

Flood Control District of Maricopa County



Comprehensive Report & Program 2015

Maricopa County, Arizona

Flood Control District of Maricopa County
Comprehensive Report & Program

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Adopted on June 10, 2015

Comprehensive Report & Program – 2015



Introduction

In response to a series of devastating floods and increasing rapid urbanization in high flood hazard areas, State of Arizona lawmakers saw a need for regional flood management, enacting legislation for the creation of flood control districts in 1959. The Flood Control District of Maricopa County (District) was initially organized under Title 5, Chapter 10, Article 4, §45-2351 to §45-2371 Arizona Revised Statutes in August 3, 1959. This statute was repealed in 1985 and replaced by Title 48, Chapter 21, Article 1, Arizona Revised Statutes (ARS).

Upon formation of the District, a survey of flood control problems and a report of existing flood control facilities were required. This initial report was completed in 1963. ARS §48-3616 states *“the report shall be prepared at least every five years beginning in 1985 and shall indicate the past efforts of the district in eliminating or minimizing flood control problems and state the planned future work of the district to eliminate or minimize flood control problems.”* The Comprehensive Report and Program (Report) must be approved by both the Flood Control Advisory Board (FCAB) and the Flood Control District Board of Directors (BOD). Subsequent Reports were prepared and approved in 1989, 1991, 1997, 2002, 2005, and 2009.

As required by A.R.S. §48-3616 A and B these reports address the following:

- A survey of the flood control problems of the district,
- A report describing existing flood control facilities in the area,
- Recommendations as to cooperation between the district and the owner or owners of existing facilities,
- Recommendations and a preliminary plan for the construction or other acquisition of facilities to carry out the purpose of the district, and a description of the property proposed to be acquired or damaged in performing the work,
- A program for carrying out the regulatory functions,
- A map showing the district boundaries and location of the work proposed to be done and property taken or damaged,
- An estimate of the cost of the proposed work and such other things as the board of directors may request.

A separate document required by state statute is prepared and submitted to the BOD for a five year Capital Improvement Program (CIP). The CIP drives design and construction of new infrastructure in conjunction with the District's planning activities. The CIP establishes a schedule and funding for each capital improvement project according to its priority, merit, and need. Additionally, the CIP documents planned District projects to help integrate District work with the larger community by aligning District planning with other local agency planning efforts.

The Comprehensive Report and Program gives a broader assessment of issues and long-range strategies, and is submitted to the BOD to tentatively adopt and schedule a public hearing on the program and performance of work. This 2015 update to the 2009 Comprehensive Plan is a condensed document capturing the key elements required by state statute.

A more detailed document, a Floodplain Management Plan required by the Federal Emergency Management Agency as part of the participation in the Community Rating System Program, is being developed to expand on the information provided in this document.

Survey of Flood Control Problems

In order to understand and identify flood control problems for Maricopa County, knowledge of the physical environment and the effects of development are needed. A brief review of the geographic scope, storms and flooding, benefits of floodplains, and socioeconomic and development issues will help give an overall picture of the challenges and flood control problems that remain.

Geographic Scope

Jurisdiction

The District is a political taxing subdivision of the State of Arizona with the powers, privileges and immunities granted generally to municipal corporations. The District's jurisdictional boundary includes all unincorporated and incorporated areas within the boundary limits of Maricopa County. All property owners within the county pay a secondary tax to the District.

Size and Topography

The county has a land area of 9,226 square miles, of which 2,148 square miles are incorporated (23.3 percent) and 7,007 square miles are unincorporated (76.7 percent). Twenty-four cities and towns are located within Maricopa County. The county has a larger land area than eight states and the District of Columbia. It is the fifth largest of Arizona's 15 counties, and the 14th largest county in the United States. The county measures 132 miles from east to west and 103 miles from north to south. The land surface elevation ranges between 436 and 7,657 feet above sea level.

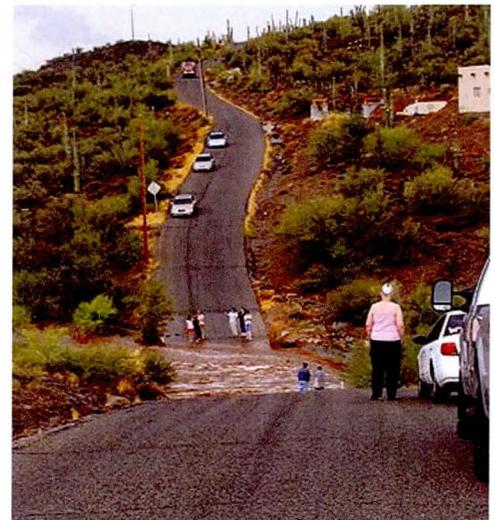
Geology

Maricopa County lies within the Basin and Range province of the Southwest, which includes the southern third of Arizona. The Maricopa County portion of the Basin and Range province is located within the Sonoran Desert and is characterized by wide valleys and mountain ranges. The mountain systems are generally comprised of metamorphic and igneous rocks that have slow infiltration rates, which can cause rapid runoff. Volcanics are more dominant in the northern and western portions, while basalts are more common in the west. The majority of the populated areas of Maricopa County are located along the alluvial deposits of the river basins, which can be erosive.

Water table depth, location of aquifers, and subsidence issues due to ground water mining can affect or contribute to flooding in some areas. The Arizona Department of Water Resources (ADWR) is responsible for regulation of groundwater issues.

Hydrologic Soil Groups

A Hydrologic Soil Group is a group of soils that have similar runoff potential under similar storm and vegetative cover conditions. These groupings are used in calculations that estimate runoff from rainfall. These physical properties of soil influence runoff potential, or the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. The soils in Maricopa County are placed into four Hydrologic Soil Groups; A, B, C, and D as defined by the Natural Resources Conservation Service (NRCS). Hydrologic Soil Groups A and B have low and moderate runoff potential. Soils in these two groups range from sands and/or gravels to sandy loams

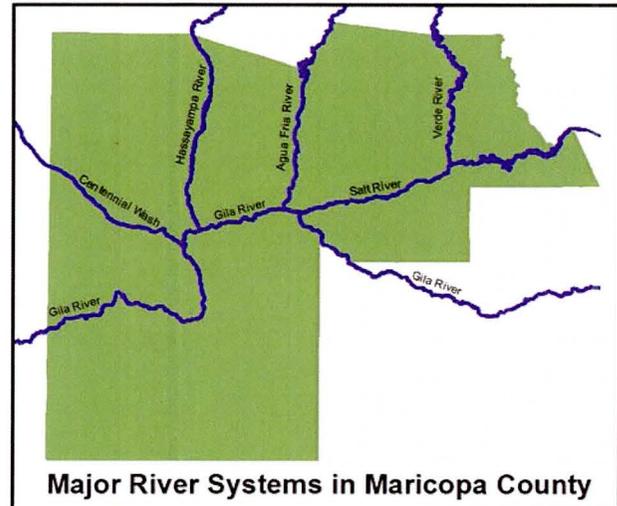


and clay loams. Most of the county can be characterized as Hydrologic Soil Groups A or B. Hydrologic Soil Groups C and D have a high runoff potential. These soils are primarily silt and clays or have an impervious under layer, such as bedrock that impedes the downward movement of water. Approximately 35 percent of Maricopa County, excluding the Tonto National Forest and the Barry M. Goldwater Gunnery Range, fall into Hydrologic Group C or D. These groups are in the mountains and low hills of the county.

Hydrology

Six major watercourses flow through Maricopa County: Centennial Wash, and the Agua Fria, Gila, Hassayampa, Salt, and Verde rivers. These rivers drain an area of approximately 57,000 square miles, including areas of New Mexico and Mexico. The Agua Fria, Hassayampa, and Verde rivers flow from north to south. The Salt River flows east to southwest and bisects Maricopa County. The Gila, which flows from the southwest, joins the Salt River near the center of the county and continues in a southwesterly direction toward the county line.

Additionally, approximately 11,000 miles of rivers, streams, and washes flow through Maricopa County. Few rivers have perennial flow, and some of the perennial flow is treated wastewater, agricultural tail water, or other urban runoff. The majority of washes are ephemeral and only have flow during storms. Some of these may remain dry for several years before a storm will result in sufficient runoff to create flows.



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Geomorphology

In the desert, both natural and artificial processes can shape landforms, as well as create relatively sudden (in geologic time) changes. Whether unexpected or predictable, these geologic changes can affect the drainage patterns of an area. The majority of the urbanized populations live in the valleys and along the floodplains of the major washes and their tributaries where the results of processes such as sedimentation and erosion culminate, and thus they are more likely to be susceptible to flooding.

Desert landforms, such as arroyos and alluvial fans, are an example of erosion forces and depositional processes that are characteristic of the desert. Arroyos and alluvial fans can both influence and be influenced by floodwaters.

Arroyo (wash) – is a term applied in the arid and semi-arid southwestern United States to a small flat-floored channel or gully usually with steep or vertical banks that form under certain conditions. Urban development along arroyos can result in the release of relatively clean water to the system that increases flood velocities and the rate of erosion.

Alluvial Fan – is a deposit of sediment occurring at the base of mountain ranges where the sediment has eroded from the mountainside to form a gently sloping fan-shaped deposit. As the floodwaters near the valleys, the velocity decreases, and the sediment begins to be deposited. Alluvial fans can contribute to flooding problems because of their unpredictable nature. In addition, alluvial fan flows frequently shift their position horizontally, known as lateral migration.

Lateral Migration – Streams have a natural tendency to shift as the channel evolves. Migration may occur either vertically or horizontally, often encroaching on properties not originally located in harm's way when constructed. Bank erosion occurs when the main channel shifts its course, either for natural or human induced reasons. Vertical channel migration is usually associated with aggradation (deposition), which affects the stability of the stream. Alterations in the channel can cause severe changes in the capacity of the channel to carry floodwaters and can affect peak flows and velocities.

Storm Events and Frequency

Climate

Maricopa County lies within a dry, subtropical desert climate zone. Average annual rainfall ranges from five inches in the lower elevations to over 16 inches in the higher elevations. Approximately 95 percent of Maricopa County is in the Sonoran Desert. Although the Sonoran Desert is lush compared to other deserts, the average evaporation losses exceed the precipitation, which defines the area as a desert.

Precipitation

There are two distinct precipitation seasons. Winter storms occur from November to March when the region is subjected to occasional frontal storms from the Pacific Ocean. The highest winter precipitation occurs when the mid-latitude storm track is to the south. Southern-originating storms tend to enter Arizona directly from the west or southwest after picking up considerable moisture from the Pacific Ocean.

The second rainfall season, also known as the North American Monsoon, is caused by a seasonal shift in wind direction and occurs in July, August and most of September. Characteristics of this season include widespread storm activity associated with moist air moving into Maricopa County from the south and southeast. These storms vary in intensity and location, and some of the heaviest amounts of precipitation in a short period occur during these months. Periodically, tropical storms in the eastern Pacific can influence our summer rainy season from the months of August through October. This additional moisture can add both volume and duration to storms that form over Maricopa County.

Rainfall records have been consistently retained for the Phoenix area for over 100 years. At Sky Harbor Airport the 24-hour duration rainfall that would occur in a 100-year event would be 3.30 inches; a 50-year event would generate 2.93 inches. These values vary throughout Maricopa County. In any given year Maricopa County experiences summer and winter storms with the potential to generate flooding given the "right conditions". These "right conditions" become more prevalent with increasing development and population.

Currently, the District has 313 automatic rain gages, 175 automatic stream gages, and 37 automatic weather stations at 354 locations throughout Maricopa and neighboring counties, with the first of these stations being installed in 1981. This system is still being expanded as information is needed in other locations. **Map A** shows the location and coverage of this system. Data from these gages is available from the District's website located at www.fcd.maricopa.gov.

Flooding in Maricopa County is typically caused by winter storms, tropical storms, or summer thunder storms.

1. Winter storms offer the greatest potential for damage on our largest watercourses. Since these storms occur over several days and often combine with snow runoff from the high country, they saturate soils and overwhelm the natural and built drainage capacity, resulting in significant flood damage in developed areas. These storms usually cover a large geographic area, such as the January 2010 flood that caused damage in parts of Cave Creek, Carefree, and north Scottsdale.

2. Tropical storms are derived from hurricanes in the Pacific. Tropical storms or hurricanes drop high volumes of rainfall in a short duration, usually 12 to 36 hours. These storms cause the most damaging floods in watersheds from 50 to 500 square miles in size. In 1997, record rainfall from Tropical Storm Nora caused two earthen dams to break in Aguila, causing widespread flooding and the evacuation of approximately 40 people from the town. Similarly the September 8, 2014 storm brought with it 1,000-year rainfall events to parts of the Valley, inundating flood control infrastructure in Mesa and flooding some 400 homes.
3. Summer thunderstorms occur during the mid-to late summer. As summer approaches, winds shift from a westerly to southerly direction, allowing moisture to stream into Arizona from the Gulf of California or the Gulf of Mexico. These storms are typically short, intense, and localized. Monsoon storms not only bring almost one-third to one-half of the annual rainfall in Maricopa County, they can also cause flash floods, lightning, strong winds, dust storms, and hail. The storms have caused significant property damage and several fatalities.

Types of Flooding

The type of flooding caused by a storm event depends on the physical conditions, such as slope or soil type, of the floodplain and surrounding land. Development and other man-made features or modifications to the landscape can also alter the dynamics of flooding. Most flooding events in Maricopa County fall into one of three major categories: riverine, alluvial fan, and shallow flooding.

1. Riverine Flooding: Flooding that occurs along a defined channel is called riverine flooding. When a river or wash receives too much water, the excess flows over its banks and inundates the adjacent floodplain. Flash flooding can occur in a riverine environment. A flash flood is a rapidly moving flood through low-lying areas such as washes and canyons. Flash flooding can also occur in urban areas where impervious surfaces, gutters, and storm sewers accelerate runoff. Flash floods occur after intense storms that drop large amounts of rainfall in a short period of time. When this happens, the ground cannot absorb the water fast enough so it accumulates in channels and flows downhill. Flash floods are sometimes preceded by a debris flow that contains rocks, brush, logs and anything else it picks up along the way. Flash floods are the leading cause of flood-related deaths in the United States because they happen quickly and often without warning.



Galloway Wash floods Spur Cross Road, 10:30 AM, Oct 10, 2003. (There is no bridge.) TMcG

2. Alluvial Fan Flooding: Typically occurs in parts of the Valley with slopes between 2-16 percent. Alluvial fans pose a significant public safety hazard. The area within a fan is subject to flash flooding, high velocity flows, debris flows, erosion, sediment movement and deposition. The public safety risk is intensified since the areas where alluvial fan flooding occurs are attractive for development due to proximity to mountains and scenic value.
3. Shallow Flooding: As defined by the National Flood Insurance Program, occurs in flat areas “where a lack of channels means water cannot drain away easily.” Shallow flood problems include sheet flow and ponding. Sheet flow is a condition where storm water runoff forms a sheet of water to a uniform depth. Sheet flooding is often found in areas where there are no clearly defined channels with slopes less than two percent. Ponding typically occurs in low spots on the upstream side of roadways, canals, railroads, and other embankments. The storm water remains in the depressions until the water evaporates or seeps into the soil.

Flooding in Maricopa County occurs when natural waterways such as creeks, rivers and washes cannot contain the flow of a rainfall event. The county's mountainous desert topography, compacted soil, and numerous watercourses prevent rainfall from quickly soaking into the ground. Development that increases impervious surfaces can worsen the impacts of flooding. Buildings, homes, paved streets and parking lots disrupt the natural flow of water and prevent absorption into the ground, potentially creating inadequate drainage.

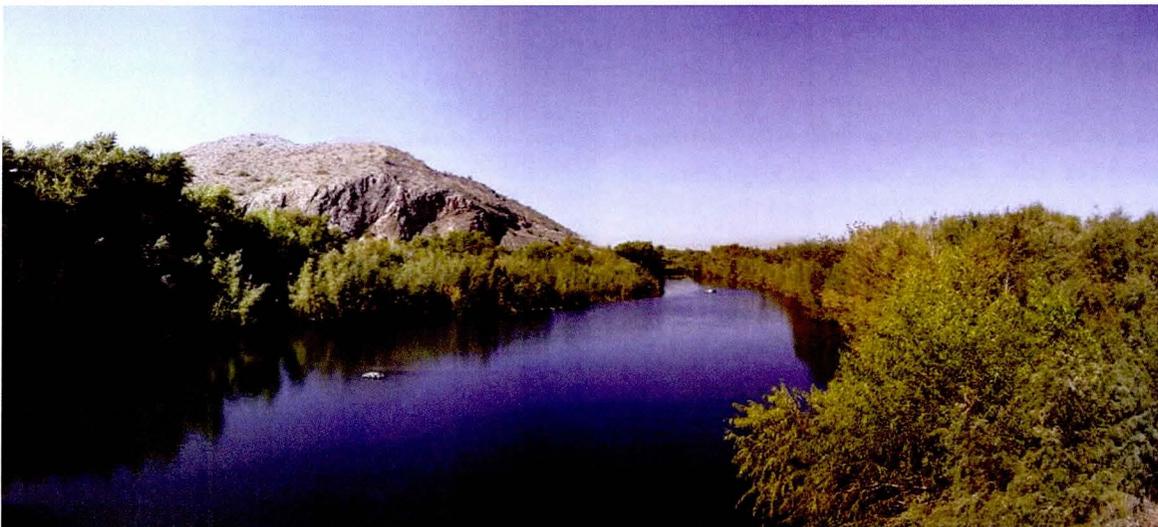
Functions of Natural Floodplains

Floodplains are the areas adjoining the channel of a watercourse that may be covered by water during a flood. The physical characteristics of floodplains provide flood and erosion control, water quality maintenance, and groundwater recharge. Additionally, biological resources within a floodplain provide wildlife and fish habitat, and also erosion control. Social values including public opportunities for outdoor recreation, scientific study and education, and enjoyment of scenery and open space are also provided by floodplains. Maricopa County has thousands of miles of rivers and washes and related floodplains. The current delineated floodplains for Maricopa County are shown on **Map B**.

Floodwater conveyance and storage are among the most important hydraulic functions performed by floodplains. Flows that exceed the capacity of a natural channel are temporarily stored within the floodplain, re-enter the watercourse slowly as either surface or subsurface flows, and are then conveyed downstream in the watershed. The capacity of natural floodplains for floodwater storage and conveyance helps minimize the magnitude of flooding and the potential for flood-related damage.

Flooding is a natural process of river systems. All rivers overtop their banks at some time, inundating the river's floodplain. A flood event is only considered hazardous when the floodwaters threaten human life or property generally due to development in the floodplain. Land within floodplains is attractive to agricultural and urban development for many reasons, including natural beauty, density of vegetation, recreational purposes, and access to fertile soil.

In addition to the physical and biological functions, floodplains provide a variety of values that enhance the livability of communities in Maricopa County including scenic, recreation, and economic benefits. Minimally developed or natural floodplains and associated open space provide an economic value to the community. The scenic values and recreation opportunities inherent in natural floodplains and washes create ideal locations for outdoor activities, such as hiking, biking, birding, and nature based education.



Floodplains and Development

Maricopa County and the surrounding region have unique physical and biological characteristics. Five major rivers drain from mountain ranges that surround the northern and eastern part of Maricopa County. A sixth major watercourse, Centennial Wash, is to the west. The Verde, Salt, Agua Fria, and Hassayampa rivers flow into the Gila River. These rivers, especially the Gila, Salt, and Verde, made settlement in Phoenix and Maricopa County possible.

Over 100 years ago, what we now call metropolitan Phoenix was a large agricultural community. Many floodplains, especially along the Gila River, were converted to agriculture fields because of the proximity of the water, and the relatively fertile soil and flat land that is characteristic of floodplains. When converting desert to agricultural land, farmers typically modified the natural drainage characteristics by grading the land and filling in the washes. The natural drainage patterns on agriculture land became indistinguishable. As the population grew, agricultural land was relatively easy to convert into residential development. Flooding hazards on agricultural land were often indistinct, and thus people built houses in these areas.

This pattern of development continued as communities grew. It is estimated that there are 8-12 million homes in our nation’s floodplains. In Maricopa County there are 3,551 homes in delineated floodways and 27,487 homes in delineated floodplains. While a concern, homes in floodplains are a small portion of the approximate 1.7 million housing units in the county as noted in 2013 Census statistics.

In 1959 when the District was created the population was approximately 663,510. In 2009, at the last update of the Report the population of Maricopa County including the incorporated cities was 3,817,117. The current population estimate is 4,009,412. Population continues to increase and development has progressed through farmland and is occurring outside the ring of dams and flood retarding structures built from 1953-1988, moving into the steeper terrain where sudden flash flooding creates hazardous conditions for structures along watercourses. Additionally, the traveling public attempting to drive through low-flow crossings to reach these destinations are at risk.

Repetitive Loss Areas

Repetitive loss areas are properties within the county that have been repeatedly damaged by floods. FEMA requires communities to identify repetitive loss areas. Unincorporated Maricopa County currently has six federally-recognized repetitive loss areas that include over 100 properties. Two of the six repetitive loss areas, Holly Acres and Wickenburg – Upper Hassayampa, had multiple properties repeatedly damaged. The remaining four are shown on **Figure 1**.

Holly Acres is located along the Salt, Gila and Agua Fria rivers. The U.S. Army Corps of Engineers, in conjunction with the City of Phoenix and the District, have completed the Tres Rios project to mitigate flooding in Holly Acres. Tres Rios consists of north bank levee improvements from 105th Avenue to the Agua Fria River, channelization, creation of habitat areas composed of open water marshes and overbank wetlands, and a pump station to provide water for the habitat areas. The property on the north side of the Salt and Gila Rivers, including the

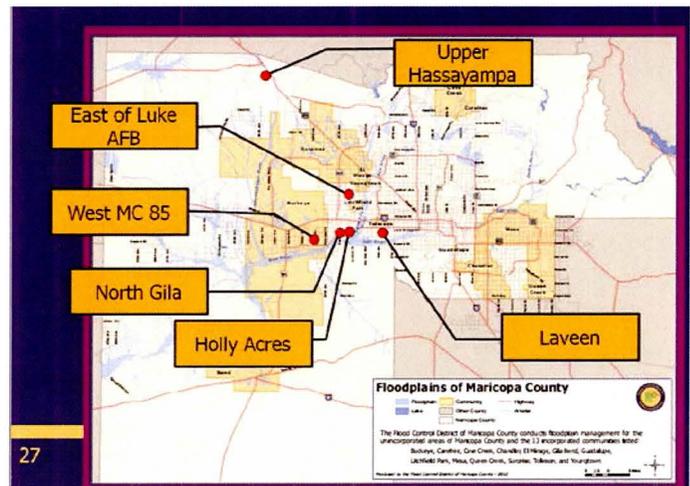


Figure 1 – Repetitive Loss Areas

Holly Acres subdivision, is protected from river flooding by the north bank levee component of the project. Construction has been completed on the levee, which runs along the Salt River from 83rd Avenue to the Agua Fria. The District will operate and maintain the north bank levee. The Flood Insurance Rate Map (FIRM) is in the process of being updated to reflect the decreased floodplain.

Summary

The vastness of Maricopa County, unique geography, and storm patterns combined with development and growth contributes to a community at risk. As recently witnessed during the 2014 Monsoon, rapid runoff from mountain areas, storage of floodwater in the floodplain, sheetflow, and ponding in low areas where development exists remind us of the flooding problems that impact infrastructure, residences, and economic functions.

Since 1966, Maricopa County has been declared a flood disaster area 20 times, with the most recent being for the September 8-9, 2014 event. In the 50 years from 1959 through 2009, flood events have inflicted more than \$1.5 billion in damages. An update on more recent damage is being prepared for the Multi-Jurisdictional Hazard Mitigation Plan for Maricopa County. **Table 1** gives an overview of major floods and past flooding damage from 1891 to present.

Although considerable strides have been made in building protective structures, establishing uniform drainage regulations, and enforcing floodplain regulations there is still work to be done. The next section gives an overview of existing facilities that have mitigated many of the flooding problems, and also describes other programs used to assess and mitigate flood problems in the county.

Existing Flood Control Facilities and Programs

Large Regional Structures

In response to the frequency and extent of past flooding in Maricopa County, the District and other agencies have built a number of flood control structures. Many of these structures are primarily for flood control. Others, such as dikes on the upstream side of the CAP canal, were built for different purposes but have indirectly contributed to some measure of flood control. **Table 2** lists all the proposed projects to mitigate the flooding problems identified in the 1963 Comprehensive Report. Since the District's inception, channels, basins, storm drains, and other structures have been completed. Many of these projects were turned over to the project partner to maintain after completion. Dams, flood retarding structures, and levees built by the federal government or District are listed in **Tables 3 and 4**. Also noted is the year built and underlying ownership.

The Operations & Maintenance Division of the District working in coordination and cooperation with the Engineering Division and the Planning and Project Management Division (Dam Safety Branch) work toward a common goal of ensuring the reliability, safety, and structural efficiency of more than 80 flood control structures throughout the 9,226 square miles of Maricopa County. These structures include 22 dams, 370 acres of basins, 41 miles of lined channels, 81 miles of unlined channels and more than 60 additional structures, including levees and drains. The District manages four flood control dams (dams) under operating agreements with the U.S. Army Corps of Engineers (USACE) and sixteen flood control dams (flood retarding structures – FRS) under operating agreements with the Natural Resources Conservation Service (NRCS). In addition, the District owns and manages Casandro Wash Dam within the Town of Wickenburg and McMicken Dam (constructed by USACE but now owned by the District), and manages 24 levees.

Planning – Flood Hazard Identification

The District's planning program emphasizes a regional, uniform, and coordinated approach to watershed management. Planning functions began with the initiation of Area Drainage Master Studies (ADMS) in 1983, intended to regulate development and establish plans and drainage criteria for use by the development community. The objective is to plan and facilitate implementation of flood control projects in the shortest time possible coupled with the lowest total cost, while balancing social and environmental considerations. A second important goal of the planning program is to identify potential flood control and stormwater management problems prior to the onset of new development. The objective of this goal, through sound planning, is to avoid or minimize the future need for publicly-funded structural flood control projects.

ADMS's are completed and implemented by the District to alleviate flooding and drainage problems within the county through awareness, regulation, and structural projects. In order to determine the location and need for flood control structures and other means of reducing the impact of floods in Maricopa County, the District has conducted flood hazard identification studies for over 45 percent (3,731 square miles) of the county.

Floodplain Delineation Studies (FDS) are completed as part of ADMS's or done independently on washes to identify the hazard area preferably before development occurs in and around the watercourses. In some cases, watercourses are re-delineated as new technology and data are available and to reflect changes that may have occurred over time. Floodplain delineation studies have been completed for approximately 4,000 lineal miles of county rivers and washes. ADMS and FDS completion represents one of the key opportunities for the District to forecast and defend against hazardous flooding, particularly as the county population grows and development increases. **Map C** show the ADMS's that have been completed and are in process and **Map D** indicates upcoming delineation studies.

Capital Improvement Program

Every year, the District selects countywide capital projects that provide flood control benefits as well as contribute to community development, maintain the benefits of existing watercourses, help protect natural habitat and landscapes, and provide multiple-use opportunities for our citizens and visitors. Funds are directed through the 5-year CIP, for regional flood control projects, and projects approved through the Small Projects Assistance Program (SPAP), which provides rapid implementation for local drainage projects with lesser but urgent impacts. For the current fiscal year, the District is committed to 47 CIP and seven SPAP projects and the preliminary fiscal year 2016 program contains 38 CIP and twelve SPAP projects.

Dam Safety Program

The District operates and maintains 22 flood control dams, which provide highly beneficial flood protection for significant portions of Maricopa County. Most of these dams are the main flood control features of federal flood control projects for which the District was the local sponsor. The District's Dam Safety Program is made up of three major components: Dam Rehabilitation, Structures Assessments and Repairs, and Recurrent Dam Safety Activities.

All District dam rehabilitation and dam modification funding are included in the CIP. With the completion of the White Tanks FRS No.3 Dam Rehabilitation Project in 2011 and the completion of the Spook Hill FRS Rehabilitation Project in 2008, seven dams now remain to be rehabilitated, and two are to be modified. The District is partnering with the NRCS for cost sharing of most of the dam rehabilitation projects - cost share split is generally 65 percent federal and 35 percent local. To date the District has received approximately \$120 million in obligated federal funding from NRCS for dam rehabilitation.

The extension of the project life of District dams through overall rehabilitation provides significant long-term flood protection benefits to the downstream communities. For example the benefit to cost ratio of the Spook Hill FRS Rehabilitation Project was estimated to be 56 to 1, with estimated average annual flood damage reduction benefits of \$23 million per year.

The Structures Assessments and Repairs component is an assessment and evaluation of the physical condition of the District's 22 dams and related features. It assures continued compliance with current regulations and implements short term and interim term measures for the safe operation and proper functioning of the dams required beyond normal operations and maintenance requirements. Site-specific dam safety issues are investigated and repaired or corrected as needed. Overall dam rehabilitations typically cost in the tens of millions of dollars and can take many years to obtain cost share funding from the federal agency that built the dams. The Structures Assessments and Repairs element of the Dam Safety Program therefore allows the dams to be kept safely in service until rehabilitation funds can be obtained and the rehabilitation project can be planned, designed and constructed.

Operations and Maintenance

The District owns, operates and maintains 83 flood control structures, including 22 dams/flood retarding structures totaling 64 miles in length, 150 miles of channels and levees, 250 acres of basins and 40 acres of general flood hazard mitigation property. Flood control structures require regular inspections and maintenance to function as designed and provide the maximum flood protection. This maintenance is performed by the staff of the District's Operations and Maintenance (O&M) Division. This year the District is adding the Loop 303 project to the maintenance program. This structure is 4.5 miles in length. The District's most significant structures are approaching their design life, maintenance costs will continue to increase on a long-term basis to extend the life of these structures. Increase in expenditures in this activity will be due to an increase in

maintenance personnel and contracted repair work. Maintenance is tracked in a Work Order System and prioritized.

Other maintenance efforts include Recurrent Dam Safety Activities such as dam safety inspections, outlet pipe inspections, field surveys, land subsidence monitoring, and earth fissure monitoring. Dam safety inspections are performed on an annual basis by District staff. Inspections of outlet pipes by video camera are performed every five years. Field surveys of the dams are required to monitor physical changes to the dams due primarily to embankment and foundation settlement and land subsidence.

Other Mitigation Efforts

Over the years, the District has partnered with a number of the cities in Maricopa County to construct 10-year to 100-year solutions to help alleviate some of the more common nuisance flooding. These projects are submitted through the CIP Prioritization Procedure (CIPPP) competing with the larger regional projects. The CIPPP is intended to address projects that provide regional solutions for flooding hazards. The District recognized that, particularly in urban areas, localized flooding hazards exist in locations where major structural solutions would be impractical. In May 2009, the BOD adopted the Small Projects Assistance Program (SPAP) to address this. The SPAP provides a mechanism for the District to commit funding, on a limited basis, to advance localized solutions in these situations and was revised March 2015 to allow small projects in the unincorporated county. Through fiscal year 2015, the District has received 69 requests and has funded 38 projects under this program in partnership with six communities.

A Floodprone Properties Acquisition Program was adopted by the Board in 1995 and has been updated several times. The Floodprone Properties Assistance Program (FPAP) was revised and adopted in 2006 to include flood proofing where feasible. Since the last program revisions, nine homes in high risk areas have been removed from floodways and floodplains. The FPAP was revised in March 2015. Participation in this program is strictly voluntary; interested homeowners may submit an application directly to the District for consideration.

Emergency Action Plans (EAP) are required for all jurisdictional dams by the State of Arizona and are updated periodically under consultant contracts or in-house. The Dam Safety EAP updates are managed by the Engineering Division of the District. EAP's are also being developed by the Floodplain Management and Services Division (FMS) of the District for the levees as part of the FEMA Levee Certification program. While the EAP's do not physically protect property and lives, they provide a warning and plan of action to move people out of harm's way during flood emergencies.

Multi-Use Opportunities

The District seeks to balance the beneficial functions and resources of natural floodplains with the need to protect life, property, and infrastructure. This is accomplished by a proactive multi-objective planning and design process that considers flooding, community, and ecosystem concerns. Constructed flood control facilities can replicate the "natural" functions of floodplains if designed and built in a sustainable, sensitive manner.

The District has also made a commitment that new flood control projects not only help protect



people and property from flooding hazards, but also provide beneficial opportunities for multi-purpose uses. These benefits may include open space, increased protection for natural habitat, recreational facilities, and aesthetically pleasing designs that contribute to the environment of communities and revitalize urban areas. The District started the Landscape Program in 1992, and 25 projects have been built that incorporated multi-use opportunities. Indian Bend Wash constructed by the USACE and completed in 1985 was an earlier example. Projects such as the El Mirage Wash Basin and Storm Drain are recent examples of the approach the District takes to partner with communities to provide structures that add protection and recreational benefits to the region.

Outreach and Notification

Flood Warning

Outreach from the Flood Warning Branch takes several forms – via our website, the Meteorological Service Program (MSP), and through social media. The District’s web site provides up-to-the-minute and historic rainfall, stream flow, impoundment, and weather data from 350 plus environmental monitoring sites throughout Maricopa and surrounding counties. The MSP provides daily weather forecasts, flood watches and flood warnings tailored for more than 125 emergency response agencies and recreation safety officials at all levels of government, allowing longer lead-times and more accurate responses to many different hazards, including flooding. Additionally, the Flood Warning Branch took the lead for the District in distributing information via social media. Facebook & Twitter accounts allow ‘followers’ information on rainfall rates and locations, hazardous conditions due to flooding, storm formation and motion, and forecast availability.

Communication and Outreach

The public information office uses multiple communication and outreach channels to promote flood safety and responsibility. In addition to traditional marketing mediums such as advertisements via radio, newspapers, television spots and billboards, the information office also manages the District’s Twitter, Facebook, and YouTube social media accounts. Since being launched in June 2014, the District’s social media accounts have created instantaneous two-way communication with the media, citizens, and stakeholders throughout the county. Additionally, increased focus on school presentations, through the creation of a new activity book and formatted classroom appearances, has increased the District’s visibility in primary-age schools. Library displays which advertise the classroom presentations and provide access to the free activity books have been placed in six county libraries. Finally, the creation of a new website will help to promote the District as an easy-access agency to citizens and stakeholders throughout the county.

Floodplain Management

District staff respond to an average of 5,000 customer inquiries a year about flood insurance, property in a floodplain, general flood information, and specifics about permitting. Staff provide maps and Special Flood Hazard Information forms for owners to give to lenders and insurance companies; research parcels regarding grandfathering and pre-FIRM for flood insurance needs; and meet with customers in the office and field to discuss what can be developed in the floodplains. Staff also visit properties after storm events to see drainage patterns and flood damage, offer FEMA information on floodproofing and other protection for future development. The District also performs floodplain management for 14 of the 24 cities and towns in Maricopa County. Duties include issuing floodplain use permits, assisting with FEMA audits for the National Flood Insurance Program and Community Rating System, and offering floodplain expertise and enforcement as needed by the community.

Summary

Since the creation of the District in 1959, 68 flood identification studies have been completed and 151 flood control projects have been built. In addition, 246 projects have been identified or approved through the yearly

CIP prioritization procedure. During this timeframe, the county's population has grown by over 3 million. **Map E** shows the completed projects through fiscal year 2014.

The District has taken on the maintenance of 16 federally built structures, while the maintenance responsibility for 90 structures out of the 151 has been turned over to our project partners. The 151 projects built from 1983 through 2013, represent an investment of over \$2.3 billion county-wide for flood protection. Many of these projects in addition to flood protection enhance the area and provide for recreation activities. The full list of these projects is found in **Table 5**. We are still completing projects identified from prior years. The 246 projects identified and approved to date and those that were submitted from ADMS's and partners total nearly \$2.3 billion. **Map F** shows the projects identified in the current CIP. Many of these projects were submitted in response to the flooding and intense storms last August and September. Responses received from 17 partners totaled in \$1.53 billion dollars in requests. These responses are located in the Appendix.

In addition to the structures built over time, the District has numerous other programs in place for helping mitigate flood losses and to warn the public. The combination of structures and programs gives the District a range of solutions to help mitigate flood control problems. The next section will address how we use these options and collaborate with our partners to continue to address growing population and development interface with flooding concerns.

Recommendations

Cooperation Between the District and Owner(s) of Existing Facilities

Federal

The District coordinates with multiple federal, state and local agencies to implement the requirements of the Federal Emergency Management Agency (FEMA), the USACE, the Arizona Department of Water Resources (ADWR), and other state and county requirements. As noted in **Tables 3** and **4** the District manages a number of federally built structures. The District also coordinates with the NRCS (formally the Soil Conservation Service) on rehabilitating nine major flood control dams (2 completed, 4 ongoing and 3 future), that now protect large areas of urban growth. The District has regularly received funding from NRCS for the rehabilitation of five dams built by NRCS in the past. The most recent allotment of NRCS dam rehabilitation funding was in 2014 for \$82 million and is required to be spent over the next four years. Funding to date from NRCS totals about \$120 million (expended and obligated).

Most of the structural projects in the early years of the District's operation were constructed through cost sharing agreements with federal agencies, such as the USACE, the U.S. Department of Agriculture, and the Soil Conservation Service. In most instances the federal cost share partner pays for project construction and the District furnishes the land on which the structure is built. Once the project was completed, the District as the local sponsor was required by formal agreement to operate and maintain the project features and to perform other Project management responsibilities as needed for the life of the structures. These responsibilities include inspections for dam and levee safety, land management, flood monitoring and warning and EAPs. Note, federal funding for new flood control projects has been steadily declining and decreasing in the last twenty years as federal budgets have been reduced. Today, with the recent exception of NRCS funding for dam rehabilitation projects, most cost sharing has been with local municipalities and county agencies, with limited monies from various state agencies.

USACE – The District manages 4 USACE dams under operating agreements with the USACE. The District participates in the USACE Rehabilitation Program (RP) funded by Public Law PL84-99 for many of its flood control dams and levees. There are 14 levees (60 percent of total) and 6 dams (27 percent of total) that are currently in the Rehabilitation Program and eligible for flood damage repair assistance. The District regularly inspects all structures while the USACE performs periodic levee inspections on approximately a five-year cycle. The District provides all funding for levee maintenance unless there is substantial storm damage. All of the District's levees meet federal standards and are either Accredited or Provisionally Accredited by FEMA as a result of the District's engineering efforts for levee certification. The Corps typically inspects their six dams annually.

FEMA –Cooperating Technical Partner (CTP)

The District has participated in FEMA's CTP program since 2001. During that time the District and FEMA collaborated to update all the Flood Insurance Rate Maps (FIRMs) for Maricopa County that became effective in 2005, and are currently in the final stages of a partial update to 100 FIRM panels. The District and FEMA have also partnered on several floodplain delineation studies in order to identify those areas vulnerable to flooding. In 2014 the District entered into a CTP agreement with FEMA to develop two ADMS and the data needed for FEMA's Risk MAP program. FEMA is working with federal, state, tribal and local partners across the nation to identify flood risk and help reduce that risk through the Risk Mapping, Assessment and Planning (Risk MAP) program. Risk MAP provides high quality flood maps, information, and tools to better assess the risk from flooding to communities to help them take action to reduce (or mitigate) flood risk.

State

Arizona Department of Water Resources is the regulatory authority for the 22 “in service” flood control dams managed by the District. Typically ADWR attends annual inspections performed by the District and prepares its own inspection reports. The District is required by law to pay for these ADWR inspections. ADWR formally issues dam safety deficiency notifications under various classifications of severity. All ADWR dam safety deficiencies are actively being addressed through dam rehabilitation projects. ADWR issues “permits to construct” for District dam rehabilitation projects, which can be obtained only after a highly rigorous review process.

Over the years the District has had occasion to work cooperatively with the Arizona Department of Transportation (ADOT) on a number of flood control projects. In the 1980s/1990s the District partnered with ADOT, Phoenix, Tempe and the SRPMIC on the design and construction of the channelization of the Salt River from the Sky harbor airport upstream to the Indian community. Additional examples of collaboration include the new Loop 202 project in the east valley. This impacted the existing Spook Hill flood retarding structure, the District and ADOT entered into a partnership that included improvements to the Spook Hill FRS which also accommodated the new freeway. Recently, the District worked with ADOT as part of the Loop 303 freeway project to include improvements to the freeway drainage channel, increasing its capacity allowing the channel to function as a regional storm water drainage facility.

