



EcoPlan Associates, Inc.
Environmental Science & Resource Economics

Transmittal

Date: October 26, 2010
To: Donna M. Meyer, Federal Emergency Management Agency
Copy: Shahir A. Safi, City of Mesa Engineering Design
From: Leslie J. Stafford
Mesa Number: 01-745-001
EcoPlan Number: 10-310
Project Name: Mesa Fire Station No. 219 Draft Environmental Assessment
Regarding: Draft Environmental Assessment–Second Submittal

Comments: Attached is the second submittal of the Draft Environmental Assessment for this project. This document was revised based on your comments on July 22, 2010, and incorporates the Federal Emergency Management Agency's Eight-step Planning Process for Floodplains and Wetlands and the results of the hydrology and hydraulics analysis.

In response to your question on the potential habitat for the Tucson shovel-nosed snake, there is no need to contact the U.S. Fish and Wildlife Service because this species is not currently protected under the Endangered Species Act. No change was made to the document regarding this comment.

Please provide comments as appropriate or verify that no changes will be needed prior to public distribution.

Draft Environmental Assessment

City of Mesa Fire Station No. 219

Mesa, Arizona

FEMA Grant No. EMW-2009-FC-00917R

City of Mesa Capital Improvement Project No. 01-745-001

November 2010



FEMA

Prepared for:

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LIST OF ACRONYMS

AAC	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
AFG	Assistance to Firefighters Grant
AGFD	Arizona Game and Fish Department
AZPDES	Arizona Pollutant Discharge Elimination System
BG	Block Group
BMPs	Best Management Practices
CFR	Code of Federal Regulations
CO	carbon monoxide
CT	Census Tract
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Phase I Environmental Site Assessment
FEMA	Federal Emergency Management Agency
GCR	General Conformity Rule
HUD	U.S. Department of Housing and Urban Development
ISO	Insurance Services Office
L _{dn}	day-night average sound level
MFD	Mesa Fire Department
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO ₂	nitrogen dioxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O ₃	ozone
PM _{2.5}	particulate matter less than 2.5 microns in diameter
PM ₁₀	particulate matter less than 10 microns in diameter
PPC	Public Protection Classification
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SRP	Salt River Project
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
Waters	Waters of the United States

1.0 INTRODUCTION

1.1 Project Authority

Assistance to Firefighters Grants (AFG) are administered by the U.S. Department of Homeland Security Federal Emergency Management Agency (FEMA) and provide financial assistance to fire departments to build new or modify existing fire stations to enhance their response capability and protect the community they serve from fire and fire-related hazards. The authority for AFG is derived from the American Recovery and Reinvestment Act of 2009 (Public Law 111-5). Congress appropriated a total of \$210 million for the Fiscal Year 2009 program. The primary goal of the program is to provide a coordinated effort to stimulate the economy while strengthening homeland security preparedness, and to support fire organizations lacking the tools and resources necessary to effectively protect the health and safety of the public, and their emergency response personnel with respect to fire and all other hazards. The City of Mesa has been awarded FEMA Grant No. EMW-2009-FC-00917R for the construction of its proposed Fire Station No. 219 to meet service demand and to improve response times in the southeastern part of the City of Mesa, Arizona.

Prior to approving funds, FEMA is required to consider potential environmental impacts on the quality of the human environment that would result from Grantee proposals. This Draft Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the President's Council on Environmental Quality regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508), and FEMA regulations implementing NEPA (44 CFR Part 10). Based on the results of the environmental assessment process, FEMA will determine whether to prepare an Environmental Impact Statement or a Finding of No Significant Impact.

1.2 Project Location

Fire Station No. 219 would be located at 3361 S. Signal Butte Road, between Elliot Road and Guadalupe Road, in Mesa, Arizona (Figure 1). The project area is approximately 2.6 acres and has not been previously developed. The fire station would include a one-story building containing a three-bay apparatus. The facility would also include parking areas, driveways, and landscaped retention areas. This project is located in Section 12, Township 1 South, Range 7 East on the Desert Well, Arizona, U.S. Geological Survey 7.5-minute topographic series map.

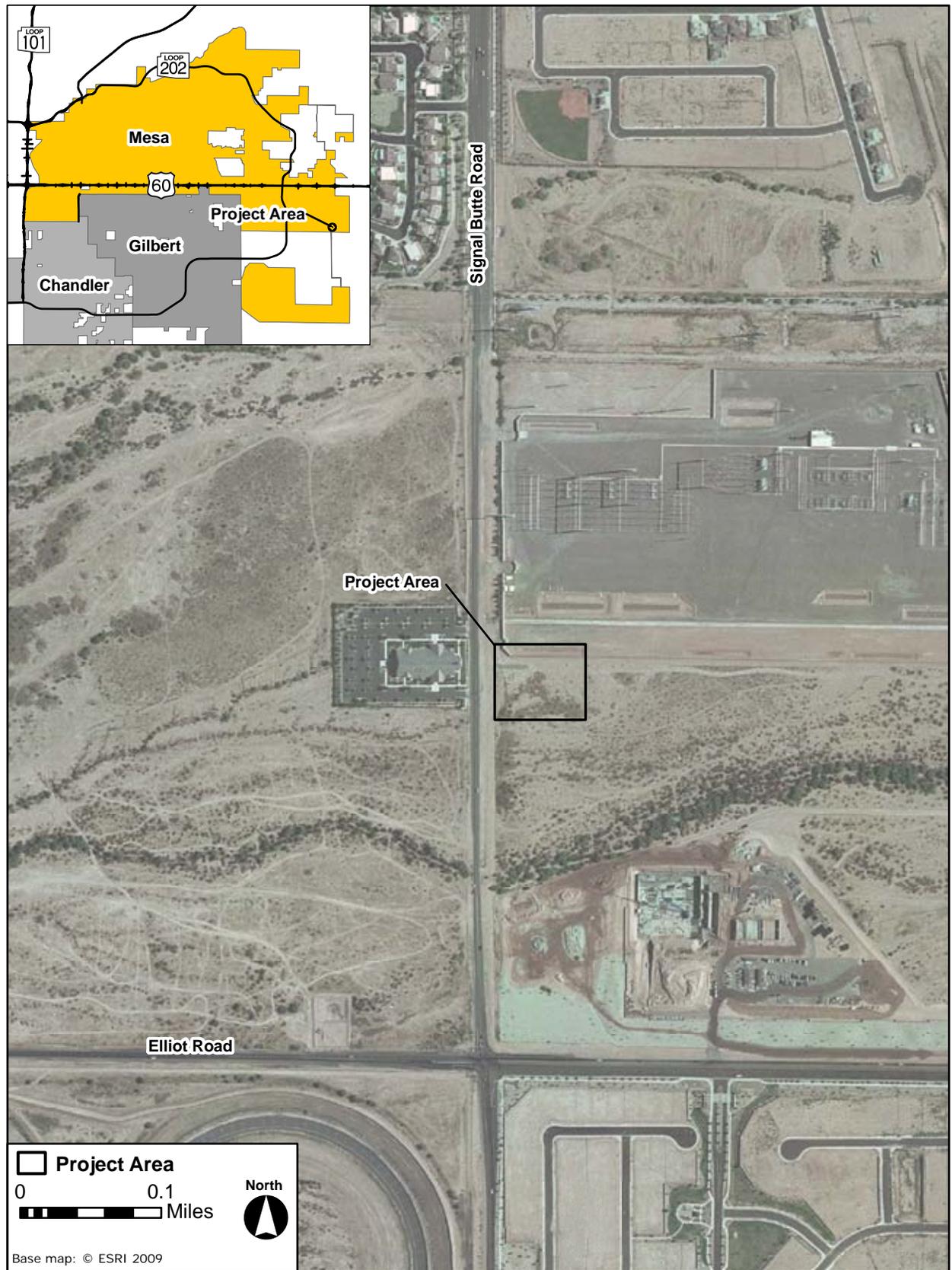


Figure 1. Project area.

2.0 PURPOSE AND NEED

The purpose and need for the project is to address increasing population growth and associated demand for firefighting capabilities in the City of Mesa. The Mesa Fire Department (MFD) protects a population in excess of 464,000 over an area of 137 square miles. Seventeen fire stations currently cover the City, and the MFD operates 19 fire engines and 26 other emergency vehicles. Due to population growth and associated increased demand, the independent Insurance Services Office (ISO) rating for firefighting capability, or Public Protection Classification (PPC), for the City of Mesa dropped from PPC 2 to PPC 3 in 2007. PPC 1 represents exemplary firefighting protection; PPC 10 represents fire-suppression programs that do not meet ISO minimum standards. The downgrade was due to City growth and the inability of the MFD to strategically expand to meet service demand. According to the ISO survey, five additional fire stations would be needed within the City to reestablish a PPC rating of 2. Eleven additional fire stations would be needed to reach a PPC rating of 1.

The defined service area for Fire Station No. 219 has been identified as one of two within the City of Mesa with the most critical need for locating a new fire station. The nearest existing fire station (No. 217) is approximately 2 miles away. From 2000 to 2008, the Fire Station No. 219 coverage area grew approximate 4 square miles; moreover, the population grew by more than 67,000 residents. From 2005 to 2008, the call volume in Fire Station No. 219's first due response area doubled. This led to an 85 percent increase in response times over 5 minutes, which exceeds the National Fire Protection Association standard. From 2008 to present, emergency units in the area of Fire Station No. 219 have arrived on scene in less than 5 minutes only 16 percent of the time. The MFD's target is to achieve an average response time of 4 minutes or less. The area that would be served by this fire station is considered high risk due to dense residential development, including an anticipated 3,000-acre master-planned community. The area is also planned for other future residential, industrial, and commercial development. Fire Station No. 219 is needed to address the increased service demand, reduce average response times, and increase safety for firefighting and emergency medical services personnel and operations in the project area. This fire station would also serve as a backup to Phoenix-Mesa Gateway Airport and would serve as a second due unit under an automatic aid agreement with the towns of Gilbert, Apache Junction, and Queen Creek.

3.0 ALTERNATIVES

3.1 No Action

Under the No Action alternative, Fire Station No. 219 would not be constructed. The area surrounding its proposed location would continue to be serviced by other fire stations—primarily the nearest fire station (No. 217), which is approximately 2 miles away. This would result in average response times in excess of 5 minutes and, therefore, would not meet the target 4-minute average response times needed to provide adequate emergency services to the area.

3.2 Proposed Action

The Proposed Action is the use of FEMA Grant No. EMW-2009-FC-00917R for the construction of City of Mesa Fire Station No. 219 at 3361 S. Signal Butte Road, between Elliot Road and Guadalupe Road, in Mesa, Arizona. The fire station would be constructed on a 2.6-acre previously undeveloped site in an urbanizing part of the City of Mesa. Adjacent land uses are

undeveloped desert areas, a church, and a Salt River Project (SRP) substation. Surrounding areas include residential subdivisions and a wastewater treatment plant operated by the City of Mesa. Appendix A includes photos that show the current site conditions.

The fire station would be built for 24-hour staffing 365 days a year and would consist of a one-story, 12,020-square-foot building with a three-bay station and living quarters, exercise and laundry facilities, a decontamination room, a kitchen, a community/training room, men's and women's public restrooms, and a dayroom. The station would have gas and electrical utilities, including solar thermal water heaters and solar photovoltaic panels, and a backup generator powered by natural gas. The facility would include parking areas, driveways, and landscaped retention areas. Traffic signals would be installed on Signal Butte Road near the proposed fire station to control northbound and southbound traffic during emergency calls. Copies of the site and traffic signal plans are included in Appendix B.

Construction is anticipated to start in February 2011 and be completed by February 2012 and would involve grading; construction of building, parking, and retention areas; and trenching and installation of utilities. Construction staging would occur on-site, and any fill material required would be obtained from an approved off-site source.

3.3 Alternatives Considered But Eliminated

The City of Mesa identified the defined service area for Fire Station No. 219 and searched within this area for potential sites for construction of the facility. Roughly described, the defined service area is a diamond-shaped area extending from a point 0.75 mile north of Guadalupe Road to 1.25 mile south of Elliot Road, and from approximately 0.5 mile west of the alignment of Crimson Road to approximately 0.5 mile east of the Maricopa/Pinal county line, or Meridian Road (Figure 2).

One primary screening consideration in the site evaluation process was the availability of vacant land. Lands previously developed or actively planned for future development were not considered feasible and were eliminated from consideration. In the defined service area, a majority of the land has been developed, is currently under development, or is being actively planned for development. The northern and southern thirds of the defined service area fall into this category and were eliminated from consideration. An additional consideration was jurisdiction. The land east of Meridian Road within the defined service area is outside City of Mesa jurisdiction and in Pinal County. For this reason, these lands were also eliminated from consideration. This initial screening resulted in the identification of a half-mile-wide strip of primarily vacant land potentially available for siting Fire Station No. 219 (Figure 2). The southern limit of this strip of land is Elliot Road.

Potential sites within this strip of land were then evaluated with regard to two other important considerations. The first is the location within the defined service area. The closer the site is to the center, the better for optimal emergency response times.

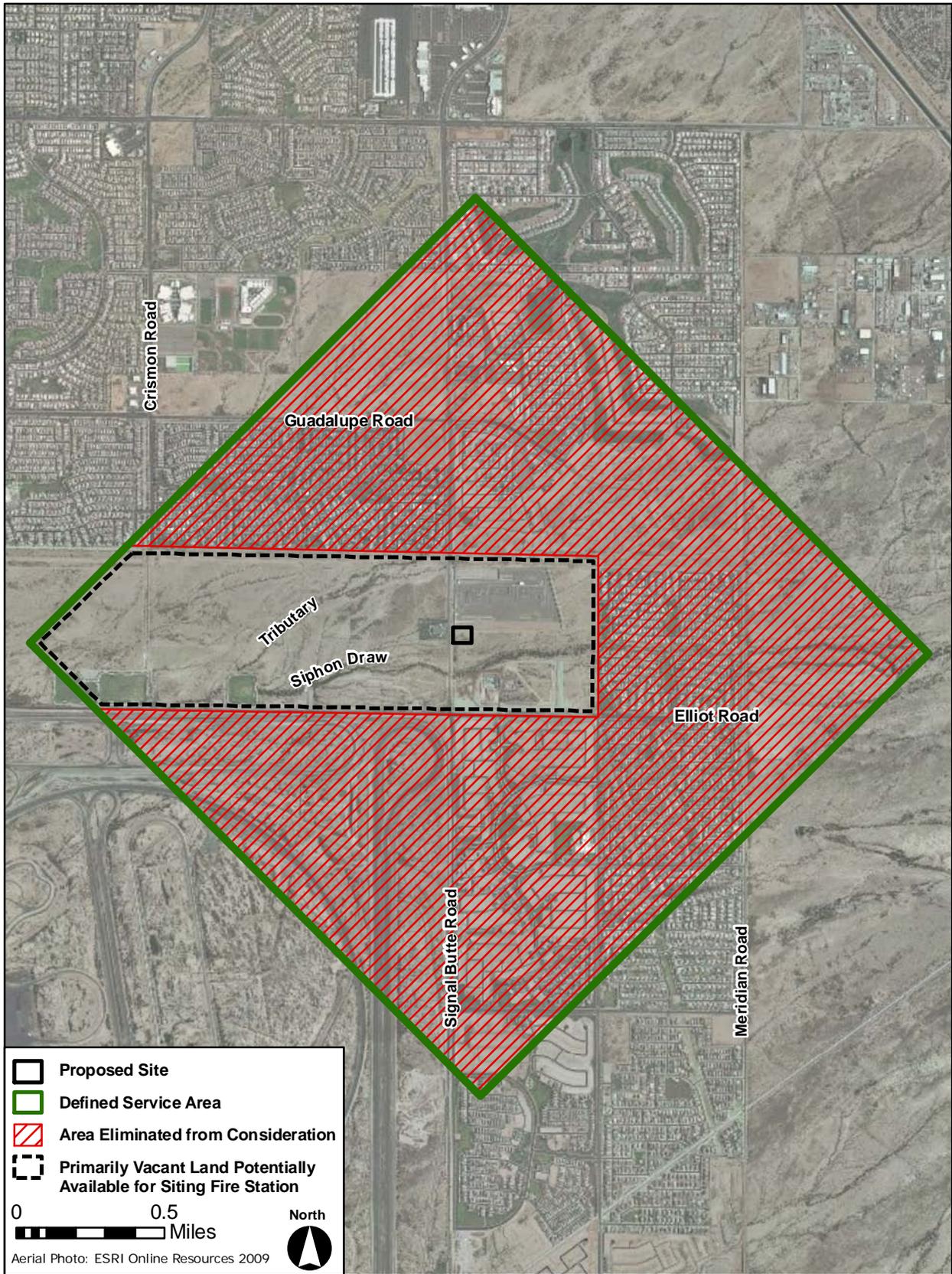


Figure 2. Defined service area for Fire Station No. 219.

The second consideration relates to whether direct access to a major arterial could be provided—another important consideration to optimize emergency response times. Sites that would front Signal Butte Road in this area would meet this criterion. The defined service area in its entirety falls within an area of “possible but undetermined flooding,” or Zone D. Therefore, any site within the defined service area, including the Proposed Action, could be subject to flooding and would necessitate the completion of hydrologic and hydraulic studies as part of FEMA’s eight-step process (Section 4.2.3, Floodplains).

The site of the Proposed Action is expected to fall within the floodplain of Siphon Draw. Similar to the Proposed Action, any alternative site on the west side of Signal Butte Road would be expected to fall within the floodplain of this wash, as well as an unnamed tributary. All feasible alternative sites for Fire Station No. 219 could be subjected to possible flooding without design precautions or mitigation. Table 1 compares the Proposed Action with an alternative site that would front the west side of Signal Butte Road.

Table 1. Comparison of feasible sites.

Siting Consideration	Proposed Site (East side of Signal Butte Road)	Alternative Site (West side of Signal Butte Road)
Land availability	Vacant land	Vacant land
Land ownership	City of Mesa	Private
Jurisdiction	Within City of Mesa jurisdiction; within Maricopa County	Within City of Mesa jurisdiction; within Maricopa County
Location within defined service area	Near center of defined service area—optimal location	Near center of defined service area—optimal location
Access to major arterial	Direct access to Signal Butte Road	Direct access to Signal Butte Road
Flood zone	Zone D	Zone D
Washes and drainage features present	Siphon Draw	Siphon Draw and unnamed tributary wash

With regard to improving emergency response capabilities, both the Proposed Action and the alternative site outlined in Table 1 would provide an optimal location within the defined service area for the siting of Fire Station No. 219. From these two feasible options, the proposed location was selected for Fire Station No. 219 because it is owned by the City of Mesa. The alternative site on the west side of Signal Butte Road would require land acquisition from a private party.

4.0 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

4.1 Physical Resources

4.1.1 Geology and Soils

The site is located in south-central Arizona within the Basin and Range physiographic province at the urbanizing fringe of the Phoenix metropolitan area. The project area is on a nearly flat depositional plain within the Middle Gila River watershed at an approximate elevation of 1,470 feet above mean sea level. Mesa has an arid climate and receives an annual average precipitation of about 8 inches (Western Regional Climate Center 2010).

Surface geology is described as Quaternary-aged sand, gravel, and conglomerate (Wilson et al. 1957). Soils are classified as Mohall loam, which are well-drained soils with 0 to 3 percent slope

and formed from mixed alluvium parent material (U.S. Department of Agriculture [USDA] 2010a).

The Farmland Protection Policy Act (P.L. 97-98, Sections 1539–1549; U.S. Code 4201, et seq.) was enacted to minimize the unnecessary conversion of farmland to non-agricultural uses as a result of federal actions. The Natural Resources Conservation Service (NRCS) is responsible for protecting significant agricultural lands from irreversible conversions that result in the loss of an essential food or environmental resource; this protection includes lands designated by the NRCS as important farmlands based on soil types present. The soil type in the project area (Mohall loam) is considered prime farmland if irrigated (USDA 2010a); however, the site is undeveloped and has not been used for agricultural purposes.

No Action: Because the fire station would not be constructed, the No Action alternative would have no impacts on the soils, geology, or farmland of the area.

Proposed Action: Construction of the fire station would result in removal of native vegetation and temporary disturbance of surface soils in the project area. Implementation of Best Management Practices (BMPs) identified in a Storm Water Pollution Prevention Plan (SWPPP) would minimize soil erosion until construction is complete and the site is permanently stabilized (see Section 4.2.1 Surface Water Quality).

Construction of the fire station would not result in the conversion of important farmlands to non-agricultural uses. Though soils mapped in the project area are identified by the NRCS as potentially supporting prime farmland if irrigated, according to a representative of the NRCS, the site is not supported by a dependable, adequate water supply for irrigation; therefore, the site is not subject to the Farmland Conversion Impact Rating Form AC 1006 (USDA 2010b).

4.1.2 Air Quality

The 1990 Clean Air Act, its amendments, and NEPA require that air quality impacts be addressed in the preparation of environmental documents. The U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for six “criteria” pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), sulfur dioxide, and lead. Primary and secondary standards for NAAQS have been established for most of the criteria pollutants. The EPA is authorized to designate those locations that have not met the NAAQS as non-attainment and to classify these non-attainment areas according to their degree of severity. The project area is located within portions of Maricopa County designated as non-attainment for O₃ and particulate matter (PM₁₀), and designated as a maintenance area for CO.

For non-attainment areas, states are required to formulate and submit to the EPA State Implementation Plans (SIPs), which outline those measures the state will use to attain and maintain compliance with NAAQS (40 CFR Part 51). Development of the SIP uses emission inventories for each of the nonattainment or maintenance pollutants and a baseline emission budget against which future emissions are compared; fire stations are not included in the SIP emission budgets (Maricopa County Air Quality Department 2010).

Federally funded projects are subject to the SIP and the General Conformity Rule (GCR). The GCR requires that actions taken by federal agencies in nonattainment and maintenance areas do not interfere with a state's plans to meet national standards for air quality.

No Action: Under this alternative, the fire station would not be constructed and operated. Emergency calls in the project area would be serviced by the nearest existing fire station (No. 217), approximately 2 miles away. Due to longer distances traveled, this would result in higher emergency-vehicle-related emissions compared with the Proposed Action, though emissions would be minimal relative to other mobile sources in the area.

Proposed Action: Under this alternative, short-term emissions of criteria pollutants would occur during the construction phase. Construction equipment and personal vehicles would generate exhaust emissions, including NO₂ and CO; the operation of motor vehicles on unpaved surfaces and the use of earthmoving equipment may additionally generate particulate matter. The moving and handling of soil during construction would increase the potential for emissions of fugitive dust; however, any deterioration of air quality would be a localized, short-term condition that would be discontinued when the project is completed and disturbed soils have been stabilized or permanently covered. Construction activities would be subject to Maricopa County Rule 310 and would be required to minimize fugitive dust emissions through watering, controlling entrainment of dust by vehicles, and/or other measures to reduce the disturbance of particulate matter. The Arizona Department of Environmental Quality (ADEQ) provided a list of actions designed to mitigate particulate matter impacts during construction (Appendix C). These measures have been incorporated as mitigation. Additional restrictions limiting emissions resulting from construction activities include Arizona Administrative Code (AAC) R18-2-604 through 607 and AAC R18-2-802 and 804.

During the operational phase, the transport of fire station personnel to and from the station and the station's response to emergencies would contribute to motor vehicle trips and generate air emissions, and emissions from a stationary natural gas generator at the facility would occur during periods requiring emergency backup power. The generator, rated at 415 horsepower, exceeds the de minimis value of 325 horsepower. Depending on the specific equipment selected, the generator might require a Class II operating permit (AAC R18-2-302[B][2]).

Increases in ambient concentrations of the criteria pollutants resulting from emergency and staff vehicle emission and the operation of the backup generator would be minimal. The proposed facility is expected to have no long-term adverse impacts on the air quality of the area.

Mitigation

- Based on the make and model of the backup generator procured, the City of Mesa would determine whether a Class II operating permit would be needed in accordance with AAC R18-2-302(B)(2).
- Construction activities would be subject to Maricopa County Rule 310 and would be required to minimize fugitive dust emissions through watering, controlling entrainment of dust by vehicles, and/or other measures to reduce the disturbance of particulate matter.

- During site preparation and construction, the contractor would:
 - Minimize land disturbance
 - Suppress dust on traveled paths that are not paved through wetting, use of watering trucks, chemical dust suppressants, or other reasonable precautions to prevent dust from entering ambient air
 - Cover trucks when hauling soil
 - Minimize soil track-out by washing or cleaning truck wheels before leaving the construction site
 - Stabilize the surface of soil piles
 - Create wind breaks
- During site restoration, the contractor would:
 - Revegetate any disturbed land not used with native species in accordance with Executive Order (EO) 13112
 - Remove unused material
 - Remove soil piles via covered trucks
- The contractor would comply with AAC R18-2-604 through 607 and AAC R18-2-802 and 804.

4.2 Water Resources

4.2.1 Surface Water Quality

No perennial or ephemeral streams, drainages, or other surface water features occur on the site. The project area is within the Middle Gila River watershed. Siphon Draw, a large ephemeral drainage, is located approximately 500 feet south of the site. Storm flows in the area drain westerly to the East Maricopa Floodway, which ultimately discharges to the Gila River south of the Phoenix metropolitan area.

No Action: Because the fire station would not be constructed, the No Action alternative would have no effect on surface water quality in the project area or within the watershed.

Proposed Action: Construction of the fire station would result in the removal of existing vegetation and the temporary disturbance of surface soils in the project area, temporarily increasing the potential for soil erosion and downstream sedimentation. Because the project would disturb more than 1 acre, the City of Mesa would be required to file a Notice of Intent under the Arizona Pollutant Discharge Elimination System (AZPDES) Construction General Permit and to prepare and implement a SWPPP for the project. Implementation of BMPs identified in the SWPPP would minimize potential soil erosion, sedimentation, and discharge of other pollutants until construction is complete and the site is permanently stabilized.

Landscaped retention basins included as part of the site design would control storm water discharges from the project area and minimize potential water quality impacts once the facility has been constructed.

4.2.2 *Waters of the United States, Including Wetlands*

The U.S. Army Corps of Engineers (USACE) regulates the placement of dredged or fill material into Waters of the United States (Waters) under the federal Clean Water Act (CWA). Authorization from the USACE and the ADEQ would be required under CWA Sections 404 and 401 for discharge of dredged or fill material to Waters, including wetlands. Furthermore, EO 11990 directs federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the values of wetlands. A site visit was conducted on March 22, 2010, by a biologist qualified to assess the occurrence of wetlands and other Waters. No hydrophytic vegetation or field indicators of wetland hydrology were observed on-site. Soils mapped in the project area are not identified as hydric soils by the NRCS. No drainages were observed in the project area that would be potentially considered jurisdictional Waters by the USACE. The project site does not support wetlands or other Waters; therefore, permitting under CWA Sections 404 and 401 would not be required.

No Action: Under this alternative, Fire Station No. 219 would not be constructed. Therefore, the No Action alternative would have no effect on wetlands or other Waters and would not require a Section 404 permit.

Proposed Action: The project area does not support any wetlands or other potential Waters. Therefore, construction of the fire station would have no effect on wetlands or other Waters and would not require a Section 404 permit.

4.2.3 *Floodplains*

EO 11988 (Floodplain Protection) requires federal agencies to avoid or minimize development in the floodplain except where there are no practicable alternatives. FEMA regulations related to the implementation and enforcement of EO 11988 are set forth in 44 CFR Chapter 1 (10-1-03 Edition). The project area falls within FEMA Flood Insurance Rate Map 04013C2705F, Panel Not Printed–Area in Zone D (FEMA 2005). The project area is designated as Zone D, defined as an area “in which flood hazards are undetermined, but possible.” A copy of the floodplain map is included as Appendix D.

Based on this classification, FEMA has not established flood elevations or delineated floodplains within the area. Siphon Draw is the only named drainage course that exists within the vicinity of the site. FEMA has conveyed to the City of Mesa that under FEMA regulations a fire station is considered a “critical action facility” and as such needs to be protected to the 500-year floodplain.

FEMA’s procedures for implementing EO 11988 (44 CFR 9, Section 9.6) include an eight-step planning process that decision-makers must use when considering projects that have potential impacts to or within a floodplain. This includes a determination of whether the proposed project is in the floodplain and, if so, justification for locating the project in the floodplain and identification of any means to minimize the impacts.

In summary, the eight-step planning process includes public notification of the City’s intent to build within the floodplain, consideration of practicable alternatives to siting within the

floodplain, an assessment of direct and indirect effects, and consideration of measures to minimize harm.

No Action: Because no fire station would be constructed, the No Action alternative would have no effect on floodplains.

Proposed Action: Because Fire Station No. 219 would be sited within an area of possible but undetermined flood hazard, the City of Mesa has completed FEMA's eight-step process. No comments from the public were received following publication of the notice. In addition, because FEMA has not established flood elevations or delineated floodplains at the site, a Drainage Technical Memorandum, Siphon Draw Wash, Water Surface Analysis was completed for Siphon Draw as part of the eight-step planning process. The technical memorandum concluded that the proposed fire station pad elevation would need to be set at 1,466.45 feet above mean sea level to mitigate the risk of flooding in the 500-year, 24-hour rainfall event. A summary of the eight-step planning process and a copy of the technical memorandum are included in Appendix E. Furthermore, the Proposed Action would not result in adverse impacts to the 500-year floodplain or to wetlands and, therefore, no additional measures to minimize harm were required.

Mitigation

- The fire station pad elevation would be set at 1,466.45 feet above mean sea level to mitigate the risk of flooding in the 500-year, 24-hour rainfall event.

4.3 Biological Resources

4.3.1 Flora and Fauna

The project area occurs within the Lower Colorado River subdivision of the Sonoran desertscrub biome. The plant community on the site is described as Creosotebush-Bursage Association and is dominated by creosote bush (*Larrea tridentata*), triangle-leaf bursage (*Ambrosia deltoidea*) and annual grasses and forbs. Siphon Draw, approximately 500 feet south of the site, supports desert riparian (xeroriparian) vegetation dominated by paloverde (*Parkinsonia* spp.) and mesquite (*Prosopis velutina*). No protected native plants (desert trees and cacti) occur on the site. No xeroriparian habitat occurs on the site, and wildlife habitat is limited due to the sparse nature of the vegetation and surrounding residential, infrastructure, and other development. Wildlife using the site is expected to be limited due to these factors but may include some invertebrates, rodents, and other small mammals, and some native birds. Siphon Draw provides higher habitat value for these species due to greater density and diversity of vegetation. A field investigation was conducted in the project area on March 22, 2010, to determine the potential presence of Western burrowing owls (*Athene cunicularia hypugaea*), a species protected under the Federal Migratory Bird Treaty Act. No burrowing owls or potential nesting or roosting sites were observed.

No Action: The No Action alternative would have no effect on flora or fauna in the project area because the site would not be developed for the proposed fire station.

Proposed Action: Construction of the fire station would result in the permanent modification and development of 2.6 acres of Sonoran desertscrub vegetation and associated wildlife habitat.

Perennial plant species such as creosote bush and triangle-leaf bursage would be removed. Construction and operation of the fire station would render xeroriparian habitat along Siphon Draw less suitable for native wildlife, though wildlife habitat values are already reduced by the presence of the SRP substation, the existing church, the surrounding residential development, and traffic on Signal Butte Road. Due to the potential for burrowing owls to move into the site prior to construction, preconstruction surveys will be conducted.

Mitigation

- The City of Mesa shall contract a biologist to complete a preconstruction survey for burrowing owls 96 hours prior to construction in areas to be disturbed. The biologist shall possess a burrowing owl survey protocol training certificate issued by the Arizona Game and Fish Department. The biologist shall report the results to the City of Mesa.
- If any burrowing owls are located during preconstruction surveys or construction, the City of Mesa shall contract with a biologist holding a permit from the U.S. Fish and Wildlife Service to relocate burrowing owls from the project area, as appropriate.
- If burrowing owls or active burrows are identified during the preconstruction surveys or during construction, no construction activities shall take place within 100 feet of any active burrow until the owls are relocated.

4.3.2 *Threatened, Endangered, and Candidate Species and Critical Habitat*

The U.S. Fish and Wildlife Service (USFWS) list of threatened, endangered, and candidate species for Maricopa County (USFWS 2010a) was reviewed by a biologist qualified to determine which listed species may occur in the project vicinity (Table 2). FEMA requested the USFWS to concur with a finding of no effect on listed endangered or threatened species for the project (Meyer [FEMA] to Spangle [USFWS], November 30, 2009) (Appendix C). The USFWS responded with concurrence and stated that no further review is required (Spangle [USFWS] to Meyer [FEMA], June 21, 2010) (Appendix C).

Information regarding the presence of special status species was requested from the Arizona Game and Fish Department (AGFD) through its On-line Environmental Review Tool and through correspondence (Appendix C). The AGFD On-line Environmental Review Tool indicated no known records of any special status species within 3 miles of the project area (Appendix F).

Table 2. USFWS listed species in Maricopa County and evaluation of effects.

Common Name	Scientific Name	Status	Suitable Habitat Present?	Occupied Habitat Present?	Critical Habitat Present?	Species Affected?	Critical/Suitable Habitat Affected?
Arizona cliffrose	<i>Purshia subintegra</i>	E	No	No	No	No	No
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	No	No	No	No	No
California least tern	<i>Sterna antillarum browni</i>	E	No	No	No	No	No
Desert pupfish	<i>Cyprinodon macularius</i>	E	No	No	No	No	No

Table 2. USFWS listed species in Maricopa County and evaluation of effects.

Common Name	Scientific Name	Status	Suitable Habitat Present?	Occupied Habitat Present?	Critical Habitat Present?	Species Affected?	Critical/Suitable Habitat Affected?
Gila topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	E	No	No	No	No	No
Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuena</i>	E	No	No	No	No	No
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T	No	No	No	No	No
Razorback sucker	<i>Xyrauchen texanus</i>	E	No	No	No	No	No
Roundtail chub	<i>Gila robusta</i>	C	No	No	No	No	No
Sonoran pronghorn	<i>Antilocapra americana sonoriensis</i>	E	No	No	No	No	No
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E	No	No	No	No	No
Tucson shovel-nosed snake	<i>Chionactis occipitalis klauberi</i>	C	Yes	Not known	No	No	No
Woundfin	<i>Plagopterus argentissimus</i>	E	No	No	No	No	No
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C	No	No	No	No	No
Yuma clapper rail	<i>Rallus longirostris yumanensis</i>	E	No	No	No	No	No

C = Candidate, E = Endangered, T = Threatened (USFWS 2010a)

Potentially suitable habitat occurs in the project area and its immediate vicinity for the candidate Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*). The USFWS has determined that listing of this species as threatened or endangered with critical habitat is warranted but precluded by other higher-priority actions (USFWS 2010b). The project area occurs within the reported historic range of this species, though there are no recent or historic records from the project vicinity. Habitat for the Tucson shovel-nosed snake is described as “more productive creosote-mesquite floodplain environments” with soft, sandy loam soils, and sparse gravel (USFWS 2010b). A habitat ranking model has been developed for this species that incorporates elevation, vegetation, soils, and slope (Center for Biological Diversity 2004). Based on this model, the site ranks relatively high as potential habitat for the Tucson shovel-nosed snake, though there are no records in the project vicinity and the area is likely marginal due to the degree of development and associated fragmentation of potential habitat.

No Action: The No Action alternative would have no effect on threatened, endangered, or candidate species or designated critical habitat because the fire station would not be constructed on the site.

Proposed Action: There are no known records of threatened or endangered species in the project area, and there is no suitable or designated critical habitat for any listed species. Therefore, construction and operation of the proposed fire station under this alternative would have no effect on threatened or endangered species or designated critical habitat.

Construction of the fire station would result in the removal, through development, of 2.6 acres of potential habitat for the candidate Tucson shovel-nosed snake.

4.4 Historic Properties

Cultural resources are properties that reflect the heritage of local communities, states, and nations. Properties judged to be significant and to retain sufficient integrity to convey that significance are termed “historic properties” and are afforded certain protections in accordance with federal legislation. In addition to review under NEPA, consideration of effects to historic properties is mandated under Section 106 of the National Historic Preservation Act (NHPA), as amended. The NHPA defines historic properties as sites, buildings, structures, districts, and objects included on, or eligible for inclusion on, the National Register of Historic Places (NRHP), as well as the artifacts, records, and remains related to such properties. “Traditional cultural properties” having heritage value for contemporary communities (often, but not necessarily, Native American groups) also can be listed on the NRHP because of their association with historic cultural practices or beliefs that are important in maintaining the cultural identities of such communities.

Regulations for *Protection of Historic Properties* (36 CFR Part 800), which implements Section 106, were most recently amended in 2004. These regulations define a process for responsible federal agencies to consult with the State Historic Preservation Office (SHPO), Native American groups, other interested parties, and, when necessary, the Advisory Council on Historic Preservation to ensure that historic properties are duly considered as federal projects are planned and implemented.

4.4.1 Historic

FEMA defined the area of potential effects as the 2.6-acre parcel proposed for construction of the fire station, but it also conducted a search of the NRHP in the vicinity of the parcel. This parcel had been surveyed intensively for archaeological sites as part of a larger City of Mesa action (Schroeder 2002). No NRHP-eligible or ineligible archaeological sites were recorded or identified as a result of the survey nor are there any NRHP-listed properties near the proposed construction site. FEMA consulted with the Arizona SHPO, provided the information presented here, and made a determination of “no historic properties affected” pursuant to 36 CFR Part 800.4(d) (1) (Meyer [FEMA] to Garrison [SHPO] December 18, 2009, and SHPO concurred (Medley [SHPO] to Meyer [FEMA] January 11, 2010 (Appendix C).

4.4.2 Resources Important to Native Americans

In addition to consulting with the Arizona SHPO, Donna M. Meyer, Deputy Environmental and Historic Preservation Officer for FEMA, distributed letters dated February 5, 2010, to eight Native American tribes: the Ak-Chin Indian Community, the Fort McDowell Yavapai Nation, the Gila River Indian Community, the Salt River Pima-Maricopa Indian Community, the San Carlos Apache Nation, the Tohono O’odham Nation, the Yavapai-Apache Nation, and the

White Mountain Apache Tribe. The tribes were asked to provide comments regarding historic properties “including those of traditional religious and cultural importance” and to participate in the resolution of any adverse effects. No responses were received.

