sustainability, and the Office of Environmental Programs. The programs include:
 - **The Citizen Forester Program** – providing training and education to volunteers to help in planting and care of trees in the community.
 - **Love Your Block** – managed by Neighborhood Services, organizes community planting events in neighborhoods and provides mini-grants for neighborhood beautification.
 - **The Tree Donation Program** – launched in 2020, will work with the residents and businesses to fund specific tree planting projects in the community.
 - **The Tree Zoning Ordinance Update** – will enhance the care and protection of trees to ensure trees planted as part of new developments will be maintained and retained.
 - **The Parks Tree planting program** – seeks to ensure all city parks have a minimum 25% shade canopy. The Parks department seeks partnerships to plant 1500 trees each year in city parks.
 - **The Streets Tree Planting Program** – dedicated funding for an average of 1,000 trees per year in city streets supplemented by additional plantings as part of Major Capital improvements.

The Environmental Quality and Sustainability Commission (EQSC) formed an Urban Heat Island and Tree and Shade Subcommittee (UHITS), composed of community experts, that developed recommendations for the implementation of the Phoenix 2010 Tree and Shade Masterplan.

New Bus Shade Shelter for Phoenix Transit System – Street Transportation Department

The Phoenix Public Transit Department set a goal to provide shade at all 4,050 bus stops in the city as part of T2050. Providing bus stop shade is not easily solved in a cost-effective manner. The city’s right-of-way and the Americans with Disabilities Act (ADA) regulatory requirements for compliant and accessible bus stops limit options. The issue is the ‘quality’ of the shade provided during the summer heat. West-facing bus stops create the biggest challenge. These shade and accessibility challenges make it uncomfortable for transit riders waiting for bus service and could potentially decrease ridership. The Public Transit Department, with Friends of Transit, an Arizona nonprofit public transit advocacy group, offered a contest to Arizona State University (ASU) students to design a bus shelter that prioritized shade and accessibility. Students from the ASU Industrial Design Program collaborated with staff to create a bus shelter that

provides shade at any time of day with individual seating, mobility vehicle alcoves and vandal-proof materials. The partnership not only aligned with the bus shelter goals in T2050 but also provided students the opportunity to apply their design skills to real-world issues. The ASU student-inspired concept has been designed by a professional engineer. Prototypes have been built but none of this design has yet been manufactured for use.

Green Infrastructure/Low Impact Development – Planning and Development Department, Street Transportation Department, Water Services Department, Office of Environmental Programs

The city of Phoenix recently partnered in the development of a handbook [for Green Infrastructure/Low Impact Development \(GI/LID\) in the Phoenix Metro Area](#). The effort was led by Arizona State University's Sustainable Cities Network and the city of Scottsdale. Other partners included the Arizona Department of Environmental Quality, the Flood Control District of Maricopa County, and the cities of Apache Junction, Glendale, Goodyear, Mesa, Tempe, Avondale, Gilbert, and Peoria. The result was a handbook providing standard details and specifications for ten GI/LID features that the partners determined would be of most interest in the Phoenix Metro Area. This handbook was an important step for GI/LID in Phoenix and was approved by the city's Development Advisory Board for use by the Planning and Development Department to streamline approvals for voluntary use by private developers outside of street right-of-way. The Planning and Development Department is currently working on incorporating the handbook into its review and approval processes. The Street Transportation Department is also currently working to include a subset of the design details in an update to the street design guidelines. A previously completed triple bottom line cost benefit analysis for Phoenix (completed in 2018 and available online here: <https://www.phoenix.gov/oep/Stormwater>).

WATER

2018 International Energy Conservation Code Adoption – Planning and Development Department

On July 6, 2018, the Phoenix City Council adopted the 2018 International Plumbing Code (IPC), as part of the adoption of the 2018 PBCC (PBCC), which is a model code that establishes minimum design and construction requirements for water efficiency. 2018 IPC has prescriptive and performance-based provisions for both residential and commercial construction for water efficiency. The program is overseen by the Planning & Development Department. The city is committed to keeping the city building codes current to maximize energy efficiency and water conservation.

Cooling Tower System Upgrades – Water Services and Aviation Departments

Water used by cooling towers to remove heat from buildings can account for as much as half of all water use in some commercial buildings, exacerbated by the high mineral content of regional water. At Sky Harbor Airport's Terminal 4, the water meter that provides make-up water for the cooling towers is one of Phoenix's highest volume water meters. A pilot project was completed to install a system that softens the make-up water, increases the cycles of concentration, and reduces water use by 20 percent. Furthermore, using a mixed oxidant generator system eliminates the use of harsh biocide chemicals, needed for these closed loop systems, that are both dangerous and expensive. Reducing water usage has saved power, which helps diminish the city's overall carbon footprint. Initial estimates inferred that the water savings would be 10,000,000 gallons per year. It has been over two years since the project was concluded, and the results are in with more than 31,500,000 gallons of water and thousands of pounds of water treatment chemicals saved in 2019. The project was so successful that the systems are now a standard central plant design, and similar systems have been installed at the Terminal 3 Central Plant and Rental Car Center Central Plant. The cost savings of these upgrades are achieved by the elimination of purchasing biocide chemicals, reduced water use, and increased system life. A principal factor of this type of system is that it can be scaled up or down in size to accommodate almost any size cooling tower.

Drought Pipeline Project – Water Services Department

The project is building a pipeline supplying North Phoenix residents (approximately 400,000 people) that are served exclusively by Colorado River water treated at two water treatment plants. The proposed 66-inch pipeline will be used to alleviate the effects of drought, by ensuring that water supplies from the Salt and Verde Rivers are available to north Phoenix during future shortage on the Colorado River. Sustainability bonds are funding the project.

Sustainability Bond Sale for Colorado River Resiliency Projects - Finance and Water Services Departments, Office of Sustainability

On March 26, 2020, the city of Phoenix issued its first-ever sale of Sustainability Bonds. The bonds will fund Colorado River resiliency related projects by the Water Services Department. This transaction was priced in the wake of one of the greatest economic downturns since the Great Depression and amidst a tumultuous municipal bond market due to the COVID-19 pandemic. However, as noted by Morgan Stanley, the "sustainability designation did assist with the marketing and achieving of strong results for the City's sale." The sale resulted in the sustainability bonds being 4.4 times oversubscribed compared with 4.1 times for the non-sustainability bonds that were priced in the same transaction. Furthermore, over half of the sustainability bond orders were placed by ESG investors or by investors influenced by the sustainability designation. Leaders throughout the financial industry used this sale by the city of Phoenix as an example of the resurgence of the municipal bond market. Given these positive results doing the challenging market, the city intends to continue and grow its Green and Sustainability Bond program.

HOA Audit Program – Water Services Department

Homeowners Associations (HOA) use water to maintain common landscaped areas, which can lead to high costs and high water usage to keep the areas looking attractive. Up to 70 percent of water used by residents is for outdoor watering. Phoenix piloted a HOA Audit Program that conducted nine audits of outdoor water use within common areas managed by HOAs. Based on that pilot, the potential average savings for the HOAs that volunteered to participate was 4.5 million gallons per year if they implemented the recommendations from the audit. The program will be expanded from pilot to ongoing program by increasing the number of inspections from nine to 40.

Internal Water Efficiency Task Force – Water Services Department

A city-wide Internal Water Efficiency Task Force was created to monitor water used in municipal operations. Water meter inventories were recorded for city-owned facilities. The efficiency of water using devices for each facility was measured and pipelines were inspected for leaks and repairs were made to any that were identified. An evaluation of the irrigation at all facilities was completed to identify leaks, broken drip or sprinkler heads and unused stations. The department worked with the landscape company to ensure leaks were repaired, replacement of missing/broken drips and sprinkler heads and capping off unused stations. In addition, grass was removed from some facilities to create a xeriscape at appropriate facilities, decreasing the amount of water needed for irrigation. As a result of the task force, water use dropped 46.5 million gallons, reducing costs, energy use and GHG emissions in the process.

ATTACHMENT 2 – ACTIONS MATRIX

STATIONARY ENERGY (SE)

QUICK START ACTIONS (Examples)

Action SES1.5: Install solar panels on carports at 7 city housing sites for a total of 872 kW by 2021.

Action SES2.1: Replace 100 percent of high-demand lighting fixtures in water and wastewater facilities with LED by 2022.

Action SES2.2: Continue to replace 50 HVAC units per year until all units that use R-22 refrigerant are replaced.

GOAL SES1

Add 50MW of renewable energy projects on city-owned properties by 2030.

Ongoing Actions	City Lead	Partnerships	Timeframe
<p>Continue to install solar energy generation systems on city-owned parking infrastructure.</p> <p>Place solar energy generation systems on city-owned parking lots to take advantage of the large amounts of space available above the vehicles while also providing shade, including Park-and-Ride facilities. Public Transit owns 8 park-and-rides; 4 of the 8 have solar panels.</p>	Public Works Department, Public Transit Department	Office of Sustainability, Valley Metro, APS, SRP	Ongoing, Long-term
Pending Actions			
<p>Install solar energy generation systems at landfills.</p> <p>Landfills are potential candidates for placing large solar energy generation systems. The Skunk Creek landfill, now decommissioned and dormant as an unused brownfield, has been identified as a location for a future City park and/or where a 60-80 MW solar array could be sited. The SR-85 landfill has an existing 10 MW solar field operated by Arizona Public Services (APS) and other portions of the 2650-acre landfill site are amenable to additional solar projects. This effort would provide the benefit at the decommissioned landfill sites that currently have no immediate plans of reuse or revitalization to produce clean energy.</p>	Public Works Department	APS	Ongoing, Long-term
<p>Install solar energy generation systems at Aviation Department properties, including Phoenix Sky Harbor International Airport.</p> <p>Solar energy generation systems at Sky Harbor International Airport currently produce 5.97 MW. Possible future solar energy system installations are being considered through a partnership with APS or through solar service agreements (SSA).</p>	Aviation Department	APS	Ongoing, Long-term
<p>Install solar energy generation systems at water and wastewater treatment plants.</p> <p>Installation of solar energy generation systems at water and wastewater treatment plants are being considered similar to the Solar Power Facility at the Lake Pleasant WWTP that produces 7.5 MW of solar power facility and was completed in 2013 in partnership with SunPower Corp. through an SSA.</p>	Water Services Department	SunPower Corp.	Ongoing, Long-term
<p>Install solar energy generation systems on Choice Neighborhoods redevelopment properties and other affordable housing neighborhoods.</p> <p>Housing developments will include new mixed-income, energy efficient housing development with solar power generation that will become a showcase of sustainable development as part of the Choice Neighborhoods Energy-Efficient Housing and APS Multifamily Solar Program Partnership Programs. This comprehensive redevelopment plan will replace 577 obsolete public housing units with 1,011 mixed income energy-efficient units.</p>	Housing Department		Ongoing, Long-term

GOAL SES2

Perform deep-energy retrofits to lower total energy use in city-owned and operated buildings 25 percent from 2010 levels by 2025.

Ongoing Actions	City Lead	Partnerships	Timeframe
<p>Replace lighting in municipal operations with light emitting diodes (LEDs) to reduce electricity consumption.</p> <p>Replacing incandescent and fluorescent lighting in municipal operations with LEDs results in lower electricity consumption and longer lifetime of the device.</p>	Public Works, Convention Center, Police, Information Technology Services, Water Services and Aviation Departments		Ongoing, Short-term

SES2.2	Replace heating, ventilation, and air conditioning (HVAC) equipment units to increase energy efficiency and phase out R-22 refrigerant. The Montreal Protocol requires the U.S. to reduce its consumption of HCFCs by 99.5 percent necessitating that equipment utilizing refrigerants be phased out. 300 HVAC units using this R-22 refrigerant have been replaced and 634 units need to be replaced.	Public Works Department		Short-term
SES2.3	Use Energy Management Plans to identify opportunities to reduce energy use and cost at city-owned facilities. As part of the facilities maintenance program, an energy management program (EMP) is used that includes ongoing energy audits to identify opportunities to reduce energy use and cost.	All Departments		Ongoing, Short-term
Pending Actions				
SES2.4	Emerging Technologies Program research on new and innovative ways to save energy for municipal operations. Investigate new and innovative ways that save energy by evaluating technologies that reduce cooling loads in a facility.	Public Works Department	Office of Sustainability	Short-term
SES2.5	Participate in Energy Service Contracts that provide energy efficiency improvements in City of Phoenix facilities located downtown. The Energy Service Contract program is a performance-based energy services contract that allows multiple energy conservation measures to be implemented and paid for over time by the savings achieved from the combination of those measures.	Office of Sustainability	Convention Center, Public Works, Police, Water Services, Aviation Departments	Short-term
GOAL SES3 Offset 100% of municipal electricity use through 200MW of new renewable energy projects by 2030.				
Ongoing Actions				
SES3.1	Contract with Partners to secure a total of 200MW of utility-scale renewable energy projects to offset or displace 100% of the electricity consumed in City operations. After lowering City energy use through other energy conservation programs, and constructing the maximum amount of solar on City property, offset the remaining electricity used in City operations through utility-scale renewable energy projects to be purchased either through green utility offerings or through virtual agreements with a third parties to achieve a carbon-neutral electricity declaration by the City on or before 2030.	Office of Sustainability	APS, SRP, Renewable Energy Providers	Ongoing, Short-term
GOAL SES4 Support energy-efficiency upgrades to existing buildings by developing three new community-wide conservation and renewable-energy programs by 2025.				
Ongoing Actions				
SES4.1	Provide services and products to enhance and promote the provision of safe, efficient, sustainable and affordable residences and neighborhoods. Administer programs citywide that provide low- and moderate-income Phoenix residents access to housing rehabilitation services to homeowners and renters, which address emergency health and safety concerns, stabilize critical systems, remediate lead hazards, and improve energy efficiency; and preserve naturally occurring affordable rental housing.	Neighborhood Services Department	Non-Profit Organizations, Small Businesses, and Community Partners	Ongoing, Short-term
Pending Actions				
SES4.2	Attract sustainable and inclusive businesses by developing entrepreneurship and leadership programs to achieve 2050 goals. Create, launch and lead a new business attraction strategy designed to recruit both national and international low and post-carbon companies to the City of Phoenix. Develop an inclusive entrepreneurship program that addresses the systemic barriers to wealth generation and small business formation, serves communities most impacted by the effects of climate change and supports and promotes the growth of entrepreneurs and innovators developing business models around climate action.	Community and Economic Development Department	Arizona State University, Arizona State Workforce Board, Maricopa County Community College	Short-term

GOAL SES5	Promote development of community-energy projects, including microgrids, that improve the sustainability and resilience of the surrounding community's electricity grid.		
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Pending Actions	City Lead	Partnerships	Timeframe
<p>SES5.1</p> <p>Install microgrids in city-owned facilities that serve the City's redundancy needs and utilities long-term energy goals.</p> <p>During the 23rd Ave WWTP Power Redundancy study, Phoenix partnered with APS to install a microgrid that would serve both the city's power redundancy needs and APS's long-term goals. Additional power redundancy studies will be conducted at different facilities. Microgrids will be installed at those facilities identified to show a benefit to the power redundancy needs at those locations.</p>	Water Services Department	APS	Ongoing, Short-term

GOAL SES6	Design and construct all new buildings to Living Building Challenge, Net Positive Design, or equivalent design standards by 2050.		
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Pending Actions	City Lead	Partnerships	Timeframe
<p>SES6.1</p> <p>Update zoning and other codes and streamline permitting processes for green/sustainable construction projects to reduce barriers for consumers.</p> <p>Updating zoning and other planning and development codes to promote green/sustainable construction projects to match internationally recognized sustainability codes. Currently, compliance with the 2012 International Green Construction Code is voluntary. A study of options for ordinances for electric vehicle charging stations and associated infrastructure is being conducted. Future adoption of code amendments that enhance water conservation and energy efficiency code requirements based upon the 2021 I-codes is being considered. Permit processes for solar photovoltaic residential system installations are being streamlined and a remote inspection program for residential construction to reduce inspection trips is being put into place.</p>	Planning and Development Department		Short-term
<p>SES6.2</p> <p>Develop embodied carbon calculators applicable to the Phoenix climate and building materials used within the region.</p> <p>Work with providers of embodied carbon calculators (such as Athena and EC3) to develop calculators applicable to our climate zone and to test those tools on a sample of the building stock. These calculators can then be used to determine which methods of construction can be used to lower GHG impact.</p>	Planning and Development Department		Short-term
<p>SES6.3</p> <p>Design and construct all City of Phoenix municipal operations facilities to Living Building Challenge, Net Positive Design, or equivalent design standards by 2050.</p> <p>The Living Building Challenge is an international sustainable building certification program that promotes the most advanced measurement of sustainability in the built environment. On July 6, 2018, the Phoenix City Council adopted the 2018 International Energy Conservation Code (2018 IECC), which is a model code that establishes minimum design and construction requirements for energy efficiency. Phoenix is currently in the plan review stage for construction of the city's first net-zero building in collaboration with the Sonoran Studio.</p>	Planning and Development Department		Long-term
<p>SES6.4</p> <p>Develop incentives and standards to foster private sector developments that meet or exceed the Living Building Challenge, Net Positive Design, or equivalent design standards by 2050.</p> <p>New incentives to foster private sector developments that meet or exceed the Living Building Challenge, Net Positive Design, or equivalent design standards, are necessary to spur innovation, create showcase projects, and build capacity in the industry. Planning and Development will work with industry to accelerate high-performance building in the region.</p>	Planning and Development Department	All Departments	Long-term

GOAL SES7**Obtain electricity from an electricity grid that is net-zero by 2050.**

Pending Actions	City Lead	Partnerships	Timeframe
SES7.1 Increase renewable and clean energy resources. APS and SRP are the utilities that serve Phoenix and the surrounding areas. By 2030, APS set a goal to achieve a resource mix that is 65 percent clean energy, with 45 percent coming from renewable energy by 2030. APS has also announced a goal to deliver 100 percent clean, carbon-free electricity by 2050. SRP set a goal to reduce the amount of carbon dioxide emissions emitted per megawatt-hour by 62 percent from 2005 levels by 2035 and by 90 percent by 2050.	APS, SRP	Office of Sustainability	Long-term
SES7.2 Leverage the City's purchasing power to procure 100 percent renewable electricity for City of Phoenix municipal operations. Municipal operations are responsible for 3.8 percent of Phoenix's total GHG emissions from electricity use as of the 2018 GHG emissions inventory. To demonstrate leadership, the City had committed to procure 100 percent renewable electricity for municipal operations by 2050. An initial project with SRP will provide 10.7 MW of electricity generated from utility-scale solar farms.	Office of Sustainability	APS, SRP	Long-term

TRANSPORTATION SECTOR (TS)

QUICK START ACTIONS (Examples)

Action TS1.5: Complete Key Corridor Master Plan by 2021.

Action TS2.1: Complete transition of the Public Transit fixed route fleet to 100% alternative fuel by 2020.

Action TS3.3: Complete construction of the Phoenix Sky Train® by 2022.

GOAL TS1		Implement the city's Complete Streets Policy and Active Transportation Program to encourage multiple modes of transportation.		
Ongoing Actions		City Lead	Partnerships	Timeframe
TS1.1	<p>Expand bus service network and service hours, and introduce new bus rapid transit corridors as part of T2050.</p> <p>The bus service network is being expanded to include an additional 75 miles of RAPID routes. Six potential bus rapid transit corridors are being evaluated to identify three potential corridors for the foundation network. Service hours have been increased to match light rail operating hours, with increased frequency on high-demand routes to every 15-minutes.</p>	Public Transit Department	Street Transportation Department	Ongoing, Long-term
TS1.2	<p>Triple the number of light rail miles in Phoenix by adding 42 miles of high capacity corridors across the city as part of T2050.</p> <p>Light rail corridors are being constructed to connect the city. 42 miles of light rail will be added to the already existing 20 miles of light rail.</p>	Public Transit Department	Street Transportation Department	Ongoing, Long-term
TS1.3	<p>Increase bike lane mileage in the city of Phoenix and ensure the bicycle network is connected and comfortable for riders of all ages and abilities.</p> <p>Bicycling promotes a healthy lifestyle and has significantly lower emissions and requires much less infrastructure than a motor vehicle. Phoenix City Council adopted the Comprehensive Bicycle Master Plan in November 2014. This plan will help develop a comprehensive bicycle network that is fully connected with the Phoenix community and other transportation networks. There are 1,065 miles of bi-directional bike lanes with a goal of 1,995 miles by 2050. In addition to the Comprehensive Bicycle Master Plan, the T2050 Mobility Improvements subprogram was established to improve neighborhood mobility through the construction of new sidewalks and multi-modal connectivity through the provision of new bicycle facilities.</p>	Street Transportation Department	ADOT, MAG	Ongoing, Long-term
Pending Actions				
TS1.4	<p>Create a network of multi-use paths along the existing canal network in Phoenix.</p> <p>The canal network is used to transport water throughout Phoenix and provides an opportunity to incorporate alternative mobility improvements along its banks. In 2020, Phoenix opened the initial 12 miles of shared use path along the Grand Canal in Central Phoenix from Interstate 17 to the city of Tempe. This shared use path provides safe and convenient walking and biking access between neighborhoods, transit corridors, local employment, shopping, education and recreation centers. The next segments will be under design in late 2020 with implementation by late 2023. 45 percent of canals have paved paths. By 2050, 90 percent of canals will have paved and connected paths, with crossings at major streets or barriers.</p>	Street Transportation Department	ADOT, MAG, SRP	Ongoing, Long-term
TS1.5	<p>Develop a series of corridors with a strong emphasis on active transportation and connections to high-capacity transit corridors.</p> <p>Two city-wide initiatives, the Key Corridor Master Plan (KCMP) and Active Transportation Plan, currently underway will help develop a more robust bicycle and pedestrian network throughout the 15 villages in Phoenix.</p>	Street Transportation Department	MAG	Ongoing, Long-term

TS1.6	<p>Develop communities that are walkable and have access to light rail as part of Reinvent PHX.</p> <p>Reinvent PHX is a collaborative partnership committed to developing walkable, opportunity-rich communities connected to light rail. Five Transit oriented development (TOD) districts were identified and sustainability, health impact, and economic assessments were produced to create action plans for each district through district steering committees. The total acreage of expanded infill development within TOD areas is 403 acres. 707 affordable housing units have been developed within the TOD areas. Over seven miles of bike lanes have been added to TOD areas.</p>	Planning and Development Department	Community and Economic Development, U.S. Department of Housing and Urban Development, Arizona State University, Vitalyst Health Foundation	Ongoing, Long-term
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GOAL TS2	Increase the use of alternative fuels (i.e., fuels other than gasoline and diesel).		
Ongoing Actions	City Lead	Partnerships	Timeframe