Local

The Cities and Towns in Maricopa County, including unincorporated county, must have a FEMA-approved local mitigation plan in order to receive project grants. The Maricopa County Multi-Jurisdictional Hazard Mitigation Plan outlines the jurisdiction’s commitment to reduce risks from natural hazards and serves as a guide for decision makers as they commit resources. Maricopa County Department of Emergency Management takes the lead on this Plan and along with the District, other participating jurisdictions, tribal nations, and Salt River Project completed the first Plan. A full update is required every 5 years by FEMA and the current approved Plan was in April 2010. Maricopa County just finished with meetings, information gathering, and progress reporting for the 2015 update to the Plan. The Plan’s estimated submittal to FEMA is in May 2015.

Generally new projects are partnered with our customer cities and towns. Through the CIP prioritization process, requested projects are evaluated and may be recommended for future funding. When project partner interest and funding becomes available, intergovernmental agreements will be developed allowing a project to move forward through design and eventual construction. The responsibility for operation and maintenance of a completed project most always falls to the project partner and local jurisdiction where the project is located. The District also partners with cities and towns on ADMS’s that often cross multiple jurisdictional boundaries.

Over the past 10 years the District has partnered with MCDOT on a program to barricade roads that flood. MCDOT funded approximately two dozen ALERT gages upstream of hazardous road crossing to give advanced warning of flooding. These gages are displayed continuously on MCDOT’s Traffic Management Center. Also, the District has embarked on a program to install signs with flashing lights to warn motorists of an impending flood at hazardous crossings. The flashing signs are activated automatically by either an upstream rain or stream gage. Currently two sets of these signs are installed with more planned if testing shows them successful in reducing risk.

Private

Regional flood control facilities are typically beyond the scope of what private development can do outside their site boundaries. Developers and property owners are invited to attend and participate in public meetings, stakeholder meetings, and Project Aesthetic Advisory Committee meetings. In these meetings, developers

provide input and feedback on the project design. When rights-of-way for a facility are required through an existing or future development, the District works with and coordinates facility designs, road crossings, and rights-of-way needs with the developer's land plan or existing features. In certain instances, the District has entered into cost-share agreements with developers to construct ultimate road and utility crossings of the facility to avoid more expensive retrofits or culvert extensions by the developer later on.

Recommendations and Preliminary Plan

Hazard Identification and Mitigation Programs

To address the design, construction, and acquisition of drainage infrastructure to carry out the purpose of the District, a five-year CIP is updated each year. In conjunction with the five-year plan, a general overview is created to show facts and figures along with project descriptions, schedules, estimated costs, maps, and partnering information. **Map F** shows the capital improvement projects for FY2015-2019. Details of these projects can be found on the District's web page.

Based on current tax rates, the proposed total five-year flood hazard identification and mitigation program budget is estimated to be \$240 million.

The 5-year construction budget (CIP) is \$210,000,000:

- FY16: \$59,000,000
- FY17: \$54,000,000
- FY18: \$47,000,000
- FY19: \$25,000,000
- FY20: \$25,000,000

In addition to the CIP, the District budgets \$4,000,000 a year for planning studies, \$1,500,000 a year for floodplain delineations, and \$800,000 a year for dam safety efforts.

Other Programs

In addition to capital projects, the District has a variety of other programs that provide different strategies for mitigating flood hazards. The Floodprone Properties Assistance Program (FPAP), established in 1995 and updated several times, is a voluntary program where a structure in the floodway or having flood damage in the floodplain could be purchased by the District and demolished. Property Owners receive payment for the property and incidental funds for relocation. An additional tool was added in 2006 to the FPAP to allow floodproofing if feasible. This allows owners to stay in the same location but the structure is elevated or floodproofed to mitigate flood damage. The Small Projects Assistance Program (SPAP) provides up to \$250,000 matching dollars toward more localized solutions for cities and towns, and now unincorporated county, to mitigate smaller flooding problems. The Capital Improvement Program Prioritization Criteria evaluates proposed structural projects on their merits based on specific criteria. Recommendations to several District policies were requested from the Board during the Strategic Planning and Budget process. Amendments to the FPAP, SPAP and CIP Prioritization Criteria were adopted by the BOD March 25, 2015.



Funding for the FPAP is contingent on availability of funds and community need. Within Maricopa County there are currently 3,543 homes in the floodway, and 27,648 homes in the floodplain. A portion of these structures were built after floodplain delineation and now meet regulatory standards so risk is reduced. 2015 Revisions to the FPAP include a cap on the amount for each property purchase and relocation costs and refined the qualifying criteria.

The SPAP has been amended to allow implementation of small projects within unincorporated Maricopa County. Previously projects could only be submitted for incorporated areas.

Changes have been made to the CIPPP and approved by the BOD that adjusts points received for various criteria in the CIPPP process. The most significant point change is for the criteria that emphasizes the need for project cost share from the submitting agency.

Funding

The District's budget is separated into two main categories: the Operating Budget and the CIP. Revenue from the property tax (FY2014 rate of \$0.1392 per \$100 of assessed valuation) and the other sources is used for the CIP and operations expenditures. The District's expenditures for Fiscal Year 2014 were \$71,642,641 million. \$40 million of this was budgeted for the CIP, and \$33 million for operations.

District infrastructure assets consist of drainage systems, dams, flood channels and real property. Their value is reported using the depreciation approach and a straight-line method of depreciation. As of June 30, 2014, District infrastructure-related assets consisted of land, infrastructure, and construction in progress of \$254.3, \$178.9, and \$215.8 million, net of any related accumulated depreciation.

Intergovernmental Participation

Revenue generated from intergovernmental agreements can be substantial, generating \$17.1 million for Fiscal Year 2001-2002. Current revenue from partnerships is anticipated to be approximately \$34 million in FY2016, \$30 million in FY2017, \$25 million in FY2018, \$4 million in FY2019, and \$3 million in FY2020. The high amount from FY2016-2018 is due to federal NRCS funding for rehabilitation of specific old Soil Conservation Service dams. Participation revenue from cities and towns for the past five fiscal years has declined on an annual basis, and totals approximately \$43.5 million. Cost share on structural projects is at least 50/50 with other agencies, except in hardship cases.

Since inception of the District, approximately \$2.3 billion has been expended on flood control structures in Maricopa County. The peak construction period was in the 60's and 70's, with nearly 60 percent of the funding coming from federal sources. With the large expansion in structures, the District's role was broadened to include operations and maintenance and requires ongoing structural assessment. The District is currently looking for partnerships to continue the dam and structure rehabilitation.

Additional Funding Resources

During the Strategic Planning process in 2014 the BOD recommended the District staff explore all funding opportunities. Almost all programs and grants would require a substantial District match. The following is a list of potential funding opportunities:

- Regional Conservation Partnership Program
- Water Infrastructure and Resiliency Finance Center
- Qualified Public Infrastructure Bonds
- Five Star and Urban Waters Restoration Grant Program

- Hazard Mitigation Grant Program
- Pre-Disaster Mitigation Grant Program
- Flood Mitigation Assistance Program
- Preparedness (Non-Disaster) Grants

On November 5, 2014 a Presidential Major Disaster declaration was authorized for Maricopa County due to the significant precipitation and flooding September 7-9, 2015. The declaration makes Hazard Mitigation Grant Program (HMGP) funds available (HMGP DR-4203). Hazard Mitigation Grant funds are currently being pursued to expand the ALERT system, prepare an updated emergency action plan for McMicken Dam, and to provide public outreach tools to teach communities about flooding. As part of the HMGP, the District is receiving Public Assistance funds based on damage to infrastructure. Total reimbursement for debris removal and repairs is established as \$2.4 million.

Summary

During the early years of the District, the focus was on large regional facilities to alleviate widespread flooding due to rapid development in the 1950's. In addition, the Soil Conservation Service, now the NRCS, built several large structures to protect farmland on the periphery of the urban area. These areas are now largely urbanized and the dams transferred to the District are essentially protecting structures and lives.

The District functions have continued to evolve over the 55 years since its creation. While regional structures are still needed in urbanized areas to address the development from earlier decades, these structures now serve multi-use opportunities such as recreation, trails, and open spaces. Projects are completed in partnership with many agencies and the District is continuing to expand on these opportunities.

Additionally, other programs such as FPAP and SPAP give the District tools to use when regional structures are not feasible. The District ALERT system, Emergency Action Plans, Flood Response Plans, and continued diligence toward keeping the structures, dams, and levees maintained provides continued protection to residents and visitors to Maricopa County.

The structures, from large regional to the more localized, in addition to the other programs and notifications elements such as the ALERT system and Emergency Action Plans comprise a comprehensive system that plays a critical role in protecting the public. Never was this more evident than during the 2014 Monsoon. The success of the many structures built over time that performed their designed function kept millions protected from the numerous large storms from August through September 2014. Homes located in the floodway that had been purchased years earlier through the FPAP would have received considerable damage if they had not been removed and if washed downstream may have damaged other property. Real time data on rainfall, dam impoundment, and streamflow was in the hands of law enforcement and emergency responders through the District's mobile applications and website. Emergency Actions Plans for dams and communities are available and regularly updated in the event an evacuation is needed. The positive results of annual practice flood drills and regular maintenance of structures was realized in 2014 when teams manned their stations and mobilized to the field to get information out, monitor structures to assure the public was protected.

Program for Carrying Out the Regulatory Functions

Floodplain Regulations

Arizona Revised Statutes Sections 48-3601 through 48-3650 direct each county Flood Control District Board of Directors to adopt and enforce floodplain regulations consistent with criteria adopted by the Director of Arizona Department of Water Resources. The floodplain regulations adopted by a district are intended to carry out the requirements of the National Flood Insurance Program (NFIP) set forth in 44 Code of Federal Regulations parts 59 through 78, as effective on January 1, 2005. In 1973, the State of Arizona passed legislation that authorized cities, towns and counties to adopt floodplain regulations for the management of watercourses within their jurisdictions. The District adopted the Floodplain Regulation for Maricopa County February 25, 1974. The Regulations are reviewed periodically and updated to keep current with federal policy and local conditions.

The Floodplain Management and Services Division (FMS) of the District regulates development in the delineated floodplains for unincorporated county and 14 of the cities and towns within the county. The remaining ten cities and towns assumed the powers and duties of their own floodplain management by adopting Resolutions stating their intent to assume functions of permitting and enforcement including the adoption of floodplain management regulations. Regulations include floodplain use permits, inspections, and compliance. The Technical review for Floodplain Use Permits for development in the unincorporated county is performed in conjunction with other permit requirements by the County Planning and Development Department. When regulating floodplains, the District first identifies flood-prone areas through floodplain delineations and then limits or restricts land use within those areas. These activities, in addition to others, earn flood insurance premium reduction credits for unincorporated county residents through the NFIP-Community Rating System program.

The Floodplain Regulations for Maricopa County are designed to ensure that proposed development is free from flood damage during the one-percent annual chance flood, and does not cause damage to other properties. Reduction of the risk to life and property is also achieved through compliance inspections in conjunction with approved permits. Once development has occurred in a floodplain District staff will continue a long-term relationship with property owners responding to inquiries on flood insurance, providing documents from these permits to future owners, visiting sites after storm events, and providing information for any additional development.

Sand and Gravel Operations in the Floodplain

The District has regulated sand and gravel mining within watercourses since February 25, 1974, when the county's first floodplain regulations were established. Like all other floodplain activities, sand and gravel mining regulations are based on federal and state requirements for floodplain management. The Floodplain Regulations for Maricopa County define development standards and permit requirements for sand and gravel excavation within flood zones.

There are a total of 38 active sand and gravel Floodplain Use Permits for operations including 7 voluntarily suspended. The permit process and follow-up is a long-term relationship between staff and the operators as regular inspections and renewals of permits occur for the life of the operation.

Unincorporated County

The District processes from 300-400 applications for Floodplain Use Permits for unincorporated county each year. During the recent building boom of 2005-2007, permits applications exceeded 1,000 each year with

Building Permits averaging around 16,000. The County processes an average of 7,000 Building Permits annually for unincorporated county, with properties in the floodplain equating to about 5 percent of the total.

Dependent Communities

Approximately 100 Floodplain Use Permits are processed for the 14 communities that the District does floodplain management for each year. Applicants start at the community which checks for floodplains on parcels. If property is in the floodplain the community refers them to the District. Applicants can submit electronically to the District or apply in person. Permits are issued to the applicant and a copy sent to the community.

District Property

The District owns 26,790 acres of property held in fee title, and controls an additional 27,470 acres of property via various easement interests, in support of the numerous structures we operate and maintain. Often utilities and other services need to access District property to extend infrastructure. Permission from the District is required to enter the property and to construct. Easements may need to be issued and the project will be reviewed by District staff to assure that District structures will not be damaged or compromised due to the project. Of this land area, 17,418 acres (65 percent) of the property held in fee and 14,274 acres (52 percent) with easement interests are in designated floodplains and a Floodplain Use Permit is required before work can be performed.

Enforcement

Article Seven of the Floodplain Regulations describes the process for enforcing the Regulations and establishing compliance, to assure that property owners build safely, structures are not damaged by flooding, and that surrounding properties are not adversely affected. District staff responds to concerns of development without permits and works with property owners to remediate the issue. The goal is compliance so that structures and surrounding property are not damaged by flooding.

National Flood Insurance Program (NFIP) and Community Rating System (CRS)

In 1970, Maricopa County entered into the NFIP Emergency Program, which provides a limited amount of flood insurance coverage for structures. Flood Prone Area Maps, developed by the United States Geological Survey (USGS), were used for floodplain management during this time. The USACE was also preparing maps and delineated portions of major watercourses such as the Salt, Gila, Agua Fria and New rivers and Skunk and Cave creeks after the District entered into the Emergency Program. The District has since updated mapping for most of these areas, and continued to participate in the NFIP. The County has remained in good standing in the program.

In 1990, the County entered into the CRS program. This is a program in which the County agrees to be rated by the federal government on its effectiveness in performing floodplain management. Citizens within rated communities may be eligible for flood insurance premium reductions based on the community's rating. District activities, including structures and the ALERT program, which are performed on a regional or inter-jurisdictional basis can be used by local communities for credit in their CRS scoring. Maricopa County is rated in the top one percent in the nation in the CRS program. Maricopa County is a Category C community (10 or more repetitive losses). The County has participated in the NFIP's Community Rating System since 1991. Through the FEMA accreditation process, the County is now at Class 4, which gives residents of unincorporated Maricopa County up to a 30 percent discount on their flood insurance. Annual reports are submitted to FEMA on program results and regular audits are conducted by FEMA.

Summary

The Flood Control District of Maricopa County identifies floodplain hazards and prepares delineations for these watercourses, ponding areas, and alluvial fans. These delineations are submitted to FEMA and then placed on the Flood Insurance Rate Maps (FIRM). The District enforces activities in delineated floodplains through the Floodplain Regulations to guide safe development in these areas. Over the 40 years the Regulations have been in place, county and city populations have continued to increase with substantial development occurring in the floodplains. Property owners can utilize their floodplain property by building safely in accordance with the Regulations.

The NFIP is aimed at reducing the impact of flooding on private and public structures. This is achieved by providing affordable insurance for property owners and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improved structures. If a community participates in the NFIP then anyone who wishes to purchase flood insurance can obtain a policy, you do not need to be in a delineated floodplain. Flood insurance is the best way for property owners to protect themselves from devastating financial loss. Flood insurance is available to homeowners, renters, condo owners/renters and commercial owners/renters. District submittal of delineations to FEMA with the placement on FIRMs triggers an alert to lenders to require flood insurance on structures in the floodplain if federally backed mortgages are sought by property owners at any time a loan is requested on a parcel. Due to the many programs that the District and county agencies have in place, these property owners can receive discounts on their flood insurance.

Tables

- 1 – Major Flood Events and Past Flooding Damage
- 2 – Projects by Group from the 1963 Program Report
- 3 – Flood Control District Dams and Flood Retarding Structures
- 4 – List of Levees (with original agency who constructed)
- 5 – Historic Project Expenditure Information (1983-2013)
- 6 - Acronyms Used In This Report

Exhibits

- Map A Rain Gage Location Map
- Map B Floodplain Delineations
- Map C Area Drainage Master Studies
- Map D Future Delineation Studies
- Map E Map of all Existing Facilities (2 pages)
- Map F Map showing the District boundaries and location of the work proposed to be done and property taken or damaged (CIP FY2016-2019)

Appendix

- Letters from Cities and Towns for Flood Mitigation Requests

Table 1 Major Floods and Past Flooding Damage 1891 to Present

Date	Remarks
February 18-26, 1891	First record of major flood in Phoenix area. Salt River estimated to have a peak flow of 300,000 cubic feet per second.
August 21, 1921	~ 4,000 acres flooded including the state capital. Damages estimated at \$240,000.
July and August, 1951	Severe flood damage to homes, highways, railroads, agricultural infrastructure and crops in and surrounding the towns of Litchfield Park, Goodyear and Avondale. The Luke Air Force Base, Goodyear Aircraft Plant and the Litchfield Naval Air Facility were all under water. Damages estimated in excess of \$3,000,000.
August 19-20, 1954	Flooding from heavy rains in the Superstition Mountains caused \$446,000 in property damage & \$1.4 million in crop damage in what is now Queen Creek, Gilbert & Chandler.
August 1963	Damages for Phoenix (Maryvale) and Glendale equal \$2,900,000.
December 22, 1965 - January 2, 1966	First large flow through Phoenix since reservoirs were built on the Verde River (1939). Damages equal \$10,000,000.
September 5-7, 1970	Eight lives lost. Damages equal \$5,800,000.
June 1972	Damages for Phoenix Metro area equals \$10,588,000.
March 1978	Salt River had a peak flow of 122,000 cubic feet per second. Damages estimated at \$33,138,000.
December 1979	Salt River has a peak flow of 140,000 cubic feet per second. Damages estimated at \$51,800,000.
February 1980	Salt River has a peak flow of 170,000 cubic feet per second. Damages estimated at \$63,700,000.
September 27 - October 3, 1983	Flooding is attributed to Tropical Storm Octave off the coast of Baja California. Although Maricopa County was not one of the eight counties in Arizona to be declared a major disaster, damage was done to residences, agricultural areas and roads.
January 7-8, 1993	Salt River has a peak flow of 124,000 cubic feet per second. Two lives were lost (kayaking on river) and over 200 families throughout the County were evacuated from their homes because of flooding.
September 25-26, 1997	Flooding from Hurricane Nora results in the breaching of Narrows Dam in La Paz County. The calculated 24-hour, 100-year rainfall amount in NW Maricopa County was exceeded at six ALERT measuring sites.
October 21, 2000	Rain described as heavy and destructive fell in western Maricopa County. Centennial Wash was hit especially hard.
February, 2005	Following several months of above-average rainfall, a series of storms in February caused many of the major rivers in Maricopa County to carry significant flows. Several houses & a bridge were damaged due to bank erosion, total damages were estimated at \$6.5 million.
August 2, 2005	One of the heaviest rainfall events of the 2005 season hit the Phoenix area, where almost three inches of rain fell in many locations in the metropolitan area, which caused roofs to collapse & streets to flood quickly. Nearly 120 residents of an apartment community in Phoenix were evacuated after 83 apartment units were damaged by floodwaters.

August 9, 2005	Heavy rains from widespread thunderstorms caused flash flood waters to over-flow washes from New River east to the Seven Springs area & Camp Creek. Rain gage networks indicated that up to 4.5 inches of rain falls during the late afternoon and early evening. Two fatalities occurred during this storm: A pickup truck driver drowned while attempting to drive across a flooded road, and a seven-year-old girl was evacuated from a home along Camp Creek slipped from the grasp of the adult and was swept away by a flooded wash. Heavy rains during the afternoon flooded highways and roads in Queen Creek, while in Tonopah many roads were closed in the area due to rapid flooding.
September 3, 2005	Very heavy rainfall across the far northern portion of the Phoenix metropolitan area resulted in rapid runoff and flooding. The Seven Springs stream gage indicated a sudden jump of the water level, from zero to 8.5 feet, in only 20 minutes. The Camp Creek ALERT system gage recorded a total of 3.11 inches of rain, with 2.01 inches in one hour. Bartlett Road was washed out and impassable, trapping about 400 motorists as they were attempting to leave Bartlett Lake. In Phoenix, the heaviest rain storm was reported at the East Fork of Cave Creek at 7th Avenue, with flooding of many streets in north Phoenix.
July 25, 2006	Heavy rains created a sinkhole adjacent to an apartment building in Tempe, forcing residents to evacuate. Flood control basins in east Mesa were filled to capacity and pumping was required.
August 21, 2006	Some streets in northern Tempe were flooded, and the right-hand lanes of both eastbound and westbound U.S. 60 at Rural Road were closed due to heavy rain.
August 24, 2006	A rainstorm dropped two inches of rain in parts of the Northeastern Phoenix and North Scottsdale. Both bridged and bridgeless crossings on Indian Bend Wash were closed. Two motorists attempted to drive across the wash on Indian Bend Road in Scottsdale. They became stranded, prompting a rescue by 40 members of the Scottsdale Fire Department. Each motorist was fined for the rescue per the state law that prohibits motorists from driving on a road that is barricaded due to flood hazards.
September 7, 2006	Roads through Indian Bend Wash in Scottsdale were closed due to rainstorm runoff in the wash.
July 21-22, 2007	A late start of the monsoon brought heavy rain to the County. Sheet flooding in Queen Creek turned dirt roads to mud and caused a 1/4-mile-long, 12-foot-wide, 10-foot-deep fissure in the ground through a rural neighbourhood. Several swift water rescues were performed, including a 2.5-hour rescue operation in Queen Creek to save a motorist who had driven into a flood retention area.
July 23, 2007	Approximately two inches of rain fell in parts of the Phoenix metropolitan area, especially in the northern portion, where a mudslide closed a road in Cave Creek. The washes in the Gila Bend area were full due to the torrential rains in the area.
July 26, 2007	In the area of Indian springs road, just west of Phoenix International Raceway, rain fell in some areas at comparable magnitudes to the County 100-year and 500-year 1-hour rainfall.
July 31-August 1, 2007	Up to three inches of rain fell in parts of the northern Phoenix metropolitan area. Various east-west roads in North Scottsdale were closed due to flooded washes and mud flows. The impoundment pond behind Cave Buttes Dam received floodwater more than 20 feet deep.
November 30-December 1, 2007	The combination of copious Pacific moisture associated with the Baja remnants and dynamic triggered within the coastal system resulted in about 30 hours of moderate to locally heavy rain bands moving east across Central Arizona with the heaviest rain over the higher terrain of Northeast Maricopa County.

January 27, 2008	A daylong rainstorm soaked the county and dropped up to three inches of rain in the northeastern mountains. Cave Creek and New River flowed rapidly, with 14 feet of water held behind Cave Buttes Dam and 23 feet in the impoundment area behind New River Dam. A dozen roads in Cave Creek, Carefree and North Scottsdale were temporarily impassable due to flooded wash crossings. The Salt River Project (SRP) released more than 15,000 cubic feet per second of floodwater over Granite Reef Dam into the Salt River through the Phoenix metropolitan area.
July 10, 2008	The first major monsoon storm of the season hit with a fury, dropping more rain in a 12-hour period than during the entire 2007 monsoon season. A cluster of severe thunderstorms moved across northwest Maricopa County causing strong winds and dense blowing dust. A second cluster of severe thunderstorms moved into east-central parts of the county and converged over the Phoenix metropolitan area. The highest rainfall totals were in the Wickenburg area (one to three inches), and central Phoenix and northeast Mesa (one to three inches). 0.83 inches was recorded at Phoenix Sky Harbor International Airport, where the runways were shut down for a short period. Areas of street flooding occurred. Rising water forced the closure of Interstate 17 near downtown Phoenix.
July 13, 2008	A surprise, late-afternoon storm hit Tempe hard, where more than two inches of rain fell in less than two hours. A five-mile section of the U.S. 60 freeway through Tempe was shut down for three hours due to deep standing water across several lanes and beneath underpasses. The Arizona Department of Transportation activated pumps to drain the water.
Jan. 19-21, 2010	A powerful winter storm system, the strongest since 1993, brings heavy precipitation and causes \$4 million in damage. Much of the region receives 1 to 5 inches of total rainfall over three days, with up to 10 inches recorded by District gages in the mountains on the northeastern edge of Maricopa County. Depending on the location, the storm is a 25- to 100-year event, or having a one percent chance of occurring in a year. All major rivers, streams and washes have significant storm water flow rates. The District's flood control structures function as designed. Cave Buttes Dam has storm water 62 feet deep in the impoundment pool behind the dam while New River Dam holds back 42 feet. A state of emergency is declared in the county and state. Some roads close due to flooded washes. SRP releases water from upstream reservoirs into the Salt River.
July 31, 2012	An intense, slow-moving severe thunderstorm produced heavy rainfall in and around the Anthem community in north-central Maricopa County. The core of the storm remained nearly stationary over Anthem for approximately 70 minutes. Rain gages operated by the Flood Control District and independent weather observers recorded a range of rainfall amounts between 1.38 and 5.01 inches in a 90-minute period, with the highest amount verified by the National Weather Service Phoenix office. The one-hour rainfall in this storm exceeds the Flood Control District's highest recorded one-hour total of 3.58 inches at Vulture Mine Road near Wickenburg on July 21, 1986. Storm water runoff damaged several homes in Anthem, with up to three feet of flood water inside some of the structures.
August 12, 2014	A cluster of thunderstorms batters the South Mountain region of Phoenix, causing flooded roads, damage to agriculture, and flooded residences and businesses. Rain gages measure intensities in the 500-900 year range for the 2-hour storm duration.

August 19, 2014	Tropically-enhanced rain falls across northern Maricopa County causing very high discharges on New River, Skunk Creek and Cave Creek. Several home and businesses are damaged. Rain gages measure up to 500-year return periods. The discharge return period on New River is estimated at 320 years. Floodwaters broke over the west bank of Skunk Creek and inundated portions of I-17.
September 8, 2014	The most devastating storm to hit urban Phoenix since June 1972. Tropical moisture began to fall as rain in the early morning, and by morning rush hour many Valley cities were crippled. In a six-hour period some areas of the SE Valley received over 5 inches of rain – a 1,000 year return period. Flooded I-10 was closed for several hours. Homes in Mesa were flooded by an over-taxed system of flood basins on the north side of US 60.
September 27, 2014	This final major storm of Monsoon 2014 affected east valley cities and NE Maricopa County with rainfall return periods up to 50 years. The East Maricopa Floodway carried a discharge peak of nearly 3,000 cfs.

All of the suggested solutions for eliminating or minimizing flood control problems from the 1963 Program Report were reviewed and divided into four groups – projects for immediate construction, two groups subject to available funds, and projects deferred as not feasible. Most of the projects in Group one were completed with some being combined and being renamed. Today the current recommended projects are in two tiers.

Table 2 Projects by Group from the 1963 Program Report – Groups I, II, III, IV

Group No. I - Projects Recommended for Immediate Construction

Drainage Area	Location	Job Description	COSTS			Annual Benefits	Annual Costs	Benefit-Cost Ratio	Remarks
			FCD	Other	Total				
1	Gillespie Dam to 107th Ave.	Channel Clearing	250,000	1,000,000	1,250,000	141,600	80,800	1.75 to 1.00	Approved by U.S. Army Corps of Engineers
27	Lower Indian Bend	Floodway Channel	1,770,000	7,250,000	9,020,000	530,000	348,000	1.52 to 1.00	Approved by U.S. Army Corps of Engineers
19-23	Agua Fria, New River, and Skunk Cr.	Channel Clearing	250,000	1,000,000	1,250,000				Deer Valley Group
22	Arizona Canal-Cave Cr. To Skunk Cr.	Divert flood water North of Canal	944,000	7,060,000	8,004,000				Deer Valley Group
25	Dreamy Draw	Earth Dam	150,000	300,000	450,000				Deer Valley Group
22	North Mt.-Arizona Canal, 20th St. to 23rd Avenue	Construct Channel	1,400,000	1,926,000	3,326,000				Deer Valley Group
22	New River NW of Glendale	Earth Dam	2,770,000	2,002,000	4,772,000				Deer Valley Group
22	NW of Adobe	Earth Dam	832,000	2,301,000	3,133,000				Deer Valley Group
22	Lower Cave Cr. Dam Site	Earth Dam	871,000	5,824,000	6,695,000				Deer Valley Group
22	Union Hills Diversion	Lined Channel	500,000	1,500,000	2,000,000				Deer Valley Group
22	64th St. to New River	Total Deer Valley	7,717,000	21,913,000	29,630,000	2,232,000	1,296,000	1.72 to 1.00	
22	Maryvale-Glendale Drain	Lined Channel	320,000	1,462,000	1,782,000	99,000	68,000	1.46 to 1.00	Moved to Group 1 (1963 Flood)
22	Glendale-Peoria Drain	Lined Channel	426,000	2,552,000	2,978,000	166,000	113,000	1.46 to 1.00	Moved to Group 1
7	Casandro Wash	Earth Dam	60,000	0	60,000	4,500	2,500	1.80 to 1.00	FCD Project
7	Sunset & Sunny Cove Washes	Earth Dams	79,000	0	79,000	6,200	3,500	1.77 to 1.00	FCD Project
32	Buckborn-Mesa	Levees & Channels	3,574,000	3,855,000	7,429,000	500,000	281,000	1.78 to 1.00	Under SCS Study
12	Bender & Sand Tanks Washes, Gila Bend	Levees	152,000	114,000	266,000	12,500	10,700	1.16 to 1.00	Under Study by Corps of Engineers
TOTAL - GROUP I			14,348,000	38,146,000	52,494,000	3,691,800	2,203,500	1.68 to 1.00	

Recommended Projects Group II - Subject to Availability of Funds

32	Apache Junction-Gilbert	Levees & Channels	1,209,000	3,803,000	5,012,000	276,700	198,000	1.40 to 1.00	Under SCS Study
32	Mesa-Chandler-Gilbert	Channel	3,000,000	0	3,000,000	259,500	122,400	2.11 to 1.00	Urban Storm Drain
32	Williams-Chandler	Levees & Channels	837,000	3,738,000	4,575,000	326,000	189,000	1.73 to 1.00	Under SCS Study
9	Buckeye-Palo Verde	Levees & Channels	776,000	2,986,000	3,762,000	175,000	128,000	1.40 to 1.00	Under SCS Study
22	W. Phoenix-Maryvale	Channel	337,000	2,205,000	2,542,000	141,000	97,000	1.46 to 1.00	Moved (1963 Rain)
22	North Phx. Mt.-Old Cross-Cut Canal	Channel	966,000	2,360,000	3,326,000	232,000	136,000	1.72 to 1.00	Held Back (Group II)
TOTAL - GROUP II			7,125,000	15,092,000	22,217,000	1,410,200	870,400	1.62 to 1.00	

Recommended Projects Group III - Subject to Availability of Funds

7	Sols Wash	Channel Alignment & Protection	40,000	0	40,000	2,500	2,000	1.25 to 1.00	FCD Project
7	Powder House Wash	Earth Dam	50,000	82,000	132,000	10,000	5,600	1.79 to 1.00	Studied by Corps of Engineers
7	Cave Creek Town	Earth Levee	3,000	12,000	15,000	1,000	840	1.19 to 1.00	Studied by Corps of Engineers
31	Maxwell Dam (Flood Control)	Earth Dam	650,000	5,050,000	5,700,000	369,000	276,000	1.34 to 1.00	Cost of Flood Control
24	Cave Creek Dam (Old)	Levee	65,000	91,000	156,000	10,200	8,200	1.24 to 1.00	Studied by the Corps of Engineers
33	Queen Creek	Channel	920,000	880,000	1,800,000	90,000	72,000	1.25 to 1.00	FCD Project-Aid expected from U.S. Bureau of Indian Affairs
TOTAL - GROUP III			4,407,000	36,376,000	40,783,000	2,282,700	1,664,640	1.37 to 1.00	

Group IV - Projects Deferred as Not Feasible at this time

7	Flying "E" Wash Wickenburg	Earth Dam	0	183,000	183,000	4,500	7,200	0.62 to 1.00	Financing a question
26	Guadalupe Watershed	Levees & Channels	519,000	660,000	1,179,000	45,450	60,600	0.75 to 1.00	To be referred to SCS
26	South Mountain, 40th St. to 75th Ave.	Levees & Channels	2,652,000	6,251,000	8,903,000	253,000	351,000	0.72 to 1.00	To be studies by Corps of Engineers
28	Indian Bend Wash Above Arizona Canal	Channels	1,217,000	1,701,000	2,918,000	76,000	124,400	0.61 to 1.00	To be studied by Corps of Engineers
33	Santan Watershed	Levees & Channels	895,000	2,678,000	3,573,000	100,000	145,000	0.70 to 1.00	To be studied by SCS
4	Harquahala Valley	Levees & Channels	400,000	3,770,000	4,170,000	70,000	171,000	0.41 to 1.00	To be studied by SCS
6	Box Canyon	Earth Dam	652,000	6,948,000	7,600,000	290,000	325,000	0.90 to 1.00	To be studied by Corps of Engineers
7	Sols Wash (Matthie Dam)	Earth Dam	500,000	556,000	1,056,000	11,000	43,000	0.26 to 1.00	Studied for recreation
8	Upper New River	Earth Dam & Channel	50,000	450,000	500,000				Studied for recreation

Table 3 Flood Control District Dams & Flood Retarding Structures (FRS)

Dams	Region	Completed	O&M Agency	Federal Sponsor
Adobe Dam	N	1982	FCDMC	USACE
Apache Junction FRS and Floodway	E	1988	FCDMC	SCS/NRCS
Buckeye FRS No. 1	W	1974	FCDMC	SCS/NRCS
Buckeye FRS No. 2	W	1975	FCDMC	SCS/NRCS
Buckeye FRS No. 3	W	1975	FCDMC	SCS/NRCS
Casandro Wash Dam and Outlet	NW	1996	Wickenburg	
Cave Buttes Dam and Dikes	N	1980	FCDMC	USACE
Dreamy Draw Dam	N	1974	FCDMC	USACE
Guadalupe FRS	E	1975	FCDMC	SCS/NRCS
Harquahala FRS and Floodway	W	1983	FCDMC	SCS/NRCS
McMicken Dam	NW	1956	FCDMC	USACE
New River Dam	NW	1985	FCDMC	USACE
Powerline FRS and Floodway	SE	1967	FCDMC	SCS/NRCS
Rittenhouse FRS	SE	1969	FCDMC	SCS/NRCS
Saddleback FRS and Diversion Channel	W	1982	FCDMC	SCS/NRCS
Signal Butte FRS and Floodway	E	1987	FCDMC	SCS/NRCS
Spook Hill FRS and Outlet	E	1979	Various	SCS/NRCS
Sunnycove FRS	NW	1976	FCDMC	SCS/NRCS
Sunset FRS	NW	1976	FCDMC	SCS/NRCS
Vineyard FRS	SE	1968	FCDMC	SCS/NRCS
White Tanks FRS No. 3	NW	1954	FCDMC	SCS/NRCS
White Tanks FRS No. 4	W	1953	FCDMC	SCS/NRCS

Table 4 Flood Control District Levees			
	Name	Built By	Year Completed
1	Agua Fria River #3 CBRLN	FCD	1998
2	Agua Fria River #8	FCD	1988
3	Agua Fria River #11 CBRLS	FCD	1998
4	Agua Fria River #16	Corps	1989
5	Agua Fria River #18	FCD and Corps	1989
6	Centennial Wash Levee	SCS (now NRCS)	1985
7	East Maricopa Floodway #21 East Levee	SCS (now NRCS)	1985
8	East Maricopa Floodway #26 West Levee	SCS (now NRCS)	1987
9	Indian Bend Wash IBW1	Corps	1986
10	Indian Bend Wash IBW2	Corps	1979
11	Indian Bend Wash IBW3	Corps	1986
12	Indian Bend Wash IBW4	Corps	1979
13	Indian Bend Wash IBW5	Corps	1979
14	Indian Bend Wash IBW6	Corps	1979
15	New River #30 NR1	Corps	1989
16	New River #30 NR2	Corps	1989
17	Pass Mountain Diversion Channel Levee #291	SCS (now NRCS)	1984
18	Salt River #33 North Levee	ADOT	1989
19	Salt River #33 South Levee	ADOT	1989
20	Skunk Creek SK1	Corps	1983
21	Skunk Creek SK2	Corps	1983
22	Scatter Wash North Levee #1901064146	ADOT	1991
23	Scatter Wash South Levee #1901064147	ADOT	1991
24	Tres Rios North Levee (TRNL)	Corps	2012