No Action: Under the No Action alternative, there would be no construction and no impacts to historic or cultural properties.

Proposed Action: Construction of the proposed fire station would not impact any historic or cultural properties.

4.5 Socioeconomic Resources

4.5.1 Environmental Justice

Title VI of the Civil Rights Act of 1964 ensures that individuals are not excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of race, color, and national origin. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs that federal programs, policies, and activities do not have disproportionately high and adverse human health and environmental effects on minority and low-income populations.

The data used for this Environmental Justice analysis were taken from the 2000 Census (U.S. Census Bureau 2000). Data specific to the project area at the Block Group (BG) level were evaluated. The construction footprint for the Proposed Action falls within Census Tract (CT) 4226.01, BG 1. The City of Mesa and Maricopa County were used as comparison populations to determine whether the selected BG contained concentrations of minority populations or persons living below the poverty level.

For the purpose of environmental justice evaluations, a racial or ethnic minority population is an aggregate composed of the following categories: Black/African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Other Races, Two or More Races, and Hispanic. Table 3 lists the aggregate of these minority populations in the selected BG. Data from the 2000 Census indicate that minority populations occur in the selected BG. The percentage of minorities for CT 4226.01, BG 1 (19.4 percent) is lower than the corresponding percentages for the City of Mesa (27 percent) and Maricopa County (33.8 percent).

The U.S. Department of Health and Human Services poverty guideline is an income of \$16,700 for a family of four in 1999. Data from the 2000 Census indicate that individuals living below the poverty level reside in the selected BG. As shown in Table 3, the percentage of persons living below the poverty level for CT 4226.01, BG 1 (4.1 percent) is lower than the corresponding percentage in the comparison populations of the City of Mesa (8.9 percent) and Maricopa County (11.8 percent).

Based on this analysis, the selected BGs do not reflect percentages that are meaningfully higher than the comparison populations; therefore, the selected BGs are not considered to have populations that would be disproportionately affected by the project.

Table 3. 2000 total minority and below poverty level populations.

Area	Total Population	Total Minority ^a		Total Population for Whom Poverty Is Determined	Below Poverty Level	
		#	Percent		#	Percent
CT 4226.01, BG 1	4,132	802	19.4	4,113	169	4.1
City of Mesa	397,215	107,124	27.0	392,911	35,031	8.9
Maricopa County	3,072,149	1,038,729	33.8	3,027,299	355,668	11.8

^a “Total Minority” is composed of all people who consider themselves Non-White racially plus those who consider themselves White Hispanic.

No Action: The No Action alternative would have no direct impacts on minority or low-income populations because no construction would occur. As the area continues to develop, all nearby residents would be affected equally by the distance fire department personnel have to travel to reach the area.

Proposed Action: Construction of the fire station under this alternative would result in quicker response times by fire personnel to the surrounding neighborhoods. This alternative would have an equally beneficial impact on nearby residents, including minority populations and persons living below the poverty level.

4.5.2 Noise

Noise is considered unwanted sound and is typically measured in decibels (dB). The day-night average sound level (L_{dn}) is the 24-hour average sound level, in dB, obtained after the addition of 10 dB to the sound levels occurring between 10 p.m. and 7 a.m. (nighttime hours), and it is used by agencies for estimating sound impacts and establishing guidelines for compatible land uses. U.S. Department of Housing and Urban Development (HUD) regulations set acceptable noise levels at 65 L_{dn} or less (24 CFR Part 51, Subpart B). The Noise Ordinance for the City of Mesa establishes a 24-hour equivalent sound level for residential areas at 60 A-weighted decibels (dBA) (City of Mesa 2009). Unlike the HUD standard, the City of Mesa ordinance does not add 10 dB to sound levels occurring during nighttime hours. Adding 10 dB to the City standard during nighttime hours would result in a 66 dBA L_{dn} 24-hour acceptable noise level.

The EPA identifies a 24-hour exposure level of 70 dB as the level of environmental noise that will prevent any measurable hearing loss over a lifetime and noise levels of 55 dB outdoors and 45 dB indoors as preventing activity interference and annoyance (e.g., spoken conversation, sleeping, working, recreation) (EPA 1974). The levels identified represent averages over long periods of time rather than single events or “peak” levels.

Noise-sensitive receptors are land uses associated with indoor or outdoor activities that may be subject to stress or substantial interference from noise. These generally include residences, hotels/motels, nursing homes, schools, and libraries. At a sound level of 115 dBA at 10 feet for a siren and a standard attenuation rate of six dBA per doubling of distance, siren noise from fire trucks leaving the fire stations would be attenuated to the 65 dBA HUD standard within approximately ½ mile of the source. Locations most affected by fire truck sirens would be those around the fire station (within ½ mile) and along Signal Butte Road to the first main arterial intersections to the north and south (Guadalupe Road and Elliot Road, respectively). Noise-sensitive receptors within this distance are limited to a church directly on the other side of Signal Butte Road and a residential subdivision on the west side of Signal Butte Road north of

the church and extending north to Guadalupe Road. Additional residential development is proposed at the southeast corner of Signal Butte Road and Elliot Road.

Local traffic contributes to the existing noise environment, primarily during the morning (6 a.m. to 9 a.m.) and evening (4 p.m. to 6 p.m.) peak periods. Peak-hour traffic on Signal Butte Road, estimated from 2007 Maricopa Association of Governments traffic counts, is approximately 1,080 vehicles per hour. Peak-hour vehicles traveling at the posted speed of 35 miles per hour generate approximately 60 dBA at a distance of 300 feet from the roadway assuming no shielding from structures such as building and privacy walls.

No Action: The No Action alternative would result in no noise-related impacts because the new fire station would not be constructed.

Proposed Action: Construction of the fire station under this alternative would result in short-term increases in noise levels from construction equipment and activities. Construction activities would be limited to daylight hours and, therefore, would not affect ambient noise levels at night in surrounding residential areas.

Once the fire station is operational, there would be a long-term increase in traffic and siren noise from emergency response personnel and activities. Siren noise from fire trucks leaving the facility would result in occasional peak noise events of up to 115 dBA at the source that would be the dominant noise source even during peak traffic hours but would be attenuated over distance. This would primarily affect noise-sensitive receptors within ½ mile of the source in the identified analysis area; these receptors consist of a church and residences along the west side of Signal Butte Road. These peak noise events would be short in duration and infrequent, and they would not be expected to result in exceedance of EPA or HUD 24-hour exposure levels or violate the City ordinance. Activation of sirens on emergency vehicles leaving the fire station has the potential to result in disruption of church services, though this would be temporary in nature and infrequent (limited to occasions when emergency calls and church services coincide).

EPA, HUD, and City standards do not apply to emergency vehicles; therefore, noise abatement standards and methods have not been established for fire truck sirens and horns. Some municipalities and fire companies have developed policies to limit the impact of emergency vehicle response on the community.

MFD apparatus are built to National Fire Protection Agency Standard 1901, which recommends that engine noise for trucks operating at 45 miles per hour should not exceed 80 decibels. Fire Station No. 219 will contain a traffic signal and an 8-foot-high concrete masonry unit perimeter wall to help mitigate engine/siren noise. As a standard practice with a control signal, sirens are not put into operation until the vehicle completes its first directional turn and encounters traffic. Normally from 8 p.m. to 8 a.m. and depending on traffic flow, sirens are not placed into operation until the apparatus approaches a major intersection or approaching traffic traveling in the same direction. It is also standard practice to shut sirens off while making the turn off a main street and entering a residential neighborhood.

MFD dispatch triages and dispatches 911 calls as Code 2 (without lights and sirens) and Code 3 (with lights and sirens), so not every call will require siren operation. The company officer also has the ability to determine the response type.

The fire apparatus is checked each morning and will undergo a pump test for approximately 1–2 minutes; therefore, the engine will run at a higher idle for a short period of time. The check is normally performed at the rear of the station, where landscaping and fencing reduced engine noise. A siren check is required, but the sirens are tested during the first call, so they are not turned on while the apparatus is in the station.

Though some members of the public participating in the public meeting for Fire Station No. 219 expressed concern about fire station-generated noise, MFD representatives responded by describing the previously noted standard operating policies designed to limit noise. Noise complaints related to the operation of existing fire stations in the City of Mesa are not a common occurrence (MFD 2010).

4.5.3 Traffic/Transportation

The project area is located on Signal Butte Road, an arterial through the southeast portion of Mesa. Signal Butte Road is a two-way, two-lane undivided roadway. Signal Butte Road provides access to U.S. Highway 60 (Superstition Freeway) to the north via an interchange. Signalized intersections are at the nearest main arterial intersections (Elliot Road, ¼ mile south, and Guadalupe Road, ¾ mile north).

No Action: Because the fire station would not be constructed, the No Action alternative would not affect traffic or transportation patterns in the project area.

Proposed Action: Under this alternative, a traffic signal would be constructed and operated on Signal Butte Road at the fire station location. The proposed traffic signal would operate only during emergency calls and, therefore, would result in only infrequent, short-term, and temporary disruption of traffic flow on Signal Butte Road. The traffic signal will allow fire trucks to enter the main arterial safely.

4.5.4 Public Health and Safety

The project area currently experiences average fire and emergency response times in excess of 5 minutes, resulting in reduced public health and safety for residents, businesses, institutions, and the general public. With the nearest existing fire station (No. 217) approximately 2 miles away, the MFD is currently unable to meet its target average response time of 4 minutes or less.

No Action: Under the No Action alternative, Fire Station No. 219 would not be constructed, and the project area would continue to be served by the other fire stations in the general area—particularly Fire Station No. 217, which is approximately 2 miles away. Area residents, businesses, institutions, and the general public in the project area would continue to experience emergency response times that average in excess of 5 minutes.

Proposed Action: Construction and operation of Fire Station No. 219 in the project area would reduce average emergency response times to less than 4 minutes, enhancing the level of public safety. It would also reduce distances traveled and time spent driving to and from emergency

calls for emergency personnel, reducing the potential for vehicular conflicts, death, and injury. Construction and operation of Fire Station No 219 under this alternative would also enhance public health and safety by serving as a backup to Phoenix-Mesa Gateway Airport and by providing mutual aid to surrounding cities.

4.6 Hazardous Materials

Hazardous wastes, as defined by the Resource Conservation and Recovery Act (40 CFR Part 261), are defined as a solid waste, or combination of solid wastes, that, because of quantity, concentration, or physical, chemical, or infectious characteristics, may (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of or otherwise managed. The management of hazardous waste is regulated by the Arizona Department of Environmental Quality, the state environmental regulatory agency that oversees general compliance with state and federal environmental regulations.

A Phase I Environmental Site Assessment (ESA) was conducted at the proposed location for Fire Station No. 219 (SA&B Environmental & Chemical Consultants 2004). The ESA was conducted in accordance with the American Society for Testing and Materials Standard E1527-00 to evaluate the property, identify potential recognized environmental conditions, and determine whether further investigation is warranted.

The ESA includes a summary of state and federal environmental databases, including the Arizona Superfund Program; the Comprehensive Environmental Response, Compensation, and Liability Act; leaking underground storage tanks; the National Priority Lists (for Superfund); and the Water Quality Assurance Revolving Fund. A review of these databases revealed no hazardous materials concerns for the project area or its immediate surroundings.

Review of select historical aerial photos dated 1963–2003 show the project area as undeveloped desert. Adjacent areas include an SRP power transfer station immediately adjacent to the north. The remaining immediately adjacent areas were undeveloped desert at the time of site reconnaissance in 2004.

Site reconnaissance of the project area did not reveal existing hazardous materials, substances, or conditions. Miscellaneous debris and items were observed dumped within the project vicinity, including tires, household goods, appliances, construction waste, and landscape waste. The debris observed appeared inert, and it was determined unlikely to have had a significant environmental impact to the project area or surrounding area.

No Action: The No Action alternative would not disturb hazardous materials or create any potential hazard to human health because the fire station would not be constructed.

Proposed Action: Construction of a new fire station would not disturb any known hazardous materials or create any potential hazard to human health. If hazardous materials are encountered in the project area during construction, appropriate measures for the proper assessment, remediation, and management of the contamination would be initiated in accordance with

applicable federal, state, and local regulations. The contractor would take appropriate measures to prevent, minimize, and control hazardous materials, if necessary, during construction.

5.0 CUMULATIVE IMPACTS

Cumulative impacts represent the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The level and scale of the cumulative analysis should be commensurate with the proposed project's potential impacts, scale, and other factors. NEPA documents should consider those past, present, and future actions that incrementally contribute to the cumulative effects on resources affected by the proposed action. Fire Station No. 219 would have no cumulative impact on ecological or historic properties because these resources would not be impacted by the project.

The project vicinity has seen substantial development in the past decade. There is a mix of undeveloped land and vacant lots suitable for future development. Within the area, two future developments have been identified by the City's planning and development departments: Mesa Proving Grounds Community Plan at the southwest corner of Signal Butte Road and Elliott Road and First Mesa Commerce Park east of Ellsworth Road on the north side of Elliot Road. In addition, single-family residential development is occurring in the project vicinity.

The Proposed Action would permanently convert open space and would constitute new air emission and noise sources in the area. Development of the fire station would have a minor cumulative effect on the quality of the human environment with past, present, and reasonably foreseeable future development and urbanization of the area. Cumulative impacts would be minor because the project would not affect sensitive or critical resources, lead to a wide range of effects, induce population growth, lead to further development, or require expansion of development infrastructure.

6.0 IRREVERSIBLE/IRRETRIEVABLE COMMITMENTS OF RESOURCES

The term "irreversible" is used to mean that which is impossible to reverse or undo, including the loss of future options. It is also used to describe the effects of the consumption of nonrenewable resources and those that are renewable only over a long period of time. The term "irretrievable" is used to mean that which is impossible to recover or repair, such as the loss of production or harvest, or the use of natural resources.

Construction of Fire Station No. 219 would require the irreversible and irretrievable commitment of financial resources, labor, and natural resources, including fossil fuels, raw materials, and water. Operation and maintenance activities over the life of the project would also require the irreversible and irretrievable commitment of these resources. The commitment of land for the fire station construction would result in the irreversible loss of approximately 2.6 acres of open space.

7.0 RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

NEPA requires consideration of the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. The intent is to employ all practicable means and measures in a manner that fosters and promotes general welfare, creates and maintains conditions under which man and nature can coexist, and fulfills the social, economic, and other requirements of present and future generations.

Construction and maintenance of the fire station would require the local short-term use of financial resources, manpower, and natural resources but would not be expected to result in the exploitation of natural resources, the degradation of the natural or human environment, or the decline of public welfare. The local short-term use of man's environment required to implement the proposed project would be consistent with, and supportive of, the general welfare of the community by enhancing fire and emergency response capabilities for present and future generations for the life of the project.

8.0 AGENCY COORDINATION, PUBLIC INVOLVEMENT, AND PERMITS

8.1 Agency Coordination

Interagency reviews have been conducted in the form of agency coordination and consultation letters and the responses received from the agencies. The following agencies were consulted:

- U.S. Fish and Wildlife Service
- State Historic Preservation Office
- Native American Tribes
- Arizona Department of Environmental Quality
- Arizona Game and Fish Department
- Flood Control District of Maricopa County

Copies of agency coordination and consultation letters and responses are included in Appendix C.

8.2 Public Involvement

A Design Review Board public meeting was held on May 6, 2009, to discuss the proposal (Appendix G). Notification of the availability of the Draft EA will be made through publication of a public notice in a local newspaper. A 15-day public comment period will commence on the initial date of publication of the public notice. Any public comments received and responses to them will be included in the Final EA.

8.3 Permits

The following permits and approvals may be required:

- Arizona Pollutant Discharge Elimination System Construction General Permit
- Class II Operating Permit for Generator

- Grading Permit (City of Mesa)
- Building Permit (City of Mesa)

9.0 REFERENCES

- Center for Biological Diversity. 2004. Petition to list the Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*) as an endangered species. Petition submitted to the Secretary of the Interior, U.S. Department of the Interior, on December 15, 2004.
- City of Mesa. 2009. Municipal Code, Title 6, Chapter 12, Ordinance 4942.
- EPA. 1974. Information on levels of environmental noise. *Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*.
- FEMA. 2005. Flood Insurance Rate Map No. 04013CIND0A. <http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=88824764&IFIT=1>. Revised September 30.
- MCAQD. 2010. Personal communication. Dennis Haas, Visibility Services, Inc. and Bob Downing, Maricopa Air Quality Department. May 18.
- MFD. 2010. Personal communication. Tony Lo Guidice, MFD, and Leslie J. Stafford, EcoPlan Associates, Inc. May 27.
- SA&B Environmental & Chemical Consultants. 2004. Report on Phase I Environmental Site Assessment for 108 Acres of Vacant Land at Northeast Corner of Elliot and Signal Butte Roads, Mesa, Arizona. Unpublished technical report prepared for City of Mesa Environmental Programs dated March 2, 2004. Project No. 04052FJ.
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- USFWS. 2010a. List of endangered, threatened, and candidate species for Maricopa County. <http://www.fws.gov/southwest/es/arizona/Documents/CountyLists/Maricopa.pdf>. Updated April 8, 2010. Accessed April 12, 2010.
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or Endangered with Critical Habitat. Federal Register Vol. 75, No. 61, Wednesday, March 31, 2010; pp: 16050–16065.

Western Regional Climate Center. 2010. Climate summary for Mesa, Arizona (025467). <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?azmesa>. Accessed April 1, 2010.

Wilson, E.D., R.T. Moore, and H.W. Peirce. 1957. Geologic map of Maricopa County, Arizona. Arizona Bureau of Mines, University of Arizona, Tucson, Arizona.

10.0 LIST OF PREPARERS

This *Draft Environmental Assessment for City of Mesa Fire Station No. 219* has been prepared for FEMA by the City of Mesa with the assistance of EcoPlan Associates, Inc., Visibility Services, Inc., and DM Environmental, LLC.

The following individuals participated in the development of this document:

FEMA

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City of Mesa

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- Gordon Haws, City of Mesa Engineering Department
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- J. Simon Bruder
- Patrick E.T. Dockens
- Kathy Thielmann

Visibility Services, Inc.

- Dennis Haas

DM Environmental, LLC

- Joe D’Onofrio

APPENDIX A
Site Photos



Photo 1. View of the proposed location for Fire Station No. 219 from Signal Butte Road, facing northeast. Note the power line pole and the barbed-wire fence, as well as the power-generating substation in the background.



Photo 2. View of the western boundary of the proposed location for Fire Station No. 219 from Signal Butte Road, facing north.



Photo 3. View of the proposed location for Fire Station No. 219 from the southern boundary, facing north. The power-generating substation is in the background.



Photo 4. View of the site access along the northern boundary of the proposed location for Fire Station No. 219 from the northeastern corner, facing west. Note the church in the background.



Photo 5. View from the access point of the proposed location for Fire Station No. 219 from the northwestern corner, facing southeast.



Photo 6. View from the access point for the proposed location for Fire Station No. 219 from the northwestern corner, facing south. Signal Butte Road is along the right side of the photo.

APPENDIX B
Site and Traffic Control Plans



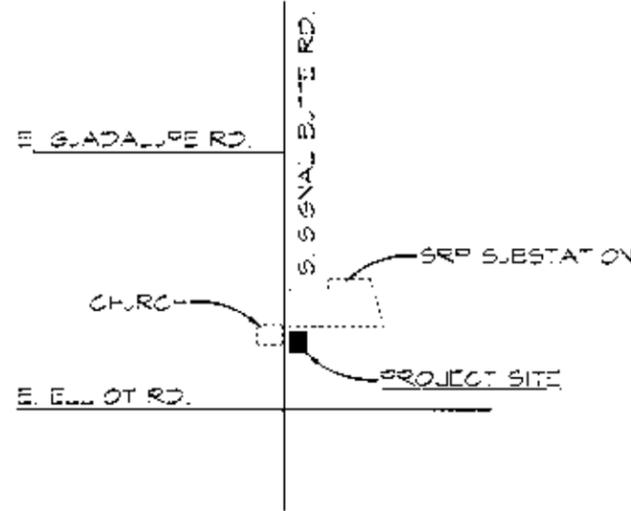
mesa·az

MESA FIRE STATION NO. 219

3361 S. SIGNAL BUTTE RD. MESA, AZ

PROJECT NO. 01-745-001

VICINITY MAP



PROJECT INFORMATION

ALL CONSTRUCTION WITHIN THE CITY OF MESA, ARIZONA SHALL COMPLY WITH THE FOLLOWING CODES AND AMENDMENTS PER THEIR ADOPTING ORDINANCES:

MESA CITY CODE VOLUME I, CHAPTER 1 ARTICLE 14 BUILDING AND TECHNICAL CODES

2006 INTERNATIONAL BUILDING CODE (IBC)	2006 INTERNATIONAL PLUMBING CODE (IPC)
2006 INTERNATIONAL EXISTING BUILDING CODE (IEBC)	2006 INTERNATIONAL RESIDENTIAL CODE (IRC)
2006 INTERNATIONAL FIRE CODE (IFC)	2006 NATIONAL ELECTRICAL CODE (NEC)
2006 INTERNATIONAL FUEL GAS CODE (IFGC)	2008 ICG AND A117-2008
2006 INTERNATIONAL MECHANICAL CODE (IMC)	2008 MESA ADMINISTRATIVE CODE (MAC)

SITE DATA
LOCATION / ADDRESS: 3361 S. SIGNAL BUTTE ROAD NORTH OF NDC SIGNAL BUTTE AND ELLIOT ROADS
 MESA, ARIZONA - MARICOPA COUNTY

PARCEL NUMBER: 304-D-198
PARCEL SIZE: 08.68 ACRES / 478486 SQ. FT.
 (TIRE STATION SITE ONLY: 2.818 ACRES / 15181 SQ. FT.)

EXISTING ZONING: RT (INDL & FACILITIES)
PARKING REQUIRED (MESA STANDARD CHAPTER 18): ONE SPACE PER 575 SQ. FT. OF GROSS FLOOR AREA (GFA) + 11482 SQ. FT. OF GFA + 275 + 31 REQUIRED SPACES

PARKING PROVIDED: STANDARD PARKING: 24 SPACES
 VAN ACCESSIBLE PARKING: 2 SPACES
 ALTERNATE FUEL: 0 SPACES
 GARPOOD, PARKING: 0 SPACES
 TOTAL PARKING: 26 SPACES

GROSS BUILDING AREA (G.B.A.): 2024 SQ. FT.

BUILDING OCCUPANCY CLASSIFICATION (CHAPTERS 18)

ASSEMBLY - A-3 (SECTION 803)	COMMUNITY / TRAINING ROOM
BUSINESS - B (SECTION 804)	OFFICE
RESIDENTIAL - R-2 (SECTION 805)	CONGREGATE LIVING AND DORMITORIES
STORAGE - S-1 (SECTION 807)	MOTOR VEHICLE GARAGE

OCCUPANCY CLASSIFICATION AREA CALCULATION

OCCUPANCY	GROSS BUILDING AREA (G.B.A.)	BUILDING COVERED AREAS (RESOLUTIONS)	TOTAL
ASSEMBLY - A-3	507 SQ. FT.	426 SQ. FT.	1033 SQ. FT.
BUSINESS - B	509 SQ. FT.	582 SQ. FT.	1091 SQ. FT.
RESIDENTIAL - R-2	4,580 SQ. FT.	126 SQ. FT.	5,006 SQ. FT.
STORAGE - S-1	5,028 SQ. FT.	0 SQ. FT.	5,028 SQ. FT.
TOTALS:	10,624 SQ. FT.	2,324 SQ. FT.	12,948 SQ. FT.

OCCUPANTS PER CLASSIFICATION (BASED ON EXISTING PLAN SHEET A04)

OCCUPANCY	NUMBER OF OCCUPANTS
ASSEMBLY - A-3	14
BUSINESS - B	8
RESIDENTIAL - R-2	22
STORAGE - S-1	23
TOTAL:	237

OCCUPANCY SEPARATION (SECTION 803): NONSEPARATED OCCUPANCIES (SECTION 803.2)

FIRE PARTITIONS SEPARATING SLEEPING UNITS - GROUP R-2 (SECTION 708): ONE HOUR RATED WALLS TO MEET BC TABLE 708.1(2) ITEM 14-13

CONDOMINIUM FIRE-RESISTANCE RATING (TABLE 1011 - R OCCUPANCY WITH SPRINKLER SYSTEM): FIRE RESISTIVE RATING IS NOT REQUIRED FOR CONDOMINIUMS WITH A SLEEPING UNIT IN AN OCCUPANCY IN GROUP R (SECTION 1011) EXCEPT ON NO. 2)

CONSTRUCTION TYPE (SECTION 803.1) TABLE 803.1: V-B

AUTOMATIC SPRINKLER SYSTEM (SECTION 803.12): YES

FIRE ALARM SYSTEM: YES

EMERGENCY LIGHTING: YES WITH STAND-BY GENERATOR

ALLOWABLE BUILDING HEIGHTS AND BUILDING AREA (CHAPTERS 18 - TABLE 803)

ALLOWABLE HEIGHT BASED ON MOST RESTRICTIVE OCCUPANCY A-3:	ALLOWABLE BUILDING AREA (BASED ON MOST RESTRICTIVE OCCUPANCY A-3):
40'-0" / ONE STORY	6,000 SQ. FT.

HEIGHT INCREASE: AUTOMATIC SPRINKLER SYSTEM INCREASE (SECTION 804.2): MAX. HEIGHT IS INCREASED BY 20'-0" AND THE MAX. NUMBER OF STORIES IS INCREASED BY ONE STORY ALLOWED: 60'-0" / TWO STORIES

BUILDING AREA INCREASE: AUTOMATIC SPRINKLER SYSTEM INCREASE (SECTION 806.2): PERMITTED TO BE INCREASED BY 50% FOR SINGLE STORY BUILDINGS ALLOWED: 6,000 SQ. FT. + 3,000 SQ. FT. X 50% = 7,500 SQ. FT. + 24,000 SQ. FT.

AREA FOR FIRE FIGHTING (SECTION 806.1): NOT USED

FRONTAGE INCREASE (SECTION 806.2): NOT USED

PROJECT TEAM

OWNER:
 CITY OF MESA, ARIZONA
 20 S. WALNUT STREET, SUITE 800
 MESA, AZ 85201
 P: 480.644.4292 / F: 480.644.3912
 CONTACT: SHAHR BAH
 sbah@mesaaz.gov

STRUCTURAL:
 JCP STRUCTURAL ENGINEERS
 3040 N. 64TH STREET, SUITE 507E
 PHOENIX, AZ 85018
 P: 602.255.8151 / F: 602.255.8255
 CONTACT: DAVID GONDT
 davidgondt@jcp-engineers.com

Mechanical:
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 330 S. CENTRAL AVENUE, SUITE 250
 PHOENIX, ARIZONA, 85004
 P: 602.249.0222 / F: 602.249.0222
 CONTACT: SHELTON KELLY, DENT, ZIMM
 skelly@andersoneng.com

CIVIL:
 NIPLEY-HORN & ASSOCIATES, INC.
 2284 S. BASELINE ROAD, SUITE 250
 MESA, AZ 85202
 P: 480.711.4171 / F: 480.755.4445
 CONTACT: STEVE HANLEY, P.E.
 shanley@nipley-horn.com

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 PERLMAN ARCHITECTS OF ARIZONA
 4150 N. DRINKWATER BLVD., SUITE 240
 SCOTTSDALE, AZ 85251
 P: 480.951.3900 / F: 480.451.5045
 CONTACT: GERRALD ADAMS
 gerald.adams@perلمان.com
 CONTACT: KIMBERLY SMITH
 ksmith@perلمان.com

MECHANICAL AND PLUMBING:
 ASSOCIATED MECHANICAL ENGINEERS, P.C.
 3008 W. JEFFERSON AVENUE, SUITE 110
 TEMPE, ARIZONA, 85281
 P: 480.766.5946 / F: 480.766.5946
 CONTACT: GEORGE JOSEPH, P.E.
 gjo@ame-engineers.com

Fire Protection:
 ELI ENGINEERING GROUP, INC.
 3508 N. 78TH AVENUE, SUITE 205
 PHOENIX, AZ 85020
 P: 602-362-1400 / F: 602-362-4003
 CONTACT: JOHN SCHAEFFER, ENT 101
 john@eli-engineering.com

LANDSCAPE:
 JORGAN DESIGN
 51 W. 14TH STREET, SUITE 450
 TEMPE, AZ 85281
 P: 480.761.3437 / F: 480.766.6232
 CONTACT: STEVE LOHMEYER
 slohme@jdesign.com

SUSTAINABLE ENERGY DESIGN:
 LOGGERS SOLAR
 TEMPE, AZ
 P: 480.233.4141
 CONTACT: BRUCE RYAN
 bruce@loggersolar.com

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SHT. NO.	DWG. NO.	SHEET NAME	SHT. NO.	DWG. NO.	SHEET NAME
ARCHITECTURAL					
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2	A02	ABBREVIATIONS, TAGS AND SYMBOLS	85	P12	DOMESTIC WATER FLOOR PLAN
3	A03	GENERAL NOTES	86	P21	PLUMBING DETAILS AND SCHEDULES
4	A04	FINISHES PLAN	87	P22	PLUMBING DETAILS AND SCHEDULES
5	A10	ARCHITECTURAL SITE PLAN	88	P31	PLUMBING DETAILS AND SCHEDULES
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7	A11	SITE DETAILS	ELECTRICAL		
8	A12	SITE DETAILS	89	E1	ELECTRICAL SITE PLAN
9	A13	SITE DETAILS	90	E2	SITE LIGHTING FIXTURE PLAN
10	A14	SITE DETAILS	91	E2 P	SITE PHOTOGRAPHIC PLAN AND SCHEDULES
11	A15	SITE DETAILS	92	E3	LIGHTING PLAN
12	A20	ANNOTATION FLOOR PLAN	93	E31	POWER PLAN
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20	A32	DOOR DETAILS	101	E51	SYMBOLS, CALCO AND ONE LINE DRAWING
21	A33	DOOR DETAILS	102	E52	SYMBOLS, CALCO AND DETAILS
22	A34	WINDOW SCHEDULE	FIRE PROTECTION		
23	A35	WINDOW SCHEDULE & DETAILS	103	FP1	FIRE SPRINKLER COVER SHEET
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25	A37	WINDOW DETAILS	105	FP2	FIRE PROTECTION FINISH PLAN
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57	A68	EXTERIOR ELEVATIONS	134	PE7	4800 SOLAR THERMAL SYSTEM
58	A69	EXTERIOR ELEVATIONS	135	PE8	4800 SOLAR THERMAL SYSTEM
59	A70	EXTERIOR ELEVATIONS	136	PE9	4800 SOLAR THERMAL SYSTEM
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61	A72	EXTERIOR ELEVATIONS	138	PE11	4800 SOLAR THERMAL SYSTEM
62	A73	EXTERIOR ELEVATIONS	139	PE12	4800 SOLAR THERMAL SYSTEM
63	A74	EXTERIOR ELEVATIONS	140	PE13	4800 SOLAR THERMAL SYSTEM
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65	A76	EXTERIOR ELEVATIONS	142	PE15	4800 SOLAR THERMAL SYSTEM
66	A77	EXTERIOR ELEVATIONS	143	PE16	4800 SOLAR THERMAL SYSTEM
67	A78	EXTERIOR ELEVATIONS	144	PE17	4800 SOLAR THERMAL SYSTEM
68	A79	EXTERIOR ELEVATIONS	145	PE18	4800 SOLAR THERMAL SYSTEM
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70	A81	EXTERIOR ELEVATIONS	147	PE20	4800 SOLAR THERMAL SYSTEM
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72	A83	EXTERIOR ELEVATIONS	149	PE22	4800 SOLAR THERMAL SYSTEM
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74	A85	EXTERIOR ELEVATIONS	151	PE24	4800 SOLAR THERMAL SYSTEM
75	A86	EXTERIOR ELEVATIONS	152	PE25	4800 SOLAR THERMAL SYSTEM
76	A87	EXTERIOR ELEVATIONS	153	PE26	4800 SOLAR THERMAL SYSTEM
77	A88	EXTERIOR ELEVATIONS	154	PE27	4800 SOLAR THERMAL SYSTEM
78	A89	EXTERIOR ELEVATIONS	155	PE28	4800 SOLAR THERMAL SYSTEM
79	A90	EXTERIOR ELEVATIONS	156	PE29	4800 SOLAR THERMAL SYSTEM
80	A91	EXTERIOR ELEVATIONS	157	PE30	4800 SOLAR THERMAL SYSTEM
81	A92	EXTERIOR ELEVATIONS	158	PE31	4800 SOLAR THERMAL SYSTEM
82	A93	EXTERIOR ELEVATIONS	159	PE32	4800 SOLAR THERMAL SYSTEM
83	A94	EXTERIOR ELEVATIONS	160	PE33	4800 SOLAR THERMAL SYSTEM
84	A95	EXTERIOR ELEVATIONS	161	PE34	4800 SOLAR THERMAL SYSTEM
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90	A101	EXTERIOR ELEVATIONS	167	PE40	4800 SOLAR THERMAL SYSTEM
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106	A117	EXTERIOR ELEVATIONS	183	PE56	4800 SOLAR THERMAL SYSTEM
107	A118	EXTERIOR ELEVATIONS	184	PE57	4800 SOLAR THERMAL SYSTEM
108	A119	EXTERIOR ELEVATIONS	185	PE58	4800 SOLAR THERMAL SYSTEM
109	A120	EXTERIOR ELEVATIONS	186	PE59	4800 SOLAR THERMAL SYSTEM
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111	A122	EXTERIOR ELEVATIONS	188	PE61	4800 SOLAR THERMAL SYSTEM
112	A123	EXTERIOR ELEVATIONS	189	PE62	4800 SOLAR THERMAL SYSTEM
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APPENDIX C
Agency Correspondence



FEMA

December 18, 2009

Mr. James Garrison
State Historic Preservation Officer
1300 W. Washington Street
Phoenix, AZ 85007
Attention: Ms. Jo Anne Medley

Re: EMW-2009-FC-00917(1), Station 219
City of Mesa Fire Department

Dear Mr. Garrison:

The Department of Homeland Security Federal Emergency Management Agency (FEMA) is considering an application to provide financial assistance in support of the City of Mesa Fire Department's (Grantee) proposal to construct a 11,970 square foot, 3-bay fire station at 3361 S. Signal Butte Road, Mesa, Maricopa County. The Grantee's proposal would fulfill a critical fire protection need due to increased service demand and reduce the current response time. Station 219 would provide back-up to the cities of Apache Junction, Gilbert, and Queen Creek. FEMA's action of providing a grant supporting the Grantee's need meets the definition of an undertaking in accordance with 36 CFR Part 800.16(y) and therefore requires the completion of Section 106 review in accordance with the National Historic Preservation Act of 1966 (Title 16 United States Code Section 470f), as amended.

The site is part of a city-owned parcel and surrounding development includes an electric substation to the north; a residential subdivision to the east; a potable water booster pump station to the south; and, a church to the west. FEMA has identified an Area of Potential Effect (APE) of 2.61 acres. FEMA has determined that the Grantee's proposal and FEMA's subsequent undertaking will result in no historic properties affected pursuant to 36 CFR Part 800.4(d)(1).

Mr. James Garrison
December 18, 2009
Page 2

FEMA requests your concurrence on our finding and have enclosed documentation in accordance with 36 CFR Part 800.11(d). If you should require any additional information about FEMA's request, please do not hesitate to contact me at (510) 627-7728 or donna.meyer@dhs.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Donna M. Meyer", with a long horizontal flourish extending to the right.

Donna M. Meyer
Deputy Environmental and
Historic Preservation Officer

Enclosure

DOCUMENTATION – NO HISTORIC PROPERTIES AFFECTED

1) A description of the undertaking, specifying the Federal involvement, and its area of potential effects, including photographs, maps, drawings, as necessary;

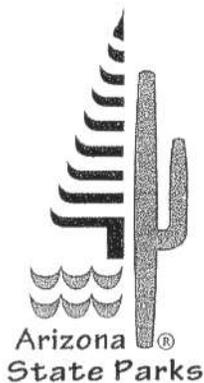
The Department of Homeland Security – Federal Emergency Management Agency intends to provide an *Assistance to Fire Fighters* grant (AF SCG) to the City of Mesa Fire Department to construct a new fire station facility. The site is located on the east side of S. Signal Butte Road approximately 800 feet north of Elliot Road, Mesa, Maricopa County. The site is in the northwest corner of a vacant 107 acre parcel owned by the City of Mesa that is intended for commercial development. The site was cleared for construction in 1975. The proposal would provide expanded fire protection coverage to meet increased service demands in the Mesa and surrounding community area. The Area of Potential Effect (APE) has been identified by FEMA as the building footprint, all asphalt/concrete paved parking area and utility trenching. Three trench drains at 45'-11 1/4" by 8" wide to a depth of 5.5" to 17.5" will be excavated to bring existing utilities to the building.

2) A description of the steps taken to identify historic properties, including, as appropriate, efforts to seek information pursuant to § 800.4(b)

A search of the National Register of Historic Places (NRHP) was performed. There are no properties listed within close proximity to the proposed construction site. The City of Mesa Real Estate Services prepared an archaeological survey for the entire 107 acre site in June 2002 (copy enclosed). No register-eligible or ineligible sites were recorded or identified as a result of the survey.

3) The basis for determining that no historic properties are present or Affected

Several archaeological surveys have been conducted in the immediate area of the proposed site with mixed results. Most of the sites contained light artifact or rock scatters. The site although vacant has been disturbed by random cattle grazing, transected by dirt roads used to access adjacent properties, and dumping of miscellaneous debris.