TS2.1	<p>All city of Phoenix fleet will be fueled by alternative fuels or GHG net-zero fuels, including electricity.</p> <p>The city fleet will continue to transition to alternative fuels with lower GHG emissions and then to GHG net-zero fuels. Currently, 73 percent of the fuel used by the fleet is alternative fuel.</p>	Public Works, Public Transit, Aviation, Police Departments		Ongoing, Long-term
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TS2.2	<p>All new garbage trucks will be replaced with trucks powered by compressed natural gas.</p> <p>As part of cleaner air initiatives, diesel-engine solid waste trucks are being replaced with CNG-fueled ones improving air quality and reducing GHG emissions. By 2030, the majority of existing garbage trucks will be replaced with cleaner burning CNG-fueled trucks or electric vehicle garbage truck options as they become available. The Solid Waste Field Services division uses a fleet of alternative fuel equipment to collect, reuse and recycle green organics, and bulk trash from approximately 400,000 residential customers each week and uses 100% alternative fuel, with 150 units using CNG, and 60 of which use ultra-low NOx CNG engines, out of a total of 234 units.</p>	Public Works Department		Ongoing, Medium-term
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Pending Actions				
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TS2.3	<p>Advocate for state and local regulations that promote alternative fuel sales in the Phoenix metropolitan area.</p> <p>Alternative fuels are fuels that are not fossil fuels. These fuels are used in place of fossil fuels to decrease GHG emissions. It is important to advocate for further local GHG emissions reductions from state and local regulations that promote alternative fuel sales in the Phoenix metropolitan area.</p>	Government Relations Departments	ADEQ	Short-term
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GOAL TS3	Increase the adoption and rollout of electric vehicles and electric-vehicle charging stations.		
Ongoing Actions	City Lead	Partnerships	Timeframe

TS3.1	<p>Purchase electric vehicles when possible for the city of Phoenix Motor Pool.</p> <p>Replacing vehicles powered by conventional fuels with electric vehicles is important to reducing GHG emissions.</p>	Public Works Department	All City Departments, Mayors Climate Purchasing Collaborative	Long-term
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TS3.2	<p>Install electric vehicle charging stations for nonroad equipment on city of Phoenix Aviation properties.</p> <p>Using VALE grants, the Aviation Department is developing electric ground support equipment infrastructure at Phoenix Sky Harbor International Airport. Teaming with the airlines, over 100 fuel-driven ground support equipment units have been retired and replaced with electric units. Forty electric charging stations have been installed and additional infrastructure will be installed in future terminal construction projects.</p>	Aviation Department	Airlines, Maricopa County	Short-term
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Pending Actions				
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TS3.3	<p>Complete construction of the Phoenix Sky Train®.</p> <p>The automated PHX Sky Train® connects travelers between the METRO Light Rail 44th Street and Washington stop and the airport. 1.9 miles have been completed with 2.5 additional miles scheduled for completion by 2022.</p>	Aviation Department		Short-term
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TS3.4	<p>Advocate for state and local regulations that incentivize that new vehicle sales in the Phoenix metropolitan area be battery-electric or plug-in electric vehicles, including electric vehicle charging infrastructure.</p> <p>Federal tax credits are available for some all-electric and plug-in hybrids models. Policy support at the state and local levels is needed to increase sales of electric vehicles. This includes developing ordinances for electric vehicle charging infrastructure to support the adoption of electric vehicles.</p>	Governmental Relations Department	Office of Sustainability, MAG, Maricopa County, APS, SRP	Short-term
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GOAL TS4 Reduce the number of trips taken, while maintaining a thriving economy.

Ongoing Actions City Lead Partnerships Timeframe

TS4.1	<p>Utilize reciprocal agreements with private haulers and other municipal entities to reduce trips and distance traveled hauling garbage to transfer stations and landfill.</p> <p>The Solid Waste Field Services division has reciprocal agreements with private haulers and other municipal entities that provide economic and increased service efficiency for the solid waste operation. These agreements have saved approximately 200,000 miles of travel.</p>	Public Works Department		Short-term
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TS4.2	<p>Transition to digital communications with residents, where possible, without a decrease in the level of service provided.</p> <p>A transition to digital communications will decrease GHG emissions by eliminating the need for printed materials and their distribution. It is important to consider residents who may not be able to receive communications digitally.</p>	Communications Office		Long-term
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Pending Actions

TS4.3	<p>Establish a policy that promotes teleworking for city of Phoenix municipal operations.</p> <p>Maricopa County Ordinance P-7 Travel Reduction Program requires a reduction of the amount of travel performed in a single occupancy vehicle by using alternative forms of travel. Teleworking is an important element of a travel reduction plan and should be established for city of Phoenix employees where possible. It is also important to incentivize and promote teleworking for all employers, regardless of size.</p>	Human Resources Department	Maricopa County	Short-term
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TS4.4	<p>Make job training for city of Phoenix employees available in a digital format.</p> <p>Providing job training in a digital format reduces GHG emissions. These reductions may come from reduced amount of travel to a training facility, reduction of space dedicated to training, and printing of training materials. Using Coronavirus Aid, Relief, and Economic Security (CARES) Act funds, a learning management system is being developed that will provide virtual learning opportunities with access to a large database of training material that will reduce in-person facilitation of training and reduced hard copy of training materials.</p>	Human Resources Department	Information Technology Services Department	Short-term
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WASTE AS A RESOURCE (WR)

QUICK START ACTIONS (Examples)

Action WR1.3: Complete Recycled Asphalt Pavement project by 2025.

Action WR2.2: Complete SR-85 Landfill gas capture project by 2025.

Action WR3.2: Increase number of Green Organic Roll Off Pulls by 5 percent annually.

GOAL WR1		Implement programs to increase the reuse and recovery of waste materials and promote social and economic value.		
Ongoing Actions		City Lead	Partnerships	Timeframe
WR1.1	<p>Continue to identify and collect waste materials to recycle.</p> <p>Programs are in place to recycle used fluorescent lamps, tires, batteries and steel, which can generate revenue. In fiscal year 2019-2020, 27,343 tires and 10,350 batteries were recycled. Approximately 1,100 tons of steel is recycled annually. In addition, Household Hazardous Waste (HHW) disposal events are held for customers so that this waste may be properly handled and processed.</p>	Public Works Department		Ongoing, Long-term
WR1.2	<p>Continue to implement reuse programs to eliminate waste by reusing items previously identified as waste.</p> <p>Waste materials are identified and collected for reuse. The Make Ready program reuses auto parts reducing waste sent to the landfill and saving over \$120,000 in fiscal year 2019-2020.</p>	Public Works Department		Ongoing, Long-term
WR1.3	<p>Continue to implement waste reduction programs at the two material recovery facilities, including a composting facility that recovers organic waste.</p> <p>Material recovery facilities (MRFs) are specialized facilities that receive, separate, and prepare recyclable materials for sale. Phoenix has two MRFs, one at the North Gateway Transfer Station and one at the 27th Avenue Transfer Station. The city's composting facility was opened in 2017 and is a key component of Reimagine Phoenix. Phoenix processes roughly 169,000 tons of recyclables and 55,000 tons of organic waste per year at these facilities.</p>	Public Works Department		Ongoing, Long-term
SES3.3	<p>Use the Adaptive Reuse Program to continue to assist with streamlining the process and steps required to repurpose existing buildings for new business uses.</p> <p>Repurposing existing buildings for new uses can be challenging. Phoenix's Adaptive Reuse Program encourages the reuse (recycling) of buildings to promote business uses and offers incentives that help bring life to underutilized buildings, supports local businesses, takes advantage of existing infrastructure and supports our neighborhoods. During the past five years, the city of Phoenix has assisted 151 qualified adaptive reuse projects by providing over \$450,000 in Adaptive Reuse Incentives.</p>	Planning and Development Department		Ongoing, Long-term
Pending Actions				
WR1.4	<p>Reuse recycled asphalt as street pavement.</p> <p>The Reclaimed Asphalt Pavement (RAP) Project is assessing the cost effectiveness and performance using different proportions of RAP on Phoenix streets as part of traditional paving materials. Phase II was recently completed, which involved performance tests on a road section within the city. If pilot is successful, this process will be applied on city streets.</p>	Street Transportation Department	Arizona State University	Medium-term

GOAL WR2		Reduce GHG emissions resulting from the degradation of waste by increasing landfill gas capture.		
Ongoing Actions		City Lead	Partnerships	Timeframe
WR2.1	<p>Continue to utilize methane capture systems on active and decommissioned landfills to oxidize methane that is produced to</p> <p>Landfill gas capture systems are utilized at SR-85, the city's only active landfill, and decommissioned landfills, including Skunk Creek, 27th Avenue, Deer Valley, 19th Avenue, and Del Rio landfills. These systems capture methane gas that is produced by decomposing waste and is combusted to produce a less GHG intensive gas.</p>	Public Works Department		Short-term
Pending Actions				
WR2.2	<p>Capture and reuse methane as vehicle fuel as part of the Landfill Gas Recovery Project at SR-85 Landfill.</p> <p>State Route 85 (SR-85) Landfill is Phoenix's only active landfill and receives over one million tons of waste per year from Phoenix and other sources. The waste decomposes and produces landfill gas that is roughly half methane and half carbon dioxide. A project will be developed in the future to capture the landfill gas and use it as fuel.</p>	Public Works Department		Short-term
GOAL WR3		Increase waste-diversion participation by all residents and businesses.		
Ongoing Actions		City Lead	Partnerships	Timeframe
WR3.1	<p>Provide outreach and feedback to residents what can and cannot be recycled through presentations to schools and communities.</p> <p>The Zero Waste team provides education on proper recycling, including group tours of the city's North Gateway Transfer Station and MRF, educational presentations to schools, neighborhood and community meetings, and hosting informational booths at community events. In 2019, the Public Works Zero Waste team interacted with approximately 23,500 community members.</p>	Public Works Department		Ongoing, Short-term
Pending Actions				
WR3.2	<p>Increase resident participation in the Green Organics Residential program and recycling program.</p> <p>Waste diversion efforts include diversion of organic materials. Through the Green Organics Residential Collection program, organic material, like yard trimmings, untreated wood, tree fruit, and cactus, is collected from residential properties. Currently, there are six green organic material collection routes collecting residential organic material each week. This organic material is then transported to the 27th Avenue Compost Facility to be processed.</p>	Public Works Department		Short-term
WR3.3	<p>Increase number of businesses that participate in the Phoenix Green Business Leader Program that recognizes Phoenix businesses that have sustainable practices, including increased waste diversion.</p> <p>The Green Business Leader (GBL) program started in 2017 as part of the Reimagine Phoenix initiative to create public-private partnerships to further waste diversion in the city. In 2019, the GBL program expanded to recognize businesses for efforts around water conservation, energy efficiency and sustainable purchasing, in addition to waste diversion. There are more than 100 certified Green Businesses, that in total have diverted over 5,000 tons of waste.</p>	Public Works Department	Office of Sustainability, Office of Environmental Programs, Water Services Department	Ongoing, Short-term
WR3.4	<p>Increase number of businesses that participate in the "green tenant" program at Sky Harbor International Airport.</p> <p>As part of the Aviation Department Sustainability Management Plan Update, a voluntary "Green Tenant" program is being developed to encourage greater collaboration between the Aviation Department and airport tenants on airport sustainability goals. Aviation Department met the waste diversion goal of 40 percent in 2019, a year earlier than targeted.</p>	Aviation Department	Airport Tenants	Ongoing, Short-term

WR3.5	Increase the number of existing buildings that are repurposed instead of demolished. In addition to reuse of materials, it is important to reuse buildings through the Adaptive Reuse Ordinance where existing buildings are repurposed. There are eleven adaptive reuse projects underway in Eastlake-Garfield, four in Midtown, nine in Uptown, and two in Gateway.	Planning and Development		Ongoing, Long-term
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GOAL WR4 Transition to green alternatives from environmentally hazardous materials.

Ongoing Actions		City Lead	Partnerships	Timeframe
WR4.1	Utilize vegetable-based inks that are formulated to reduce solvents. Volatile organic compounds are chemicals that evaporate quickly and are precursors to ozone. One way to limit their use is to transition to vegetable-based inks that are formulated to minimize and, in some cases, eliminate the use of volatile organic compounds as much as possible.	City Clerk Department	State of Arizona	Short-term
WR4.2	Use digital communication or recycled paper when possible. To decrease the production of waste from paper-based transactions and communications, digital communications will replace paper-based communications. If paper is still necessary, the paper that is used should contain recycled content.	Communications, City Clerk, Human Resources		Ongoing, Short-term

GOAL WR5 Expand brownfield redevelopment along the Rio Salado in Phoenix.

Pending Actions		City Lead	Partnerships	Timeframe
WR5.1	Increase the cleanup and redevelopment of brownfields in the Rio Reimagined Project area. The Rio Reimagined Project encompasses more than 78,000 acres and 1,189 potential brownfields. Cleaning up and reuse of these properties brings community, economic, and environmental benefits. The Rio Salado, Agua Fria and Gila Rivers will be revitalized by reconnecting the community with the river and be a catalyst for economic growth. Utilize resources obtained through a U.S. EPA grants	Office of Environmental Programs, Community & Economic Development Department	U.S. EPA, ADEQ, ASU, Cities of Avondale & Tempe	Medium-term

GOAL WR6 Reduce greenhouse gas emissions from water and wastewater treatment by capturing biogas from treatment processes and increasing renewable sources of energy.

Pending Actions		City Lead	Partnerships	Timeframe
WR4.1	Identify water and wastewater facilities where biogas can be treated, transferred and sold as a renewable green energy commodity. Investigate other opportunities for biogas capture. Renewable energy projects provide biological sources of natural gas, which can displace natural gas from fossil fuel sources. Biogas that is produced as a result of treatment at the wastewater treatment plants contains methane. As part of the city's pledge to be a sustainable and cost-effective utility, a renewable energy project at 91st Avenue Wastewater Treatment Plant treats, transfers and sells biogas as a renewable green energy commodity. The city will investigate other opportunities for biogas capture at other water and wastewater treatment facilities.	Water Services Department	Ameresco, Inc.	Short-term

AIR QUALITY (AQ)

QUICK START ACTIONS (Examples)

Action AQ1.1: Obtain a new DERA grant by 2025.

Action AQ2.1: Ensure city-owned vacant lots remain stabilized to prevent dust and PM emissions.

GOAL AQ1		Decrease ozone precursor emissions, including NOx and VOCs from municipal vehicles by 10% by 2025.		
Ongoing Actions		City Lead	Partnerships	Timeframe
AQ1.1	<p>Use Diesel Emissions Reductions Act (DERA) grants to transition to cleaner burning vehicles.</p> <p>The Public Works Department was recently awarded \$1 million in Diesel Emissions Reduction Act (DERA) grants by the US Environmental Protection Agency (EPA) to replace some of the department's diesel-fueled trucks. The grant money will be combined with matching funds of \$2.1 million from Phoenix Public Works and its private partner, Mr. Bults Inc., to purchase nine new solid waste collection trucks and one long-haul truck fueled by CNG to replace old, diesel-fueled vehicles.</p>	Public Works	U.S. EPA, Mr. Bults, Inc.	Ongoing, Short-term
AQ1.2	<p>Continue to collaborate with regional entities to address ozone precursor emissions.</p> <p>The city collaborates with various regional entities to focus on how best to reduce ozone throughout the metropolitan area, including the MAG, MCAQD, ADEQ, and other valley cities. The city is a member of the MAG Technical Air Quality Committee, the Maricopa County Clean Air Council, and the ADEQ Air Quality Coalition.</p>	Office of Environmental Programs	MAG, MCAQD, ADEQ	Ongoing, Short-term
Pending Actions				
AQ1.3	<p>Determine the air quality improvements from actions completed from changes in the transportation sector.</p> <p>Calculate the reduction in ozone precursor emissions from transportation resulting from the the various actions being undertaken by the different departments.</p>	Office of Environmental Programs	All Departments	Ongoing, Short-term
GOAL AQ2		Decrease emissions of dust/particulate matter (PM-10 and PM-2.5).		
Ongoing Actions		City Lead	Partnerships	Timeframe
AQ2.1	<p>Continue to stabilize and maintain surfaces to reduce PM-10 emissions.</p> <p>The largest sources of PM-10 are from unpaved roads and paved roads. Much of the efforts to decrease PM-10 have been focused on stabilizing these surfaces and maintaining them with the use of street sweepers. The city has stabilized streets, lots and alleys, and conducted outreach activities to ensure that residents would become of methods to prevent the formation of dust. The city of Phoenix has paved or stabilized over 500 miles of alleys since 2012 as part of the Five Percent Plan.</p>	Street Transportation Department	Office of Environmental Programs	Ongoing, Short-term
AQ2.2	<p>Promote activities that reduce emissions of PM-2.5.</p> <p>Particulate matter with a diameter of 2.5 micrometers or smaller (PM-2.5) is primarily soot from burning activities, but also comes from vehicle exhaust. Efforts to reduce PM-2.5 include retrofitting fireplaces and improvements in vehicle exhaust systems.</p>	Office of Environmental Programs	MAG, MCAQD, ADEQ, EPA	Ongoing, Short-term

LOCAL FOOD SYSTEMS (LFS)

QUICK START ACTIONS (Examples)

Action LFS2.2: Incorporate agriculture, food processing, and distribution into existing and future economic development plans by 2020.

Action LFS5.2: Convene local food producers with city staff, leaders, and elected officials to build trust and understanding by 2020.

Action LFS3.1: Update codes and ordinances where appropriate to eliminate barriers and encourage developing a healthy food infrastructure, including food waste diversion by 2021.

Action LFS3.3: Complete an inventory of city-owned parcels as opportunities for urban agriculture, focused on food deserts within irrigation districts by mid-2021.

Action LFS5.4: Complete a GHG Emissions Inventory for the local food system, defined as Maricopa County by 2023.

NOTE: The goals and actions identified in the Local Food Systems section are from the 2025 Phoenix Food Action Plan adopted in March 2020 by Phoenix City Council with implementation by 2025.

GOAL LFS1 All people living in Phoenix should have enough to eat and have access to affordable, healthy, local, and culturally appropriate food.

Pending Actions	City Lead	Partnerships	Timeframe
<p>LFS1.1 Incorporate agriculture, food processing, and distribution into existing and future land use plans. Collaborate with key partners to facilitate new opportunities for urban-scale gardens, farms, gleaning, and distribution systems.</p> <p>PlanPHX emphasizes the importance of residents having access to healthy food and sets measures for access within a ¼-mile. Policies that are supportive of food access should be integrated into future redevelopment, transit-oriented, and other land use plans. Explore criteria for various transportation, tree and shade, urban heat island and similar projects that create safe and convenient connections between residential neighborhoods and healthy food assets. Study the impacts of local food production on food equity and social justice for low income communities.</p>	Office of Environmental Programs	Planning and Development Department	Short-term June 2021
<p>LFS1.2 Use existing financial resources for food production and infrastructure. Pursue grants and other funding opportunities that will enhance the community's access to healthy foods.</p> <p>Identify funding resources available through private sector, government, and philanthropic sources. It is important to determine the viability of using current funding mechanisms available from the City that can be used for food system improvements. Collaborate with key partners to facilitate new opportunities for urban-scale gardens, farms, gleaning, and distribution systems.</p>	Office of Environmental Programs	Governmental, philanthropic and place-based funders	Short-term December 2020
<p>LFS1.3 Partner with schools and others to support and promote education for youth and adults.</p> <p>Support education and awareness on all aspects of the food system and create opportunities to create or enhance urban agriculture, health and nutrition education for youth, adults, and seniors. Collaborate with state and county agencies working with school districts in Phoenix and support Farm to Table programs in schools.</p>	Office of Environmental Programs	City of Phoenix Youth & Education Office, Phoenix School Districts, Nonprofits, community & grassroot organizations	Short-term Ongoing
<p>LFS1.4 Promote existing healthy food assets, such as farmers markets, grocery stores, retail, community gardens, farms, etc.</p> <p>Focus on efforts to address challenges within communities with limited access to fresh healthy food, followed by a city-wide approach to planning for food access for all communities. identify existing food and farm assets within food desert areas, such as the South Phoenix and Maryvale communities. Develop asset maps that are accessible by residents through a variety of communication tools, including online mapping, apps, social media with written resources available at city libraries, community centers, and recreations centers.</p>	Office of Environmental Programs	Community and Economic Development Department	Short-term December 2020

GOAL LFS2 Businesses that produce, process, distribute, and sell local and healthy food should be recognized as integral to the economy and encouraged to grow and thrive in Phoenix.