**Table 5 FCD Completed Capital Projects
Fiscal Year 1983 Through Fiscal Year 2013**

Project	Location	District	Project Partner(s)	Year Completed	Project Cost	Composite Index Multiplier*	Project Cost In Today's Dollars
Adobe St. Structures over EMF	Adobe St. 1/2 mi. east of Greenfield Rd.	1	Mesa	1990	\$ 134,980	2.143	\$ 289,262
ADOT Pit and Diversion Channel	I-10, Elliot Rd. to 1/4 mi. south of Warner Rd.; I-10 and 1/4 mi. south of Warner Rd.	1	Tempe	1987	\$ 2,832,265	2.217	\$ 6,279,132
Central Chandler Area Drainage System	Area bounded by Ray Rd. (N), Pecos Rd. (S), SR-101L (W), Arizona Ave. (E)	1	Chandler	2005	\$ 4,900,725	1.159	\$ 5,679,940
City of Mesa Flood Projects	Misc. Storm Drain Projects	1	Mesa	1983	\$ 1,007,636	2.217	\$ 2,233,929
Cloud Road and Sossaman Road Basin and Outlet	SE corner of Cloud Rd. and Sossamna Rd.; outlets along Sossman Rd. to Sonoqui Wash	1	Queen Creek	2011	\$ 3,537,917	1.000	\$ 3,537,917
Gila Drain Storm Drain	Rural Rd., 1/2 mi. south of Guadalupe Rd. to 1/2 mi. south of Warner Rd. (Hanger Park)	1	Tempe	1988	\$ 1,915,461	2.094	\$ 4,010,975
Gilbert Crossroads Park Basin	Greenfield Rd. and Ray Rd.	1	Gilbert	1992	\$ 3,700,634	2.132	\$ 7,889,752
Gilbert Retention Basin	In Gilbert	1	Gilbert	1992	\$ 1,315,210	2.132	\$ 2,804,028
Guadalupe Box and Channel	Guadalupe Rd., Sossaman Rd. to the EMF at Power Rd.	1	Mesa	1989	\$ 2,605,567	2.160	\$ 5,628,025
Higley Outfall Channel	Higley Rd. in Chandler	1	Chandler	2005	\$ 5,014,619	1.159	\$ 5,811,943
Hazard Mitigation Grant Program (HMGP)	Various Locations	1	None	2003	\$ 641,384	1.500	\$ 962,076
Price Road Drain	SR-101L (Price), Salt River to 1/2 mi. south of Guadalupe Rd. (Carriage Lane Park)	1	ADOT	1993	\$ 15,378,085	2.072	\$ 31,863,392
Queen Creek Channel (Hawes to Power)	Queen Creek, Hawes Rd. to Power Rd.	1	Queen Creek	2006	\$ 4,510,643	1.000	\$ 4,510,643
Queen Creek Channel (Recker to Higley)	Queen Creek, Recker Rd. to Higley Rd.	1	Gilbert	2009	\$ 608,900	1.000	\$ 608,900
Queen Creek Road Basin	McQueen Rd. and Queen Creek Rd.	1	Chandler	2009	\$ 2,051,000	1.000	\$ 2,051,000
Rittenhouse Basin	NW corner of Rittenhouse Rd. and Power Rd.	1	None	2010	\$ 13,410,149	1.000	\$ 13,410,149
Salt River Channel	Salt River, SR-143 to McClintock Dr.	1	Phoenix, Tempe, ADOT, SRPMIC	1991	\$ 16,461,579	2.027	\$ 33,367,621
San Tan Collector Channel	From the East Maricopa Floodway to Guadalupe Rd along the Santan Freeway	1	ADOT, GRIC	2003	\$ 25,089,475	1.500	\$ 37,634,213
Sonoqui Wash Channelization (Chandler Heights to Crismon)	Sonoqui Wash, Chandler Heights Rd. to Riggs Rd., and east from Hawes Rd. to Crismon Rd.	1	Queen Creek, MCDOT	2013	\$ 18,537,099	1.000	\$ 18,537,099
Sonoqui Wash Channelization (Higley to Chandler Heights)	Sonoqui Wash, Higley Rd. and Ocotillo Rd. to Chandler Heights Rd. and Sossaman Rd.	1	Queen Creek, Gilbert	2008	\$ 10,025,763	1.000	\$ 10,025,763
Southeast Phoenix Regional Drainage System	SR-202L and 48th St.	1	Phoenix	2002	\$ 4,832,023	1.574	\$ 7,605,604
District 1 Totals:		21	-	-	\$ 138,511,114	-	\$ 204,741,362
84th Street & Cholla Basin Storm Drain	84th St. and Cholla St.	2	Scottsdale	2002	\$ 846,002	1.574	\$ 1,331,607
Apache Junction FRS and Floodway	Lost Dutchman Blvd. and Idaho Rd.	2	SCS	1988	\$ 11,641,284	2.094	\$ 24,376,849
Broadway Rd. Collector Channel (Broadway Rd. to EMF)	Approximately 1/2 mi. east of Higley Rd., Broadway Rd south for 1/3 mi. to EMF	2	Scottsdale	1998	\$ 281,284	1.801	\$ 506,592
Bulldog Floodway	Apache Junction FRS to Signal Butte FRS	2	SCS	1988	\$ 11,583,664	2.094	\$ 24,256,192
Bush Hwy Box Culvert	Bush Hwy. in north Mesa near the Spook Hill FRS	2	Mesa	1992	\$ 351,004	2.132	\$ 748,341
Camelback Side Drain Extension (IBW Interceptor)	Camelback Rd., 64th St. to 68th St; Lafayette Blvd., 64th St. to 68th St.	2	Scottsdale	1986	\$ 3,922,605	2.217	\$ 8,696,415
Carefree Town Center Drainage	Area bounded by Sundance Tr. / Tom Darl. Dr. (NW), Bloody Bas. Rd. / Tranquil Tr. (SE)	2	Carefree	2002	\$ 552,308	1.574	\$ 869,333
Central Arizona Project Detention Basins	Northeast corner of Cheshire St. and Southern Ave.	2	Mesa	2001	\$ 5,265,084	1.916	\$ 10,087,901
City of Scottsdale Flood Projects	Misc. Storm Drain Projects	2	Scottsdale	1988	\$ 90,821	2.094	\$ 190,179
East Mesa Drains #4 & #7	No.4 at Broadway Rd./Ellsworth Rd. & No.7 along 85th St. from Alder Ave./ Broadway	2	None	2010	\$ 1,881,927	1.000	\$ 1,881,927
East Mesa Projects	Various Locations	2	None	1999	\$ 5,026,663	1.667	\$ 8,379,447
East Maricopa County Channel & SD	East Maricopa ADMS Area	2	None	1987	\$ 58,393	2.217	\$ 129,457
Elliot Rd. Basin and Channel	Approx. Elliot Rd., approx. Signal Butte Rd. to SR-202L; Crismon Rd. 0.5 mi. north	2	Mesa	2007	\$ 11,611,018	1.000	\$ 11,611,018
Ellsworth Rd. Channel at Phoenix-Mesa Gateway Airport	North and East boundaries of Phoenix-Mesa Gateway Airport	2	Mesa, MCDOT	2008	\$ 4,465,303	1.000	\$ 4,465,303
Golden Eagle Park Dam	Golden Eagle Blvd. and Palisades Blvd.	2	Fountain Hills	2002	\$ 1,735,554	1.574	\$ 2,731,762
Hawes Rd. Channel (Emelita Ave. to Main St.)	Hawes Rd., Apache Tr. (Main St.) To Emelita Ave. (1/2 mi. north of Southern Ave.)	2	Mesa	2004	\$ 2,261,952	1.574	\$ 3,560,312
Hermosa Vista Dr. / Hawes Rd. Storm Drain and Basin	Area bounded by McDowell Rd. (N), Hermosa Vista Dr. (S), Spook Hill FRS (W), 90th St.	2	Mesa	2009	\$ 7,263,085	1.000	\$ 7,263,085
Lafayette Interceptor Drain	Lafayette Blvd. in Arcadia area to 44th Street	2	Phoenix	2013	\$ 10,513,000	1.000	\$ 10,513,000
Lindsey Rd Basin	Bounded by Lindsay Rd., Eastern Canal, Guadalupe Rd., & by the Southern Pacific RR	2	Gilbert	1986	\$ 1,266,400	2.217	\$ 2,807,609
McDowell Rd. Storm Drain and Basin	McDowell Rd., Hawes Rd. to Sossaman Rd. alignment	2	Mesa	2010	\$ 5,682,448	1.000	\$ 5,682,448
Pass Mountain Diversion Channel	McKellips Rd., Crismon Rd. to Signal Butte Rd., south to behind Signal Butte FRS	2	SCS	1987	\$ 6,229,600	2.217	\$ 13,811,023
Plan Six Roosevelt Dam Modifications	Roosevelt Dam - Eastern Maricopa County near Apache Tail (SR-188)	2	CWACD	1993	\$ 9,967,988	2.072	\$ 20,653,671
PV-S-P Flood Control Project	Area bounded by the CAP, Indian Bend Wash, Scottsdale Rd. and 56th St.	2	Phoenix, Scottsdale, Paradise Valley	1990	\$ 4,700,000	2.143	\$ 10,072,100
Recker & McDowell Drainage Structure	Recker Rd. and McDowell Rd.	2	Mesa	1987	\$ 550,000	2.217	\$ 1,219,350
Signal Butte Floodway	Between Mclellan Rd. and Adobe Rd., Signal Butte FRS to CAP at Ellsworth Rd.	2	SCS	1984	\$ 1,333,982	2.217	\$ 2,957,438
Signal Butte FRS	Southwest of Signal Butte Rd. and McKellips Rd.	2	SCS	1987	\$ 5,006,400	2.217	\$ 11,099,189
Siphon Draw Drainage Improvements	Meridian Rd., 1/4 mi. south of Baseline Rd. to Elliot Rd., basin east of Meridian Rd.	2	Mesa	2010	\$ 6,579,086	1.000	\$ 6,579,086
Sossaman - US 60 to Baseline	Sossaman Rd. from US-60 to Baseline Rd.	2	None	2003	\$ 1,110,704	1.500	\$ 1,666,056
Sossaman Rd Channel	Sossaman Rd. from Guadalupe Rd. to Baseline Rd.	2	None	1995	\$ 3,416,846	1.833	\$ 6,263,079
Spook Hill FRS Rehabilitation	SR-202L, Power Rd. to 1/4 mi. south of Brown Rd.; CAP, SR-202L, north 1 1/2 mi.	2	ADOT	2008	\$ 1,096,759	1.000	\$ 1,096,759
University Drive Basin	64th St. and University Dr.	2	Mesa, MCDOT	1992	\$ 2,105,816	2.132	\$ 4,489,600

Project	Location	District	Project Partner(s)	Year Completed	Project Cost	Composite Index Multiplier*	Project Cost In Today's Dollars
District 2 Totals:		31	-	-	\$ 128,396,980	-	\$ 209,996,129
10th St. Wash Detention Basin No. 1	12th St. and Peoria Ave.	3	Phoenix	1996	\$ 7,142,354	1.863	\$ 13,306,206
10th St. Wash Detention Basin No. 2	11th St. and Alice Ave.	3	Phoenix	1997	\$ 1,916,000	1.713	\$ 3,282,108
10th St. Wash Improvements (Alice to ACDC)	10th St., Alice Ave to ACDC at Griswold Rd. alignment	3	Phoenix	2008	\$ 5,130,889	1.000	\$ 5,130,889
9th Ave. Storm Drain (Peoria Ave. to ACDC)	9th Ave., Peoria Ave. to ACDC	3	Phoenix	2008	\$ 2,056,480	1.000	\$ 2,056,480
Beardsley Rd. Drainage System (7th Ave. to 23rd Ave.)	Beardsley Rd., 7th Ave. to 23rd Ave.	3	ADOT	1995	\$ 6,400,416	1.833	\$ 11,731,963
Cactus Rd. Flood Control System	Cactus Rd., Scottsdale Rd. to 64th St.; 68th St., Cactus Rd. to Mescal Park	3	Scottsdale, PV	1991	\$ 4,066,641	2.027	\$ 8,243,081
Cave Creek Channelization	Deer Valley Rd. to Arizona Canal	3	USACE	1991	\$ 8,285,446	2.027	\$ 16,794,599
City of Phoenix Dam No. 7 Rehabilitation	Phoenix North Mountain Preserve, approximately 2nd St. and Aster Dr.	3	Phoenix	2009	\$ 624,378	1.008	\$ 629,373
Doubletree Ranch Road System	Doubletree Ranch Rd., Tatum Blvd to Indian Bend Wash at 58th St. alignment	3	Paradise Valley	2004	\$ 10,012,671	1.600	\$ 16,020,274
Greenway Parkway Channel (9th St. to Cave Creek Rd.)	Greenway Parkway, 9th St. to Cave Creek Rd.	3	Phoenix	2002	\$ 2,261,368	1.574	\$ 3,559,393
Paradise Valley Detention Basin No. 4	Paradise Valley Community College (Component of Upper E. Fork Cave Creek)	3	Phoenix	1991	\$ 2,840,978	2.027	\$ 5,758,662
Scatter Wash Channel (43rd Ave. to 35th Ave.)	Scatter Wash, 43rd Ave. to 35th Ave.	3	Phoenix	1995	\$ 1,349,298	1.833	\$ 2,473,263
Scatter Wash Channel and Basin at I-17	Scatter Wash at I-17	3	Phoenix, ADOT	2010	\$ 1,033,333	1.000	\$ 1,033,333
Tatum Wash Detention Basin	45th St. and Shea Blvd.	3	Phoenix	1998	\$ 3,294,942	1.801	\$ 5,934,191
Union Hills Drive Drainage Improvements	Union Hills Dr. between Skunk Creek at approx. 57th Ave. & Black Canyon Frwy. (I-17)	3	Phoenix, Glendale	1992	\$ 3,510,665	2.132	\$ 7,484,738
Upper East Fork Cave Creek	Area bounded by SR-101L (N), Bell Rd. (S), 9th St. (W), 32nd St. (E); 4 basins & PVCC	3	Phoenix	1996	\$ 26,005,695	1.863	\$ 48,448,610
District 3 Totals:		16	-	-	\$ 85,931,554	-	\$ 151,887,162
51st Ave. Storm Drain (Bell Rd. to Thunderbird Rd.)	51st Ave., Bell Rd. to Thunderbird Rd.	4	Glendale	1991	\$ 826,479	2.027	\$ 1,675,273
59th Ave. Storm Drain (Bell Rd. to ACDC)	59th Ave., Bell Rd. to ACDC	4	Glendale	1991	\$ 778,858	2.027	\$ 1,578,745
67th Ave. Storm Drain (Bell Rd. to ACDC)	67th Ave., Bell Rd. to ACDC	4	Glendale	1990	\$ 1,087,416	2.143	\$ 2,330,332
67th Ave. Storm Drain (Olive Ave. to ACDC)	67th Ave., Olive Ave. to ACDC	4	Glendale	2009	\$ 2,630,894	1.008	\$ 2,651,941
83rd Ave. and Pinnacle Peak Rd. Drainage Improvements	Area bounded by Calley Lejos (N), Willisams Rd. (S), 91st Ave. (W), 83rd Ave. (E)	4	Peoria, MCDOT	2008	\$ 14,074,497	1.000	\$ 14,074,497
83rd Ave. Grade Control Structure (Skunk Creek)	83rd Ave. and Skunk Creek	4	Glendale	2003	\$ 11,919,654	1.500	\$ 17,879,481
83rd Ave Bridge over New River	83rd Ave. and New River	4	Glendale	1995	\$ 3,690,990	1.833	\$ 6,765,585
91st Ave. and Bell Rd. Drainage	91st Ave., Bell Rd. to Greenway Rd.; Greenway Rd., 91st Ave. to New River	4	Glendale	1991	\$ 3,173,842	2.027	\$ 6,433,378
91st Ave to Union Hills	91st Ave. and Union Hills Drive	4	Peoria	2001	\$ 3,649,489	1.916	\$ 6,992,421
Bell Road Stormdrains (Sun City Drains)	Bounded by Grand Ave., Union Hills Dr., 115th Ave. and 91st Ave.	4	None	1992	\$ 6,033,348	2.132	\$ 12,863,098
Bethany Home Outfall Channel (Phase I)	Bethany Home Rd., SR-101L to New River	4	Glendale	2000	\$ 33,758,132	1.739	\$ 58,705,392
Cactus Rd. Storm Drain (67th Ave. to SR-101L)	Cactus Rd., 67th Ave. to Agua Fria Freeway (SR-101L)	4	Glendale, Peoria	1998	\$ 2,693,489	1.801	\$ 4,850,974
Camelback Ranch Levee	Agua Fria River and Camelback Rd.	4	Phoenix	1999	\$ 11,098,611	1.667	\$ 18,501,385
Casandro Wash Dam	North of US-60, between Mariposa Dr. alignment and Los Altos Dr. alignment	4	Wickenburg	1996	\$ 3,781,802	1.863	\$ 7,045,497
Casandro Wash Outlet	Jackson St., Navajo St. to Mohave St.; Mohave St., Jackson St. to Casandro Wash	4	Wickenburg	1996	\$ 889,407	1.863	\$ 1,656,965
Colter Channel	Between Camelback Rd. and Missouri Ave., Litchfield Rd. to Agua Fria River	4	None	1995	\$ 3,605,578	1.833	\$ 6,609,024
Dysart Drain	Between Olive Ave. and Glendale Ave., Reems Rd. to Agua Fria River	4	LAFB	1996	\$ 12,021,644	1.863	\$ 22,396,323
Indian School Rd. Drain (107th Ave. to Agua Fria)	Indian School Rd., 107th Ave. to Agua Fria River	4	Phoenix	1989	\$ 475,940	2.160	\$ 1,028,030
Loop 303 Corridor Improvements	Sun City West Area	4	ADOT	2001	\$ 2,461,316	1.916	\$ 4,715,881
McMicken Dam Restoration	8 miles NW of Luke AFB along the Beardsley Canal alignment from Peoria Ave. to Grand A	4	None	1986	\$ 2,495,702	2.217	\$ 5,532,971
McMicken Dam Outlet Channel	8 miles NW of Luke AFB along the Beardsley Canal alignment from Peoria Ave. to Grand A	4	None	1995	\$ 6,328,863	1.833	\$ 11,600,806
McMicken Dam Fissure Repair	8 miles NW of Luke AFB along the Beardsley Canal alignment from Peoria Ave. to Grand A	4	None	2005	\$ 3,697,394	1.159	\$ 4,285,280
New River Channelization (Bethany Home Rd. to Skunk C	New River, Bethany Home Rd. to Olive Ave.	4	USACE	1996	\$ 35,392,354	1.863	\$ 65,935,956
New River Dam	Alignment of 79th Ave. and approximately Pinnacle Vista Rd.	4	USACE	1985	\$ 15,500,000	2.217	\$ 34,363,500
New River Improvements (Grand Ave. to Skunk Creek)	New River, Grand Ave. to Skunk Creek, including Paradise Shores (1/2 mile south of Bell	4	USACE	2009	\$ 4,010,407	1.000	\$ 4,010,407
Northern and Orangewood Storm Drain	Between Butler Dr. and Glendale Ave., 63rd Ave. to Agua Fria River	4	Glendale, Peoria	2001	\$ 24,041,973	1.916	\$ 46,064,420
Northern Ave. Bridge over New River	Northern Ave. and New River	4	MCDOT	1992	\$ 2,775,542	2.132	\$ 5,917,456
Northern Ave. Storm Drain (47th Ave. to 63rd Ave.)	Northern Ave., 47th Ave. to 63rd Ave.	4	Glendale	2011	\$ 7,009,777	1.000	\$ 7,009,777
Oak St. Storm Drain (58th St. to Indian Bend Wash)	Oak Street, 58th St. to Indian Bend Wash	4	Scottsdale	2000	\$ 6,329,634	1.739	\$ 11,007,234
Olive Ave. Storm Drain (51st Ave. to 91st Ave.)	Olive Ave., 51st Ave. to 91st Ave.	4	Glendale, Peoria	1995	\$ 10,401,959	1.833	\$ 19,066,791
Osborn Rd. Storm Drain	Between Osborn Rd. and Thomas Rd., 60th St. to Ind. Bend Wash at 76th St. and Earl D	4	Scottsdale	2001	\$ 2,551,462	1.916	\$ 4,888,601
Pinnacle Peak Channel & Basin & Rose Garden Ln. Basin	Pinnacle Peak Rd. - 89th to 99th Ave.; Rose Garden Ln. from Lake Pleasant Rd. to Agua	4	Peoria	2012	\$ 14,526,347	1.000	\$ 14,526,347
Reems Road Channel and Basin	Reems Rd. and Olive Ave.	4	Surprise	2009	\$ 13,603,272	1.000	\$ 13,603,272
Roosevelt Irrigation District Canal Overchute	Litchfield Rd. and RID Canal	4	Litchfield Park	1998	\$ 2,645,711	1.801	\$ 4,764,926
Skunk Creek / ACDC Low Flow Channel	Skunk Creek, New River to 75th Ave.; ACDC, 73rd Ave. to Skunk Creek	4	Peoria	2007	\$ 1,354,554	1.000	\$ 1,354,554
Skunk Creek Channel and Levee	Skunk Creek, approximately Jomax Rd. alignment to Central Arizona Project	4	USACE	1983	\$ 5,100,000	2.217	\$ 11,306,700
Skunk Creek Channel Imp. (75th Ave. to 51st Ave.)	Skunk Creek, 75th Ave. to 51st Ave.	4	Glendale	2000	\$ 10,856,337	1.739	\$ 18,879,170
Skunk Creek Sports Complex Bank Protection	Skunk Creek, New River to 75th Ave.	4	Peoria	1999	\$ 978,000	1.667	\$ 1,630,326
Skunk Creek Channel Improvement	Skunk Creek at various locations	4	Glendale, Peoria	1995	\$ 257,618	1.833	\$ 472,214
Trilby Wash Detention Basin	Vicinity of the McMicken Dam Outlet Channel	4	USACE	1994	\$ 1,741,955	2.100	\$ 3,658,106

Project	Location	District	Project Partner(s)	Year Completed	Project Cost	Composite Index Multiplier*	Project Cost In Today's Dollars
Upper New River Land Acquisition	Vicinity of Skunk Creek in Peoria	4	None	1996	\$ 2,059,716	1.863	\$ 3,837,251
White Tanks FRS No. 3 North Inlet Channel	Beardsley Canal, Olive Ave. to White Tanks FRS No. 3	4	None	2008	\$ 12,903,394	1.000	\$ 12,903,394
White Tanks FRS No. 3 Outfall Channel	Jackrabbit Trail (195th Avenue), from McDowell Road to Missouri Avenue.	4	None	2013	\$ 28,157,357	1.000	\$ 28,157,357
White Tanks FRS No. 3 Rehabilitation	FRS at Jackrabbit Trail and Bethany Home Rd.	4	None	2005	\$ 8,544,221	1.159	\$ 9,902,752
White Tanks FRS No. 4	FRS at Jackrabbit Trail and Van Buren St.	4	None	1987	\$ 10,429,952	2.217	\$ 23,123,204
White Tanks FRS No. 4 Inlet Improvements	FRS inlet at Jackrabbit Trail and south of I-10	4	None	1999	\$ 2,543,272	1.667	\$ 4,239,634
Wickenburg Downtown Flooding Hazard Mitigation	Sol's Wash, from the Highway 93 Interim Bypass Bridge to the Tegner St. Bridge	4	Wickenburg	2009	\$ 11,009,645	1.000	\$ 11,009,645
District 4 Totals:		47	-	-	\$ 365,897,804	-	\$ 581,806,271

23rd Ave. and Roeser Rd. Storm Drain and Basin	NE corner of 23rd Ave. and Roeser Rd.; outlets along Roeser Rd. and Broadway Rd.	5	Phoenix	2011	\$ 2,076,437	1.000	\$ 2,076,437
24th Ave. and Camelback Rd. Basin	24th Ave. and Camelback Rd.	5	Phoenix	2008	\$ 3,090,248	1.000	\$ 3,090,248
26th Ave. and Verde Ln. Basin	Verde Ln. alignment; 26th Dr. to I-17 Frontage Rd.	5	Phoenix	2007	\$ 4,014,108	1.000	\$ 4,014,108
35th Ave. and Dobbins Rd. Basin and Storm Drain	35th Ave. and Dobbins Rd.	5	Phoenix	2002	\$ 2,526,974	1.574	\$ 3,977,457
43rd Ave. and Southern Ave. Detention Basin	43rd Ave. and Southern Ave.	5	Phoenix	2005	\$ 1,966,551	1.159	\$ 2,279,233
43rd Ave. Storm Drain	43rd Ave., Broadway Rd. to Baseline Rd.	5	Phoenix, MCDOT	2000	\$ 9,064,810	1.739	\$ 15,763,705
48th Street Storm Drain	48th St., Baseline Rd. to 48th St. Drain	5	ADOT, Tempe, SRP, Phoenix	1988	\$ 600,000	2.094	\$ 1,256,400
75th Ave. Storm Drain & DRCC Phase 1	Area bounded by 64th Ave. and 71st Ave. from south of Van Buren Ave. to Southern Ave	5	Phoenix	2011	\$ 20,398,218	1.000	\$ 20,398,218
Agua Fria Channelization	Agua Fria River, Camelback Rd. to 1/4 mi. south of Lower Buckeye Rd.	5	USACE	1988	\$ 45,225,000	2.094	\$ 94,701,150
Avondale Landfill Excavation	Dysart Rd. and Buckeye Rd.	5	Avondale	1986	\$ 2,253,776	2.217	\$ 4,996,621
Baseline Rd. Storm Drain	Baseline Rd., 7th Ave. to 43rd Ave.	5	Phoenix, MCDOT	2002	\$ 3,544,100	1.574	\$ 5,578,413
Broadway Rd Bank Stabilization	Broadway Rd. and Salt River	5	Phoenix	1989	\$ 31,432	2.160	\$ 67,893
Bullard Wash (Phase 1)	Bullard Wash, Lower Buckeye Rd. alignment to Gila River	5	Goodyear	2001	\$ 19,558,512	1.916	\$ 37,474,109
Camelback Road Storm Drain	West Camelback Road from 59th Ave. to 75th Ave.	5	Glendale, Phoenix	2012	\$ 13,147,991	1.000	\$ 13,147,991
Centennial Levee	South of I-10, T2N/R9W, T2N/R10W	5	SCS	1985	\$ 741,460	2.217	\$ 1,643,817
City of Phoenix Flood Projects	Misc. Storm Drain Projects	5	Phoenix	1983	\$ 1,455,036	2.217	\$ 3,225,815
Elm Ln. Drainage Mitigation	Area bounded by 4th St. (Avondale) / Lower Buckeye Rd. / MC-85	5	Avondale	2010	\$ 1,027,700	1.000	\$ 1,027,700
Gila / Salt River Clearing (Gillespie Dam to 91st Ave.)*	Gila / Salt River, Gillespie Dam to 107th Ave.	5	None	1985	\$ 1,284,161	2.217	\$ 2,846,985
Guadalupe Drainage Improvement Project	Town of Guadalupe (Various Basins)	5	Guadalupe	2003	\$ 8,641,646	1.500	\$ 12,962,469
Holly Acres Levee and Bank Stabilization	Gila River North Bank, El Mirage Rd. to 113th Ave.	5	None	1984	\$ 439,466	2.217	\$ 974,296
Laveen Area Conveyance Channel	Laveen Area Conveyance Channel	5	Phoenix	2009	\$ 15,291,970	1.000	\$ 15,291,970
Maryvale Stadium West Inlet Channel & Basin	Grand Canal, between Indian School Rd. and Osborn Rd., 57th Ave. to 51st Ave.	5	Phoenix	2001	\$ 5,726,572	1.916	\$ 10,972,112
Main Drain Improvement Project	South Phoenix	5	Phoenix	1998	\$ 1,975,058	1.801	\$ 3,557,079
Salt River Low Flow Ch. (19th Ave. to I-10) (Phx. Rio Salado)	Salt River, 19th Ave. to I-10 at approximately 30th St. alignment	5	USACE, Phoenix	2002	\$ 16,446,128	1.574	\$ 25,886,205
Sunset Drive Basin	Vicinity of 64th Dr./Sunset Dr. and 47th Dr./Cittenden Ln.	5	Phoenix	1999	\$ 3,005,373	1.667	\$ 5,009,957
Southern Ave Channel	Southern Ave. - Hawes Rd. to 78th St., & Hawes Rd. to 750' south of Southern Ave.	5	Mesa	2003	\$ 2,155,640	1.500	\$ 3,233,460
Tres Rios Levees	North bank on the Salt & Gila Rivers from 91st Ave. to the Agua Fria River.	5	USACE, Phoenix	2011	\$ 2,655,737	1.000	\$ 2,655,737
District 5 Totals:		27	-	-	\$ 188,344,104	-	\$ 298,109,586

Alma School Drain	Brown Road from Dobson Road to Alma School Rd.	1,2	Mesa, SRP	2004	\$ 106,379	1.600	\$ 170,206
Indian Bend Wash	Between Hayden Rd. and Scottsdale Rd., Indian Bend Rd. to Salt River at SR-202L	1,2	USACE, Scottsdale, Tempe	1985	\$ 41,500,000	2.217	\$ 92,005,500
Rittenhouse Road Channel	Rittenhouse Rd., Queen Creek Rd. to the EMF at Pecos Rd.	1,2	Queen Creek	1997	\$ 5,833,640	1.713	\$ 9,993,025
RWCD (East Maricopa Floodway)	Parallels the RWCD from Brown Rd. to Hunt Hwy, then westerly in Pinal Cnty. to the Gila	1,2	SCS	1990	\$ 42,987,622	2.143	\$ 92,122,474
Old Cross Cut Canal	48th St., Arizona Canal to McDowell Rd.	2,3	Phoenix, SRP	1991	\$ 22,260,728	2.027	\$ 45,122,496
Old Cross Cut Canal Extention	Under the CAP Canal at 48th Street	2,3	Phoenix, SRP	2011	\$ 2,380,309	1.000	\$ 2,380,309
Scottsdale Rd. Drainage (Thunderbird to Doubletree Ranch)	Approximately Scottsdale Rd., Thunderbird Rd. to Doubletree Ranch Rd.	2,3	Scottsdale	2008	\$ 3,592,184	1.000	\$ 3,592,184
Arizona Canal Diversion Channel	Arizona Canal, 37th Street to New River & Bridges	3,4	USACE, Phoenix, Peoria, Glendale	1994	\$ 274,429,128	2.217	\$ 608,409,377
Bethany Home Outfall Channel (Phases IIA, IIB and IIC)	Bethany Home Rd., SR-101L to 83rd Ave.; Grand Canal, Bethany Home Rd. to 67th Ave.	4,5	Glendale, Phoenix	2008	\$ 33,806,399	1.000	\$ 33,806,399
Multiple District Totals:		9	-	-	\$ 426,896,389	-	\$ 887,601,970

TOTAL 151 - \$ 1,333,977,945 - \$ 2,334,142,480

* Composit Index Multiplier - Source: Oregon Highway Construction Cost Trends from 1987 to 2010; Index takes into account diesel fuel, and material costs (reinforcing steel, concrete, crushed rock).

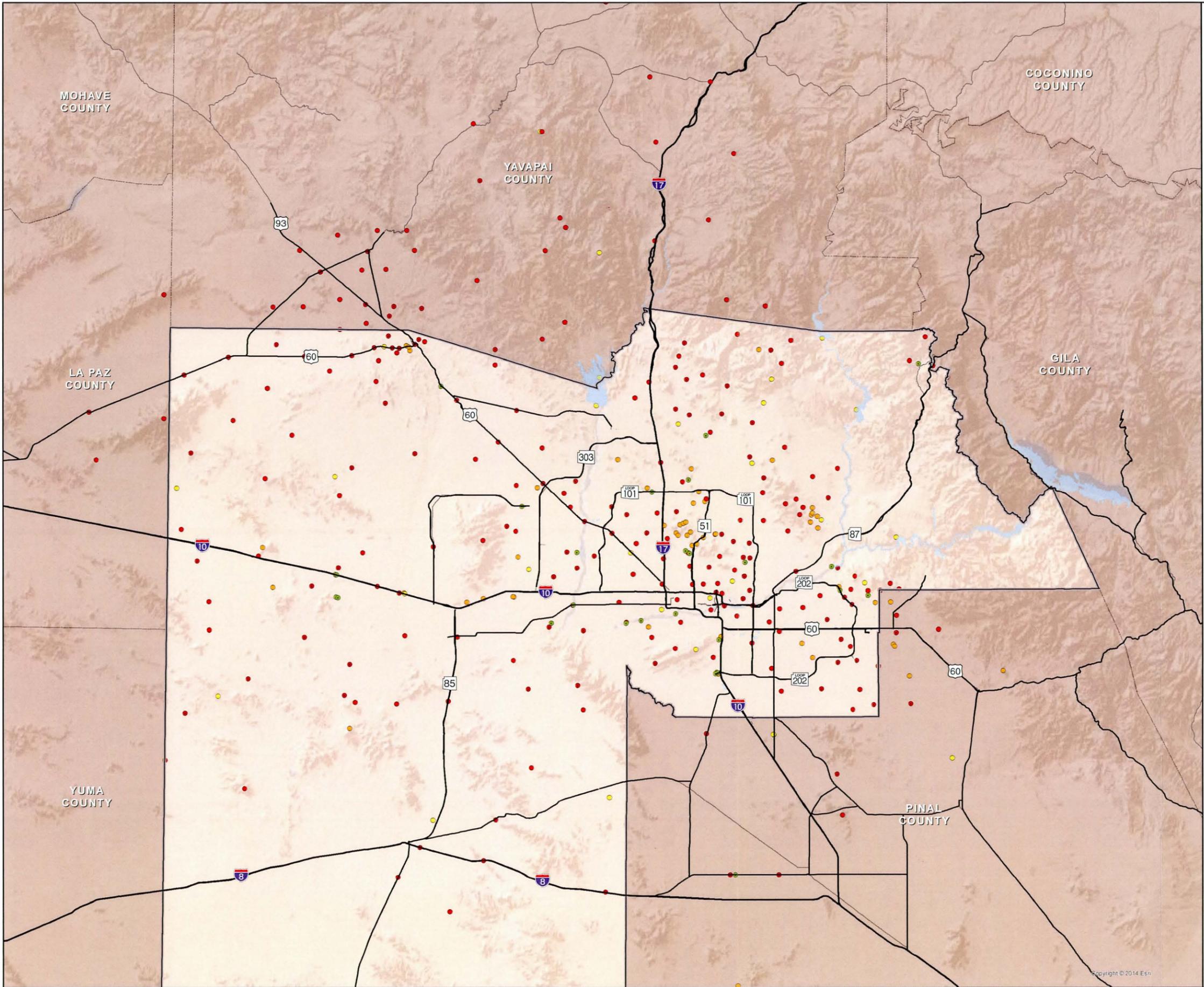
NOTE: This list does not include older structures and dams that were completed by regulatory agencies in the 50's,60's & 70's. Examples of this would be many of the County dams (McMicken Dam, Cave Buttes Dam, PVR, etc.)

Table 6 - Acronyms Used In This Report

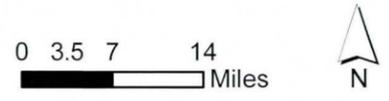
Acronym	Description	1st Appears on Page
ADMS	Area Drainage Master Study	8
ADWR	Arizona Department of Water Resources	2
ARS	Arizona Revised Statutes	1
BOD	Maricopa County Board of Directors	1
CIP	Capital Improvement Program	1
CIPPP	Capital Improvement Program Prioritization Procedure	10
CTP	Cooperating Technical Partner	13
District	Flood Control District of Maricopa County	1
EAP	Emergency Action Plan	10
FCAB	Flood Control Advisory Board	1
FDS	Floodplain Delineation Study	8
FEMA	Federal Emergency Management Agency	6
FIRM	Flood Insurance Rate Map	7
FPAP	Floodprone Properties Assistance Program	10
FRS	Flood Retarding Structure	8
MSP	Meteorological Services Program	11
NRCS	Natural Resources Conservation Service	2
Plan	Comprehensive Report & Program 2015	1
SPAP	Small Projects Assistance Program	9
USACE	United States Army Corps of Engineers	6

Rain Gage Locations

Map A



- Rain Gage**
- Flasher
 - Rain
 - Rain/Repeater
 - Rain/Stage
 - Rain/Stream
 - Repeater
 - Stage
 - Stream
 - Weather
 - Weather/Repeater
 - Weather/Stage
 - Weather/Stream
 - Lake
 - Other County
 - Maricopa County

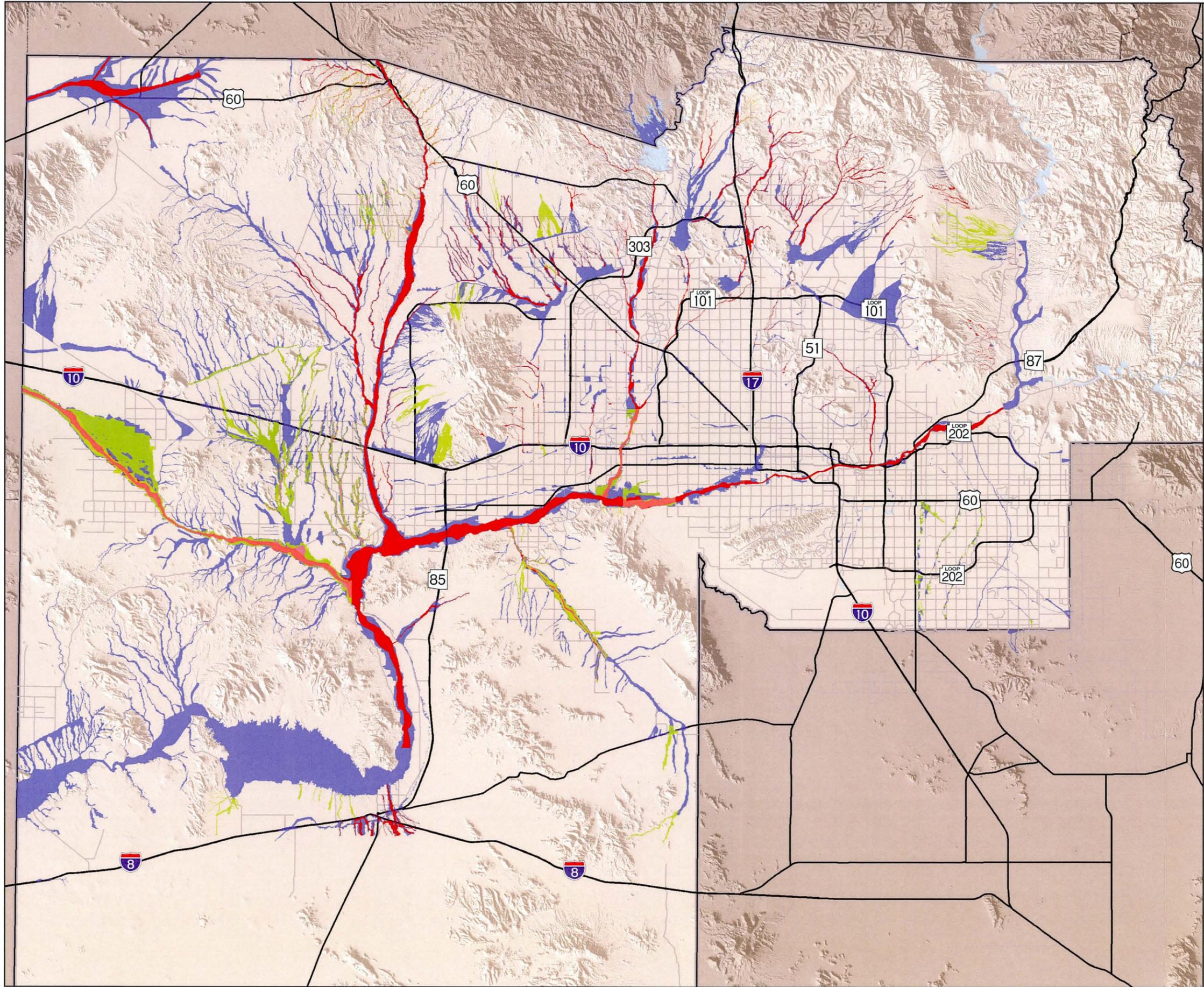


Data Source: Flood Control District of Maricopa County

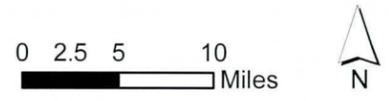


Floodplain Delineations

Map B



- Regulatory FEMA 100-Year Floodway
- Regulatory FEMA 100-Year Floodplain
- Proposed FEMA 100-Year Floodway
- Proposed FEMA 100-Year Floodplain
- Lake
- Other County
- Maricopa County

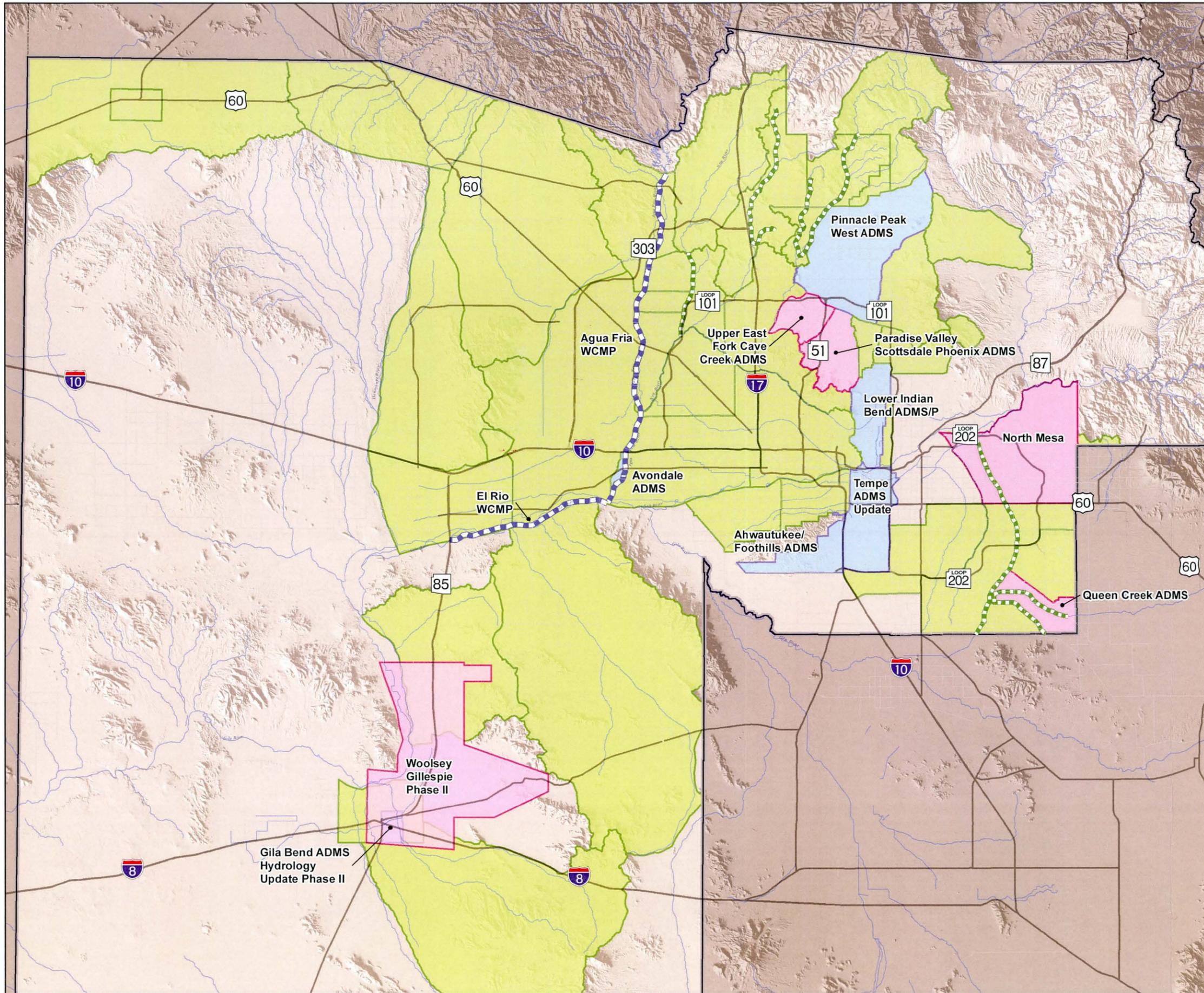


Data Source: Flood Control District of Maricopa County

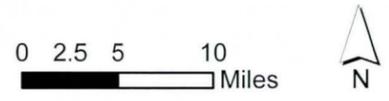


Area Drainage Master Studies

Map C



-  WCMP - Ongoing
 -  WCMP - Complete
- ADMS/P STATUS**
-  New Start 77 sq.mi.
 -  Ongoing 586 sq.mi.
 -  Complete 3049 sq.mi.
 -  Other County
 -  Maricopa County