"Managing and conserving Arizona's natural, cultural and recreational resources"

In reply refer to SHPO-2009-1901
No historic properties affected

January 11, 2010

RECEIVED
JAN 20 2010

BY: _____

Donna M. Meyer
Deputy Environmental and
Historic Preservation Officer
US Department of Homeland Security – FEMA
1111 Broadway, Suite 1200
Oakland, CA 94607-4052

Janice K. Brewer
Governor

State Parks
Board Members

Chair
Reese Woodling
Tucson

Tracey Westerhausen
Phoenix

Larry Landry
Phoenix

Walter D. Armer, Jr.
Vail

Arlan Colton
Tucson

William C. Scalzo
Phoenix

Maria Baier
State Land
Commissioner

Renée E. Bahl
Executive Director

Arizona State Parks
1300 W. Washington
Phoenix, AZ 85007

Tel & TTY: 602.542.4174
AZStateParks.com

800.285.3703 from
(520 & 928) area codes

General Fax:
602.542.4180

Director's Office Fax:
602.542.4188

Re: EMW-2009-FC-00917(1), Station 219
City of Mesa Fire Department
Proposed Construction at 3361 S. Signal Butte Road
SHPO-2009-1901 (75821)

Dear Ms. Meyer:

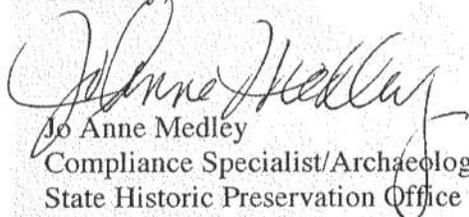
Thank you for consulting with our office regarding the above referenced undertaking. I have reviewed the documentation submitted and have the following comments:

John Wesley, the City of Mesa Acting Historic Preservation Officer informed me today that the City has no historic preservation concerns about this project.

I concur with your finding of no historic properties affected.

If you have any comments or concerns, please contact me at 602/542-7142 or by e-mail at jmedley@azstateparks.gov.

Sincerely,



Jo Anne Medley
Compliance Specialist/Archaeologist
State Historic Preservation Office

Cc: John Wesley, AICP
Acting Historic Preservation Officer
City of Mesa
55 North Center St.
PO Box 1466
Mesa, AZ 85211-1466



FEMA

November 30, 2009

Mr. Steve Spangle
Field Supervisor
2321 W. Royal Palm Road,
Suite 103
Phoenix, AZ 85021

RE: EMW-2009-FC-00917

Dear Mr. Spangle:

The Department of Homeland Security Federal Emergency Management Agency (FEMA) is considering an application to provide financial assistance in support of the City of Mesa Fire Department's (Grantee) proposal to construct a 11,970 square foot, 3-bay fire station at 3361 S. Signal Butte Road, Mesa, Maricopa County. The Grantee's proposal would fulfill a critical fire protection need due to increased service demand. The site is part of a larger city-owned parcel and surrounding development includes an electric substation to the north; a residential subdivision to the east; a potable water booster pump station to the south; and, a church to the west. Previous site surveys have revealed that flora consists mainly of creosote and mesquite along with scattered grasses. The observance of any fauna on site was scarce but appears to consist of small mammals, rodents, and lizards. Birds such as mourning doves, quail, and thrashers were the most observed during site surveys. In accordance with Section 7 of the Endangered Species Act (16 U.S.C. §1531 et seq. (1973)) we advise you of our finding of no effect on any listed endangered or threatened species. We have reviewed the Arizona Ecological Services County Listing for Maricopa County and have determined that no listed threatened or endangered species exist in the project area.

FEMA requests your concurrence with our determination and anticipates your response within 30 days of receipt of this letter. Enclosed for your use is a location map and photographs of the proposed work. If you need any further information please contact me at (510) 627-7728 or donna.meyer@dhs.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Donna M. Meyer", written over a horizontal line.

Donna M. Meyer
Deputy Regional Environmental Officer

Enclosures



FEMA

February 5, 2010

Ms. Diane Enos, President
Salt River Pima-Maricopa Indian Community
10005 E. Osborn
Scottsdale, AZ 85256

Re: EMW-2009-FC-03256 – Town of Buckeye Fire Department
EMW-2009-FC-02614 – Gilbert Fire Department
EMW-2009-FC-00917(1) – City of Mesa Fire Department
EMW-2009-FC-00917(2) – City of Mesa Fire Department

Dear President Enos:

Section 101(d)(6)(B) of the National Historic Preservation Act of 1966 as amended requires the Department of Homeland Security – Federal Emergency Management Agency (FEMA) to consult with any Indian Tribe that may attach religious and cultural significance to historic properties that may be affected by FEMA's undertaking. FEMA is considering four America Recovery and Reinvestment Act (ARRA) grant applications to the Grantees listed above. All four of the ARRA proposals would be Assistance to Firefighter grants for the construction of new fire stations located throughout Maricopa County. The specific locations are identified below:

Town of Buckeye Fire Department – 2582 North Verrado Way, Buckeye. (T2N, R2W, Sec 31)(33° 28' 31"N, -112° 30' 12"W);

Gilbert Fire Department – 1280 West Guadalupe Road, Gilbert. (T1S, R15E)(33°21.8585'N, -111°49.0756'W);

City of Mesa Fire Department – 3361 South Signal Butte Road, Mesa (T1S, R7E, Sec 12)(33°21'13"N, -111°36'3"W);

Ms. Diane Enos, President
February 5, 2010
Page #2

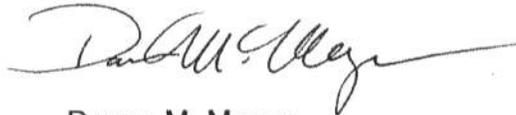
City of Mesa Fire Department – SW corner of South 58th Street and East Main Street, Mesa (T1N, R6E, Sec 23)(33°24'55"N, -111°42'10"W).

Each of the new fire stations would occupy between 1.3 and 3 acres in size. The new fire stations would fulfill a critical fire protection need due to increased service demand and would decrease current response times.

Because potential direct and indirect impacts of the Grantee's proposal may have an effect on historic properties we respectfully request your interest regarding the proposals, any comments regarding historic properties, advise us on the identification and evaluation of any historic properties, including those of traditional religious and cultural importance, articulate your views on the Grantees proposals and FEMA's undertaking on such historic properties, and to participate in the resolution of any adverse effects.

If you have any questions or require additional information please do not hesitate to contact me at (510) 627-7728, the letterhead address above or donna.meyer@dhs.gov.

Sincerely,



Donna M. Meyer
Deputy Environmental and Historic
Preservation Officer

Enclosure



FEMA

February 5, 2010

Mr. Wendsler Nosie, Chairperson
San Carlos Apache Tribe of the
San Carlos Reservation
P.O. Box 0
San Carlos, AZ 85550

Re: EMW-2009-FC-03256 – Town of Buckeye Fire Department
EMW-2009-FC-02614 – Gilbert Fire Department
EMW-2009-FC-00917(1) – City of Mesa Fire Department
EMW-2009-FC-00917(2) – City of Mesa Fire Department

Dear Chairperson Nosie:

Section 101(d)(6)(B) of the National Historic Preservation Act of 1966 as amended requires the Department of Homeland Security – Federal Emergency Management Agency (FEMA) to consult with any Indian Tribe that may attach religious and cultural significance to historic properties that may be affected by FEMA's undertaking. FEMA is considering four American Recovery and Reinvestment Act (ARRA) grant applications to the Grantees listed above. All four of the ARRA proposals would be Assistance to Firefighter grants for the construction of new fire stations located throughout Maricopa County. The specific locations are identified below:

Town of Buckeye Fire Department – 2582 North Verrado Way, Buckeye. (T2N, R2W, Sec 31)(33° 28' 31"N, -112° 30' 12"W);

Gilbert Fire Department – 1280 West Guadalupe Road, Gilbert. (T1S, R15E)(33°21.8585'N, -111°49.0756'W);

City of Mesa Fire Department – 3361 South Signal Butte Road, Mesa (T1S,R7E, Sec 12)(33°21'13"N, -111°36'3"W);

Mr. Wendsler Nosie, Chairperson
February 5, 2010
Page #2

City of Mesa Fire Department – SW corner of South 58th Street and East Main Street, Mesa (T1N, R6E, Sec 23)(33°24'55"N, -111°42'10"W).

Each of the new fire stations would occupy between 1.3 and 3 acres in size. The new fire stations would fulfill a critical fire protection need due to increased service demand and would decrease current response times.

Because potential direct and indirect impacts of the Grantee's proposal may have an effect on historic properties we respectfully request your interest regarding the proposals, any comments regarding historic properties, advise us on the identification and evaluation of any historic properties, including those of traditional religious and cultural importance, articulate your views on the Grantees proposals and FEMA's undertaking on such historic properties, and to participate in the resolution of any adverse effects.

If you have any questions or require additional information please do not hesitate to contact me at (510) 627-7728, the letterhead address above or donna.meyer@dhs.gov.

Sincerely,



Donna M. Meyer
Deputy Environmental and Historic
Preservation Officer

Enclosure



FEMA

February 5, 2010

Mr. Ned Norris, Chairman
Tohono O'odham Nation of Arizona
P.O. Box 837
Sells, AZ 85634

Re: EMW-2009-FC-03256 – Town of Buckeye Fire Department
EMW-2009-FC-02614 – Gilbert Fire Department
EMW-2009-FC-00917(1) – City of Mesa Fire Department
EMW-2009-FC-00917(2) – City of Mesa Fire Department

Dear Chairman Norris:

Section 101(d)(6)(B) of the National Historic Preservation Act of 1966 as amended requires the Department of Homeland Security – Federal Emergency Management Agency (FEMA) to consult with any Indian Tribe that may attach religious and cultural significance to historic properties that may be affected by FEMA's undertaking. FEMA is considering four America Recovery and Reinvestment Act (ARRA) grant applications to the Grantees listed above. All four of the ARRA proposals would be Assistance to Firefighter grants for the construction of new fire stations located throughout Maricopa County. The specific locations are identified below:

Town of Buckeye Fire Department – 2582 North Verrado Way, Buckeye. (T2N, R2W, Sec 31)(33° 28' 31"N, -112° 30' 12"W);

Gilbert Fire Department – 1280 West Guadalupe Road, Gilbert. (T1S, R15E)(33°21.8585'N, -111°49.0756'W);

City of Mesa Fire Department – 3361 South Signal Butte Road, Mesa (T1S,R7E, Sec 12)(33°21'13"N, -111°36'3"W);

Mr. Ned Norris, Chairperson
February 5, 2010
Page #2

City of Mesa Fire Department – SW corner of South 58th Street and East Main Street, Mesa (T1N, R6E, Sec 23)(33°24'55"N, -111°42'10"W).

Each of the new fire stations would occupy between 1.3 and 3 acres in size. The new fire stations would fulfill a critical fire protection need due to increased service demand and would decrease current response times.

Because potential direct and indirect impacts of the Grantee's proposal may have an effect on historic properties we respectfully request your interest regarding the proposals, any comments regarding historic properties, advise us on the identification and evaluation of any historic properties, including those of traditional religious and cultural importance, articulate your views on the Grantees proposals and FEMA's undertaking on such historic properties, and to participate in the resolution of any adverse effects.

If you have any questions or require additional information please do not hesitate to contact me at (510) 627-7728, the letterhead address above or donna.meyer@dhs.gov.

Sincerely,



Donna M. Meyer
Deputy Environmental and Historic
Preservation Officer

Enclosure



FEMA

February 5, 2010

Mr. Jamie Fullmer, Chairman
Yavapai-Apache Nation of the
Camp Verde Indian
2400 W. Datsi
Camp Verde, AZ 86322

Re: EMW-2009-FC-03256 – Town of Buckeye Fire Department
EMW-2009-FC-02614 – Gilbert Fire Department
EMW-2009-FC-00917(1) – City of Mesa Fire Department
EMW-2009-FC-00917(2) – City of Mesa Fire Department

Dear Chairman Fullmer:

Section 101(d)(6)(B) of the National Historic Preservation Act of 1966 as amended requires the Department of Homeland Security – Federal Emergency Management Agency (FEMA) to consult with any Indian Tribe that may attach religious and cultural significance to historic properties that may be affected by FEMA's undertaking. FEMA is considering four American Recovery and Reinvestment Act (ARRA) grant applications to the Grantees listed above. All four of the ARRA proposals would be Assistance to Firefighter grants for the construction of new fire stations located throughout Maricopa County. The specific locations are identified below:

Town of Buckeye Fire Department – 2582 North Verrado Way, Buckeye. (T2N, R2W, Sec 31)(33° 28' 31"N, -112° 30' 12"W);

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City of Mesa Fire Department – 3361 South Signal Butte Road, Mesa (T1S,R7E, Sec 12)(33°21'13"N, -111°36'3"W);

Mr. Jamie Fullmer, Chairman
February 5, 2010
Page #2

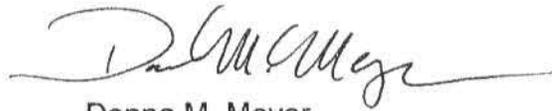
City of Mesa Fire Department – SW corner of South 58th Street and East Main Street, Mesa (T1N, R6E, Sec 23)(33°24'55"N, -111°42'10"W).

Each of the new fire stations would occupy between 1.3 and 3 acres in size. The new fire stations would fulfill a critical fire protection need due to increased service demand and would decrease current response times.

Because potential direct and indirect impacts of the Grantee's proposal may have an effect on historic properties we respectfully request your interest regarding the proposals, any comments regarding historic properties, advise us on the identification and evaluation of any historic properties, including those of traditional religious and cultural importance, articulate your views on the Grantees proposals and FEMA's undertaking on such historic properties, and to participate in the resolution of any adverse effects.

If you have any questions or require additional information please do not hesitate to contact me at (510) 627-7728, the letterhead address above or donna.meyer@dhs.gov.

Sincerely,



Donna M. Meyer
Deputy Environmental and Historic
Preservation Officer

Enclosure



FEMA

February 5, 2010

Mr. Ronnie Lupe, Chairman
White Mountain Apache Tribe of the Fort Apache
P.O. Box 700
Whiteriver, AZ 85941

Re: EMW-2009-FC-03256 – Town of Buckeye Fire Department
EMW-2009-FC-02614 – Gilbert Fire Department
EMW-2009-FC-00917(1) – City of Mesa Fire Department
EMW-2009-FC-00917(2) – City of Mesa Fire Department

Dear Chairman Lupe:

Section 101(d)(6)(B) of the National Historic Preservation Act of 1966 as amended requires the Department of Homeland Security – Federal Emergency Management Agency (FEMA) to consult with any Indian Tribe that may attach religious and cultural significance to historic properties that may be affected by FEMA's undertaking. FEMA is considering four America Recovery and Reinvestment Act (ARRA) grant applications to the Grantees listed above. All four of the ARRA proposals would be Assistance to Firefighter grants for the construction of new fire stations located throughout Maricopa County. The specific locations are identified below:

Town of Buckeye Fire Department – 2582 North Verrado Way, Buckeye. (T2N, R2W, Sec 31)(33° 28' 31"N, -112° 30' 12"W);

Gilbert Fire Department – 1280 West Guadalupe Road, Gilbert. (T1S, R15E)(33°21.8585'N, -111°49.0756'W);

City of Mesa Fire Department – 3361 South Signal Butte Road, Mesa (T1S, R7E, Sec 12)(33°21'13"N, -111°36'3"W);

Mr. Ronnie Lupe, Chairman
February 5, 2010
Page #2

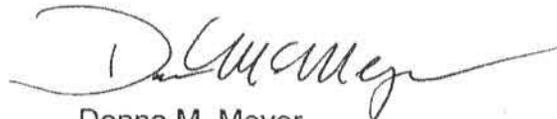
City of Mesa Fire Department – SW corner of South 58th Street and East Main Street, Mesa (T1N, R6E, Sec 23)(33°24'55"N, -111°42'10"W).

Each of the new fire stations would occupy between 1.3 and 3 acres in size. The new fire stations would fulfill a critical fire protection need due to increased service demand and would decrease current response times.

Because potential direct and indirect impacts of the Grantee's proposal may have an effect on historic properties we respectfully request your interest regarding the proposals, any comments regarding historic properties, advise us on the identification and evaluation of any historic properties, including those of traditional religious and cultural importance, articulate your views on the Grantees proposals and FEMA's undertaking on such historic properties, and to participate in the resolution of any adverse effects.

If you have any questions or require additional information please do not hesitate to contact me at (510) 627-7728, the letterhead address above or donna.meyer@dhs.gov.

Sincerely,



Donna M. Meyer
Deputy Environmental and Historic
Preservation Officer

Enclosure



FEMA

February 5, 2010

Mr. William Rhodes, Governor
Gila River Indian Community of the Gila River Indian
P.O. Box 97
Sacaton, AZ 85247

Re: EMW-2009-FC-03256 – Town of Buckeye Fire Department
EMW-2009-FC-02614 – Gilbert Fire Department
EMW-2009-FC-00917(1) – City of Mesa Fire Department
EMW-2009-FC-00917(2) – City of Mesa Fire Department

Dear Governor Rhodes:

Section 101(d)(6)(B) of the National Historic Preservation Act of 1966 as amended requires the Department of Homeland Security – Federal Emergency Management Agency (FEMA) to consult with any Indian Tribe that may attach religious and cultural significance to historic properties that may be affected by FEMA's undertaking. FEMA is considering four American Recovery and Reinvestment Act (ARRA) grant applications to the Grantees listed above. All four of the ARRA proposals would be Assistance to Firefighter grants for the construction of new fire stations located throughout Maricopa County. The specific locations are identified below:

Town of Buckeye Fire Department – 2582 North Verrado Way, Buckeye. (T2N, R2W, Sec 31)(33° 28' 31"N, -112° 30' 12"W);

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City of Mesa Fire Department – 3361 South Signal Butte Road, Mesa (T1S, R7E, Sec 12)(33°21'13"N, -111°36'3"W);

Mr. William Rhodes, Governor
February 5, 2010
Page #2

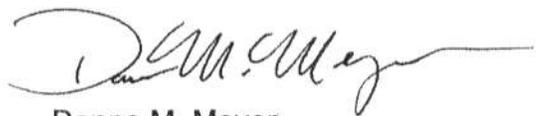
City of Mesa Fire Department – SW corner of South 58th Street and East Main Street, Mesa (T1N, R6E, Sec 23)(33°24'55"N, -111°42'10"W).

Each of the new fire stations would occupy between 1.3 and 3 acres in size. The new fire stations would fulfill a critical fire protection need due to increased service demand and would decrease current response times.

Because potential direct and indirect impacts of the Grantee's proposal may have an effect on historic properties we respectfully request your interest regarding the proposals, any comments regarding historic properties, advise us on the identification and evaluation of any historic properties, including those of traditional religious and cultural importance, articulate your views on the Grantees proposals and FEMA's undertaking on such historic properties, and to participate in the resolution of any adverse effects.

If you have any questions or require additional information please do not hesitate to contact me at (510) 627-7728, the letterhead address above or donna.meyer@dhs.gov.

Sincerely,



Donna M. Meyer
Deputy Environmental and Historic
Preservation Officer

Enclosure



FEMA

February 5, 2010

Mr. Raphael Bear, President
Fort McDowell Yavapai Nation
P.O. Box 17779
Fountain Hills, AZ 85268

Re: EMW-2009-FC-03256 – Town of Buckeye Fire Department
EMW-2009-FC-02614 – Gilbert Fire Department
EMW-2009-FC-00917(1) – City of Mesa Fire Department
EMW-2009-FC-00917(2) – City of Mesa Fire Department

Dear President Bear:

Section 101(d)(6)(B) of the National Historic Preservation Act of 1966 as amended requires the Department of Homeland Security – Federal Emergency Management Agency (FEMA) to consult with any Indian Tribe that may attach religious and cultural significance to historic properties that may be affected by FEMA's undertaking. FEMA is considering four American Recovery and Reinvestment Act (ARRA) grant applications to the Grantees listed above. All four of the ARRA proposals would be Assistance to Firefighter grants for the construction of new fire stations located throughout Maricopa County. The specific locations are identified below:

Town of Buckeye Fire Department – 2582 North Verrado Way, Buckeye. (T2N, R2W, Sec 31)(33° 28' 31"N, -112° 30' 12"W);

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City of Mesa Fire Department – 3361 South Signal Butte Road, Mesa (T1S,R7E, Sec 12)(33°21'13"N, -111°36'3"W);

Mr. Raphael Bear, President
February 5, 2010
Page #2

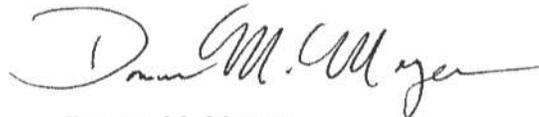
City of Mesa Fire Department – SW corner of South 58th Street and East Main Street, Mesa (T1N, R6E, Sec 23)(33°24'55"N, -111°42'10"W).

Each of the new fire stations would occupy between 1.3 and 3 acres in size. The new fire stations would fulfill a critical fire protection need due to increased service demand and would decrease current response times.

Because potential direct and indirect impacts of the Grantee's proposal may have an effect on historic properties we respectfully request your interest regarding the proposals, any comments regarding historic properties, advise us on the identification and evaluation of any historic properties, including those of traditional religious and cultural importance, articulate your views on the Grantees proposals and FEMA's undertaking on such historic properties, and to participate in the resolution of any adverse effects.

If you have any questions or require additional information please do not hesitate to contact me at (510) 627-7728, the letterhead address above or donna.meyer@dhs.gov.

Sincerely,

A handwritten signature in black ink that reads "Donna M. Meyer". The signature is fluid and cursive, with the first name "Donna" being the most prominent.

Donna M. Meyer
Deputy Environmental and Historic
Preservation Officer

Enclosure



FEMA

February 5, 2010

Ms. Delia Carlyle, Chairperson
Ak Chin Indian Community of the Maricopa
42507 W. Peters & Nall Road
Maricopa, AZ 85239

Re: EMW-2009-FC-03256 – Town of Buckeye Fire Department
EMW-2009-FC-02614 – Gilbert Fire Department
EMW-2009-FC-00917(1) – City of Mesa Fire Department
EMW-2009-FC-00917(2) – City of Mesa Fire Department

Dear Chairperson Carlyle:

Section 101(d)(6)(B) of the National Historic Preservation Act of 1966 as amended requires the Department of Homeland Security – Federal Emergency Management Agency (FEMA) to consult with any Indian Tribe that may attach religious and cultural significance to historic properties that may be affected by FEMA's undertaking. FEMA is considering four American Recovery and Reinvestment Act (ARRA) grant applications to the Grantees listed above. All four of the ARRA proposals would be Assistance to Firefighter grants for the construction of new fire stations located throughout Maricopa County. The specific locations are identified below:

Town of Buckeye Fire Department – 2582 North Verrado Way, Buckeye. (T2N, R2W, Sec 31)(33° 28' 31"N, -112° 30' 12"W);

Gilbert Fire Department – 1280 West Guadalupe Road, Gilbert. (T1S, R15E)(33°21.8585'N, -111°49.0756'W);

City of Mesa Fire Department – 3361 South Signal Butte Road, Mesa (T1S, R7E, Sec 12)(33°21'13"N, -111°36'3"W);

Ms. Delia Carlyle, Chairperson
February 5, 2010
Page #2

City of Mesa Fire Department – SW corner of South 58th Street and East Main Street, Mesa (T1N, R6E, Sec 23)(33°24'55"N, -111°42'10"W).

Each of the new fire stations would occupy between 1.3 and 3 acres in size. The new fire stations would fulfill a critical fire protection need due to increased service demand and would decrease current response times.

Because potential direct and indirect impacts of the Grantee's proposal may have an effect on historic properties we respectfully request your interest regarding the proposals, any comments regarding historic properties, advise us on the identification and evaluation of any historic properties, including those of traditional religious and cultural importance, articulate your views on the Grantees proposals and FEMA's undertaking on such historic properties, and to participate in the resolution of any adverse effects.

If you have any questions or require additional information please do not hesitate to contact me at (510) 627-7728, the letterhead address above or donna.meyer@dhs.gov.

Sincerely,



Donna M. Meyer
Deputy Environmental and Historic
Preservation Officer

Enclosure



March 24, 2010

Mark Shaffer
Arizona Department of Environmental Quality
Phoenix Main Office
1110 W. Washington Street
Phoenix, AZ 85007

Dear Mr. Shaffer:

The City of Mesa is applying for a grant from the Federal Emergency Management Agency (FEMA) for the construction of two fire stations—No.219 and No. 220. Because these projects are federally-funded, an environmental assessment (EA) will be prepared to comply with the National Environmental Policy Act (NEPA). FEMA will act as the lead agency with respect to NEPA compliance. EcoPlan Associates, Inc. has been contracted by the City to assist with the environmental analysis and documentation. This letter is a request for comments.

The following summarizes the two proposed sites:

Fire Station No. 219

Fire Station #219 would be constructed at 3361 South Signal Butte Road, north of Elliot Road on the east side of Signal Butte Road in Mesa, Arizona (Figure 1). The project site is approximately 2.23 acres in size and has not been previously developed. The fire station will include a one-story building containing a three-bay station with living quarters. The facility will also include parking areas, driveways, and landscaped retention areas. Fire Station #219 would be located in Section 12, Township (T) 1 North (N), Range (R) 7 East (E) on the Mesa, Arizona, US Geological Survey (USGS) 7.5-minute topographic series map.

Fire Station No. 220

Fire Station #220 would be located at the southwest corner of 58th Street and Main Street in Mesa, Arizona (Figure 2). The project site is approximately 2.34 acres in size on a previously developed site and within an urbanized area. All of the original buildings and structures previously on the site were removed prior to the City's acquisition of the property. The fire station will include a one-story building containing a four-bay apparatus. The facility will also include parking areas, driveways, and landscaped retention areas. This project is located in Section 23, Township (T) 1 North (N), Range (R) 6 East (E) on the Mesa, Arizona, US Geological Survey (USGS) 7.5-minute topographic series map.

Project location maps are attached for reference. Phase I Environmental Site Assessments have been completed for both sites and no Recognized Environmental Conditions were identified.

Mr. Shaffer
March 24, 2010
Page 2

Please identify any issues or concerns you have regarding this project and contact Ron van Ommeren at EcoPlan Associates, Inc., by phone at (480) 733-6666, extension 126; by fax at (480) 733-6661; by e-mail at rvanommern@ecoplanaz.com; or by mail at EcoPlan Associates, Inc., 701 W. Southern Ave., Suite 203, Mesa, AZ 85210.

We would appreciate receipt of your comments by April 24, 2010. Thank you for your participation in this project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ron van Ommeren', with a long horizontal line extending to the right.

Ron van Ommeren
Senior Environmental Planner

Enclosures: Figure 1–Project location – Fire Station 219
Figure 2–Project location – Fire Station 220

Cc: Shahir Safi, City of Mesa Engineering Design

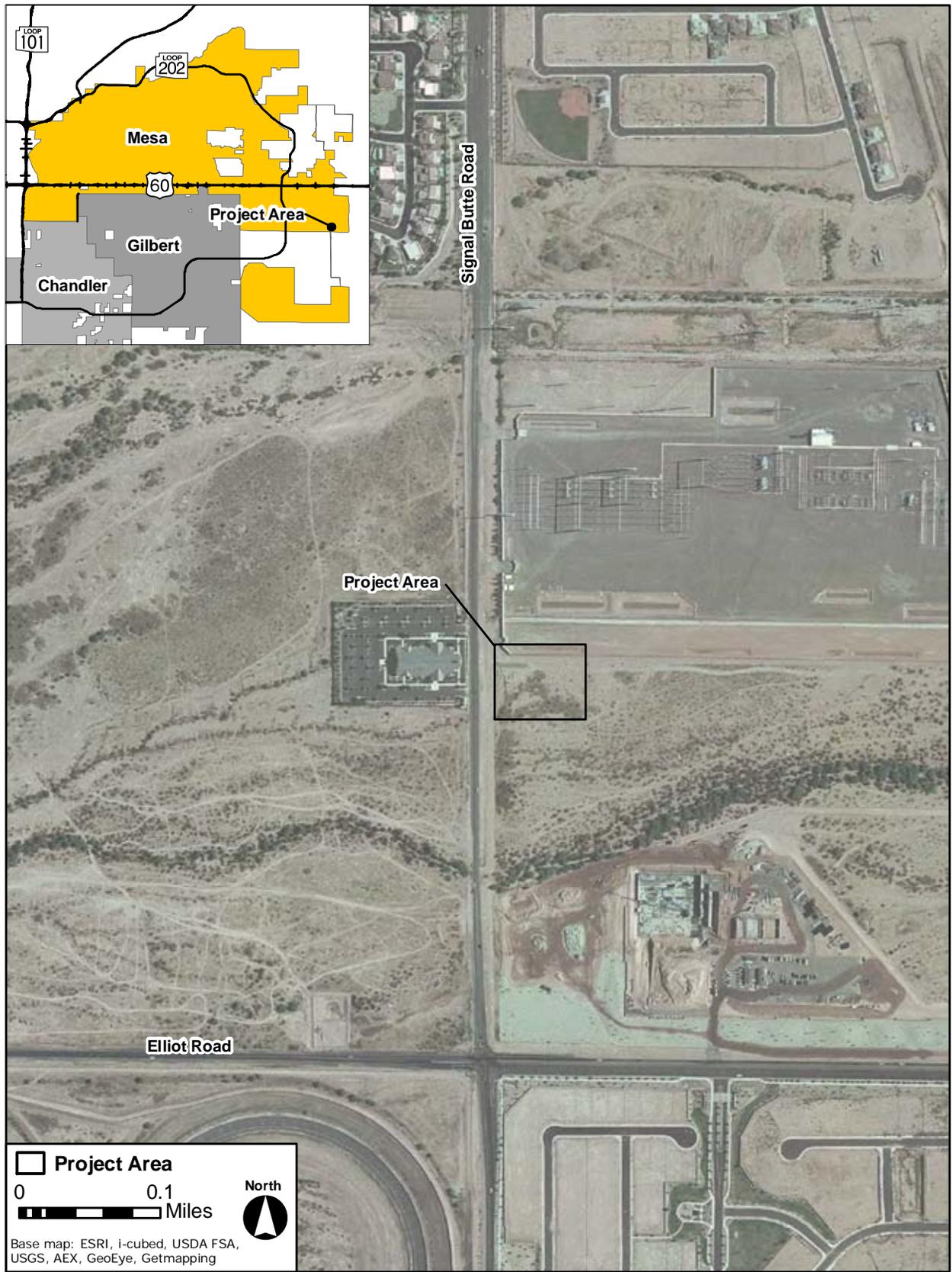
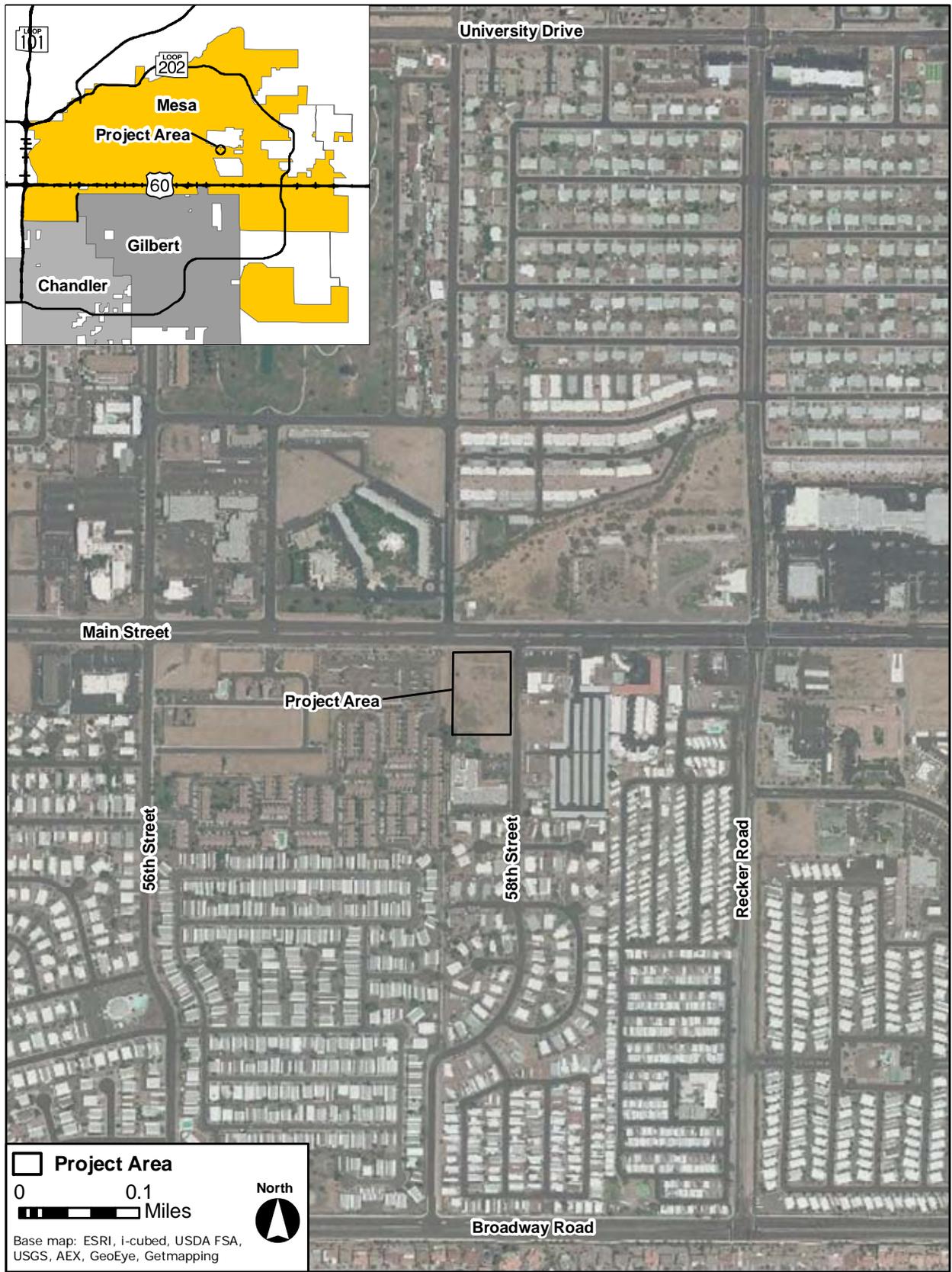


Figure 1. Project Area



W:\10-310\NEPA\EA\No220\Fig2

Figure 2. Project Area



March 24, 2010

Ms. Laura Canaca
Project Evaluation Program Supervisor
Arizona Game and Fish Department
WMHB-Project Evaluation Program
5000 W. Carefree Highway
Phoenix, AZ 85086-5000

Re: City of Mesa Proposed Fire Stations No. 219 and No. 220

Dear Ms. Canaca:

The City of Mesa is applying for a grant from the Federal Emergency Management Agency (FEMA) for the construction of two fire stations—No.219 and No. 220. Because these projects are federally-funded, an environmental assessment (EA) will be prepared to comply with the National Environmental Policy Act (NEPA). FEMA will act as the lead agency with respect to NEPA compliance. EcoPlan Associates, Inc. has been contracted by the City to assist with the environmental analysis and documentation. This letter is a request for comments.

The following summarizes the two proposed sites:

Fire Station No. 219

Fire Station #219 would be constructed at 3361 South Signal Butte Road, north of Elliot Road on the east side of Signal Butte Road in Mesa, Arizona (Figure 1). The project site is approximately 2.23 acres in size and has not been previously developed. The fire station will include a one-story building containing a three-bay station with living quarters. The facility will also include parking areas, driveways, and landscaped retention areas. Fire Station #219 would be located in Section 12, Township (T) 1 North (N), Range (R) 7 East (E) on the Mesa, Arizona, US Geological Survey (USGS) 7.5-minute topographic series map.

Fire Station No. 220

Fire Station #220 would be located at the southwest corner of 58th Street and Main Street in Mesa, Arizona (Figure 2). The project site is approximately 2.34 acres in size on a previously developed site and within an urbanized area. All of the original buildings and structures previously on the site were removed prior to the City's acquisition of the property. The fire station will include a one-story building containing a four-bay apparatus. The facility will also include parking areas, driveways, and landscaped retention areas. This project is located in Section 23, Township (T) 1 North (N), Range (R) 6 East (E) on the Mesa, Arizona, US Geological Survey (USGS) 7.5-minute topographic series map.

The Arizona Game and Fish Department's On-line Environmental Review Tool was used on February 1, 2010 and identified no known records of special status species within 3 miles of either project site (search ID numbers 20100201011343 and 20100201011344).

Ms. Canaca
March 24, 2010
Page 2

Please identify any issues or concerns you have regarding this project and contact Ron van Ommeren at EcoPlan Associates, Inc., by phone at (480) 733-6666, extension 126; by fax at (480) 733-6661; by e-mail at rvanommeren@ecoplanaz.com; or by mail at EcoPlan Associates, Inc., 701 W. Southern Ave., Suite 203, Mesa, AZ 85210.

We would appreciate receipt of your comments by April 24, 2010. Thank you for your participation in this project.