Pending Actions	City Lead	Partnerships	Timeframe
<p>LFS2.1 Recognize food production as a highest and best use of land.</p> <p>Phoenix has the potential to be an agricultural technology innovation hub, with a focus on farming that is water efficient, restorative and adaptable to the arid climate and high temperatures. Coordination with internal and external economic development professionals will be done to evaluate the economic development potential of the food system as a local industry cluster. Create opportunities to connect food production businesses with available land. Continue to collaborate with academic partners to establish an agriculture technology initiative.</p>	Office of Environmental Programs	Community and Economic Development Department; University of Arizona, Arizona State University	Short-term June 2021

LFS2.2	<p>Incorporate agriculture, food processing, and distribution into existing and future economic development plans.</p> <p>Assist agricultural entrepreneurs and existing food-related businesses and identify financial and technical resources and the most effective means to make those resources available. Develop comprehensive, user-friendly information on the requirements of food production, processing, and distribution businesses that is available from the city and through partners.</p>	Office of Environmental Programs	Municipal/Regional/State Economic Development Organizations (EDOs)	Short-term June 2021
LFS2.3	<p>Establish a local food buying preference in future City contracts and include in current Sustainable Purchasing Policy.</p> <p>Develop appropriate contract language that can be incorporated into City contracts for the purchase of local food. Coordination with internal departments to develop guidelines and language, and potentially set procurement goals. Provide healthy, local produce to city employees through a Community Supported Agriculture (CSA) program and pilot in downtown City facilities initiated. Explore the development of healthy procurement guidelines for City events and facilities.</p>	Office of Environmental Programs	Finance Department	Short-term June 2021
LFS2.4	<p>Partner with stakeholders to support and promote a Buy Local Food campaign.</p> <p>Educate and engage residents on the benefits of purchasing locally-produced food. Develop a Buy Local Food Campaign in collaboration with partners, such as Local First Arizona Foundation and others. Partnership opportunities with grocers to further promote Buy Local will be established or enhanced.</p>	Office of Environmental Programs	Local First Arizona Foundation, MarCo, Local Food Producers; Grocers	Short-term December 2021
GOAL LFS3	Growing food in Phoenix and the region should be easy and valued whether for personal use or for business.			
Pending Actions		City Lead	Partnerships	Timeframe
LFS3.1	<p>Update codes and ordinances where appropriate to eliminate barriers and encourage developing a healthy food infrastructure.</p> <p>Existing zoning codes will be further clarified to clearly identify which zoning classifications and requirements are needed for various agricultural and food production uses, commercial and residential, including, hydroponic, aquaponics, growing inside structures, and for burgeoning uses, such as rooftop and building-integrated agriculture. Identify and update/amend appropriate sections of the zoning code to clearly identify zoning districts in which agricultural land uses are permitted. Develop definitions for agricultural land uses. Develop streamlined processes for agricultural zoning. Explore the development of an "Agritainment" zoning districts, and zoning incentive models (density, PAD district, similar zoning options) that encourages set asides of land for food production.</p>	Office of Environmental Programs	Planning and Development Department; local food producers, and businesses	Short-term December 2021
LFS3.2	<p>Explore development of agriculture community land trusts and/or preservation mechanisms.</p> <p>Various mechanisms that could be used in concert with nonprofit and private partnerships to preserve land for food production will be identified, as well as best practices of other cities. Existing city policies impacting agricultural land uses will be reviewed. Recommendations will be made for new or modifications to existing policies.</p>	Office of Environmental Programs	Community and Economic Development, Real Estate, Water Services, Planning and Development Departments; MarCo, Arizona Community	Short-term December 2020
LFS3.3	<p>Explore the use of City-owned parcels as opportunities for urban agriculture, focused on food deserts within irrigation districts.</p> <p>Develop, with City departments, guidelines on how to lease/buy city owned land for food production, including establishing appropriate minimum length of lease terms feasible for agriculture. Adopt policies allowing the use of park land and other city-owned land, where feasible and appropriate, for food production. An inventory of land potentially available for agricultural use will be created, including Brownfields. Upon identification of available city-owned land located in food desert and irrigation district areas, a Request for Proposal for agricultural development may be issued.</p>	Office of Environmental Programs	Parks and Recreation, Public Works, Water Services, and Real Estate Departments	Short-term June 2021

LFS3.4	<p>Support the growth of land uses that contribute to a healthy and sustainable food system (i.e. grocery stores, community gardens, urban farms and other urban agriculture elements).</p> <p>In addition to city-owned land, there is the opportunity to support efforts to expand urban food production on residential, commercial and institutional properties. Support and encourage collaboration between public and private sectors and small/medium sized farms, food-hubs, mobile markets, co-ops, community and back-yard gardens. Establish community commercial kitchens and/or use existing commercial kitchens. Explore opportunities to work with vacant schools with kitchens to use as a training and economic development resource will be performed.</p>	Office of Environmental Programs	Planning & Development, Community and Economic Development Departments, GPEC, school districts	Short-term December 2021
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LFS3.5	<p>Use existing and explore new job training resources, where feasible, and partner with others to provide training opportunities.</p> <p>A cornerstone in a sustainable local food system is the development of career pathways in farming. Support programs focused on training future farmers and collaborate with partners and institutions, such as the University of Arizona Cooperative Extension of Maricopa County. Identify other potential partners with a focus on providing training for new farmers. Facilitate business training programs for farmers to gain more marketing knowledge and expertise. Explore city policies that support the creation of agricultural employment training opportunities to further promote job creation in the agriculture sector.</p>	Office of Environmental Programs	City of Phoenix Workforce Development, Maricopa Community Colleges, University of Arizona	Short-term June 2022
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GOAL LFS4	Food-related waste should be prevented, reused, or recycled. Sustainable food production practices that maintain a healthy environment are desired.		
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Pending Actions		City Lead	Partnerships	Timeframe
LFS4.1	<p>Update codes and ordinances to clarify food waste diversion, i.e., composting opportunities.</p> <p>Providing clear and understandable codes and ordinances to clarify food waste diversion, such as composting, is essential to a thriving local food system. This includes identifying and updating/amending appropriate sections of the zoning code to clearly identify zoning requirements for composting opportunities.</p>	Office of Environmental Programs	Planning and Development, Public Works Department, MarCo, Business	Short-term December 2021

LFS4.2	<p>Support and promote methods to prevent edible food from entering the waste stream.</p> <p>A key factor in preventing food waste is to provide means for edible food to be consumed. In the United States an estimated 30-40% of food goes uneaten and ends up in landfills, further contributing to greenhouse gas emissions. Creating opportunities to provide edible food to those that don't have enough to eat involves collaborating with stakeholders to identify solutions. Opportunities for collaboration with other stakeholders involved in the prevention of food waste and food rescue will be evaluated.</p>	Office of Environmental Programs	Public Works Department; MarCo, Waste Not, restaurants, institutions	Short-term December 2020
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LFS4.3	<p>Promote and support sustainable practices in all areas of the food system.</p> <p>The food economy is an integral contributor to the overall economic vitality of the City. Business opportunities are varied, from agricultural entrepreneurs, catering, restaurants, food trucks, mobile markets, retail, such as neighborhood bodegas or convenience stores, and for backyard gardeners to sell their produce. Identifying and providing business resources, including water and energy efficiency, regenerative agricultural practices, and safe food handling are keys to creating a sustainable food economy. Continue working toward development of a Sustainable Food Economy Accelerator for entrepreneurs. identify mechanisms to assist food-related businesses, including technical assistance and financial resources.</p>	Office of Environmental Programs	Community and Economic Development, ASU, Cities within Maricopa County	Short-term June 2022
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GOAL LFS5		Develop food policies and actions that address local and global challenges posed by climate change, urbanization, political and economic crises, population growth and other factors.			
Pending Actions	City Lead	Partnerships	Timeframe		
LFSS.1	<p>Research policies and actions that plan for future shocks related to changing population growth, hazards, economic conditions and climate. Conduct research on best practices and explore ways to integrate food system resiliency within existing and future hazard mitigation, emergency response, and or resilience planning efforts. OEP would serve as the lead for food systems in future resilience planning. Coordination with City Departments and external stakeholders will identify opportunities for food system integration.</p>		Office of Environmental Programs	Stakeholders from within all aspects of the local food system.	Short-term December 2021
LFSS.2	<p>Convene local food producers with city staff, leaders, and elected officials to build trust and understanding. Create opportunities and collaborate with stakeholders to identify solutions for providing edible food to those that don't have enough to eat.</p>		Office of Environmental Programs	Phoenix elected officials and city departments, Local First Arizona Foundation, local food producers	Short-term December 2020 and Ongoing
LFSS.3	<p>Explore funding opportunities from federal, state, and philanthropic organizations for food system activities and staff. Identify and submit for funding opportunities from federal, state, and philanthropic organizations for food system activities and staff. Resources to conduct recommended actions will be needed. Obtaining funding from all feasible and available resources will be paramount to the success of achieving the goals, strategies and actions identified.</p>		Office of Environmental Programs	Potential funders	Short-term Ongoing
LFSS.4	<p>Complete a GHG Emissions Inventory for the local food system, defined as Maricopa County. Complete a GHG emissions inventory of the local food system, that is Maricopa County, to determine which reduction actions will be necessary to reduce the GHG emissions from the production, processing and delivery of food across Phoenix and the region.</p>		Office of Environmental Programs	MarCo; University of Arizona, NRDC, ICLEI, ASU	Short-term December 2023

HEAT (H)**QUICK START ACTIONS (Examples)**

Action H1.2: Complete walkshed mapping tool pilot by 2020.

Action H2.7: Provide shade at all 4,050 bus stops by 2025.

Action H4.2: Complete street cool seal pilot project by 2025.

Action H5.1: Complete pilot certification as a HeatReady City by 2022.

GOAL H1 Create a network of cool corridors in vulnerable communities to facilitate movement from residents' homes to their places of employment, education and play.

Pending Actions	City Lead	Partnerships	Timeframe
H1.1 Update Phoenix's Walkable Urban Code to include additional heat mitigation actions. The Walkable Urban Code regulates development in proximity to light rail stations. Additional heat mitigation actions are being considered to be included in the code, along with the current shade requirements.	Planning and Development Department		Short-term
H1.2 Develop walkshed mapping tool to identify key pedestrian corridors and priority routes for adding shade in vulnerable neighborhoods and increase shade provided by trees or constructed shade. A next generation Walkshed mapping tool, based on the principles of a model developed by Harvard students studying in Phoenix, is being developed in partnership with ASU to identify key pedestrian corridors and priority routes for adding shade in vulnerable neighborhoods. The tool considers zero car households, proximity to schools, shopping and transit, and identified the most likely routes or "walkshed" that pedestrians would likely take in a given neighborhood. The tool is being piloted in 2020 and will be used to select corridors for implementing priority tree and shade elements.	Office of Sustainability	ASU	Short-term
H1.3 Construct cool corridors in vulnerable communities. The urban heat island effect can be reduced locally by creating cool corridors. These corridors would provide cooling through shaded walkways, green spaces and sources of water to aid against the heat. The cool corridors would be placed where the walkshed mapping tool identified the greatest need of a walkway in vulnerable communities to facilitate movement from residents' homes to work, school, and play.	Planning and Development Department	Street Transportation Department	Short-term

GOAL H2 Increase shade provided by trees or constructed shade in parks, streets and rights-of-way.

Ongoing Actions	City Lead	Partnerships	Timeframe
H2.1 Continue to implement the Tree and Shade Master Plan to establish 25% tree and shade canopy city-wide by 2030. The Tree and Shade Master Plan launched in 2010 with a vision to double the tree and shade canopy by 2030 to 25%. The Tree and Shade Master Plan implementation is supported by over \$5 million in annual funding to City departments as part of a City-wide program with 4000 trees now being planted annually on City streets, parks and rights of way.	Street Transportation and Parks and Recreation Departments	Office of Sustainability, Planning and Development Department	Medium-term
H2.2 Increase tree and shade canopy of parks by 30% by 2030. The Parks and Recreation Department plans to plant 1500 trees annually. As of summer, 2020, 131 parks currently meet the 25% canopy coverage; with 29 parks that are in process to meet the goal.	Parks and Recreation Department		Medium-term
H2.3 Educate City staff on proper tree care, including Right Tree, Right Place training, and the use of tall pots to help establish plants. Increasing the tree canopy of the urban forest requires that the right trees are planted in the right place for long-term growth. Recently, in order to increase the success rate of planting, a method was piloted to use tall pots to increase the number of plants that survive.	Parks & Recreation Department	Street Transportation Department, Office of Sustainability, AmeriCorps VISTA	Short-term
H2.4 Maintain and update tree database for entire Phoenix Parks system. Using TreeKeeper software, trees will be tracked as they are planted and removed, along with the estimated value of the trees and estimated environmental benefits.	Parks and Recreation Department	TreeKeeper	Short-term

H2.5	Implement Project sunBLOCK, which includes permanent and temporary public art microclimates. Project sunBLOCK is composed of permanent and temporary public art microclimates that lower the intense heat confronting pedestrians along key corridors in two of Central Phoenix's hottest neighborhoods. The project brings community, artists, designers and environmental specialists together to create designs that both visually and physically cool transit stops and surrounding streetscapes.	Arts and Culture Department	Public Transit Department	Short-term
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Pending Actions

H2.6	Increase shade at public transit stops in the City. An overarching goal of the T2050 plan was to provide all residents in the City with accessible transit and build ridership. Within that goal is the element to provide shade at all bus stops in the City – 4,050 bus stops by 2025. Currently, 2,680 of those bus stops have constructed shade structures.	Public Transit Department		Short-term
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H2.7	Coordinate and track the planting of trees to achieve the 25% tree and shade canopy goal. At the direction of the Phoenix City Council, the Environmental Quality and Sustainability Commission (EQSC) created the Urban Heat Island/Tree and Shade Subcommittee (UHITS) with the purpose to evaluate, analyze and recommend policies to address the issues surrounding Urban Heat and to advance implementation of the Phoenix Tree and Shade Master Plan.	Environmental Quality and Sustainability Commission	Office of Environmental Programs and Office of Sustainability	Short-term
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GOAL H3 Provide resources and services to residents to manage heat.

Ongoing Actions

		City Lead	Partnerships	Timeframe
H3.1	Educate the community on proper planting and care for trees through the Citizen Forester Program. Increasing the tree canopy throughout the city will require community participation. Education on how to properly plant and care for trees is provided through the Citizen Forester program. Citizen Foresters advocate for trees by promoting best practices regarding proper tree planting and maintenance techniques, while supporting community efforts to achieve tree and shade canopy goals. Residents can become certified as Citizen Foresters and assist in the planting and care of the urban forest.	Parks and Recreation Department	Office of Sustainability, AmeriCorps VISTA, HandsOn Greater Phoenix	Short-term
H3.2	Continue to participate in the Heat Relief Regional Network. The Heat Relief Regional Network is a regional partnership of the Maricopa Association of Governments (MAG), municipalities, nonprofit organizations, the faith-based community, and businesses. The Heat Relief Regional Network works with 137 partner organizations to provide water, resources and wellness checks in communities alongside an education and awareness campaign each summer focusing on vulnerable communities. The number of heat related deaths in the county has risen in each of the last four years with nearly 200 heat related deaths in 2019.	City of Phoenix	MAG	Short-term

Pending Actions

H3.4	Plant trees in neighborhoods with an emphasis on targeted areas in the most recent urban heat island maps. Work with communities and partners to identify and develop cool assets in vulnerable communities such that all residents in those communities will be within a quarter mile of a cooling asset. The program will leverage the City's weatherization program, to provide energy upgrades to low income housing in these neighborhoods and seek grant funding to support deep engagement with the community and the construction of new cooling elements.	Office of Sustainability		Short-term
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GOAL H4 Increase the use of high albedo, or reflective, materials in infrastructure projects.

Ongoing Actions		City Lead	Partnerships	Timeframe
H4.1	<p>Continue to implement the Cool (Energy Star) Roofs on city-owned buildings.</p> <p>Coating the roof reduces the amount of energy needed to cool the building, reducing GHG emissions. Cool (Energy Star) Roofs is the standard for all departments that work with the Public Works Department (PWD) to handle their roof replacement, as well as for those buildings owned by PWD. This type of roof has been implemented for PWD owned buildings since 2005.</p>	Public Works Department		Short-term

Pending Actions

H4.2	<p>Complete cool pavement pilot program and expand program to areas where it would be most effective.</p> <p>A Cool Pavement pilot is currently underway in eight Phoenix neighborhoods and one city park. Phoenix wants to test the cool pavement material to see whether it is effective at reducing temperatures in Phoenix desert climate.</p>	Street Transportation Department	Office of Sustainability, ASU	Short-term
H4.3	<p>Be a living laboratory to test cool materials for use in Infrastructure projects.</p> <p>Be a living laboratory to test new materials that could mitigate urban heat island when implemented at scale. Many promising materials are coming on the market yet their performance in high temperature conditions, their durability and the overall economics need further study. For example, ASU is currently evaluating a new material from 3M that reflects heat as long wave radiation while cooling the underlying surface.</p>	Office of Sustainability	ASU	Medium-term

GOAL H5 Develop HeatReady certification for Cities.

Pending Actions		City Lead	Partnerships	Timeframe
H5.1	<p>Pilot HeatReady certification in partnership with ASU.</p> <p>Where more than 2000 cities including Phoenix have achieved "StormReady" certification by the National Weather Service, ASU in partnership with the City are seeking to pilot a HeatReady certification program—identifying the policies, programs and governance framework and scorecard to assist cities in preparing for increasing temperatures and heat waves. With Phoenix being the epicenter of research related to heat and a hotbed of heat-related programs, ASU and the City are seeking to develop HeatReady to allow it to become a national or international certification program.</p>	Office of Sustainability	ASU	Short-term
H5.2	<p>Expand HeatReady Certification nationally or internationally.</p> <p>After piloting and refining HeatReady Certification in Arizona, ASU and the City are seeking to test HeatReady nationally and internationally to increase its functionality and shared learnings and, more importantly, its impact. C40 and the Global Cool Cities Alliance have both expressed interest in becoming the global verification and certification body once the certification tool reaches maturity.</p>	Office of Sustainability	ASU, C40, National Weather Service, Global Cool Cities Alliance	Short-term

WATER (W)**QUICK START ACTIONS (Examples)**

Action W1.2: Complete construction of Drought Pipeline Project by 2025.

Action W2.4: Implement Greater Phoenix Green Infrastructure and Low Impact Development Details for Alternative Stormwater Management handbook by 2025.

GOAL W1 Identify and implement infrastructure projects to ensure water security.

Ongoing Actions	City Lead	Partnerships	Timeframe
<p>W1.1 Continue to bank water, which is storing water underground for use at a later date. Arizona is a leader in water banking, the practice of storing water underground to be used later. Millions of acre-feet of water have been banked in Central Arizona aquifers through the Arizona Water Banking Authority. The water that is delivered to residents comes from renewable surface water supplies, so that groundwater can be saved for the future. In addition, a water-sharing agreement with Tucson will continue, where Phoenix will store some of its unused Colorado River water in aquifers in Tucson. In times of shortage, Tucson will give Phoenix some of its Colorado River water allocation in exchange for this stored water.</p>	Water Services Department	City of Tucson, Arizona Water Banking Authority	Short-term

Pending Actions

<p>W1.2 Design and construct additional infrastructure to provide a reliable water supply to 1.7 million customers. The Drought Pipeline Project will provide Salt and Verde River water supplies to areas of the city that are currently entirely dependent on Colorado River water. The project is essential to the economic health and vitality of Phoenix. This sustainability project will ensure all residents have access to safe, reliable, clean drinking water during the future times of shortage on the Colorado River. This project will be financed using sustainability bonds, a result of the recent development of the Green and Sustainability Bond Framework. This will result in loan service cost savings.</p>	Water Services Department	Street Transportation and Finance Departments	Short-term
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GOAL W2 Improve the conservation of water resources by improving stormwater management, optimizing water use, conducting water audits, and utilizing wastewater.

Ongoing Actions	City Lead	Partnerships	Timeframe
<p>W2.1 Improve stormwater drainage capacity and reduce backup surging at Phoenix Sky Harbor International Airport. Phoenix Sky Harbor International Airport, located at the end of the Camelback Mountain south watershed, will improve stormwater drainage efficiency by performing preventative maintenance that will improve capacity and reduce backup surging preventing flooding and contamination of the stormwater runoff.</p>	Aviation Department	Water Services and Finance Departments	Short-term
<p>W2.2 Identify and implement water saving measures on city of Phoenix facilities and processes. A city-wide Internal Water Efficiency Task Force was created to monitor water used by municipal operations to identify and implement water saving measures. As a result of the task force, water use dropped 46.5 million gallons. On-going tracking of water usage in Parks and Aviation Departments is possible by a GIS program developed by Water Services Department.</p>	Water Services Department	All Departments	Short-term

Pending Actions

<p>W2.3 Implement successful Phoenix Sky Harbor International Airport commercial cooling tower system upgrade program in other processes throughout city of Phoenix and encourage commercial and industrial adoption of process. Cooling towers are one of Phoenix's highest volume water uses. The Cooling Tower System Upgrade was successfully completed reducing water use by 20 percent. This cooling water treatment system was also installed as part of the Terminal Modernization Project and a system is now being installed in the Rental Car Center. Future opportunities are being investigated for municipal operations and commercial use.</p>	Aviation Department		Short-term
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W2.4	<p>Implement the use of the Greater Phoenix Green Infrastructure and Low Impact Development Details for Alternative Stormwater Management.</p> <p>The Greater Phoenix Green Infrastructure and Low Impact Development Details for Alternative Stormwater Management is a handbook that provides technical standard details and specifications (TSDS) to be used for low impact development to members of the design, planning and development communities in Maricopa County. These TSDS will primarily be used on right of way projects and can be implemented in private projects. Using the handbook will result in environmental benefits, water conservation, urban heat reduction, improvement in public health and additional green spaces.</p>	<p>Planning and Development Department, Water Services Department, Office of Environmental Programs</p>	<p>MAG, ADEQ, ASU</p>	<p>Short-term</p>
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GOAL W3 Increase outreach and provide programs to residents and businesses to reduce water use.

Actions to be Completed City Lead Partnerships Timeframe

W3.1	<p>Expand existing SRP program that subsidizes cost of irrigation controllers for residential use.</p> <p>Water conservation has always been part of Phoenix's strategy to maintain a 100-year water supply. Residents are encouraged to adopt xeriscape landscaping with efficient irrigation controllers through a program that subsidizes the cost of smart irrigation controllers for residential use. Expanding this program will reduce water use and lower costs for residents.</p>	<p>Water Services Department</p>	<p>SRP</p>	<p>Short-term</p>
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W3.2	<p>Expand Toilet Retrofit Program to include a low-income program and other incentives.</p> <p>To conserve water, the feasibility of a new toilet retrofit program is being evaluated. The elements that the program will contain are a low-income program that includes toilet and professional installation at no cost to customer and a flat rebate program to all customers that purchase and install a low flow toilet that uses 1.28 gallons per flush.</p>	<p>Water Services Department</p>		<p>Short-term</p>
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W3.3	<p>Expand the Homeowners Association Audit Program.</p> <p>Homeowners Associations (HOA) use water to maintain common landscaped areas, which can lead to high costs and high water usage to keep the areas looking attractive. Up to 70 percent of water used by residents is for outdoor watering. Phoenix piloted a HOA Audit Program that conducted nine audits of outdoor water use within common areas managed by HOAs. Based on that pilot, the potential average savings for the HOAs that volunteered to participate was 4.5 million gallons per year if they implemented the recommendations from the audit. The program will be expanded from pilot to ongoing program by increasing the number of inspections from nine to 40.</p>	<p>Water Services Department</p>		<p>Short-term</p>
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ASU® Rob and Melani Walton
Sustainability Solutions Service
Arizona State University

2018 Community-Scale Greenhouse Gas Emissions Inventory

A comprehensive report
prepared for



City of Phoenix
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sustainabilitysolutions.asu.edu

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Note: The data and calculations presented in this report may not be exact due to rounding errors within the GHG emissions template.