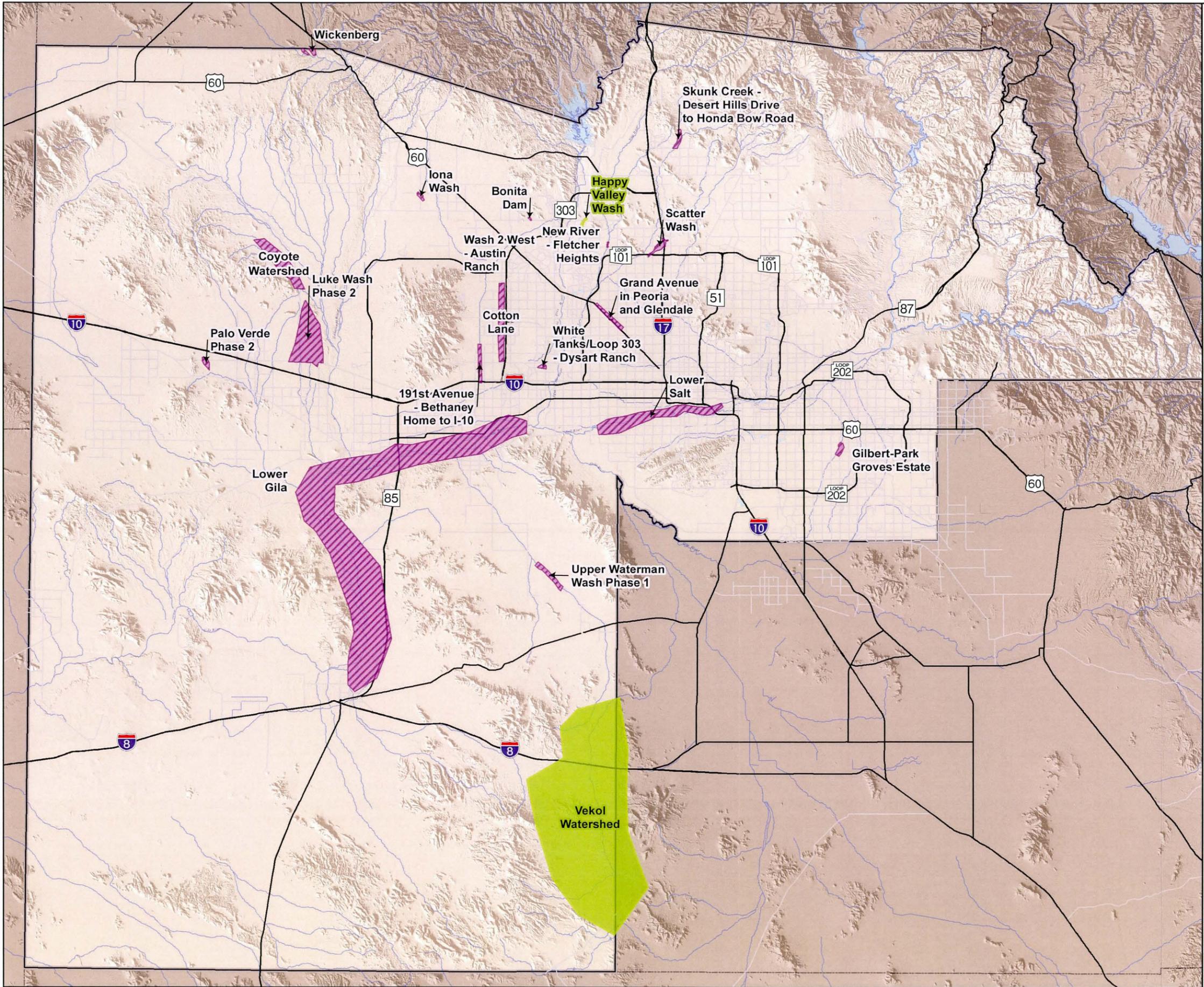


Data Source: Flood Control District of Maricopa County

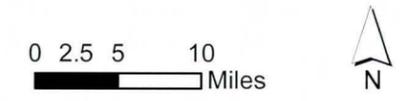


Future Delineation Studies

Map D



- Future Delineation Studies**
-  Re-Delineation Study
 -  New Delineation Study
 -  Lake
 -  Other County
 -  Maricopa County



Data Source: Flood Control District of Maricopa County



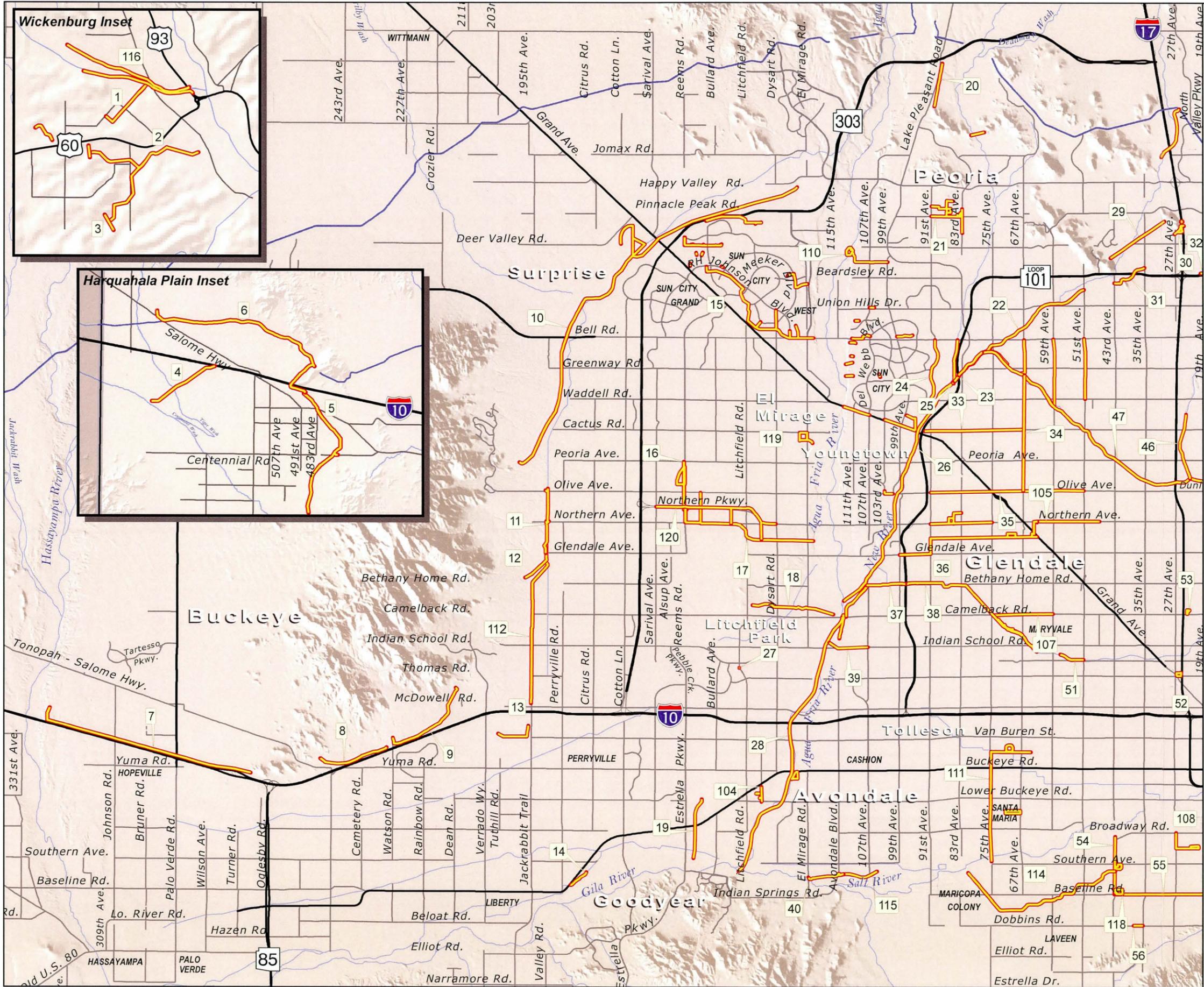
Completed Capital Projects through Fiscal Year 2014 (West of I-17) Map E

Label	FCDMC Project
1	Casandro Wash Dam and Outlet
2	Sunset Dam
3	Sunnycove Dam
4	Centennial Levee
5	Saddleback FRS and Diversion Channel
6	Harquahala FRS and Floodway
7	Buckeye FRS No. 1
8	Buckeye FRS No. 2
9	Buckeye FRS No. 3
10	McMicken Dam
11	White Tanks FRS No. 3 North Inlet Channel
12	White Tanks FRS No. 3
13	White Tanks FRS No. 4
14	Perryville Bank Stabilization
15	Sun City and Sun City West Drains
16	Reems Rd. Channel and Basin
17	Dysart Drain
18	Colter Channel
19	Bullard Wash (Phase I)
20	New River Dam
21	83rd Ave. & Pinnacle Peak Rd. Drainage Improvements
22	Skunk Creek Channel
23	Skunk Creek Low Flow Channel
24	Bell Rd. Drainage Improvements
25	83rd Ave. Grade Control Structure
26	New River Channelization
27	Roosevelt Irrigation District Canal Overchute
28	Agua Fria Channelization
29	Adobe Dam
30	Scatter Wash Basin and Channel at Interstate-17
31	Scatter Wash Channel (43rd Ave. to 35th Ave.)
33	Cactus Rd. Storm Drain (67th Ave. to SR-101L)
34	67th Ave. Storm Drain (Olive Ave. to ACDC)
35	Olive Ave. Storm Drain (51st Ave. to 91st Ave.)
36	Northern Ave. & Orangewood Ave. Storm Drain
37	Bethany Home Outfall Channel (Phase I)
38	Bethany Home Outfall Channel (Phase II)
39	Indian School Rd. Drain (107th Ave. to Agua Fria River)
40	Holly Acres Levee
46	Cave Creek Channelization
47	Arizona Canal Diversion Channel
51	Maryvale Stadium West Inlet Channel
52	26th Ave. & Verde Ln. Basin
53	24th Ave. & Camelback Rd. Basin
54	43rd Ave. & Southern Ave. Detention Basin and Storm Drain
55	Baseline Rd. Storm Drain
56	35th Ave. & Dobbins Rd. Basin and Storm Drain
104	Elm Ln. Drainage Mitigation
105	Northern Ave. Storm Drain (47th Ave. to 63rd Ave.)
107	Camelback Rd. Storm Drain (59th Ave. to 75th Ave.)
108	23rd Ave. & Roeser Rd. Basin & Storm Drain
110	Pinnacle Peak Channel & Basin & Rose Garden Lane Basin
111	75th Ave. Storm Drain and Durango Regional Conveyance Channel
112	White Tanks FRS No. 3 Outlet Channel
114	Laveen Area Conveyance Channel
115	Tres Rios (Holly Acres Levee)
116	Wickenburg Downtown Flooding Hazard Mitigation
118	43rd Avenue & Baseline Road Detention Basin
119	Lower El Mirage Wash Detention Basin
120	Northern Parkway Channel Phase I (L303 to Dysart Rd)

 CIP Structures & Projects
 Rivers & Washes
 CAP Canal

Data Source: Flood Control District of Maricopa County

0 0.5 1 2 3 4 Miles

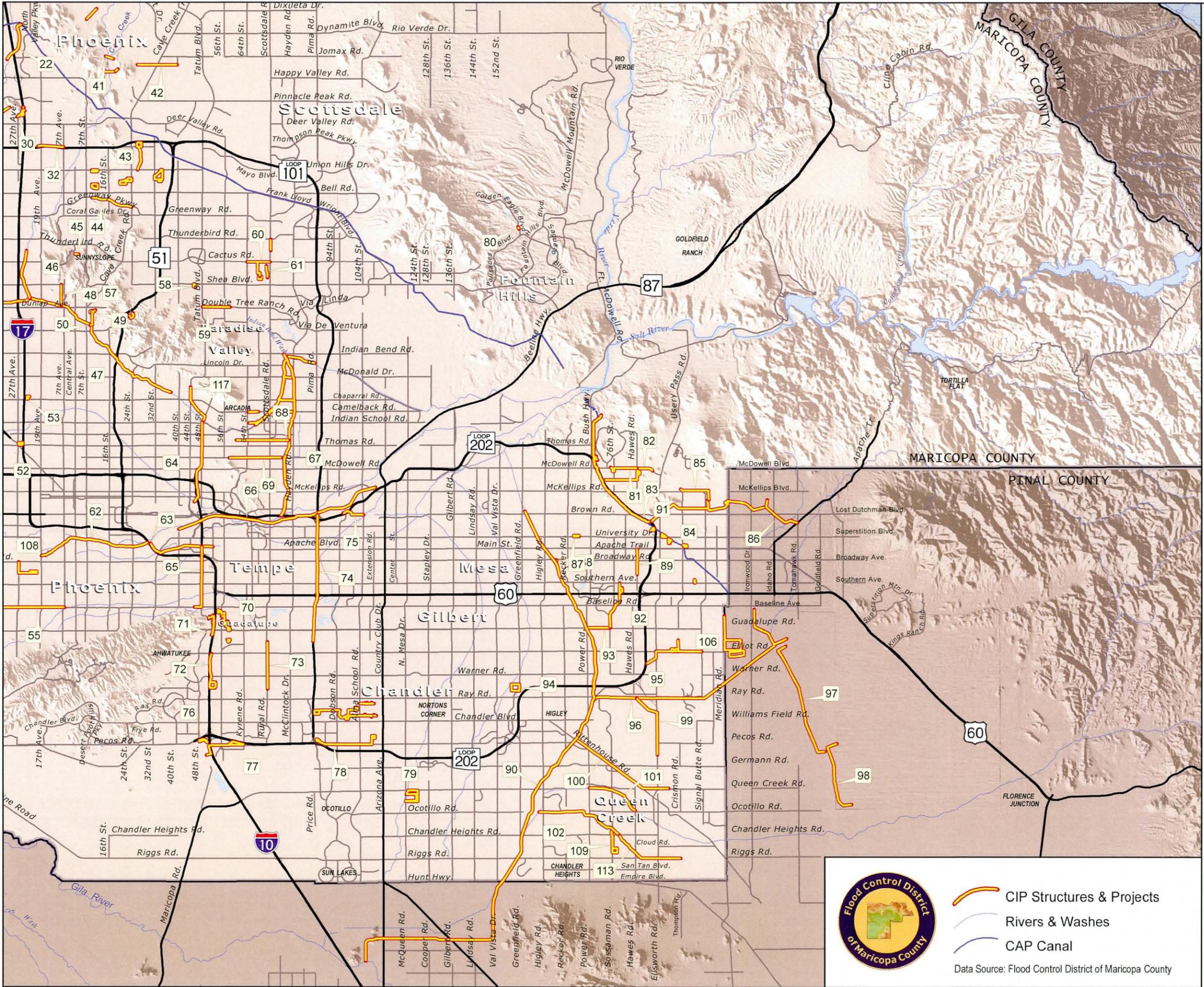



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Completed Capital Projects through Fiscal Year 2014 (East of I-17)

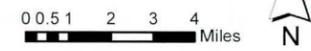
Map E

Label	FCDMC Project
22	Skunk Creek Channel
30	Scatter Wash Basin and Channel at Interstate-17
32	Bearslley Rd. Drainage System (7th Ave. to 23rd Ave.)
41	Cave Creek Dam
42	Cave Buttes Dam and Dikes
43	Upper East Fork Cave Creek Drainage and PV Detention Basin #4
44	Greenway Pkwy. Channel (9th St. to Cave Creek Rd.)
45	City of Phoenix Dam No. 7
46	Cave Creek Channelization
47	Arizona Canal Diversion Channel
48	9th Ave. Storm Drain (Peoria Ave. to ACDC)
49	10th St. Wash Basins
50	10th St. Wash Improvements (Alice Ave. to ACDC)
52	26th Ave. & Verde Ln. Basin
53	24th Ave. & Camelback Rd. Basin
55	Baseline Rd. Storm Drain
57	Dreamy Draw Dam
58	Tatum Wash Detention Basin
59	Doubletree Ranch Road System
60	Cactus Rd. Flood Control System
61	Scottsdale Rd. Corridor Drainage Improvements
62	Salt River Low Flow Channel (19th Ave to I-10)
63	48th St. Drain
64	Old Cross Cut Canal
65	48th St. Storm Drain
66	Salt River Channel (40th St. to Country Club Dr.)
67	Indian Bend Wash
68	Osborn Rd. Storm Drain
69	Oak St. Storm Drain (58th St. to Indian Bend Wash)
70	Guadalupe Drainage Improvements
71	Guadalupe FRS
72	ADOT Pit and Diversion Channel
73	Gila Drain Storm Drain
74	Price Rd. Drain
75	Alma School Drain
76	Southeast Phoenix Regional Drainage System
77	Southeast Valley Regional Drainage System
78	Central Chandler Area Drainage System
79	Queen Creek Rd. Basin
80	Golden Eagle Park Dam
81	McDowell Rd. Storm Drain and Basin (Hawes Rd. to Sossaman Rd.)
82	Hermosa Vista Dr. & Hawes Rd. Storm Drain and Basin
83	Spook Hill FRS and Floodway
84	Signal Butte FRS and Bulldog Floodway
85	Pass Mountain Diversion Channel
86	Apache Junction FRS and Floodway
87	University Dr. / 64th St Basin
88	Broadway Rd. Collector Channel (Broadway Rd. to EMF)
89	Hawes Rd. Channel (Emilta Ave. to Main St.)
90	East Maricopa Floodway
91	Central Arizona Project Canal Basins
92	Sossaman Channel and Basin
93	Guadalupe Box and Channel
94	Gilbert Crossroads Park Basin
95	Elliot Rd. Basin and Channel
96	Powerline FRS
97	Vineyard FRS
98	Rittenhouse FRS
99	Ellsworth Road Channel at Phoenix-Mesa Gateway Airport
100	Rittenhouse Rd. Channel
101	Queen Creek Channel (Hawes Rd. to Power Rd.)
102	Sonoqui Wash Channelization Phase I (Higley to Chandler Heights)
106	Siphon Draw Drainage Improvements
108	23rd Ave. & Roeser Rd. Basin & Storm Drain
109	Cloud Rd. & Sossaman Rd. Basin and Outlet
113	Sonoqui Wash Improvements Phase II (Chandler Heights to Crismon)
117	Lafayette Interceptor Drain & Outlet



- CIP Structures & Projects
- Rivers & Washes
- CAP Canal

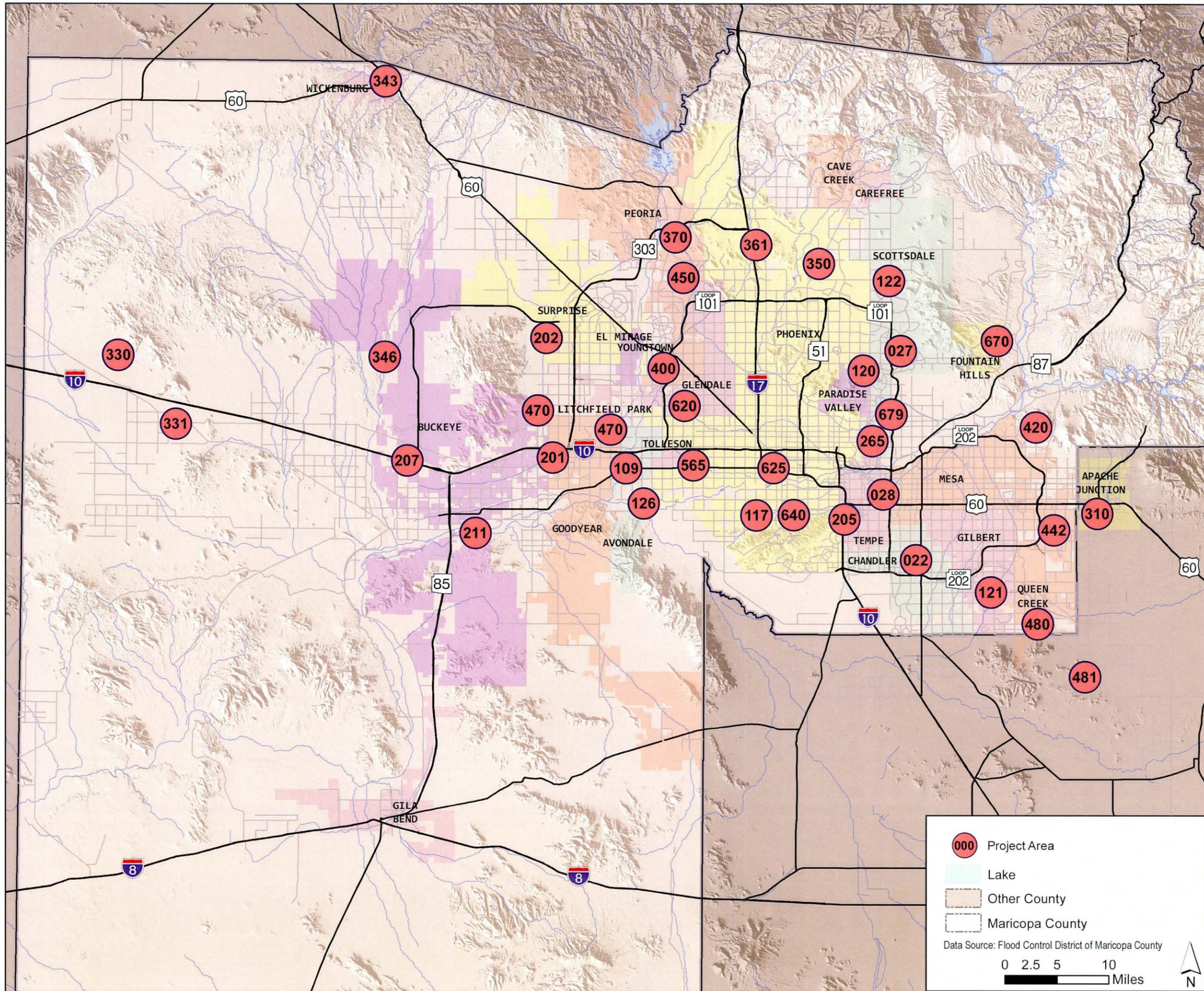
Data Source: Flood Control District of Maricopa County



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Capital Improvement Project Areas FY 2015 - 2019

Map F



Project Account	Project Name
022	City of Chandler
027	City of Scottsdale
028	Tempe ADMP
109	Agua Fria River
117	South Phoenix Drainage Improvements
120	Scottsdale Road Corridor DMP
121	East Maricopa Floodway
122	Pinnacle Peak ADMP
126	Salt/Gila River
201	White Tanks FRS No. 4
202	McMicken Dam
205	Guadalupe Dam
207	Buckeye FRS No. 1
211	Buckeye/Sun Valley ADMS
265	Granite Reef Wash
310	Powerline, Rittenhouse & Vineyard Road FRS's
330	Harquahala FRS
331	Saddleback FRS
343	Wickenburg ADMP
346	Hassayampa WCMP
350	Cave Buttes Dam
361	Skunk Creek & I-17
370	New River Dam
400	Skunk Creek & New River
420	Spook Hill ADMP
442	East Mesa ADMP
450	Glendale/Peoria ADMP
470	White Tanks/Agua Fria ADMP
480	Queen Creek ADMS
481	San Tan ADMS
565	Durango ADMP
620	Maryvale ADMP
625	Metro ADMP
630	South Mountain ADMP
640	Hohokam ADMP
670	Ashbrook Wash
679	Lower Indian Bend Wash ADMP



Appendix



AGENCY FLOOD CONTROL NEEDS SUMMARY

As Submitted in November 2014

Summary of Flood Control Requests

17 agencies responded to the October request in identifying flood control requests and priorities.

200 total projects submitted

162 new agency CIP projects and studies requested for a total estimated cost of \$1,299,749,050

11 Unincorporated Maricopa County project/program needs:

Total estimated cost of UMC needs: \$137,194,000

Tier 1 Projects (agreements in place): \$281,718,500

Tier 2 Projects (few agreements in place) plus SPAP (FY15 & 16): \$583,738,995

Total estimated Tier 1 & 2 plus SPAP cost: \$865,457,495

TOTAL ESTIMATED REQUESTS: \$2,302,400,545

AGENCY FLOOD CONTROL NEEDS SUMMARY - AS SUBMITTED BY AGENCIES

MUNICIPALITY	PROJECT	DESCRIPTION	PRIORITY	PROJECT TYPE	PREVIOUSLY PRIORITIZED / IN CURRENT CIP	ADMS/P ELEMENT	TOTAL ESTIMATED PROJECT COST
ADOT	SR-85/Oglesby Outfall Channel	3-mile long outfall channel	Low	CIP	X	Yes - Buckeye	\$14,000,000
ADOT	Skunk Creek at I-17/Dixileta Drive	Cleanout		CIP			\$2,000,000
Chandler	Downtown Chandler Storm Drain Improvements	10-year storm drains and catch basins	High	CIP	X	Yes - SWMPU	\$2,800,000
Chandler	Chandler Regional Airport Basin	Resize exiting basin and provide for an outfall		CIP			\$5,000,000
Chandler	Pima Park Retention Basin	Install drywells		SPAP			\$200,000
Chandler	Dobson Rd. & Chandler Blvd. Drainage Improvements	Basin reconstruction and storm drain		SPAP			\$600,000
Chandler	Bullnose Dr. & Alba Way Drainage Improvements	Basin reconstruction and storm drain		SPAP			\$400,000
Chandler	Woodglen Unit 4 Subdivision Drainage Improvements	Basin reconstruction and storm drain		SPAP			\$400,000
Chandler	Apache Park/Knox Road Drainage Improvements	Basin reconstruction and storm drain		SPAP			\$750,000
Chandler	Hunt Hwy. Drainage Impr. - Gilbert to Val Vista	Sedimentation control		DCR			\$5,000,000
Chandler	SR-L202/Alma School Road Drainage Improvements	Basin reconstruction and storm drain		DCR			\$2,000,000
El Mirage	Dysart Road Culvert Between Thunderbird & Cactus	Remove existing 2-48" RCP, replace with box culvert	High	CIP		Yes - L303/WT	\$951,000
Glendale	Camelback Road Storm Drain - 51st Ave. to 58th Ave.	Install 72" storm drain	High	CIP		Yes - SWMP	\$2,210,670
Glendale	83rd Ave. Storm Drain - Bethany Home to Camelback	Install 60" storm drain	High	CIP		Yes - SWMP	\$1,741,470
Glendale	83rd Ave. & Georgia Ave. Drainage Improvements	Basin reconstruction, storm drain and catch basins	High	SPAP			\$900,000
Glendale	47th Ave. & State Ave. Drainage Improvements	Storm drain and inlets	High	SPAP			\$700,000
Glendale	Murphy Park/City Hall Drainage Improvements	Outlet pipe and drywell	High	SPAP			\$470,000
Glendale	Rose Land Park & 49th Ave. Drainage Improvements	Curb cuts and grading	High	SPAP			\$100,000
Glendale	Bethany Home Road Storm Drain - 51st to 59th Ave.	Storm drain and catch basins	Medium	CIP	X		\$3,150,000
Glendale	Bethany Home Road Storm Drain - 59th to 79th Ave.	Storm drain and catch basins	Medium	CIP	X		\$4,070,000
Glendale	51st Avenue Storm Drain - Northern to Olive	Storm drain and catch basins	Medium	CIP		Yes - SWMP	\$6,570,000
Glendale	51st Avenue Storm Drain - Olive to Peoria	Storm drain and catch basins	Medium	CIP		Yes - SWMP	\$1,720,000
Goodyear	Bullard Wash at Yuma Road	Upgrade pipe capacity and erosion protection		SPAP			\$60,000
Goodyear	Elwood Street Channel (near Sarival Avenue)	Repair erosion and stabilize channel		SPAP			\$350,000
MCDOT	Agua Fria Blvd. Scour Protection Grade Control Structure	Erosion control		CIP	X		\$2,000,000
MCDOT	AT&SF Channel	Channel		CIP	X	Yes - L303/WT	\$6,377,000
MCDOT	Northern Parkway Drainage Improvements - Phase II	storm drain, channel and basins		CIP	X	Yes - L303/WT	\$7,246,550
MCDOT	Honda Bow & 9th Avenue Crossing	Re-establish channelization of Klein Wash		CIP			\$500,000
MCDOT	Desert Hills Drive and 15th Avenue Crossing	Re-establish channelization of Klein Wash		CIP			\$500,000
MCDOT	Old Stage Road/36th Avenue/35th Avenue	Re-establish levee.		CIP			\$2,000,000
MCDOT	Narramore Rd at the Waterman Wash	construct an all-weather crossing		CIP			\$500,000
MCDOT	19th Ave south of Desert Hills Drive	Re-establish channelization of Klein Wash		CIP			\$500,000
MCDOT	Erie Street/Mountain Road Drainage Improvements	Evaluate storm drain system		DCR			\$250,000
MCDOT	Palm Lane Improvements - Sossaman to Hawes	Evaluate storm drain system		DCR			\$500,000
MCDOT	Patton Road west of 195th Avenue	No access during rain events		DCR			\$500,000
MCDOT	Patton Road at Hassayampa River	No access during rain events		DCR			\$500,000
MCDOT	Patton Rd west of 257th Avenue	Establish capacity of downstream channel		DCR			\$500,000
MCDOT	115th Ave, north of Happy Valley Parkway	Road closes during rain events		DCR			\$500,000
MCDOT	Hyder Area Levee	Levee improvements		DCR			\$750,000
Mesa	Oak Street Detention Basin and Storm Drain	Detention basin, storm drain and catch basins	High	CIP	X	Yes - Spook Hill	\$3,480,000
Mesa	Pecos Road Channel	Channel	High	CIP	X	Yes - East Mesa	\$13,620,000
Mesa	Broadway Rd Storm Drain - Center to Mesa Drive	Storm drain and catch basins	High	CIP			\$5,000,000
Mesa	Center Street Storm Drain - Southern to US 60	Storm drain to tie into Heritage Park Basin	High	CIP			\$3,000,000
Mesa	Lewis Road Storm Drain - Baseline to US 60	Storm Drain and catch basins	High	CIP			\$5,000,000
Mesa	Southern Avenue Area Drainage Improvements	Storm drain and catch basins	High	CIP			\$5,000,000
Mesa	Hawes Road Channel - Range Rider Trail to Oak Street	Channel and outfall to Oak Street system	High	CIP			\$4,000,000
Mesa	Winterhaven Storm Drain Connection	Relief line from existing storm drain	High	CIP			\$2,500,000
Mesa	Skyline - Power and McKellips	Retention basin.	High	CIP			\$3,000,000
Mesa	Countryside Park Line Connection	36" storm drain with siphon	High	CIP			\$2,000,000
Mesa	90th and Brown Rd. Drainage Improvements	Channel	High	CIP			\$2,500,000
Mesa	Hawes Road Channel - Pecos to Germann	Channel	High	CIP			\$5,000,000
Mesa	90th St. and Butternut Ave. Drainage Improvements	Storm drain and catch basins	High	SPAP	X		\$172,300
Mesa	2nd Avenue and Solomon Drainage Improvements	Relieve flows from Main; outfall to basin at junior high. O	High	SPAP	X		\$1,420,000

Mesa	Emerald Acres Drainage Improvements	Increase retention capacity. Over 100 homes flooded.	High	SPAP	X		\$390,500
Mesa	Pecos Road Drainage	Verify H&H and original solutions	High	DCR			\$190,365
Mesa	Baseline - Signal Butte and State Land	Flows from state land cause road closures even in small events	High	DCR			\$1,500,000
Mesa	McKellips Road - Higley to Greenfield, Laterals, Retention on	Storm drain and expand existing retention basin	Medium	CIP			\$6,000,000
Mesa	Mesa St - Sossaman to Power	Retention basin	Medium	CIP			\$4,000,000
Mesa	Upper Ellsworth Rd Detention Basin and Storm Drain	Identified in City of Mesa Storm Drain Master Plan	Medium	CIP		Yes - SWMP	\$10,000,000
Mesa	Guadalupe Road - Mesquite Canyon to Loop 202	Storm drain and catch basins	Medium	CIP			\$4,500,000
Mesa	Germann Road Channel	Channel	Medium	CIP		Yes - East Mesa	\$6,000,000
Mesa	6th and Fraser Drainage Improvements	Extension of Horne Road storm drain	Medium	SPAP			\$350,000
Mesa	Seton and Halifax Drainage Improvements	Relief line to tie into Higley Road system	Medium	SPAP			\$350,000
Mesa	Broadway Road Junction Structures near EMF	Manholes and inlets	Medium	SPAP			\$100,000
Mesa	Broadway and Recker Drainage Improvements	Channel and box culvert	Medium	SPAP			\$500,000
Mesa	Dobson and Baseline Drainage Improvements	Junction structure	Medium	SPAP			\$40,000
Mesa	Royal Palms	Storm drain and manholes	Medium	SPAP	X		\$145,000
Mesa	9th Avenue and Horne	Basin for 10-year event	Medium	SPAP	X		\$1,426,345
Mesa	Horne - 8th to Main St.	Add parallel pipes to existing system	Low	CIP			\$3,000,000
Mesa	Gilbert Road - Powerline corridor north of Colby Street	Add retention and lateral piping	Low	CIP			\$3,000,000
Mesa	Southern Avenue - Hobson to Center St	Add parallel piping to accommodate 100-year event	Low	CIP			\$3,000,000
Mesa	McKellips Road - Lindsay to Val Vista	Add parallel pipes to convey existing flows	Low	CIP			\$3,000,000
Mesa	Val Vista - Eastern Canal to Main, Main to Broadway	Add parallel pipes to convey 100-year storm	Low	CIP			\$3,000,000
Mesa	Eastern Canal - Main Street	Add parallel pipes to convey 100-year storm	Low	CIP			\$3,000,000
Mesa	Greenfield - Broadway to Southern Avenue and Irrigation Di	Add parallel pipes, increase retention in Greenfield Park B	Low	CIP			\$3,000,000
Mesa	Brown Road - Recker to Higley to Eastern Canal	Add parallel pipes to convey 100-year storm	Low	CIP			\$3,000,000
Mesa	Broadway Road - 70th to Power, 70th to Main	Increase capacity of culverts and pipes at road crossings.	Low	CIP			\$2,500,000
Mesa	McKellips Road, Crismon to 95th Place	SD Line	Low	CIP			\$3,000,000
Mesa	Crismon Rd Storm Drain - Brown to University	Design storm drain	Low	CIP			\$3,000,000
Mesa	Warner Rd-EMF-Sossaman Rd	Channel	Low	CIP			\$4,000,000
Mesa	Ellsworth Channel	Channel relocation for airport expansion	Low	CIP			\$4,000,000
Mesa	Crismon Road Channel	Channel	Low	CIP			\$4,000,000
Mesa	Citrus Gardens - Maple and Main	Storm drain system to tie into Main Street system	Low	CIP			\$3,000,000
Mesa	Stapley and Brown Drainage Improvements	Parallel lines and basin at SWC of Stapley and Brown	Low	CIP			\$3,000,000
Mesa	Silvergate Park Detention Basin	Add 11 AF of additional retention to basin	Low	SPAP			\$500,000
Mesa	10th Avenue and SIRRINE	Extension of storm drain system	Low	SPAP	X		\$100,000
Mesa	Summer and Bates	Storm drain to tie into ADOT basin	Low	SPAP			\$500,000
Mesa	Lehi Road	Roadside basins and improvements to tailwater ditch	Low	SPAP			\$500,000
Mesa	SRP Powerline Corridor Laterals	Add retention basin between Higley Rd & Recker Rd	Low	DCR			\$1,500,000
Mesa	94th Street - Jasmin Circle to McClellan	Resolve storm drain issues	Low	DCR			\$1,500,000
Mesa	Signal Butte Drainage Improvements	New infrastructure to connect to existing system	Low	DCR			\$1,500,000
Mesa	Ellsworth Road and McKellips Road Drainage System	Detention basin, storm drain and catch basins		CIP	X	Yes - Spook Hill	\$4,800,000
Mesa	Meridian Road North and South Channels	Channel		CIP	X	Yes - East Mesa	\$2,400,000
Mesa	Pecos Road North and South Detention Basins	Detention basins		CIP	X	Yes - East Mesa	\$15,500,000
Paradise Valley	Hummingbird Ln. & Quartz Mtn. Rd. Impr.		High	CIP			\$2,000,000
Paradise Valley	Scottsdale Rd. & Indian Bend Drainage Impr.		High	CIP			\$4,000,000
Paradise Valley	Middle Indian Bend Wash Area Drainage Master Study		High	STUDY			\$400,000
Paradise Valley	Berniel Channel Improvements	Channel upgrade	Medium	CIP	X		\$5,500,000
Paradise Valley	Cudia City Wash Crossing at Tatum Blvd.		Medium	CIP			\$3,000,000
Paradise Valley	Doubletree Ranch Rd. at Indian Bend Wash Crossing		Medium	CIP			\$3,000,000
Paradise Valley	Invergordon Road at Indian Bend Wash Crossing		Medium	CIP			\$3,000,000
Peoria	T4N, R1E, S12 Drainage Study	Study hazards in an imminent development situation	High	STUDY			\$250,000
Peoria	Pinnacle Peak Rd. & 67th Ave. Drainage Improvements	Storm drain and catch basins	Medium	CIP		Yes - HV DCR	\$3,000,000
Phoenix	DRCC - Phase II (83rd Ave. to 107th Ave.)	Channel	High	CIP	X	Yes - Durango	\$15,500,000
Phoenix	27th Ave. & South Mtn Rd. Detention Basin	Detention basin	High	CIP	X	Yes - S. Mtn	\$5,300,000
Phoenix	27th Ave. & Dobbins Rd. Detention Basin	Detention basin	High	CIP	X	Yes - S. Mtn	\$6,700,000
Phoenix	South Phoenix/Laveen Drainage Improvements	Storm drains, catch basins and detention basins	High	CIP	X	Yes - S. Mtn/Lav	\$11,300,000
Phoenix	Circle K Park Detention Basin & Storm Drain	Storm drains, catch basins and detention basins	High	CIP	X	Yes - Hohokam	\$16,800,000
Phoenix	14th/15th Street Storm Drain	Storm drains and catch basins	High	CIP			\$3,300,000
Phoenix	Ardmore Road Storm Drain	Storm drains and catch basins	High	CIP			\$1,300,000
Phoenix	South Mtn. Ave. and 17th Way Storm Drain	Storm drains and catch basins	High	CIP			\$1,200,000
Phoenix	20th Avenue and Turney Basin	Detention basin	High	CIP	X		\$13,000,000