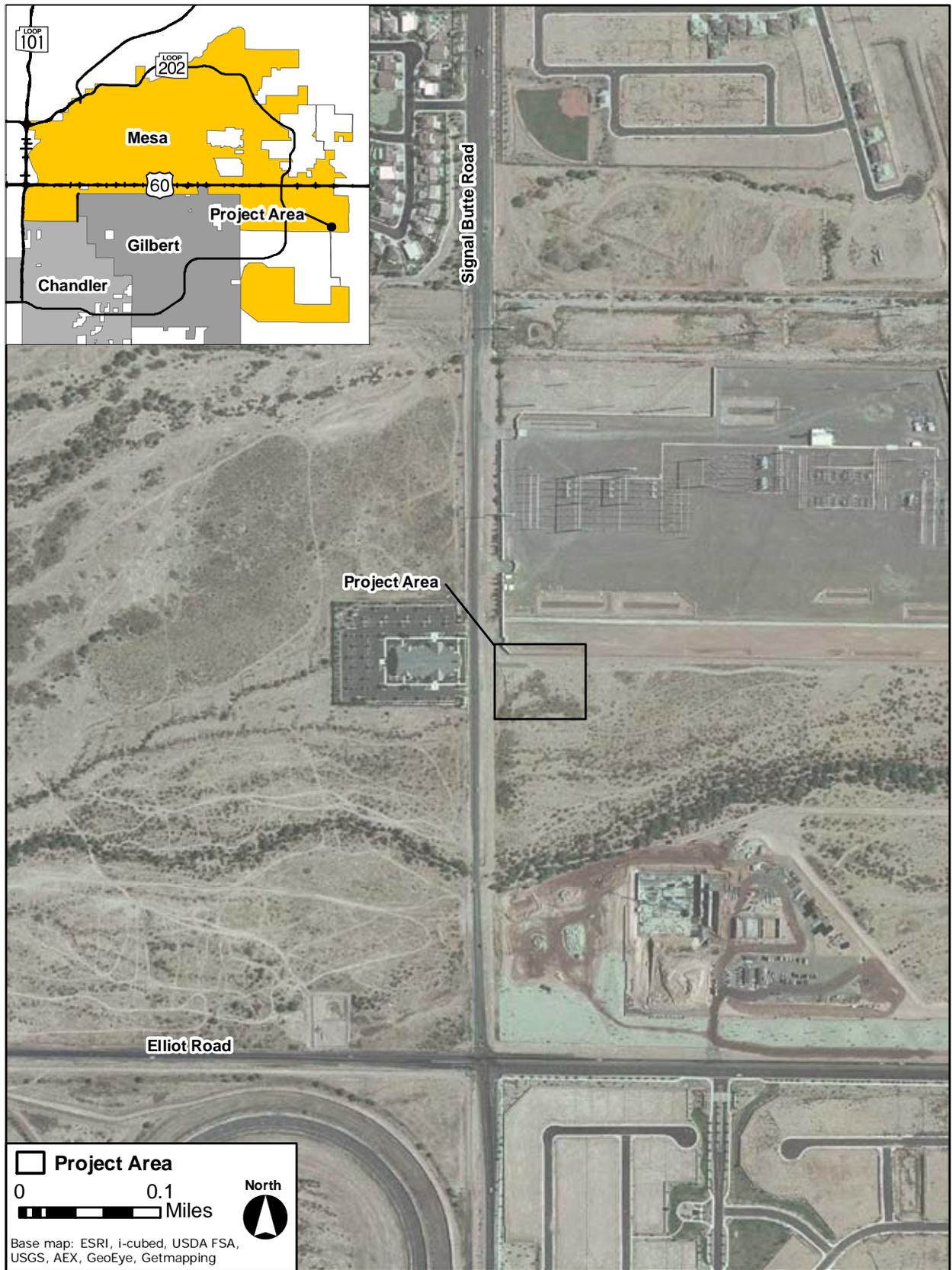
Sincerely,

A handwritten signature in black ink, appearing to read 'Ron van Ommeren', with a long horizontal line extending to the right.

Ron van Ommeren
Senior Environmental Planner

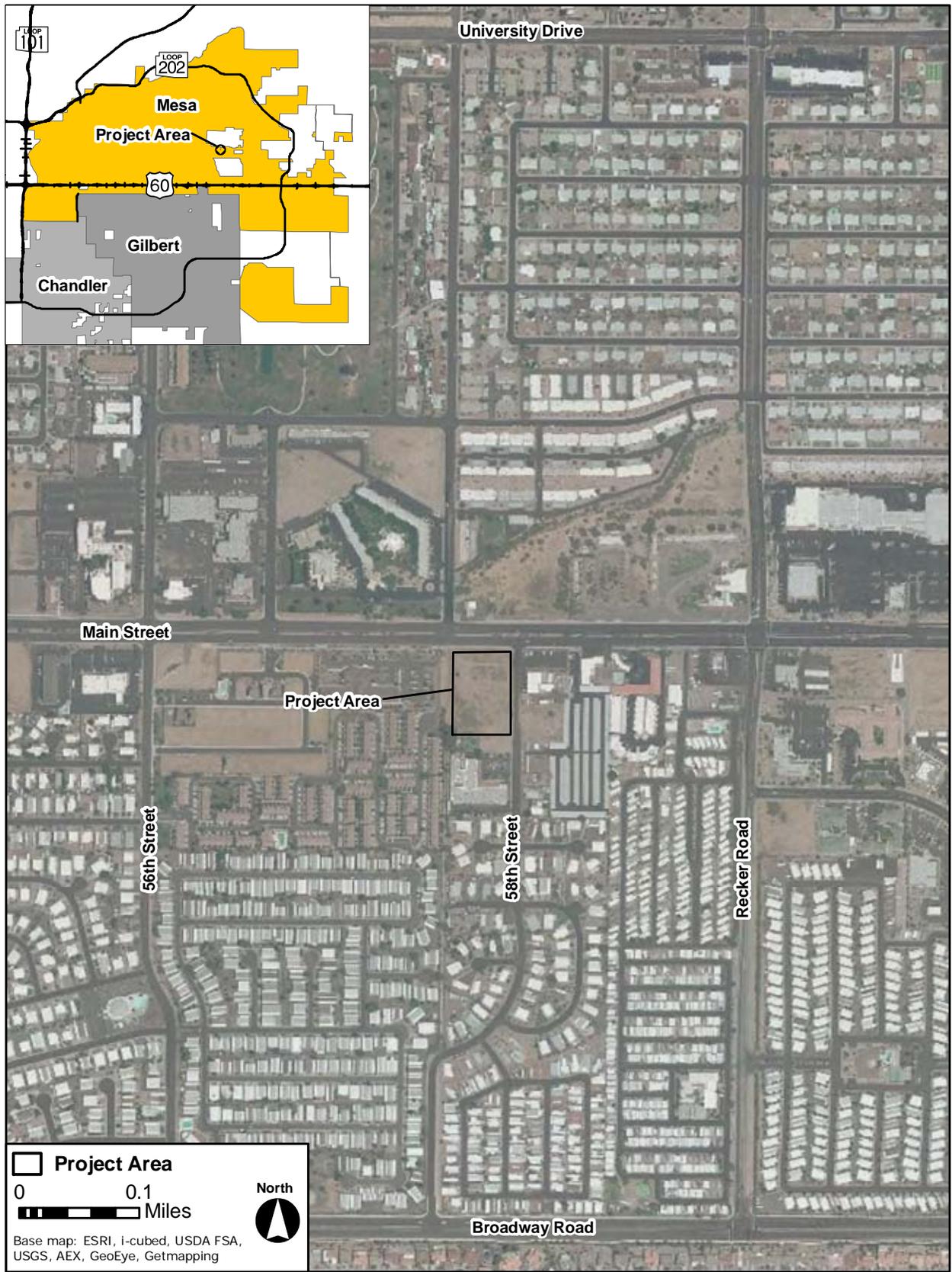
Enclosures: Figure 1–Project location – Fire Station 219
Figure 2–Project location – Fire Station 220

Cc: Shahir Safi, City of Mesa Engineering Design



W:\10-310\NEPA\EA\No219\Fig1

Figure 1. Project Area



W:\10-310\NEPA\EA\No220\Fig2

Figure 2. Project Area



March 24, 2010

Ted Collins, CFM
Floodplain Development Services Branch Manager
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Dear Mr. Collins:

The City of Mesa is applying for a grant from the Federal Emergency Management Agency (FEMA) for the construction of two fire stations—No.219 and No. 220. Because these projects are federally-funded, an environmental assessment (EA) will be prepared to comply with the National Environmental Policy Act (NEPA). FEMA will act as the lead agency with respect to NEPA compliance. EcoPlan Associates, Inc. has been contracted by the City to assist with the environmental analysis and documentation. This letter is a request for comments.

The following summarizes the two proposed sites:

Fire Station No. 219

Fire Station #219 would be constructed at 3361 South Signal Butte Road, north of Elliot Road on the east side of Signal Butte Road in Mesa, Arizona (Figure 1). The project site is approximately 2.23 acres in size and has not been previously developed. The fire station will include a one-story building containing a three-bay station with living quarters. The facility will also include parking areas, driveways, and landscaped retention areas. Fire Station #219 would be located in Section 12, Township (T) 1 North (N), Range (R) 7 East (E) on the Mesa, Arizona, US Geological Survey (USGS) 7.5-minute topographic series map.

Fire Station No. 220

Fire Station #220 would be located at the southwest corner of 58th Street and Main Street in Mesa, Arizona (Figure 2). The project site is approximately 2.34 acres in size on a previously developed site and within an urbanized area. All of the original buildings and structures previously on the site were removed prior to the City's acquisition of the property. The fire station will include a one-story building containing a four-bay apparatus. The facility will also include parking areas, driveways, and landscaped retention areas. This project is located in Section 23, Township (T) 1 North (N), Range (R) 6 East (E) on the Mesa, Arizona, US Geological Survey (USGS) 7.5-minute topographic series map.

Project location maps are attached for reference. FEMA shows that Fire Station # 219 lies within Flood Hazard Zone "D", defined as an area "in which flood hazards are undetermined, but possible". Based on this classification, FEMA has not established flood elevations or delineated floodplains within the area. Siphon Draw Wash is the only named drainage course that exists within the vicinity of the site. Various HEC-RAS models of the wash adjacent to the site have been prepared with differing results. One model that uses approximate topographic information from the USGS maps

Mr. Collins
March 24, 2010
Page 2

shows a 100-year water surface elevation of 1465.79 feet near the fire station site. Another model that uses more accurate, locally collected topographical information shows a 100-year water surface elevation of 1464.20 feet. Neither study has been adopted by FEMA. The finished floor elevation of the fire station (1465.95 feet) accommodates either of the two 100-year models. FEMA has conveyed to the City that under FEMA regulations a fire station is considered a “critical action facility” and as such needs to be protected to the 500-year floodplain. The City has requested a waiver from FEMA from the 500 year floodplain protection requirement.

Please identify any issues or concerns you have regarding this project and contact Ron van Ommeren at EcoPlan Associates, Inc., by phone at (480) 733-6666, extension 126; by fax at (480) 733-6661; by e-mail at rvanommeren@ecoplanaz.com; or by mail at EcoPlan Associates, Inc., 701 W. Southern Ave., Suite 203, Mesa, AZ 85210.

We would appreciate receipt of your comments by April 24, 2010. Thank you for your participation in this project.

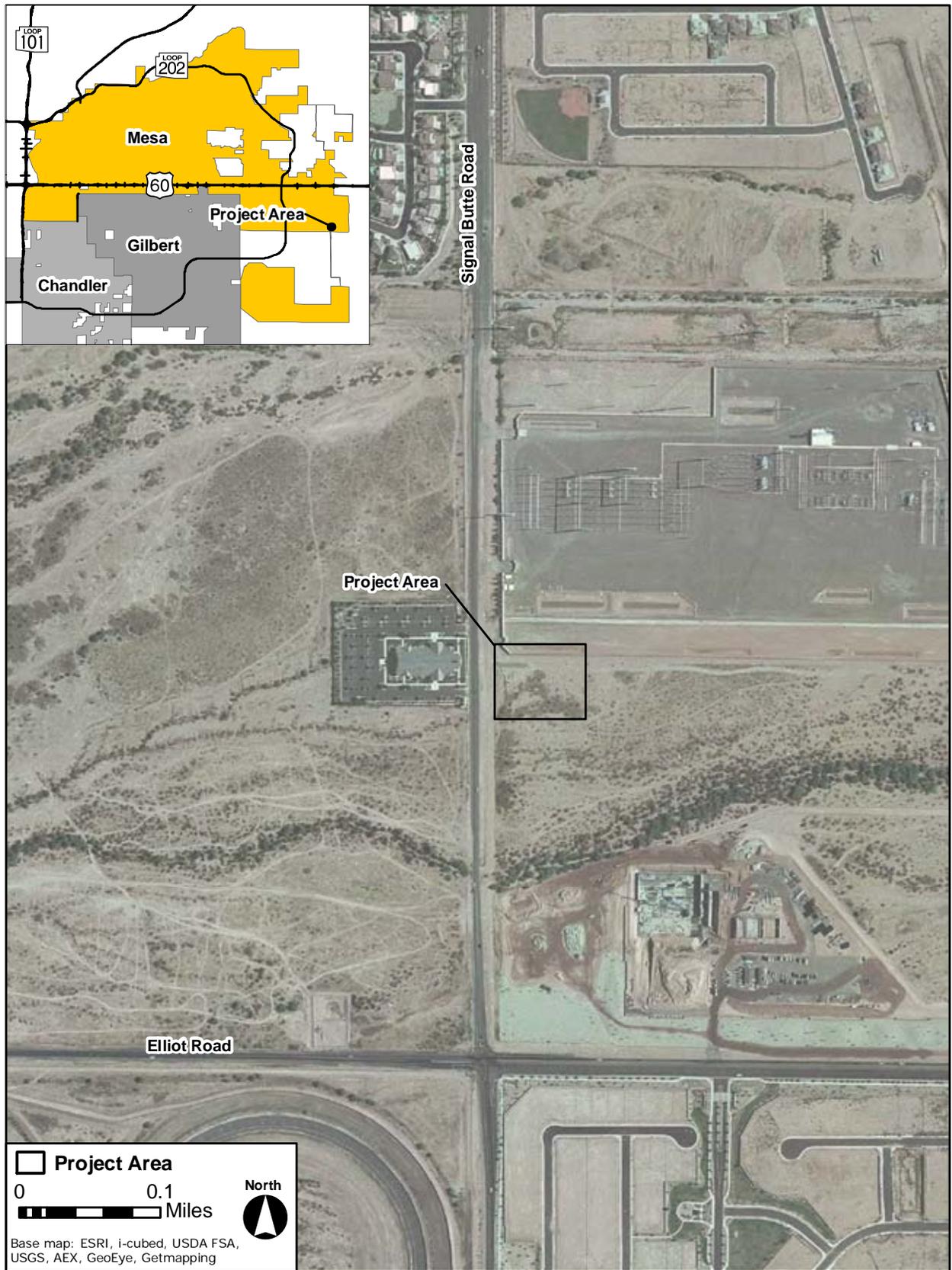
Sincerely,

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Ron van Ommeren
Senior Environmental Planner

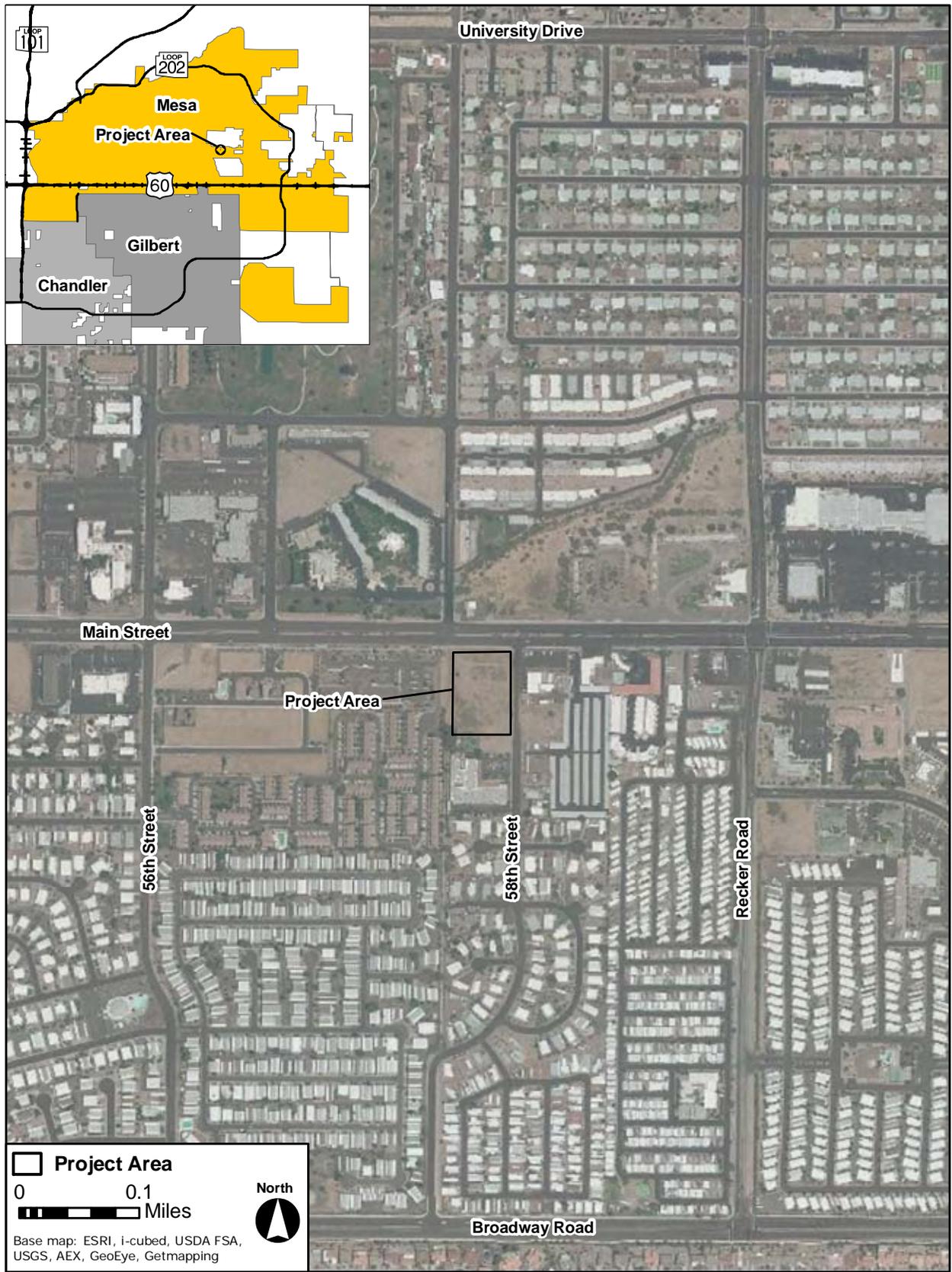
Enclosures: Figure 1–Project location – Fire Station 219
Figure 2–Project location – Fire Station 220

Cc: Shahir Safi, City of Mesa Engineering Design



W:\10-310\NEPA\EA\No219\Fig1

Figure 1. Project Area



W:\10-310\NEPA\EA\No220\Fig2

Figure 2. Project Area



Janice K. Brewer
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov



Benjamin H. Grumbles
Director

April 16, 2010

Mr. Ron van Ommeren
Senior Environmental Planner
EcoPlan Associates, Inc.
701 W. Southern Ave., Suite 203
Mesa, Arizona 85210

Project: Environmental Assessment for Construction of Fire Stations Numbers. 219 and 220
FEMA funded for Mesa, Arizona

Dear Mr. Ommeren:

On April 13, 2010, the Air Quality Division of the Arizona Department of Environmental Quality received your National Environmental Policy Act (NEPA) Scoping Input request for the proposed construction of two fire stations in Mesa, Arizona.

Federally funded projects are subject to State Implementation Plan (SIP) and General Conformity requirements according to Clean Air Act Section 176(c)(1); 58 Federal Register 63214-63259; Title 40 Code of Federal Regulations (CFR) Part 51, Subpart W §§ 51.850-51.860; Title 40 CFR Part 93, Subpart B §§ 93.150-160; and Arizona Administrative Code R18-2-1438. The Air Quality Division is hereby responding as requested after reviewing the project's description and maps included with your letter.

Both identified station construction projects are located in the Carbon Monoxide Maintenance Area, as well as the Phoenix Metro PM₁₀ Nonattainment Area and the 8-hour Ozone Nonattainment Area. Therefore, during your environmental assessment we refer you to <http://www.azdeq.gov/cnviron/air/plan/notmeet.html#phoenix> for consideration.

To comply with applicable air pollution control requirements and minimize adverse impacts on public health and welfare, the following information is provided for your consideration:

REDUCE DISTURBANCE of PARTICULATE MATTER during CONSTRUCTION

The following measures are recommended to reduce disturbance of particulate matter, including emissions caused by strong winds as well as machinery and trucks tracking soil off the construction site:

Northern Regional Office
1801 W. Route 66 • Suite 117 • Flagstaff, AZ 86001
(928) 779-0313

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ 85701
(520) 628-6733

April 16, 2010

Page 2

- I. Site Preparation and Construction
 - A. Minimize land disturbance;
 - B. Suppress dust on traveled paths which are not paved through wetting, use of watering trucks, chemical dust suppressants, or other reasonable precautions to prevent dust entering ambient air;
 - C. Cover trucks when hauling soil;
 - D. Minimize soil track-out by washing or cleaning truck wheels before leaving construction site;
 - E. Stabilize the surface of soil piles; and
 - F. Create windbreaks.

- II. Site Restoration
 - A. Revegetate any disturbed land not used;
 - B. Remove unused material; and
 - C. Remove soil piles via covered trucks.

The following rules applicable to reducing dust during construction, demolition and earth moving activities are enclosed:

- Arizona Administrative Code R18-2-604 through -607
- Arizona Administrative Code R18-2-804

Should you have further questions, please do not hesitate to call A. "Bonnie" Cockrell at (602) 771-2378 or Dave Biddle at (602) 771-2376 of the Planning Section Staff.

Very truly yours,



Diane L. Arnst, Manager
Air Quality Planning Section

Enclosure

cc: Bret Parke, EV Administrative Counsel
A. "Bonnie" Cockrell, Environmental Program Specialist, Air Planning
File No. 234862

R18-2-604. Open Areas, Dry Washes, or Riverbeds

- A. No person shall cause, suffer, allow, or permit a building or its appurtenances, or a building or subdivision site, or a driveway, or a parking area, or a vacant lot or sales lot, or an urban or suburban open area to be constructed, used, altered, repaired, demolished, cleared, or leveled, or the earth to be moved or excavated, without taking reasonable precautions to limit excessive amounts of particulate matter from becoming airborne. Dust and other types of air contaminants shall be kept to a minimum by good modern practices such as using an approved dust suppressant or adhesive soil stabilizer, paving, covering, landscaping, continuous wetting, detouring, barring access, or other acceptable means.
- B. No person shall cause, suffer, allow, or permit a vacant lot, or an urban or suburban open area, to be driven over or used by motor vehicles, trucks, cars, cycles, bikes, or buggies, or by animals such as horses, without taking reasonable precautions to limit excessive amounts of particulates from becoming airborne. Dust shall be kept to a minimum by using an approved dust suppressant, or adhesive soil stabilizer, or by paving, or by barring access to the property, or by other acceptable means.
- C. No person shall operate a motor vehicle for recreational purposes in a dry wash, riverbed or open area in such a way as to cause or contribute to visible dust emissions which then cross property lines into a residential, recreational, institutional, educational, retail sales, hotel or business premises. For purposes of this subsection "motor vehicles" shall include, but not be limited to trucks, cars, cycles, bikes, buggies and 3-wheelers. Any person who violates the provisions of this subsection shall be subject to prosecution under A.R.S. § 49-463.

Historical Note

Adopted effective May 14, 1979 (Supp. 79-1). Former Section R9-3-604 renumbered without change as Section R18-2-604 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-604 renumbered to R18-2-804, new Section R18-2-604 renumbered from R18-2-404 and amended effective November 15, 1993 (Supp. 93-4).

R18-2-605. Roadways and Streets

- A. No person shall cause, suffer, allow or permit the use, repair, construction or reconstruction of a roadway or alley without taking reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne. Dust and other particulates shall be kept to a minimum by employing temporary paving, dust suppressants, wetting down, detouring or by other reasonable means.
- B. No person shall cause, suffer, allow or permit transportation of materials likely to give rise to airborne dust without taking reasonable precautions, such as wetting, applying dust suppressants, or covering the load, to prevent particulate matter from becoming airborne. Earth or other material that is deposited by trucking or earth moving equipment shall be removed from paved streets by the person responsible for such deposits.

Historical Note

Adopted effective May 14, 1979 (Supp. 79-1). Former Section R9-3-605 renumbered without change as Section R18-2-605 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-605 renumbered to R18-2-805, new Section R18-2-605 renumbered from R18-2-405 effective November 15, 1993 (Supp. 93-4).

R18-2-606. Material Handling

No person shall cause, suffer, allow or permit crushing, screening, handling, transporting or conveying of materials or other operations likely to result in significant amounts of airborne dust without taking reasonable precautions, such as the use of spray bars, wetting agents, dust suppressants, covering the load, and hoods to prevent excessive amounts of particulate matter from becoming airborne.

Historical Note

Section R18-2-606 renumbered from R18-2-406 effective November 15, 1993 (Supp. 93-4).

R18-2-607. Storage Piles

- A. No person shall cause, suffer, allow, or permit organic or inorganic dust producing material to be stacked, piled, or otherwise stored without taking reasonable precautions such as chemical stabilization, wetting, or covering to prevent excessive amounts of particulate matter from becoming airborne.
- B. Stacking and reclaiming machinery utilized at storage piles shall be operated at all times with a minimum fall of material and in such manner, or with the use of spray bars and wetting agents, as to prevent excessive amounts of particulate matter from becoming airborne.

Historical Note

Section R18-2-607 renumbered from R18-2-407 effective November 15, 1993 (Supp. 93-4).

R18-2-804. Roadway and Site Cleaning Machinery

- A. No person shall cause, allow or permit to be emitted into the atmosphere from any roadway and site cleaning machinery smoke or dust for any period greater than 10 consecutive seconds, the opacity of which exceeds 40%. Visible emissions when starting cold equipment shall be exempt from this requirement for the first 10 minutes.
- B. In addition to complying with subsection (A), no person shall cause, allow or permit the cleaning of any site, roadway, or alley without taking reasonable precautions to prevent particulate matter from becoming airborne. Reasonable precautions may include applying dust suppressants. Earth or other material shall be removed from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, eroded by water or by other means.

Historical Note

Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Amended effective February 3, 1993 (Supp. 93-1). Former Section R18-2-804 renumbered to Section R18-2-904, new Section R18-2-804 renumbered from R18-2-604 effective November 15, 1993 (Supp. 93-4).



THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT

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PHOENIX, AZ 85086-5000
(602) 942-3000 • WWW.AZGFD.GOV

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April 24, 2010

Ron van Ommeren
EcoPlan Associates, Inc.
78 W. Cushing St.
Tucson, AZ 85701

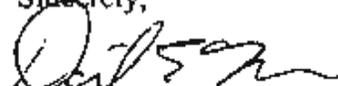
Re: City of Mesa Proposed Fire Stations no. 219 and 220

Dear Mr. Ommeren:

The Arizona Game and Fish Department (Department) has reviewed EcoPlan's letter, dated March 24, 2010 regarding special status species information associated with the above-referenced project areas. We have verified and validated the searches you conducted using the Department's On-line Environmental Review Tool which indicated the presence of no special status species or habitat within 2 miles of the project area.

The Department has no further comment at this time. If you have questions or would like further information on this subject, please feel free to give me a call at (623) 236-7513.

Sincerely,



Daniel E. Nelson

Project Evaluation Program Specialist

CC. Dana Warnecke



Janice K. Brewer
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov



Benjamin H. Grumbles
Director

April 27, 2010

Ron van Ommeren
Senior Environmental Planner
EcoPlan Associates, Inc.
701 W. Southern Avenue, Suite 203
Mesa, AZ 85210

SENT VIA E-MAIL: rvanommeren@ecoplanaz.com

Re: Environmental Assessment for City of Mesa fire stations

Thank you for the March 24, 2010 letter requesting comments on an environmental assessment for the City of Mesa to construct two fire stations. The Arizona Department of Environmental Quality Water Quality Division (ADEQ) is responsible for ensuring the delivery of safe drinking water to customers of regulated public water systems under the Safe Drinking Water Act, permits for proposed discharges to surface waters of the United States under the federal Clean Water Act (CWA), permits under the state Aquifer Protection Program, and water quality certifications of certain federal licenses and permits. Based on the information provided, ADEQ has the following comments related to water quality.

Stormwater: Stormwater discharges associated with construction activities (clearing, grading, or excavating) that disturb one acre or more must obtain a general permit for coverage of stormwater discharges under the Arizona Pollutant Discharge Elimination System's (AZPDES) Construction General Permit. As part of permit coverage, a Stormwater Pollution Prevention Plan (SWPPP) must be prepared, and implemented during the course of construction. The SWPPP must comply with ADEQ's Construction General Permit's SWPPP requirements, and must identify such elements as the project scope, anticipated acreage of land disturbance, and the best management practices that would be implemented to reduce soil erosion, and contain or minimize the pollutants that might be released to waters of the U.S. In addition to preparing the SWPPP, the project proponent must file for permit coverage before construction. The Construction General Permit, SWPPP checklist, and associated forms are available on ADEQ's website at: <http://www.azdeq.gov/environ/water/permits/stormwater.html#const>. For questions, please contact Chris Henninger in our Stormwater and General Permits Unit at (602) 771-4508 or by e-mail at cph@azdeq.gov.

CWA 401 Water Quality Certification: If project activities will occur inside the Ordinary High Water Mark of any water of the U.S., then a CWA section 404 permit (a.k.a. dredge and fill), issued by the U.S. Army Corps of Engineers, may be required. If a 404 permit (or any other

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federal permit) is required for the project, a state-issued CWA section 401 certification of the permit may be required to ensure that the permitted activities will not result in a violation of Arizona's surface water quality standards. For questions, please contact Bob Scalamera at (602) 771-4502 or by e-mail at rs3@azdeq.gov. The CWA 401 application form can be downloaded from ADEQ's website at: <http://www.azdeq.gov/function/forms/appswater.html#dredge>.

We appreciate the opportunity to review and provide comments. If you need further information, please contact Wendy LeStarge of my staff at (602) 771-4836 or via e-mail at w11@azdeq.gov, or myself at (602) 771-4416 or via e-mail at lc1@azdeq.gov.

Sincerely,

A handwritten signature in blue ink, appearing to read "L. Taunt".

Linda Taunt, Deputy Director
Water Quality Division



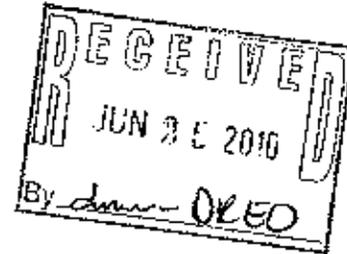
United States Department of the Interior

U.S. Fish and Wildlife Service
Arizona Ecological Services Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513



In Reply refer to:
AESO/SE
22410-2010-I-0406

June 21, 2010



Ms. Donna M. Meyer
Deputy Regional Environmental Officer
U.S. Department of Homeland Security
Federal Emergency Management Agency, Region IX
1111 Broadway, Suite 1200
Oakland, California 94607-4052

Dear Ms. Meyer:

Thank you for your correspondence of November 30, 2009, received by us on May 11, 2010, requesting our concurrence with your determination that the construction of a three-bay fire station at 3361 S. Signal Butte Road, Mesa, Maricopa County, will have no effect on threatened or endangered species in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et. seq.). For future reference, please note that "no effect" determinations do not require concurrence from the U.S. Fish and Wildlife Service. However, this letter documents our review in accordance with section 7 of the ESA.

We have reviewed the project information provided with your letter. Based on the information provided, we believe no endangered or threatened species, critical habitat, or wetlands will be affected by the project; nor is the project likely to jeopardize the continued existence of proposed species or destroy or adversely modify proposed critical habitat, because no such species or habitats exist in the project area. No further review is required for this project at this time. Should the project site change or if additional information on the distribution of listed or proposed species becomes available, this determination may need to be reconsidered.

We encourage you to coordinate review of this project with the Arizona Game and Fish Department and the U.S. Army Corps of Engineers. Should you require further assistance or have any questions, please contact Mike Martinez (x224) or Debra Bills (x239).

Sincerely,



Steven L. Spangle
Field Supervisor

cc: Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Chief, Regulatory Branch, U.S. Army Corps of Engineers, Phoenix, AZ

W:\Mike Martinez\Section7\Mesa_3_Bay_Fire_Station.docx: jkey

APPENDIX D
Floodplain Map

APPENDIX E
Summary of Federal Emergency Management Agency
Eight-step Planning Process for Floodplains and Wetlands,
and Drainage Technical Memorandum, Siphon Draw Wash, Water Surface Analysis



Memorandum

Date: October 13, 2010
To: Donna M. Meyer, Federal Emergency Management Agency
Copy: Shahir A. Safi, City of Mesa Engineering Design
From: Leslie J. Stafford
Mesa Number: 01-745-001
EcoPlan Number: 10-310
Project Name: Mesa Fire Station No. 219
Regarding: Eight-step Planning Process Documentation

The City of Mesa has been awarded Federal Emergency Management Agency (FEMA) Grant No. EMW-2009-FC-00917R for the construction of proposed Fire Station No. 219 to meet service demand and to improve response times in the eastern part of the City of Mesa, Arizona. Fire Station No. 219 would be located at 3361 S. Signal Butte Road, Mesa, Arizona, within the 500-year floodplain. A fire station is considered a “critical action” and, as such, cannot be sited within a 500-year floodplain if a practicable alternative is available. Pursuant to Executive Order 11988, FEMA’s Eight-step Planning Process for Floodplains and Wetlands has been undertaken. The results are summarized as follows.

Step 1

Determine whether the Proposed Action is located in a wetland and/or the 100-year floodplain, or whether it has the potential to affect or be affected by a floodplain or wetland.

Project Analysis: The project area falls within FEMA Flood Insurance Rate Map No. 04013C2705F, Panel Not Printed–Area in Zone D (FEMA 2005). The project area is designated as Zone D, defined as an area “in which flood hazards are undetermined, but possible.” Because Fire Station No. 219 would be sited in a 500-year floodplain and fire stations are considered critical actions pursuant to FEMA regulations 44 Code of Federal Regulations, Part 9, Floodplain Management and Protection of Wetlands, the City of Mesa initiated FEMA’s Eight-step Planning Process for Floodplains and Wetlands. Because the proposed site fell within an area of undetermined flood hazard, FEMA required an analysis of hydrology and hydraulics for the site. The report *Drainage Technical Memorandum, Siphon Draw Wash, Water Surface Analysis* (attached) describes the results of this analysis.

A site visit was conducted on March 22, 2010, by a biologist qualified to assess the occurrence of wetlands and other Waters of the United States. No hydrophytic vegetation or field indicators of wetland hydrology were observed on-site.

Step 2

Notify public at earliest possible time of the intent to carry out an action in a floodplain or wetland, and involve the affected and interested public in the decision-making process.

Project Analysis: The City of Mesa, the project applicant, placed a public notice in a local newspaper with general distribution notifying the public of the city’s plans to construct Fire Station No. 219 within the 500-year floodplain. The notice was published on January 1 and 2, 2010, in *The Arizona Republic* (notice attached). No responses were received from the public.

Following FEMA approval of the Draft Environmental Assessment (EA), the City of Mesa will notify the public of the availability of the Draft EA and the final results of the Eight-step Planning Process for Floodplains and Wetlands through a public notice in a local newspaper of general distribution. An electronic copy of the Draft EA will be posted on the city’s website, and hard copies will be available for review at City Hall. Public comment on the Draft EA will be accepted for 15 days after the date of publication of the public notice.

Step 3

Identify and evaluate practicable alternatives to locating the Proposed Action in a floodplain or wetland.

Project Analysis: Within the area of identified need for Fire Station No. 219, the City of Mesa considered available properties for its potential siting, including the proposed site along Signal Butte Road north of Elliot Road. Three primary considerations in the site evaluation process were the availability of vacant land, location within the defined service area, and direct access to a major arterial street. All feasible alternative sites for Fire Station No. 219 could be subjected to possible flooding without design precautions or mitigation. Table 1 compares the Proposed Action with an alternative site that would front the west side of Signal Butte Road.

Table 1. Comparison of feasible sites.

Siting Consideration	Proposed Site (East side of Signal Butte Road)	Alternative Site (West side of Signal Butte Road)
Land availability	Vacant land	Vacant land
Land ownership	City of Mesa	Private
Jurisdiction	Within City of Mesa jurisdiction; within Maricopa County	Within City of Mesa jurisdiction; within Maricopa County
Location within defined service area	Near center of defined service area—optimal location	Near center of defined service area—optimal location
Access to major arterial	Direct access to Signal Butte Road	Direct access to Signal Butte Road
Flood zone	Zone D	Zone D
Washes and drainage features present	Siphon Draw	Siphon Draw and unnamed tributary wash

With regard to improving emergency response capabilities, both the Proposed Action and the alternative site outlined in Table 1 would provide an optimal location within the defined service area for the siting of Fire Station No. 219. From these two feasible options, the proposed location

was selected for Fire Station No. 219 because it is owned by the City of Mesa. The alternative site on the west side of Signal Butte Road would require land acquisition from a private party.

Step 4

Identify the full range of potential direct or indirect impacts associated with the occupancy or modification of floodplains and wetlands, and the potential direct and indirect support of floodplain and wetland development that could result from the Proposed Action.

Project Analysis: FEMA confirmed that completion of a hydrology and hydraulics analysis was required for Fire Station No. 219.

Construction of the fire station would result in the permanent modification and development of 2.6 acres of Sonoran desertscrub vegetation and associated wildlife habitat. Perennial plant species such as creosote bush and triangle-leaf bursage would be removed. Construction and operation of the fire station would render xeroriparian habitat along Siphon Draw less suitable for native wildlife, though wildlife habitat values are already reduced by the presence of the SRP substation, a church, the surrounding residential development, and traffic on Signal Butte Road. Because of the potential for burrowing owl to move into the site prior to construction, preconstruction surveys will be conducted.

The proposed fire station would improve emergency response times for populations residing in the floodplain and would not directly or indirectly support floodplain or wetland development.

Step 5

Minimize the potential adverse impacts from work within floodplains and wetlands (identified under Step 4), restore and preserve the natural and beneficial values served by wetlands.

Project Analysis: The fire station pad elevation would be set at an elevation of 1466.45 feet above mean sea level to mitigate the risk of flooding in the 500-year, 24-hour rainfall event.

Step 6

Reevaluate the Proposed Action to determine (1) if it is still practicable in light of its exposure to flood hazards, (2) the extent to which it will aggravate the hazards to others, and (3) its potential to disrupt floodplain and wetland values.

Project Analysis: Reevaluation of the Proposed Action is not needed for the reasons described under Steps 1, 2, 3, and 4. With the implementation of the mitigation identified in Step 5, the proposed site remains practical for Fire Station No. 219.

Step 7

If the agency decides to take an action in a floodplain or wetland, prepare and provide the public with a finding and explanation of any final decision that the floodplain or wetland is the only practicable alternative. The explanation should include any relevant factors considered in the decision-making process.