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Acronym List

AFFA	Agriculture, Forestry, and Fishing Activities
AFOLU	Agriculture, Forestry, and Land Use
APS	Arizona Public Service
AR	IPCC Assessment Report (Numbered 2 through 5)
ASU	Arizona State University
AZNM	Arizona and New Mexico eGRID Subregion
B20 Biodiesel	Contains up to 20% biodiesel
BEV	Battery Electric Vehicle
BPEV	Batter Plugin Electric Vehicle
CH ₄	Methane
CNG	Compressed Natural Gas
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent Emissions
E54	Fuel containing 54% ethanol
E85	Fuel containing 85% ethanol
eGRID	EPA's Emissions and General Resource Integrated Database
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
EV	Electric Vehicle
FERC	Federal Energy Regulatory Commission
FTE	Full-time equivalent
GGE	Gasoline Gallon Equivalent
GHG	Greenhouse Gas
GPC	Global Protocol for Community-Scale GHG Emission Inventories
GWP	Global Warming Potential

ICLEI	International Council for Local Environmental Initiatives,
IE	Included Elsewhere
IPPU	Industrial Processes and Product Use
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MPST	Mining, Processing, Storage, and Transport of Coal
MT	Metric Tons
MWh	megawatt-hour
NAU	Northern Arizona University
NE	Not Estimated
NERC	North American Electric Reliability Corporation
NO	Not Occurring
N ₂ O	Nitrous Oxide
ONGS	Oil and Natural Gas Systems
PNM	Public Service Company of New Mexico
SRP	Salt River Project
T&D	Transmission & Distribution
TRP	Trip Reduction Program
WECC	Western Electricity Coordinating Council
WWT	Wastewater Treatment
WWTP	Wastewater Treatment Plant

Executive Summary

The City of Phoenix (City) has completed a community-scale greenhouse gas (GHG) emissions inventory for calendar year 2018. The 2018 community-scale GHG emissions inventory was conducted using the Global Protocol for Community-Scale GHG Emission Inventories (GPC). The GPC is a worldwide standard for inventorying city-induced GHG emissions developed by the World Resources Institute, C40 Cities Climate Leadership Group, and ICLEI¹. The GPC is also the standard supported by the Global Covenant of Mayors for Climate and Energy, of which the City is a member.

The GPC categorizes direct and indirect GHG emissions into three sectors: Stationary Energy, Transportation and Waste. Direct GHG emissions occur within City boundaries, while indirect GHG emissions are induced by activity within the City boundary.

- The Stationary Energy Sector includes GHG emissions that occurs from energy utilized in residential buildings, commercial buildings and facilities, manufacturing industries, agriculture, forestry and fishing energy use, and electricity transmission and distribution energy losses.
- The Transportation Sector includes GHG emissions from commercial and civil aviation, on-road transportation, non-road vehicle use, freight and light rail.
- The Waste Sector includes GHG emissions from solid waste disposal, the biological treatment of waste (composting), and wastewater treatment.

The 2018 community-scale GHG inventory is the third completed by the City following the 2012 and 2016 2018 community-scale GHG inventories. While each of the community-scale GHG inventories completed by the City have followed the GPC, during each inventory process the previous year(s) GHG inventory have been recalculated to reflect updates to source data, data collection and processing methods, GHG global warming potentials, GHG emissions estimation methods. Changes to GHG emissions totals for the 2012 and 2016 calendar years are reported along with the 2018 GHG emissions totals.

¹ Greenhouse Gas Protocol. (n.d.). GHG Protocol for Cities | Greenhouse Gas Protocol. Retrieved from <http://www.ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities>

Key Findings

- In 2018, community-scale GHG emissions were 16,603,754 metric tons of carbon dioxide equivalents (MT CO₂e)
- 2018 community-scale GHG emissions were 0.5% lower than the 2012 levels of 16,692,626 MT CO₂e (Figure ES-1).
- Stationary Energy Sector GHG emissions totaled 8,550,631 MT CO₂e.
- Transportation Sector GHG emissions totaled 7,748,914 MT CO₂e.
- Waste Sector GHG emissions totaled 304,209 MT CO₂e.
- GHG emissions decreased during a period where the City's population grew 12% and the metro area economy grew 26%. Per capita emissions fell from the 2012 baseline of 11.33 MT CO₂e to 10.00 MT CO₂e in 2018.

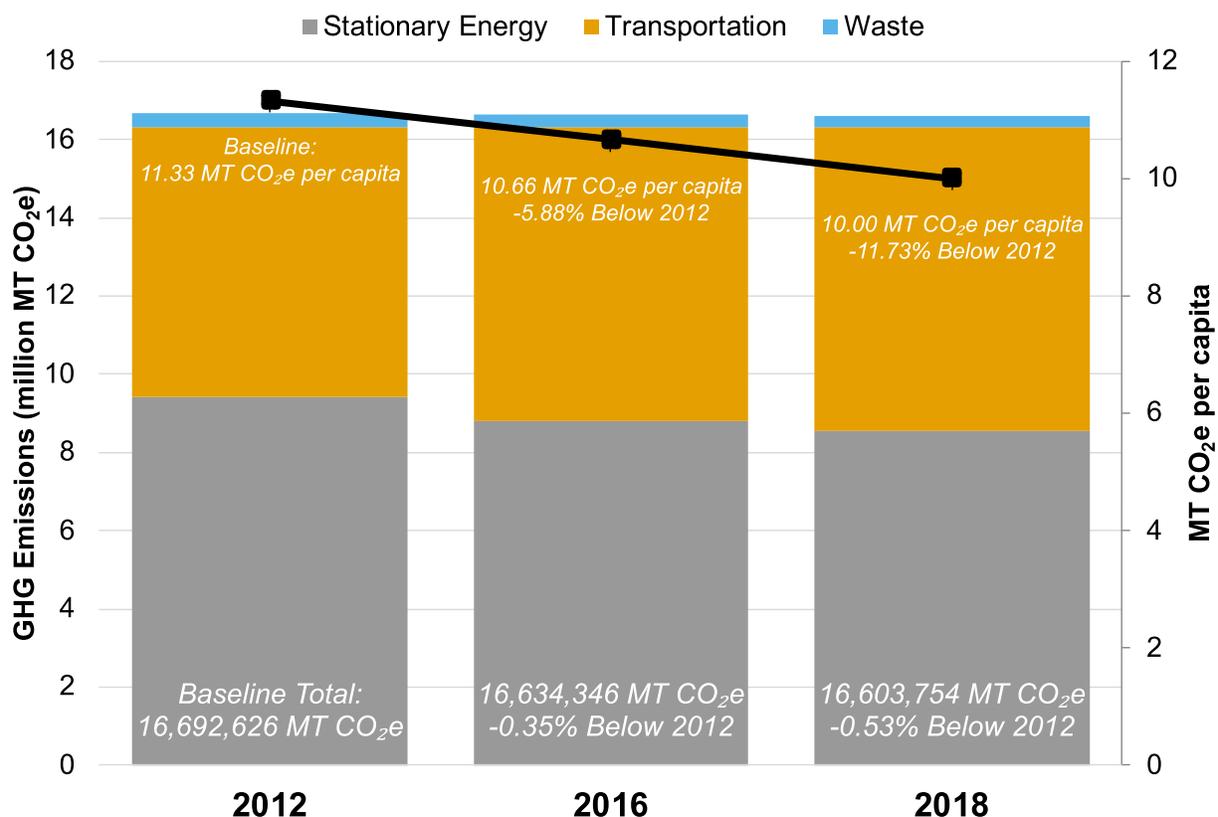


Figure ES-1. GHG emissions by emissions sector for 2012, 2016, and 2018.

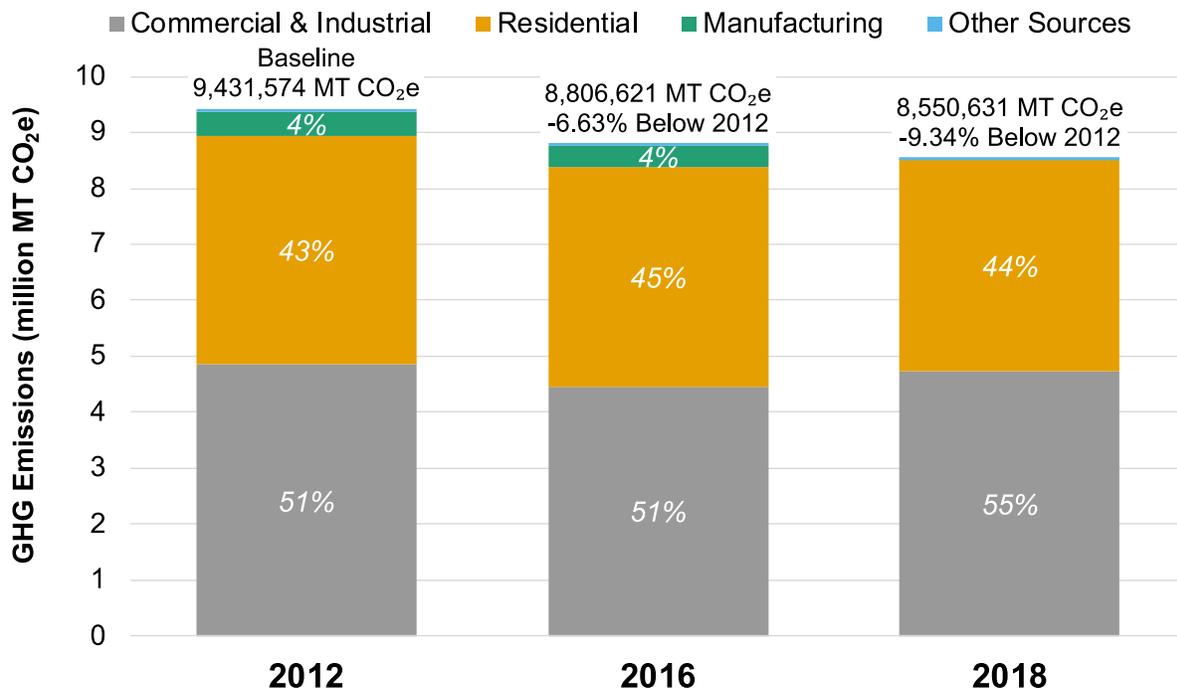
The distribution of GHG emissions between Stationary Energy, Transportation, and Waste Sectors for 2012, 2016, and 2018 is detailed in Table ES-1.

Table ES-1. Phoenix GHG emissions by Sector (MT CO₂e)

Sector	2012	2016	2018	% Change 2012 -2018
Stationary Energy	9,431,574	8,806,621	8,550,631	-9.3%
Transportation	6,895,031	7,514,844	7,748,914	12.4%
Waste	366,021	312,881	304,209	-17.6%
Total	16,692,626	16,634,346	16,603,754	-0.5%

Stationary Energy

The Stationary Energy Sector is the largest source of GHG emissions in the City. Stationary energy GHG emissions sources include energy utilized in residential buildings; commercial buildings and facilities; manufacturing industries; agriculture, forestry and fishing energy use; and electricity transmission and distribution energy losses. GHG emissions from natural gas leakages were not included for any reporting year due to a lack of data on leakage rates.



Residential - Residential buildings; Commercial & Industrial - Commercial and institutional buildings and facilities; Manufacturing - Manufacturing industries and construction; Other Sources - Agriculture, forestry, and fishing activities and Non-specified sources.

Figure ES-2. Stationary Energy GHG emissions for 2012, 2016, and 2018.

Stationary Energy GHG emissions for 2018 were 8,550,631 MT CO₂e, which is a 9% decrease in emissions from 2012. The driving force behind the large reduction in Stationary Energy GHG emissions resulted from a regional increase in clean energy

production, which decreased the carbon intensity of what Phoenix consumes, as reflected in the EPA Emissions and General Resource Integrated Database (eGRID) GHG emissions factor. Data to calculate Stationary Energy GHG emissions were obtained from Arizona Public Service (electricity), the Salt River Project (electricity), Southwest Gas (natural gas), and the Energy Information Administration (electricity transmission and distribution loss). Figure ES-2 shows the distribution of GHG emissions between different sub-sectors in the Stationary Energy Sector for 2012 and 2018 and Table ES-2 details the GHG emissions by subsector.

Table ES-2. Subsector Stationary Energy GHG Emissions (MT CO_{2e})

Stationary Energy	2012	2016	2018	% Change 2012-2018
Residential Buildings	4,093,258	3,940,954	3,755,614	-8%
Commercial & Institutional Buildings	4,853,598	4,449,184	4,740,164	-2%
Manufacturing Industries & Construction	415,704	364,647	8,303	-98%
Agriculture, Forestry & Fishing Activities	68,954	51,758	46,477	-33%
Non-Specified Sources	60	78	74	23%
Total	9,431,574	8,806,621	8,550,631	-9%

Transportation

The Transportation Sector is the second largest source of GHG emissions in Phoenix. Transportation GHG emissions sources occur from commercial air travel, civil aviation, on-road transportation, non-road vehicle use, light rail, and freight rail. GHG emissions result from the combustion of fossil fuels (gasoline, diesel, CNG, LNG, LPG, aviation gasoline, jet fuel A), blended alternative fuels (B20 biodiesel, E85 Ethanol, E54 Ethanol), or indirectly through the consumption of electricity to charge electric vehicles. Transportation GHG emissions for 2018 were 7,748,914 MT CO_{2e}, a 12% increase in GHG emissions from the 2012 level of 6,895,031 MT CO_{2e} (Figure ES-3).

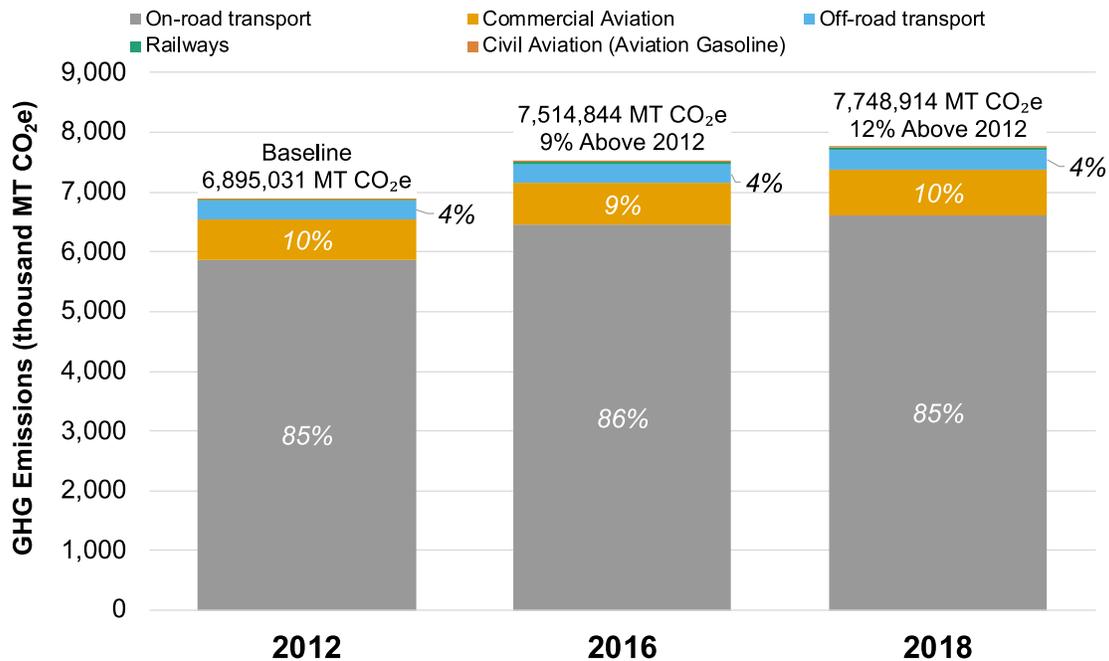


Figure ES-3. Transportation GHG emissions for 2012, 2016, and 2018.

Increased on-road and off-road transportation activity was responsible for the increased emissions. Data were obtained from the City of Phoenix, Arizona Department of Transportation, the Weights and Measures Division of the Arizona Department of Agriculture, the Federal Aviation Administration, and Southwest Gas. Table ES-3 details GHG emissions among Transportation sub-sectors for the years 2012, 2016, and 2018.

Table ES-3. Subsector Transportation GHG Emissions (MT CO₂e)

Transportation	2012	2016	2018	% Change 2012-2018
On-road transport	5,856,023	6,444,711	6,601,864	13%
Railways	29,113	29,300	31,541	8%
Commercial Aviation	698,263	705,643	779,113	12%
Civil Aviation (Aviation Gasoline)	13,394	15,067	10,043	-25%
Off-road transport	298,237	320,122	326,353	9%
Transportation Sector Total	6,895,031	7,514,844	7,748,914	12%

Waste

The Waste Sector includes emissions from the current and historic disposal of solid waste generated and treated in Phoenix, the current disposal of solid waste generated in Phoenix that is disposed outside the city, wastewater treated at the 91st Avenue and 23rd Avenue wastewater treatment plants in Phoenix, and the biological treatment (composting) of waste generated and treated in Phoenix. Between 2012 and 2018 there

was a 17% decrease in Waste Sector GHG emissions. GHG emissions from solid waste disposal decreased by approximately 19%, similar to the Waste Sector overall (Table ES-4). GHG emissions from wastewater treatment increased by 21% and composting increased 40%. The total GHG emissions from the Waste Sector were 304,209 MT CO_{2e} in 2018 as compared to 366,021 MT CO_{2e} reported in the 2012. Waste Sector reductions were driven by solid waste disposal, which is more than 90% of the sector emissions. While Solid Waste GHG emissions will occur from the ongoing disposal of solid waste, historic, closed landfills within the City of Phoenix would produce less GHG emissions over time as the waste decays.

Table ES-4. Subsector Waste Sector GHG Emissions (MT CO_{2e})

Waste	2012	2016	2018	% Change 2012-2018
Solid Waste Disposal	351,780	299,484	285,885	-19%
Wastewater Treatment & Discharge	8,440	9,428	10,199	21%
Biological Waste Treatment (Composting)	5,802	3,968	8,125	40%
Waste Sector Total	366,021	312,881	304,209	-17%

Conclusion

In 2018, citywide GHG emissions in Phoenix was 16,603,754 metric tons CO_{2e} – 0.5% below the 2012 levels of 16,692,626 MT CO_{2e}. Emissions increased in the Transportation Sector by 853,883 MT CO_{2e}, which was proportional to population growth. Stationary Energy GHG emissions decreased 880,943 MT CO_{2e}, driven by a less GHG-intensive regional electricity grid. Waste Sector GHG emissions decreased by 17% between 2012 and 2018, but are small compared to the Stationary Energy and Transportation sectors. While Solid Waste GHG emissions will occur from the ongoing disposal of solid waste, closed landfills within the City produce less GHG emissions as the waste decays.

The Transportation Sector is the second largest source of GHG emissions in Phoenix and grew by 853,883 MT CO_{2e} between 2012 and 2018. On-road transportation, mainly gasoline consumption, drove Transportation Sector GHG emissions increase. Measures to reduce transportation-related GHG emissions will reduce community-scale GHG emissions. Gasoline-powered motor vehicles used for on-road transportation is the largest single source of transportation-related GHG emissions. An increased adoption of battery electric vehicles (BEVs) or plugin electric hybrid vehicles (PEHVs) is one avenue to reduce transportation-related GHG emissions. Another is higher adoption rate of mass transit options.

Introduction

City of Phoenix community-scale GHG emissions were inventoried according to the Greenhouse Gas Protocol for Cities (GPC). The GPC has five GHG emissions sectors – Stationary Energy, Transportation, Waste, Industrial Processes and Product Use (IPPU), and Agriculture, Forestry, and Land Use (AFOLU). The City of Phoenix Community-scale GHG emissions inventory is a BASIC-level inventory, which only requires an inventory of Stationary Energy, Transportation, Waste sectors. IPPU and AFOLU are not required to be inventoried for BASIC-level reporting under the GPC.

In 2018, community-scale emissions totaled 16,603,754 MT CO₂e, 0.5% decrease below the baseline 2012 level of 16,692,626 MT CO₂e (Table 1). Appendix A contains a detailed breakdown of GPC sector and subsector GHG emissions for 2012, 2016, and 2018. The Stationary Energy and Transportation Sectors account for 99% of the community-scale emissions. The largest source of emissions is from on-road motor gasoline combustion, which comprise 85% Transportation emissions and 36% of all emissions. The next largest source is from electricity consumption from commercial, industrial, and residential areas at 47%. Commercial aviation composed 5% of emissions. Meeting any community-scale goal requires mitigating GHG emissions from these sources.

Table 1. Community- Level GHG Emissions by Sector for 2012, 2016, and 2018

Sector	GHG Emissions (MT CO ₂ e)			% Change 2012 -2018
	2012	2016	2018	
Stationary Energy	9,431,574	8,806,621	8,550,631	-9.3%
Transportation	6,895,031	7,514,844	7,748,914	12.4%
Waste	366,021	312,881	304,209	-17.6%
Total	16,692,626	16,634,346	16,603,754	-0.5%

The observed decreases in community-scale GHG emissions were driven by the regional electricity grid becoming less GHG-intensive. GHG emissions from electricity production fell by 855,221 MT CO₂e between 2012 and 2018. The Transportation sector GHG emissions grew by 854,193 MT CO₂e. Waste GHG emissions, which are 1% of community-scale GHG emissions, fell by 61,813 MT CO₂e. Per capita GHG emissions fell by 11.8% from 11.33 to 10.00 MT CO₂e per resident between 2012 and 2018 (Figure 1).