Phoenix	Skunk Creek Channel & Pinnacle Peak Road	Channel	High	CIP	X		\$8,500,000
Phoenix	Arcadia Drive Drainage Improvements Phase III	Storm drain and catch basins	High	CIP	X		\$6,500,000
Phoenix	I-17/Jefferson Street Storm Drain	Storm drain and catch basins	High	CIP	X	Yes - Metro	\$3,100,000
Phoenix	43rd Avenue and Dobbins Road Detention Basin	Detention basin	Medium	CIP		Yes - Laveen	\$1,260,000
Phoenix	44th Avenue and Carver Road Detention Basin	Detention basin	Medium	CIP		Yes - Laveen	\$3,600,000
Phoenix	51st Avenue Storm Drain (Baseline to Elliot Road)	Storm drain and catch basins	Medium	CIP		Yes - Laveen	\$2,330,000
Phoenix	51st Avenue and Dobbins Road Basin	Detention basin	Medium	CIP		Yes - Laveen	\$1,420,000
Phoenix	51st Avenue and Elliot Road Basin	Detention basin	Medium	CIP		Yes - Laveen	\$1,550,000
Phoenix	67th Ave. Channel - Southern Ave. to South Mtn. Ave.	Channel	Medium	CIP		Yes - Laveen	\$2,700,000
Phoenix	Dobbins Road Storm Drain - 43rd Ave. to 51st Ave.	Storm drain and catch basins	Medium	CIP		Yes - Laveen	\$780,000
Phoenix	7th Ave. Storm Drain - Baseline Rd. to South Mtn. Ave.	Storm drain and catch basins	Medium	CIP		Yes - Laveen	\$1,600,000
Phoenix	27th Ave. Storm Drain - Baseline Rd. to S. Mtn. Ave.	Storm drain and catch basins	Medium	CIP		Yes - Laveen	\$1,700,000
Phoenix	20th Street and Baseline Road & Outfall	Storm drain and catch basins	Medium	CIP			\$3,800,000
Phoenix	20th Street/Euclid Avenue Storm Drain	Storm drain and catch basins	Medium	CIP			\$1,800,000
Phoenix	19th Street/South Mountain Avenue Storm Drain	Storm drain and catch basins	Medium	CIP			\$1,800,000
Phoenix	20th Street and Dobbins Road Basin	Detention basin	Medium	CIP			\$1,500,000
Phoenix	43rd Avenue Storm Drain Outfall at Broadway Road	Storm drain	Medium	CIP			\$2,000,000
Phoenix	Pecos Basin Outfall Project (48th Street & Pecos Road)	Storm drain	Medium	CIP			\$2,000,000
Phoenix	40th Street/Camelback Road Storm Drain	Storm drain and catch basins	Medium	CIP			\$4,100,000
Phoenix	Arcadia Drive Storm Drain - 48th St. to Camelback Rd.	Storm drain and catch basins	Medium	CIP			\$4,900,000
Phoenix	Camelback Road Storm Drain - Arcadia to 40th Street	Storm drain and catch basins	Medium	CIP			\$5,500,000
Phoenix	Downtown Storm Drains (various locations, north of RR)	Storm drain and catch basins	Medium	CIP			\$31,600,000
Phoenix	Central Ave. Storm Drain - Bethany Home Rd. to AZ Canal	Storm drain and catch basins	Medium	CIP		Yes - Metro	\$8,100,000
Phoenix	Thomas Road Storm Drain - OCCO to 60th St.	Storm drain and catch basins	Medium	CIP		Yes - Metro	\$10,700,000
Phoenix	Encanto Golf Course Storage Basin (7th / 19th Avenues)	Detention basin	Medium	CIP		Yes - Metro	\$40,800,000
Phoenix	Van Buran Street Storm Drain (I-10 to 40th Street)	Storm drain and catch basins	Medium	CIP		Yes - Metro	\$19,300,000
Phoenix	Palisene-Paradise Ridge Drainage Project	Study solutions in an imminent development situation	Medium	DCR			\$20,000,000
Phoenix	Reservation Channel - Dobbins Rd. to LACC	Channel	Low	CIP			\$1,120,000
Phoenix	Carver Hills Storm Drain - Estrella Dr. to 45th Ave.	Storm drain and catch basins	Low	CIP			\$630,000
Phoenix	Western Canal Channel - 43rd Avenue to 51st Avenue	Channel	Low	CIP			\$2,700,000
Phoenix	47th Avenue Channel System - Buckeye Rd. to Salt River	Channel	Low	CIP			\$19,100,000
Phoenix	Sunland Avenue Channel - 99th Ave. to 115th Ave.	Channel	Low	CIP			\$8,100,000
Phoenix	Salt River Channelization at 67th Avenue Improvements	Channelization	Low	CIP			\$10,000,000
Phoenix	Camelback Road Storm Drain - Arcadia Drive to 56th St.	Storm drain and catch basins	Low	CIP			\$3,900,000
Phoenix	Palo Verde Golf Course Storage Basin	Detention basin	Low	CIP			\$12,600,000
Phoenix	15th Ave. Storm Drain - Palo Verde GC to Butler Dr.	Storm drain and catch basins	Low	CIP			\$18,700,000
Phoenix	21st Avenue Storm Drain - Encanto GC to Northern Ave.	Storm drain and catch basins	Low	CIP			\$50,800,000
Phoenix	15th Avenue Storm Drain - Encanto GC to Grand Canal	Storm drain and catch basins	Low	CIP			\$23,900,000
Phoenix	3rd Ave. Storm Drain - Encanto GC to Bethany Home Rd.	Storm drain and catch basins	Low	CIP			\$21,900,000
Phoenix	Thomas Rd. Storm Drain - Encanto GC to 24th Ave.	Storm drain and catch basins	Low	CIP			\$3,600,000
Phoenix	McDowell Rd. Storm Drain - AZDOT Tunnel to 15th Ave.	Storm drain and catch basins	Low	CIP			\$5,800,000
Phoenix	Downtown Storm Drains (various location, south of RR)	Storm drain and catch basins	Low	CIP			\$19,700,000
Phoenix	Durango Curve Detention Basin and Collection System	Storm drain, catch basins and detention basins	Low	CIP			\$74,100,000
Phoenix	Undefined Local Drainage Projects/City wide	Various infrastructure		CIP/SPAP/DCR			\$479,000,000
Queen Creek	San Tan Interceptor Channel/Farmers Dike	Levee, channel and basin	High	DCR		Yes - San Tan W	\$5,500,000
Queen Creek	Goldmine Ranch Subdivision Drainage Improvements	Collector channels and basin	High	CIP		Yes - San Tan W	\$3,000,000
Queen Creek	Riggs Road (Grapefruit to Hawes) Drainage Impr.	Channels, storm drain and basin	High	CIP		Yes - San Tan W	\$3,500,000
Queen Creek	Newell Barney Junior High School Drainage Impr.	Storm drain and basin	High	CIP		Yes - San Tan W	\$4,000,000
Queen Creek	Cloud Road Area Improvements	Basin and Outlet channel	High	CIP		Yes - San Tan W	\$3,000,000
Queen Creek	Power Road Channel - Cloud Rd. to Chandler Heights	Channel	High	CIP		Yes - San Tan W	\$5,000,000
Queen Creek	Queen Creek Channel Extension & Detention Basin	Channel and basin	High	CIP		Yes - EM ADMPU	\$11,672,000
Salt River Proj.	Stormwater Improvement Features along SRP Canal	Overchutes, interceptor channels/SD, basins	High	CIP			\$25,000,000
Scottsdale	Granite Reef Wash Improvements	Storm drain, catch basins and detention basins	High	CIP	X	Yes - SWMP	\$21,375,000
Scottsdale	Reata Pass Wash Flood Control Project	Channel and basins	High	CIP		Yes - PPS	\$30,000,000
Scottsdale	Rawhide Wash Flood Control Project	Channel and basins	High	CIP		Yes - PPW	\$25,000,000
Scottsdale	Crossroads East Phase I Drainage Improvements	Various infrastructure	High	CIP			\$15,094,035
Scottsdale	Crossroads East Phase II Drainage Improvements	Various infrastructure	High	CIP			\$22,257,510
Scottsdale	Pinnacle Peak West Area Drainage Master Study	Hazard identification	High	STUDY			\$1,855,000
Scottsdale	Paradise Drive Storm Drain - 67th St. to 68th St.	Storm drain and catch basins	Medium	SPAP	X		\$243,000

Scottsdale	8525 E. Pinnacle Peak Road Drainage Improvements	Floodwall	Medium	SPAP	X		\$25,000
Scottsdale	7117 E. 3rd Ave. Drainage Improvements	Storm drain and catch basins	Medium	SPAP	X		\$30,000
Scottsdale	Sherwood Heights Detention Basin	Detention basin	Medium	SPAP			\$500,000
Scottsdale	El Cuadro Drainage Improvements		Medium	SPAP			\$500,000
Scottsdale	Cheery Lynn Rd. Storm Drain - 67th Pl. to 69th Pl.	Storm drain and catch basins	Medium	SPAP			\$400,000
Scottsdale	Desert Cove & 80th Place Storm Drain	Storm drain and catch basins	Medium	SPAP			\$400,000
Scottsdale	Police/Fire Headquarters Flood Hazard Mitigation	Grated Inlet and detention basin.	Medium	SPAP			\$54,000
Scottsdale	Lower Indian Bend Wash Area Drainage Master Study	Hazard identification	Medium	STUDY			\$1,250,000
Scottsdale	Shea Corridor East Area Drainage Master Study	Hazard identification	Medium	STUDY			\$1,000,000
Scottsdale	Desert Mountain Area Drainage Master Study	Hazard identification	Medium	STUDY			\$500,000
Scottsdale	Indian Bend Rd./Lincoln Dr. Drainage Improvements	Storm drain and catch basins		CIP		Yes - LIBW	\$7,000,000
Scottsdale	McCormick Stillman RR Park/Lincoln Drive Drainage	Storm drain and catch basins		CIP	X	Yes - LIBW	\$6,703,400
Scottsdale	82nd Street Storm Drain	Storm drain and catch basins		CIP		Yes - LIBW	\$5,000,000
Surprise	115th Ave./Union Hills Dr. Drainage Improvements	Channel, storm drains, catch basins, detention basins	High	CIP	X		\$11,445,000
Surprise	Reems Road Channel - Waddell Rd. to Cactus Rd.	Channel	High	CIP			\$1,050,000
Surprise	Peoria Ave. & Litchfield Rd. Drainage Improvements	Channel rehab	High	CIP			\$110,000
Surprise	Martin Acres Drainage Improvements	Channel and culverts	High	SPAP	X		\$750,000
Surprise	Jerry Street & Rimrock Rd. Drainage Improvements	Detention basin	High	SPAP	X		\$450,000
Surprise	Tierra Buena & 151st Ave. Drainage Improvements	curb and gutter	Medium	SPAP			\$30,000
Surprise	Tara Lane & Christine Lane Drainage Improvements	Storm drain and drywell	Low	SPAP			\$30,000
Tempe	Loma Vista Corridor Drainage Improvements	Storm drain, catch basins and detention basin	High	CIP	X	Yes - B/R DCR	\$2,670,000
Tempe	Tempe Area Drainage Master Study	Hazard identification	High	STUDY			\$950,000
Tempe	Lower Indian Bend Wash Area Drainage Master Study	Hazard identification	High	STUDY			\$1,250,000
Tempe	Highline Western Canal Storm Drain	Storm drain and catch basins	Medium	CIP	X		\$3,980,000
Wickenburg	Hassayampa Elementary School Drainage Impr.	Alternatives analysis	High	DCR			\$3,000,000
Wickenburg	Powder House Wash Improvements	Alternatives analysis	High	DCR			\$4,000,000
Wickenburg	Sols Wash Crossing at Vulture Mine Road	Construct culvert or bridge	Medium	CIP			\$750,000
Wickenburg	Flying E Wash at Vulture Mine Road	Box culvert	Medium	CIP			\$500,000
Youngtown	Connecticut Avenue Storm Drain	Storm drain and catch basins	High	DCR			\$4,000,000

17 AGENCIES SUBMITTING
34 LETTERS SENT
50% RESPONSE

200 PROJECT TOTALS: \$1,531,715,145

NOTE: Project costs that are italicized were best guesses from
FCD Staff. Submitting agency did not provide a cost estimate.

UNINCORPORATED MARICOPA COUNTY FLOOD CONTROL NEEDS SUMMARY

FCD	PROJECT	DESCRIPTION	PRIORITY	PROJECT TYPE	PREVIOUSLY PRIORITIZED / IN CURRENT CIP	ADMS/P ELEMENT	TOTAL ESTIMATED PROJECT COST
UMC	Skunk Creek/New River Road Levee	Construct Levee		CIP		Adobe Dam/DH	\$2,650,900
UMC	Desert Lake Wash Drainage Improvements	Construct channels, box culverts and basin		CIP		Adobe Dam/DH	\$4,583,300
UMC	Carver Hills Basin and Storm Drain	Construct detention basin and storm drain		CIP		Laveen	\$4,908,800
UMC	San Tan Interceptor Channel	Farmers dike replacement		DCR		San Tan West	\$13,750,000
UMC	Power Rd./Cloud Road Drainage Improvements	Construct channel		CIP		San Tan West	\$2,500,000
UMC	Bonita Area Drainage Channel	Construct channel and basin		CIP		Wittman	\$13,300,000
UMC	Circle City Drainage Improvements	Construct channel(s)		CIP		Wittman	\$6,000,000
UMC	Iona Wash/Lone Mtn Road Area Drainage Impr.	Construct channel(s)		CIP		Wittman	\$7,713,000
UMC	FRS No.1 Subarea - Fan 36	Construct channels and basins		CIP		Sun Valley	\$65,788,000
UMC	Floodprone Property Acquisition Program (FPAP)	35 properties located in a new delineated area		CIP			\$6,000,000
UMC	Small Projects Assistance Program	Specific locations need to be analyzed further		CIP			\$10,000,000

PROJECT/PROGRAM/NEEDS TOTALS: \$137,194,000

GRAND TOTAL OF FLOOD CONTROL NEEDS: \$1,668,909,145

15-YEAR CAPITAL IMPROVEMENT PROGRAM NEEDS ASSESSMENT

Tier 1 Status Current as of December 31, 2014

Project	District	Master Plan Element	Initial PEC Score	Status	Programming Notes	15-year Project Cost	District Cost Share %	District Cost	Description	Level of Protection	Benefited Area (Sq. Mi.)	Floodplain Benefits	Location: Urban or Rural	District Maintenance Effort & Risk Level	Economic/Population Development Potential	Other Notable/Ancillary Benefits
Ashbrook Wash Improvements	2	Fountain Hills ADMS & Technical Memo	84	Tier 1	Funded in the 5-year CIP, currently in design. Construction to start in FY15.	\$1,952,000	50%	\$976,000	The project will provide channel improvements to convey increased flood flow from the upstream dam. Construction will replace old corrugated metal pipes with new reinforced concrete box culverts and channel excavation.	100-year	0.1	Yes, 13 structures	Urban	N/A	None	Improved transportation safety during storm events.
Buckeye FRS No.1 Rehabilitation Phase 1	4	Buckeye/Sun Valley ADMPs	76	Tier 1	Funded in the 5-year CIP, currently in construction. <u>NRCS funds obligated.</u>	\$5,490,000	35%	\$1,921,500	Phase I consists of rehabilitating the dam embankment by constructing a new central filter, improving the spillway works, improving the principal outlet, and improving the culverts at roadway crossings.	100-year	61.4	No	Rural	Yes (Medium); Corrects dam deficiencies.	Yes, significant downstream commercial and residential development potential (from I-10 south to the Gila River) for the City of Buckeye.	Protects the traveling public and transport of goods on the I-10 corridor, the Buckeye Airport, the Roosevelt IDC, UPRR and agriculture. Extends functional life of the dam for 100+ years.
Sonoqui Wash Channelization Phase IIB	1	Queen Creek / Sonoqui Wash HMP	75	Tier 1	Funded in the 5-year CIP, currently in final design. Phase IIB is to start in FY15.	\$5,452,000	100%	\$5,452,000	Includes the channelization of the main branch of Sonoqui Wash, from Empire Road at Ellsworth Road, northwest to Riggs Road at approximately Hawes Road.	100-year	0.5	Yes, 345 acres and 217 residential structures	Urban	N/A	Yes, minor development potential for land that is being taken out of the floodplain once project is complete.	Improved transportation safety during storm events.
White Tanks FRS No.4 Rehabilitation Phase 2	4	Loop 303/White Tanks ADMP	74	Tier 1	Funded in the 5-year CIP, currently in final design. <u>NRCS funds obligated.</u>	\$23,072,000	37%	\$8,536,640	Phase 1 replaced the existing central filter with an engineered filter system. Phase 2, will extend the dam embankment and the right emergency spillway will be widened to accommodate the loss of the left emergency spillway.	100-year	9.5	No	Urban	Yes (Medium); Corrects dam deficiencies.	Yes, minor development potential on state land property.	Protects 7,000 acres of irrigated agricultural land, local residences, 62 arterial streets, Union Pacific Railroad. Multi-use opportunities. Extends functional life of the dam for 100+ years.
McMicken Dam Rehabilitation Phases 1 & 2	4	N/A	74	Tier 1	Funded in the 5-year CIP, currently in design.	\$23,446,000	100%	\$23,446,000	This phase of the project will relocate the principal emergency spillway and principal outlet. <u>Discounted project cost with the land sale potential.</u>	100-year	19.2	No	Urban	Yes (High); Corrects dam deficiencies.	None	Protects approximately 80,000 persons and \$6 billion of infrastructure downstream of the structure. Protects Luke Air Force Base. Extends functional life of the dam for 100+ years.
Van Buren St. Channel (99th Ave. to Agua Fria River)	5	Durango ADMP	74	Tier 1	Funded in the 5-year CIP, currently in design.	\$9,347,000	40%	\$3,738,800	Project will construct a drainage system along Van Buren Street carrying stormwater west of 99th Avenue to the Agua Fria River. The channel project will improve stormwater drainage in the Avondale City Center.	10-year	5.2	No	Urban	N/A	Yes, significant commercial development potential for the new Avondale City Center and along Van Buren Street.	The channel project will improve stormwater drainage for the new upcoming Avondale City Center. Multi-use opportunities.
Loop 303 Outfall	4	Loop 303/White Tanks ADMP	73	Tier 1	Funded in the 5-year CIP, currently in construction.	\$1,861,010	100%	\$1,861,010	The <u>regional backbone drainage system</u> is designed to collect and convey 100-year storm water runoff to the Gila River. Includes approximately 5 miles of open channel and 13 box culverts.	100-year	77.8	No	Urban	N/A	None	Mitigates property damage and flooding of the SR-L303 freeway and adjacent areas during a major storm event.
Watson Drainage System	4	Buckeye ADMP	72	Tier 1	District is responsible for the Outfall portion. The Outfall design is funded in the 5-year CIP. ROW & Construction is in the out-years.	\$40,788,000	96%	\$39,156,480	The <u>regional backbone drainage conveyance system</u> for development in eastern Buckeye. Project will construct regional drainage channels and basins to capture storm water from areas north of the RID to the Gila River.	100-year	21.5	Yes, potential to a reduce a small area of floodplain at the UPRR and irrigation canals.	Rural	N/A	Yes, significant downstream commercial and residential development potential in eastern portion of the City of Buckeye.	Multi-use opportunities. Improved transportation safety during storm events.
27th Ave. & South Mountain Ave. Basin	5	South Phoenix/Laveen ADMP	71	Tier 1	Design complete. Construction is programmed in the 5-year CIP in FY17.	\$5,236,000	60%	\$3,141,600	Constructs a new basin located at 27th Avenue and South Mountain Avenue will discharge into the previously-constructed storm drain system.	100-year	2.7	No	Urban	N/A	None	A major component of a series of improvements to help mitigate flooding hazards to the South Phoenix/Laveen area. Multi-use opportunities
Vineyard FRS Rehabilitation	1, 2	N/A	68	Tier 1	30% design includes the whole PVR system and is in progress. Project is fully funded in the 5-year CIP. <u>NRCS funds obligated.</u>	\$58,118,000	41%	\$23,828,380	Rehabilitation includes raising the dam and installing a new filter system along with the construction of the new principal outlet and spillway.	100-year	168.8	No	Urban	Yes (Medium); Corrects dam deficiencies.	None	Protects 72 sq. mi. of downstream area and approximately 100,000 persons. Extends functional life of the PVR system for 100+ years.
Cave Buttes Dam Modifications Phase 1	3	N/A	68	Tier 1	Design includes all phases. Phase I construction funded in the 5-year CIP, currently in final design.	\$5,790,000	100%	\$5,790,000	Phase 1 construction includes a new Install a new gated outlet and drainage channel in order to increase the drawdown capacity of the dam's flood pool.	100-year	100.0	No	Urban	Yes (Low); Corrects dam deficiencies.	None	Protects approximately 250,000 persons and \$15.6 billion of infrastructure downstream of the structure. Extends functional life of the dam for 100+ years.
Downtown Phoenix Drainage System Improvements	5	Metro Phoenix ADMP	67	Tier 1	Funded in the 5-year CIP, currently in construction.	\$300,000	50%	\$150,000	Project includes the installation of various drainage features, generally along 1st Ave., from Van Buren St. to Hadley St.; along Jefferson St. from 19th Ave. to 3rd Ave.; and in the vicinity of Fillmore St. and 3rd Ave.	10-year	0.6	No	Urban	N/A	None	Provides flood mitigation to people, existing structures, and the traveling public in downtown Phoenix.
Northern Parkway Drainage Improvements - Phase I	4	Loop 303/White Tanks ADMP	66	Tier 1	Funded in the 5-year CIP. Construction of the flood control components are complete with exception of the installation of landscaping aesthetics.	\$100,000	50%	\$50,000	Project constructed a drainage channel along the north side of the parkway from SR-303L to Reems Road and outlets to the existing Dysart Drain.	100-year	1.9	No	Urban	N/A	None	Mitigates property damage and flooding of the new Northern Parkway and adjacent areas during a major storm event.
Union Hills Drainage Improvements Phase I	4	Glendale/Peoria ADMPU	66	Tier 1	30% design included the entire system. Project construction will be phased. Phase I is currently in final design and all phase 1 components are in the 5-year CIP.	\$3,790,000	50%	\$1,895,000	Phase I will improve the existing Sun City Drain along 115th Ave. from the Agua Fria River to Bell Rd.; add a stilling basin at the northeast corner of 115th Ave. & Bell Rd.; improve the channel grade along 115th Ave. from Bell Rd. to Union Hills Dr.; and add catch basins at the intersection of 115th Ave & Union Hills Dr.	100-year	1.9	Yes, minor benefits around the area of where the channel discharges into the Agua Fria River.	Urban	Yes (Low); upgrades storm drain and channels the District currently maintains.	None	Mitigates property damage and flooding of the 115th & Bell Road area and adjacent areas during a major storm event. Improves protection to the existing transportation system and the traveling public.
Cave Buttes Dam Modifications Phase 2	3	N/A	66	Tier 1	Final design is in progress. Construction of Phase II is scheduled for FY18.	\$4,720,000	100%	\$4,720,000	Phase 2 construction includes a new seepage collection system.	100-year	100.0	No	Urban	Yes (Low); Corrects dam deficiencies.	None	Protects approximately 250,000 persons and \$15.6 billion of infrastructure downstream of the structure. Extends functional life of the dam for 100+ years.

NOTE: Tier 1 Projects:

Projects are active in either design or construction; project partner IGA's are in place; and funds programmed in the 5-year CIP.

Project	District	Master Plan Element	Initial PEC Score	Status	Programming Notes	15-year Project Cost	District Cost Share %	District Cost	Description	Level of Protection	Benefited Area (Sq. Mi.)	Floodplain Benefits	Location: Urban or Rural	District Maintenance Effort & Risk Level	Economic/Population Development Potential	Other Notable/Ancillary Benefits
Upper Camelback Wash Improvements	2	City of Scottsdale's Storm Water Master Plan	64	Tier 1	Funded in the 5-year CIP, currently in construction by the City of Scottsdale.	\$1,600,000	65%	\$1,040,000	Eliminates structural flooding for this major wash corridor to the greatest extent feasible in a sensitive manner by constructing channels, basins, culverts and multi-use facilities.	25-year & 100-year	0.6	Yes, approximately 600 structures	Urban	N/A	None	Multi-use opportunities. Upgrades the existing 2-year level of protection system.
Buckeye FRS No.1 Rehabilitation Phase 2	4	Buckeye/Sun Valley ADMPs	61	Tier 1	Currently in final design. Funded in the 5-year CIP. Construction is scheduled to start in FY15. <u>NRCS funds obligated.</u>	\$23,865,000	44%	\$10,500,600	Project consists of rehabilitating the dam embankment by constructing a new central filter, improving the spillway works, improving the principal outlet, and improving the culverts at roadway crossings.	100-year	61.4	No	Rural	Yes (Medium); Corrects dam deficiencies.	Yes, significant downstream commercial and residential development potential (from I-10 south to the Gila River)for the City of Buckeye.	Protects the traveling public and transport of goods on the I-10 corridor, the Buckeye Airport, the Roosevelt IDC, UPRR and agriculture. Extends functional life of the dam for 100+ years.
McMicken Dam Outfall Channel	4	N/A	60	Tier 1	Unilateral project; design is in progress. Construction is out of the 5-year CIP.	\$16,400,000	100%	\$16,400,000	Project will re-construct the outlet channel and wash.	100-year	19.2	Yes, new channel will take the existing levee out of service and reduce the flood pool area.	Urban	Yes (Medium); Existing levee risks and its useful life coming to an end.	Yes, minor residential development potential upstream of the new channel section.	Protects approximately 80,000 persons and \$6 billion of infrastructure downstream of the structure. <u>Land sale potential of approximately 370 acres.</u> Multi-use opportunities.
Powerline FRS Replacement & Decommissioning (Channel)	1, 2	N/A	60	Tier 1	30% design includes the whole PVR system and is in progress. Project is fully funded in the 5-year CIP. <u>NRCS funds obligated.</u>	\$30,762,500	38%	\$11,689,750	Powerline FRS will be replaced with a flood control channel that drains to Vineyard Rd. FRS.	100-year	168.8	No	Urban	Yes (High); Corrects dam deficiencies and removes the existing fissure hazard.	None	Protects 72 sq. mi. of downstream area and approximately 100,000 persons. Extends functional life of the PVR system for 100+ years.
Tres Rios	5	N/A	Predates Prioritization	Tier 1	Construction complete. Currently in the FEMA LOMR process.	\$10,000	100%	\$10,000	Project constructed wetlands; open water marshes and riparian corridors; and a flood control levee along the north bank of the river from approximately 105th Avenue to El Mirage Road.	100-year	4.9	Yes, reduced the floodplain area.	Rural	N/A	None	Mitigates existing flooding hazards. Environmental benefits.
ALERT2 System Upgrades	1, 2, 3, 4, 4	N/A	FCD Engineering	Tier 1	Unilateral and authorized. Material, hardware & software purchases are contingent upon year end funding availability.	\$267,000	100%	\$267,000	Upgrade of the existing ALERT system materials, hardware, software and network.	N/A	0.0	No	Both Rural and Urban	Yes, hardware and software upgrades to existing stations.	None	Enhances flood warning notifications and collects data more efficiently.
Land Rights Acquisition Program	1, 2, 3, 4, 4	N/A	FCD O&M	Tier 1	Unilateral, authorized, as needed basis.	\$1,000,000	100%	\$1,000,000	Secure additional land rights to access District maintained structures to respond to emergencies, accomplish repairs, perform inspections and conduct O&M activities.	N/A	0.0	No	Both Rural and Urban	Yes, provides access need to perform routine maintenance activities.	None	Provides adequate accessibility to District O&M staff.
Maintenance Road Paving (Dust Abatement) Program	1, 2, 3, 4, 4	N/A	FCD O&M	Tier 1	Unilateral, authorized, as needed basis.	\$1,500,000	100%	\$1,500,000	Improvements to maintenance roads to minimize air quality impacts.	N/A	0.0	No	Both Rural and Urban	Yes, improves access and dust abatement during routine maintenance activities.	None	Provides adequate accessibility to District O&M staff.
Small Projects Assistance Program	1, 2, 3, 4, 4	N/A	N/A	Tier 1	Authorized, Programmed, funded.	\$30,000,000	75% of construction costs up to a max of \$250K per project	\$30,000,000	Mitigates existing localized flooding hazards where major structural solutions would be impractical.	Varies	0.0	No	Both Rural and Urban	N/A	None	Mitigates flood hazards to existing infrastructure. Reduces the frequency of structural flooding. Inexpensive and easy to implement.
Number of Tier 1 Projects: 21 Number of Tier 1 Programs: 3					Total Tier 1 Project/Program Costs:	\$294,866,510		\$197,070,760				7 - Reduces the Floodplain	16 - Urban 5 - Rural	11 - District O&M	6 - w/ development potential	

NOTE: Tier 1 Projects:
Projects are active in either design or construction; project partner IGA's are in place; and funds programmed in the 5-year CIP.

15-YEAR CAPITAL IMPROVEMENT PROGRAM NEEDS ASSESSMENT

Tier 2 Status Current as of December 31, 2014

Project	District	Master Plan Element	Initial PEC Score	Status	Programming Notes	15-year Project Cost	District Cost Share %	District Cost	Description	Level of Protection	Benefited Area (Sq. Mi.)	Floodplain Benefits	Location: Urban or Rural	District Maintenance Effort & Risk Level	Economic/Population Development Potential	Other Notable/Ancillary Benefits
Luke Air Force Base Flood Mitigation Improvements	4	Loop 303/White Tanks ADMP	84	Tier 2	Prioritized and authorized. Awaiting partner commitment and funding. Construction is outside the 5-year CIP.	\$5,975,000	50%	\$2,987,500	The project includes rehabilitating and improving the existing storm drain system to collect and convey 100-year flows from sensitive areas on the base to the improved channel system.	100-year	7.1	Yes, approximately 250 acres of on-base facilities will be removed from the floodplain.	Urban	N/A	None	Will provide protection to 128 aircraft parking spots (valued at \$3 billion) and 94 buildings (valued at \$345 million), 4 aircraft hangars, command post, control tower, simulator complex, and 3 drinking water wells.
27th Avenue and Dobbins Road Detention Basin Project	5	South Phoenix/Laveen ADMP 2013 Update	81	Tier 2	Prioritized, not authorized. Awaiting funding and partner commitment.	\$6,700,000	50%	\$3,350,000	The project will construct a regional detention basin at 27th Avenue and Dobbins Road along with a bleed-off storm drain along 27th Avenue.	100-year basin, 10-year storm drain	0.0	No	Urban	N/A	None	A major component of a series of improvements to help mitigate flooding hazards to the South Phoenix/Laveen area. Multi-use opportunities.
South Phoenix/Laveen Drainage Improvement Project	5	South Phoenix/Laveen ADMP 2013 Update	79	Tier 2	Prioritized, not authorized. Awaiting funding and partner commitment.	\$11,300,000	50%	\$5,650,000	Project will construct multiple regional detention basins and storm drains, which are generally bound by 7th Avenue, Olney Avenue, 19th Avenue and South Mountain Avenue.	100-year basin, 10-year storm drain	0.0	No	Urban	N/A	None	A major component of a series of improvements to help mitigate flooding hazards to the South Phoenix/Laveen area. Multi-use opportunities.
Bullard Wash (Phase II)	4	Loop 303/White Tanks ADMP	78	Tier 2	Outside 5-year CIP. Phase 2 is awaiting funding and partner commitment.	\$12,500,000	50%	\$6,250,000	Phase I constructed 3 1/2 miles of an earthen flood control channel from the Phoenix/Goodyear Airport south to the Gila River. Phase II is the continuation of the previous (Phase I) outfall project.	100-year	0.7	Yes, will channelize the 100-year floodplain north of the Phoenix-Goodyear Airport.	Rural	N/A	Yes, minor development potential after floodplain is reduced.	Mitigates flooding to the Phoenix-Goodyear Airport. Mitigates stormwater that currently collects in streets, businesses, farm fields, and residential areas.
Waddell Rd. Drainage Improvements	4	White Tanks/Loop 303 ADMP	78	Tier 2	Prioritized, not authorized. Awaiting funding and partner commitment.	\$772,000	33%	\$254,760	Construction of channels to convey offsite drainage along the south side of Waddell Road then south along the west side of Dysart Road.	100-year	0.2	Yes, 59.8 acres involving 2300 residential, 3 commercial and 1 public properties.	Rural	N/A	Yes, major residential development potential (8,000 new residence)	Multi-use opportunities. Provides protection to the transportation corridor.
Circle K Park Detention Basin and Storm Drain	5	Hohokam ADMP	77	Tier 2	Prioritized, not authorized. Awaiting funding and partner commitment.	\$16,800,000	50%	\$8,400,000	Project will construct a 35 ac-ft. detention basin and a series of 48" & 60" stormdrains. Stormwater currently overtops the Highline canal and floods properties to the north.	10-year	0.2	Yes, potential reduction of floodplain along the Highline Canal.	Urban	N/A	None	A major component of a series of improvements to help mitigate flooding hazards to the South Phoenix/Laveen area. Multi-use opportunities.
Highline Western Canal Storm Drain	1	N/A	76	Tier 2	Prioritized, not authorized. Awaiting DMP results.	\$3,980,000	50%	\$1,990,000	Construct box culverts, storm drains, and nine existing structure rehabilitations to convey storm water from street flooding areas to Ken McDonald Golf Course.	100-year	0.5	Yes, over 80 structures	Urban	N/A	None	Provides protection to 70 homes, 12 multi-family structures and two commercial structures, with an estimated combined value of \$22million. Provides protection to the transportation corridor.
Berneil Channel Modifications	2	Scottsdale Road Corridor DMP & CAR completed by Paradise Valley.	76	Tier 2	Prioritized, not authorized. Outside the 5-year CIP. Awaiting funding and partner commitment.	\$5,500,000	50%	\$2,750,000	Project will improve the capacity of the Berneil Channel within the existing channel corridor.	10-year to 100-year	0.6	Yes, over 200 structures	Urban	N/A	None	Reduces the potential for shallow flooding of 200-300 residences; increased protection for roadway infrastructure and public utilities.
Loma Vista Corridor Drainage Improvement Project	1	Broadway/Rural DMP	75	Tier 2	Prioritized, not authorized. Outside the 5-year CIP. Awaiting funding and partner commitment.	\$2,670,000	75%	\$2,002,500	Project will construct storm drains in Loma Vista, Alameda and Los Feliz Drives with an outfall into an expanded detention basin at the NW corner of McClintock High school.	100-year	0.2	No	Urban	N/A	None	Mitigates flood hazards to twenty one (21) homes in an existing development that are to be inundated during a 100-year rain event.
Sonoqui Wash Channelization Phase II	1	Queen Creek / Sonoqui Wash HMP	75	Tier 2	Construction of the District's reach is complete. Construction of the Town's reach is dependent on town funding availability.	\$6,000,000	-	\$50,000	The channel will collect and convey the 100-year flow from Chandler Heights Road to Riggs Road, and along Riggs Road to Crismon Road.	100-year	3.6	Yes, anticipated to remove the existing floodplain from Chandler Heights Rd. to Riggs Rd., which includes 71 acres of land & 68 properties.	Urban	N/A	Yes, minor residential development potential north of the new channel.	Multi-use components such as equestrian and pedestrian trails. Channelizes the existing (No Suggestions) wash. Benefits existing developments and transportation corridors.
Skunk Creek Levees at CAP	3	Skunk Creek WCMP	75	Tier 2	Prioritized, not authorized. Awaiting study, funding and partner commitment.	\$8,900,000	30%	\$2,670,000	Project extends the existing Skunk Creek levees on the south side of the Central Arizona Project (CAP) to tie into CAP embankment and to raise existing levees on the north side of the CAP to effectively contain the watershed flows.	100-year	0.4	Yes, approximately 150 acres	Urban	N/A	Yes, minor residential development potential north of the new channel.	Will contain the flows from Skunk Creek and Sonoran Wash. Project will provide flood protection to approx. two businesses, ten single-family homes, and an entire subdivision.
Agua Fria Boulevard Scour Protection Grade Control Structure	4	Agua Fria WCMP Addendum	75	Tier 2	Prioritized, not authorized. Awaiting funding and partner commitment.	\$2,000,000	50%	\$1,000,000	Constructs a drop/grade control structure at the Agua Fria River crossing of Agua Fria Boulevard.	100-year	0.1	No	Urban	N/A	None	Protection against possible bridge failure and provides scour protection.
Chandler Heights Basin	1	East Mesa ADMP & Queen Creek ADMP	74	Tier 2	Unilateral project. Outside the 5-year CIP. Dependent upon the need of earthen material by agencies/contractors and District funding.	\$8,500,000	100%	\$8,500,000	Constructs a new basin which reduces flows from the Queen Creek and Sonoqui washes into the EMF. Will involve excavation of 3 million cubic yards of material.	100-year	58.3	No	Urban	Yes (Low); maintenance associated with the EMF.	None	Mitigates EMF capacity problems by constructing a large, off-line detention basin. Recreational use of the basin.
Rittenhouse Basin	1	East Mesa ADMP & Queen Creek ADMP	74	Tier 2	Construction complete. The District is committed fund future aesthetic enhancement costs which is outside the 5-year CIP.	\$1,990,000	-	-	A 160-acre basin was constructed in 2010. The Town of Gilbert has purchased a recreational use easement over the basin, intended for future park use. The town is responsible for maintenance of the basin.	100-year	58.3	No	Urban	Yes (Low); maintenance associated with the EMF.	None	Mitigates EMF capacity problems by constructing a large, off-line detention basin. Recreational use of the basin.
SR-85/Oglesby Outfall Channel	4	Buckeye ADMP	74	Tier 2	Outside the 5-year CIP. Project implementation is dependent on ADOT's SR-85 improvement schedule and funding availability.	\$14,000,000	50%	\$7,000,000	The Oglesby System's outfall would be constructed in conjunction with ADOT's State Route 85 (SR-85) improvements from north of Baseline Road south to the Gila River.	100-year	10.6	Yes, floodplains along RR and irrigation canals	Rural	N/A	Yes, 10 sq. mi. of future residential, commercial and industrial development.	Alleviates flooding condition that has caused overtopping of irrigation canals and railroads. Will serve as outfall for the drainage area.

NOTE: Tier 2 Projects:
Prioritized, inactive, project on-the-shelf, awaiting funding and/or partner commitment.