Project Analysis: The entire service area for proposed Fire Station No. 219 is within Zone D, defined as an area “in which flood hazards are undetermined, but possible”; therefore, no practicable alternatives exist outside of the 500-year floodplain. A notice will be published in a general distribution newspaper describing the results of the Eight-step Planning Process for Floodplains and Wetlands undertaken for Fire Station No. 219 and announcing FEMA’s final decision. This notification will be combined with the public notice of availability of the Draft EA.

Step 8

Review the implementation and post-implementation phases of the Proposed Action to ensure that the requirements of the Executive Orders are fully implemented. Oversight responsibility shall be integrated into existing processes.

Project Analysis: This step is integrated into the National Environmental Policy Act process and FEMA project management and oversight functions.

Reference

FEMA. 2005. Flood Insurance Rate Map No. 04013CIND0A. <http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=88824764&IFIT=1>. Revised September 30, 2005.

Attachments

- Public notice published in *The Arizona Republic* on January 1 and 2, 2010
- *Drainage Technical Memorandum, Siphon Draw Wash, Water Surface Analysis*

PUBLISHED January 1, 2010 and January 2, 2010

Public Notice

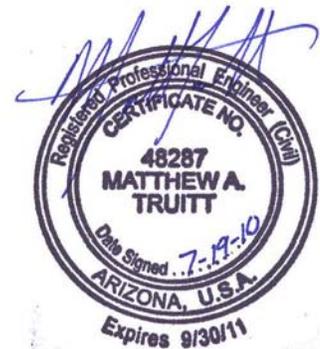
The Department of Homeland's Federal Emergency Management Agency is considering an application for financial assistance to the City of Mesa Fire Department (Grantee) to construct a 11,970 square foot, 3-bay station Fire Station 219 at 3361 S. Signal Butte Road, Mesa, Maricopa County. The Grantee's proposal is considered a critical action facility pursuant to Executive Order 11988 and is proposed to be located in an area that has not been studied for flood hazards and are undetermined, but where flooding may be possible. The proposed site is flat and contains natural ephemeral washes throughout. A wash is usually a dry creek bed or gulch that can temporarily fill with water after a heavy rain. No wetlands are known to exist at the proposed site. FEMA is soliciting comments from other Federal, state, local government, and the interested public in order to consider and evaluate any potential impacts to floodplains and wetlands resulting from the Grantee's proposed construction. We are interested in any practicable alternatives to locating at the preferred site; any use or zoning restrictions; conformance to local plans; positive and negative direct and indirect impacts; short-term and long-term impacts; and, feasible mitigation measures.

Please provide your comments within 15 days of the date of this publication and direct your comments to Donna M. Meyer, Deputy Regional Environmental Officer at FEMA, Region IX, 1111 Broadway, Suite 1200, Oakland, CA, 94607 or by email to fema-rix-ehp-documents@dhs.gov.



Drainage Technical Memorandum
Siphon Draw Wash
Water Surface Elevation Analysis

Prepared for
The City of Mesa



EPS Project No. 10-039

City of Mesa Proj. No. 10-757-001

Date: July 2010

2045 S. Vineyard Avenue, Suite 101

Mesa, AZ 85210

o: 480.503.2250

f: 480.503.2258

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Appendix E – HEC-RAS Model Output Files (Existing and Future Conditions)



1.0 Introduction

1.1 Background

The City of Mesa (City) is proposing to construct a new fire station using federal funding administered by the Federal Emergency Management Agency (FEMA). Fire stations are considered “critical action” facilities according to Executive Order 11988 and as such, 44 Code of Federal Regulations (CFR) Part 2 requires that they be designed to the 500-year storm event. Fire Station No. 219 is proposed near the intersection of Signal Butte Road and Elliot Road, near the Siphon Draw Wash (SDW) where the floodplain has not been determined (see Figure 1-1 for the Location/Vicinity map). Reasons for locating Fire Station 219 at the proposed site are detailed in the Environmental Report, 'Alternatives Analysis' section.

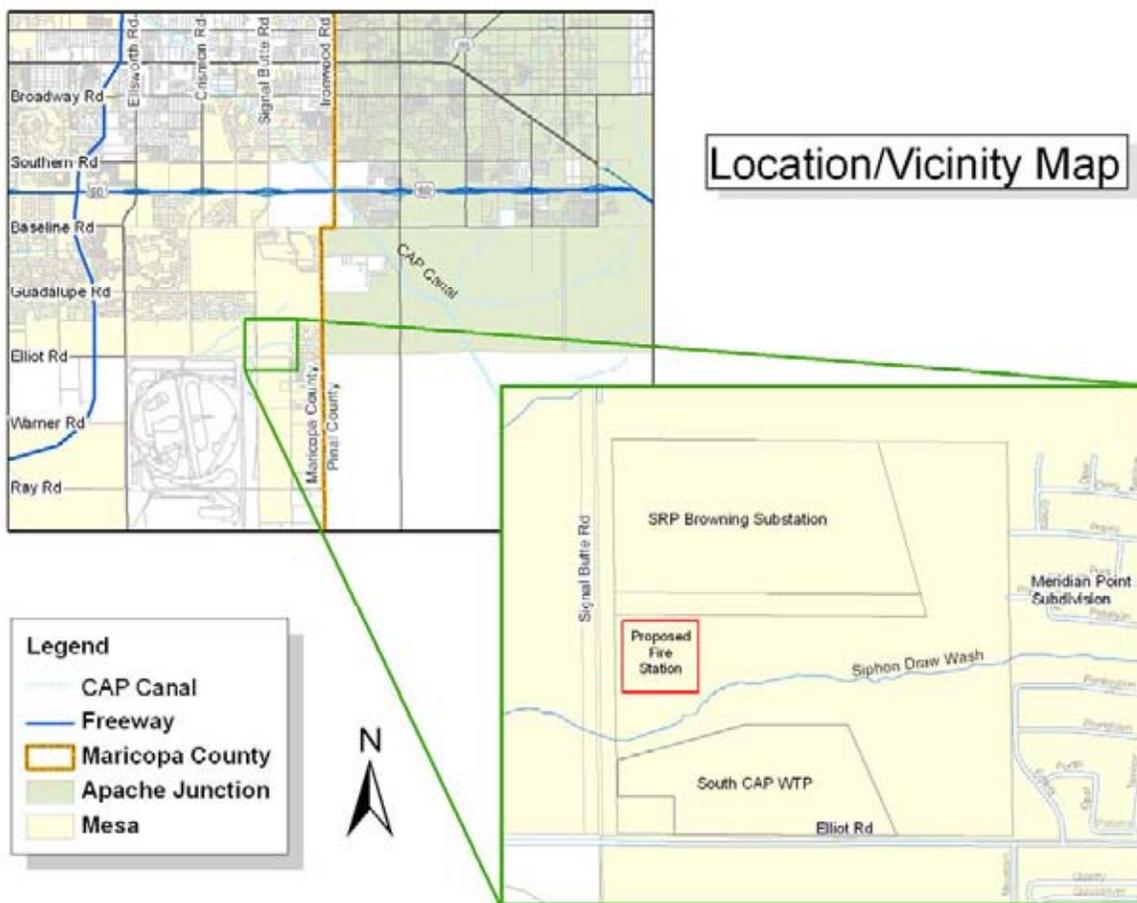


Figure 1–1 Location/Vicinity Map



1.2 Purpose

The purpose of this technical memorandum is to document the hydrologic and hydraulic analyses used to determine the 500-year water surface elevation at which the finished floor elevation for City of Mesa Fire Station 219 will be set at or above.

1.3 Existing Drainage Characteristics

Siphon Draw Wash is a meandering shallow desert wash that drains from east to west. It originates near the CAP canal, approximately 3 miles to the east, (See Figure 1-1) and terminates at the Elliot Road Detention basin (approximately one mile to the west). The SDW has multiple flow paths between the Meridian Point subdivision and Signal Butte Road.

The contributing drainage area for the SDW as it crosses Signal Butte Road is approximately 5.3 square miles (see Figure 2-1). In order to attenuate the peak flow within the SDW, the Flood Control District of Maricopa County (FCDMC) recently constructed a detention basin east of Meridian Road that intercepts the flows from the SDW and Meridian Road Channel (see Figure 2-1 for detention basin location).



2.0 Hydrology

2.1 Base Hydrology

The hydrology calculations are based upon a modified version the HEC-1 model (SDW100AB.dat) developed by the FCDMC to estimate flow from the newly constructed Siphon Draw Basin per as-built measurements. The FCDMC SDW as-built model was ultimately derived from previous HEC-1 models that were developed as a part of the East Mesa Area Drainage Master Plan (EMADMP).

The base hydrology model is run in two parts. The first part, N60EM.dat, is a direct carryover from the EMADMP. It estimates the peak flows that are generated from the drainage areas to the north and east of the CAP canal. The FCDMC as-built model, SDW100AB.dat, reads flow data from the N60EM.dss file to define runoff that is carried over the CAP canal at two overchute locations.

2.2 Design Hydrology

The FCDMC SDW as-built model estimates flows for the 100-year 24-hour storm event assuming fully developed conditions. This model was modified for this drainage analysis to estimate runoff for the 500-year 24-hour storm under existing and fully developed conditions. The SCS Type II rainfall pattern was used to determine the temporal distribution for the 500-year 24-hour events.

2.3 Model Parameters

A summary of the modified drainage area model parameters for existing and proposed conditions are reported in Appendix A.

2.3.1 Drainage Area Boundaries

The base drainage area boundaries from the FCDMC as-built model were designed to estimate flows at the Elliot Road detention basin, which is located approximately one mile to the west of the proposed fire station site (see Figure 2-1). To better reflect the catchment area that directly contributes to the SDW at Signal Butte Road, the following basin modifications were made:

- Basin 65AW was removed from the model because it does not directly feed into SDW. Instead it crosses Signal Butte Road to the north of the SRP Browning Substation and flows into the Elliot Road detention basin via another unnamed wash.
- A portion of Basin 65B (north of the SRP Browning Substation) flows to the Elliot Road detention basin via the same route as Basin 65AW. This area was removed from the design model.
- The area of Basin 65B west of Signal Butte Road was also removed from the design model.



- Although delineated as separate basins in the Final Design Report for the Siphon Draw Wash Drainage Improvements, Basins 65A3 and 65A3A were treated as one basin in the FCDMC (65A3) as-built model. A single/combined Basin 65A3 was used in the design model for this analysis.

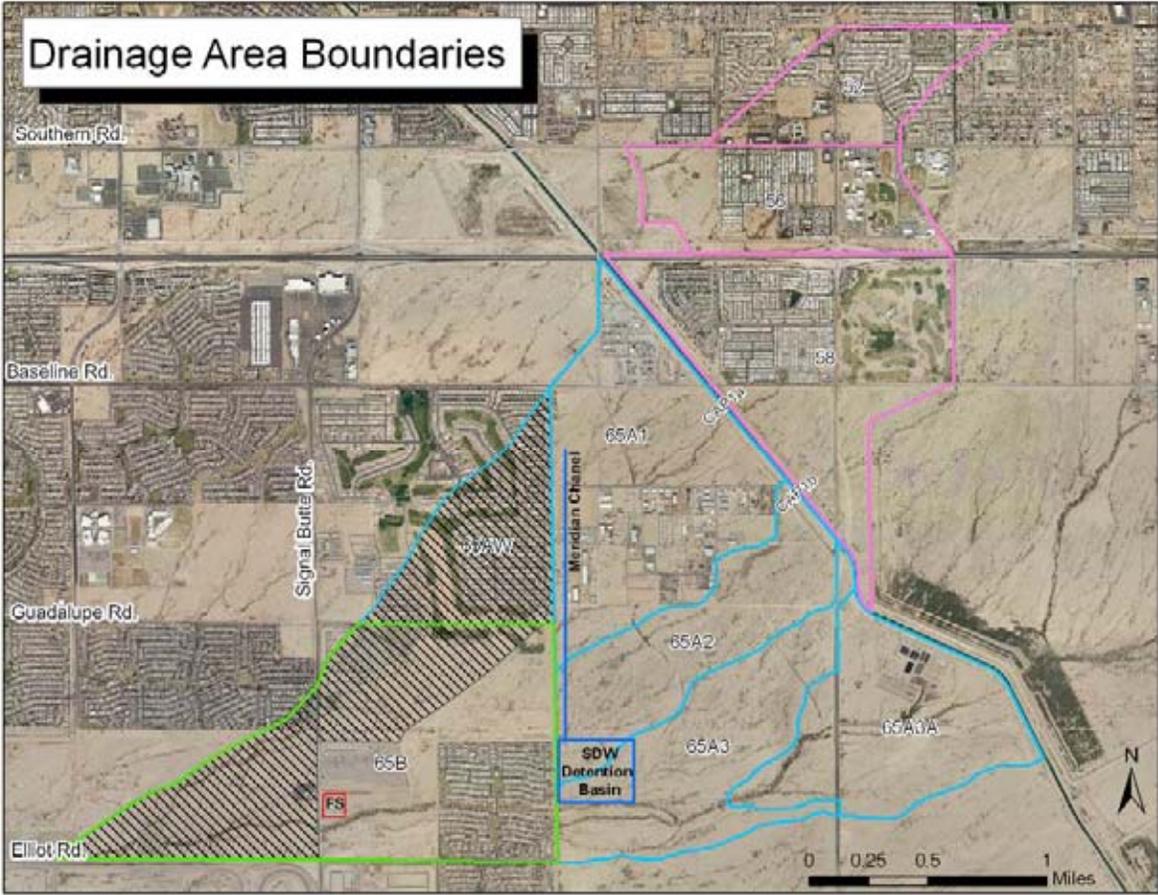


Figure 2–1 Drainage Area Boundaries

The hatched areas of Figure 2-1 represent the portions of the base model drainage areas that were removed from the current design model because they do not contribute to the flow in SDW near the fire station site.

2.3.2 Rainfall

The point precipitation value used for the 500-year 24-hour storm event was 4.46 inches. This value was obtained from the NOAA Atlas 14 online precipitation frequency data server (latitude 33.352 N/longitude 111.597 W).

The depth area reduction factors for the 24-hour storm were taken from Figure 15 of the National Weather Service HYDRO-40, as reported in the FCDMC DDM - Hydrology (2009) and applied to the 500 year point precipitation value to estimate the equivalent uniform depth across the entire drainage basin. The aerially reduced precipitation values used in the design model are presented in table 2-1.



Table 2-1 Aerially reduced point precipitation values

Watershed Area (miles ²)	Aerial Reduction factor	500-yr 24hr storm
0 miles	1.000	4.46
1 mile	0.995	4.44
5 miles	0.975	4.35
10 miles	0.950	4.24

2.3.3 Land Use

Land use classifications are used to estimate hydrologic parameters that define rainfall losses and basin lag factors for the S-graph unit hydrograph synthesis. Existing land use was estimated by examining recent aerial imagery of the drainage watersheds. Table 2-2 lists the land use types and the associated hydrologic parameters that were used to develop the existing conditions design hydrology model. The land use types and hydrologic parameters are consistent with the values for the base HEC-1 model prepared for the EMADMP.

Table 2-2 Land use hydrologic parameters

Land Use Type	DTHETA type	% Vegetation	% Impervious	IA	Kn
Desert	Dry	25%	0%	0.35	0.09
Industrial	Normal	*25%	55%	0.15	0.03
Medium Density Residential	Normal	50%	45%	0.25	0.05
Vacant	Dry	10%	0%	0.35	0.09

*The % vegetation used for the industrial land use type was modified from 60% to 25% to better reflect existing conditions.

The hydrologic parameters DTHETA, % vegetation, % impervious, and IA were used to modify the rainfall loss variables in the existing conditions model. The variable Kn was used to estimate new basin lag times for the existing conditions model.

2.3.4 Rainfall Losses

The Green and Ampt method was used to estimate rainfall losses for the current hydrology model. It was assumed that the soil parameters used in the base models were valid for the current analysis. The reported PSIF values from the base model were used to determine the unadjusted XKSAT and DTHETA variables for each basin per Figure 4.3 of the DDM - Hydrology (2009). The procedures outlined in the DDM were used to determine the loss parameters for the existing conditions model based upon the current land uses.

2.3.5 Unit Hydrographs

The Phoenix Valley S-Graph was used to estimate unit hydrographs for the drainage basins per the methods outlined in the DDM – Hydrology (2009). The Unit hydrographs are dependant on the basin lag time which is also affected by the land use type. The basin lag times were adjusted to account for the mean Manning's roughness of the drainage basins under existing conditions using the following US Army Corp of Engineers equation:



$$Lag = 24k_n \left[\frac{L \cdot L_{ca}}{S^{0.5}} \right]^{0.38}$$

Where:

- Lag = basin lag in hours
- L = length of longest watercourse, in miles
- L_{ca} = length along the watercourse to a point opposite the basin centroid, in miles
- S = watercourse slope, in feet/mile
- k_n = estimated mean Manning’s roughness for all channels within a basin

Unit hydrographs were calculated using a 5 minute interval to remain consistent with the tabulation interval of the hydrology model.

2.3.6 Siphon Draw Detention Basin Outlet

The FCDMC as-built model reported the stage-storage-discharge values for the newly constructed basin up to a peak water surface elevation of 1499 ft (see table 2-3). The storage values used for the model were reduced by 5 acre-ft from the actual as-built measurements to account for future sediment deposits within the basin.

Additional storage and discharge capacity had to be estimated for the current hydrology model to handle the peak flows generated during the 500-year storm event. The Siphon Draw Drainage Improvement plans indicate that the detention basin has a minimum top elevation of 1500 ft. The storage volume for the 1500 ft water surface elevation was linearly extrapolated from the as-built data. The Federal Highway Administrations HY-8 software package was used to estimate the additional discharge capacity at the 1500 ft water surface elevation. Approximately half of the peak discharge may be attributed to flow over the spillway. The results of this simulation are reported in Appendix B.

Table 2-3 Stage-Storage-Discharge values for the Siphon Draw Detention Basin

	Listed in SDW100AB.dat file									Estimated using HY-8	
Storage acre-ft	0	0	11	23	134	185	237	263	289	341	367
Discharge	0	28	82	152	234	328	432	474	526	1000	1070
Elevation	1492	1493	1494	1495	1496	1497	1498	1498.5	1499	1500	1500.2

2.3.7 HEC-1 Models

- The 500-year future conditions model (SDW500FC.dat) modifies the FCDMC as-built hydrology model for the Siphon Draw detention basin to reflect the rainfall data of the 500-year 24-hour event. It also removes the drainage areas that do not contribute to the SDW (refer to section 2.3.1 for discussion) and adds an additional data point (elev. = 1500.2) in the stage-storage-discharge table of the Siphon Draw Detention basin to handle the additional runoff from the 500-year storm.
- The 500-year existing conditions model (SDW500EC.dat) modifies the basin loss parameters and unit hydrographs of the contributing drainage areas to reflect the existing land use types. It also removes/reduces estimated on-site retention (represented as diversions) assumed for the fully developed conditions. Figure 2-2 presents a schematic of the existing conditions HEC-1 hydrology model.



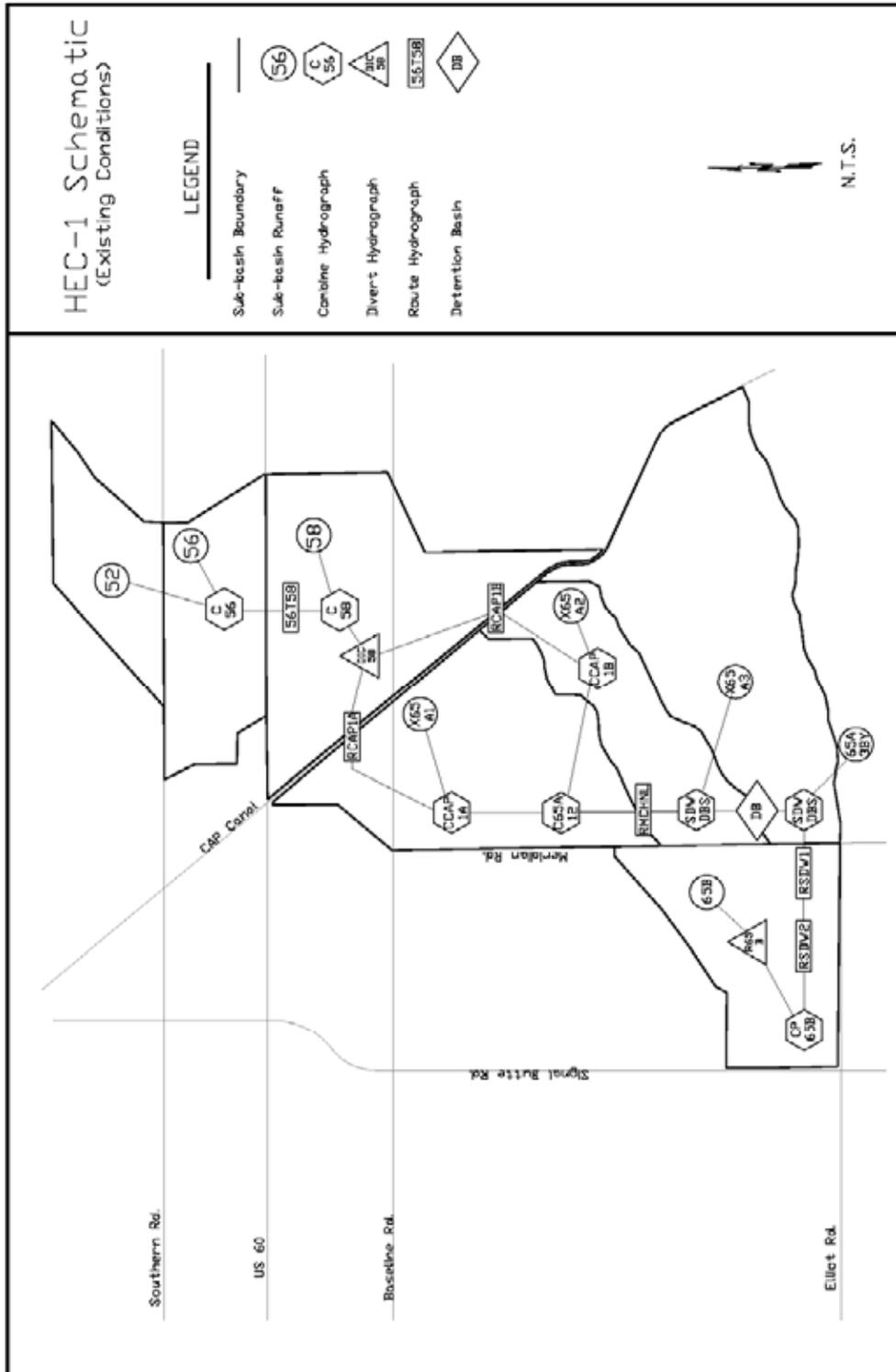


Figure 2-2 HEC-1 Model Schematic (existing conditions)

The N60EM.dat file was also updated with the 500-year 24-hour rainfall data and renamed N60_500.dat. The associated N60_500.dss file was referenced in the current 500-year 24-hour event models.



2.4 Hydrology Results

The results of the hydrology models for the 500-year 24-hour storm are summarized in Table 2-4. Appendix C contains the HEC-1 outputs with a complete list of peak discharges for both hydrology models.

Table 2-4 Hydrology Peak Flow Summary

Base Model	500-year, 24-hour
Existing Hydrologic Conditions	750 cfs
Future Hydrologic Conditions	1104 cfs

2.4.1 General Hydrology Observations

The following results were observed:

- Basin 65B dictates the peak flow at the outlet under existing conditions.
- The future conditions model assumes that additional on-site retention will be provided. The additional retention in the developed conditions model attenuates the flow from basin 65B. Runoff from the SDW detention basin determines the peak flow at the outlet.
- The maximum storage/elevation/discharge data point for the Siphon Draw Detention basin in the HEC-1 model had to be increased to 1500.2 feet and 1070 cfs. This was done to avoid warning messages in the HEC-1 model associated with overtopping the SDW detention basin in the 500-year 24-hour future conditions event.



3.0 Hydraulics

The water surface elevation for the Siphon Draw Wash was estimated using the US Army Corps of Engineers Hydrologic Engineering Centers River Analysis System (HEC-RAS). Water surface elevations were estimated for the SDW between Mountain Road and Signal Butte Road for the 500-year 24-hour rainfall event under existing conditions and for future conditions with the proposed fire station incorporated into the model.

3.1 Steady Flow Data

The peak flow data reported in Table 2-4 was used for the HEC-RAS model. A normal depth boundary condition was assumed for the downstream portion of the river reach with an estimated average natural ground slope of 0.06 ft/ft. The flow was assumed to be in the sub-critical regime.

3.2 Geometric Data

Cross-sections were cut from the existing digital terrain model (DTM). A Manning's n-value of 0.05 was assumed for the main channel and overbank areas similar to what was used in previous hydraulic studies of the SDW. Contraction and expansion coefficients were generally set at 0.1 and 0.3, respectively.

Appendix D contains exhibits that illustrate the cross-section locations for the existing and future conditions models.

The future conditions model modified the existing cross-sections to reflect the proposed grades of the Fire Station No. 219 and associated retention basin. An additional cross-section was added to the future conditions model to capture the water surface elevation at the eastern boundary of the fire station site.

3.3 Culvert Data

Culvert data from the proposed Signal Butte Roadway Improvements were used for both the existing and future conditions model. The proposed roadway improvements include a double barrel 3'x6' concrete box culvert and a single barrel 3'x6' concrete box culvert where the SDW crosses Signal Butte Road. The proposed roadway profile was also used to estimate the potential for overtopping Signal Butte Road.

3.4 Hydraulic Results

3.4.1 Water Surface Elevation - Existing Hydrologic Conditions

Flows within the Siphon Draw Wash under existing hydrologic conditions remain in the subcritical regime with channel velocities ranging between 1.6 and 3.4 cubic feet per second. The shallow, meandering wash is unable to contain the flow from the 500-year 24-hour rainfall event within its natural banks. As such, the flow spreads out between the South CAP Reservoir/Booster Pump Station and the SRP Browning Substation. The proposed Fire Station No. 219 constrains the SDW near Signal Butte Road. The calculated water surface elevations adjacent to the proposed site for Fire Station No.



219 is 1466.25 (see cross section No. 5 from the existing conditions with fire station improvements model).

The 500-year storm event appears to overtop Signal Butte Road in front of the proposed fire station site under existing conditions. Appendix E contains the HEC-RAS outputs for the existing conditions hydraulic analysis.

3.4.2 Water Surface Elevation – Future Hydrologic Conditions

Under future hydrologic conditions, runoff remains within the subcritical regime with channel velocities ranging between 1.7 and 3.3 cubic feet per second. However, the flow within the Siphon Draw Wash is constrained between the South CAP Reservoir/Booster Pump Station levee and the proposed retention basin/levee immediately south of the fire station. The reduced cross-sectional area caused the calculated water surface elevation to rise to 1466.45 for the 500-year event (see cross-section No.5 from the future conditions model).

The 500-year storm event appears to overtop Signal Butte Road in front of the proposed fire station site under future conditions. Appendix E contains the HEC-RAS output for the future conditions hydraulic analysis.

3.4.3 General Hydraulic Observations

The following general observation was made:

- The proposed Fire Station finished floor elevation should be set at or above 1466.45 to mitigate the risk of flooding in the 500-year 24-hour rainfall event.



4.0 References

- EPS Group Inc, *Initial Drainage Report – South CAP Reservoir and Booster Pump Station*, August 2005
- Federal Highway Administration, *HY-8, Version 7.2*, July 2009
- Flood Control District of Maricopa County, *East Mesa Area Drainage Master Plan – Volumes 1 and 2*, October 1998.
- Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County – Volume 1 Hydrology*, November 2009.
- Flood Control District of Maricopa County, *Draft Drainage Design Manual for Maricopa County – Volume 2 Hydraulics (Draft)*, April 2010.
- Kimley Horne and Associates, *Final Drainage Technical Memorandum - Street Improvements Signal Butte Road and Elliot Road*, May 2010.
- Stanley Consultants, *Final Design Report – Siphon Draw Wash Drainage Improvements Project – Volumes 1 and 2*, January 2009.
- U.S. Army Corps of Engineers, Hydrologic Engineering Center, *HEC-1 Flood Hydrograph Package, Version 4.1*, June 1998.
- U.S. Army Corps of Engineers, Hydrologic Engineering Center, *HEC-RAS River Analysis System, Version 4.1.0*, January 2010.
- Wood Patel and Associates, Inc, *Siphon Draw Drainage Improvements – Pre-Design Report*, August 2004



Appendix A

- Drainage Area Model Parameters

The EMADMP future conditions model (N60EM.dat) provides hydrologic parameters for basins 52, 56, and 58 in developed conditions. These three basins are currently ~75% developed. Therefore the Green and Ampt loss parameters, lag, and unit hydrographs were not adjusted for the existing conditions model. The values used are as follows:

Basin 52

Basin Parameters

Area (miles ²)	L (miles)	Lca (miles)	Kn	S (ft/mile)	Lag (min)
0.433	1.64	0.74	0.04	54.9	36

Loss Parameters

IA	DTHETA	PSIF	XKSAT _{adj}	RTIMP
0.2	0.19	6.6	0.18	45%

Basin 56

Basin Parameters

Area (miles ²)	L (miles)	Lca (miles)	Kn	S (ft/mile)	Lag (min)
0.547	0.95	0.51	0.04	57.9	33

Loss Parameters

IA	DTHETA	PSIF	XKSAT _{adj}	RTIMP
0.18	0.15	7.3	0.14	54%

Basin 58

Basin Parameters

Area (miles ²)	L (miles)	Lca (miles)	Kn	S (ft/mile)	Lag (min)
0.95	1.13	0.51	0.08	50.4	28

Loss Parameters

IA	DTHETA	PSIF	XKSAT _{adj}	RTIMP
0.12	0.24	5.6	0.29	56%

Data from the FCDMC as-built model (SDW100AB.dat) was used whenever possible to calculate the hydrologic parameters for basins 65A1, 65A2, 65A3 and 65B. The values for area, L, Lca, S, and PSIF were read directly from the as-built model.

Basin 65A1

Basin Parameters

Area (miles ²)	L (miles)	Lca (miles)	S (ft/mile)	PSIF
0.971	1.9	1.4	31.5	5.0

Land Use

Area	Land Use Type	DTHETA type	% Vegetation	% Impervious	IA	Kn
230	Desert	Dry	25%	0%	0.35	0.09
177	Industrial	Normal	25%	55%	0.15	0.03
0	Med Resident	Normal	50%	45%	0.25	0.05
0	Vacant	Dry	10%	0%	0.35	0.09
407			25%	24%	0.26	0.064

Directly calculate LAG

$$24x(.064)*((1.9x1.4)/31.5^{.5})^{.38}=1.16\text{hr}=70\text{min}$$

Read XKSAT and DTHETA off of graph from DDM for Maricopa County (Figure 4.3)

XKSAT	DTHETA _{dry}	DTHETA _{norm}
0.226	0.359	0.253

Adjust XKSAT for % vegetation (look up coefficient from Fig 4.4 from DDM for Maricopa County)

$$\text{XKSAT}_{\text{adj}}=0.226*1.16=0.262$$

Compute weighted DTHETA per land use

$$\text{DTHETA}_w=0.57*.359+0.43*0.253=0.313$$

Basin 65A2

Basin Parameters

Area (miles ²)	L (miles)	Lca (miles)	S (ft/mile)	PSIF
0.544	1.5	0.9	42.8	4.6

Land Use

Area	Land Use Type	DTHETA type	% Vegetation	% Impervious	IA	Kn
348	Desert	Dry	25%	0%	0.35	0.09
0	Industrial	Normal	25%	55%	0.15	0.03
0	Med Resident	Normal	50%	45%	0.25	0.05
0	Vacant	Dry	10%	0%	0.35	0.09
348			25%	0%	0.35	0.090

Directly calculate LAG

$$24x(.09)*((1.5x0.9)/42.8^{.5})^{.38}=1.19\text{hr}=71\text{min}$$

Read XKSAT and DTHETA off of graph from DDM for Maricopa County (Figure 4.3)

XKSAT	DTHETA _{dry}	DTHETA _{norm}
0.252	0.344	0.253

Adjust XKSAT for % vegetation (look up coefficient from Fig 4.4 from DDM for Maricopa County)

$$\text{XKSAT}_{\text{adj}}=0.252*1.16=0.292$$

Compute weighted DTHETA per land use

$$\text{DTHETA}_w=1*.344+0*0.253=0.344$$

Basin 65A3

Basin Parameters

Area (miles ²)	L (miles)	Lca (miles)	S (ft/mile)	PSIF
1.207	2.1	1.2	27.9	4.6

Land Use

Area	Land Use Type	DTHETA type	% Vegetation	% Impervious	IA	Kn
737	Desert	Dry	25%	0%	0.35	0.09
35	Industrial	Normal	25%	55%	0.15	0.03
0	Med Resident	Normal	50%	45%	0.25	0.05
0	Vacant	Dry	10%	0%	0.35	0.09
772			25%	2%	0.34	0.087

Directly calculate LAG

$$24x(.087)*((2.1x1.2)/27.9^{.5})^{.38}=1.58\text{hr}=95\text{min}$$

Read XKSAT and DTHETA off of graph from DDM for Maricopa County (Figure 4.3)

XKSAT	DTHETA _{dry}	DTHETA _{norm}
0.252	0.344	0.253

Adjust XKSAT for % vegetation (look up coefficient from Fig 4.4 from DDM for Maricopa County)

$$\text{XKSAT}_{\text{adj}}=0.252*1.16=0.292$$

Compute weighted DTHETA per land use

$$\text{DTHETA}_w=0.95*.344+0.05*0.253=0.340$$

Basin 65B

Basin Parameters

Area (miles ²)	L (miles)	Lca (miles)	S (ft/mile)	PSIF
0.677	1.52	0.82	31.7	6.0

Land Use

Area	Land Use Type	DTHETA type	% Vegetation	% Impervious	IA	Kn
224	Desert	Dry	25%	0%	0.35	0.09
0	Industrial	Normal	25%	55%	0.15	0.03
160	Med Resident	Normal	50%	45%	0.25	0.05
50	Vacant	Dry	10%	0%	0.35	0.09
434			32%	17%	0.31	0.075

Directly calculate LAG

$$24x(.075)*((1.52x0.82)/31.7^{.5})^{.38}=0.99\text{hr}=59\text{min}$$

Read XKSAT and DTHETA off of graph from DDM for Maricopa County (Figure 4.3)

XKSAT	DTHETA _{dry}	DTHETA _{norm}
0.148	0.4	0.25

Adjust XKSAT for % vegetation (look up coefficient from Fig 4.4 from DDM for Maricopa County)

$$\text{XKSAT}_{\text{adj}}=0.148*1.255=0.186$$

Compute weighted DTHETA per land use

$$\text{DTHETA}_w=0.63*.40+0.37*0.25=0.345$$

Basin 65B Future Conditions

Land Use

Area	Land Use Type	DTHETA type	% Vegetation	% Impervious	IA	Kn
0	Desert	Dry	25%	0%	0.35	0.09
0	Industrial	Normal	25%	55%	0.15	0.03
384	Med Resident	Normal	50%	45%	0.25	0.05
50	Vacant	Dry	10%	0%	0.35	0.09
434			45%	40%	0.26	0.054

Directly calculate LAG

$$24x(.054)*((1.52x0.82)/31.7^{.5})^{.38}=0.71\text{hr}=43\text{min}$$

Read XKSAT and DTHETA off of graph from DDM for Maricopa County (Figure 4.3)

XKSAT	DTHETA _{dry}	DTHETA _{norm}
0.148	0.4	0.25

Adjust XKSAT for % vegetation (look up coefficient from Fig 4.4 from DDM for Maricopa County)

$$\text{XKSAT}_{\text{adj}}=0.148*1.4=0.207$$

Compute weighted DTHETA per land use

$$\text{DTHETA}_w=0.12*.40+0.88*0.25=0.27$$

Appendix B

- HY-8 Estimate of the Siphon Draw Detention Basin Outlet Capacity.