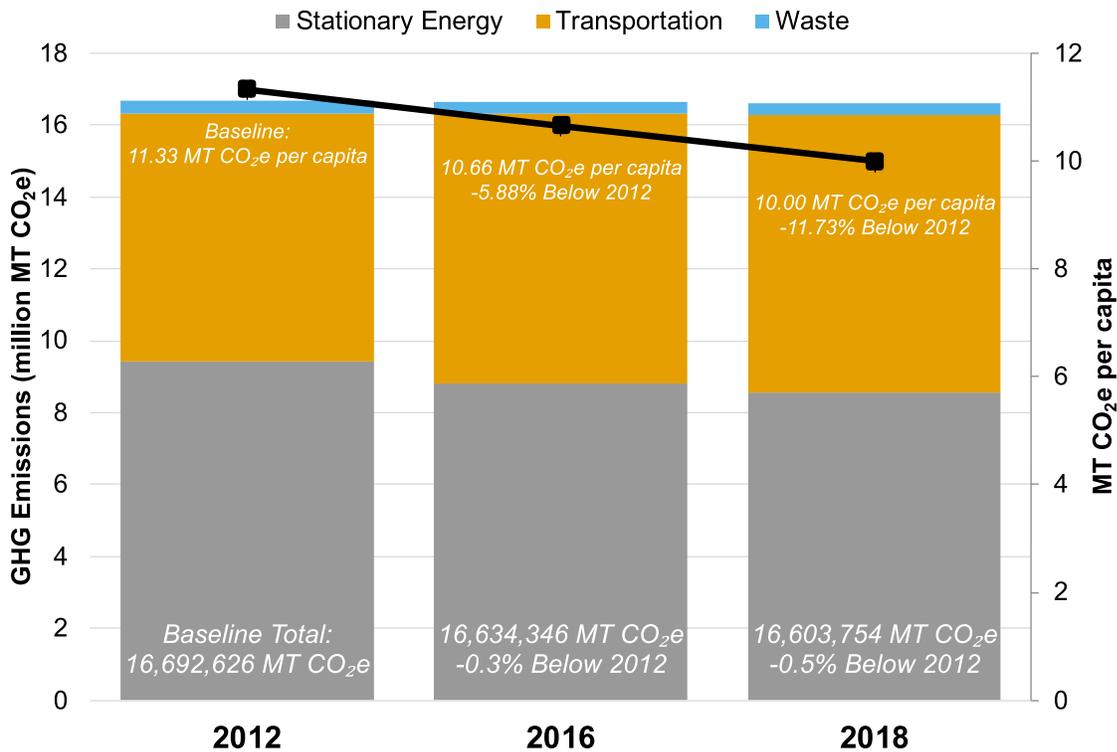


Figure 1. Total GHG Emissions and Per Capita GHG Emissions Since 2012

GHG emissions are assigned to scopes based on where the emitting activity occurs. Scope 1 GHG emissions occur directly within city boundaries from transportation activities, natural gas combustion, and waste disposal. Scope 2 GHG emissions are indirect GHG emissions through the purchase of grid-supplied energy, such as electricity and do not necessarily occur within city boundaries. Scope 3 GHG emissions are other indirect emissions from waste disposed of outside the city boundary. In 2018, 52% of GHG emissions occurred directly within the city boundary as Scope 1 emissions; 47% occurred indirectly as Scope 2 emissions through the purchase of electricity; and 1% occurred indirectly as Scope 3 emissions from waste disposed of outside the city boundary (Table 2).

Table 2. 2018 Community-Level GHG Emissions by Sector and Scope

Sector	GHG Emissions (MT CO ₂ e)			
	Scope 1	Scope 2	Scope 3	Total
Stationary Energy	781,000	7,769,631	310,445*	8,550,631
Transportation	7,735,257	13,657	546*	7,748,914
Waste	150,118	0	154,091	304,209
Total	8,666,375	7,783,288	154,091	16,603,754

*Scope 3 Stationary Energy and Transportation GHG emissions do not count toward the BASIC-level GHG emissions total.

In 2018, Stationary Energy activities – GHG emissions resulting from natural gas combustion and electricity consumption – accounted for approximately 51% of community-scale GHG emissions. Transportation activities comprise approximately 47%. Community-scale Transportation Sector GHG emissions have increased relative to Stationary Energy Section GHG emissions since 2012 (Figure 2). Gasoline combustion produced 76% of Transportation GHG emissions within city boundaries. The two largest sources of GHG emissions produced 83% of total community-scale GHG emissions – electricity consumption (47%) and gasoline combustion (36%). Community-level GHG mitigation efforts should prioritize these two sources of GHG emissions to achieve material GHG emissions reductions.

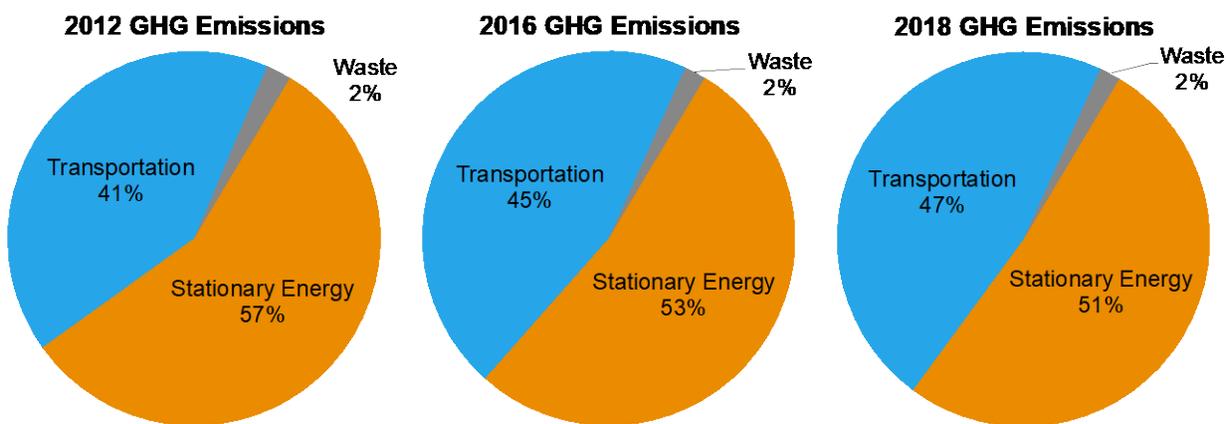


Figure 2. Distribution of GHG Emissions by Sector for 2012, 2016, and 2018.

Recent plant closures and announcements by Arizona Public Service² (APS), Salt River Project³ (SRP) and the Public Service Company of New Mexico⁴ (PNM) to retire and replace coal-fired power plants with generation sources that are less carbon intensive will result in significant reductions to community-scale GHG emissions. The single largest GHG emissions source in the regional electricity grid – the Navajo Generating Station operated by SRP – closed in 2019. This will reduce community-scale GHG emissions significantly and should be measurable in all future inventories.

Motor gasoline consumed for on-road transportation is the single largest GHG emitting activity. These emissions have grown in each GHG inventory. Between 2012 and 2018, GHG emissions from gasoline consumption grew 667,130 MT CO₂e (12.7%). The viability and cost effectiveness of strategies to reduce GHG emissions from

² Arizona Public Service (2020). Stakeholder Perspectives. URL: <https://www.aps.com/en/About/Our-Company/Clean-Energy/Stakeholder-Perspectives>

³ Salt River Project (2019). Navajo Generating Station Permanently Shuts Down. URL: <https://media.srpnet.com/navajo-generating-station-permanently-shuts-down/>

⁴ PNM (2020). Our Commitment. URL: <https://www.pnm.com/our-commitment>

Transportation activities, specifically on-road motor gasoline consumption, will dictate future community-scale GHG emissions and the ability of the City to meet GHG emissions reductions goals.

1. Stationary Energy Sector

Stationary Energy sector GHG emissions occur due to the combustion of natural gas (Scope 1) and the consumption of purchased electricity at residential, commercial, and industrial buildings, in addition to other facilities (Scope 2).

Stationary Energy GHG emissions were predominantly Scope 2 emissions from electricity consumption (Figure 3). Since 2012, the distribution of Stationary Energy GHG emissions between Scope 1 and Scope 2 emissions have been 9% Scope 1 emissions and 91% Scope 2 emissions. Scope 2 Stationary Energy GHG emissions are one of the largest sources of GHG emissions comprising 52% of total community-scale emissions in 2012; 48% in 2016; and 47% in 2018. The decrease in electricity-related GHG emissions has occurred during a period where electricity consumption has increased by 1.5% from 16,428,313 MWh to 16,671,691 MWh. GHG emissions from electricity fell despite consumption growing because of the significant decrease in the carbon intensity of the regional electricity grid.

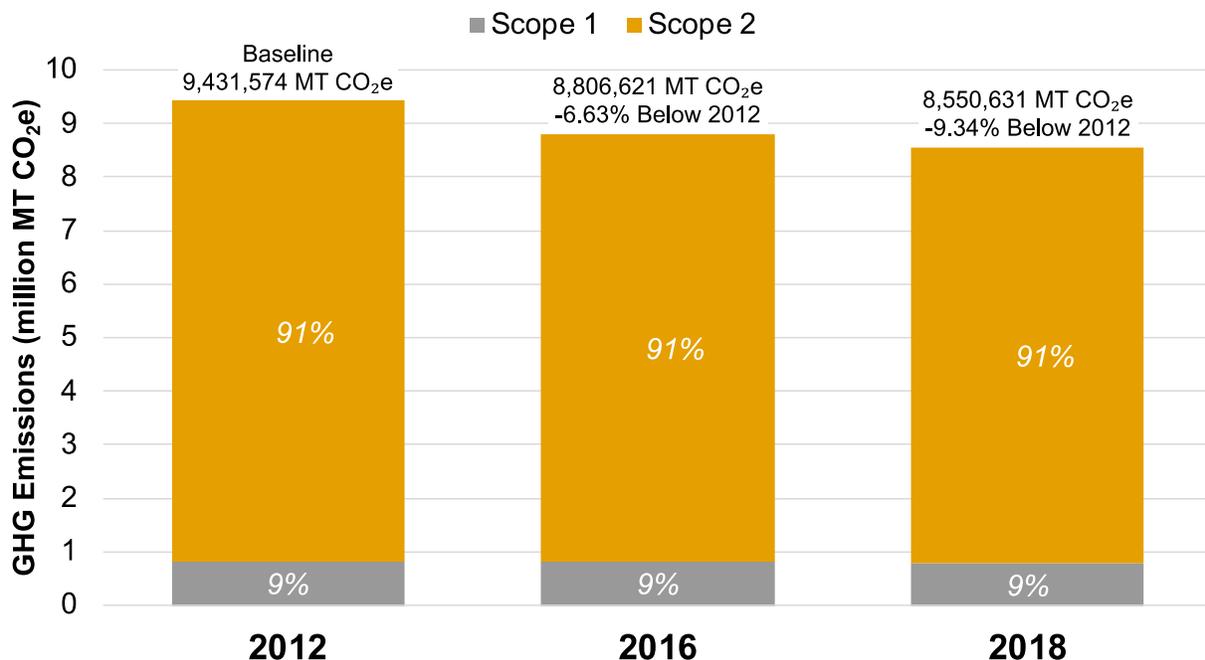


Figure 3. Stationary Energy GHG Emissions by Scope Since 2012

Electricity GHG emissions are calculated using electricity consumption data (activity data) and GHG emissions factors published by the EPA in the eGRID.⁵ The Arizona-New Mexico (AZNM) subregion GHG emissions factor is used to calculate electricity GHG emissions. An eGRID subregion emissions factor is not utility-specific, and characterizes the typical GHG profile of electricity generation in that area in CO₂e emissions per MWh of net generation. The AZNM subregion emissions factor includes all regional power plants in Arizona, Western and Central New Mexico, Southern Nevada, and parts of southwestern California. Therefore, GHG emissions reduction activities undertaken by regional utilities – APS, SRP, Tucson Electric Power, and the Public Service Company of New Mexico (PNM) – and municipalities – such as the City-owned solar facilities at the Lake Pleasant water treatment plant and Sky Harbor International Airport – reduce the AZNM subregion GHG emissions factor.

Since 2012, the AZNM subregion GHG emissions factor has decreased 11.2%. This reduction has occurred due to an increase in electricity generation from natural gas and renewable sources, such as wind and solar energy, and, most importantly, a decrease in coal electricity generation. According to eGRID data, the percentage of natural gas production in the AZNM generation portfolio has increased 8%; wind and solar generation has increased 5%; and coal has decreased 11%. Coal still made up 27% of electricity production in the AZNM subregion.

The single largest source of GHG emissions in the AZNM subregion – the Navajo Generating Station operated by SRP – closed in 2019⁶. SRP has a long-term goal of reducing the GHG-intensity of electricity production 62% below 2005 levels by 2035 and 90% by 2050. APS has a carbon neutrality goal for 2050⁷; the utility plans to source 65% of electricity from renewable sources by 2030 and to stop coal-fired electricity generation by 2031⁸. PNM plans to have 100% carbon free electricity by 2040⁹. Therefore, based on how electricity emissions are calculated, the recent coal-fired power plants closures and announcements by regional electric utilities to reduce the

⁵ The eGRID database inventories plant-level environmental attributes of electric power generation and its effect on air emissions for every power plant in the United States. Phoenix is in the Arizona and New Mexico (AZNM) subregion. The Emissions & Generation Resource Integrated Database (eGRID), developed by the EPA in collaboration with the Energy Information Administration (EIA), the North American Electric Reliability Corporation (NERC), and the Federal Energy Regulatory Commission (FERC), is a comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States. Detailed information can be found at <http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html>.

⁶ Salt River Project (2019). Navajo Generating Station Permanently Shuts Down. URL: <https://media.srpnet.com/navajo-generating-station-permanently-shuts-down/>

⁷ Arizona Public Service (2020). Stakeholder Perspectives. URL: <https://www.aps.com/en/About/Our-Company/Clean-Energy/Stakeholder-Perspectives>

⁸ Arizona Public Service (2020). Clean Energy. URL: <https://www.aps.com/en/About/Our-Company/Clean-Energy>

⁹ PNM (2020). Our Commitment. URL: <https://www.pnm.com/our-commitment>

GHG-intensity of electricity generation, or to go carbon neutral, will result in a significant reduction in community-scale GHG emissions. The City of Phoenix recently pledged to become carbon neutral by 2050 and similar efforts by Arizona Public Service (APS) and Salt River Project (SRP) will help the City achieve its GHG reduction goals.

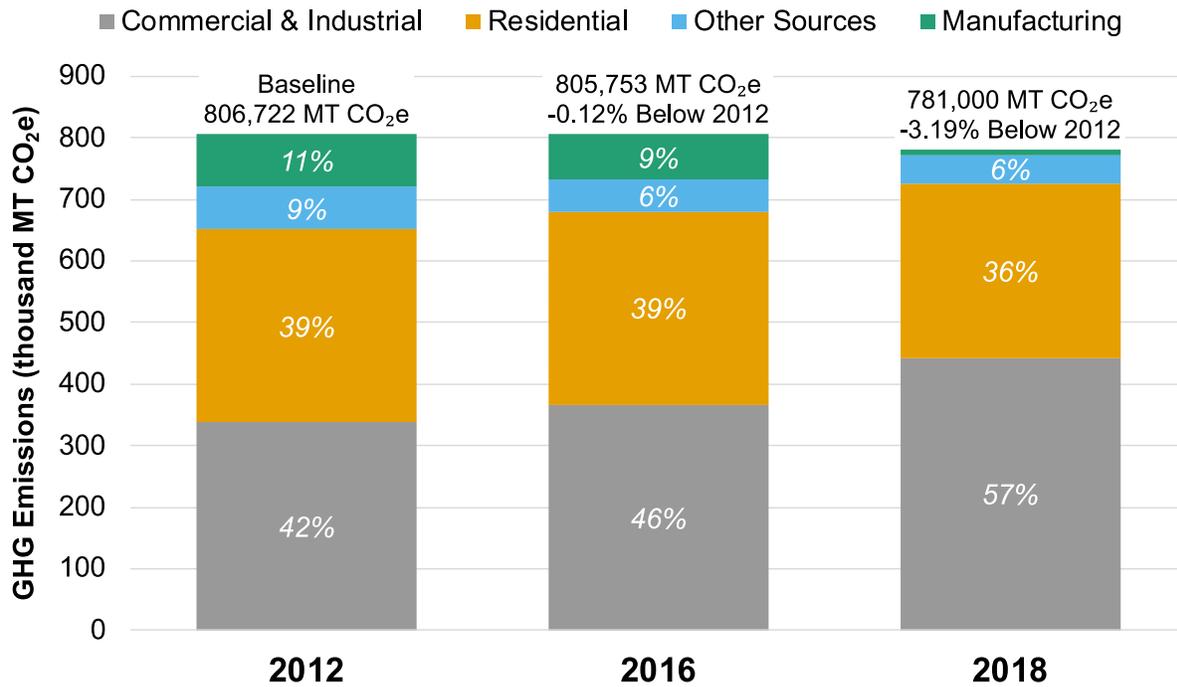
1.1 Scope 1 Stationary Energy

Scope 1 Stationary Energy GHG emissions occur from the combustion of natural gas delivered by Southwest Gas within the city boundary. Citywide natural gas consumption was 3% lower in 2018 than in 2012 (Table 3). Additionally, natural gas consumption in the manufacturing industries and construction subsector has been reclassified to the commercial and institutional buildings and facilities subsector, resulting in a relative increase of natural gas consumption at commercial and institutional buildings and facilities. Future community GHG emissions will consider retroactively combining these two sectors.

Table 3. Summary of Scope 1 Stationary Energy GHG Emissions

Scope 1 Activity Data (kilotherms)	2012	2016	2018
Residential Buildings	58,796	58,946	53,241
Commercial & Industrial Buildings	63,802	69,036	83,367
Manufacturing Industries & Construction	16,289	13,850	1,562
Agriculture, Fishing, and Forestry Activities	12,982	9,737	8,744
Non-specified	11	15	14
Total	151,881	151,584	146,927
Scope 1 GHG Emissions (MT CO_{2e})	2012	2016	2018
Residential Buildings	312,298	313,330	283,007
Commercial & Industrial Buildings	338,887	366,966	443,139
Manufacturing Industries & Construction	86,522	73,622	8,303
Agriculture, Fishing, and Forestry Activities	68,954	51,758	46,477
Non-specified	60	78	74
Total	806,722	805,753	781,000

Scope 1 Stationary Energy GHG emissions fell by 25,722 MT CO_{2e} below 2012 levels (Figure 4). Natural gas consumption at commercial and institutional buildings are the largest source of Scope 1 Stationary Energy GHG emissions. In 2012, Scope 1 Stationary Energy GHG emissions from commercial and institutional buildings and facilities subsector were only slightly higher than the residential buildings subsector, 42% and 39% respectively. In 2018, the commercial and institutional buildings and facilities subsector comprised 57% of Scope 1 Stationary Energy GHG emissions.



Residential - Residential buildings; Commercial & Industrial - Commercial and institutional buildings and facilities; Manufacturing - Manufacturing industries and construction; Other Sources - Agriculture, forestry, and fishing activities and Non-specified sources.

Figure 4. Scope 1 Stationary GHG Emissions Since 2012

1.2 Scope 2 Stationary Energy

Scope 2 Stationary Energy GHG emissions occur from the consumption of electricity purchased from Arizona Public Service (APS) and Salt River Project (SRP) within the city boundary. Between 2012 and 2018, GHG emissions from the consumption of electricity purchased electricity fell by 9.92% (855,221 MT CO₂e) despite consumption levels increasing by 1.5% or 243,378 MWh (Table 4).

Table 4. Summary of Scope 2 Stationary Energy GHG Emissions

Scope 2 Activity Data (GWh)	2012	2016	2018
Residential Buildings	7,202	7,624	7,451
Commercial & Industrial Buildings	8,599	8,579	9,220
Manufacturing Industries & Construction	627	612	IE*
Total	16,428	16,815	16,671

Scope 2 GHG Emissions (MT CO₂e)	2012	2016	2018
Residential Buildings	3,780,960	3,627,624	3,472,607
Commercial & Industrial Buildings	4,514,711	4,082,219	4,297,024
Manufacturing Industries & Construction	329,182	291,025	IE*
Total	8,624,852	8,000,868	7,769,631

*In 2018, Manufacturing industries and construction were IE in Commercial and institutional buildings. Scope 2 Stationary Energy GHG emissions from Energy Industries; AFFA; and Non-Specified Sources were assumed to be included elsewhere (IE) and, therefore, not included in this table. Scope 2 Stationary Energy GHG emissions Fugitive Emissions from MPST; and Fugitive Emissions from ONGS are were NE and, therefore, not included in this table.

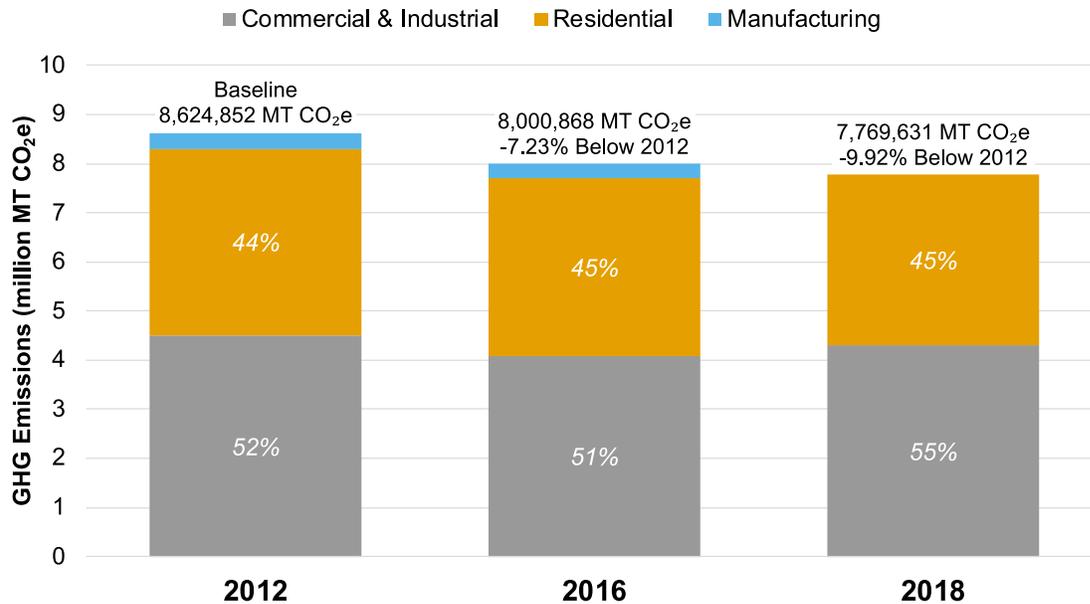
In 2018, Scope 2 Stationary Energy GHG emissions were 7,769,631 MT CO₂e, which was 9.92 % below the 2012 levels of 8,624,852 MT CO₂e (Figure 5). Stationary Energy GHG emissions decreased due to the regional electricity grid becoming 11.2% less GHG-intensive from the retirement and replacement of coal-fired power plants with natural gas and renewable (wind and solar) electricity generation.¹⁰ Additionally, residential electricity consumption only grew 3.5% during a period in which population grew approximately 12.6%. The decreased growth in electricity consumption relative to population growth could have occurred for numerous reasons, including energy efficiency retrofits, energy efficient new construction, milder weather, cost, or resident and commercial solar adoption. Further work must be conducted to determine the extent each of these contributed to the decreased growth in electricity consumption.