Project	District	Master Plan Element	Initial PEC Score	Status	Programming Notes	15-year Project Cost	District Cost Share %	District Cost	Description	Level of Protection	Benefited Area (Sq. Mi.)	Floodplain Benefits	Location: Urban or Rural	District Maintenance Effort & Risk Level	Economic/Population Development Potential	Other Notable/Ancillary Benefits
White Tanks FRS No.4 Outlet	4	White Tanks/Loop 303 ADMP	74	Tier 2	Unilateral project; design complete. Construction is out of the 5-year CIP. Awaiting District funding.	\$8,035,000	100%	\$8,035,000	Provides an outlet connection to the Gila River for the White Tanks Flood Retarding Structure (FRS) No. 4. Construction will include the installation of underground storm drain pipe up to 7.5 feet of inside diameter.	100-year	16.7	No	Urban	Yes, associated with the O&M of the White Tanks FRS No.4	None	Provides and outfall to the Gila River. A functionality component of the White Tanks FRS No.4.
McCormick Stillman Railroad Park/Lincoln Drive Drainage Improvements	2	Lower Indian Bend Wash ADMP	73	Tier 2	Prioritized, not authorized. Awaiting LIBW ADMP results to verify H&H.	\$6,703,400	60%	\$4,022,040	New storm drain in Lincoln Drive from just west of the city limits to the USACE Side Channel System and a drainage channel and culverts will be constructed from the NW to the SE corners of McCormick Stillman Railroad Park.	50-year & 100-year	1.0	No	Urban	N/A	None	83 structures (estimated value of \$27 million) would receive 100-year protection. 10 buildings within McCormick Stillman Railroad Park would receive 100-year protection.
DRCC (107th Ave. to Agua Fria)	5	Durango ADMP	73	Tier 2	Outside the 5-year CIP. Awaiting funding and partner commitment.	\$6,320,000	60%	\$3,792,000	Constructs a regional channel and basin in the vicinity of the Salt River Project Buckeye Feeder Canal to intercept storm water flows and provide an outfall to the Agua Fria River.	100-year	4.7	No	Urban	N/A	Yes, minor residential, commercial and industrial development potential for the Durango area.	The project would reduce flooding hazards and provide a 100-year outfall in the Durango drainage area.
DRCC (75th Ave. to 107th Ave.)	5	Durango ADMP	73	Tier 2	Unilateral project; design complete. Construction is out of the 5-year CIP. Awaiting District funding.	\$11,365,000	100%	\$11,365,000	Portion of the regional channel/basin in the vicinity of the Salt River Project Buckeye Feeder Canal to intercept storm water flows. Project constructs new basins along the channel alignment with box culverts connecting the linear basins	100-year	5.4	No	Urban	N/A	Yes, minor residential, commercial and industrial development potential for the Durango area.	The project would reduce flooding hazards and provide a 100-year outfall in the Durango drainage area.
Oglesby Drainage System	4	Buckeye ADMP	72	Tier 2	Prioritized, not authorized. Awaiting development and partner funding.	\$37,400,000	28%	\$10,472,000	A regional backbone drainage conveyance system for development in Buckeye. Project consists of open channels and box culverts. Begins north of Baseline Rd. and conveys flows along Oglesby Rd. south to the ADOT SR-85 Channel. Construction also includes 2 new detention basins.	100-year	6.0	Yes, potential to a reduce a small area of floodplain at the UPPR and irrigation canals.	Rural	N/A	Yes, significant downstream commercial and residential development potential for the City of Buckeye.	Multi-use opportunities. Improved transportation safety during storm events.
Palo Verde Drainage System	4	Buckeye ADMP	72	Tier 2	Prioritized, not authorized. Awaiting development, funding and partner commitment.	\$93,700,000	28%	\$26,236,000	A regional backbone drainage conveyance system for development in Buckeye. Project consists of open channels and box culverts along Johnson Rd., Southern Ave. and Palo Verde Rd. south to the Gila River. A detention basin is also to be constructed at the northeast corner of Baseline Rd. and Palo Verde Rd.	100-year	25.0	Yes, potential to a reduce a small area of floodplain at the UPPR and irrigation canals.	Rural	N/A	Yes, significant downstream commercial and residential development potential for the City of Buckeye.	Multi-use opportunities. Improved transportation safety during storm events.
Rooks Drainage System	4	Buckeye ADMP	72	Tier 2	Prioritized, not authorized. Awaiting development, funding and partner commitment.	\$45,500,000	28%	\$12,740,000	The regional backbone drainage conveyance system for development in Buckeye. Project consists of open channels, box culverts, and storm drains along Rooks Rd. from Hazard Rd. south to the Gila River. A detention basin is also to be constructed at Southern Ave. and Rooks Rd.	100-year	9.5	Yes, potential to a reduce a small area of floodplain at the UPPR and irrigation canals.	Rural	N/A	Yes, significant downstream commercial and residential development potential for the City of Buckeye.	Multi-use opportunities. Improved transportation safety during storm events.
Skyline Wash Basin and Outlet	4	Sun Valley ADMP	71	Tier 2	Prioritized, not authorized. Outside the 5-year CIP. Awaiting development, funding and partner commitment.	\$6,800,000	40%	\$2,720,000	Project will construct a detention facility and channel to attenuate and channelize Sky Wash alluvial fan flows.	100-year	1.4	Yes, will reduce a very large alluvial fan area.	Rural	N/A	Yes, significant commercial and residential development potential for the City of Buckeye.	Multi-use opportunities.
Camelback Road Storm Drain (Arcadia Phase III)	3	Metro Phoenix ADMP	70	Tier 2	Prioritized, not authorized. Outside the 5-year CIP. Awaiting funding and partner commitment.	\$5,310,000	60%	\$3,186,000	Construction of interceptor drains, primarily in Arcadia Drive. This project will provide the outlet from Camelback Road to the Old Cross Cut Canal.	10-year	1.6	No	Urban	N/A	None	Provides flood mitigation to people, structures, and the traveling public in the Arcadia Area of Phoenix.
Skunk Creek Channel at Pinnacle Peak Rd. and 35th Ave.	4	Adobe Dam/Desert Hills ADMP	70	Tier 2	Prioritized, not authorized. Awaiting funding and partner commitment.	\$8,500,000	50%	\$4,250,000	Project will modify the channel and construct a new grade control structure upstream of 35th Avenue.	100-year	0.2	Yes, small area at the NE corner of Pinnacle Peak Rd. & 35th Ave.	Urban	N/A	None	Provides flood protection to existing residential developments in the project vicinity. Multi-use trail opportunities.
Jefferson St. and I-17 Storm Drain	5	Metro Phoenix ADMP	70	Tier 2	Prioritized, not authorized. Awaiting DCR results and partner commitment.	\$3,100,000	50%	\$1,550,000	Upgrades the existing storm drain system and eliminates non-working dry-wells that clog and create septic conditions.	10-year	0.3	No	Urban	N/A	None	Reduces O&M efforts and costs. Provides protection to the existing bridge.
Granite Reef Wash Drainage Improvements	2	City of Scottsdale's Storm Water Master Plan	69	Tier 2	City currently leading the pre-design effort. Awaiting IGA, partner funding and outfall alignment agreement w/ SRPMIC. Design is partially funded in the 5-year CIP.	\$21,375,000	50%	\$10,687,500	Construct a drainage system, principally along the Pima Road alignment, from Chaparral Road south to McKellips Road with a outfall to the Salt River.	100-year	2.1	Yes, over 500 structures	Urban	N/A	Yes, significant commercial and residential development potential for the City of Scottsdale and SRP-MIC.	The project would reduce flooding hazards and provide a 100-year protection. Multi-use opportunities
Happy Valley Channel	4	Wittmann ADMP	69	Tier 2	Prioritized. Not authorized. Awaiting partner funding.	\$2,260,000	50%	\$1,130,000	Improve the existing Happy Valley Channel to mitigate flooding and retain an existing watercourse.	100-year	0.1	Yes, 135 structures; existing roadways; 12.5 acres of land.	Rural	N/A	Yes, minor residential potential along the Happy Valley Road Corridor.	Multi-use opportunities. Improved transportation safety during storm events.
Downtown Buckeye Regional Basin & Storm Drain	4	Buckeye ADMP	68	Tier 2	Prioritized and authorized. Outside the 5-year CIP. Awaiting partner funding.	\$3,778,900	50%	\$1,889,450	The first phase, completed in 2007, consisted of a storm drain in Monroe Avenue. The next phase will extend this storm drain to the regional basin with an ultimate outfall at the Gila River.	10-year (SD) & 100-year (basins)	1.7	No	Urban	N/A	Yes, minor residential, commercial and industrial development potential for the downtown Buckeye area.	Mitigates historical flooding in downtown Buckeye. Improved transportation safety during storm events.
Northern Parkway Drainage Improvements - Phase II (Dysart Rd. to 111th Ave.)	4	Loop 303/White Tanks ADMP	67	Tier 2	Prioritized. Design complete. MCDOT proceeding with construction. Awaiting FCD funding.	\$7,246,550	50%	\$3,623,275	A continuation of the roadway and drainage facilities constructed along the new Northern Parkway alignment between Dysart Rd. and 111th Ave. Drainage facilities include detention basins, channel segments and bank protection for the new bridge at the crossing of the Agua Fria River.	10-year (SD) & 100-year (basins)	TBD	Yes, minor at the Agua Fria River and mining locations	Urban	N/A	None	Mitigates property damage and flooding of the new Northern Parkway and adjacent areas during a major storm event.
Bethany Home Road Storm Drain (51st Ave. to 59th Ave.)	5	Maryvale ADMP	67	Tier 2	Prioritized. Design complete. Awaiting funding and partner commitment.	\$3,150,000	50%	\$1,575,000	Construction of a new storm drain within Bethany Home Road from 59th Avenue to 51st Avenue.	10-year	4.5	No	Urban	N/A	None	Provides flood mitigation to people, structures, and the traveling public in the City of Glendale.

NOTE: Tier 2 Projects:
Prioritized, inactive, project on-the-shelf, awaiting funding and/or partner commitment.

Project	District	Master Plan Element	Initial PEC Score	Status	Programming Notes	15-year Project Cost	District Cost Share %	District Cost	Description	Level of Protection	Benefited Area (Sq. Mi.)	Floodplain Benefits	Location: Urban or Rural	District Maintenance Effort & Risk Level	Economic/Population Development Potential	Other Notable/Ancillary Benefits
AT&SF Channel	4	Loop 303/White Tanks ADMP	66	Tier 2	Prioritized. Not authorized. Awaiting funding and partner commitment.	\$6,377,000	50%	\$3,188,500	Project will construct a 1/2 mile portion of an interim AT&SF regional channel from Dysart Drain to the Northern Parkway, including a 4-10 ft. x 6 ft. CBC, and 1-1/2 mile channel along Northern Parkway.	100-year	0.5	Yes, approximately 178 acres of land	Urban	N/A	Yes, minor residential development potential both west and east of the Railroad and north of Northern Parkway.	Diverts offsite flows from the east to the existing Northern Parkway channel. Provides protection to the existing and future transpiration system.
Union Hills Drainage Improvements Phases 2 & 3	4	Glendale/Peoria ADMPU	66	Tier 2	Design is ongoing. Construction of Phase II is out of the 5-year CIP.	\$8,405,000	50%	\$4,202,500	The project includes approximately two miles of storm drains, basins, channel improvements, maintenance roads adjacent to the project, and associated structures and features.	100-year	1.9	Yes, a very small amount of land at 115th Ave. and Beardsley Rd.	Urban	N/A	Yes, small potential where current floodplain exists.	Mitigates property damage and flooding of the 107th & Union Hills Road area and adjacent areas during a major storm event. Improves protection to the existing transportation system and the traveling public.
Sand Tank Wash Flood Control Improvements	5	Gila Bend ADMP	66	Tier 2	Prioritized, not authorized. Awaiting partner funding and Gila Bend DMP results.	\$11,707,000	90%	\$10,536,300	Reconstruction of the Sand Tank Wash levee to meet FEMA standards, construction of an overchute on the Gila Bend Canal at Bender Wash, and construction of an offline floodwater basin on Sand Tank Wash.	100-year	1.0	Yes, approximately 100 residential structures, 11 business buildings, 2 historic buildings, several roads, and a railroad.	Rural	N/A	Yes, minor residential development for the area.	Preserves the existing washes and their riparian habitats.
Ellsworth Rd. & McKellips Rd. Drainage System	2	Spook Hill ADMP	65	Tier 2	Prioritized and authorized. Design and construction awaiting funding and partner commitment.	\$4,800,000	60%	\$2,880,000	Construction of a basin at Ellsworth Road and McKellips Road, and storm drain or channel south along Ellsworth Road and east along McKellips Road.	100-year	1.5	No	Urban	N/A	Yes, minor residential development potential north of the Spook Hills FRS.	Mitigations downstream flooding to existing and future development of residential structures and the transportation system.
Pecos North and South Detention Basins	2	East Mesa ADMP	64	Tier 2	Prioritized. Not authorized. Awaiting East Mesa ADMPU results.	\$15,500,000	75%	\$11,625,000	Project involves the construction of two detention basins in Pinal County.	100-year	0.7	No	Rural	N/A	Yes, medium residential, commercial and industrial development potential within the project area.	Mitigates flooding to four large industrial sites: General Motors Proving Grounds, TRW Plant, Olin Mitsubishi and Baker Recycling. Indirect benefits to the Williams Gateway Airport.
Oak St. Detention Basin and Storm Drain	2	Spook Hill ADMP	63	Tier 2	Outside the 5-year CIP. Design complete. Construction awaiting funding and partner commitment.	\$3,480,000	50%	\$1,740,000	Construction of a basin at Oak Street and Hawes Road, and storm drains east along Oak Street and north along Hawes Road.	100-year	0.5	No	Urban	N/A	Yes, minor residential development potential northeast of the Spook Hills FRS.	Mitigations downstream flooding to existing and future development of residential structures and the transportation system.
Bethany Home Rd. Storm Drain (59th Ave. to 79th Ave.)	5	Maryvale ADMP	63	Tier 2	Prioritized and authorized. Outside the 5-year CIP. Awaiting funding and partner commitment.	\$4,070,000	60%	\$2,442,000	Constructs storm drain and associated catch basins, manholes and appurtenances to convey flows to the Bethany Home Outfall Channel.	10-year	3.7	No	Urban	N/A	None	Mitigations flooding to existing development of residential structures and Bethany Home Road
Rittenhouse Road FRS	1	N/A	62	Tier 2	Construction is out of the 5-year CIP. NRCS funding is uncertain.	\$8,200,000	35%	\$2,870,000	Rittenhouse FRS will be converted from a dam to a levee that drains to the newly reconstructed Vineyard Rd. FRS.	100-year	168.8	No	Rural	Yes (Medium); Corrects dam deficiencies and extends operational life of the structure.	None	Protects 72 sq. mi. of downstream area and approximately 100,000 persons. Extends functional life of the PVR system for 100+ years.
Central Chandler Storm Drain Improvements	1	City of Chandler Stormwater Master Plan	60	Tier 2	Prioritized and authorized. Outside the 5-year CIP. Awaiting funding and partner commitment.	\$2,800,000	50%	\$1,400,000	Removes all local drainage connections to the Chandler Drain, reducing the chances of pollutants from this irrigation system being introduced into the city's storm drain system, establishes a distinct city storm drain system.	10-year	1.9	No	Urban	N/A	None	Mitigates historical flooding in downtown Chandler. Improved transportation safety during storm events.
Meridian North and South Channels	1, 2	East Mesa ADMP	60	Tier 2	Prioritized, not authorized. Awaiting East Mesa ADMPU Results.	\$2,400,000	75%	\$1,800,000	Construction of two earthen channels which will intercept flow from Pinal County and direct runoff into the Pecos basins.	100-year	3.1	No	Rural	N/A	Yes, medium residential, commercial and industrial development potential within the project a	Mitigates flooding to four large industrial sites: General Motors Proving Grounds, TRW Plant, Olin Mitsubishi and Baker Recycling. Indirect benefits to the Williams Gateway Airport.
McMicken Dam Rehabilitation Phases 3 & 4	4	N/A	60	Tier 2	Unilateral project, construction is out of the 5-year CIP.	\$34,078,000	100%	\$34,078,000	This phase of the project will maintain the current level of protection by addressing the land subsidence/earth fissure issues and embankment cracking by replacing the embankment material <u>north</u> of Sunvalley Parkway.	100-year	19.2	No	Urban	Yes (Medium); Aging structure and needs upgrade	None	Protects approximately 80,000 persons and \$6 billion of infrastructure downstream of the structure. Protects Luke Air Force Base. Extends functional life of the dam for 100+ years.
McMicken Dam Rehabilitation Phases 5, 6 & 7	4	N/A	60	Tier 2	Unilateral project, construction is out of the 5-year CIP.	\$29,696,000	100%	\$29,696,000	This phase of the project will maintain the current level of protection by addressing the land subsidence/earth fissure issues and embankment cracking by replacing the embankment material <u>south</u> of Sunvalley Parkway.	100-year	19.2	No	Urban	Yes (Medium); Aging structure and needs upgrade	None	Protects approximately 80,000 persons and \$6 billion of infrastructure downstream of the structure. Protects Luke Air Force Base. Extends functional life of the dam for 100+ years.
South Gila Bend Drainage Improvements	5	Gila Bend ADMP	60	Tier 2	Prioritized. Not authorized. Awaiting partner funding and Gila Bend DMP results.	\$283,000	100%	\$283,000	Project consists of enlarging the existing drainage channel along the Gila Bend Canal, constructing a new detention basin on the upstream side of the Sand Tank Wash Levee, and replacing the culvert that discharges through the Levee.	10-year (SD) & 100-year (basin)	0.3	No	Rural	N/A	None	Mitigates historical flooding in South Gila Bend (Project would benefit 12 homes, 4 streets, and 1 commercial building)
Pecos Road Channel	2	East Mesa ADMP	58	Tier 2	Prioritized. Not authorized. Awaiting East Mesa ADMPU results.	\$13,620,000	75%	\$10,215,000	Project will construct a drainage channel along the Pecos Road alignment, extending from Meridian Road to Ellsworth Road.	100-year	0.3	No	Rural	N/A	Yes, medium residential, commercial and industrial development potential within the project area.	Mitigates flooding to four large industrial sites: General Motors Proving Grounds, TRW Plant, Olin Mitsubishi and Baker Recycling. Indirect benefits to the Williams Gateway Airport.
20th Ave. and Turney Ave. Detention Basin	5	24th Ave. & Camelback Rd. DCR	58	Tier 2	Prioritized. Not authorized. Awaiting partner funding.	\$13,000,000	50%	\$6,500,000	Basin and associated storm drains to collect and dispose of floodwaters north of Grand Canal at the intersection of 20th Ave. and Turney Ave.	10-year	0.5	No	Urban	N/A	None	Provides flood protection to existing infrastructure in the drainage watershed bounded by Camelback Rd., Grand Canal, 19th Ave. and I-17.
Guadalupe FRS Modifications	1, 5	N/A	51	Tier 2	Currently in pre-design & funded in the operating budget. Final design & Construction in CIP. <u>Small amount of NRCS funds obligated.</u>	\$3,000,000	70%	\$2,100,000	Project includes a new principal outlet intake structure and slip lining pipe through the existing dam embankment. Downstream outlet improvements are also needed.	100-year	4.5	No	Urban	Yes (Medium); Corrects intake structure and outlet pipe deficiencies.	None	Protects downstream residential, commercial, and recreational developments in the Town of Guadalupe, City of Tempe, City of Phoenix and I-10.

NOTE: Tier 2 Projects:
Prioritized, inactive, project on-the-shelf, awaiting funding and/or partner commitment.

<u>Project</u>	<u>District</u>	<u>Master Plan Element</u>	<u>Initial PEC Score</u>	<u>Status</u>	<u>Programming Notes</u>	<u>15-year Project Cost</u>	<u>District Cost Share %</u>	<u>District Cost</u>	<u>Description</u>	<u>Level of Protection</u>	<u>Benefited Area (Sq. Mi.)</u>	<u>Floodplain Benefits</u>	<u>Location: Urban or Rural</u>	<u>District Maintenance Effort & Risk Level</u>	<u>Economic/Population Development Potential</u>	<u>Other Notable/Ancillary Benefits</u>
Saddleback FRS Modifications	5	N/A	48	Tier 2	Currently in pre-planning. Outside the 5-year CIP. NRCS funding request has been sent	\$20,000,000	35%	\$7,000,000	Saddleback FRS has experienced the formation of numerous erosion holes and longitudinal cracking. Construction will modify the central material zone of the dam known as the central filter.	100-year	17.8	No	Rural	Yes (Low); Numerous erosion holes and longitudinal cracking have been identified along the entire length of the dam.	None	Protects agricultural land and the I-10 corridor.
New River Dam Outlet Improvements	4	N/A	FCD O&M	Tier 2	Unilateral and authorized. Design complete. Construction is awaiting District funding.	\$900,000	100%	\$900,000	Construction includes re-grading the channel back to its original conditions and re-armoring the channel with grouted riprap to prevent future erosion.	100-year	0.0	No	Urban	Yes (Medium); Outlet channel has experienced significant bank erosion.	None	Operational functionality of the New River Dam.
East Maricopa Floodway Low Flow Channel	1	N/A	FCD O&M	Tier 2	Unilateral. Not authorized. Outside the 5-year CIP. Awaiting District funding.	\$2,300,000	100%	\$2,300,000	Due to the topography of the area, the EMF has a particularly shallow slope. Project will construct a concrete low flow channel to enhance O&M functions and address mosquito control issues.	N/A	0.0	No	Urban	Yes (Low); O&M efforts to mitigate sediment transport.	None	Operational functionality of the EMF.
Agua Fria River Levee Safety Improvements	4	N/A	FCD O&M	Tier 2	Outside the 5-year CIP. Awaiting funding and partner commitment.	\$440,000	100%	\$440,000	Maintenance of the Agua Fria River levees poses a hazard to District personnel and the regional trail atop the levees would pose a similar hazard to the public. Project provides 21,000 linear feet of safety railing.	N/A	0.0	No	Urban	Yes (Low); O&M efforts to mitigate bank erosion.	None	Hazard safety.
Harquahala FRS Erosion Hazard Reduction	5	N/A	FCD O&M	Tier 2	Unilateral. Authorized. On-hold awaiting District funding.	\$2,000,000	100%	\$2,000,000	Comprehensive rock mulch treatment and related measures to prevent future erosion.	N/A	0.0	No	Rural	Yes (Low); O&M efforts to mitigate bank erosion.	None	Keeps the dam operational.
Floodprone Property Acquisition Program	1, 2, 3, 4, 5	N/A	N/A	Tier 2	Authorized. Program is currently unfunded.	\$0	100%	\$0	A voluntary buyout of structures located in a floodplain, with the FCD purchasing the property at appraised market value. FCD demolishes structures on purchased properties.	N/A	0.0	No	Both Rural and Urban	N/A	None	None
Number of Tier 2 Projects: 52 Number of Tier 2 Programs: 1					Total Tier 2 Project/Program Costs:	\$565,186,850		\$298,324,325				21 - Reduces the Floodplain	36 - Urban 16 - Rural	12 - District O&M	23 - with development potential	
					TOTAL PROGRAM/PROJECT COSTS:	\$860,053,360		\$495,395,085								

NOTE: Tier 2 Projects:
Prioritized, inactive, project on-the-shelf, awaiting funding and/or partner commitment.



November 14, 2014

Flood Control District of Maricopa County
Attn: Jennifer Pokorski
2801 W. Durango St.
Phoenix, AZ 85009

RE: City of Chandler Flood Control Priorities

Dear Ms. Pokorski:

Thank you for the opportunity to provide a list of flood control priorities for the City of Chandler. Given the magnitude of the storm events that occurred back in September, overall we fared pretty well. However, these flood events did expose a few areas that warrant further study in the event we experience another significant event in the future. Please see the attached listing for very high level descriptions of new project requests.

The currently identified Capital Project titled "Downtown Chandler Storm Drain Improvements" still rates as a high priority and was a problem area in the September storm.

We appreciate your time and effort collecting this information. Please feel free to contact me for any questions or concerns at (480) 782-3403.

Sincerely,

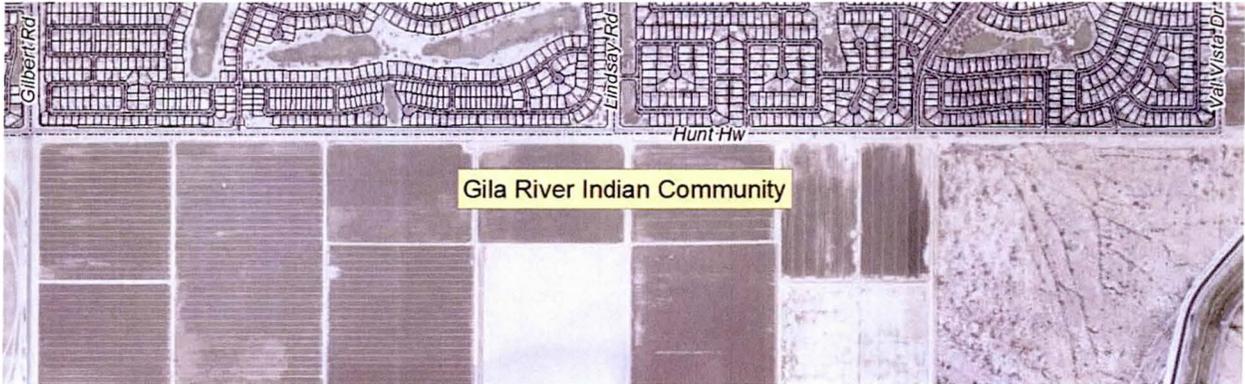
J. Warren White, P.E.
Principal Engineer

Attachment:

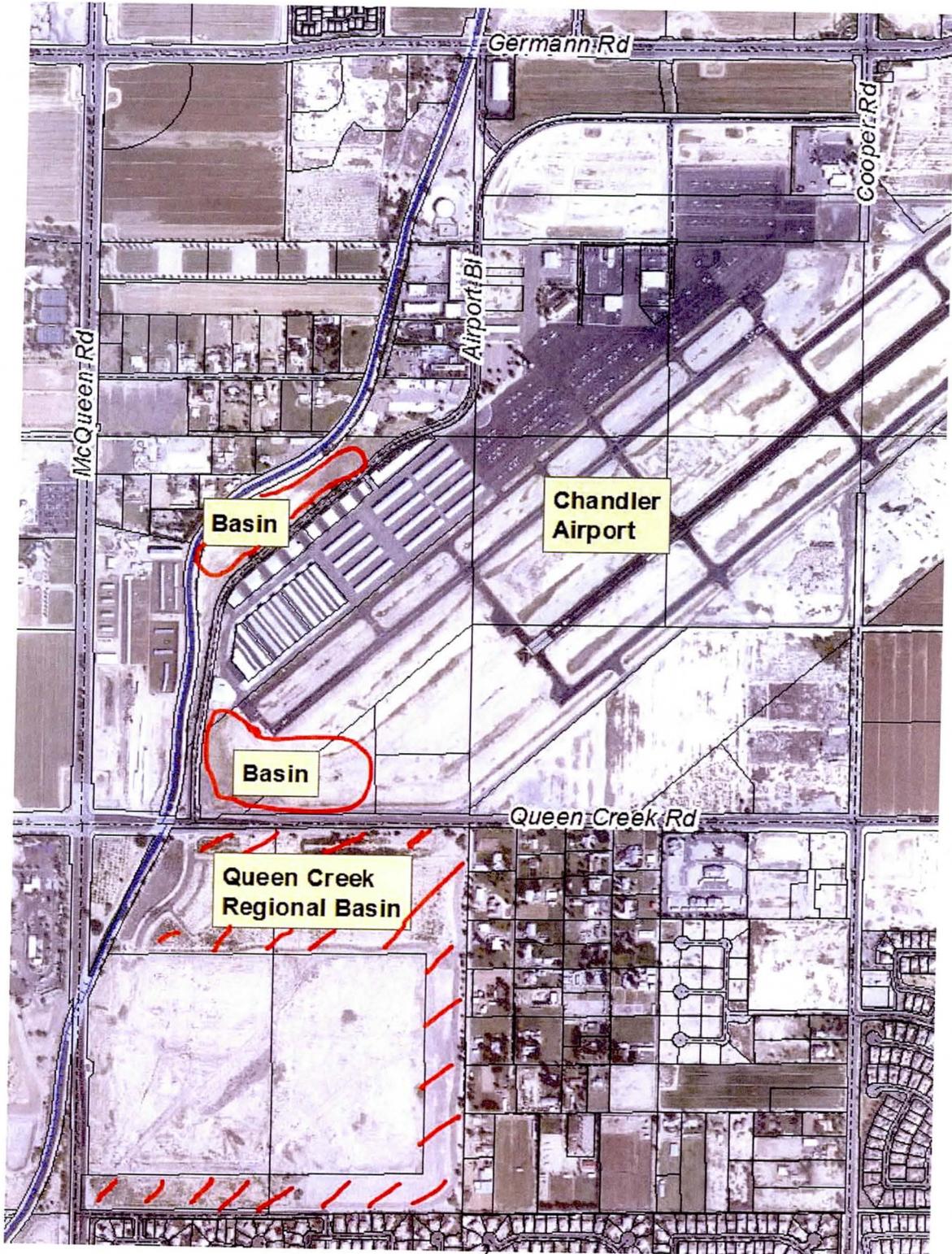
New City of Chandler Flood Control Priorities / Available Photos

New City of Chandler Flood Control Priorities:

- 1) Hunt Highway from Gilbert Rd to Val Vista Dr: An on-going issue even with smaller rain events where sheet flows from the Gila River Indian Community (GRIC) deposit sediment onto the roadway, drainage structures and retention basins. This often results in closing the roadway and extensive cleanup both by the City and adjacent private developments. The project requires coordination with GRIC and the Bureau of Indian Affairs and could involve the construction of a feature to prevent farm field sediment from eroding into Hunt Hw and adjacent developments.

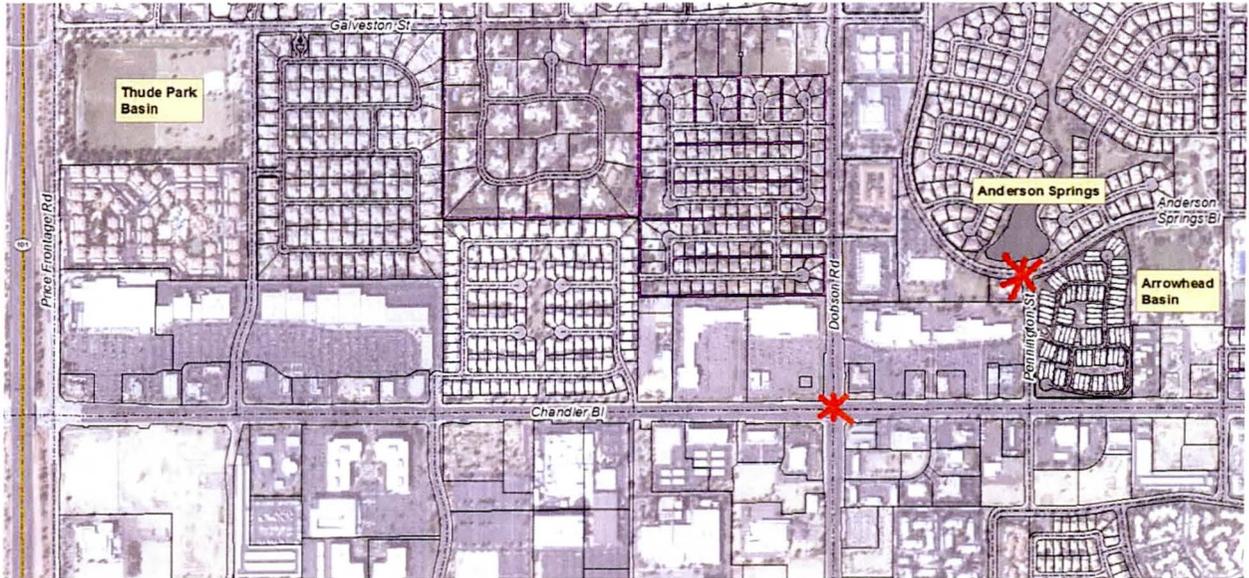


- 2) Chandler Regional Airport Basin: The retention basin at the northeast corner of Airport Bl and Queen Creek Rd does not drain adequately and attracts birds. This issue raises FAA safety concerns for bird strikes. The City has initiated a Capital Improvement Project to resolve the issue. Coordination with the FCD and construction cost sharing could help this project become more viable.



3) Project / Study for Areas where retention basins overtopped and streets were flooded during the September storm event.

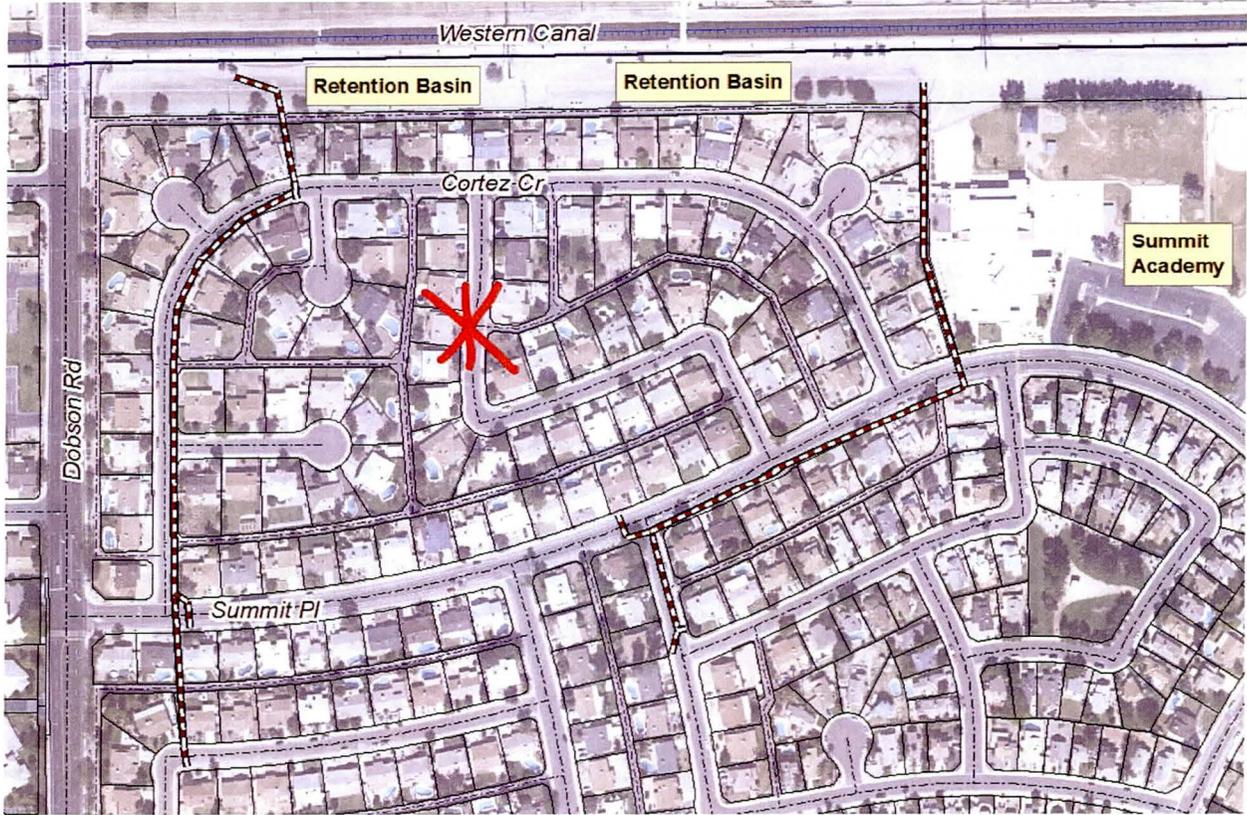
- a. Dobson Rd and Chandler Blvd Intersection / Anderson Springs Blvd and Pennington St: The intersection of Dobson and Chandler was partially closed and required significant pumping to alleviate flooding of adjacent structures. In addition, the Anderson Springs Lake adjacent to Anderson Springs and Pennington and the Arrowhead Basin overflowed causing major flooding and full roadway closures. Project/Study of options to relieve the future flooding potential in these areas possibly by additional storm drain to Thude Park Basin.



- b. Bullmoose Basin/Orange Tree Subdivision: The retention basin adjacent Bullmoose Dr north of Warner Rd overflowed causing significant neighborhood roadway flooding and closures. In addition Dobson Rd south of Mesquite St was flooded. Project/Study of options to relieve the future flooding potential in these areas possibly by increasing the Bullmoose Basin volume and/or additional storm drain to the ADOT Basin adjacent to the Price Frontage Rd and Mequite St roadway alignment. The City has an IGA with ADOT that allows for 100 CFS to be added to their storm system.



- c. Western Canal / Woodglen Unit Four Subdivision: The two retention basins north of this subdivision and south of the Western Canal overflowed causing significant neighborhood roadway flooding and closures. Project/Study of options to relieve the future flooding potential in this area possibly by increasing the volume of these basins.



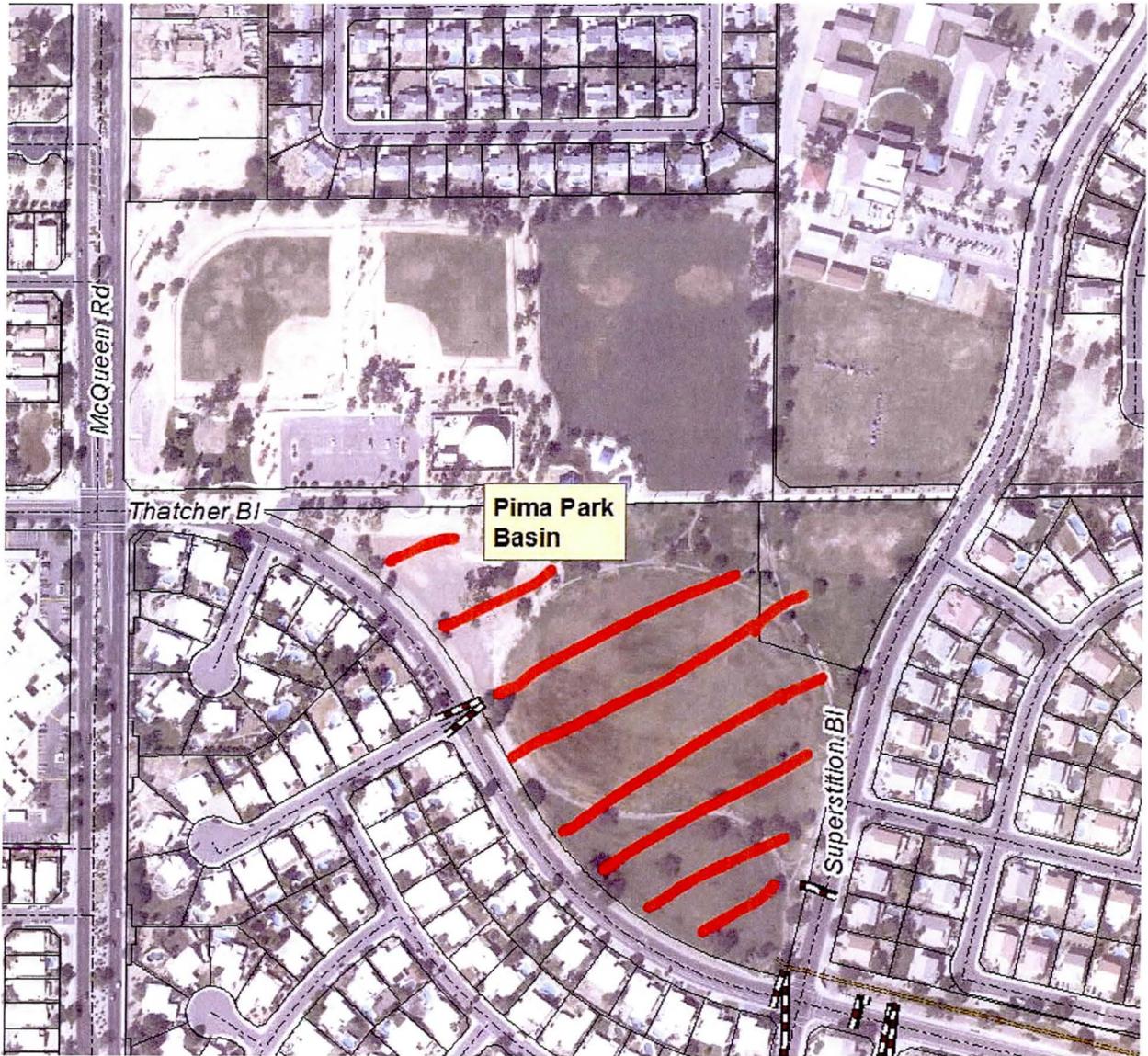
- d. Apache Park Basin / Knox Rd: The retention basin overflowed flooding the intersection of Knox Rd and Hartford St. Project/Study of options to relieve the future flooding potential in this area possibly by increasing the volume of this basin and /or providing positive street drainage west to Alma School Rd.



- e. Retention Basins off Central Dr and Fairview St: the basins identified below with the asterisk overflowed onto roadways causing closures. Project/Study of options to relieve the future flooding potential in these areas possibly by basin improvements and / or storm drainage to the ADOT channel along the 202 or Denver Basin.



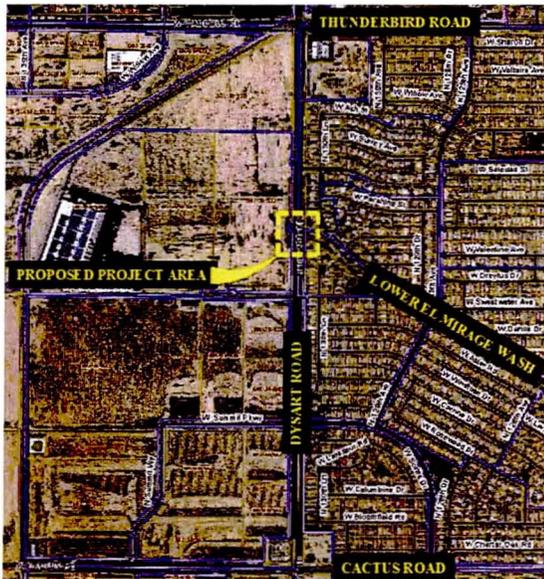
- f. Pima Park Retention Basin: The basin within this Park north of Chandler Blvd and east of McQueen Rd does not percolate adequately. The desire is to add 8 to 11 drywells to resolve the issue.



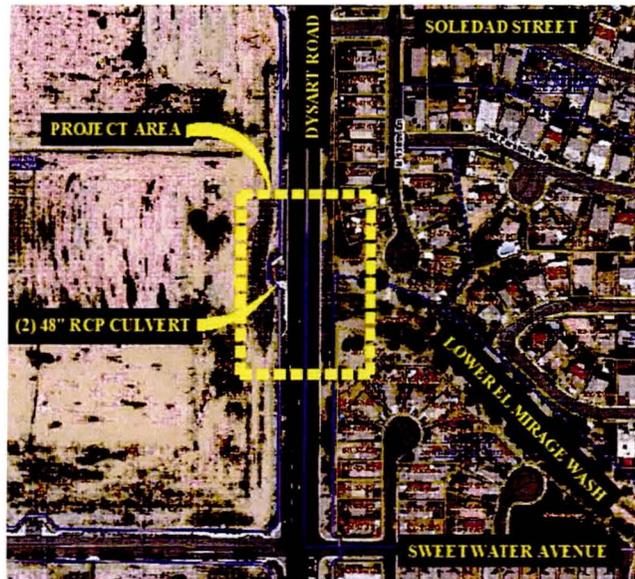
Project Description:

Dysart Road between Thunderbird Road and Cactus Road is a major arterial with an average daily traffic count of approximately 16,000 vehicles. The roadway dips between Sweetwater Avenue and Soledad Street and directs most surface flow to the east, over the sidewalk and into an existing wash. Two 48" reinforced concrete pipes (RCP) convey storm water beneath the roadway at this location. The entire project is within existing right of way.