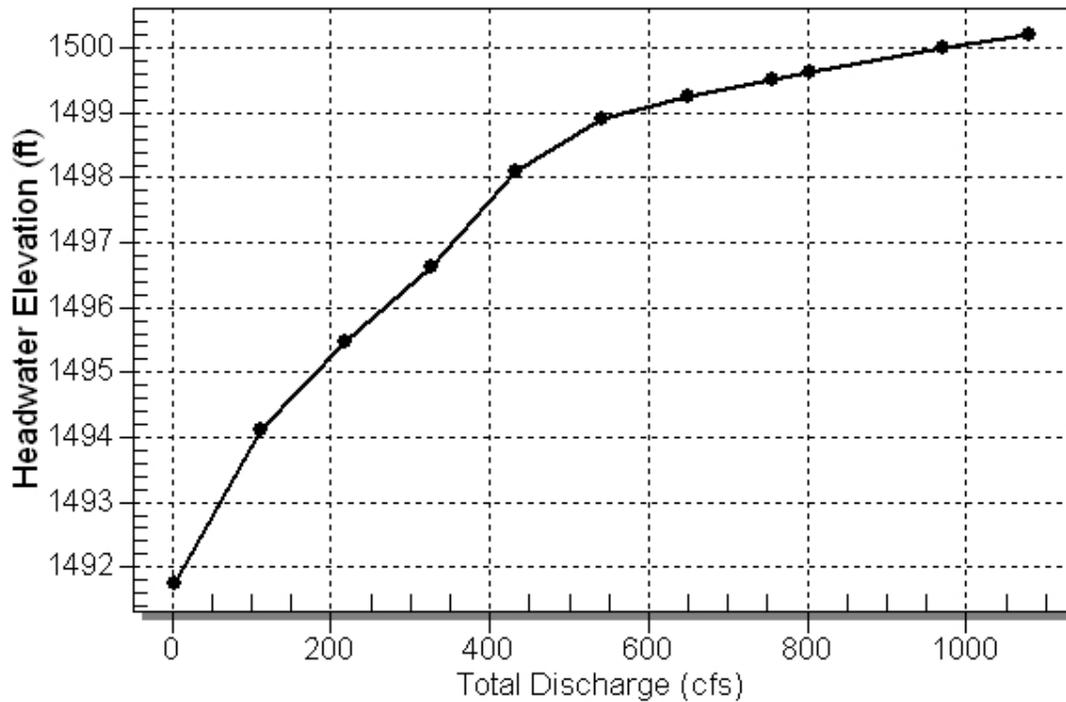
HY-8 Culvert Analysis Report

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1491.75	0.00	0.00	0.00	1
1494.11	107.50	107.50	0.00	1
1495.47	215.00	215.00	0.00	1
1496.64	322.50	322.50	0.00	1
1498.09	430.00	430.00	0.00	1
1498.91	537.50	481.30	56.17	5
1499.25	645.00	501.12	143.79	5
1499.53	752.50	516.62	235.53	4
1499.64	800.00	522.78	277.03	4
1500.00	967.50	541.79	425.54	4
1500.20	1075.00	552.60	522.31	4
1498.50	456.21	456.21	0.00	Overtopping

Table 1 - Summary of Culvert Flows at Crossing: SDW outlet

Rating Curve Plot for Crossing: SDW outlet

Total Rating Curve
Crossing: SDW outlet



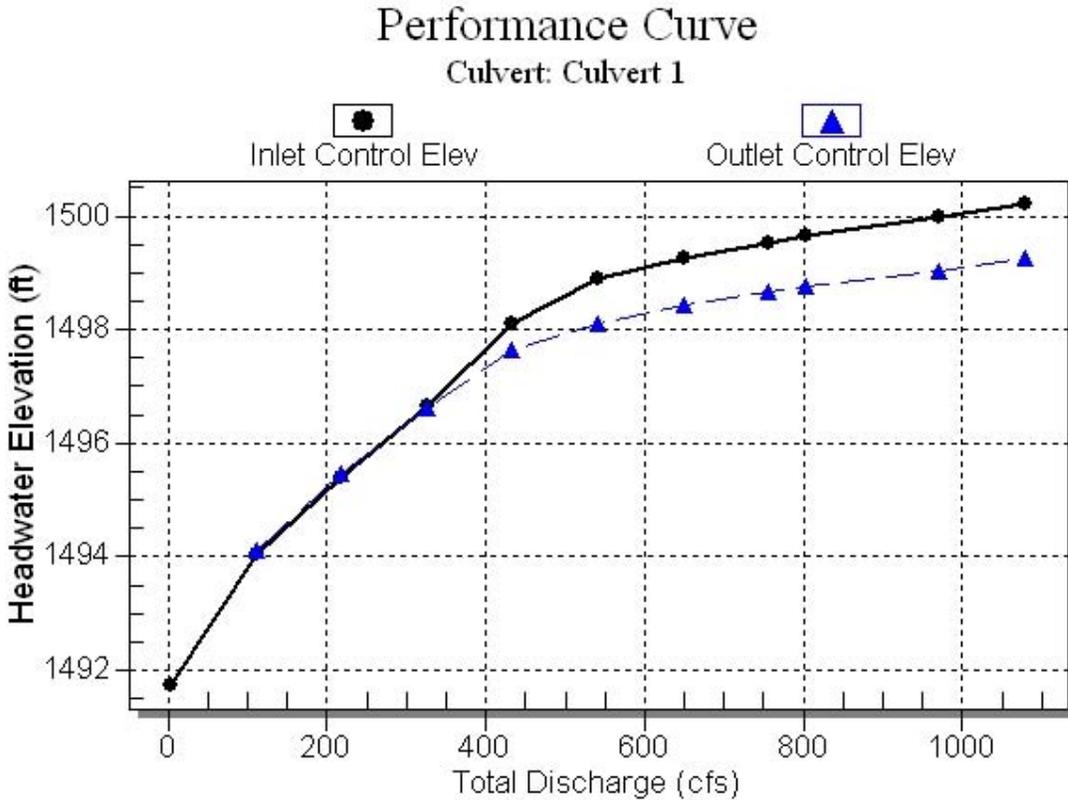
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	1491.75	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
107.50	107.50	1494.11	2.310	2.360	2-M2c	1.376	1.359	1.357	1.346	6.602	2.916
215.00	215.00	1495.47	3.636	3.725	2-M2c	2.249	2.157	2.149	1.981	8.335	3.628
322.50	322.50	1496.64	4.888	4.867	2-M2c	3.034	2.826	2.819	2.468	9.535	4.100
430.00	430.00	1498.09	6.343	5.886	2-M2c	4.000	3.424	3.415	2.876	10.491	4.462
537.50	481.30	1498.91	7.161	6.350	7-M2c	4.000	3.691	3.682	3.234	10.894	4.758
645.00	501.12	1499.25	7.501	6.695	7-M2c	4.000	3.792	3.782	3.555	11.042	5.010
752.50	516.62	1499.53	7.778	6.925	7-M2c	4.000	3.869	3.859	3.847	11.155	5.231
800.00	522.78	1499.64	7.890	7.011	7-M2c	4.000	3.900	3.890	3.970	11.199	5.320
967.50	541.79	1500.00	8.246	7.268	7-M2c	4.000	3.994	3.984	4.370	11.334	5.608
1075.00	552.60	1500.20	8.454	7.517	4-FFf	4.000	4.000	4.000	4.607	11.513	5.772

Table 2 - Culvert Summary Table: Culvert 1

* theoretical depth is impractical. Depth reported is corrected.

 Inlet Elevation (invert): 1491.75 ft, Outlet Elevation (invert): 1491.50 ft
 Culvert Length: 85.00 ft, Culvert Slope: 0.0029

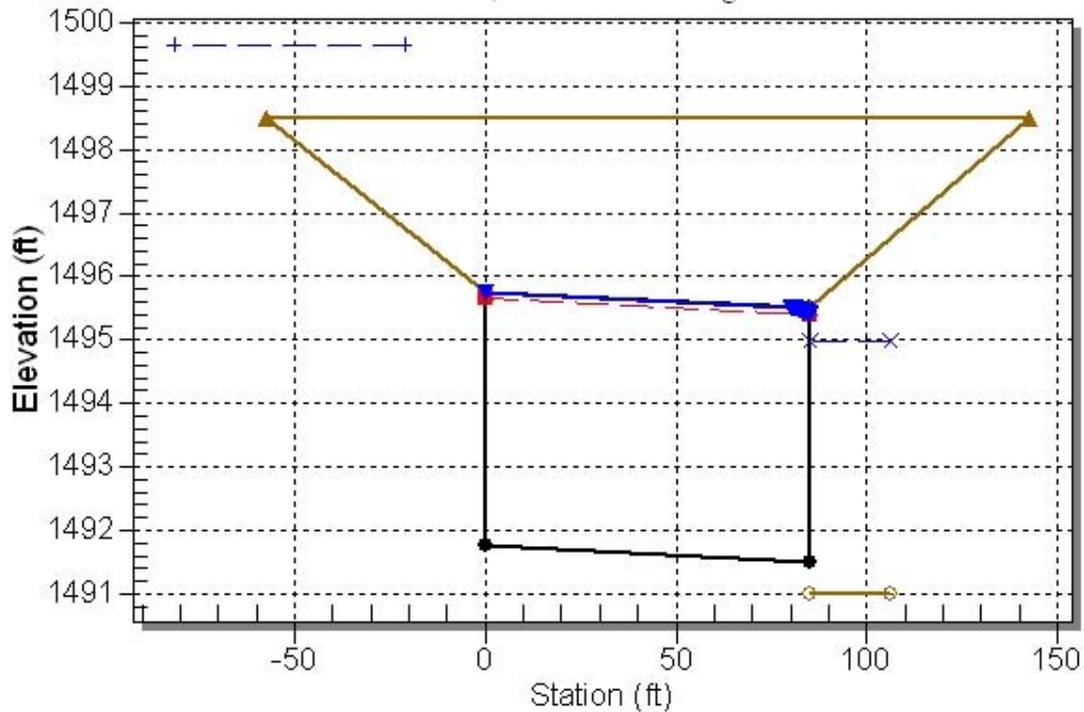
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1

Crossing - SDW outlet, Design Discharge - 800.0 cfs

Culvert - Culvert 1, Culvert Discharge - 522.8 cfs



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1491.75 ft

Outlet Station: 85.00 ft

Outlet Elevation: 1491.50 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Square Edge (90°) Headwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: SDW outlet)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	1491.00	0.00	0.00	0.00	0.00
107.50	1492.35	1.35	2.92	0.25	0.48
215.00	1492.98	1.98	3.63	0.37	0.51
322.50	1493.47	2.47	4.10	0.46	0.53
430.00	1493.88	2.88	4.46	0.54	0.54
537.50	1494.23	3.23	4.76	0.61	0.55
645.00	1494.55	3.55	5.01	0.67	0.55
752.50	1494.85	3.85	5.23	0.72	0.56
800.00	1494.97	3.97	5.32	0.74	0.56
967.50	1495.37	4.37	5.61	0.82	0.57
1075.00	1495.61	4.61	5.77	0.86	0.57

Tailwater Channel Data - SDW outlet

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 22.00 ft

Side Slope (H:V): 4.00 (1:1)

Channel Slope: 0.0030

Channel Manning's n: 0.0300

Channel Invert Elevation: 1491.00 ft

Roadway Data for Crossing: SDW outlet

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 80.00 ft

Crest Elevation: 1498.50 ft

Roadway Surface: Gravel

Roadway Top Width: 200.00 ft

Appendix C

- HEC-1 Model Output Files

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 28JUN10 TIME 13:33:50
*
*****
  
```

SDW500EX.txt

```

*****
*
* U. S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****
  
```

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X X XXXXXXX XXXX X
X X X X X XX
X X X X X X
XXXXXX XXXX X XXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXX XXX
  
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS: WRITE STAGE FREQUENCY, DSS: READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE: GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID Model: Siphon draw wash as-built conditions
3 ID Single Online Basin to Siphon Draw Wash & Meridian Channel
4 ID
5 ID Project: Siphon Draw Wash Hydro for FS 219 site
6 ID Contract CofM: 01-757-001
7 ID EPS Project No: 10-039
8 ID
9 ID Notes By: EPS Group Inc.
10 ID Revision Date: May 2010
11 ID
12 ID Filename: SDW500EX.DAT
13 ID Storm Event: 500-Yr, 24 Hrs
14 ID Conditions: Existing Conditions
15 ID
16 ID Comments:
17 ID This file is based on the SDW100AB.DAT model prepared to capture the as-built
18 ID conditions of the Siphon Draw Wash Detention Basin. It removes all elements
19 ID contributing to the SDW west of Signal Butte Road. The loss parameters, unit
20 ID hydrographs, and retention volumes were modified to represent existing cond.
21 ID Point precip values were edited to reflect the 500yr 24hr storm.
22 ID
23 ID Use the N60_500.DSS file for this model to pull in hydrographs from basins
24 ID from the north side of the CAP canal.
25 ID
26 ID The following comments were included in the SDW100AB.DAT file:
27 ID
28 ID
29 ID This design model includes:
30 ID
31 ID * A single basin online detention basin to both SDW
32 ID and the Meridian Channel.
33 ID * Reduces excavated volume of the basin by 5 acre-ft based upon
34 ID the assumption that 5 acre-ft of sediment would accumulate within
35 ID the basin before removal.
36 ID * Eliminates the Elliot Rd storm drain extension which previously was
37 ID to serve as the basin outlet. Instead the basin was enlarged and now
38 ID discharges directly to SDW just upstream of Meridian Road and passes
39 ID through the Meridian Pointe subdivision.
40 ID * Utilizes the revised kn values per direction from FCDMC (utilizes
41 ID subbasins annotated with X as the first letter of the subbasin name
42 ID * Conservatively assumes some area within the drainage easement bypass
43 ID the basin completely and drains directly down SDW to the project
44 ID outfall. This area was not removed from the subbasin 65A3 area so
45 ID the area runoff is essentially accounted for twice. This was assumed
46 ID because it is not know how runoff from the area south of the proposed
47 ID basin will be handled in the future. The runoff (-30 cfs) has minimal
48 ID impact on the basin design.
49 ID * Routing of all flow from the CAP overchutes is assumed to be routed
50 ID to Meridian Channel north of the Guadalupe Road. This is not the case
51 ID for existing conditions. For existing conditions, some flow
52 ID (particularly from CAP2A) would likely not enter the proposed Meridian
53 ID Channel until just north of the proposed detention basin approximately
54 ID * Modifications to the diversion at DI65B where flow is split between
55 ID the Elliot Rd storm drain and the Elliot Detention Basin. The changes
  
```

1 HEC-1 INPUT PAGE 2

SDW500EX.txt

56 ID reflect the removal of an existing orifice plate over the 78" Elliot
57 ID Road storm drain inlet and the installation of a orifice plate (with
58 ID a 24" diameter orifice) over the 78" inlet to the Elliot Road Detention
59 ID basin. While the upstream channel does not appear to have the capacity
60 ID to contain the magnitude of flow indicated for the 100-year event,
61 ID no changes will be made to the upstream channel as part of this
62 ID project.
63 ID * The low flow outlet data for the East Elliot Basin (RS65A SL record)
64 ID from the original hydrology model was changed to be reflect the actual
65 ID outlet design as shown in the design/as-built plans (an 18" low flow
66 ID outlet pipe at an invert elevation of 1426.5). The SL record the low
67 ID flow outlet pipe area was therefore changed from 0.7854 sq ft
68 ID (for a 12" pipe) to 1.7663 sq ft (for an 18" pipe) and the outlet
69 ID pipe centerline elevation was changed from 1430.0 (which is
70 ID actually the inlet grate elevation) to 1427.3 (which is the pipe
71 ID invert of 1426.5 + 0.75 for the CL of an 18" pipe) per design plans.
72 ID
73 ID Model Background:
74 ID
75 ID This model was developed from the base hydrology model (SDW-BASE.DAT)
76 ID produced as part of this project and developed from previous hydrology
77 ID models from previous studies. For this project SDW-BASE.DAT truncated
78 ID the previous hydrologic model S60EMAP1.DAT provided by the FCDMC.
79 ID Any hydrologic elements which do not contribute to runoff along
80 ID Elliot Road, just upstream of the SanTan Freeway Channel (routing
81 ID reach 66T70C) were removed
82 ID
83 ID To run correctly, this model requires referencing a DSS file created
84 ID by the upstream hydrologic model ultimately developed from the
85 ID East Mesa ADMP. For the 100-year, future conditions, this model is
86 ID N60EM.DAT (which produces N60EM.DSS).
87 ID
88 ID This model is a revision of the pre-design submittal to address
89 ID comments from the FCDMC. Revisions included:
90 ID
91 ID * changes to Kn values for the project subbasins
92 ID * adjustment of land area assumed as water (proposed basin site)
93 ID * the reclassification of the proposed basin site as open space
94 ID (as opposed to water as previously defined).
95 ID
96 ID Subbasins with X are: default Kn, with open space-undef. as land use.
97 ID Subbasins w/o a letter are: ADMP Kn, with water as land use.
98 ID
99 ID END SCI INTRODUCTORY COMMENTS
100 ID
101 ID *****
102 ID
103 ID MODEL REVISED 9/12/02 TO CHANGE ZW CARD TO ZR CARD AT HYDROGRAPH CAP1B (CWR)
104 ID
105 ID ID Kirkham Michael:
106 ID Last Revised Date: 5/14/02
107 ID Filename: WS4-SEM.DAT
108 ID
109 ID Comments Dated 5/14/02 (CJ)
110 ID

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HEC-1 INPUT

PAGE 3

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

111 ID This model should be used for the Rittenhouse and Chandler Heights Basin
112 ID Design Project - 30% Design Analyses.
113 ID
114 ID This model is one of several models that represent the EMF watershed.
115 ID This model covers the Southeast Mesa Area and should reference as a DSS
116 ID the watershed model for the Northeast Mesa Area (Filename WS2-NEM.DAT).
117 ID
118 ID This model is necessary to determine the input hydrographs for the
119 ID Rittenhouse Basin Design HEC-RAS Unsteady State analysis. To develop
120 ID the necessary input hydrographs the following models should be run in order.
121 ID Because the files utilize a TAPE21 file to export import hydrographs
122 ID between models, prior to running the FIRST model (WS1-NWM.DAT) any existing
123 ID TAPE21 file in the directory should be deleted. The run procedure order is:
124 ID
125 ID 1) WS1-NWM.DAT
126 ID 2) WS2-NEM.DAT
127 ID 3) WS3-QCSW.DAT
128 ID 4) WS4-SEM.DAT (referencing WS2-NEM.DSS for the DSS file)
129 ID 5) RT1-BASE.DAT
130 ID
131 ID The necessary input hydrographs for the Rittenhouse Basin analysis
132 ID are determined in RT1-BASE. In that output file, the hydrograph at
133 ID RWFLD1 should be exported and used as the input hydrograph at the
134 ID EMF Reach 4 Cross Section 17.082. And the hydrograph at RITTEN should
135 ID be exported and used as the input hydrograph for the Rittenhouse Main
136 ID Channel at Cross Section 820.00
137 ID
138 ID
139 ID *****
140 ID **** NOTE BY PRIMATECH ENGINEERS: ****
141 ID **** DATE: 06/12/2001 ****
142 ID **** THE NEW FILE NAME IS: SEBTALT2.DAT ****
143 ID **** THE FILE WAS RENAMED AS <<RTBTALT2.DAT>> FOR THE EAST MARI COPA ****
144 ID **** FLOODWAY CAPACITY MITIGATION PROJECT, BY FLOOD CONTROL DISTRICT OF ****
145 ID **** MARI COPA COUNTY. ****
146 ID **** THE FILE WAS RENAMED <<RTBTALT3.DAT>> AND UPDATED USING GREEN AND ****

SDW500EX.txt
**** AMPT FUTURE CONDITIONS FOR BASINS 258 TO 268. ****

THIS MODEL WAS ORIGINALLY MIDDOUT.DAT
IT HAS BEEN MODIFIED BY CPE (7/2000)
FOR ALTERNATIVE 2 FOR THE EAST MARI COPA FLOWWAY
CAPACITY MITIGATION AND MULTI-USE CORRIDOR STUDY
TO ROUTE BOTH THE POWERLINE FLOWWAY
AND THE SANTAN FREEWAY CHANNEL INTO THE RAY BASIN PRIOR THEIR OUTFALL
INTO THE EMF

Model files changed by Collins/Pina Engineering
to reflect multi-use design concepts (recreation
and environment) proposed throughout the entire
EMF Corridor. July 2000
HEC-1 INPUT

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PAGE 4

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
166 ID
167 ID
168 ID VERSION 8.06 CPE 7/31/00
169 ID
170 ID *****
171 ID
172 ID
173 ID *****
174 ID FILENAME: MIDDOUT.DAT
175 ID
176 ID ALL CIP INFRASTRUCTURE IS IN PLACE, FUTURE CONDITIONS LANDUSE IS IN PLACE
177 ID FLOW IS ROUTED UP ELLSWORTH ROAD IN A EARTH LINED CHANNEL
178 ID
179 ID *****
180 ID PRODUCED BY DIBBLE AND ASSOCIATES AND HOSKIN ENGINEERING CONSULTANTS.
181 ID File Name: Final8.Dat
182 ID Revised - Jan. 2000 by SZ (Wood/Patel) From Final7.dat - new Z-V & Sidewei r
183 ID Revised - Jan. 2000 by SZ (Wood/Patel) from Final6.dat - 60% review comments
184 ID Revised - Dec. 1999 by SZ (Wood/Patel) from Final5.dat
185 ID Revised - Dec. 1999 by SZ (Wood/Patel) from Final4.dat
186 ID Revised - Nov. 1999 by SZ (Wood/Patel) from Final3.dat
187 ID Revised - June 1999 by SZ (Wood/Patel) for Final Model from Opt1.dat.
188 ID Revised - May 1999 by SZ (Wood/Patel) for Option 1, Based on Model SDIB.DAT
189 ID REVISED - MAY, 1999 BY VAS TO INCORPORATE INCREASE OF SUBBASIN RETENTION AND
190 ID REVISIONS TO THE REGIONAL DETENTION BASIN STORAGE
191 ID REVISED - FEB, 1999 BY VALERIE SWICK, FCD OF MARI COPA COUNTY
192 ID REVISED - MAY, 1998 BY D&A
193 ID
194 ID REVISED BY VALERIE SWICK, FEB. 26, 1998
195 ID
196 ID FLOWS FROM DETENTION BASIN LOCATED AT NE CORNER OF ELLIOT AND ELLSWORTH ROADS
197 ID IS ROUTED TO THE SOUTHWEST BY SIPHON DRAW TO SUBBASIN 70A. FROM THERE THEY
198 ID WILL BE ROUTED BY A CHANNEL TO THE EMF. FLOWS FROM SUBBASINS ADJACENT TO
199 ID SANTAN FREEWAY ALIGNMENT WILL BE ROUTED SOUTH TO SUBBASIN 70A WHERE THEY WILL
200 ID BE COMBINED WITH FLOW IN SIPHON DRAW.
201 ID
202 ID EAST MESA AREA DRAINAGE MASTER PLAN
203 ID AREA SOUTH OF SUPERSTITION (U. S. HWY 60)
204 ID AUGUST 1997
205 ID SOUTHEAST MESA HIGH RESOLUTION MODEL
206 ID
207 ID *****FUTURE CONDITION MODEL OF THE WATERSHED*****
208 ID
209 ID *****ATTENTION*****
210 ID SUBBASINS 75, 79A, 79B, 78E, LANDUSES WERE NOT
211 ID CHANGED BECAUSE IT WAS FELT THAT THEIR FUTURE CONDITIONS LANDUSES WOULD BE
212 ID SIMILAR TO THE EXISTING CONDITIONS LANDUSES.
213 ID RETENTION VOLUMES WILL ALSO NOT BE UTILIZED FOR SUBBASINS 75, 79A, 79B, 78E
214 ID SOME QUEEN CREEK SUBBASINS WILL ALSO NOT HAVE RETENTION VOLUMES, EITHER
215 ID BECAUSE THEY LIE IN PINAL COUNTY AND WE DONT KNOW PINAL COUNTIES PLANS OR
216 ID THEY LIE IN THE SANTAN MOUNTAINS AND WON'T GET DEVELOPED
217 ID WILLIAMS GATEWAY AIRPORT (SUBBASINS 80A, 80B, 81A, AND 81B) ARE MODELED AS
218 ID FUTURE CONDITIONS AND HAVE RETENTION VOLUMES FOR THE 100YR 2HR STORM
219 ID *****
220 ID FILENAME: SDIBB.DAT

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PAGE 5

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
221 ID
222 ID THIS MODEL REPRESENTS THE FUTURE CONDITION OF THE WATERSHED.
223 ID TOTAL DRAINAGE AREA IS APPROXIMATELY 213 SQ. MI.
224 ID THIS MODEL USES A Kn VALUE OF 0.09 FOR DESERT LAND USE DUE TO SHEET FLOW
225 ID CONDITIONS.
226 ID
227 ID 100-YEAR 24-HOUR FREQUENCY
228 ID AREAL REDUCTIONS FROM FCD HYDROLOGY MANUAL
229 ID THIS MODEL INCLUDES INFLOW FROM NORTH OF THE SUPERSTITION FREEWAY
230 ID AND EAST OF THE CAP
231 ID
232 ID DATA FROM THE QUEEN CREEK ADMS HAS BEEN ADDED TO CALCULATE FLOWS INTO THE
233 ID EMF. MUSKINGUM ROUTING NSTEPS WERE ADJUSTED TO BE WITHIN THE SUGGESTED
234 ID RANGE.

SDW500EX.txt

235 ID
 236 ID METHODOLOGY
 237 ID THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
 238 ID SCS TYPE 11 RAINFALL DISTRIBUTION
 239 ID S-GRAPH HYDROGRAPH
 240 ID GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
 241 ID NORMAL DEPTH STORAGE CHANNEL ROUTING
 242 ID APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
 243 ID EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LAND'S AERIAL SURVEYS
 244 ID DATED 1994
 245 ID THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS
 246 ID
 247 ID ORIGINAL STUDY PERFORMED BY LISA C. YOUNG AND AFSHIN AHOURAIYAN, UPDATED BY
 248 ID DAVID DEGERNESS (OCT-DEC, 1996). REVIEWED BY VALERIE A. SWICK
 249 ID AND AMIR MOTAMEDI OF THE FLOOD CONTROL DISTRICT
 250 ID HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
 251 ID DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.
 252 ID
 253 ID ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2-3 FT/SEC FOR WASH/NATURAL
 254 ID CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL
 255 ID
 256 ID VELOCITIES FOR ADMP IMPROVEMENT CHANNELS FROM DIBBLE AND ASSOCIATES
 257 ID SUGGESTED ALTERNATIVES (JULY 1, 1997)
 258 ID
 259 ID *****
 260 ID **** THE FOLLOWING NOTE WAS ADDED BY PRIMATECH ENGINEERS ON 06-12-2001 ****
 261 ID *****
 262 ID NOTE: MUST USE NEBUILD.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
 263 ID SUPERSTITION FREEWAY.
 264 ID *****
 265 ID
 266 ID
 267 ID NOTE: MUST USE NDI BF.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
 268 ID SUPERSTITION FREEWAY.
 269 ID
 270 ID DDM MCUHP2 SOUTH EAST MESA ADMP - SOUTH OF SUPERSTITION FREEWAY, FUTURE CONDI
 *DIAGRAM
 271 IT 5 1APR97 0000 1000
 272 IO 5
 273 IN 15
 274 JD 4.46 0.01

HEC-1 INPUT

PAGE 6

LINE	ID	1	2	3	4	5	6	7	8	9	10
275	PC	.000	.002	.005	.008	.011	.014	.017	.020	.023	.026
276	PC	.029	.032	.035	.038	.041	.044	.048	.052	.056	.060
277	PC	.064	.068	.072	.076	.080	.085	.090	.095	.100	.105
278	PC	.110	.115	.120	.126	.133	.140	.147	.155	.163	.172
279	PC	.181	.191	.203	.218	.236	.257	.283	.387	.663	.707
280	PC	.735	.758	.776	.791	.804	.815	.825	.834	.842	.849
281	PC	.856	.863	.869	.875	.881	.887	.893	.898	.903	.908
282	PC	.913	.918	.922	.926	.930	.934	.938	.942	.946	.950
283	PC	.953	.956	.959	.962	.965	.968	.971	.974	.977	.980
284	PC	.983	.986	.989	.992	.995	.998	1.000			
	*										
285	JD	4.44	1.0								
286	JD	4.35	5.0								
287	JD	4.24	10.0								
288	JD	4.01	30.0								
289	JD	3.88	60.0								
290	JD	3.80	90.0								
291	JD	3.75	120.0								
292	JD	3.71	150.0								
	*										
293	KK	X65A1	BASIN								
294	KM	The following parameters were used for this basin									
295	KM	L= 1.9	Lca= 1.4	S= 31.5	kn= 0.064	Lag= 70					
296	KM	PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN									
297	BA	0.971									
298	LG	0.26	0.31	5.00	0.26	24					
299	UI	47	47	47	134	177	221	245	271	299	339
300	UI	376	453	570	599	502	438	394	358	315	282
301	UI	248	223	185	135	88	83	77	73	47	47
302	UI	47	16	14	14	14	14	14	14	14	14
303	UI	14	0	0	0	0	0	0	0	0	0
	*										
304	KK	CAP1A									
305	KM	INFLOW FROM EAST OF THE CAP ASSOCIATED WITH TWO 72" PIPE OVERCHUTES AT									
306	KM	STATION 131+90 SALT-GILA AQUEDUCT REACH 2									
307	KM	Overchute consists of two 72" pipes but level pool function									
308	KM	at the CAP is disregarded for this location per the upper ADMP									
309	KM	hydrology model.									
310	KM	Basin area below represents half of the drainage area above CAP (1.93									
311	BA	0.965									
312	ZR	=QI	A=CAP1A	B=OVERCHUTE	C=FLOW	E=5MIN	F=100YEAR				
	*										
313	KK	RCAP1A									
314	KM	Route flow from CAP overchute (CAP1A) to confluence with CAP1B overchute									
315	KM	at top of proposed Meridian Channel (-at Guadalupe Road).									
316	KM	Hypothetical future condition earth channel.									
317	RS	4	FLOW	-1							
318	RC	.035	.035	.035	7250	.007					

319	RX	0	4	8	SDW500EX.txt				
320	RY	100	99	98	24	44	60	64	68
	*				94	94	98	99	100

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HEC-1 INPUT

PAGE 7

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

321	KK	CCAP1A								
322	KM	Combine routed (RCAP1A) and local hydrographs (65A1).								
323	HC	2	1.936							
	*									
324	KK	X65A2	BASIN							
325	KM	The following parameters were used for this basin								
326	KM	L=1.5	Lca=.9	S= 42.8	kn=.09	Lag= 71				
327	KM	PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN								
328	BA	0.544								
329	LG	0.35	0.34	4.60	0.29	0				
330	UI	26	26	26	69	95	117	132	146	180
331	UI	199	234	289	338	290	251	224	204	182
332	UI	145	129	113	88	66	47	42	42	35
333	UI	26	22	8	8	8	8	8	8	8
334	UI	8	8	0	0	0	0	0	0	0
	*									

335	KK	CAP1B								
336	KM	INFLOW FROM EAST OF THE CAP THROUGH 2 - 72" PIPE OVERCHUTES								
337	KM	STATION 158+00 SALT-GILA AQUEDUCT REACH 2								
338	KM	Overchute consists of two 72" pipes but level pool function								
339	KM	at the CAP is disregarded for this location per the upper ADMP								
340	KM	hydrology model.								
341	KM	Basin area below represents half of the drainage area above CAP (1.93)								
342	BA	0.965								
343	ZR	=Q1 A=CAP1B B=OVERCHUTE C=FLOW E=5MIN F=100YEAR								
	*									

344	KK	RCAP1B								
345	KM	Route flow from CAP overchute (CAP1A) to confluence with CAP1B overchute								
346	KM	at top of proposed Meridian Channel (-at Guadalupe Road).								
347	KM	Hypothetical future condition earth channel.								
348	RS	4	FLOW	-1						
349	RC	.035	.035	.035	6750	.008				
350	RX	0	4	8	24	44	60	64	68	
351	RY	100	99	98	94	94	98	99	100	
	*									

352	KK	CCAP1B								
353	KM	Combine routed (RCAP1B) and local hydrographs (65A2).								
354	HC	2	1.509							
	*									

355	KK	C65A12								
356	KM	Combine routed (RCAP1A & RCAP1B) and local hydrographs (65A1 & 65A2)								
357	HC	2	3.445							
	*									

1

HEC-1 INPUT

PAGE 8

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

358	KK	RMCHNL								
359	KM	Proposed Meridian Channel from Siphon Draw Basin to approximately Guadalupe R								
360	KM	Proposed concrete lined channel, 40' bottom, 2:1 sideslopes.								
361	RS	1	FLOW	-1						
362	RC	.016	.016	.016	3000	.002				
363	RX	0	10	20	36	76	92	102	112	
364	RY	100	100	100	92	92	100	100	100	
	*									

365	KK	X65A3	BASIN							
366	KM	The following parameters were used for this basin								
367	KM	L= 2.1	Lca= 1.2	S= 27.9	kn= .087	Lag= 95				
368	KM	PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN								
369	BA	1.207								
370	LG	0.34	0.34	4.60	0.29	3				
371	UI	43	43	43	43	107	149	171	201	217
372	UI	251	272	295	324	348	403	485	545	541
373	UI	423	387	359	336	306	280	258	236	215
374	UI	171	137	116	76	76	72	71	69	43
375	UI	43	43	22	13	13	13	13	13	13
376	UI	13	13	13	13	13	13	0	0	0
377	ZW	A=X65A3 B=X65A3 C=FLOW E=5MIN F=500YR								
	*									

378	KK	SDWDBS								
379	KM	Combine flow from Meridian Channel and Siphon Draw Wash (SDW)								
380	HC	2	4.652							
381	ZW	A=SDWDBS B=COMBINED SDW N MERIDIAN C=FLOW E=5MIN F=100YR								
	*									

382	KK	DB								
383	KM	Single Inline Basin								
384	KM	Level pool route at proposed Meridian on line basin. Outlet consists of								
385	KM	2-6' x4' RCBC with a culvert invert at 1492 (basin bottom).								
386	KM	The emergency spillway crest elevation is set at 1498.5.								

387 RS 1 STOR 0 SDW500EX.txt
 *
 * Storage values from DTM report are shown in * SV below. These values were
 * decreased by 5 acre-ft to account for the accumulation of sediment
 * in the detention basin and then used for the hydrologic analysis
 * SV 0 6 17 30 145 196 249 275 301
 *
 388 SV 0 0 11 23 134 185 237 263 289 341
 389 SQ 0 28 82 152 234 328 432 474 526 1000
 390 SE 1492 1493 1494 1495 1496 1497 1498 1498.5 1499 1500
 391 ZW A=DB B=SINGLE BASIN OUTLET C=FLOW E=5MIN F=500YR
 *

392 KK 65A3BY
 393 KM Flow from subbasin X65A3 assumed to bypass basin.
 394 KM THIS IS A CONSERVATIVE APPROACH SINCE THIS AREA IS ALSO
 395 KM INCLUDED IN THE AREA FROM SUBBASIN 65A3.
 396 KM The hydrograph for X65A3 obtained from this model) and multiplied
 397 KM by the ratio of bypass area to the overall subbasin area (~12%).
 HEC-1 INPUT

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LINE	ID	1	2	3	4	5	6	7	8	9	10
398	KM										
399	BA	0.144		0.12							
400	LG	0.34	0.34	4.60	0.29	3					
401	UI	43	43	43	43	107	149	171	201	217	236
402	UI	251	272	295	324	348	403	485	545	541	471
403	UI	423	387	359	336	306	280	258	236	215	201
404	UI	171	137	116	76	76	72	71	69	43	43
405	UI	43	43	22	13	13	13	13	13	13	13
406	UI	13	13	13	13	13	13	0	0	0	0
407	ZW	A=65A3BY B=X65A3BY C=FLOW E=5MIN F=500YR									

408 KK CP-MER
 409 KM Combine flow from Meridian basin and drainage area south of basin.
 410 HC 2 4.652
 411 ZW A=CP-MER B=FLOW AT MERIDIAN CULVER C=FLOW E=5MIN F=500YR
 *

412 KK RSDW1
 413 KM Siphon Draw Wash (SDW) Meridian Rd to Mountain Rd
 414 KM
 415 RS 3 FLOW -1
 416 RC .055 .045 .055 2700 .005
 417 RX 100 125 170 175 185 190 235 260
 418 RY 100 98 96 94 94 96 98 100
 *

419 KK RSDW2
 420 KM Siphon Draw Wash (SDW) Mountain Rd to Signal Butte
 421 KM Revised the reach length from 5800 ft to 2640 ft to model the concentration
 422 KM point of interest for this study.
 423 RS 10 FLOW -1
 424 RC .060 .050 .060 2640 .005
 425 RX 100 200 340 345 355 360 500 600
 426 RY 100 98 96 94 94 96 98 100
 427 ZW A=RSDW2 B=RSDW2 ROUTED FLOW FROM SDDB C=FLOW E=5MIN F=500YR
 *

428 KK 65B
 429 KM BASIN 65B
 430 KM A portion of the original basin fell to the west of Signal Butte Rd. A
 431 KM second area of basin 65B was removed because it crosses Signal Butte Rd. to
 432 KM the north of the SRP substation and does not contribute to the SDW. The
 433 KM basin parameters were amended to only reflect the area of basin 65B that
 434 KM could contribute to the concentration point of interest (East of SB road).
 435 KM L= 1.5 Lca= 0.8 S= 37.1 kn= .075 LAG= 59
 436 KM PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 437 BA .677
 438 LG .31 .34 6.00 .19 17
 439 UI 39 39 63 136 172 200 225 254 291 346
 440 UI 448 489 400 345 308 267 234 202 177 132
 441 UI 90 68 64 56 39 39 23 12 12 12
 442 UI 12 12 12 12 12 0 0 0 0 0
 *

PAGE 10

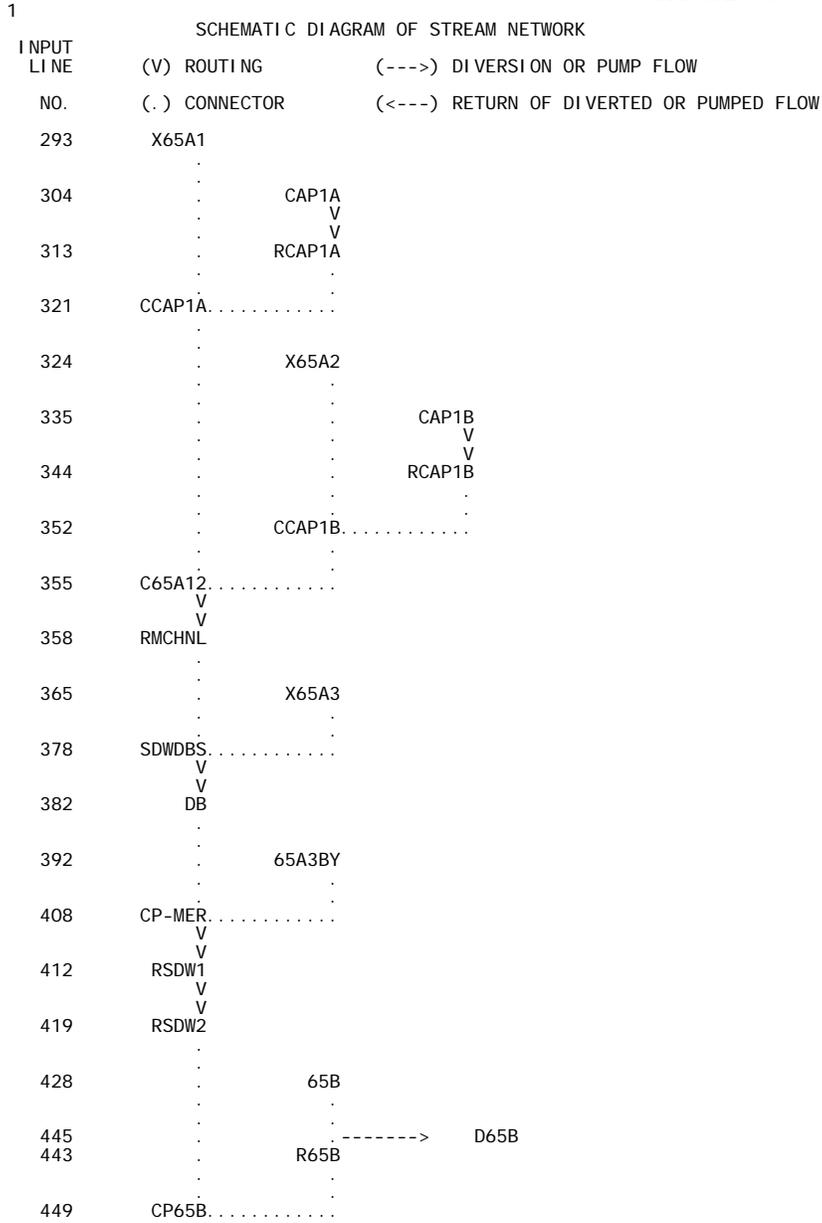
LINE	ID	1	2	3	4	5	6	7	8	9	10
------	----	---	---	---	---	---	---	---	---	---	----