1.3 Scope 3 Stationary Energy

Scope 3 Stationary Energy GHG emissions occur from transmission and distribution loss in the state's electricity grid and fluctuates from year-to-year (Table 5). Between 1990 and 2018, transmission and distribution (T&D) loss in the State of Arizona has

¹⁰ The Emissions & Generation Resource Integrated Database (eGRID), developed by the EPA in collaboration with the Energy Information Administration (EIA), the North American Electric Reliability Corporation (NERC), and the Federal Energy Regulatory Commission (FERC), is a comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States. Detailed information can be found at <http://www.epa.gov/cleanenergy/energy-resources/eGRID/index.html>. The 11.2% reduction in the GHG intensity of the regional electricity was calculated comparing the 2012 and 2018 emissions factor for the Arizona-New Mexico subregion.

averaged 4.6% ± 0.6% of electricity consumption and has ranged between 3.4% in 2015 up to 5.7% in 1996.¹¹ Scope 3 Stationary Energy GHG emissions are not within the scope of GPC BASIC-level reporting. They are being presented to show the full extent of GHG emissions from electricity consumption. T&D loss underscores the fact that that on-site renewable energy generation and energy efficiency avoids GHG emissions from the electricity lost during T&D in the electricity grid.



Residential - Residential buildings; Commercial & Industrial - Commercial and institutional buildings and facilities; Manufacturing - Manufacturing industries and construction.

Figure 5. Scope 2 Stationary GHG Emissions Since 2012

Table 5. Summary of Scope 3 Stationary Energy GHG Emissions

Scope 3 Activity Data	2012	2016	2018
Transmission & Distribution Loss (MWh)	613,573	631,792	666,138
Natural Gas Leakage (therms)	NE	NE	NE
Scope 3 GHG Emissions (MT CO₂e)			
Transmission & Distribution Loss (MWh)	322,125	300,632	310,345
Natural Gas Leakage (therms)	NE	NE	NE
Total	322,125	300,632	310,345

*NE – Not Estimated

¹¹ U.S. Energy Information Administration, Form EIA-923, Power Plant Operations Report and predecessor forms. U.S. Energy Information Administration, Form EIA-860, Annual Electric Generator Report. U.S. Energy Information Administration, Form EIA-861, Annual Electric Power Industry Report. Form EIA-111, Quarterly Imports and Exports Report.

2. Transportation Sector

Transportation Sector GHG emissions have both Scope 1 and Scope 2 components. Scope 1 Transportation Sector GHG emissions occur due to the combustion of fossil fuels – gasoline, diesel, CNG, LNG, LPG – and biofuel blends – B20 biodiesel and E85 ethanol. Scope 2 Transportation Sector GHG emissions occur from the consumption of electricity to charge plug-in electric vehicles and power electric light rail. In 2018, community-scale Transportation sector GHG emissions totaled 7,748,912 MT CO₂e and were 12.7% greater (853,881 MT CO₂e) than the 2012 levels of 6,895,031 MT CO₂e.

Motor gasoline is the largest source of community-scale Transportation Sector GHG emissions at 76.4% (Figure 6). Community-level gasoline consumption encompasses all gasoline end uses. While some end uses may not be for transportation purposes (e.g., gasoline lawnmowers), emissions from these end uses were assumed to be insignificant compared to gasoline consumption for motor vehicles.¹² GHG emissions from Jet Fuel A (10.1%) and on-road diesel fuel (8.0%) are the next largest sources of transportation GHG emissions, and are much smaller sources than motor gasoline consumption. On-road combustion of motor gasoline alone is responsible for 37% of all community-scale GHG emissions.

Community-level GHG emissions reduction plans must address how to reduce the single largest source of GHG emissions. Transportation Sector GHG emissions have grown since 2012. GHG emissions from gasoline combustion grew on pace with population growth. As growth occurs, viable solutions to reduce gasoline consumption – from plug-in EVs and increased mass transit to creating walkable communities – are critical for meeting GHG emissions reductions goals.

¹² The U.S. Energy Information Administration estimates light-duty vehicles account for 92% of gasoline consumption in the United States. Source: U.S. Energy Information Administration, 2019. Use of Gasoline. URL: <https://www.eia.gov/energyexplained/gasoline/use-of-gasoline.php>

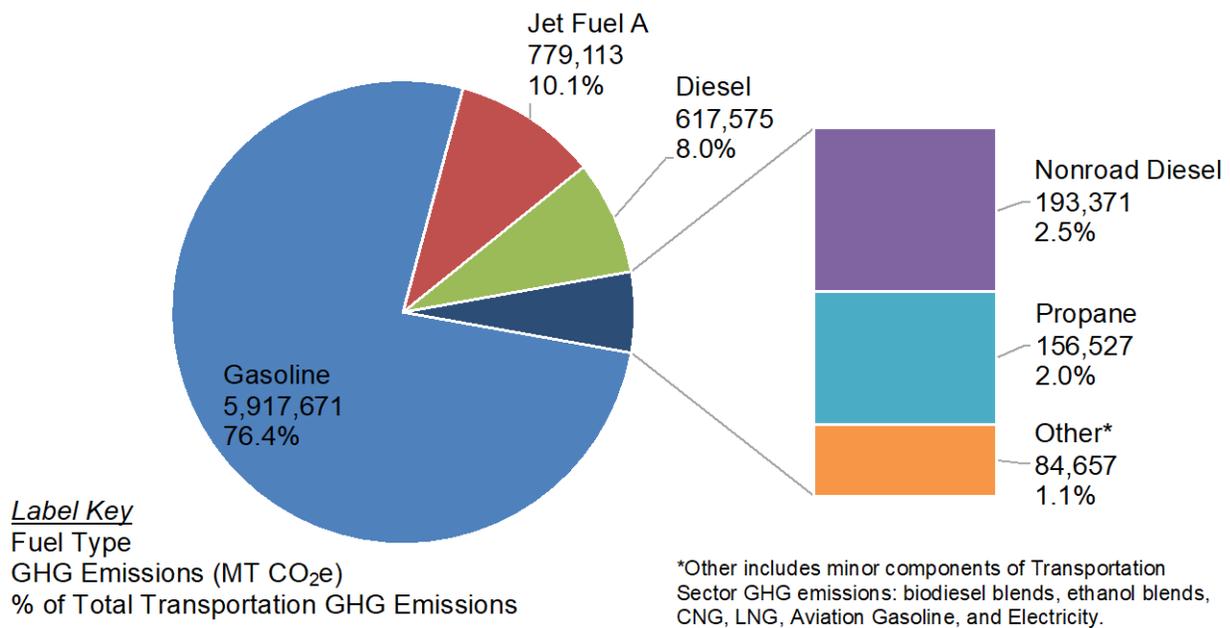


Figure 6. Summary of Transportation Sector GHG Emissions by Fuel Type

2.1 Scope 1 Transportation GHG Emissions

Scope 1 Transportation GHG emissions occur from the combustion of fossil fuels and biofuel blends in on-road motor vehicles, commercial and civil aircrafts, freight rail, and nonroad vehicles such as tractors and construction equipment (Table 6). Growth in on-road transport GHG emissions (12.7%) has largely followed population growth (12.7%). The second largest source of community-scale Transportation sector GHG emissions comes from Commercial Aviation, which is almost primarily from the Phoenix Sky Harbor International Airport. Community-level GHG emissions from off-road transport, which is the third largest source community-scale Transportation sector GHG emissions, result from construction equipment, agricultural equipment and mining equipment.

Table 6. Summary of Scope 1 Transportation GHG Emissions (MT CO_{2e})

Scope 1 Sources	2012	2016	2018
On-road transport	5,855,292	6,441,344	6,596,202
Railways*	23,545	23,545	23,545
Commercial Aviation	698,263	705,643	779,113
Civil Aviation	13,394	15,067	10,043
Nonroad transport	298,237	320,122	326,353
Total	6,888,732	7,505,722	7,735,257

*Freight rail GHG emissions have not been re-estimated since the 2012 community inventory due to constraints with source data.

Gasoline consumption is the major driver of Scope 1 Transportation GHG Emissions (Table 7). Between 2012 and 2018, fuel consumption increased across every fuel type except LNG and B20 biodiesel. The City of Phoenix vehicle fleet – e.g., buses and garbage and recycling trucks – is the primary consumer of LNG and B20 biodiesel. With the City of Phoenix phasing out LNG usage, emissions from this fuel type should reduce to zero. LNG is being replaced by CNG in the City of Phoenix vehicle fleet.

Table 7. Scope 1 Transportation Activity Data and GHG Emissions by Fuel

Scope 1 Activity Data	2012	2016	2018
Gasoline ¹	586,464	652,970	667,093
On-Road Diesel ¹	51,781	57,834	60,435
B20 Biodiesel ¹	3,034	2,701	3,028
E85 Ethanol ¹	287	157	311
E54 Ethanol ¹	0	109	0
CNG ¹ – <i>therms</i>	4,304	3,484	6,356
LNG ¹ – <i>GGE</i>	6,222	2,544	543
Jet Fuel A (Commercial Aviation) ²	71,038	71,788	79,263
Aviation Gasoline (Civil Aviation) ²	1,569	1,765	1,176
Railways**	NE	NE	NE
Nonroad Diesel ³	14,528	16,009	16,619
Nonroad LPG ³	NE	NE	NE

Scope 1 GHG Emissions (MT CO₂e)	2012	2016	2018
Gasoline ¹	5,250,540	5,797,934	5,917,671
On-Road Diesel ¹	529,242	591,063	617,575
B20 Biodiesel ¹	24,785	22,062	24,732
E85 Ethanol ¹	379	207	410
E54 Ethanol ¹	0	441	0
CNG ¹ – <i>therms</i>	22,595	18,293	33,391
LNG ¹ – <i>GGE</i>	27,751	11,345	2,423
Jet Fuel A (Commercial Aviation) ²	698,263	705,643	779,113
Aviation Gasoline (Civil Aviation) ²	13,394	15,067	10,043
Railways**	23,545	23,545	23,545
Nonroad Diesel ³	148,488	163,595	169,826
Nonroad LPG ³	149,749	156,527	156,527
Total	6,888,732	7,505,722	7,735,257

**Activity Data are reported in gallons unless otherwise noted.*

NE – Not Estimated. Emissions estimated from EPA National Emissions Inventory.

Italicized entries denote Activity Data estimated from EPA National Emissions Inventory.

***Emissions estimated from the EPA National Emissions Inventory and not activity data.*

Transportation Sector: ¹On-Road Sector; ²Aviation; ³Off-Road.

2.2 Scope 2 Transportation GHG Emissions

Scope 2 Transportation sector GHG emissions, which includes the consumption of purchased electricity to charge electric vehicles and to power electric light rail, have increased 117% since 2012 (Table 8). The growth of Scope 2 Transportation sector GHG emissions is primarily from the increased adoption of plug-in electric vehicles; Scope 2 GHG emissions from on-road transport increased 674% since 2012. GHG emissions related to the Valley Metro light rail system increased 2,428 MT CO₂e (44%) largely due to the expansion of the light rail system since 2012.

GHG emissions from electric transport are a small percentage of overall transportation-related GHG emissions (~0.2%). As the regional electricity grid becomes less GHG-intensive over the coming decades, the use of electric personal transport – plugin EVs and plugin hybrid EVs – and electric mass transit – light rail and battery electric buses – will become GHG-saving alternatives to traditional gasoline-powered personal vehicles. Increasing electric-powered transit will require investment in electric mass transit, which is already happening through T2050, battery technology improvements, installing a

regional charging station network, and market conditions to change so electric-powered transport becomes more consumer-friendly.

Table 8. Summary of Scope 2 Transportation GHG Emissions

Scope 2 Activity Data (MWh)	2012	2016	2018
On-road transport	1,393	7,075	12,148
Railways (Light Rail)	10,605	12,095	17,157
Total	11,998	19,170	29,305
Scope 2 GHG Emissions (MT CO₂e)	2012	2016	2018
On-road transport	731	3,367	5,661
Railways (Light Rail)	5,568	5,755	7,996
Total	6,299	9,122	13,657

2.3 Scope 3 Transportation GHG Emissions

Scope 3 Transportation GHG emissions occur from transmission and distribution loss in the state's electricity grid (Table 9). Scope 3 Transportation GHG emissions are not within the scope of GPC BASIC-level reporting and presented for informational purposes. Refer to the **Scope 3 Stationary Energy** section for a more detailed discussion on T&D loss in the State of Arizona.

Table 9. Summary of Scope 3 Transportation GHG Emissions

Scope 3 Activity Data (MWh)	2012	2016	2018
On-road transport	52	266	485
Railways (Light Rail)	396	454	686
Total	448	720	1,171
Scope 3 GHG Emissions (MT CO₂e)	2012	2016	2018
On-road transport	27	127	226
Railways (Light Rail)	208	216	319
Total	235	343	546

3. Waste Sector

The Waste Sector includes GHG emissions from the disposal of municipal solid waste (MSW); wastewater treatment; and compost processing. It is the smallest GHG emissions sector in the community-scale inventory, comprising only 1% of overall GHG emissions.

Community-level emissions from MSW have both Scope 1 and Scope 3 components. Unlike Scope 3 emissions in the Stationary Energy and Transportation sectors, Scope 3 Waste emissions are included within the scope of GPC BASIC-level reporting. Scope 1 MSW emissions include emissions from waste/wastewater generated and treated within the city boundary in addition to waste imported into the city and treated. Wastewater treatment GHG emissions sources include the 23rd Avenue and 91st Avenue wastewater treatment plants. Compost emissions – the biological treatment of waste in – occur at the 27th Avenue Compost Facility, but have historically also occurred at a compost facility co-located at the 27th Avenue Landfill. Emissions from both wastewater treatment and composting are Scope 1 emissions. Scope 3 MSW emissions cover the emissions from all waste exported outside the city boundary. Currently, there are no open landfills within city limits so all Scope 1 MSW emissions are from closed landfills. Over time, these emissions will decrease as the biological processes that generate GHG emissions cease. All solid waste is disposed at a city-owned landfill outside the city-boundary, which is a Scope 3 emissions.

Scope 1 Waste GHG emissions occur from the disposal of solid waste generated within the city. These GHG emissions will continue to decrease, as they have since 2012, because there are no longer any open landfills within the City boundary, and each year there is less waste available for the generation of methane emissions (Table 10). The last city-owned landfill to accept waste within the City boundary closed in 2006 and the last privately-owned landfill to accept waste within the city boundary – the Waste Management Lone Cactus Landfill – closed in 2019. However, as solid waste generated within the City is now primarily disposed of outside the City boundary, Scope 3 Waste GHG emissions will continue to increase in future GHG emissions inventories.

While wastewater treatment GHG emissions have increased since 2012, so too has the population, and these emissions are largely population-dependent. Wastewater treatment GHG emissions are a small fraction of overall community-scale GHG emissions. Scope 1 GHG emissions from the biological treatment of waste generated (compost processing) will likely increase over time with increased organic waste

diversion goals. These emissions will be offset by reducing future Scope 3 Waste GHG emissions generated at the SR-85 landfill and Scope 1 Transportation GHG emissions from hauling waste to the landfill.

Table 10. Summary of Scope 1 Waste GHG Emissions

Scope 1 Sources Activity Data (MT CH₄ Emissions)	2012	2016	2018
Disposal of Solid Waste Generated in the City	8,425	5,099	4,707
Biological Treatment of Waste Generated in the City	121	83	170
Wastewater Generated Inside the City	92.00	121.39	134.68
Total	8,440	9,428	10,199
Scope 1 Sources Activity Data (MT N₂O Emissions)	2012	2016	2018
Biological Treatment of Waste Generated in the City	9.09	6.22	12.73
Wastewater Generated Inside the City	22.13	22.75	24.26
Total	8,440	9,428	10,199
Scope 1 GHG Emissions (MT CO₂e)	2012	2016	2018
Disposal of Solid Waste Generated in the City	235,889	142,770	131,794
Biological Treatment of Waste Generated in the City	5,802	3,968	8,125
Wastewater Generated Inside the City	8,440	9,428	10,199
Total	250,130	156,167	150,118

Scope 3 Waste GHG emissions from the disposal of waste generated within the city, but disposed outside the city, will continue to increase (Table 11). This GHG emissions trend will occur as 2018 was the last full GHG inventory year with an operating landfill (Waste Management Lone Cactus Landfill) within the city boundary. As GHG emissions increase at the SR-85 landfill, methane capture and reuse programs may become a viable way to reduce waste related emissions, and offset Scope 1 Stationary Energy GHG emissions from natural gas combustion. The capture of digester gas at the 91st Ave WWTP for processing and sale as renewable natural gas (RNG) by Ameresco, Inc. will reduce Waste Sector GHG emissions from wastewater treatment. The diversion of green-organic waste from waste streams is a viable way to reduce future Waste sector GHG emissions.

Table 11. Summary of Scope 3 Waste GHG Emissions

Scope 3 Sources Activity Data (MT CH₄ Emissions)	2012	2016	2018
Disposal of Solid Waste Generated in the City but Disposed Outside the City at SR-85	295	2,147	2,029
Disposal of Solid Waste Generated in the City but Disposed Outside the City by Private Haulers	3,844	3,450	3,474
Total	4,139	5,597	5,503
Scope 3 GHG Emissions (MT CO_{2e})	2012	2016	2018
Disposal of Solid Waste Generated in the City but Disposed Outside the City at SR-85	8,260	60,116	56,820
Disposal of Solid Waste Generated in the City but Disposed Outside the City by Private Haulers	107,631	96,598	97,271
Total	115,891	156,714	154,091

Appendix A. Detailed GHG Emissions Summary

Appendix A contains tables detailing City of Phoenix community-scale GHG emissions by each GPC sector and subsector.

Table A1. Year-to-Year Comparison of Stationary Energy GHG Emissions

GPC ref No.	Scope	GHG Emissions Source (By Sector and Sub-sector)	Greenhouse Gas Emissions (metric tons CO ₂ e)			% Change	
			2012	2016	2018	2012 - 2018	2016 - 2018
I		Stationary Energy					
I.1		Residential Buildings					
I.1.1	1	Emissions from fuel combustion within the city boundary	312,298	313,330	283,007	-9%	-10%
I.1.2	2	Emissions from grid-supplied energy consumed within the city boundary	3,780,960	3,627,624	3,472,607	-8%	-4%
I.1.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	141,213	136,308	138,752	-2%	2%
I.2		Commercial and institutional buildings and facilities					
I.2.1	1	Emissions from fuel combustion within the city boundary	338,887	366,966	443,139	31%	21%
I.2.2	2	Emissions from grid-supplied energy consumed within the city boundary	4,514,711	4,082,219	4,297,024	-5%	5%
I.2.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	168,618	153,389	171,693	2%	12%
I.3		Manufacturing industries and construction					
I.1.1	1	Emissions from fuel combustion within the city boundary	312,298	313,330	283,007	-9%	-10%
I.1.2	2	Emissions from grid-supplied energy consumed within the city boundary	3,780,960	3,627,624	3,472,607	-8%	-4%
I.2.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	168,618	153,389	171,693	2%	12%
I.4		Energy Industries					

GPC ref No.	Scope	GHG Emissions Source (By Sector and Sub-sector)	Greenhouse Gas Emissions (metric tons CO ₂ e)			% Change	
			2012	2016	2018	2012 - 2018	2016 - 2018
I.4.1	1	Emissions from energy used in power plant auxiliary operations within the city boundary	NE	NE	NE	—	—
I.4.2	2	Emissions from grid-supplied energy consumed in power plant auxiliary operations within the city boundary	NE	NE	NE	—	—
I.4.3	3	Emissions from transmissions and distribution losses from grid-supplied energy consumption in power plant auxiliary operations	NE	NE	NE	—	—
I.4.4	1	<i>Emissions from energy generation supplied to the grid</i>	986,289	1,200,633	1,391,552	41%	16%
I.5		Agriculture, forestry and fishing activities					
I.5.1	1	Emissions from fuel combustion within the city boundary	68,954	51,758	46,477	-33%	-10%
I.5.2	2	Emissions from grid-supplied energy consumed within the city boundary	IE	IE	IE	—	—
I.5.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	IE	IE	IE	—	—
I.6		Non-specified sources					
I.1.1	1	Emissions from fuel combustion within the city boundary	312,298	313,330	283,007	-9%	-10%
I.1.2	2	Emissions from grid-supplied energy consumed within the city boundary	3,780,960	3,627,624	3,472,607	-8%	-4%
I.1.3	3	Emissions from transmission and distribution losses from grid-supplied energy consumption	141,213	136,308	138,752	-2%	2%
I.7		Fugitive emissions from mining, processing, storage, and transportation of coal					
I.7.1	1	Emissions from fugitive emissions within the city boundary	NO	NO	NO	—	—

GPC ref No.	Scope	GHG Emissions Source (By Sector and Sub-sector)	Greenhouse Gas Emissions (metric tons CO ₂ e)			% Change	
			2012	2016	2018	2012 - 2018	2016 - 2018
I.8		Fugitive emissions from oil and natural gas systems					
I.8.1	1	Emissions from fugitive emissions within the city boundary	NE	NE	NE	—	—

Notation Key	Definition	Explanation	Color Key
IE	Included Elsewhere	GHG emissions for this activity are estimated and presented in another category of the inventory. The category shall be noted in the explanation.	Sources required for BASIC reporting
NE	Not Estimated	Emissions occur but have not been estimated or reported; justification for exclusion shall be noted in the explanation.	Sources required for BASIC+ reporting
NO	Not Occurring	An activity or process does not occur or exist within the city.	Sources included in Other Scope 3
C	Confidential	GHG emissions which could lead to the disclosure of confidential information and can therefore not be reported.	Sources required for territorial reporting
			Non-applicable emissions

Scope	Definition
Scope 1	GHG emissions from sources within the city boundary.
Scope 2	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary.
Scope 3	All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary.