The City of El Mirage proposes raising the elevation of Dysart Road and its sidewalk in the project area to remove the existing depression so that water can safely direct away from the travel surface. In addition, the City would like to remove the existing two 48" reinforced concrete pipes and replace them with a box culvert.



Area Map



Location Map

Funding Commitment and Agency Priority:

This project is the highest priority for the City of El Mirage. The City has submitted no other projects for Fiscal Year 2016. The City's current CIP outlines projects between Fiscal Years 2013 and 2017 and this project is not included in that document. However, the City is fully committed to the project as significant storm events over the past two months have caused major flooding issues at this location.

The design should commence as soon as a notice to proceed has been issued and the construction is anticipated to start within 12 months of that date. The construction is estimated to be completed within six months.

Flood Control / Drainage Master Plan Element:

The project is located within an existing drainage channel as part of the Lower El Mirage Wash. The watershed that contributes to the channel was studied as part of the “Loop 303/White Tanks Area Drainage Master Plan Update Area Hydrologic Analysis” (ADMPUAHA) prepared in 2009 by HDR, Inc. for the District. The City of El Mirage has never formally adopted this report through Council action but it is widely recognized by Staff as the ruling drainage document not only for the proposed project area, but for the majority of the City.

Flooding Threat:

Rainfall events (based on two and five-year average) disrupt multimodal roadway users. Without appropriate surface conveyance, rainfall renders the area intermittently unusable for autos, bicycles, and pedestrian activities. Less frequent rainfall events occurring ten years or more apart disrupt the flow of vehicular traffic because the existing 48” pipes cannot handle the larger flows, causing tail water to overtop the roadway. The targeted project area does not currently pose a flood risk for commercial or residential properties. However, ongoing deterioration of the roadway and surrounding surfaces will, in all likelihood, pose future flood risks to such properties and safety issues for area drivers.

The existing watershed contributing, and including, the project site is approximately 6.81 square miles, incorporating a portion of the City of Surprise and is made up of mostly residential subdivisions and several pockets of undeveloped desert land. The watershed generally slopes to the south-southeast towards the Agua Fria River at relatively flat gradients, varying between 0.10% and 0.50%.

Area Protected:

The City owns and maintains existing drainage channels that begin at Dysart Road and carry storm water south to the Agua Fria River. No residential, commercial or industrial properties are located in the delineated floodplain/floodways within the project limits. All properties adjacent to the project are currently protected and the proposed project will not change the level of protection. The 100-year floodplain will not change with the construction of this project.

Ancillary Benefits:

There are several benefits to this proposed project including:

- Installing an adequately sized culvert will allow water to flow free into the Lower El Mirage Wash, reduce tail water to the west and keep the flow from overtopping the roadway
- By keeping the stormwater off of the road, vehicles and pedestrians will be able to move freely without safety issues and the roadway could avoid closures due to flooding.
- Keeping water off of the road also will help preserve the pavement and sidewalk and ultimately reduce maintenance problems.

Total Project Cost:

Design Costs: The City estimates that the design costs will be 10% of the construction cost or approximately \$79,250.

Land Acquisition Costs: The City already owns the property on which the improvements will be made therefore there will be no costs.

Construction Costs: The City estimates the construction costs to be \$871,750 as shown on the Cost Estimate provided.

Cost Estimate:

Removals			
Asphalt	8000 SY	\$5/SY	\$ 40,000
Sidewalk	1000 SY	\$5/SY	\$ 5,000
Pipe	650 FT	\$10/FT	\$ 6,500
Box Culvert	140 FT	\$325/FT	\$ 59,500
Scupper	1 EA	\$2500 EA	\$ 2,500
Pavement	2625 TON	\$200/TON	\$525,000
Sidewalk	1000 SY	\$26/SY	\$ 26,000
Striping	LS		\$ 3,000
Traffic Control	LS		\$ 75,000
Mobilization	LS		\$ 50,000
Subtotal			\$792,500
Contingency	10%		\$ 79,250
		Construction Cost:	\$871,750
Design	10%		\$ 79,250
		Total Project Cost:	\$951,000

Level of Partner Participation and Operations and Maintenance Costs to the District:

City's share includes the credit from the land that the improvements will be constructed.

Any costs associated with the operations and maintenance of the proposed improvements will be provided by the City of El Mirage. The District will not be responsible for any costs beyond the requested cost sharing stated in the Letter of Intent.

Please contact Jorge Gastelum at jgastelum@cityofelmirage.org or 623-876-2976 for any additional information concerning the proposed improvements.

Project Location Photos:



Dysart Road – Northbound Lanes and Sidewalk



Outlet Structure



Flood Control Capital Project Letter of Intent

Project Name: Dysart Road Culvert
Name of Submitting Agency: City of El Mirage

1. General

A. Project Area Dysart Road between Sweetwater Avenue and Soledad Street

B. Summary Project Description Remove existing undersized 2-48" RCP and replace with box culvert.

C. Estimated Project Cost \$951,000.00

2. Proposed Lead Agency by Task (For each task, indicate "District", City/Agency name, or "Not Applicable")

A. Design District
B. Rights-of-Way Acquisition City of El Mirage
C. Construction District
D. Operations and Maintenance City of El Mirage

3. Proposed Cost Share

	District	City/Agency	Other	Total
A. Percentage	100.00%	0.00%	0.00%	100.00%
B. Dollars	\$951,000.00	\$0.00	\$0.00	\$951,000.00

4. Estimated Availability of City/Agency Funding (Dollars)

FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY2019/20	Later FYs

5. Master Plan/Study Applicable to Submitted Project

A. Title (if applicable) Loop 303/White Tanks Area Drainage Master Plan Update Area Hydrologic Analysis
B. Adopted by City/Agency? Adopted Not Adopted Pending Not Applicable

6. Agency Approval (City Engineer, Public Works Director, or Agency Manager)

Jorge Gastelum 11/14/2014
Signature Date
Jorge Gastelum Director of DCS/City Engineer
Printed Name Title

Submittals must adhere to the CIP Prioritization Procedure guidelines - in particular: (1) Explicitly and quantitatively address the evaluation criteria identified by the CIP Prioritization Procedure, giving particular attention to quantifying flood control benefits; (2) include maps and other graphic attachments demonstrating the conceptual components of the project; (3) provide eight copies of each project submittal (accompanied by corresponding signed letters of intent); (4) if a non-District study generated the project, provide one copy of the study.



November 14, 2014

Jen Pokorski
Flood Control District of Maricopa County
2801 West Durango St.
Phoenix, AZ 85009

Re: Flood Control Priorities - City of Glendale

Ms. Pokorski,

The storm events over the last few months have brought attention to the storm drainage needs of the City of Glendale. Thank you for the opportunity to allow the City to present these flooding issues.

Shortly after the rain event on September 8, 2014, City Staff met internally and allocated resources to establish a priority list of drainage projects and identify possible funding options. As a result of our discussions, we classified the projects into either localized issues or regional issues and further prioritized these projects based on the potential impact to the health and safety of the public and the amount of damage to private property. In addition, our list was compared to the recommendations listed in the City of Glendale Stormwater Management Plan prepared by Kimley-Horn and Associates in July 2011.

If you have any questions or need additional information please contact me at 623-930-3623 or dbeard@glendaleaz.com.

Sincerely,

David D. Beard, P.E.
City of Glendale - City Engineer

Localized Flooding Issues

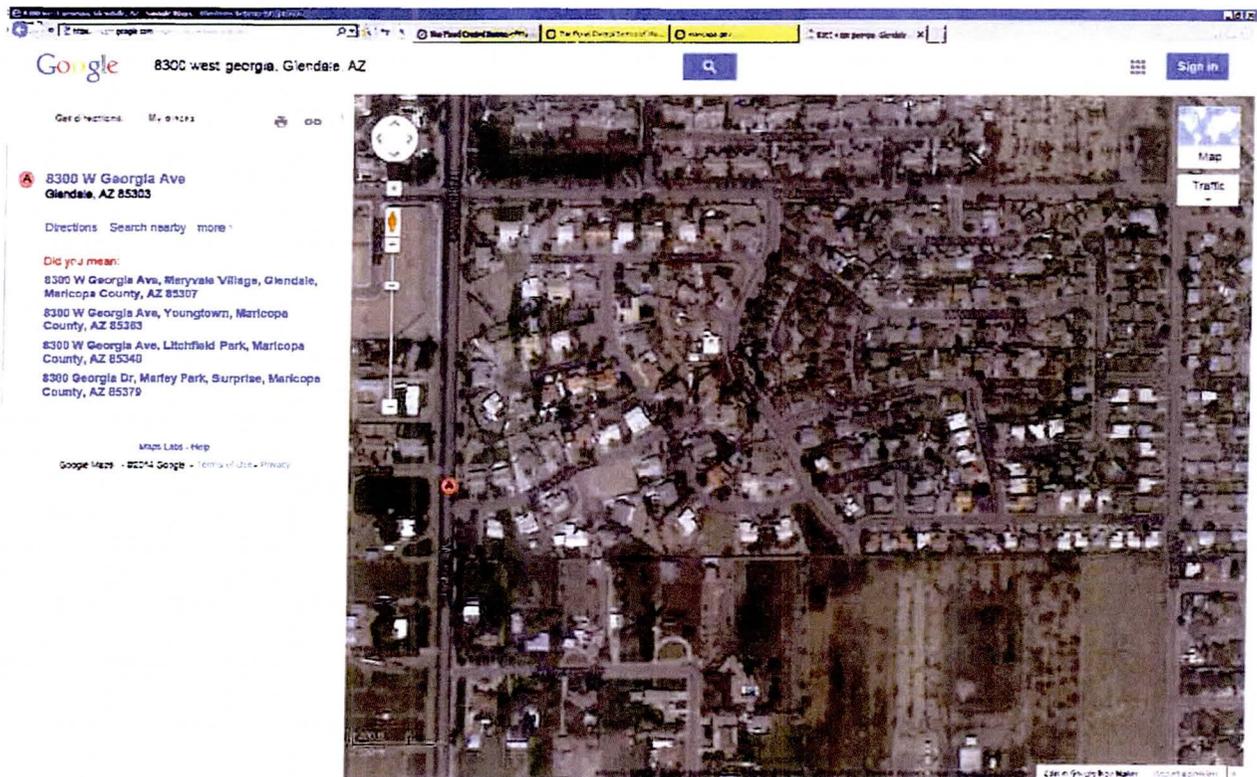
The list of localized flooding issues was developed by cataloging citizen complaints and investigating the sites. All of the projects identified in the localized section are classified as high priority due to the property damage caused by the flooding. Below is a list of the top priorities identified by staff followed by a short discussion of each project.

Schedule of Localized Flooding Issues

Description	Priority	Opinion of Probable Cost
83 rd Ave and Georgia Ave.	High	\$900,000
47 th Ave and State Ave	High	\$700,000
Amphitheatre - Murphy Park (City Hall)	High	\$470,000
Rose Lane Park and 49 th Ave	High	\$100,000

83rd Ave and Georgia Ave

The subdivision in this vicinity of 83rd Ave and Georgia Ave was developed in the 1980's. The detention/retention structures were designed to the 10-yr (10%) storm event standard. In addition, upstream development discharges to 83rd Ave and Missouri Ave which contribute runoff to this development. Consequently the runoff control structures are undersized and were inundated during the September 8, 2014 event. Several of the houses along Georgia Ave west of 83rd Ave were damaged due to water from the rain event entering the house. The City has hired an engineer to study the localized flooding in this area and make recommendations to mitigate the flooding. Initial opinions of probable cost indicate a project cost of \$900,000.



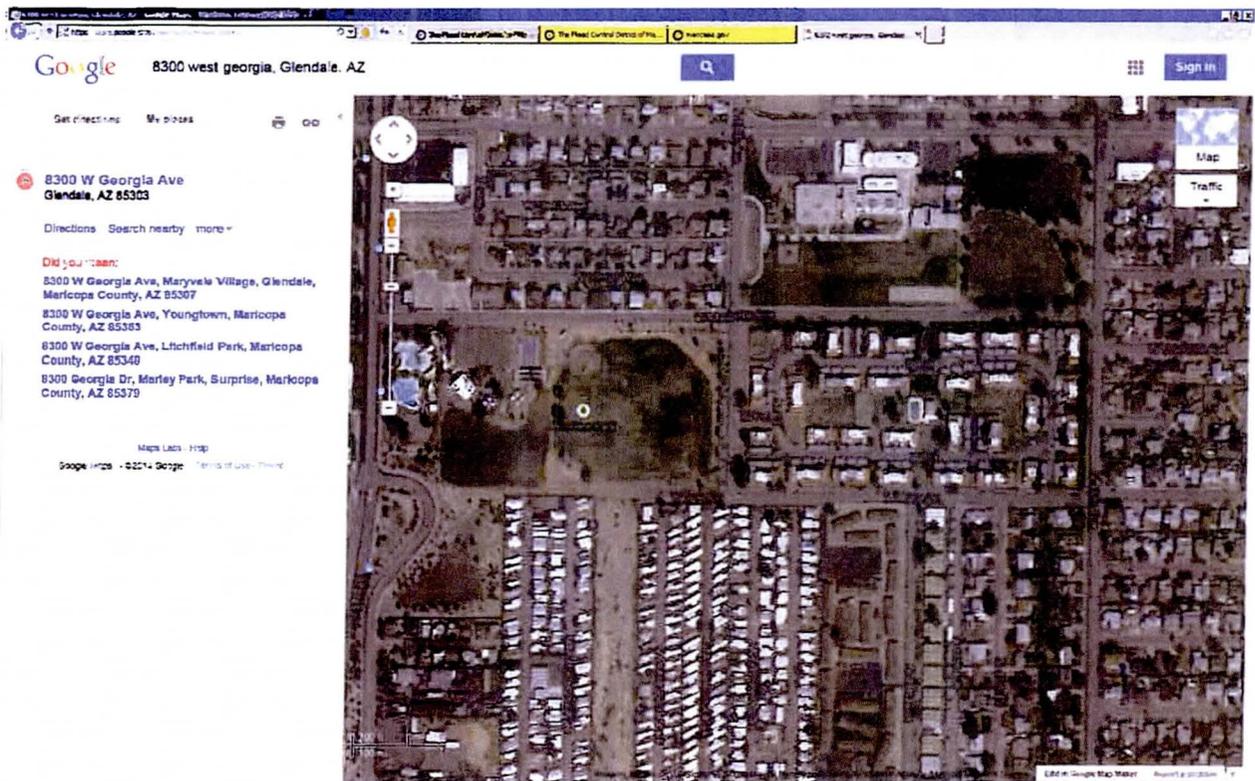
47th Ave and State Ave

The subdivision in this vicinity of 47th Ave and State Ave was developed in the 1970's. All of the runoff flows west along State Ave towards 47th Ave. The intersection is in a sump condition and is drained by one inlet (4' curb opening) that is connected to old SRP irrigation line. It appears that the inlet is undersized and the pipe has inadequate capacity to carry the flow. This combination causes water in the intersection to back-up to a depth of approximately 2'-3' and enter the residence at 7225 N. 47th Ave. In addition to the damage to private property, the standing water creates a hazard for drivers. The owner claims water enters the garage regularly during rain events and has entered the house 4-5 times in the past. The City has hired an engineer to study the localized flooding in this area and make recommendations to mitigate the flooding. Initial opinions of probable cost indicate a project cost of \$700,000.



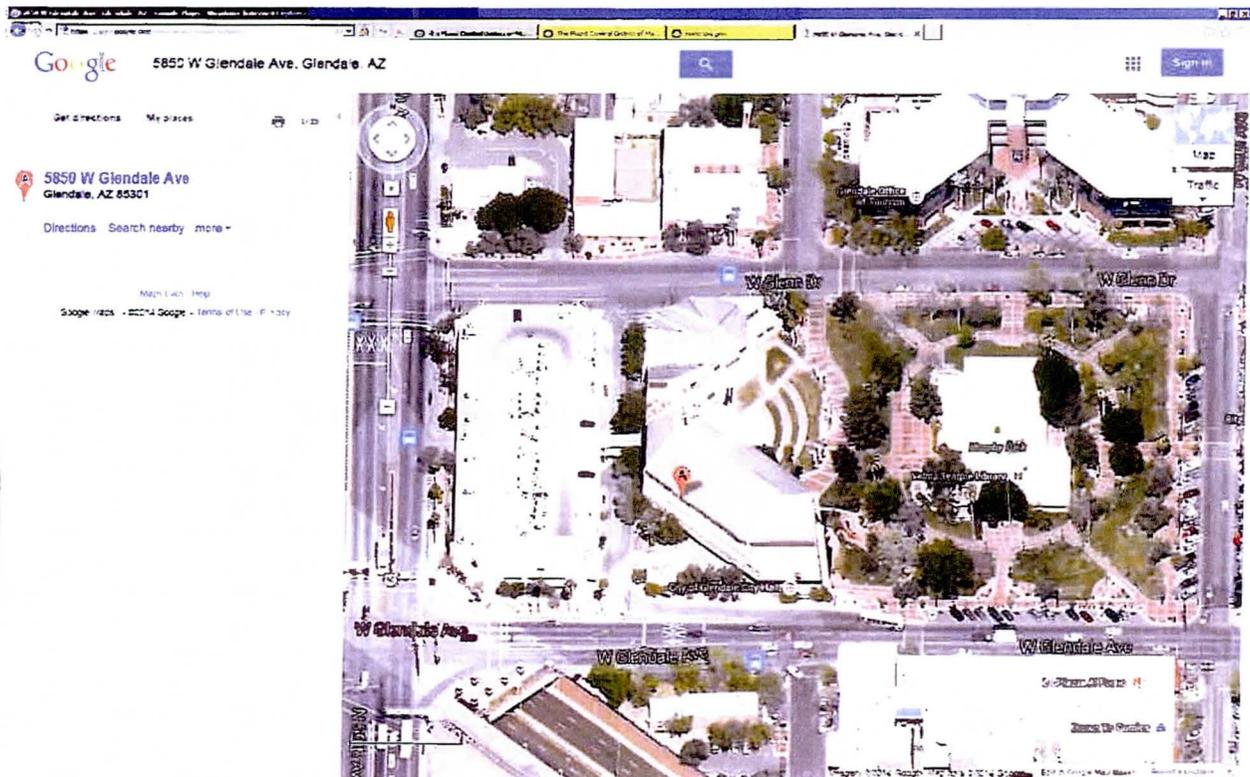
Rose Lane Park and 49th Ave

Rose Lane Park is located in the older section of Glendale and property around the park experiences flooding issues during regular rain events. During the September 8, 2014 event, stormwater was not contained within the limits of the park and entered the apartment complex on the east side of the park. Further, Rose Lane Park was noted as a piece of a larger project in the Stormwater Management Plan prepared by Kimley-Horn. Initial investigations indicate that curb cuts and other grading improvements can be made to allow the water into the park. The analysis and design of these improvements are being developed by City Engineering staff. Initial opinions of probable cost indicate a project cost of \$100,000.



Murphy Park – City Hall Amphitheatre

The Amphitheatre at Murphy Park – Glendale City Hall experienced significant flooding during the September 8, 2014 event. The Amphitheatre adjacent to City Hall has no outlet and the accumulated runoff is pumped into Murphy Park. During heavy events, the runoff exceeds the capacity of the park and drains back into the Amphitheatre. During the September 8, 2014 event the storm water backed up into the sub-basement of City Hall causing significant damage. The City had to move all of the staff, equipment, and storage to satellite locations to allow for repairs. Final damage estimates are still being calculated. In addition, this project was noted in the Stormwater Management Plan prepared by Kimley-Horn. The construction drawings and specifications for this project are being developed by City Engineering staff. Based on the Kimley-Horn Study, the opinion of probable cost is \$470,000.



9.4 Amphitheatre at Glendale City Hall

9.4.1 Recommended Project Description

This alternative consists of connecting the existing pump in the amphitheatre to the proposed Glenn Drive storm drain. Approximately 400 feet of the proposed Glenn Drive storm drain will be constructed.

This project will provide positive outlet for the pump station and provide street drainage for Glenn Drive near downtown and eliminate ponding at the intersection of Glenn Drive and 59th Avenue. This will also reduce the cost of the future Glenn Drive Storm Drain.

9.4.2 Flooding Issue

The amphitheatre located at the City of Glendale city hall currently has no outlet for local runoff that has accumulated in the amphitheater. Runoff collects in the lowered area of the amphitheatre and is pumped to the park area at street level. During major events, the storm runoff exceeds the capacity of the park, overtops the berm between the upper and lower levels of the amphitheatre and drains back into the amphitheatre.

9.4.3 Level of Protection

This project will provide a 10-year level of protection for the amphitheatre and for a 500 foot long portion of Glenn Drive.

9.4.4 Area Protected

This will eliminate the drainage issue at the amphitheatre and provide relief for flooding along Glenn Drive and at the intersection of Glenn Drive and 59th Avenue.

9.4.5 Utilities

There is an existing 10-inch diameter water main that is running east/west in the Glenn Drive corridor that will need to be considered during construction. Additionally, there are water main and sanitary sewer crossings at multiple street crossings.

9.4.6 Anticipated Right-of-Way Needs

No new right-of-way requirements are anticipate for this project.

9.4.7 Estimated Cost

Table 23 Estimated Probable Cost of Construction

Alternative Description	Cost
Connect pump to proposed Glenn Drive storm drain	\$470,000

Regional Flooding Issues

The list of regional flooding issues was developed through discussions with City staff and comparing the known problem areas with the recommendations in the Stormwater Management Plan prepared by Kimley-Horn. Below is a list of the top priorities identified with opinions of probable cost followed by a short discussion of the projects.

Schedule of Regional Flooding Issues

Description	Priority	Opinion of Probable Cost
Camelback Rd – 51 st to 58 th	High	\$2,210,670
83 rd Ave – Bethany Home Rd to Camelback	High	\$1,741,470
Bethany Home Rd – 51 st to 59 th	Medium	\$3,150,000
Bethany Home Rd – 59 th to 79 th	Medium	\$4,070,000
51 st Ave – Northern to Olive	Medium	\$6,570,000
51 st Ave - Olive to Peoria	Medium	\$1,720,000

Camelback Rd – 51st Ave to 58th Ave

The installation of a 72” storm drain in Camelback Rd from 51st Ave to 58th Ave was identified in the Stormwater Management Plan. This project was moved to a high priority due to the timing of the planned reconstruction of Camelback Rd from 43rd Ave to 59th Ave. It is the intent of the City of Glendale to reconstruct this 2-mile section of Camelback Rd. as part of the Pavement Maintenance Program. This section of roadway is programed for FY 2015, but may be moved back one year to allow for construction of storm drain improvements. The opinion of probable cost for this project is \$2,210,670.

83rd Ave – Bethany Home Rd to Camelback Ave

The installation of a 60” storm drain in 83rd Ave from Bethany Home Rd to Camelback Ave was identified in the Stormwater Management Plan. This project is a regional project that would connect and further serve the 83rd and Georgia project listed in the Localized Flooding Issues. The opinion of probable cost for this project is \$1,741,470

Bethany Home Rd – 51st to 59th & 59th to 79th

These projects have been previously submitted to the District.

51st Avenue – Northern Ave to Olive Ave & Olive Ave to Peoria Ave

The storm drain in 51st Ave was identified in the Stormwater Management Plan prepared by Kimley-Horn. Attached is the discussion and recommendations.

Table 19. Estimated Sizes, Lengths and Costs Associated with Storm Drain Construction in the Arterial Streets

No.	Street Segment	From	To	Length (feet)	10-Year Future Flow (cfs)	Pipe Dia. (in.)	Unit Cost	Total Cost
2	Greenway Road	67th Avenue	59th Avenue	4,620	169	66	\$435	\$2,009,700
3	Greenway Road	59th Avenue	51st Avenue	4,620	173.5	66	\$435	\$2,009,700
4	Bell Road	67th Avenue	59th Avenue	4,620	90	54	\$319	\$1,473,780
5	Bell Road	59th Avenue	51st Avenue	4,620	188	66	\$435	\$2,009,700
6	59th Avenue	Bell Road	Union Hills Drive	4,620	188	66	\$435	\$2,009,700
10	Camelback Road	83rd Avenue	75th Avenue	4,620	131	60	\$377	\$1,741,740
11	83rd Avenue	Camelback Road	Bethany Home Road	4,620	132	60	\$377	\$1,741,740
12	91st Avenue	Camelback Road	Bethany Home Road	4,620	166.5	66	\$435	\$2,009,700
13	59th Avenue	SR 101	Deer Valley Road	4,620	103	60	\$377	\$1,741,740
14	67th Avenue	SR 101	Deer Valley Road	4,620	154.5	66	\$435	\$2,009,700
16	Camelback Road	59th Avenue	51st Avenue	4,620	233	72	\$478	\$2,210,670
17	Camelback Road	51st Avenue	43rd Avenue	4,620	505	72	\$478	\$2,210,670
18	51st Avenue	Camelback Road	Bethany Home Road	4,620	505	72	\$478	\$2,210,670
22	75th Avenue	Camelback Road	Bethany Home Road	4,620	112	60	\$377	\$1,741,740
23	Bethany Home Road	79th Avenue	71st Avenue	5,280		108	\$834	\$4,402,200
24	Bethany Home Road	71st Avenue	59th Avenue	7,920		96	\$725	\$5,742,000
25	Bethany Home Road	59th Avenue	51st Avenue	5,280		66	\$435	\$2,296,800
26	Bethany Home Road	51st Avenue	47th Avenue	2,640		48	\$290	\$765,600
27	51st Avenue	Bethany Home Road	Glendale Avenue	4,620	159.5	66	\$435	\$2,009,700
28	59th Avenue	Bethany Home Road	Glendale Avenue	4,620	187	72	\$478	\$2,210,670
29	67th Avenue	Bethany Home Road	Glendale Avenue	5,280	389	90	\$689	\$3,636,600
35	67th Avenue	Glendale Avenue	Orangewood Drive	1,980	81	54	\$319	\$631,620
34	Glendale Avenue	67th Avenue	59th Avenue	4,620	162	66	\$435	\$2,009,700
30	75th Avenue	Bethany Home Road	Glendale Avenue	4,620	374	90	\$689	\$3,182,025
33	Glendale Avenue	75th Avenue	67th Avenue	4,620	124	60	\$377	\$1,741,740
36	75th Avenue	Glendale Avenue	Orangewood Drive	1,980	62	48	\$290	\$574,200
31	83rd Avenue	Bethany Home Road	Glendale Avenue	4,620	169	66	\$435	\$2,009,700
32	91st Avenue	Bethany Home Road	Glendale Avenue	4,620	169	66	\$435	\$2,009,700

8.3.7 Estimated Cost

Table 7. Estimated Probable Cost of Construction

Alternative Description	Cost
Storm Drain at 67th Avenue and Arrowhead Hospital	\$390,000

8.4 51st Avenue North of Olive Avenue

8.4.1 Recommended Project Description

This alternative consists of four storm drain elements

1. A 54-inch diameter storm drain in 51st Avenue between Cholla Street Peoria Avenue;
2. A 54-inch diameter storm drain in Peoria Avenue between 51st Avenue and approximately 300 feet east of 47th Avenue;
3. A 60-inch diameter storm drain in 51st Avenue between Peoria Avenue and Mountain View Road;
4. A 66-inch diameter storm drain in 51st Avenue between Mountain View Road and Olive Avenue.

Flow from the two 54-inch diameter storm drains will discharge into the 60-inch diameter storm drain, then into the 66-inch diameter line. There is an existing 66-inch diameter stub out in the Olive Drain at 51st Avenue. Each storm drain will consist of storm drain pipe, inlet structures, and appurtenances. The storm drain will include inlets to capture runoff and stub outs for various side streets that intersect with 51st Avenue.

8.4.2 Flooding Issue

51st Avenue is a major arterial within the City of Glendale that experiences flooding during moderate storm events. There are no existing storm drainage facilities along 51st Avenue north of Olive Avenue and south of the ACDC. Housing developments east of 51st Avenue were constructed prior to the development of retention/detention guidelines by the City of Glendale. As a result, stormwater runoff from these lots drains into the streets and eventually flows toward 51st Avenue. The runoff exceeds the conveyance capacity of the 51st Avenue, which results in ponding at the intersections north of Olive Avenue. City personnel have also indicated a flooding occurs along Peoria Avenue east of 51st Avenue. Flooding along 51st Avenue and particularly at the major intersections impedes traffic, could delay emergency responders, and could cause premature deterioration of the roadway pavement.

There is an existing 78-inch diameter storm drain in Olive Avenue that conveys stormwater flow to the Loop 101 channel several miles to the west. There is a 66-inch diameter stub-out in the Olive Avenue Drain at 51st Avenue.

The results of the hydrologic analysis indicate that the peak discharge rate for the 10-year return frequency storm event is 468 cfs along 51st Avenue north of Olive Avenue. The peak discharges for one-mile arterial street segments are presented in **Table 8**. The 10-year storm event produces a total runoff volume of 93 acre-feet.

Table 8. 10-Year Peak Discharges.

Location of Discharge	Upstream Street	Downstream Street	10-yr Peak Discharge (cfs)
51st Avenue	ACDC	Peoria Avenue	135
Peoria Avenue	43rd Avenue	51st Avenue	91
51st Avenue	Peoria Avenue	Olive Avenue	341

8.4.3 Level of Protection

The full flow capacity of a 66-inch pipe at the street slope of 0.0030 ft/ft is approximately 184 cfs which is approximately 55% of the peak discharge from the 10-year storm event.

8.4.4 Area Protected

The total area benefited by this project is approximately 1.5 squares miles. The area of runoff is between 51st Avenue and 47th Avenue along 51st Avenue north to the ACDC. The project will provide this area with a drainage outfall. The area between 55th and 51st Avenue from Olive to Cholla Street, which is approximately 0.75 square miles is protected from storm events up to the design discharges.

The storm drain alternative improves life safety, has a high community acceptance and improves impacts on traffic up to the peak design discharge for the storm drain system. Emergency responders will also have fewer traffic delays caused by flooding event.

8.4.5 Utilities

There are several utilities located within the 51st Avenue corridor. There are multiple water mains running in 51st Avenue that will need to be considered during design. There is an existing 48-inch water main that is located on the west side of the corridor and will need to be avoided. There is also a 12-inch diameter sanitary sewer in the corridor along the east side of 51st Avenue. An existing SRP irrigation line is located along the west side of 51st Avenue. These utilities will need to be considered during design, including lateral crossings.

8.4.6 Anticipated Right-of-Way Needs

It is anticipated that no new rights-of-way will need to be acquired for this project. The project will be constructed within the existing City of Glendale right-of-way.

8.4.7 Estimated Cost

Table 9. Estimated Probable Cost of Construction

Alternative Description	Cost
Storm drain-51st Avenue North of Olive Avenue	\$ 5,970,000

8.5 51st Avenue between Northern and Olive

8.5.1 Recommended Project Description

This project consists of 3,900 feet of 42-inch diameter storm drain in 51st Avenue that extends from approximately an existing 42-inch stub out in the Northern Avenue storm drain to Barbara Drive south of Olive Avenue. The storm drain includes pipe, inlet structures, and appurtenances.

There is an existing 42-inch diameter stub out from the Northern Avenue storm drain. Connections to the existing system will have less impact on Northern Avenue traffic during construction. The Northern Avenue storm drain was designed to accept some flows from the north.

The storm drain would include inlets with lateral pipes located along 51st Avenue to intercept runoff from the residential streets intersecting with 51st Avenue. A stub out would be placed at Butler Drive.

The storm drain alternative is recommended. The value of the proposed detention basin parcel is significant and there is a portion of the public and City leadership that would prefer to see the parcel developed for the greatest economic benefit.

8.5.2 Flooding Issue

As with the area north of Olive Avenue, 51st Avenue between Olive and Northern Avenues is a major arterial within the City of Glendale that experiences flooding during moderate storm events. Housing developments to the east discharge stormwater into the streets without any retention or detention causing flooding in 51st Avenue. Ponding and flooding has occurred within the square mile spanning Northern Avenue to Olive Avenue between 43rd Avenue and 51st Avenue. There is repeated flooding at the intersection of 51st Avenue and Olive Avenue.

There are no storm drains or detention/retention basins in or along 51st Avenue between Northern and Olive Avenues. There is an existing 66-inch diameter storm drain constructed recently in Northern Avenue that conveys stormwater runoff to a basin near

Northern and 63rd Avenue. The Northern Avenue Storm Drain has an existing 42-inch diameter stub-out at 51st Avenue. The results of the hydrology study indicated the peak discharge rate from the 10-year return frequency storm event is approximately 148 cfs and produces a total runoff volume of approximately 32 acre-feet.

8.5.3 Level of Protection

The full flow capacity of a 42-inch storm drain is approximately 55 cfs. This capacity is approximately 40% of the 10-year storm event.

8.5.4 Area Protected

The project would protect about 0.8 square mile between 55th Avenue and 47th Avenue and between Northern Avenue and Olive Avenue. Half of that area will be protected from a storm event up to the design discharge rate. The other half of the area is benefited by a positive drainage outfall. This project improves life safety, has a higher community acceptance and improves impacts on traffic and from flooding up to the peak design discharge for the storm drain system. Emergency responders will also have fewer traffic delays caused by flooding event.

8.5.5 Utilities

Several public utilities are located within the 51st Avenue corridor that will need to be considered during construction. There is an existing 48-inch water main that is located on the west side of the corridor that should be avoided if possible. Two smaller water mains are located on the east side of 51st Avenue that should be considered. There is an existing 12-inch sanitary sewer located on the east side of 51st Avenue. An irrigation line on the west side of 51st Avenue will need to be considered during construction and will not be easily relocated.

8.5.6 Anticipated Right-of-Way Needs

It is anticipated that no new rights-of-way will need to be acquired for this project. The project will be constructed within the existing City of Glendale right-of-way.

8.5.7 Estimated Cost

Table 10. Estimated Probable Cost of Construction

Alternative Description	Cost
51 st Avenue Storm drain - Northern Avenue to Olive Avenue	\$ 1,720,000

Bullard Wash Phase II

PCN: 470.13.31

Scott Vogel, P.E., Project Manager
602-506-4771
csv@mail.maricopa.gov

Districts: 4, 5
Jurisdiction: Goodyear
Origin: FY 2002 Prioritization Procedure
Resolutions: FCD 2000R016, 2000R016A
Agreements: FCD 2001A006, 2003A002, 2006A010, 2003A011

Bullard Wash is included within the Loop 303 Corridor/White Tanks Area Drainage Master Plan, which recommends wash improvements. Phase I of the project, from the Gila River to Lower Buckeye Road, was constructed by the District in partnership with the City of Goodyear. Phase II includes an earthen/greenbelt channel along the Bullard Wash alignment from Lower Buckeye Road to McDowell Road and a detention basin just south of McDowell Road. Landscaping and trails are anticipated along the channel alignment and within the basin.

The project will channelize the floodplain north of the Phoenix-Goodyear Airport, reducing the floodplain width and protecting the Phoenix-Goodyear Airport and nearby development from flooding. This stormwater would otherwise collect in streets, farm fields and residential and commercial areas. Design of Bullard Wash from Lower Buckeye Road to I-10 is complete, and IGAs with the city for construction of the project are in place.

Design and construction schedule is dependent upon the availability of funding and will likely be phased, with the majority of work being completed outside the five-year CIP.

Fiscal Year	Budget
FY 2015	\$5,000
FY 2016	\$5,000
FY 2017	\$5,000
FY 2018	\$5,000
FY 2019	\$265,000
5-Year Program	\$285,000

MCDOT prioritized list of projects for FCDMC

1. **Current Projects on FCDMC List** – The 3 capital projects and 1 planning project identified by FCDMC on their current projects list for MCDOT remain project priorities for MCDOT. None of the projects should be deleted from the list.
2. **Honda Bow & 9th Ave.** – Need to re-establish channelization of the Klein Wash and reconstruct the road crossing to an all-weather type crossing. Currently there is only one way in/out. After the last flooding MCDOT forces constructed a low flow drain to the historic flow alignment in order to allow the crossing to drain so that it doesn't have to be closed and pumped for every minor event, but the flow line/dip is substantially deeper than the approaches on both sides.



3. **Desert Hills Dr. & 15th Ave.** – Klein Wash Crossing floods and closes the road. Issues similar to Honda Bow Crossing to the North.
4. **Palm Lane, Sossaman to Hawes** – Area experiences flooding during storms that affect roadway and residences, particularly in area of 78th Street. Need to look at storm drain system for the area that conveys runoff to the wash on the west side of Sossaman. MCDOT has performed two alternative analysis studies on Palm Lane, but a different perspective may be advantageous as no clear solution has emerged.

5. **Old Stage Road/36th Ave/35th Ave.** – Need to re-establish flood protection levee along east bank of New River. Without this levee, the road washes away whenever water flows in New River.



6. **115th Ave, north of Happy Valley Parkway** – Closes when it rains in the area. Currently there is only one way in/out.



7. **Narramore Rd at the Waterman Wash** – Closes when wash flows. PM&C (Bill Hahn) is initiating a project to construct an all-weather crossing. Currently there is only one way in/out
8. **19th Ave South of Desert Hills Dr.** - Klein Wash Crossing floods and closes the road. Issues similar to Honda Bow Crossing to the North.
9. **Patton Rd west of 257th Ave.** – Patton Rd. is the only access to the Toyota Facility. Residents installed a culvert in a wash under 257th Ave (downstream of Patton) which cause backwater to pond over Patton during rain events, restricting access on Patton. Need to re-establish capacity of the downstream channel so Patton does not get inundated.
10. **Patton Rd, west of 195th Ave** – Area flooding closes Patton Road and restricts access to US60
11. **Patton Rd at the Hassayampa River** – Crossing closes whenever the Hassayampa flows. Currently there is only one way in/out.



12. **Damaged levee in the Hyder area** – Breach in levee (near blue arrow) causes downstream flood damage to Lahman Rd. It is unknown to MCDOT who constructed the levee originally.





November 13, 2014

Mr. William Wiley, P.E.
Chief Engineer and General Manager
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009

Re: Flood Control Priorities

Dear Mr. Wiley:

The City of Mesa recognizes the efforts of the Maricopa County Flood Control District in developing flood control solutions to issues throughout the County. The storm events from the past two months caused major flooding issues throughout the City of Mesa. Many of these issues were previously identified; others were recently discovered through community outreach.

The City of Mesa would like to reconfirm our interest in current projects from the Flood Control District's Capital Improvement Program Prioritization Process (CIPP) and the Small Projects Assistance Program (SPAP). For your reference, we have enclosed with this letter a list of identified storm and flood projects (small and large) in the City of Mesa that we are aware of and in which we have an interest working towards resolution.

Previous joint funding ventures with the Flood Control District of Maricopa County has allowed us to pursue and complete several flood control projects that would not have otherwise been possible. We look forward to potential funding for and working with you on these projects. Please contact me at 480-644-2512 if you have any questions or require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Elizabeth Huning".