443 KK R65B
 444 KM RETAIN 100 YR 2 HR RUNOFF VOLUME
 445 DT D65B 30
 446 DI 0 10000
 447 DQ 0 10000
 448 ZW A=R65B B= R65B IS routed 65B C=FLOW E=5MIN F=500YR
 *

449 KK CP65B
 450 KM Combine flow from 65B and RSDW2 (Siphon Draw Basin bypass flow)
 451 HC 2 5.329
 452 ZW A=CP65B B= CP65B IS 65AW+65B+RSDW2 C=FLOW E=5MIN F=500YR
 *

453 ZZ

SDW500EX.txt



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1

RUNOFF SUMMARY
 FLOW IN CUBIC FEET PER SECOND
 TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
+	HYDROGRAPH AT								
+		X65A1	819.	13.00	193.	56.	19.	.97	
+	HYDROGRAPH AT	CAP1A	972.	12.67	181.	49.	16.	.96	
+	ROUTED TO	RCAP1A	923.	12.92	181.	49.	16.	.96	
+	2 COMBINED AT	CCAP1A	1727.	12.92	371.	104.	35.	1.94	
+	HYDROGRAPH AT	X65A2	394.	13.00	80.	20.	7.	.54	
+	HYDROGRAPH AT	CAP1B	972.	12.67	181.	49.	16.	.96	

SDW500EX.txt								
+	ROUTED TO	RCAP1B	927.	12.92	181.	49.	16.	.96
+	2 COMBINED AT	CCAP1B	1304.	12.92	260.	69.	23.	1.51
+	2 COMBINED AT	C65A12	3017.	12.92	628.	172.	57.	3.44
+	ROUTED TO	RMCHNL	2987.	13.00	628.	172.	57.	3.44
+	HYDROGRAPH AT	X65A3	695.	13.33	184.	47.	16.	1.21
+	2 COMBINED AT	SDWDBS	3459.	13.00	806.	217.	73.	4.65
+	ROUTED TO	DB	625.	14.33	442.	213.	73.	4.65
+	HYDROGRAPH AT	65A3BY	84.	13.33	22.	6.	2.	.14
+	2 COMBINED AT	CP-MER	656.	14.25	458.	219.	74.	4.65
+	ROUTED TO	RSDW1	651.	14.50	457.	219.	75.	4.65
+	ROUTED TO	RSDW2	647.	14.75	457.	219.	75.	4.65
+	HYDROGRAPH AT	65B	645.	12.83	129.	36.	12.	.68
+	DIVERSION TO	D65B	580.	12.67	56.	15.	5.	.68
+	HYDROGRAPH AT	R65B	645.	12.83	80.	21.	7.	.68
+	2 COMBINED AT	CP65B	750.	12.83	512.	238.	81.	5.33

*** NORMAL END OF HEC-1 ***

-----DSS---ZCLOSE Unit: 71, File: N60_500.DSS
 Pointer Utilization: .31
 Number of Records: 215
 File Size: 386.8 Kbytes
 Percent Inactive: .0

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 03JUN10 TIME 10:30:35
*
*****
SDW500FC.txt
*****
*
* U. S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****
  
```

```

X X XXXXXXX XXXX X
X X X X X XX
X X X X X X
XXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX
  
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS: WRITE STAGE FREQUENCY, DSS: READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE: GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID Model: Siphon draw wash as-built conditions
3 ID Single Online Basin to Siphon Draw Wash & Meridian Channel
4 ID
5 ID Project: Siphon Draw Wash Hydro for FS 219 site
6 ID Contract CofM: 01-757-001
7 ID EPS Project No: 10-039
8 ID
9 ID Notes By: EPS Group Inc.
10 ID Revision Date: May 2010
11 ID
12 ID Filename: SDW500FC.DAT
13 ID Storm Event: 500-Yr, 24 Hrs
14 ID Conditions: Future Conditions
15 ID
16 ID Comments:
17 ID This file is based on the SDW100AB.DAT model prepared to capture the as-built
18 ID conditions of the Siphon Draw Wash Detention Basin. It removes all elements
19 ID contributing to the SDW west of Signal Butte Road. Point precip values were
20 ID edited to reflect the 500yr 24hr storm.
21 ID
22 ID Use the N60_500.DSS file for this model to pull in hydrographs from basins
23 ID from the north side of the CAP canal.
24 ID
25 ID The following comments were included in the SDW100AB.DAT file:
26 ID
27 ID
28 ID This design model includes:
29 ID
30 ID * A single basin online detention basin to both SDW
31 ID and the Meridian Channel.
32 ID * Reduces excavated volume of the basin by 5 acre-ft based upon
33 ID the assumption that 5 acre-ft of sediment would accumulate within
34 ID the basin before removal.
35 ID * Eliminates the Elliot Rd storm drain extension which previously was
36 ID to serve as the basin outlet. Instead the basin was enlarged and now
37 ID discharges directly to SDW just upstream of Meridian Road and passes
38 ID through the Meridian Pointe subdivision.
39 ID * Utilizes the revised kn values per direction from FCDMC (utilizes
40 ID subbasins annotated with X as the first letter of the subbasin name
41 ID * Conservatively assumes some area within the drainage easement bypass
42 ID the basin completely and drains directly down SDW to the project
43 ID outfall. This area was not removed from the subbasin 65A3 area so
44 ID the area runoff is essentially accounted for twice. This was assumed
45 ID because it is not know how runoff from the area south of the proposed
46 ID basin will be handled in the future. The runoff (~30 cfs) has minimal
47 ID impact on the basin design.
48 ID * Routing of all flow from the CAP overchutes is assumed to be routed
49 ID to Meridian Channel north of the Guadalupe Road. This is not the case
50 ID for existing conditions. For existing conditions, some flow
51 ID (particularly from CAP2A) would likely not enter the proposed Meridian
52 ID Channel until just north of the proposed detention basin approximately
53 ID * Modifications to the diversion at DI65B where flow is split between
54 ID the Elliot Rd storm drain and the Elliot Detention Basin. The changes
55 ID reflect the removal of an existing orifice plate over the 78" Elliot
  
```

1 HEC-1 INPUT PAGE 2

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
 Page 1

SDW500FC.txt

56 ID Road storm drain inlet and the installation of a orifice plate (with
57 ID a 24" diameter orifice) over the 78" inlet to the Elliot Road Detention
58 ID basin. While the upstream channel does not appear to have the capacity
59 ID to contain the magnitude of flow indicated for the 100-year event,
60 ID no changes will be made to the upstream channel as part of this
61 ID project.
62 ID * The low flow outlet data for the East Elliot Basin (RS65A SL record)
63 ID from the original hydrology model was changed to be reflect the actual
64 ID outlet design as shown in the design/as-built plans (an 18" low flow
65 ID outlet pipe at an invert elevation of 1426.5). The SL record the low
66 ID flow outlet pipe area was therefore changed from 0.7854 sq ft
67 ID (for a 12" pipe) to 1.7663 sq ft (for an 18" pipe) and the outlet
68 ID pipe centerline elevation was changed from 1430.0 (which is
69 ID actually the inlet grate elevation) to 1427.3 (which is the pipe
70 ID invert of 1426.5 + 0.75 for the CL of an 18" pipe) per design plans.
71 ID

72 ID Model Background:

73 ID
74 ID This model was developed from the base hydrology model (SDW-BASE.DAT)
75 ID produced as part of this project and developed from previous hydrology
76 ID models from previous studies. For this project SDW-BASE.DAT truncated
77 ID the previous hydrologic model S60EMAP1.DAT provided by the FCDMC.
78 ID Any hydrologic elements which do not contribute to runoff along
79 ID Elliot Road, just upstream of the SanTan Freeway Channel (routing
80 ID reach 66T70C) were removed
81 ID

82 ID To run correctly, this model requires referencing a DSS file created
83 ID by the upstream hydrologic model ultimately developed from the
84 ID East Mesa ADMP. For the 100-year, future conditions, this model is
85 ID N60EM.DAT (which produces N60EM.DSS).
86 ID

87 ID This model is a revision of the pre-design submittal to address
88 ID comments from the FCDMC. Revisions included:
89 ID

- 90 ID * changes to Kn values for the project subbasins
- 91 ID * adjustment of land area assumed as water (proposed basin site)
- 92 ID * the reclassification of the proposed basin site as open space
93 ID (as opposed to water as previously defined).
94 ID

95 ID Subbasins with X are: default Kn, with open space-undef. as land use.
96 ID Subbasins w/o a letter are: ADMP Kn, with water as land use.
97 ID

98 ID END SCI INTRODUCTORY COMMENTS

99 ID *****

100 ID
101 ID
102 ID MODEL REVISED 9/12/02 TO CHANGE ZW CARD TO ZR CARD AT HYDROGRAPH CAP1B (CWR)

103 ID
104 ID ID Kirkham Michael:
105 ID Last Revised Date: 5/14/02
106 ID Filename: WS4-SEM.DAT

107 ID
108 ID Comments Dated 5/14/02 (CJ)

109 ID
110 ID This model should be used for the Rittenhouse and Chandler Heights Basin
HEC-1 INPUT

1

PAGE 3

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

111 ID Design Project - 30% Design Analyses.
112 ID

113 ID This model is one of several models that represent the EMF watershed.
114 ID This model covers the Southeast Mesa Area and should reference as a DSS
115 ID the watershed model for the Northeast Mesa Area (Filename WS2-NEM.DAT).
116 ID

117 ID This model is necessary to determine the input hydrographs for the
118 ID Rittenhouse Basin Design HEC-RAS Unsteady State analysis. To develop
119 ID the necessary input hydrographs the following models should be run in order.
120 ID Because the files utilize a TAPE21 file to export import hydrographs
121 ID between models, prior to running the FIRST model (WS1-NWM.DAT) any existing
122 ID TAPE21 file in the directory should be deleted. The run procedure order is:
123 ID

- 124 ID 1) WS1-NWM.DAT
- 125 ID 2) WS2-NEM.DAT
- 126 ID 3) WS3-QCSW.DAT
- 127 ID 4) WS4-SEM.DAT (referencing WS2-NEM.DSS for the DSS file)
- 128 ID 5) RT1-BASE.DAT

129 ID
130 ID The necessary input hydrographs for the Rittenhouse Basin analysis
131 ID are determined in RT1-BASE. In that output file, the hydrograph at
132 ID RWFLD1 should be exported and used as the input hydrograph at the
133 ID EMF Reach 4 Cross Section 17.082. And the hydrograph at RITTEN should
134 ID be exported and used as the input hydrograph for the Rittenhouse Main
135 ID Channel at Cross Section 820.00
136 ID
137 ID

138 ID *****
139 ID **** NOTE BY PRIMATECH ENGINEERS: ****
140 ID **** DATE: 06/12/2001 ****
141 ID **** THE NEW FILE NAME IS: SEBTALT2.DAT ****
142 ID **** THE FILE WAS RENAMED AS <<RTBTALT2.DAT>> FOR THE EAST MARI COPA ****
143 ID **** FLOODWAY CAPACITY MITIGATION PROJECT, BY FLOOD CONTROL DISTRICT OF ****
144 ID **** MARI COPA COUNTY. ****
145 ID **** THE FILE WAS RENAMED <<RTBTALT3.DAT>> AND UPDATED USING GREEN AND ****
146 ID **** AMPT FUTURE CONDITIONS FOR BASINS 258 TO 268. ****

147 ID SDW500FC.txt
148 ID *****
149 ID
150 ID
151 ID THIS MODEL WAS ORIGINALLY MIDDOUT.DAT
152 ID IT HAS BEEN MODIFIED BY CPE (7/2000)
153 ID FOR ALTERNATIVE 2 FOR THE EAST MARI COPA FLOWWAY
154 ID CAPACITY MITIGATION AND MULTI-USE CORRIDOR STUDY
155 ID TO ROUTE BOTH THE POWERLINE FLOWWAY
156 ID AND THE SANTAN FREEWAY CHANNEL INTO THE RAY BASIN PRIOR THEIR OUTFALL
157 ID INTO THE EMF
158 ID
159 ID *****
160 ID
161 ID Model files changed by Collins/Pina Engineering
162 ID to reflect multi-use design concepts (recreation
163 ID and environment) proposed throughout the entire
164 ID EMF Corridor. July 2000
165 ID

1

HEC-1 INPUT

PAGE 4

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

166 ID
167 ID VERSION 8.06 CPE 7/31/00
168 ID
169 ID *****
170 ID
171 ID
172 ID *****
173 ID FILENAME: MIDDOUT.DAT
174 ID
175 ID ALL CIP INFRASTRUCTURE IS IN PLACE, FUTURE CONDITIONS LANDUSE IS IN PLACE
176 ID FLOW IS ROUTED UP ELLSWORTH ROAD IN A EARTH LINED CHANNEL
177 ID
178 ID *****
179 ID PRODUCED BY DIBBLE AND ASSOCIATES AND HOSKIN ENGINEERING CONSULTANTS.
180 ID File Name: Final8.Dat
181 ID Revised - Jan. 2000 by SZ (Wood/Patel) From Final7.dat - new Z-V & Sidewei r
182 ID Revised - Jan. 2000 by SZ (Wood/Patel) from Final6.dat - 60% review comments
183 ID Revised - Dec. 1999 by SZ (Wood/Patel) from Final5.dat
184 ID Revised - Dec. 1999 by SZ (Wood/Patel) from Final4.dat
185 ID Revised - Nov. 1999 by SZ (Wood/Patel) from Final3.dat
186 ID Revised - June 1999 by SZ (Wood/Patel) for Final Model from Opt1.dat.
187 ID Revised - May 1999 by SZ (Wood/Patel) for Option 1, Based on Model SDIB.DAT
188 ID REVISED - MAY, 1999 BY VAS TO INCORPORATE INCREASE OF SUBBASIN RETENTION AND
189 ID REVISIONS TO THE REGIONAL DETENTION BASIN STORAGE
190 ID REVISED - FEB, 1999 BY VALERIE SWICK, FCD OF MARI COPA COUNTY
191 ID REVISED - MAY, 1998 BY D&A
192 ID
193 ID REVISED BY VALERIE SWICK, FEB. 26, 1998
194 ID
195 ID FLOWS FROM DETENTION BASIN LOCATED AT NE CORNER OF ELLIOT AND ELLSWORTH ROADS
196 ID IS ROUTED TO THE SOUTHWEST BY SIPHON DRAW TO SUBBASIN 70A. FROM THERE THEY
197 ID WILL BE ROUTED BY A CHANNEL TO THE EMF. FLOWS FROM SUBBASINS ADJACENT TO
198 ID SANTAN FREEWAY ALIGNMENT WILL BE ROUTED SOUTH TO SUBBASIN 70A WHERE THEY WILL
199 ID BE COMBINED WITH FLOW IN SIPHON DRAW.
200 ID
201 ID EAST MESA AREA DRAINAGE MASTER PLAN
202 ID AREA SOUTH OF SUPERSTITION (U.S. HWY 60)
203 ID AUGUST 1997
204 ID SOUTHEAST MESA HIGH RESOLUTION MODEL
205 ID
206 ID *****FUTURE CONDITION MODEL OF THE WATERSHED*****
207 ID
208 ID *****ATTENTION*****
209 ID SUBBASINS 75, 79A, 79B, 78E, LANDUSES WERE NOT
210 ID CHANGED BECAUSE IT WAS FELT THAT THEIR FUTURE CONDITIONS LANDUSES WOULD BE
211 ID SIMILAR TO THE EXISTING CONDITIONS LANDUSES.
212 ID RETENTION VOLUMES WILL ALSO NOT BE UTILIZED FOR SUBBASINS 75, 79A, 79B, 78E
213 ID SOME QUEEN CREEK SUBBASINS WILL ALSO NOT HAVE RETENTION VOLUMES, EITHER
214 ID BECAUSE THEY LIE IN PINAL COUNTY AND WE DONT KNOW PINAL COUNTIES PLANS OR
215 ID THEY LIE IN THE SANTAN MOUNTAINS AND WON'T GET DEVELOPED
216 ID WILLIAMS GATEWAY AIRPORT (SUBBASINS 80A, 80B, 81A, AND 81B) ARE MODELED AS
217 ID FUTURE CONDITIONS AND HAVE RETENTION VOLUMES FOR THE 100YR 2HR STORM
218 ID *****
219 ID FILENAME: SDIB.DAT
220 ID

1

HEC-1 INPUT

PAGE 5

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

221 ID THIS MODEL REPRESENTS THE FUTURE CONDITION OF THE WATERSHED.
222 ID TOTAL DRAINAGE AREA IS APPROXIMATELY 213 SQ. MI.
223 ID THIS MODEL USES A Kn VALUE OF 0.09 FOR DESERT LAND USE DUE TO SHEET FLOW
224 ID CONDITIONS.
225 ID
226 ID 100-YEAR 24-HOUR FREQUENCY
227 ID AREAL REDUCTIONS FROM FCD HYDROLOGY MANUAL
228 ID THIS MODEL INCLUDES INFLOW FROM NORTH OF THE SUPERSTITION FREEWAY
229 ID AND EAST OF THE CAP
230 ID
231 ID DATA FROM THE QUEEN CREEK ADMS HAS BEEN ADDED TO CALCULATE FLOWS INTO THE
232 ID EMF. MUSKINGUM ROUTING NSTEPS WERE ADJUSTED TO BE WITHIN THE SUGGESTED
233 ID RANGE.
234 ID

SDW500FC.txt

235 ID METHODOLOGY
 236 ID THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
 237 ID SCS TYPE II RAINFALL DISTRIBUTION
 238 ID S-GRAPH HYDROGRAPH
 239 ID GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
 240 ID NORMAL DEPTH STORAGE CHANNEL ROUTING
 241 ID APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
 242 ID EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS
 243 ID DATED 1994
 244 ID THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS
 245 ID
 246 ID ORIGINAL STUDY PERFORMED BY LISA C. YOUNG AND AFSHIN AHOURAIYAN, UPDATED BY
 247 ID DAVID DEGERNESS (OCT-DEC, 1996). REVIEWED BY VALERIE A. SWICK
 248 ID AND AMIR MOTAMEDI OF THE FLOOD CONTROL DISTRICT
 249 ID HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
 250 ID DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.
 251 ID
 252 ID ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2-3 FT/SEC FOR WASH/NATURAL
 253 ID CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL
 254 ID
 255 ID VELOCITIES FOR ADMP IMPROVEMENT CHANNELS FROM DIBBLE AND ASSOCIATES
 256 ID SUGGESTED ALTERNATIVES (JULY 1, 1997)
 257 ID
 258 ID *****
 259 ID **** THE FOLLOWING NOTE WAS ADDED BY PRIMATECH ENGINEERS ON 06-12-2001 ****
 260 ID *****
 261 ID NOTE: MUST USE NEBUILD.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
 262 ID SUPERSTITION FREEWAY.
 263 ID *****
 264 ID
 265 ID
 266 ID NOTE: MUST USE NDI BF.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
 267 ID SUPERSTITION FREEWAY.
 268 ID
 269 ID DDM MCUHP2 SOUTH EAST MESA ADMP - SOUTH OF SUPERSTITION FREEWAY, FUTURE CONDI
 *DIAGRAM
 270 IT 5 1APR97 0000 1000
 271 IO 5
 272 IN 15
 273 JD 4.46 0.01
 274 PC .000 .002 .005 .008 .011 .014 .017 .020 .023 .026
 HEC-1 INPUT

PAGE 6

1

LINE	ID	1	2	3	4	5	6	7	8	9	10
275	PC	.029	.032	.035	.038	.041	.044	.048	.052	.056	.060
276	PC	.064	.068	.072	.076	.080	.085	.090	.095	.100	.105
277	PC	.110	.115	.120	.126	.133	.140	.147	.155	.163	.172
278	PC	.181	.191	.203	.218	.236	.257	.283	.387	.663	.707
279	PC	.735	.758	.776	.791	.804	.815	.825	.834	.842	.849
280	PC	.856	.863	.869	.875	.881	.887	.893	.898	.903	.908
281	PC	.913	.918	.922	.926	.930	.934	.938	.942	.946	.950
282	PC	.953	.956	.959	.962	.965	.968	.971	.974	.977	.980
283	PC	.983	.986	.989	.992	.995	.998	1.000			
284	JD	4.44	1.0								
285	JD	4.35	5.0								
286	JD	4.24	10.0								
287	JD	4.01	30.0								
288	JD	3.88	60.0								
289	JD	3.80	90.0								
290	JD	3.75	120.0								
291	JD	3.71	150.0								
292	KK	X65A1 BASIN									
293	KM	THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN									
294	KM	L= 1.9 Lca= 1.4 S= 31.5 Kn= .040 LAG= 43.9									
295	KM	PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN									
296	BA	0.971									
297	LG	0.20	0.25	5.00	0.35	50					
298	UI	74	75	257	342	418	482	578	782	940	738
299	UI	619	516	429	363	253	151	127	104	74	55
300	UI	23	23	23	22	23	23	0	0	0	0
301	UI	0	0	0	0	0	0	0	0	0	0
302	UI	0	0	0	0	0	0	0	0	0	0
303	KK	R65A1									
304	KM	Retain first flush volume (equal to 80% of first 1/2" of runoff)									
305	KM	from MDR areas only.									
306	KM	First flush retention is not included for industrial areas at this time.									
307	DT	FF65A1 9.9									
308	DI	0 10000									
309	DQ	0 10000									
310	KK	CAP1A									
311	KM	INFLOW FROM EAST OF THE CAP ASSOCIATED WITH TWO 72" PIPE OVERCHUTES AT									
312	KM	STATION 131+90 SALT-GILA AQUEDUCT REACH 2									
313	KM	Overchute consists of two 72" pipes but level pool function									
314	KM	at the CAP is disregarded for this location per the ADMP									
315	KM	hydrology model.									
316	KM	Basin area below represents half of the drainage area above CAP (1.93									
317	BA	0.965									
318	ZR	=QI A=CAP1A B=OVERCHUTE C=FLOW E=5MIN F=100YEAR									

SDW500FC.txt

1

HEC-1 INPUT

PAGE 7

LINE	ID	1	2	3	4	5	6	7	8	9	10	
319	KK	RCAP1A										
320	KM	Route flow from CAP overchute (CAP1A) to confluence with CAP1B overchute										
321	KM	at top of proposed Meridian Channel (-at Guadalupe Road).										
322	KM	Hypothetical future condition earth channel.										
323	RS	4	FLOW	-1								
324	RC	.035	.035	.035	7250	.007						
325	RX	0	4	8	24	44	60	64	68			
326	RY	100	99	98	94	94	98	99	100			
	*											
327	KK	CCAP1A										
328	KM	Combine routed (RCAP1A) and local hydrographs (65A1).										
329	HC	2	1.936									
	*											
330	KK	X65A2 BASIN										
331	KM	THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN										
332	KM	L=	1.5	Lca=	.9	S=	42.8	Kn=	.048	LAG=	37.5	
333	KM	PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN										
334	BA	0.544										
335	LG	0.24	0.25	4.60	0.40	42						
336	UI	48	80	193	252	308	378	527	590	439	367	
337	UI	296	234	161	88	79	50	41	16	15	15	
338	UI	15	15	0	0	0	0	0	0	0	0	
339	UI	0	0	0	0	0	0	0	0	0	0	
340	UI	0	0	0	0	0	0	0	0	0	0	
	*											
341	KK	R65A2										
342	KM	Retain first flush volume (equal to 80% of first 1/2" of runoff)										
343	KM	from MDR areas only.										
344	DT	FF65A2	9.1									
345	DI	0	10000									
346	DQ	0	10000									
	*											
347	KK	CAP1B										
348	KM	INFLOW FROM EAST OF THE CAP THROUGH 2 - 72" PIPE OVERCHUTES										
349	KM	STATION 158+00 SALT-GILA AQUEDUCT REACH 2										
350	KM	Overchute consists of two 72" pipes but level pool function										
351	KM	at the CAP is disregarded for this location per the upper ADMP										
352	KM	hydrology model.										
353	KM	Basin area below represents half of the drainage area above CAP (1.93)										
354	BA	0.965										
355	ZR	=QI	A=CAP1B	B=OVERCHUTE	C=FLOW	E=5MIN	F=100YEAR					
	*											

1

HEC-1 INPUT

PAGE 8

LINE	ID	1	2	3	4	5	6	7	8	9	10	
363	RY	100	99	98	94	94	98	99	100			
	*											
364	KK	CCAP1B										
365	KM	Combine routed (RCAP1B) and local hydrographs (65A2).										
366	HC	2	1.509									
	*											
367	KK	C65A12										
368	KM	Combine routed (RCAP1A & RCAP1B) and local hydrographs (65A1 & 65A2)										
369	HC	2	3.445									
	*											
370	KK	RMCHNL										
371	KM	Proposed Meridian Channel from Siphon Draw Basin to approximately Guadalupe R										
372	KM	Proposed concrete lined channel, 40' bottom, 2:1 side slopes.										
373	RS	1	FLOW	-1								
374	RC	.016	.016	.016	3000	.002						
375	RX	0	10	20	36	76	92	102	112			
376	RY	100	100	100	92	92	100	100	100			
	*											
377	KK	X65A3 BASIN										
378	KM	THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN										
379	KM	L=	2.1	Lca=	1.2	S=	27.9	Kn=	.047	LAG=	50.4	
380	KM	PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN										
381	BA	1.207										
382	LG	0.23	0.25	4.60	0.41	40						
383	UI	80	82	206	331	408	468	541	633	828	1018	
384	UI	878	717	628	537	458	383	296	186	140	134	
385	UI	92	80	56	24	25	25	24	25	25	25	
386	UI	0	0	0	0	0	0	0	0	0	0	

387 UI 0 0 0 SDW500FC.txt 0 0 0 0 0
 388 ZW A=X65A3 B=X65A3 C=FLOW E=5MIN F=500YR
 *

389 KK R65A3
 390 KM Retain first flush volume (equal to 80% of first 1/2" of runoff)
 391 KM from MDR areas only.
 392 DT FF65A3 21.8
 393 DI 0 10000
 394 DQ 0 10000
 *

395 KK SDWDBS
 396 KM Combine flow from Meridian Channel and Siphon Draw Wash (SDW)
 397 HC 2 4.652
 398 ZW A=SDWDBS B=COMBINED SDW N MERIDIAN C=FLOW E=5MIN F=500YR
 *

1 HEC-1 INPUT PAGE 9

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

399 KK DB
 400 KM Single Inline Basin
 401 KM Level pool route at proposed Meridian on line basin. Outlet consists of
 402 KM 2-6' x4' RCBC with a culvert invert at 1492 (basin bottom).
 403 KM The emergency spillway crest elevation is set at 1498.5.
 404 RS 1 STOR 0
 *
 * Storage values from DTM report are shown in * SV below. These values were
 * decreased by 5 acre-ft to account for the accumulation of sediment
 * in the detention basin and then used for the hydrologic analysis
 * SV 0 6 17 30 145 196 249 275 301
 *
 405 SV 0 0 11 23 134 185 237 263 289 341
 406 SQ 0 28 82 152 234 328 432 474 526 1070
 407 SE 1492 1493 1494 1495 1496 1497 1498 1498.5 1499 1500.2
 408 ZW A=DB B=SINGLE BASIN OUTLET C=FLOW E=5MIN F=500YR
 *

409 KK 65A3BY
 410 KM Flow from subbasin X65A3 assumed to bypass basin.
 411 KM THIS IS A CONSERVATIVE APPROACH SINCE THIS AREA IS ALSO
 412 KM INCLUDED IN THE AREA FROM SUBBASIN 65A3.
 413 KM The hydrograph for X65A3 obtained from this model) and multiplied
 414 KM by the ratio of bypass area to the overall subbasin area (-12%).
 415 KM
 416 BA 0.144 0.12
 417 LG 0.23 0.25 4.60 0.41 40
 418 UI 80 82 206 331 408 468 541 633 828 1018
 419 UI 878 717 628 537 458 383 296 186 140 134
 420 UI 92 80 56 24 25 25 24 25 25 25
 421 UI 0 0 0 0 0 0 0 0 0 0
 422 UI 0 0 0 0 0 0 0 0 0 0
 423 ZW A=65A3BY B=X65A3BY C=FLOW E=5MIN F=500YR
 *

424 KK CP-MER
 425 KM Combine flow from Meridian basin and drainage area south of basin.
 426 HC 2 4.652
 427 ZW A=CP-MER B=FLOW AT MERIDIAN CULVER C=FLOW E=5MIN F=500YR
 *

428 KK RSDW1
 429 KM Siphon Draw Wash (SDW) Meridian Rd to Mountain Rd
 430 KM
 431 RS 3 FLOW -1
 432 RC .055 .045 .055 2700 .005
 433 RX 100 125 170 175 185 190 235 260
 434 RY 100 98 96 94 94 96 98 100
 *

1 HEC-1 INPUT PAGE 10

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

435 KK RSDW2
 436 KM Siphon Draw Wash (SDW) Mountain Rd to Signal Butte
 437 KM Revised the reach length from 5800 ft to 2640 ft to model the concentration
 438 KM point of interest for this study.
 439 RS 10 FLOW -1
 440 RC .060 .050 .060 2640 .005
 441 RX 100 200 340 345 355 360 500 600
 442 RY 100 98 96 94 94 96 98 100
 443 ZW A=RSDW2 B=RSDW2 ROUTED FLOW FROM SDDB C=FLOW E=5MIN F=500YR
 *

444 KK 65B
 445 KM BASIN 65B
 446 KM A portion of the original basin fell to the west of Signal Butte Rd. A
 447 KM second area of basin 65B was removed because it crosses Signal Butte Rd to
 448 KM the north of the SRP substation and does not contribute to the SDW. The
 449 KM basin parameters were amended to only reflect the area of basin 65B that
 450 KM could contribute to the concentration point of interest (East of SB road).
 451 KM L= 1.5 Lca= 0.8 S= 37.1 kn= .054 LAG= 43
 452 KM PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN

SDW500FC.txt

```

453      BA      .677
454      LG      .26      .27      6.00      .21      40.0
455      UI      39      39      63      136      172      200      225      254      291      346
456      UI      448      489      400      345      308      267      234      202      177      132
457      UI      90      68      64      56      39      39      23      12      12      12
458      UI      12      12      12      12      12      0      0      0      0      0
      *
459      KK      R65B
460      KM      RETAIN 100 YR 2 HR RUNOFF VOLUME
461      DT      D65B      61
462      DI      0      10000
463      DQ      0      10000
464      ZW      A=R65B B= R65B IS routed 65B C=FLOW E=5MIN F=500YR
      *
465      KK      CP65B
466      KM      Combine flow from 65B and RDSW2 (Siphon Draw Basin bypass flow)
467      HC      2      5.329
468      ZW      A=CP65B B= CP65B IS 65AW+65B+RDSW2 C=FLOW E=5MIN F=500YR
      *
469      ZZ
  