Table A2. Year-to-Year Comparison of Transportation GHG Emissions

GPC ref No.	Scope	GHG Emissions Source (By Sector and Sub-sector)	Greenhouse Gas Emissions (metric tons CO ₂ e)			% Change	
			2012	2016	2018	2012-2018	2012-2018
II		Transportation					
II.1		On-road Transportation					
II.1.1	1	Emissions from fuel combustion for on-road transportation occurring within the city boundary	5,855,292	6,441,344	6,596,202	13%	2%
II.1.2	2	Emissions from grid-supplied energy consumed within the city boundary for on-road transportation	731	3,367	5,661	674%	68%
II.1.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmissions and distribution losses from grid-supplied energy consumption	27	127	226	728%	79%
II.2		Railways					
II.2.1	1	Emissions from fuel combustion for railway transportation occurring within the city boundary	23,545	23,545	23,545	0%	0%
II.2.2	2	Emissions from grid-supplied energy consumed within the city boundary for railways	5,568	5,755	7,996	44%	39%
II.2.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmissions and distribution losses from grid-supplied energy consumption	208	216	319	54%	48%
II.3		Waterborne navigation					
II.3.1	1	Emissions from fuel combustion for waterborne navigation occurring within the city boundary	NO	NO	NO	—	—
II.3.2	2	Emissions from grid-supplied energy consumed within the city boundary for waterborne navigation	NO	NO	NO	—	—

GPC ref No.	Scope	GHG Emissions Source (By Sector and Sub-sector)	Greenhouse Gas Emissions (metric tons CO ₂ e)			% Change	
			2012	2016	2018	2012-2018	2012-2018
II.3.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmissions and distribution losses from grid-supplied energy consumption	NO	NO	NO	—	—
II.4		Aviation					
II.4.1	1	Emissions from fuel combustion for aviation occurring within the city boundary	711,658	720,710	789,156	11%	9%
II.4.2	2	Emissions from grid-supplied energy consumed within the city boundary for aviation	NE	NE	NE	—	—
II.4.3	3	Emissions from portion of transboundary journeys occurring outside the city boundary, and transmissions and distribution losses from grid-supplied energy consumption	NE	NE	NE	—	—
II.5		Off-road transportation					
II.5.1	1	Emissions from fuel combustion for off-road transportation occurring within the city boundary	298,237	320,122	326,353	9%	2%
II.5.2	2	Emissions from grid-supplied energy consumed within the city boundary for off-road transportation	IE	IE	IE	—	—

Notation Key	Definition	Explanation	Color Key
IE	Included Elsewhere	GHG emissions for this activity are estimated and presented in another category of the inventory. The category shall be noted in the explanation.	Sources required for BASIC reporting
NE	Not Estimated	Emissions occur but have not been estimated or reported; justification for exclusion shall be noted in the explanation.	Sources required for BASIC+ reporting

NO	Not Occurring	An activity or process does not occur or exist within the city.
C	Confidential	GHG emissions which could lead to the disclosure of confidential information and can therefore not be reported.

Sources included in Other Scope 3
 Sources required for territorial reporting
 Non-applicable emissions

Scope	Definition
Scope 1	GHG emissions from sources within the city boundary.
Scope 2	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary.
Scope 3	All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary.

Table A3. Year-to-Year Comparison of Waste GHG Emissions

GPC ref No.	Scope	GHG Emissions Source (By Sector and Sub-sector)	Greenhouse Gas Emissions (metric tons CO ₂ e)			% Change	
			2012	2016	2018	2012-2018	2016-2018
III		Waste					
III.1		Solid waste disposal					
III.1.1	1	Emissions from solid waste generated within the city boundary and disposed in landfills or open dumps within the city boundary	235,889	142,770	131,794	-44%	-8%

GPC ref No.	Scope	GHG Emissions Source (By Sector and Sub-sector)	Greenhouse Gas Emissions (metric tons CO ₂ e)			% Change	
			2012	2016	2018	2012-2018	2016-2018
III.1.2	3	Emissions from solid waste generated within the city boundary and disposed in landfills or open dumps outside the city boundary	115,891	156,714	154,091	33%	-2%
III.1.3	1	<i>Emissions from waste generated outside the city boundary and disposed in landfills or open dumps within the city boundary</i>	NO	NO	NO	—	—
III.2		Biological treatment of waste					
III.2.1	1	Emissions from solid waste generated within the city boundary that is treated biologically within the city boundary	5,802	3,968	8,125	40%	105%
III.2.2	3	Emissions from solid waste generated within the city boundary but treated biologically outside of the city boundary	NO	NO	NO	—	—
III.2.3	1	<i>Emissions from waste generated outside the city boundary but treated biologically within the city boundary</i>	NO	NO	NO	—	—
III.3		Incineration and open burning					
III.3.1	1	Emissions from solid waste generated treated within the city boundary	NO	NO	NO	—	—
III.3.2	3	Emissions from solid waste generated within the city boundary but treated outside of the city boundary	NO	NO	NO	—	—
III.3.3	1	<i>Emissions from waste generated outside the city boundary but treated within the city boundary</i>	NO	NO	NO	—	—
III.4		Wastewater treatment and discharge					
III.4.1	1	Emissions from wastewater generated and treated within the city boundary	8,440	9,428	10,199	21%	8%

GPC ref No.	Scope	GHG Emissions Source (By Sector and Sub-sector)	Greenhouse Gas Emissions (metric tons CO ₂ e)			% Change	
			2012	2016	2018	2012-2018	2016-2018
III.4.2	3	Emissions from wastewater generated within the city boundary but treated outside of the city boundary	NO	NO	NO	—	—
III.4.3	1	<i>Emissions from wastewater generated outside the city boundary but treated within the city boundary</i>	NO	NO	IE	—	—
IV		Industrial Processes and Product Uses (IPPU)					
IV.1	1	Emissions from industrial processes occurring within the city boundary	NE	NE	NE	—	—
IV.2	1	Emissions from product use occurring within the city boundary	NE	NE	NE	—	—
V		Agriculture, Forestry, and Other Land Use (AFOLU)					
V.1	1	Emissions from livestock within the city boundary	NE	NE	NE	—	—
V.2	1	Emissions from land within the city boundary	NE	NE	NE	—	—
V.3	1	Emissions from aggregate sources and non-CO ₂ emissions sources on land within the city boundary	NE	NE	NE	—	—
VI		Other Scope 3					
VI.1	3	Other Scope 3	3,001	715	278	-91%	-61%

Notation Key	Definition	Explanation	Color Key
IE	Included Elsewhere	GHG emissions for this activity are estimated and presented in another category of the inventory. The category shall be noted in the explanation.	Sources required for BASIC reporting
NE	Not Estimated	Emissions occur but have not been estimated or reported; justification for exclusion shall be noted in the explanation.	Sources required for BASIC+ reporting

NO	Not Occurring	An activity or process does not occur or exist within the city.
C	Confidential	GHG emissions which could lead to the disclosure of confidential information and can therefore not be reported.

- Sources included in Other Scope 3
- Sources required for territorial reporting
- Non-applicable emissions

Scope	Definition
Scope 1	GHG emissions from sources within the city boundary.
Scope 2	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary.
Scope 3	All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary.

Appendix B. Stationary Energy – Natural Gas Documentation

Appendix B describes the data collection and data processing for obtaining natural gas consumption data and calculating GHG emissions from natural gas combustion. Appendix B also describes any changes to data sources and methodologies in the 2018 community-scale GHG emissions inventory.

B.1 Natural Gas Data Collection

Stationary Energy GHG emissions from the combustion of natural gas occur at residential buildings, commercial and institutional buildings and facilities, manufacturing industries and construction, energy industries, agriculture, forestry, and fishing activities, non-specified sources, fugitive emissions from mining, processing, storage, and transport of coal, and fugitive emissions from oil and natural gas systems. Natural gas consumption data were obtained from the Southwest Gas Corporation (Southwest Gas), which is the only natural gas utility that services the city. Natural gas data were obtained for each GHG emissions inventory as the inventory was being compiled – i.e., 2012 data were collected while conducting the 2012 community-scale inventory, 2016 data were collected while conducting the 2016 community-scale inventory, and 2018 data were collected while conducting the 2018 community-scale inventory.

A similar data request process was followed for each of the GHG emissions inventory years. For 2012 and 2016, Southwest Gas provided consumption data at the zip code resolution for residential buildings, commercial and institutional buildings and facilities, manufacturing industries and construction, energy industries, agriculture, forestry, and fishing activities, and non-specified sources. For 2018, Southwest Gas did not provide zip code level data. Southwest Gas provided total annual consumption data for residential buildings, commercial and institutional buildings and facilities, manufacturing industries and construction, energy industries; agriculture, forestry, and fishing activities, and non-specified sources.

B.2 Natural Gas Data Processing

For 2012 and 2016, zip code level data were scaled to the percentage of land area in a zip code that was within the city. Natural gas consumption data were scaled only for zip codes which contained a fraction of land within and outside the city boundary. Upon

follow up evaluation of the natural gas data previously provided by Southwest Gas; it was found that this scaling of natural gas data by the percent area of a zip code with the City of Phoenix was not necessary. Previously, zip code level natural gas consumption was scaled by percent land area within the City boundary. However, a review of the previous 2012 and 2016 datasets found that if a zip code was associated with more than one Phoenix metropolitan area city the consumption was reported for each city associated with that zip code. To avoid under-reporting natural gas consumption, the zip code scaling factors which were used previously were no longer used. For this reason, 2012 and 2016 community-scale GHG emissions from natural gas combustion were revised upwards (See Section Appendix A.3).

Using the data provided by Southwest Gas, the following equation was used to calculate GHG emissions from Stationary Energy natural gas consumption.

$$GHG_{NG,i,j,y} = NG_{i,y} \times CF \times EF_{NG,j}$$

- Where,
- $GHG_{NG,i,j,y}$ = The GHG emissions in metric tons from natural gas (NG) consumption from a Stationary Energy sector (i) for a GHG (j) for a GHG emissions inventory year (y).
 - $NG_{i,y}$ = Natural gas (NG) consumption from a Stationary Energy sector (i) for a GHG emissions inventory year (y) in therms.
 - CF = Conversion factor for converting data reported in therms to million British thermal units (mmBTU).
 - $EF_{NG,j}$ = The natural gas consumption GHG emissions factor for CO₂, CH₄, N₂O (j).

Finally, natural gas consumption GHG emissions were converted to metric tons of carbon dioxide equivalent (MT CO₂e) by multiplying $GHG_{NG,i,j,y}$ by global warming potential $GWP_{AR5,j}$ and summed across GHGs (j).

B.3 Changes between inventory years

As mentioned in Section Appendix B.1, the natural gas consumption data for 2012 and 2016 in the 2018 GHG emissions inventory were not scaled unlike the previous 2012 and 2016 GHG emissions inventories. A comparison between the scaled (previously reported) and unscaled natural gas consumption for 2012 and 2016 is shown below in Table B4.

Table B4. Changes to Natural Gas GHG Emissions Due to Updated Scaling Methods

Year	Scaled Natural Gas Use (kilotherms)	Scaled GHG Emissions (MT CO _{2e})	Unscaled Natural Gas Use (kilotherms)	Unscaled GHG Emissions (MT CO _{2e})	ΔGHG Emissions (MT CO _{2e})	% Change
2012	122,983	650,267	151,881	806,722	156,455	24%
2016	128,256	678,147	151,584	805,753	127,606	19%

The result of using unscaled natural gas consumption data increases total Stationary Energy GHG emissions by approximately 2% over reported 2012 and 2016 levels.

Appendix C. Stationary Energy – Electricity Documentation

Appendix C describes the data collection and data processing for obtaining electricity consumption data and calculating GHG emissions from electricity consumption. This appendix also describes any changes to data sources and methodologies in the 2018 community-scale GHG emissions Inventory.

C.1 Electricity Data Collection

Stationary Energy GHG emissions from the consumption of purchased electricity can occur at residential buildings, commercial and institutional buildings and facilities, manufacturing industries and construction facilities, energy industry facilities, agriculture, forestry, and fishing activities, and non-specified sources.

Electricity consumption data for the Community GHG Emissions Inventory were obtained from Arizona Public Service (APS) and the Salt River Project (SRP). APS and SRP are the only electric utilities that provide electricity to consumers within the city boundary. Electricity data were obtained from APS and SRP for each GHG emissions inventory as the inventory was being compiled – i.e., 2012 data were collected while conducting the 2012 community-scale inventory, 2016 data were collected while conducting the 2016 community-scale inventory, and 2018 data were collected while conducting the 2018 community-scale inventory.

Both APS and SRP have electricity generation facilities located within the Phoenix metropolitan area, but only APS has an electricity generation facility within city boundaries – the APS West Phoenix Power Plant. The APS West Phoenix Power Plant is a 997 MW natural gas facility located in southwest Phoenix.¹³ The APS West Phoenix Power Plant is included in the 2018 community-scale inventory as emissions from energy generation supplied to the grid (eGRID). Emissions from the APS West Phoenix Power Plant are included in this inventory as an information item (Appendix A, GPC ref. no I.4.4), and are not tabulated as part of the community-scale inventory per GPC guidelines. APS West Phoenix Power Plant emissions for 2012, 2016, and 2018 were

¹³ Pinnacle West Capital Corporation (2019). 2018 Annual Report. URL: http://s22.q4cdn.com/464697698/files/doc_financials/annual/2018/Annual-Report_2018_Web.pdf

obtained from the EPA Greenhouse Gas Reporting Program through the Facility Level Information on GreenHouse gases Tool (FLIGHT).¹⁴

A similar data request process was followed for each of the GHG emissions inventory years. For 2012, APS provided consumption data at the zip code resolution for residential, commercial, and industrial consumers. However, for 2016 and 2018, APS only provided total consumption data for residential, commercial, and industrial consumers for zip codes associated with the City of Phoenix. Unlike APS, SRP only provided total consumption for residential and commercial consumers within the City of Phoenix.

C.2 Electricity Data Processing

C.2.1 APS Electricity Data Processing

Using the data provided by APS, the following equation was used to calculate GHG emissions from Stationary Energy electricity consumption in 2012.

$$GHG_{APS,i,j,scaled,2012} = \sum_z EC_{APS,i,z,2012} \times SF_{i,z,2012} \times CF \times EF_{AZNM,j,2012}$$

Where, $GHG_{APS,i,j,scaled,2012}$ = The scaled GHG emissions in metric tons from purchased electricity from APS for a Stationary Energy subsector (i) for a GHG (j) for inventory year 2012.

$EC_{APS,i,z,2012}$ = Purchased electricity from APS for a Stationary Energy subsector (i) in zip code (z) for inventory year 2012.

$SF_{i,z,2012}$ = Scaling factor for zip code (z). The scaling factor the % of land area in z that is within the city boundary. $SF_{i,z,2012}$ ranges from near 0 to 1.

CF = Conversion factor to convert kWh to MWh. If data were reported in the MWh, $CF = 1$. If data were reported in kWh than $CF = 0.001$.

$EF_{AZNM,j,y}$ = The eGRID¹⁵ emissions factor for the AZNM subregion for GHG emissions factor for CO₂, CH₄, N₂O (j) for eGRID reporting year (y). $y = 2012$ (i.e.

¹⁴ U.S. Environmental Protection Agency (2019). EPA Greenhouse Gas Reporting Program through the Facility Level Information on GreenHouse gases Tool URL: <https://ghgdata.epa.gov/ghgp/main.do>

¹⁵ The eGRID database inventories plant-level environmental attributes of electric power generation and its effect on air emissions for every power plant in the United States. Phoenix is in the Arizona and New Mexico (AZNM) subregion. The Emissions & Generation Resource Integrated Database (eGRID), developed by the EPA in collaboration with the Energy Information Administration (EIA), the North American Electric Reliability Corporation (NERC), and the Federal Energy Regulatory Commission

electricity emissions from eGRID 2012) for calendar year 2012 data and $y = 2016$ (i.e. electricity emissions from eGRID 2016) for calendar year 2016 and 2018 data.

Zip code level data from APS were not available for calendar years 2016 and 2018. Therefore, the 2012 data (SF_{2012}) were used to develop the scaling factors for 2016 and 2018:

$$SF_{APS,2012} = \frac{\sum_{i,z} EC_{APS,i,z,2012} \times SF_{i,z,2012}}{\sum_{i,z} EC_{APS,i,z,2012}}$$

Where, $SF_{APS,2012}$ = Is the overall scaling factor for APS data in calendar year 2012. It is the ratio of the total purchased electricity from APS within the city scaled by zip code specific scaling factors to the reported total unscaled purchased electricity from APS within the city.

$EC_{APS,i,z,2012}$ = Purchased electricity from APS for a Stationary Energy subsector (i) in zip code (z) for an inventory year 2012.

$SF_{i,z,2012}$ = Scaling factor for zip code (z). The scaling factor the % of land area in z that is within the city boundary. $SF_{i,z,2012}$ ranges from near 0 to 1.

Therefore,

$$GHG_{APS,scaled,i,j,y} = \sum_z EC_{APS,i,z,y} \times SF_{APS,2012} \times EF_{AZNM,j,y}$$

Where, $GHG_{APS,scaled,i,j,y}$ = The scaled GHG emissions in metric tons from purchased electricity from APSY for a Stationary Energy subsector (i) for a GHG (j) for an inventory year 2016 or 2018 (y).

$SF_{APS,2012}$ = Is the overall scaling factor for APS data in calendar year 2012. It is the ratio of the total purchased electricity from APS within the city scaled by zip code specific scaling factors to the reported total unscaled purchased electricity from APS within the city.

$EF_{AZNM,j,y}$ = The eGRID emissions factor for the AZNM subregion for GHG emissions factor for CO_2 , CH_4 , N_2O (j) for eGRID reporting year (y). $y = 2012$ (i.e. electricity emissions from eGRID 2012) for calendar year 2012 data and $y =$

(FERC), is a comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States. Detailed information can be found at <http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html>.

2016 (i.e., electricity emissions from eGRID 2016) for calendar year 2016 and 2018 data.

Finally, GHG emissions from APS electricity consumption were converted to metric tons of carbon dioxide equivalent (MT CO_{2e}) by multiplying $GHG_{i,j}$ by the GHG-specific global warming potential found in the IPCC AR5 report ($GWP_{AR5,j}$).

C.2.2 SRP Data Processing

For each inventory, SRP provided total residential, commercial, and industrial electricity consumption for accounts within the city boundary. As this data consisted of account holders only within the city boundary, no scaling factor was applied to the data.

Using the data provided by SRP, the following equation was used to calculate GHG emissions from Stationary Energy natural gas consumption.

$$GHG_{SRP,i,j,y} = EC_{SRP,i,y} \times CF \times EF_{AZNM,j,y}$$

- Where,
- $GHG_{SRP,i,j,y}$ = The GHG emissions in metric tons from purchased electricity from SRP for a Stationary Energy subsector (i) for a GHG (j) for an inventory year (y).
 - $EC_{SRP,i,y}$ = Purchased electricity from SRP for a Stationary Energy subsector (i) for an inventory year (y).
 - CF = Conversion factor to convert kWh to MWh. If data were reported in the MWh, $CF = 1$. If data were reported in kWh than $CF = 0.001$.
 - $EF_{AZNM,j,y}$ = The eGRID emissions factor for the AZNM subregion for GHG emissions factor for CO₂, CH₄, N₂O (j) for eGRID reporting year (y). $y = 2012$ (i.e. electricity emissions from eGRID 2012) for calendar year 2012 data and $y = 2016$ (i.e. electricity emissions from eGRID 2016) for calendar year 2016 and 2018 data.

Finally, GHG emissions from SRP electricity consumption were converted to metric tons of carbon dioxide equivalent (MT CO_{2e}) by multiplying $GHG_{i,j,y}$ by the GHG-specific global warming potential found in the IPCC AR5 report ($GWP_{AR5,j}$).

C.2.3 Total GHG Emissions from Electricity Consumption

After the GHG emissions from electricity consumption (*EC*) in the SRP and APS service territories were calculated, the following equation was summed across inventory sectors (*i*) and GHGs (*j*) to calculate total GHG emissions from electricity consumption within city boundaries.

$$GHG_{EC,i,j,y} = GHG_{APS,i,j,y} + GHG_{SRP,i,j,y}$$

C.3 Transmission and Distribution Loss (T&D Loss)

GHG emissions from T&D loss were estimated using data obtained from the EIA on Arizona's supply and disposition of electricity from 1990 through 2017.¹⁶ For each inventory year, and using 2017 and proxy for 2018, T&D loss is calculated as the ratio between estimated electricity system losses and the difference between total electricity disposition minus direct use of electricity at power plants.

C.4 Changes between inventory years

For each of the inventory years – 2012, 2016, and 2018 – electricity consumption has been provided by APS and SRP. SRP data has been provided as an overall total electricity consumption for commercial and residential sectors within City boundaries. For the 2012 community-scale inventory, APS provided zip code level consumption data for commercial, industrial, and residential sectors for zip codes associated with the City. An analysis of this data showed that some of the zip codes with highest reported consumption only had minor portion of the zip code within the City. For example, in the 2012 data the zip code with the highest reported total consumption had less than 1% land area within City boundaries and the zip code with highest reported residential consumption had only 30% land area within City boundaries.

To account for this aspect of the data, a scaling factor was developed to scale reported electricity consumption to City electricity consumption using land area as indicator of electricity consumption. For 2012, a single scaling factor was used, which was a simple ratio of the total area of the City compared to the total area of all zip code for which data was provided. For the 2016 community-scale inventory, the same scaling factor methodology was used because the reported electricity consumption was within 0.5% of

¹⁶ U.S. Energy Information Administration, Form EIA-923, Power Plant Operations Report and predecessor forms. U.S. Energy Information Administration, Form EIA-860, Annual Electric Generator Report. U.S. Energy Information Administration, Form EIA-861, Annual Electric Power Industry Report. Form EIA-111, Quarterly Imports and Exports Report.

2012 levels. For 2018 community-scale inventory, the scaling methodology was updated for the 2012 data and then applied to 2016 and 2018 data. In the updated method, consumption for each zip code is scaled by the percent land area within the City; electricity consumption for some zip codes are scaled, others are not because those zip codes are entirely within City boundaries. Use of this scaling factor assumes that electricity consumption by customer-type within each zip code is constant through the reporting time period from 2012 to 2018. This assumption and scaling approach may need to be revisited in future community-scale GHG emissions inventories. After data from each zip code are scaled, they are summed to arrive at electricity consumption for the City. The result of this methodological change was to increase GHG emissions from electricity consumption in 2012 and 2016 (Table C1).

Table C1. Changes to Scaling Methodologies for Electricity Data

Year	Old Scaling Method		New Scaling Method		ΔGHG Emissions (MT CO ₂ e)	% Change
	APS Electricity Consumption	GHG Emissions (MT CO ₂ e)	APS Electricity Consumption	GHG Emissions (MT CO ₂ e)		
2012 (kWh)*	6,429,328,231	3,102,482	9,873,891,733	4,764,661	1,662,179	54%
2016 (MWh)	5,677,762	2,413,206	9,875,762	4,197,472	1,784,266	74%

*kWh data were provided in 2012; MWh data were provided in 2016 and 2018.

C.5 Impact of Electricity Emissions Factor on GHG Emissions

Community-level GHG emissions are highly sensitive to the emissions factor used to calculate GHG emissions from electricity consumption. Previous GHG emissions inventories – both government operations and community-scale inventories – have used the electricity emissions factor for the Arizona-New Mexico subregion from EPA eGRID. eGRID emissions factors available at multiple scales in addition to the eGRID subregion. These scales include plant (finest resolution), plant operator (utility), balancing authority, state, and NERC region to name a few. Arizona is in the Western Electricity Coordinating Council (WECC) NERC region. The eGRID GHG emissions factors at each of these scales provide a range of GHG emissions intensity for electricity consumption within the city (Table C2).