Beth Huning, P.E.
City Engineer

Cc: Kari Kent – Assistant City Manager
Rob Kidder – Assistant City Engineer
Fred Rustam – Deputy Engineer
Julie Christoph – Supervising Engineer

Project Location	Project Description	Priority
Gilbert Rd. - Lateral Piping, Retention and Other	Add retention to the current east-west Powerline corridor crossing Gilbert Road, north of Colby Street to minimize volume and peak flow from subbasin 32 of the Consolidated Canal model.	Low
Southern Ave. - Hobson to Center St.	Keep the existing infrastructure and add parallel pipes to keep the hydraulic grade line for the 100-year storm even flows below the existing ground. This is valid if all proposed changes are made upstream of the network.	Low
Broadway Road 1/2 Mile East of Gilbert Road and Retention at Silvergate Park	Additional 11-acre feet of online retention in Silvergate Park and no retention north of Broadway.	Low
McKellips Rd. - Lindsay to Val Vista	Keep existing infrastructure and add parallel pipes to the storm drain system to convey existing flows generated by the governing 10-year storm event. System is deficient between Lindsay and 32nd Street for both the 100-year and 10-year storm events.	Low
Val Vista SD - Eastern Canal to Main, Main to Broadway, Laterals	Keep existing infrastructure and add parallel pipes to keep the hydraulic grade line for the 100-year flows below existing ground.	Low
Eastern Canal - Piping and Main Street	At the eastern Canal, Main Street, and Broadway and 40th Street, keep existing infrastructure and add parallel pipes to keep the hydraulic grade line for the 100-year flows below existing ground.	Low
Greenfield - Broadway to Southern Ave. and Irrigation Disconnection Pipe	On Greenfield Road, add parallel pipes combined with an additional 20 acre-feet or retention to Greenfield Park basin by building up the edge of the basin along the Eastern Canal on the north between the existing development and the basin. On Broadway Road, add parallel pipes to keep the HGL for the 100-Year below existing ground. Disconnect several RWCD connections located on Broadway Road.	Low
Brown Road - Recker to Higley to Eastern Canal	On Brown Road between 64th Street and the EMF, keep existing infrastructure and add parallel pipes to maintain the 100-year HGL below grade.	Low
SRP Powerline Corridor Laterals	Add a proposed retention basin along the Powerline Corridor between Higley Road and Recker Road., north of University Drive including several laterals to convey the flow the proposed basins.	Low
Broadway Rd. - 70th to Power, 70th - Main to Broadway	There are two locations where the road crossings were determined to be inadequate. The first is located on 79th Street and Arbor Ave where the channel transitions from the east side of the road to the west. The second is located at the intersection of 70th Street and Broadway Road. Currently, the existing lined channel transitions to a multiple barrel box culvert via a single 30-inch pipe. It is recommended that the pipes be removed and replaced with infrastructure adequate to convey the required flow. On Power Road, add proposed online retention along Adobe Street, west of Sun Valley including several laterals to convey the flow to the proposed basins.	Low
McKellips Road, Crismon to 95th Place	SD line	Low
94th St. - Jasmin Cir to McClellan	Resolve storm drain issues.	Low
Crismon Rd. - Brown to University, University Dr. - Crismon Rd. to CAP	Storm drain line design.	Low
Signal Butte - Brown to Cholla, University - Crismon to Signal Butte, Signal Butte - University to Main	Proposing new infrastructure along Crismon Road to the existing channel at Cholla Street. New proposed infrastructure along University between the existing channel outlet north of University and inlet south fo University.	Low
Warner Rd. - EMF to Sossoman Rd.	Channel system required to convey flows.	Low
Ellsworth Channel	Channel relocation for the airport expansion. Ties into the powerline floodway.	Low
Crismon Rd. Channel	Channel system.	Low
10th Avenue and Sistine - SPAP	Extension of storm drain system to tie into the Sistine system. Road is extremely flat.	Low
Summer and Bates - SPAP	Storm drain system to tie into the ADOT basin for the Loop 202.	Low
Lehi Road - SPAP	Roadside basins and reestablish the tailwater ditch that has been filled in by downstream residents.	Low
Citrus Gardens - Maple and Main	Flows are directed into this neighborhood. It requires a storm drain system that can tie into the Main Street system.	Low
Stapley and Brown	Parallel line and potential basin at the southwest corner of Stapley and Brown.	Low

Project Location	Project Description	Priority
Broadway Rd. - Center to Mesa Dr.	New infrastructure is proposed along Broadway Road running eastward from Serrine to Mesa Drive to mitigate flooding in the area. This is valid if all proposed changes are made upstream of the network. It is recommended that the current storm drain systems on Serrine Road and Hilbert Road be connected to the new infrastructure to terminate current flooding problems in the vicinity.	High
Center - Southern to US 60	Storm drain line that ties into Heritage Park Basin.	High
Lewis - Baseline to US 60	Keep the existign infrastructure and add parallel pipes to keep the hydraulic grade line for the 100-year storm event flows below the existing ground.	High
Southern Ave. - Gilbert to Stapley, Stapley - Broadway to Southern, Horne, Broadway to US 60	Include additional pipes along Broadway Road running westward to Horne, then south until it connects with the existing system. This will dramatically reduce the runoff from north of Broadway Road and mitigate storm water impacts. Keep the existing infrastructure and add parallel pipes in Southern Ave to keep the HGL for the 100-year below the existing ground. New infrastructure poroposed on Broadway Road fromw est of Gilbert Road to Horne to make up for the lack of retention between Main Street and Broadway Road. The proposed infrastructure will then head south along Horne from Broadway to Southern Avenue where is then connects to the existing infrastructure.. On Horne, new infrastructure will add parallel lines south of Horne to keep 100-year HGL below existing ground.	High
Oak Street Basin and Storm Drain	The proposed storm drain runs westbound along Oak Street and carries storm flow from 87th Street to the basin on the northeast corner of Hawes and Oak Street. A bypass segment of the same size was extended to Hawes Road where the flows are proposed to be conveyed in an existing 404 wash.	High
Hawes Rd. - Range Rider Trail to Oak Street Channel	Channel along east side of Hawes Road beginning at Range Rider Trail and carries flows south to the proposed retention basin on the northeast corner of Hawes and Oak Street.	High
Pecos Rd. Channel	Channel system to accommodate offsite flows that currently inundate several businesses along this corridor.	High
Hawes Rd. - Pecos to Germann	Channel system that extends south.	High
90th Street and Butternut Ave. Storm Drain - SPAP	Storm drain infrastructure to be built to handle flooding withtin the neighborhood and on Broadway Road.	High
2nd Avenue and Solomon - SPAP	Over 80 homes flooded. This project is intended to help relieve flows off Main Street and to a regional basin at the Mesa Junior High project site.	High
Emerald Acres - SPAP	Over 100 homes flooded. This project is intended to divert flows back into the ADOT channel and other improvements to increase retention capacity.	High
Pecos DCR	Currently in progress.	High
Winterhaven Storm Drain Connection	Relief line from channel into existing storm drain system.	High
Skyline - Power and McKellips	Erosion and Unconfined Roads. Retention basin in development where City owns land.	High
Countryside Park Line Connection	36-inch line connection with siphon.	High
90th and Brown	Channel construction to divert flow through the culvert and not over Brown Road.	High
Baseline - Signal Butte and State Land	Flows from the state land piece flow onto Baseline and cause closures with small events.	High
6th and Fraser - SPAP	Extension of Horne Road storm drain system (future) to alleviate flooding in the local neighborhood.	Medium
Seton and Halifax - SPAP	Neighborhood built in a bowl. Requires relief line to tie into Higley Road system.	Medium
Broadway Road Junction Structures	Junctions structures to mix flows from the north that primarily tie into the northern box culvert . Flow needs to be shared by all three culverts. Flows flow to EMF.	Medium
Broadway and Recker - SPAP	Channel construction and connection into the box culvert system in Broadway Road.	Medium
Dobson and Baseline	Junction structure to diver flows into the lake system.	Medium
McKellips Rd. - Higley to Greenfield, Laterals, Retention on SEC of 64th St. and Leonard	Keep existing infrastructure and add parallel pipes to maintain 100-year HGL below grade along McKellips Road. Expand a small existing retention basin in the empty lot located on the south east corner of Leonard Street and 64th Street, north of McKellips.	Medium
Main Street - Sossoman to Power	Retention basin in Jefferson Park due to lack of retention in the development between 72nd Street and 76th Street.	Medium
Ellsworth Road Detention Basin System, Upper Ellsworth Road Storm Drain	Identified in the City of Mesa Master Storm Drain Plan.	Medium
Guadalupe Rd. - Mesquite Canyon to Loop 202	Keep existing structure and add proposed parallel pipes along Guadalupe before it intersects with the Loop 202 to maintain the 100-year storm event HGL below grade. Al the intersection with the Loop 202, it is proposed to divert all the flow into the existing ADOT channel running southbound on the eastern side of the Loop 202 alignment.	Medium
Germann Channel	Channel system identified in the East Mesa ADMPLU.	Medium
Royal Palms - SPAP	A few homes flooded. Reliever line to direct flows to Candlelight Park instead of flooding residential homes.	Medium
9th Avenue and Horne - SPAP	Basin to capture the 10-year event for the local neighborhood and to help alleviate the flooding that currently happens on Horne Road.	Medium
Horne - 8th to Main St.	Keep existing infrastructure and add parallel pipes to the storm drain system to convey existing flows. Additional infrastructure is required starting south of 8th Street to University to compensate for little to no retention east of Horne Road. System is adequate south of University Drive.	Low



November 5th, 2014

William D. Wiley, P.E.
Chief Engineer and General Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

RE: Response Flood Control Priorities, Town of Paradise Valley

Dear Mr. Wiley, P.E.

The Town of Paradise Valley received a letter from you dated October 7th, 2014 that was requesting a list of flood control priorities for the Town of Paradise Valley. The letter indicated that these projects could be in the form of capital projects that could relieve some of these flooding issues or planning studies that could better identify the flooding hazards that caused the flooding problems.

Based on the most recent storm events of the past two months the Town of Paradise Valley did experience flooding within the community. The Mayor Elect has indicated that Storm Water Management is a priority for the Town and has indicated that he will lead an effort to work with Maricopa County and The Cities of Phoenix and Scottsdale to identify flood-prone areas of our town. He has also indicated that we will work with neighborhoods and residents to identify potential solutions to reduce risks to human health and property damage, prepare storm water management policy alternatives and facilitate a public discussion and decision on the roles and responsibilities of town government with regard to storm water management.

The Town of Paradise Valley has an existing 5-year Capital Improvement Program that includes six (6) drainage projects and one (1) master study. Based on the recent flooding within the community, resident concerns and the Mayor Elects storm water priority; I expect additional projects to be added to the list in the future.

The projects that are currently included within the Capital Improvement Program are:

Drainage Projects:

Hummingbird Lane / Quartz Mountain Road – High Priority
Berneil Channel Improvements – Medium Priority
Cudia City Wash Crossing at Tatum Boulevard – Medium Priority
Scottsdale Road and Indian Bend – Joint Project with Scottsdale – High Priority
Invergordon Road at the Indian Bend Wash Crossing – Medium Priority
Doubletree Ranch Road at the Indian Bend Wash Crossing – Medium Priority

Master Study:

Storm Water Master Plan – High Priority

6401 East Lincoln Drive
Paradise Valley, Arizona
85253-4328

480-948-7411
480-951-3715 Fax
480-483-1811 TDD



The Town also believes that the recent study completed by the Flood Control District for the Lower Indian Bend Wash (ADMS) and the upcoming study of for the Middle Indian Bend Wash (ADMS) are two very important projects for the Town. These two studies will provide valuable information for the portion of the Town that flows to the Indian Bend Wash. The Town would also like to see a project included that would update the ACDC (ADMS) for the portion within the Town of Paradise Valley. With these three studies being completed it would help to identify areas of need and identify future projects for the Town.

The Town appreciates the Flood Control District of Maricopa County reaching out to us. If you have any questions or need additional information, please contact me at (480)-348-3573.

Sincerely,

TOWN OF PARADISE VALLEY

James P. Shano

James P. Shano, P.E.
Public Works Director / Town Engineer

Office # 480-348-3573
E-mail: jshano@paradisevalleyaz.gov

Cc: James C. Bacon, Jr., Town Manager
Richard Edwards, Senior Engineering Technician
Jeremy Knapp, Engineering Services Analyst
Jen Pokorski, MCFCD

TOWN OF PARADISE VALLEY

Capital Projects Submitted to the District

Project Name	Estimated Total Project Cost
Berneil Channel Improvements	\$ 4,050,000

Planning Studies In-Progress

Project Name	Estimated Total Project Cost
Middle Indian Bend Wash Area Drainage Master Study	\$ 1,099,280



City of Phoenix
STREET TRANSPORTATION DEPARTMENT

November 4, 2014

William D. Wiley, P.E.
Chief Engineer and General Manager
2801 W. Durango Street
Phoenix, AZ 85009

RE: Flood Control Priorities

Dear Mr. Wiley,

This is in response to your letter dated October 7, 2014 requesting assistance in identifying the City's Flood Control Priorities.

Following guidelines for submitting projects to the Capital Improvement Program Prioritization Process (CIPP) and the Small Projects Assistance Program (SPAP), staff has prepared a comprehensive list of flood mitigation projects. The projects are ranked based on priority as high, medium and low. The estimated costs for each project are listed in the same table (see attachment).

The total estimated costs for the needed capital flood mitigation projects are approximately \$566 million dollars, while the total costs for all the needed local drainage projects are \$479 million dollars, with a combined total of \$1.05 billion dollars.

If you have any questions or need assistance in this regard, please contact me or Hasan Mushtaq at hasan.mushtaq@phoenix.gov or at (602) 262-4026.

Thank you very much for your assistance in solving the flood mitigation needs for the City of Phoenix.

Sincerely,

A handwritten signature in black ink, appearing to read "Ray Dovalina".

Ray Dovalina, P.E.
Acting Street Transportation Department Director

Cc: Jen Pokorski, Flood Control District of Maricopa County

CITY OF PHOENIX
Capital Improvement Projects
Flood Mitigation Projects

Mitigation Projects, Citywide	Estimated cost	Priority
A	B	C
Durango Regional Conveyance Channel - Phase II (83rd to 107th Ave., along Elwood Street)	\$15,515,000	High
27th Avenue/South Mountain Avenue Detention Basin	\$5,300,000	High
27th Avenue/Dobbins Road Detention Basin	\$6,700,000	High
South Phoenix/Laveen Drainage Improvement Project (19th Ave and Dobbins Road)	\$11,300,000	High
Basin 5/Circle K Park (12th Street and South Mountain Avenue)	\$11,100,000	High
14th/15th Street Storm Drain (14th Street and Dobbins Road)	\$3,300,000	High
Basin 1/Ardmore Road Storm Drain (16th Street and Ardmore Road)	\$1,300,000	High
South Mountain Avenue/17th Way Storm Drain	\$1,200,000	High
20 th Avenue and Turney Basin	\$13,000,000	High
Skunk Creek Levee at Central Arizona Project (at I-17)	\$27,300,000	High
Skunk Creek Channel at Pinnacle Peak Road (35th Ave and Pinnacle Peak Road)	\$8,500,000	High
Lafayette Blvd Storm Drain Arcadia Drive to 44th Street)	\$6,500,000	High
Jefferson Street Storm Drain (at I-17)	\$3,100,000	High
43 rd Avenue and Dobbins Road Detention Basin	\$1,260,000	Medium
44 th Avenue and Carver Road Detention Basin	\$3,600,000	Medium
51st Avenue Storm Drain (Baseline to Elliot Road)	\$2,330,000	Medium
51 st Avenue and Dobbins Road Basin	\$1,420,000	Medium
51 st Avenue and Elliot Road Basin	\$1,550,000	Medium
67 th Avenue Channel (Southern Avenue to South Mountain Avenue)	\$2,700,000	Medium
Dobbins Road Storm Drain (43rd Avenue to 51st Avenue)	\$780,000	Medium
7th Avenue Storm Drain (Baseline Road to South Mountain Avenue)	\$1,600,000	Medium
27th Avenue Storm Drain (Baseline Road to South Mountain Avenue)	\$1,700,000	Medium
Basin 11 and Outfall Storm Drain (20th Street and Baseline Road)	\$3,800,000	Medium
20th Street/Euclid Avenue Storm Drain	\$1,800,000	Medium
19th Street/South Mountain Avenue Storm Drain	\$1,800,000	Medium
Basin 10/Head Scout Pueblo Boy's Scout Club (20th Street and Dobbins Road)	\$1,500,000	Medium
43 rd Avenue Storm Drain Outfall Project (at Broadway Road)	\$2,000,000	Medium
Pecos Basin Outfall Project (48th Street and Pecos Road)	\$2,000,000	Medium
Palisene-Paradise Ridge Drainage Project (State Route 101 and Scottsdale Road)	\$20,000,000	Medium
40th Street Storm Drain (40th Street and Camelback Road)	\$4,100,000	Medium
Arcadia Drive Storm Drain (48th Street and Camelback Road)	\$4,900,000	Medium
Camelback Road Storm Drain (West, Arcadia to 40th Street)	\$5,500,000	Medium
Downtown Storm Drains (various locations, north of railroad)	\$31,600,000	Medium
Central Avenue Storm Drain (Bethany Home Road to Arizona Canal)	\$8,100,000	Medium
Thomas Road Storm Drain (Old Cross Cut Canal to 60th Street)	\$10,700,000	Medium
Encanto Golf Course Storage Basin (7th to 19th Avenues)	\$40,800,000	Medium
Van Buran Street Storm Drain (I-10 to 40th Street)	\$19,300,000	Medium
Reservation Channel (Dobbins Road to Laveen Area Conveyance Channel)	\$1,120,000	Low
Carver Hills Storm Drain (Estrella Drive and 45th Avenue)	\$630,000	Low
Western Canal Channel (43rd Avenue to 51st Avenue)	\$2,700,000	Low
47th Avenue Channel System (Buckeye Road to Salt River)	\$19,100,000	Low
Sunland Avenue Channel (99th Avenue to 115th Avenue)	\$8,100,000	Low
Salt River Channelization at 67 th Avenue (67th Avenue and Salt River)	\$10,000,000	Low
Camelback Road Storm Drain (East, Arcadia Drive to 56th Street)	\$3,900,000	Low
Palo Verde Golf Course Storage Basin (15th Avenue and Rose Lane)	\$12,600,000	Low
15th Avenue Storm Drain (Palo Verde Golf Course to Butler Drive)	\$18,700,000	Low
21st Avenue Storm Drain (Encanto Golf Course to Northern Avenue)	\$50,800,000	Low
15th Avenue Storm Drain (Encanto Golf Course to Grand Canal)	\$23,900,000	Low
3rd Avenue Storm Drain (Encanto Golf Course to Bethany Home Road)	\$21,900,000	Low
Thomas Road Storm Drain (Encanto Golf Course to 24th Avenue)	\$3,600,000	Low
McDowell Road Storm Drain (Arizona Dept. of Transportation Tunnel to 15th Avenue)	\$5,800,000	Low
Downtown Storm Drains (various location, south of Railroad)	\$19,700,000	Low
Durango Curve Detention Basin and Collection System (19th Ave and Buckeye Road)	\$74,100,000	Low
Total	\$565,605,000	
Local Drainage Projects, Citywide	\$479,000,000	
Grand Total	\$1,044,605,000	

Flood Control District of Maricopa County/City of Scottsdale Priorities

Draft

Major Capital Projects	Estimated Total Project Cost	Priority	Location	Notes
Upper Camelback Wash Improvements	\$17,710,000	High		Project will be complete in January 2015
Granite Reef Wash Improvements	\$51,055,600	High		Cost will decrease substantially due to revised hydrology and value engineering; 39 properties allegedly flooded on 9/8/2014
Reata Pass Wash Flood Control Project	?	High		Alternatives analysis and design concept report underway
Rawhide Wash Flood Control Project	?	High		PPW ADMS is developing cost estimate
Crossroads East Phase 1	\$15,094,034	High	Generally Hayden to Pima and Legacy to Mayo	Models show flood hazard in Princess Resort area
Crossroads East Phase 2	\$22,257,508	High	Generally Hayden to Pima and Hualapai to the CAP	1 structure flooded in October 2003
Indian Bend Road/Lincoln Drive Flood Hazard Mitigation	\$7,000,000	Other	Between Scottsdale Road and the Arizona Canal	Project cost will decrease based upon LIBW ADMS
Northern & 73rd Place Storm Drain/McCormick Parkway Improvements	\$3,000,000	Other	Northern & 73rd and Camelback Wash at McCormick Pkwy.	LIBW ADMS shows need for Northern and 73rd storm drain
82nd St. Storm Drain	?	Other	North of McDonald Drive	LIBW ADMS shows need
Small Projects Assistance Program	Estimated Total Project Cost	Priority	Location	Notes
East 5th Avenue & Scottsdale Road Drainage Improvements - SPAP	\$328,000	Other		Project complete
Paradise Drive Storm Drain (67th St to 68th St) - SPAP	\$243,000	Medium		2 structures flooded in July 2013, 8/19/14, 9/8/14, and 9/27/14
Police/Fire Department Headquarters Flood Hazard Mitigation - SPAP	\$54,000	Medium	Southeast corner of Granite Reef and Indian School	Critical facility has flooded 5 times in 2012 and 2014
8525 E Pinnacle Peak Road Flood Wall - SPAP	\$25,000	Medium		1 structure flooded 7 times in 2013 and 2014
7117 E Third Avenue Drainage Improvements - SPAP	\$30,000	Medium		1 structure flooded 4 times in 2014
Sherwood Heights Detention Basin	?	Medium	Generally south of Oak and 58th St.	3 structures flooded on 9/8/14 and 1 structure flooded on 9/27/14
El Cuadro Drainage Improvements	?	Medium	Generally east of Miller and Virginia	At least 3 structures flooded on 9/8/14 and 1 structure flooded on 9/27/14
Cheery Lynn Storm Drain - SPAP	\$400,000	Other	Cheery Lynn generally between 67th Pl. and 69th Pl.	Stormwater was observed 1" above threshold on 1 structure on 9/8/14
Desert Cove & 80th Place Storm Drain - SPAP	?	Other		1 structure flooded on 9/27/14
Planning Studies	Estimated Total Project Cost	Priority	Location	Notes
Pinnacle Peak West ADMS	\$1,855,000	High		Underway
Lower Indian Bend Wash ADMS	\$1,250,000	Medium		Underway
Shea Corridor-East ADMS	\$1,000,000	Medium	Generally east of Indian Bend Wash, south of the CAP, and north of the Arizona Canal, but including the area south of the PPS ADMS and northeast of the CAP	New ADMS. Some structural flooding has occurred in the past and this year.
Desert Mountain ADMS	\$500,000	Medium	Generally north of Cave Creek Road and east of Pima Road	New ADMS in Flood Zone D. At least 3 structures flooded in Desert Mountain on 8/19/14. Boundary may need to be expanded to include Mirabel area due to flooding of 4 structures on 8/19/14.

Note: Some photos of flooding can be provided upon request

City of Tempe
P. O. Box 5002
31 East Fifth Street
Tempe, AZ 85280
480-350-8200
www.tempe.gov



Public Works Department- Engineering Division

November 13, 2014

Mr. William D. Wiley, PE
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

RE: Tempe Flood Control Priorities

Dear Mr. Wiley:

Thank you for your agency efforts in identifying and assisting with the City of Tempe's drainage issues. As you noted, the recent storm events have highlighted a number of areas within Tempe where we have drainage concerns, but with no clear area that trumps over the rest. **We do not currently have a list of new priority areas.** However, we would list the priorities of Tempe's current projects as follows:

- Tempe Area Drainage Master Study – HIGH PRIORITY
- Lower Indian Bend Wash Area Drainage Master Study (Scottsdale) – HIGH PRIORITY
- Loma Vista Corridor Drainage Improvements – HIGH PRIORITY
- Highline Western Canal Storm Drain – MEDIUM PRIORITY

We prioritize the two Area Master Studies above everything else. The results of these studies will allow us to identify where our highest drainage concerns reside. Once complete, we can layout where our greatest needs are and target our limited CIP budgets and focus our requests from the FCDMC to where they will do the most good.

Next, the study that resulted in the Loma Vista Corridor Drainage Improvements showed that an investment in the infrastructure in that area could provide a significantly higher level of flood protection to the homes in the neighborhood. In addition, Tempe applied for and received a WIFA (Water Infrastructure Finance Authority of Arizona) Grant to look at alternative concepts to adapt the project better to McClintock High School and the adjacent neighborhood.

Finally, the Highline Western Canal Storm Drain would improve the conveyance of storm water runoff in the area near the canal, which traditional has experienced flooding issues.

We appreciate the Flood Control Districts continuing efforts in completing the master studies and our current projects, and your ongoing work in these vital areas.

Sincerely,

A handwritten signature in blue ink that reads 'Andy Goh'.

Andy Goh, PE
Deputy Public Works Director/City Engineer



TOWN OF WICKENBURG

155 N. Tegner, Ste. A • Wickenburg, Arizona 85390 • (928) 684-5451
Phoenix Line (602) 506-1622 • FAX (602) 506-1580
Voice & TTY (928) 684-5411

November 13, 2014

Mr. William D. Wiley, P.E.
Chief Engineer & General Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

RE: Flood Control Priorities

Dear Mr. Wiley:

Thank you for your letter dated October 7, 2014, regarding flood control priorities throughout Maricopa County. Like other areas of the county, Wickenburg has experienced some major flood events in recent years, including this past summer. We tremendously appreciate our partnership with the Flood Control District in addressing these issues, both in terms of planning and constructing flood control structures as well as responding to emergency incidents. Below please find the Town's highest flood control priorities and their current statuses.

Sols Wash Crossing at Vulture Mine Road

Vulture Mine Road is one of the major roadways in Town which connects Highway 60 to Highway 93. North of the BNSF Railway, Sols Wash crosses the roadway at a low spot and multiple times in the rainy season the roadway is required to be closed due to excessive water on the pavement surface. The closure creates an emergency response issue since the roadway cannot be utilized during rainy events. On the east shoulder of the road, there is drop-off ranging from 4-6 feet which seems to deepen after every event. This shoulder currently has no protection, which should be evaluated if objects need to be installed to protect from vehicle falls. The Town requests design and construction assistance for a major culvert or bridge be installed at the Sols Wash Crossing to alleviate roadway closures. The priority ranking on this project is medium.



(east shoulder on Vulture Mine Road)



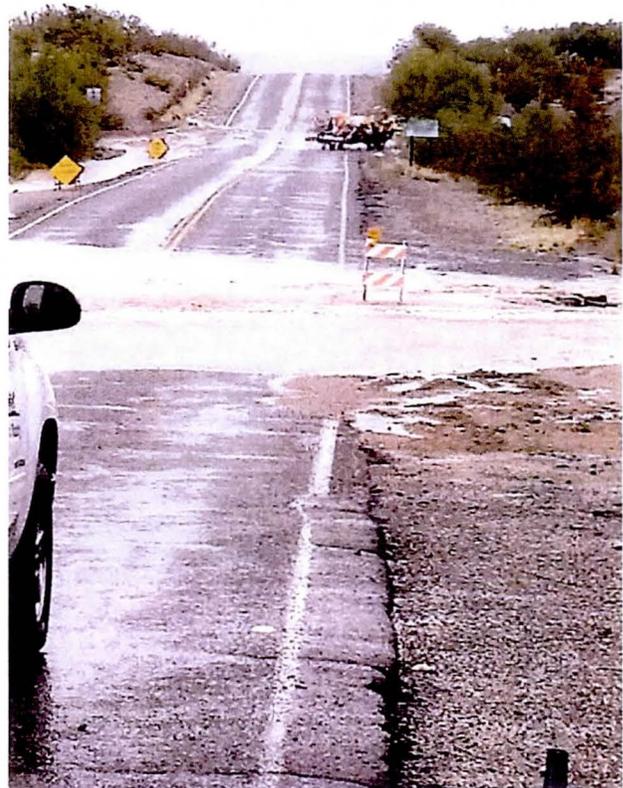
(flooded crossing at Vulture Mine Road)

Flying E Wash at Vulture Mine Road

Vulture Mine Road is one of the major roadways in Town which connects Highway 60 to Highway 93. At Flying E Wash and Vulture Mine Road, there is a low spot and multiple times in the rainy season the roadway is required to be closed due to excessive water on the pavement surface. The Town requests a box culvert designed to allow the flow to go under the roadway (instead of on top of it), as well as construction assistance. The priority ranking on this project is medium.



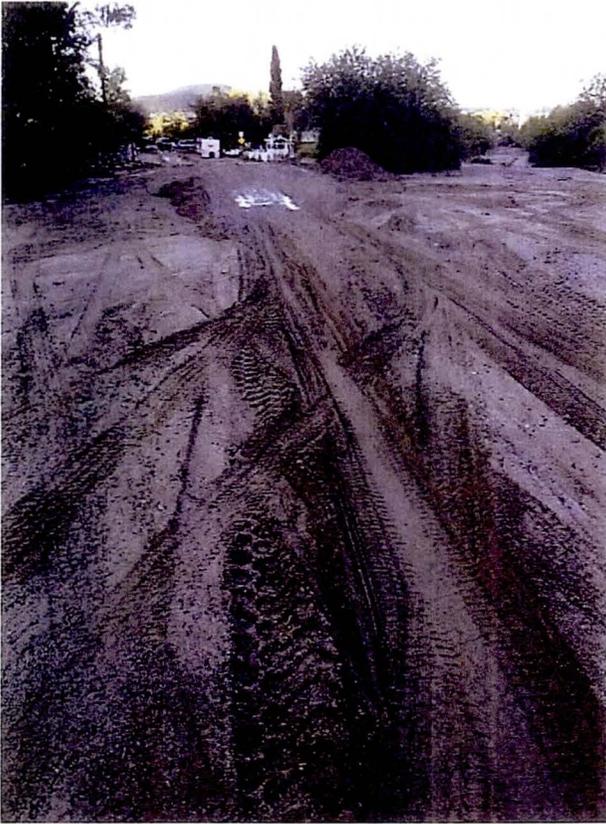
(Flying E Wash crossing on Vulture Mine Road)



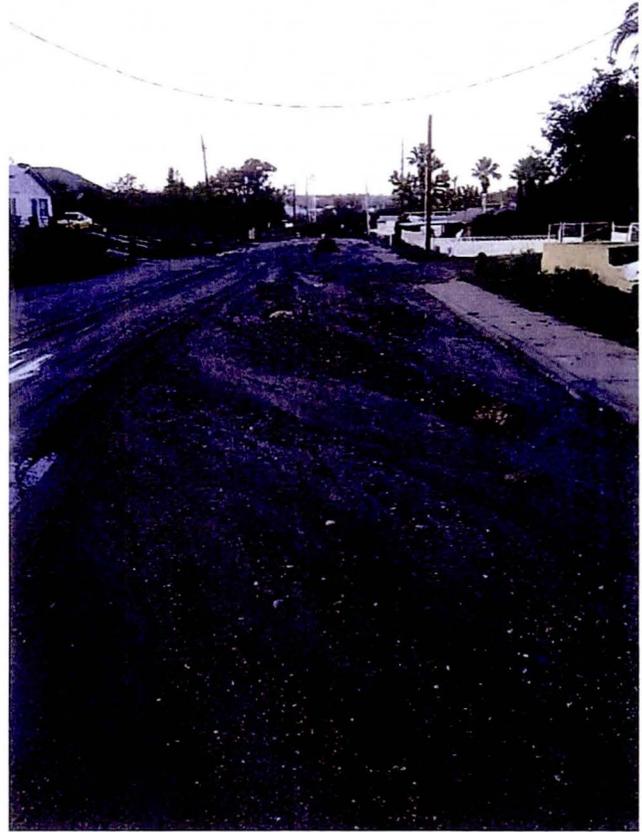
(Flying E Wash flooded on Vulture Mine Road)

Powder House Wash

Powder House Wash is located on the west side of Town. The wash crosses Constellation Road at a number of spots, but the most significant areas of concern are at the junction of Constellation Road/El Recreo Drive and the area west of the junction where Powder House Wash opens again on Constellation Road. This area has experienced some major events which have led to multiple road closures and swift water rescues for surrounding residences. The Town requests an engineered design and construction assistance with alleviating the flow hazard associated with Powder House Wash along Constellation Road and El Recreo Drive. The priority ranking on this project is high.



(El Recreo Drive & Constellation Rd. junction after monsoon)

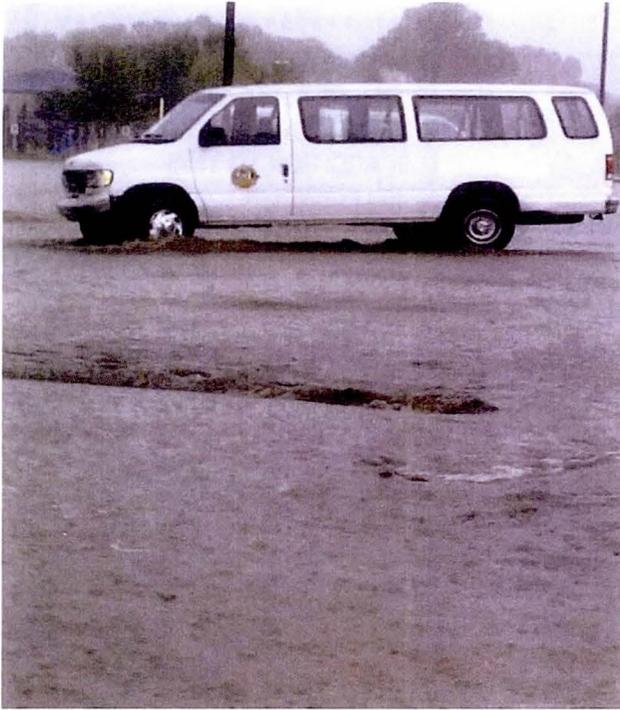


(Constellation Road after monsoon)

Hassayampa Elementary School

The Hassayampa Elementary School, located at 251 S. Tegner Street, experiences frequent flooding of the main parking lot and building. The ponding of water in the parking lot has been a hazard and nuisance for many years. The property is located on the south side of the downtown and is on the receiving end of drainage. The Town and the Wickenburg Unified School District are currently engaged in a drainage study of the area, but request assistance with a design and construction. The priority ranking on this project is high.

Mr. William D. Wiley, General Manager
RE: Flood Control Priorities
November 17, 2014
Page 4



(Elementary Parking Lot during storm)



(flow into parking lot from Valentine St.)

Thank you again for requesting information on these important flood control projects. Please do not hesitate to contact me with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Steve Boyle".

Steve Boyle
Community Development & Neighborhood Services Director

TOWN ENGINEER DAVID GUE
WILL BE MAKING A
PRESENTATION TO COUNCIL
IN ADDITION TO THIS
INFORMATION.

May 30, 2008

Mark Hannah, Public Works Director
Town of Youngtown
12030 Clubhouse Square
Youngtown, AZ 85363

RE: Connecticut Ave. Drainage and Survey Findings

Dear Mr. Hannah,

This memo is written to summarize our findings in regards to the drainage issues occurring behind the properties located at 11206 W. Connecticut Ave., 11202 W. Connecticut Ave. and the apartments located at 11129 W. Alabama Ave. Willdan investigated the elevations of the buildings and surrounding drainage structures by performing a field survey on July 31st, 2008. The survey elevations reveal that the catch basin is in a sump condition behind the aforementioned properties. It appears that the catch basin and storm drain are quickly overcome by recent storm events, with photos taken of the flooding by the one of the homeowners. The overloaded storm drain overflows between the two properties to Connecticut Avenue. It appears through observation of recent storms and photos taken during two recent events, the overflow does not convey storm water quickly enough to keep portions of the homes from flooding. Mr. Trolen is the owner of one of the residences that has flooding problems on Connecticut Ave. He recently submitted a letter to Willdan addressing his concerns and thoughts on the problems in the area. That document is attached to this memo as reference. In conversation with Mr. Trolen he also stated that the apartment complex has continual ponding over the years throughout the property. Willdan did find two drywells located on the apartment complex property. It is recommended that the owner of the complex be contacted regarding maintenance of the drywells. If the drywells have not been cleaned or maintained in several years, cleaning may help ease the burden of ponding water on that property although not a solution to the peak storm water flows.

Willdan identified three key aspects of the flooding problem when analyzing the situation. First was to look at the existing catch basin and storm drain to see if it could handle the contributing storm water flows and if any upgrades could be made to the existing system. The second was to look at increasing the storm water carrying capacity of the overflow area between the two houses and possibly outlet the ponding water at a greater rate. The third was to look at the alley to the west that connects the flooded area to 112th Drive.

1. **Existing catch basin and piping** – Hydrology calculations were performed on the area using field observations for contributing area and the Rational Method for calculation of flow. The following peak flows and volumes were determined to be impacting the catch basin for their respective storm frequency events:
10-year = 27.95 cfs, 1.75 Ac-ft or 76,230 cubic feet
25-year = 35.92 cfs, 2.14 Ac-ft or 93,184 cubic feet
100-year = 52.78 cfs, 2.74 Ac-ft or 119,354 cubic feet

The existing storm drain pipe is a 15-inch CMP with roughly 0.23% slope using elevations taken in the field at the inlet catch basin and catch basin found in the parking lot near the lake. It should be noted that no manholes could be located at bends in the storm drain nor as-builts located to determine the exact installed slope for the entire run of pipe. Using the above numbers the full flowing capacity of storm drain pipe using the Manning's Equation is roughly 1.62 cfs. This pipe when completely clean and flowing full can only handle 6% of the 10-year event and 3% of the 100-year event. Even if the Town were to look into cleaning the pipe and placing manholes on the bends for maintenance, it would still not be able to handle the storm water flows imposed upon it. Other options for mitigating flooding would need to be analyzed. It is also identified that the storm drain pipe exits to the Youngtown Town Lake under water, and the effects of tailwater on the piping system were not analyzed due to unknown piping layout and elevations.

2. **Enlarging drainage conveyance between homes** – The top or curb at the sump catch basin behind the homes is an elevation of 33.37 relative to a top of curb elevation on Connecticut Ave. of 33.03. This is 0.35 feet of fall over approximately 120 feet between the two points. This provides a maximum of 0.29 % slope between the houses when graded out. Assuming a full 20 foot wide triangular swale, Manning's Equation was again used to determine the maximum flow capacity in this area, calculation attached. The capacity in this channel is a maximum of 1.59 cfs, flowing from finish floor to finish floor. This is still well under the 10-year event flow of 27.95 cfs and the house lawns fencing landscaping would need to be torn out to grade the swale. This did not present itself as the solution to the problem especially since some of the grading would need to take place on private property and require temporary construction easements.
3. **Opening drainage conveyance of alley to 112th Drive.** – The third and final option analyzed would be to remove and lower the alley grade to west out 112th Drive as requested by Mr. Trolen in his letter to Willdan. It has been suggested by residences in the area that the installation of alley paving in 2002 may have caused the flooding to take place. Willdan was able to locate a design plan done by Brooks, Hersey and Associates (BHA) in 2002 which re-graded the alley. The plans existing survey shows that the catch basin was located in a sump in 2002 prior to the alley work taking place. It also shows an existing hump between the catch basin and 112th Drive proving that the alley did not drain to 112th Drive prior to 2002. Whether it ever drained to the west is not known to Willdan or any Town employees at the time of this study. The BHA plans actually called for the lowering of the hump between the catch basin and 112th Drive but did not remove it completely.

If the hump were to be removed from the alley for drainage, the curb and gutter along 112th Dr. would still be higher than the existing catch basin grate and roughly equal to the top of curb elevation at the catch basin. This means that a portion of the alley would still flow to the catch basin which would still be in a sump condition. Water would still pond slightly until it reached sufficient elevation to begin backflow out to 112th Ave and then down to Connecticut Ave.

Assuming that the water had ponded to sufficient depth to backflow and the alley re-graded, a Manning's calculation was used to determine conveyance. The flow was calculated assuming a re-graded alley for the first 100-feet of alleyway and water ponded to the adjacent home finish floors to determine a maximum possible flow conveyance, calculation attached. The calculation determined that roughly 5.52 cfs can be conveyed

through the new cross section. This does not by any means convey enough water to completely solve the drainage issue but does alleviate some of the stress placed on the properties. It also provides an additional overflow point for the area.

Conclusion

While none of these options provide a clear solution to the problem, it is recommended that the alleyway be re-graded to allow additional storm water to reach the streets. This is a relatively inexpensive option that can mitigate some of the impact of storm water until a more long term solution can be initiated. Without major reconstruction of the storm drain it appears difficult if not impossible to correct the flooding problem. Connecticut Ave. is nearly flat from 111th Ave. to the lake, which means regrading of the roadway would not be able to increase flow characteristics by much. This would also be an extremely expensive proposition. Raising the foundations of the homes by mud jacking or similar operation is also very expensive and has large impacts on the home owners.

One reasonable solution would be to try and find funding to increase the size of the storm drain along Connecticut Ave. While this would be an expensive project to build it would ultimately alleviate the drainage problems in the area. This option would need to be studied to see if the lake is capable of handling these flows along with all the other areas of Youngtown currently draining to it. Drainage from the lake out to the river may need to be introduced as a part of that project in order to make the whole system work.

Willdan is pleased to present the Town with these findings and recommendations. Please let us know if you require anything else. Thank you.

Sincerely,

Nick Bernoski, P.E.
Willdan Engineering

cc: Grant Anderson, P.E., Division Manager
David Gue, P.E. Supervising Engineer
James Paustian, P.E., R.L.S., Project Manager