Table C2. Electricity GHG EFs Derived from Multiple eGRID Decision Boundaries

Electricity EF Boundary	eGRID 2012 (MT CO₂e/MWh)	eGRID 2016 (MT CO₂e/MWh)	eGRID 2018 (MT CO₂e/MWh)
SRP & APS Plant Operator (Utility-Scale)	0.55	0.43	0.47
SRP & APS Balancing Authority	0.53	0.43	0.46
State of Arizona	0.48	0.43	0.44
<i>AZNM eGRID Subregion*</i>	0.52	0.48	0.47
Western Electricity Coordinating Council (WECC)	0.44	0.40	0.35

In the eGRID 2018 data, the plant operator GHG EF was greater than the AZNM GHG EF; both were greater than the balancing authority and State of Arizona GHG EF. In the eGRID 2012 database this is not the case: the AZNM subregion is less GHG-intensive than SRP & APS plant operator and balancing authority scale, but more GHG-intensive than electricity production in the State of Arizona. For all eGRID years, the local and regional scales are all more GHG-intensive than the WECC as a whole. Using the AZNM eGRID subregion EF for electricity increases emissions inventory by 657,133 MT CO₂e in 2012; 840,710 MT CO₂e in 2016; and 418,274 MT CO₂e in 2018 relative to the State of Arizona GHG EF for electricity consumption (Table C3). Therefore, the boundary used to calculate the EF for electricity consumption is extremely important as minor changes can cause significant changes to GHG emissions totals. Therefore, per existing EPA guidance, it is recommended to use the AZNM eGRID subregion EF until new datasets are produced that provide more detailed information on the carbon-intensity of a locality's electricity supply.

Table C3. Electricity GHG Emissions from Multiple eGRID Decision Boundaries

Electricity EF Boundary	2012 (MT CO₂e)	2016 (MT CO₂e)	2018 (MT CO₂e)
SRP & APS Plant Operator (Utility-Scale)	9,035,572 (492,849)	7,230,104 (-840,710)	7,921,800 (152,169)
SRP & APS Balancing Authority	8,707,006 (164,283)	7,230,104 (-840,710)	7,643,560 (-126,071)
State of Arizona	7,885,590 (-657,133)	7,230,104 (-840,710)	7,351,257 (-418,274)
<i>AZNM eGRID Subregion*</i>	<i>8,542,723</i> —	<i>8,070,814</i> —	<i>7,769,631</i> —
Western Electricity Coordinating Council (WECC)	7,228,458 (-1,314,265)	6,725,678 (-1,345,136)	5,858,867 (-1,910,764)

*Note: Calculated GHG emissions are the top number in each cell. The change in emissions relative to the AZNM eGRID Subregion EF is shown in parentheses in each cell. Positive parenthetical values indicate an increase in GHG emissions relative to the AZNM eGRID Subregion EF and negative parenthetical values indicate a decrease in GHG emissions.

Due to the interconnectedness of the grid, regional trends and projects to reduce the GHG intensity of electricity production in the AZNM subregion will place downward pressure on the subregion EF. For example, the closure of the Navajo Generating Station in 2019, and additional closures and partial closures of coal-fired electricity generating facilities by APS and PNM, will significantly reduce the AZNM subregion EF. Additionally, further development of utility-scale solar power facilities will also reduce the local and regional GHG EFs for electricity consumption, resulting in additional GHG emissions reductions compared to the 2012 baseline.

Appendix D. Transportation Sector Documentation

Transportation Sector GHG emissions are generated by a number of different sources and types of fuel. GHG emissions sources include on-road transport, railways, commercial aviation, civil aviation, and off-road transport. Fuel types consumed gasoline, diesel, B20 biodiesel, E85 ethanol, compressed natural gas (CNG), liquified natural gas (LNG), propane (LPG), aviation gasoline, and jet fuel A. Transportation sector GHG emissions also includes the consumption of purchased electricity to charge electric vehicles and to power electric light rail. Appendix D describes data sources and methods by fuel type.

D.1 Transportation Sector Data Processing

Transportation sector GHG emissions are calculated using a generalized formula.

$$GHG_{i,j,y} = FC_{i,y} \times CF \times EF_{i,j,y}$$

Where, $GHG_{i,j,y}$ =	The GHG emissions in metric tons from a transportation fuel (i) for a GHG (j) for an inventory year (y).
$EC_{SRP,i,y}$ =	Fuel consumption of a transportation fuel (i) for an inventory year (y).
CF =	Conversion factor to convert fuel consumption data to the units of the emissions factor. A CF is only used when necessary and is equal to 1 when not necessary.
$EF_{i,j,y}$ =	The GHG emissions factor in metric tons from a transportation fuel (i) for a GHG (j) for an inventory year (y).

Finally, GHG emissions from transportation fuel consumption were converted to metric tons of carbon dioxide equivalent (MT CO₂e) by multiplying $GHG_{i,j,y}$ by the GHG-specific global warming potential found in the IPCC AR5 report ($GWP_{AR5,j}$).

D.2 On-Road Transport

D.2.1 Gasoline and Diesel

Gasoline and diesel consumption for Maricopa County were obtained from the Arizona Department of Transportation (ADOT) via a public records request. Gasoline and diesel gallonage data are reported to the ADOT in order to obtain funds through the Highway

User Revenue Fund (HURF). Historic HURF monthly distribution reports are available through ADOT. ADOT HURF reports contain county-level monthly gasoline and use oil (diesel) sales data.¹⁷ As these data were for the entirety of Maricopa County, gasoline and diesel sales data were scaled using a ratio of City of Phoenix and Maricopa County populations. Per GPC guidance, population is an acceptable scaling factor for population-dependent activity data. A future study would be needed to determine if and how driving behaviors differ by Phoenix metropolitan area city.

D.2.2 Alternative Fuel Vehicles – B20 Biodiesel, E85 Ethanol, CNG, LNG

The *City of Phoenix 2018 GHG Emissions Inventory of Local Government Operations* is the primary source of data for alternative fuel consumption and the resulting GHG emissions within the city boundary. It was assumed that local government operations were the largest consumer of these fuels for transportation within the city boundary and other alternative fuel uses were *de minimis*.

D.2.3 Electric Vehicles

GHG emissions from electric vehicles for 2012, 2016 and 2018 haven been added to the community-scale inventory. National data were used to estimate electric vehicle consumption as local data were not available for estimating these GHG emissions. National-level statistics for annual gasoline consumption and electricity use for mobile transportation were obtained from the EIA Annual Energy Outlook. The ratio between electric energy for transportation and the energy in gasoline usage in the U.S. was used as a proxy to estimate citywide residential electric vehicle usage. GHG emissions from electricity consumption from electric vehicles were calculated according to the method in Appendix C, Section C.2.2.

D.3 Railways

D.3.1 Valley Metro Light Rail

Valley Metro light rail electricity consumption data were obtained from two sources. The National Transit Database¹⁸ used for inventory years 2012 and 2016. The National Transit Database is published by the U.S. Department of Transportation and contains various statistics about public transit systems across the United States, including fuel

¹⁷ Arizona Department of Transportation. Archived Audits and Reports. *Highway User Revenue Fund (HURF)*. URL: <https://azdot.gov/node/5069>.

¹⁸ U.S. Department of Transportation. The National Transit Database. URL: <https://www.transit.dot.gov/ntd>.

usage. Electricity usage by Valley Metro is reported to the National Transit Database as Valley Metro Rail, Inc. The National Transit Database had not been published for calendar year 2018 during the time in which the 2018 inventory was compiled. Therefore, 2018 electricity consumption by the Valley Metro light rail system was obtained via a public records request of Valley Metro.

For each inventory year, total Valley Metro electricity usage for rail operations were scaled based on ratio of the length of light rail track within the city compared to the overall length of Valley Metro light rail track. GHG emissions from electricity consumption from the Valley Metro light rail were calculated according to the method in Appendix C, Section C.2.2.

D.3.1 Freight Rail

The National Emissions Inventory (NEI)¹⁹ published by U.S. EPA was used to gather data on GHG emissions from freight rail activity in Maricopa County. The 2011 NEI was used as a proxy for 2012, 2016, and 2018. Please refer to the 2016 community-scale GHG emissions inventory report for a summary of methods to estimate Freight Rail GHG emissions.

D.4 Aviation

D.4.1 Commercial Aviation

The NEI was used to gather data on commercial aviation fuel consumption at Phoenix Sky Harbor International Airport and Phoenix Deer Valley Airport. The 2011 NEI was used as a proxy for 2012 and the 2017 NEI was used as a proxy for 2016 and 2018. Jet Fuel A was assumed to be the primary fuel consumed by commercial aviation.

To estimate Jet Fuel A consumption the following procedure was followed, CO₂ emissions Phoenix Sky Harbor International Airport and Phoenix Deer Valley Airport data for 'Aircraft /Air Taxi /Turbine', 'Aircraft /General Aviation /Turbine', and 'Aircraft/Commercial' processes were obtained from the NEI. Next, the total emissions of CO₂ emissions were converted to gallons of Jet Fuel A using the CO₂ EF for Jet Fuel A. The estimated consumption of Jet Fuel A was then converted back into CO₂ emissions in addition to CH₄ and N₂O emissions.

¹⁹ U.S. Environmental Protection Agency. National Emissions Inventory (NEI). URL: <https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-nei>.

As the NEI is published for 2011 and 2017, estimated Jet Fuel A consumption was scaled to the 2012, 2016, and 2018 calendar years using landing and takeoff operations (LTO) activity data obtained from the City of Phoenix.²⁰ As Jet Fuel A consumption is strongly tied to commercial aircraft LTO, it was used as an indicator to scale 2011 and 2017 activity data to the inventory calendar year.

D.4.2 Civil Aviation

The NEI was used to gather data on civil aviation fuel consumption at Phoenix Sky Harbor International Airport and Phoenix Deer Valley Airport. The 2011 NEI was used as a proxy for 2012 and the 2017 NEI was used as a proxy for 2016 and 2018. Aviation gasoline was assumed to be the primary fuel consumed by commercial aviation. As aviation gasoline contains lead (Pb), lead emissions reported at Phoenix Sky Harbor International Airport and Phoenix Deer Valley Airport in the National Emissions Inventory is used as an indicator of aviation gasoline consumption.

Per EPA guidance documents, the lead emissions from piston-based aircraft is related to aviation gasoline consumption through the following equation.²¹

$$g Pb = \frac{\text{gallons Aviation Gasoline} \times \left(\frac{2.12 g Pb}{\text{gallons Aviation Gasoline}} \right) \times 0.95}{907,180 \frac{g}{ton}}$$

Lead emissions obtained from the NEI for Phoenix Sky Harbor International Airport and Phoenix Deer Valley Airport were input to the equation above and used to solve for the gallons of aviation gasoline consumed at each airport. As the NEI is published for 2011 and 2017, estimated aviation gasoline gallons is scaled to 2012, 2016, and 2018 calendar years using LTO activity data obtained from the City of Phoenix²². As lead emissions are reported for LTO operations, which is 10% of an aircraft operation, the estimated gallons of Aviation Gasoline are divided by 10%.

²⁰ Phoenix Sky Harbor International Airport. Airport Statistics. URL: <https://www.skyharbor.com/About/Information/AirportStatistics>.

²¹ U.S. Environmental Protection Agency, 2013. Assessment and Standards Division Office of Transportation and Air Quality. Calculating Piston-Engine Aircraft Airport Inventories for Lead for the 2011 National Emissions Inventory. Report EPA-420-B-13-040.

²² Phoenix Sky Harbor International Airport. Airport Statistics. URL: <https://www.skyharbor.com/About/Information/AirportStatistics>.

D.5 Off-Road Transportation

D.5.1 Nonroad Diesel

Consumption data for nonroad diesel (dyed diesel) were obtained via a public records request of the Arizona Department of Transportation for dyed diesel sales in Maricopa County. Nonroad (dyed) diesel is only permitted for use in “vehicles and equipment used in agriculture (farming and ranching), mining and roadway construction”²³ and illegal for on-road transportation uses. Public records requests were submitted for two different points in time. The public records request for nonroad diesel consumption for calendar year 2016 was submitted in 2017 and data were obtained in 2017. These data had contained origin-destination flows of dyed diesel sales – from the terminal to point of sale – at the city level for Maricopa County. The second public records request for dyed diesel sales in Maricopa County for 2012 and 2018 (submitted as one public records request) yielded aggregate sales in Maricopa County for each calendar year requested. Therefore, the ratio of dyed diesel sales in Phoenix compared to Maricopa County was used as scaling factor for 2012 and 2018 data.

GHG emissions for dyed diesel were calculated using the following equation.

$$GHG_{NonRoadDiesel,Phoenix,j,y} = \begin{cases} DyedDiesel_{Gallons,Phoenix,y} \times EF_{diesel,j} & \text{if } y = 2016 \\ DyedDiesel_{Gallons,MaricopaCounty,y} \times SF_{Phoenix,2016} \times EF_{diesel,j} & \text{if } y = 2012, 2018 \end{cases}$$

Where, $GHG_{NonRoadDiesel,Phoenix,j,y}$ = the GHG emissions from red-dyed diesel sold within the city for a GHG (j) and an inventory year (y).

$DyedDiesel_{Gallons,Phoenix,y}$ = The gallons of red-dyed diesel sold at pumps located within the city in an inventory year (y).

$EF_{diesel,j}$ = The diesel emissions factor (EF) for a GHG (j).

$DyedDiesel_{Gallons,MaricopaCounty,y}$ = The gallons of red-dyed diesel sold at pumps located within the Maricopa County in an inventory year (y).

$SF_{Phoenix,2016}$ = The ratio between total red-dyed diesel gallons sold at pumps located in the city to the total red-dyed diesel gallons sold in pumps located in Maricopa County for year 2016.

²³ Arizona Department of Transportation (2019). Red-Dyed Diesel Fuel in Arizona. URL: <https://azdot.gov/motor-vehicles/professional-services/fuel-tax-information/red-dyed-diesel-fuel-arizona>.

For 2012 and 2016, the 2011 and 2014 US EPA National Emissions Inventory (NEI) were the sources of nonroad diesel GHG emissions, respectively. However, a follow up analysis showed that the amount of CO₂ emissions associated within nonroad diesel use reported in the NEI was equivalent to the volume diesel sold in both 2012 and 2016 in Maricopa County as reported by ADOT. Therefore, it was concluded there was double counting of diesel no. 2 sales for nonroad purposes included in the nonroad diesel GHG emissions in the 2012 and 2016 community-scale GHG emissions inventories (Table D1). To correct for this double-counting, red-dye diesel consumption data for the City (2016) and Maricopa County (2012, 2018) were obtained from ADOT. Red-dye diesel consumption was used as a proxy for nonroad diesel emissions because it is illegal for purchase for on-road transportation. ADOT provided city-specific data for Maricopa County for 2016 and county-level data for 2012 and 2018, so 2016 data was used to scale 2012 and 2018 county-level data to the city-level. With this updated method for estimating non-road diesel consumption, on-road diesel GHG emissions may contain diesel purchased for nonroad purposes, but nonroad diesel GHG emissions only contains GHG emissions for nonroad purposes.

Table D1. Changes to Non-Road Diesel Consumption and GHG Emissions

Year	NEI Data Nonroad Diesel	ADOT Dyed Diesel Sales	ΔGHG Emissions (MT CO ₂ e)	% Change in GHG Emissions
	GHG Emissions (MT CO ₂ e)	GHG Emissions (MT CO ₂ e)		
2012	1,864,570	148,488	-1,716,082	-92%
2016	1,992,217	149,749	-1,842,468	-92%

D.5.2 Other Nonroad GHG Emissions

The NEI was used to gather data on GHG emissions from other nonroad fuel consumption in Maricopa County. The 2011 NEI was used as a proxy for 2012 and the 2014 NEI was used as a proxy for 2017. Other nonroad fuel consumption data were scaled from Maricopa County to the city boundary. These data primarily cover the combustion of propane for nonroad uses.

Appendix E. Waste Sector Documentation

Waste Sector GHG emissions occur from numerous sources: solid waste, wastewater treatment, compost processing, and granulated activated carbon (GAC) hauling and regeneration. Much of these GHG emissions occur due to city’s local government operations and as such a description of the methods to calculate these GHG emissions are found in the *City of Phoenix 2018 GHG Emissions Inventory of Local Government Operations*.

E.1 Solid Waste

Solid Waste GHG emissions occur at landfills owned and operated by the city within city boundary, a landfill owned and operated by the city outside city boundary, a privately-owned landfill within the city boundary, and privately-owned landfills outside the city boundary.

GHG emissions from landfills owned and operated by the city were obtained from the *City of Phoenix 2018 GHG Emissions Inventory of Local Government Operations*. Of the seven landfills owned and operated by the city, six are located within the city boundaries – these landfills are closed and no longer accept waste – and the only open landfill is located outside city boundaries. The names of these landfills, the data source, method of GHG emissions calculation, and GPC subsector are described in Table E1.

Table E1. Data and Method Documentation for City-Owned Landfills

Landfill	Activity Data	Source	Method	Active?	GPC Subsector
Skunk Creek	CH ₄ Monitoring	City of Phoenix	ICLEI LGOP	No	Disposal of solid waste generated in the city
27th Avenue	CH ₄ Monitoring	City of Phoenix	ICLEI LGOP	No	Disposal of solid waste generated in the city
Del Rio	CH ₄ Monitoring	City of Phoenix	ICLEI LGOP	No	Disposal of solid waste generated in the city
Deer Valley	CH ₄ Monitoring	City of Phoenix	ICLEI LGOP	No	Disposal of solid waste generated in the city
19th Avenue	CH ₄ Monitoring	City of Phoenix	ICLEI LGOP	No	Disposal of solid waste generated in the city

Estes	EPA LandGEM Model	City of Phoenix	First Oder Decay	No	Disposal of solid waste generated in the city
SR-85	CH ₄ Monitoring	City of Phoenix	ICLEI LGOP	Yes	Disposal of solid waste generated in the city but disposed outside the city

The City of Phoenix only collects municipal solid waste from single family residences within city boundaries. Residents in the city that live in multi-family housing in addition to commercial and industrial establishments are serviced by private haulers. There is one landfill within the city boundary – the Lone Cactus Landfill – owned by a private waste management company. GHG emissions from the Lone Cactus Landfill are reported by Waste Management, Inc. to the EPA Greenhouse Gas Reporting Program. Therefore, GHG emissions from the Lone Cactus Landfill were obtained from the EPA Facility-Level Information on Greenhouse Gas Emissions Tool (Table E2).

Table E2. Data Documentation for Privately-Owned Landfills

Landfill	Activity Data	Owner	Active?	GPC Subsector
Lone Cactus	EPA GHGRP	Waste Management	Yes	Disposal of solid waste generated in the city
Private Haulers	EPA GHGRP/Population	Multiple	Yes	Disposal of solid waste generated in the city but disposed outside the city

Since solid waste is also collected by private haulers and disposed of in privately-owned landfills outside of the city boundary, an additional estimation method was employed to estimate GHG emissions from the landfills attributable to solid waste generated within the City of Phoenix. First, a per capita GHG emissions from solid waste calculated for Maricopa County. To do this, all landfill emissions data reported to the EPA GHGRP within Maricopa County was pulled from EPA FLIGHT for 2012, 2016, and 2018 and converted to a per capita metric using population data obtained from the U.S. Census and City of Phoenix. Next, the number of residents living in multi-family housing in city was estimated using data obtained from the U.S. Census American Housing Survey. Finally, the population data were converted to GHG emissions using the per capita GHG emissions rate, as shown in the equation below.

$$GHG_{PrivateMSW,y} = \frac{\sum_l GHG_{SW,l,Maricopa,y}}{Pop_{Maricopa,y}} \times \left[\left(1 - \frac{\# \text{ Single Family Detached Housing}}{\text{All Dwellings}} \right)_{PHX MSA,y} \times Pop_{Phoenix,y} \right]$$

Where, $GHG_{PrivateMSW,y}$ = the GHG emissions from solid waste picked up by private haulers (PrivateHaulers) in an inventory year (y).

$\sum_l GHG_{SW,l,Maricopa,y}$ = The total reported GHG emissions by all landfills in Maricopa County, Arizona.

$Pop_{Maricopa,y}$ = The population of Maricopa County, Arizona in an inventory year (y).

$\# \text{ Single Family Detach Housing}$ = The number of single-family detached housing units in the Phoenix metropolitan area in an inventory year (y).

$\# \text{ All Dwellings}$ = The number of housing units in the Phoenix metropolitan area in an inventory year (y).

$Pop_{Phoenix,y}$ = the population of Phoenix, Arizona in an inventory year (y).

E.2 Wastewater Treatment

GHG emissions from wastewater treatment were obtained from the *City of Phoenix 2018 GHG Emissions Inventory of Local Government Operations*. Please refer to the *City of Phoenix 2018 GHG Emissions Inventory of Local Government Operations* for details about monitoring data and method. A summary table is presented below (Table E3).

Table E3. Data Documentation for Wastewater Treatment Plants

Wastewater Treatment Plant	Service Area	GHG Emissions	Data Source	GHG Emissions Methodology	GPC Subsector
23 rd Avenue	City of Phoenix	CH ₄ , N ₂ O	City of Phoenix CH ₄ and effluent monitoring data	ICLEI LGOP	Wastewater generated in the city
91 st Avenue	All or Portions of Glendale, Mesa, Phoenix, Scottsdale and Tempe	CH ₄ , N ₂ O	City of Phoenix CH ₄ and effluent monitoring data	ICLEI LGOP	Wastewater generated in the city

E.3 Compost Processing

GHG emissions from compost processing were obtained from the *City of Phoenix 2018 GHG Emissions Inventory of Local Government Operations*. The city provided data on the total tons of green organic waste diverted to be processed as compost from FY 2005-2006 to FY 2018-19. Using these data, GHG emissions from composting were calculated according to the methodology employed by the EPA to estimate national-level emissions from composting in Section 7.3 of the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017*.²⁴

E.4 GAC Hauling and Regeneration

GHG emissions from GAC hauling and regeneration were obtained from the *City of Phoenix 2018 GHG Emissions Inventory of Local Government Operations*. The city provided data on the vehicle miles driven to the GAC recharging facility and the amount and type of energy used at the recharging facility. GHG emissions from GAC Hauling and Regeneration are included as Other Scope 3 GHG emissions.

²⁴ U.S. EPA. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017. URL: <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2017>