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
292 X65A1
      .
307      .-----> FF65A1
303 R65A1
      .
310      .      CAP1A
      .      V
319      .      RCAP1A
      .      V
327 CCAP1A.....
      .
330      .      X65A2
      .
344      .-----> FF65A2
341 R65A2
      .
347      .      CAP1B
      .      V
356      .      RCAP1B
      .      V
364      .      CCAP1B.....
      .
367 C65A12.....
      .      V
370 RMCHNL
      .      V
377      .      X65A3
      .
392      .-----> FF65A3
389 R65A3
      .
395 SDWDBS.....
      .      V
399      .      DB
      .      V
409      .      65A3BY
      .
424 CP-MER.....
      .      V
428 RSDW1
      .      V
435 RSDW2
      .
444      .      65B
      .
461      .-----> D65B
  
```

SDW500FC.txt

459 . R65B
 .
 .
 465 CP65B.....

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY										
FLOW IN CUBIC FEET PER SECOND										
TIME IN HOURS, AREA IN SQUARE MILES										
	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
					6-HOUR	24-HOUR	72-HOUR			
+	HYDROGRAPH AT									
+		X65A1	1222.	12.58	236.	76.	25.	.97		
+	DI VERSION TO									
+		FF65A1	27.	7.00	19.	5.	2.	.97		
+	HYDROGRAPH AT									
+		R65A1	1222.	12.58	236.	71.	24.	.97		
+	HYDROGRAPH AT									
+		CAP1A	972.	12.67	181.	49.	16.	.96		
+	ROUTED TO									
+		RCAP1A	923.	12.92	181.	49.	16.	.96		
+	2 COMBINED AT									
+		CCAP1A	1833.	12.67	413.	119.	40.	1.94		
+	HYDROGRAPH AT									
+		X65A2	725.	12.50	122.	38.	13.	.54		
+	DI VERSION TO									
+		FF65A2	22.	10.17	14.	5.	2.	.54		
+	HYDROGRAPH AT									
+		R65A2	725.	12.50	121.	34.	11.	.54		
+	HYDROGRAPH AT									
+		CAP1B	972.	12.67	181.	49.	16.	.96		
+	ROUTED TO									
+		RCAP1B	927.	12.92	181.	49.	16.	.96		
+	2 COMBINED AT									
+		CCAP1B	1294.	12.75	301.	82.	27.	1.51		
+	2 COMBINED AT									
+		C65A12	3086.	12.67	711.	200.	67.	3.44		
+	ROUTED TO									
+		RMCHNL	3069.	12.75	710.	200.	67.	3.44		
+	HYDROGRAPH AT									
+		X65A3	1309.	12.67	264.	83.	28.	1.21		
+	DI VERSION TO									
+		FF65A3	61.	11.00	32.	11.	4.	1.21		
+	HYDROGRAPH AT									
+		R65A3	1309.	12.67	261.	72.	24.	1.21		
+	2 COMBINED AT									
+		SDWDBS	4304.	12.67	962.	269.	90.	4.65		
+	ROUTED TO									
+		DB	1019.	13.75	567.	265.	90.	4.65		
+	HYDROGRAPH AT									
+		65A3BY	158.	12.67	32.	10.	3.	.14		
+	2 COMBINED AT									
+		CP-MER	1039.	13.75	585.	274.	93.	4.65		
+	ROUTED TO									
+		RSDW1	1033.	13.92	585.	274.	93.	4.65		
+	ROUTED TO									
+		RSDW2	1029.	14.17	584.	274.	93.	4.65		
+	HYDROGRAPH AT									
+		65B	699.	12.83	158.	49.	16.	.68		
+	DI VERSION TO									
+		D65B	699.	12.83	112.	31.	10.	.68		
+	HYDROGRAPH AT									
+		R65B	468.	13.17	63.	18.	6.	.68		
+	2 COMBINED AT									
+		CP65B	1104.	14.08	640.	290.	99.	5.33		

SDW500FC.txt

*** NORMAL END OF HEC-1 ***

-----DSS---ZCLOSE Unit: 71, File: N60_500.DSS
Pointer Utilization: .31
Number of Records: 215
File Size: 386.8 Kbytes
Percent Inactive: .0

Appendix D

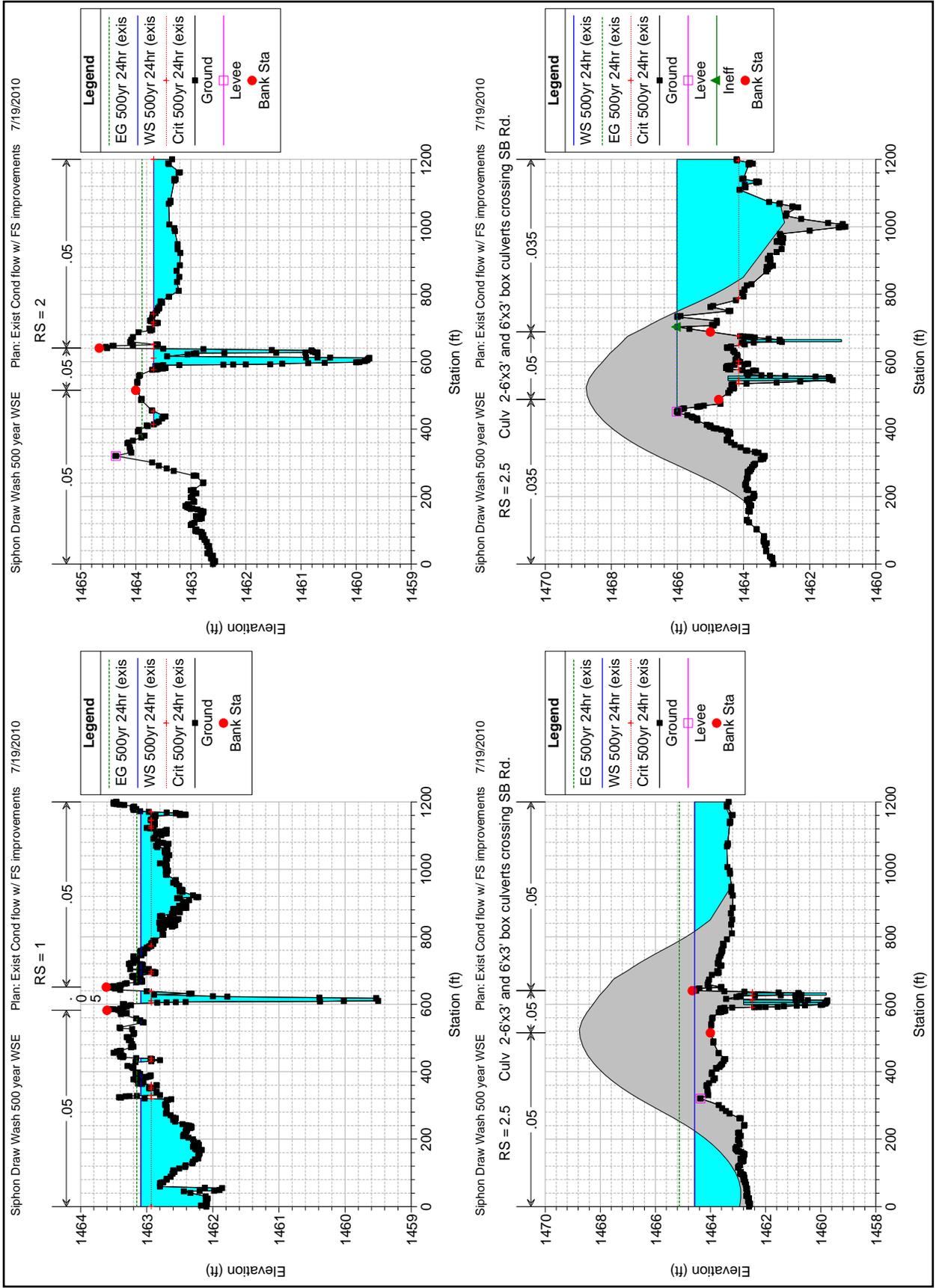
- HEC-RAS Cross-Section Exhibits

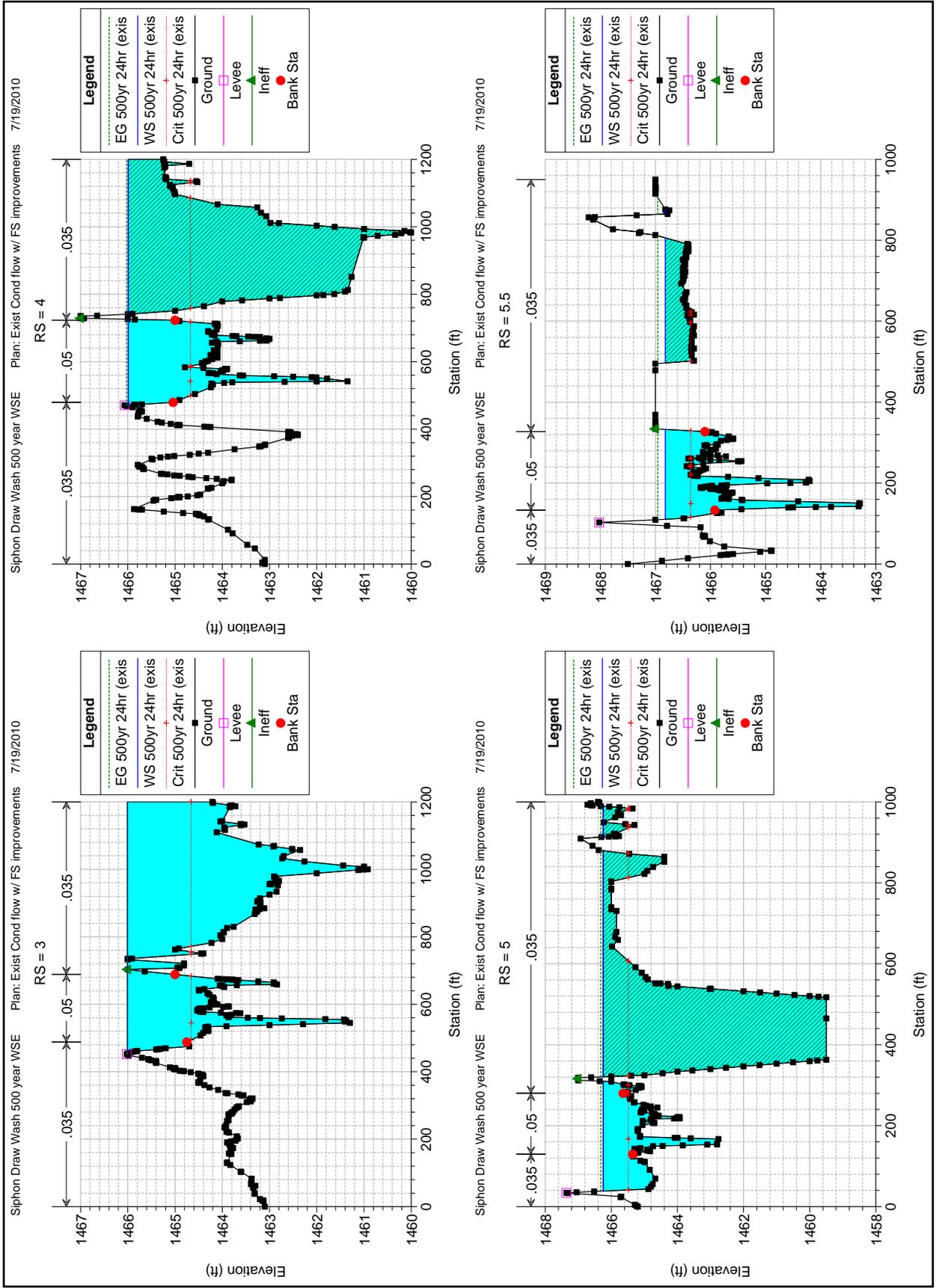
Appendix E

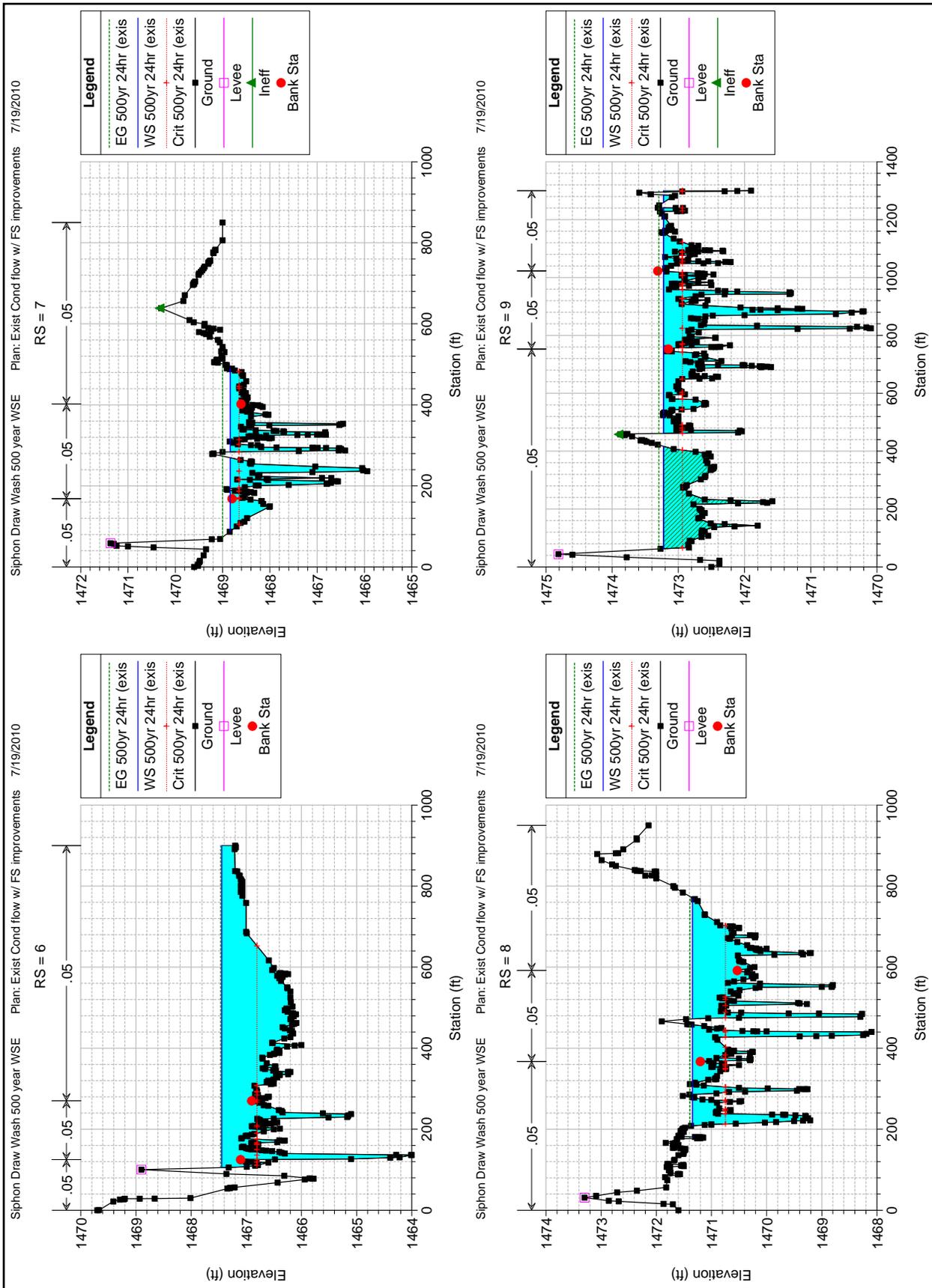
- HEC-RAS Model Output Files

HEC-RAS Plan: Ex with FS River: Siphon Draw Wash Reach: Mtn to SB Profile: 500yr 24hr (exis)

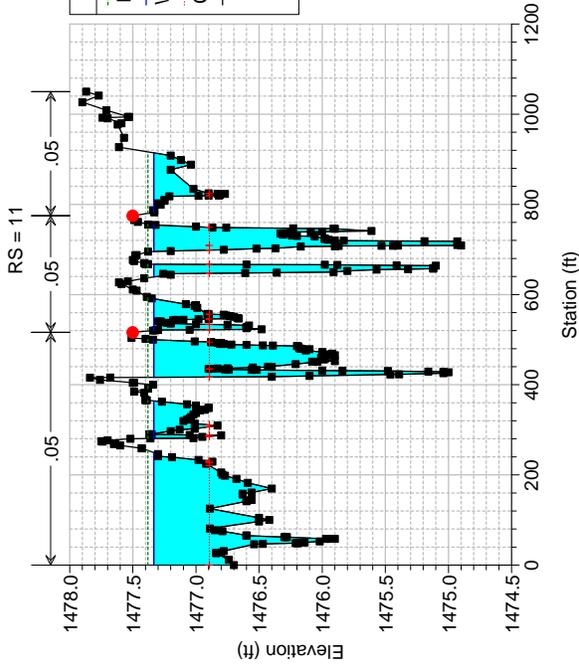
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Q Culv Group (cfs)
Mtn to SB	11	500yr 24hr (exis)	750.00	1474.90	1477.33	1476.89	1477.38	0.004717	1.83	443.00	702.36	0.35	
Mtn to SB	10	500yr 24hr (exis)	750.00	1472.01	1475.58	1475.19	1475.63	0.005318	1.95	416.44	712.28	0.37	
Mtn to SB	9	500yr 24hr (exis)	750.00	1470.09	1473.22	1472.94	1473.29	0.008706	2.37	383.01	1134.25	0.47	
Mtn to SB	8	500yr 24hr (exis)	750.00	1468.10	1471.35	1470.75	1471.39	0.003741	1.84	454.27	543.74	0.32	
Mtn to SB	7	500yr 24hr (exis)	750.00	1465.94	1468.84	1468.65	1469.00	0.016035	3.38	246.88	383.09	0.64	
Mtn to SB	6	500yr 24hr (exis)	750.00	1464.00	1467.44	1466.80	1467.47	0.001934	1.36	649.83	794.75	0.23	
Mtn to SB	5.5	500yr 24hr (exis)	750.00	1463.29	1466.82	1466.36	1466.96	0.007703	2.96	254.18	542.84	0.47	
Mtn to SB	5	500yr 24hr (exis)	750.00	1462.76	1466.25	1465.49	1466.32	0.002334	1.86	366.67	905.84	0.27	
Mtn to SB	4	500yr 24hr (exis)	750.00	1461.35	1465.99	1464.68	1466.03	0.001188	1.58	476.19	713.37	0.20	
Mtn to SB	3	500yr 24hr (exis)	750.00	1461.30	1466.01	1464.66	1466.01	0.000041	0.31	1690.37	747.85	0.04	297.71
Mtn to SB	2.5	500yr 24hr (exis)	750.00										
Mtn to SB	2	500yr 24hr (exis)	750.00	1459.76	1463.67	1463.67	1463.89	0.010253	4.37	281.08	569.11	0.56	
Mtn to SB	1	500yr 24hr (exis)	750.00	1459.50	1463.09	1462.93	1463.15	0.005998	3.00	444.33	881.22	0.42	



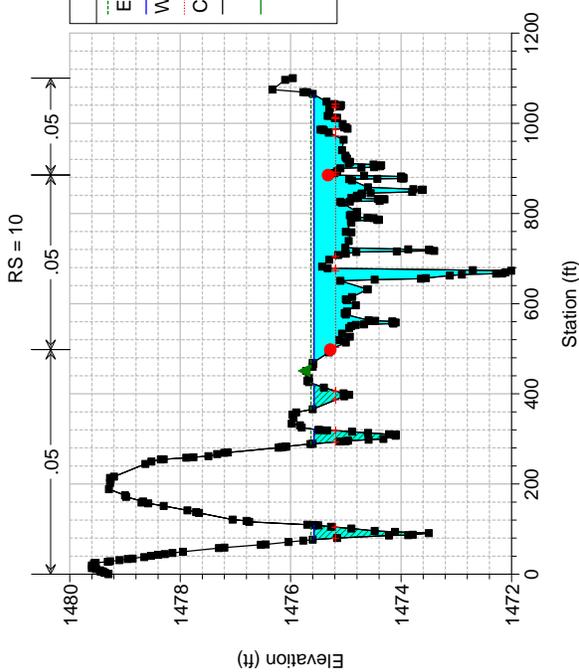




Siphon Draw Wash 500 year WSE Plan: Exist Cond flow w/ FS Improvements 7/19/2010



Siphon Draw Wash 500 year WSE Plan: Exist Cond flow w/ FS Improvements 7/19/2010

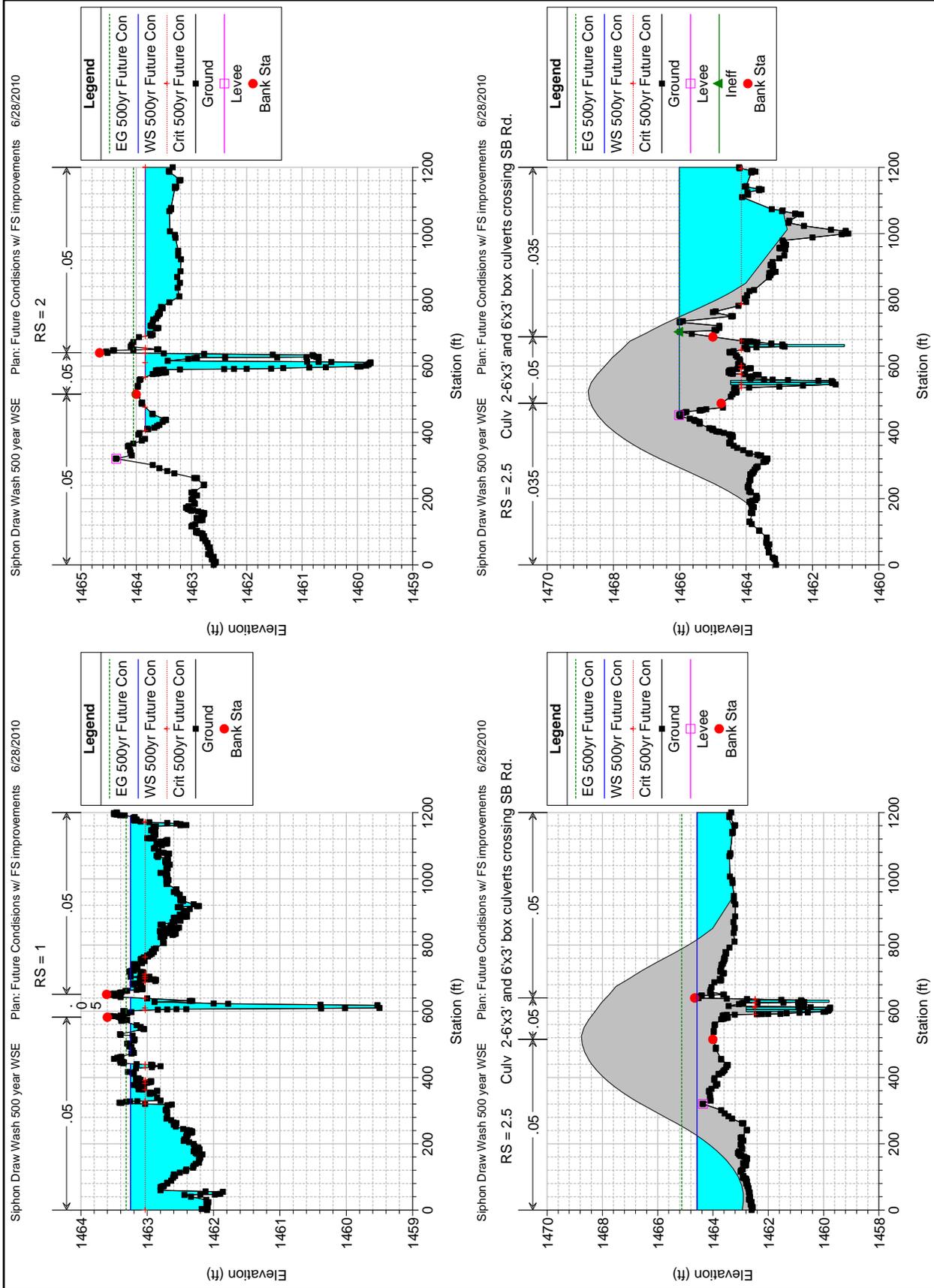


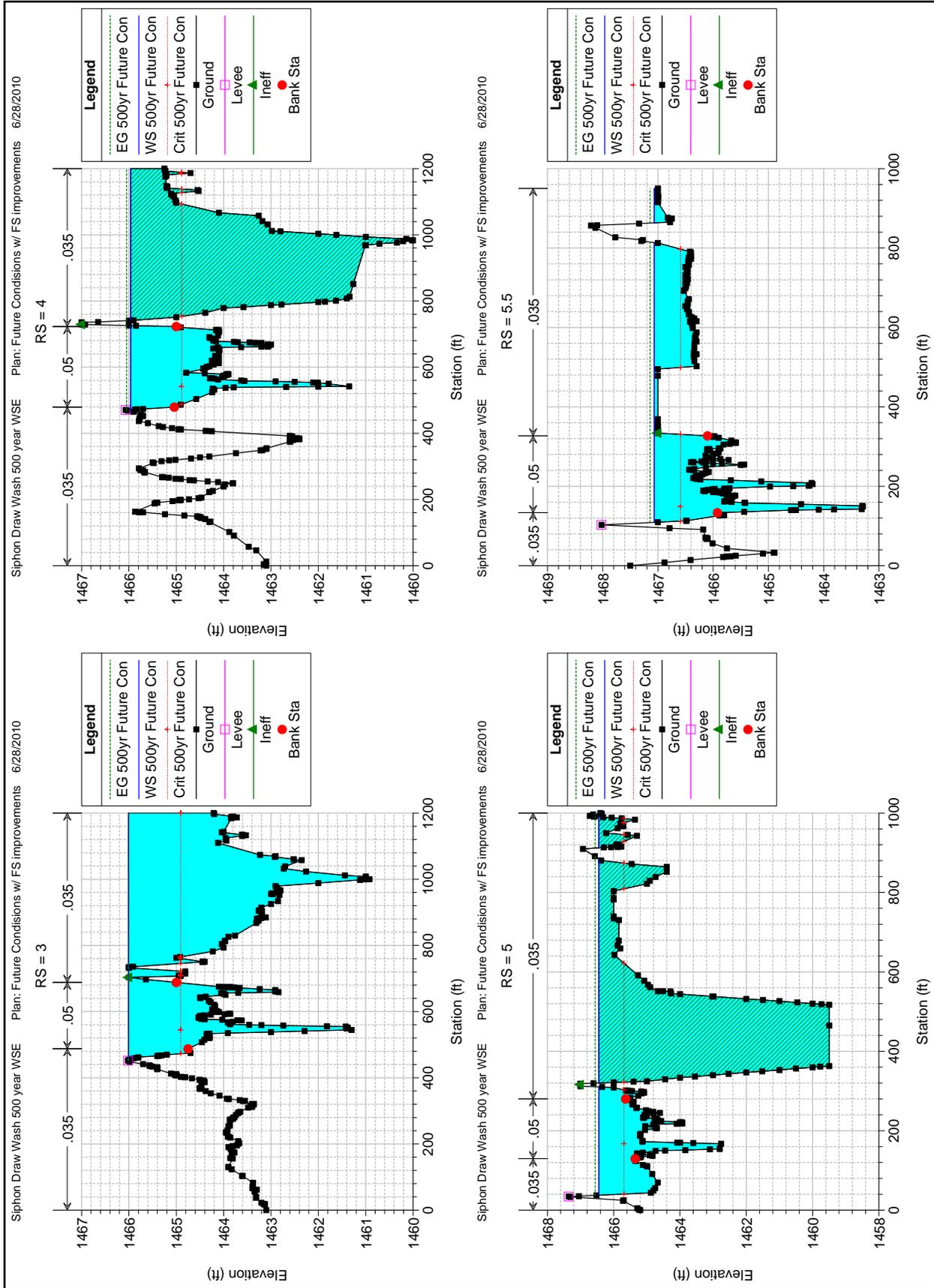
Legend
 EG 500yr 24hr (exis)
 WS 500yr 24hr (exis)
 Crit 500yr 24hr (exis)
 Ground
 Bank Sta

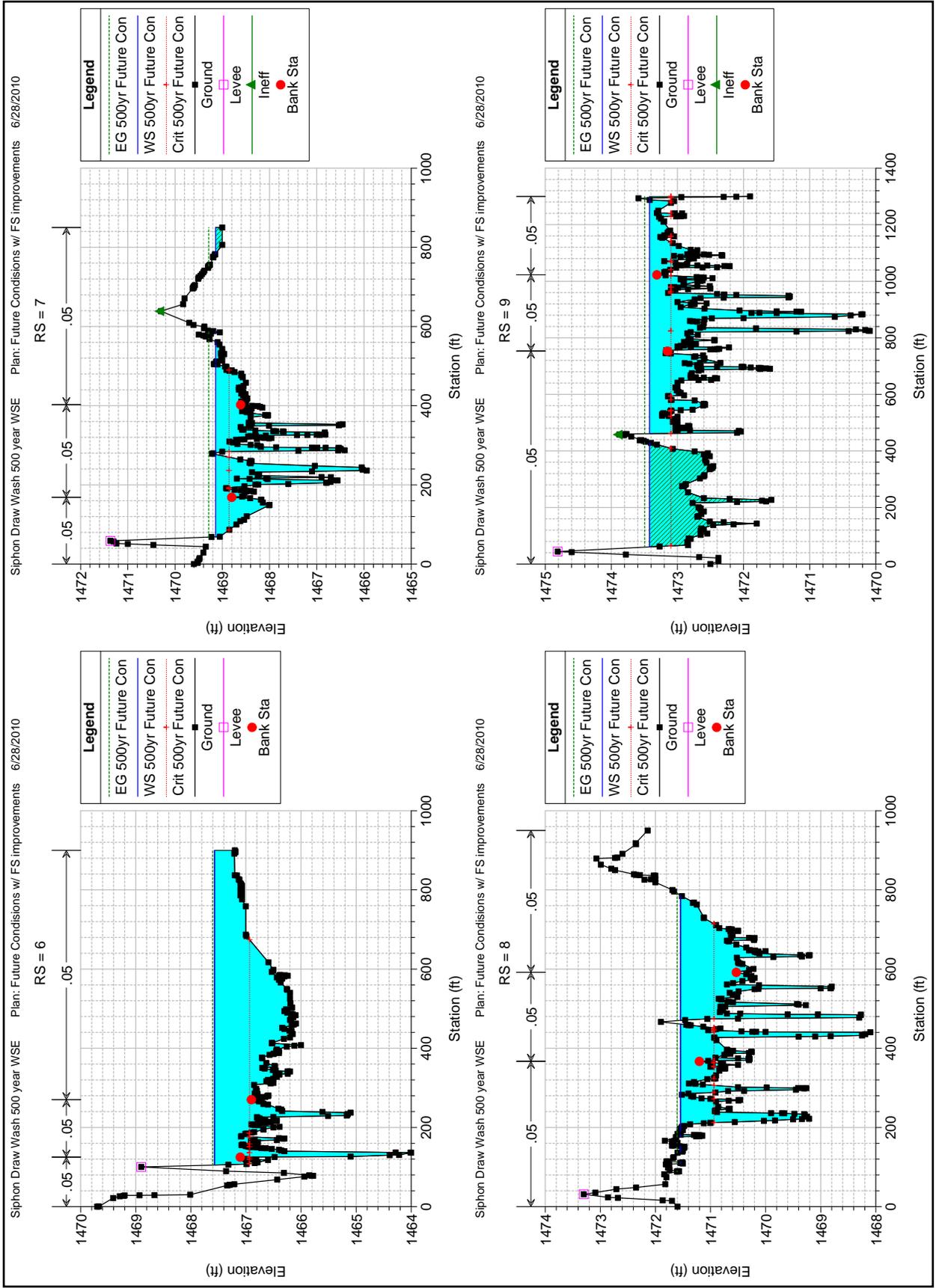
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 EG 500yr 24hr (exis)
 WS 500yr 24hr (exis)
 Crit 500yr 24hr (exis)
 Ground
 Ineff
 Bank Sta

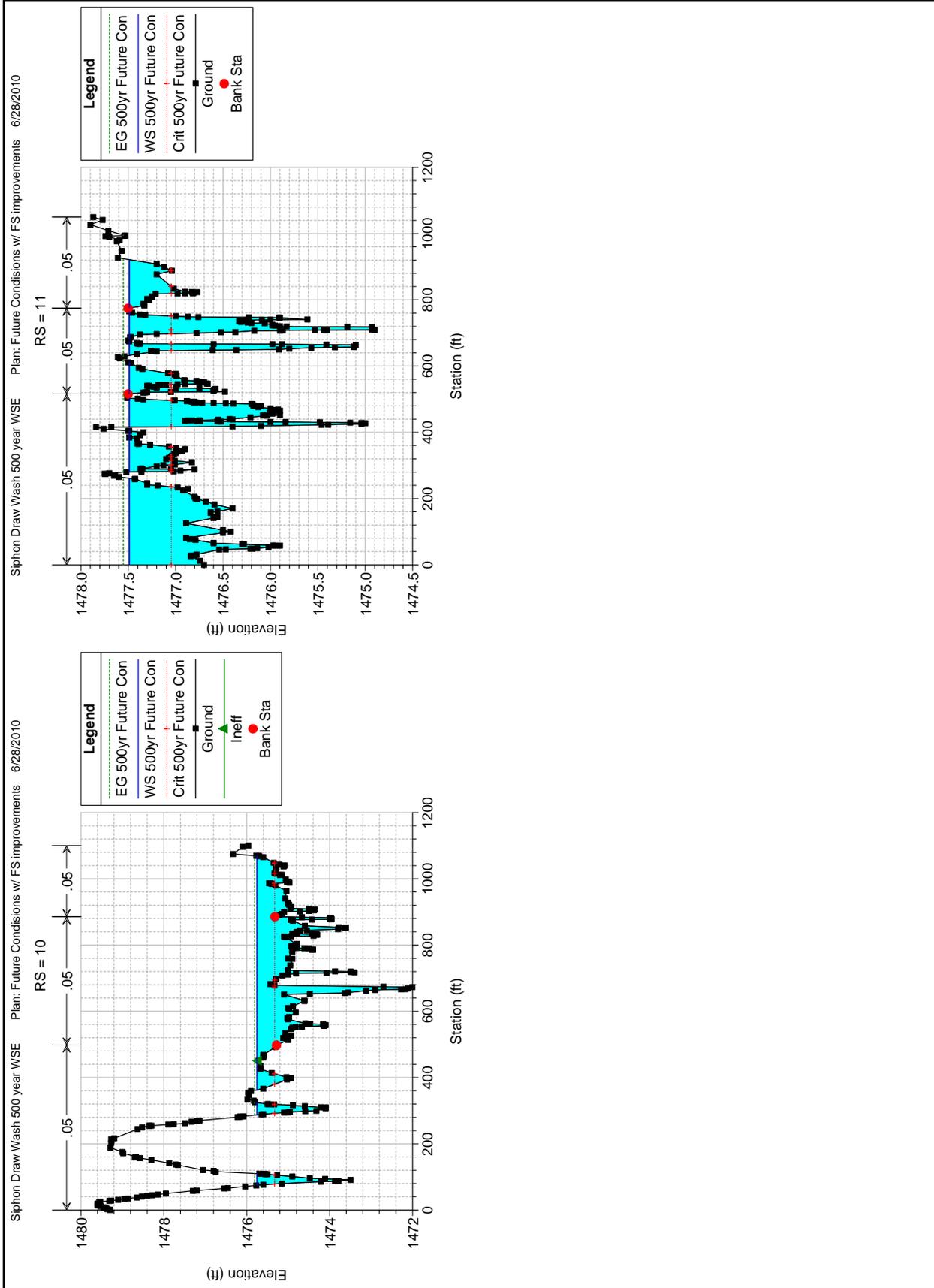
HEC-RAS Plan: Future w FS River: Siphon Draw Wash Reach: Mtn to SB Profile: 500yr Future Con

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Q Culv Group (cfs)
Mtn to SB	11	500yr Future Con	1100.00	1474.90	1477.49	1477.05	1477.55	0.006130	1.90	562.74	837.68	0.39	
Mtn to SB	10	500yr Future Con	1100.00	1472.01	1475.76	1475.33	1475.81	0.004126	1.94	624.88	779.74	0.34	
Mtn to SB	9	500yr Future Con	1100.00	1470.09	1473.42	1473.10	1473.50	0.006946	2.45	546.57	1201.27	0.43	
Mtn to SB	8	500yr Future Con	1100.00	1468.10	1471.54	1470.94	1471.61	0.004357	2.19	567.21	608.48	0.35	
Mtn to SB	7	500yr Future Con	1100.00	1465.94	1469.14	1468.86	1469.29	0.011084	3.30	377.42	554.39	0.55	
Mtn to SB	6	500yr Future Con	1100.00	1464.00	1467.57	1466.93	1467.60	0.002596	1.70	750.17	795.18	0.27	
Mtn to SB	5.5	500yr Future Con	1100.00	1463.29	1467.07	1466.59	1467.14	0.004122	2.45	533.13	791.44	0.36	
Mtn to SB	5	500yr Future Con	1100.00	1462.76	1466.45	1465.69	1466.56	0.003186	2.36	420.98	917.40	0.32	
Mtn to SB	4	500yr Future Con	1100.00	1461.35	1465.96	1464.89	1466.05	0.002674	2.35	469.61	712.89	0.30	
Mtn to SB	3	500yr Future Con	1100.00	1461.30	1466.01	1464.91	1466.02	0.000089	0.46	1690.46	747.85	0.06	
Mtn to SB	2.5	500yr Future Con	1100.00										297.66
Mtn to SB	2	500yr Future Con	1100.00	1459.76	1463.83	1463.83	1464.05	0.012777	4.69	381.16	658.03	0.63	
Mtn to SB	1	500yr Future Con	1100.00	1459.50	1463.25	1463.03	1463.32	0.006000	3.03	603.07	1062.91	0.42	









APPENDIX F
AGFD On-line Environmental Review Tool Receipt

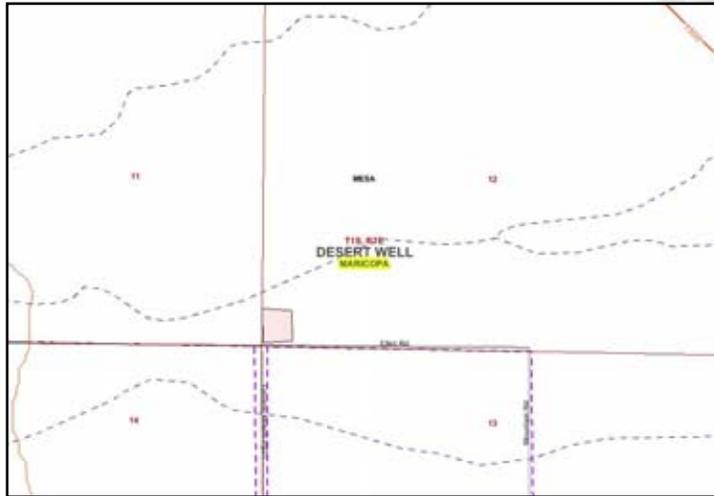
Arizona's On-line Environmental Review Tool

Search ID: 20100201011343

Project Name: 10-01010 Signal and Elliot Firestation

Date: 2/1/2010 10:28:35 AM

Project Location



Project Name: 10-01010 Signal and Elliot Firestation

Submitted By: Patrick Dockens

On behalf of: CONSULTING

Project Search ID: 20100201011343

Date: 2/1/2010 10:28:31 AM

Project Category: Development Within Municipalities (Urban Growth), Public & Community Facilities (school, library, church) and associated infrastructure, New construction

Project Coordinates (UTM Zone 12-NAD 83): 444102.290, 3690302.879 meter

Project Area: 2.189 acres

Project Perimeter: 377.727 meter

County: MARICOPA

USGS 7.5 Minute Quadrangle ID: 1353

Quadrangle Name: DESERT WELL

Project locality is not anticipated to change

Location Accuracy Disclaimer

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Receipt is solely responsible for the project location and thus the correctness of the Project Review Receipt content.

The Department appreciates the opportunity to provide in-depth comments and project review when additional information or environmental documentation becomes available.

Special Status Species Occurrences/Critical Habitat/Tribal Lands within 3 miles of Project Vicinity:

No special status species were documented as occurring within the project vicinity. However, further field investigations of the project area are highly recommended. Site visits may reveal previously unrecorded resources of special concern in locations where they are currently undocumented.

No proposed or designated critical habitat is within the project vicinity.

No Indian tribal lands are within the project vicinity.

Arizona's On-line Environmental Review Tool

Search ID: 20100201011343

Project Name: 10-01010 Signal and Elliot Firestation

Date: 2/1/2010 10:28:35 AM

Please review the entire receipt for project type recommendations and/or species or location information and retain a copy for future reference. If any of the information you provided did not accurately reflect this project, or if project plans change, another review should be conducted, as this determination may not be valid.

Arizona's On-line Environmental Review Tool:

1. This On-line Environmental Review Tool inquiry has generated recommendations regarding the potential impacts of your project on Special Status Species (SSS) and other wildlife of Arizona. SSS include all U.S. Fish and Wildlife Service federally listed, U.S. Bureau of Land Management sensitive, U.S. Forest Service sensitive, and Arizona Game and Fish Department (Department) recognized species of concern.
2. These recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation). These recommendations are preliminary in scope, designed to provide early considerations for all species of wildlife, pertinent to the project type you entered.
3. This receipt, generated by the automated On-line Environmental Review Tool does not constitute an official project review by Department biologists and planners. Further coordination may be necessary as appropriate under the National Environmental Policy Act (NEPA) and/or the Endangered Species Act (ESA).

The U.S. Fish and Wildlife Service (USFWS) has regulatory authority over all federally listed species under the ESA. Contact USFWS Ecological Services Offices: <http://arizonaes.fws.gov/>.

Phoenix Main Office
2321 W. Royal Palm Road, Suite 103
Phoenix, AZ 85021
Phone 602-242-0210
Fax 602-242-2513

Tucson Sub-Office
201 North Bonita, Suite 141
Tucson, AZ 85745
Phone 520-670-6144
Fax 520-670-6154

Flagstaff Sub-Office
323 N. Leroux Street, Suite 101
Flagstaff, AZ 86001
Phone 928-226-0614
Fax 928-226-1099

Disclaimer:

1. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area.
2. The Department's Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there.
3. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HDMS data contains information about species occurrences that have actually been reported to the Department.

Arizona Game and Fish Department Mission

To conserve, enhance, and restore Arizona's diverse wildlife resources and habitats through aggressive protection and

management programs, and to provide wildlife resources and safe watercraft and off-highway vehicle recreation for the enjoyment, appreciation, and use by present and future generations.

Project Category: Development Within Municipalities (Urban Growth), Public & Community Facilities (school, library, church) and associated infrastructure, New construction

Project Type Recommendations:

Based on the project type entered; coordination with Arizona Department of Environmental Quality may be required (<http://www.azdeq.gov/>).

Based on the project type entered; coordination with Arizona Department of Water Resources may be required (<http://www.water.az.gov/adwr/>)

Based on the project type entered; coordination with County Flood Control districts may be required.

Based on the project type entered; coordination with State Historic Preservation Office may be required
<http://azstateparks.com/SHPO/index.html>

Based on the project type entered; coordination with U.S. Army Corps of Engineers may be required

(<http://www.spl.usace.army.mil/regulatory/phonedir.html>)

Communities can actively support the sustainability and mobility of wildlife by incorporating wildlife planning into their regional/comprehensive plans, their regional transportation plans, and their open space/conservation land system programs. An effective approach to wildlife planning begins with the identification of the wildlife resources in need of protection, an assessment of important habitat blocks and connective corridors, and the incorporation of these critical wildlife components into the community plans and programs. Community planners should identify open spaces and habitat blocks that can be maintained in their area, and the necessary connections between those blocks to be preserved or protected. Community planners should also work with State and local transportation planning entities, and planners from other communities, to foster coordination and cooperation in developing compatible development plans to ensure wildlife habitat connectivity. The Department's guidelines for incorporating wildlife considerations into community planning and developments can be found at <http://www.azgfd.gov/hgis/guidelines.aspx>.

Development plans should provide for open natural space for wildlife movement, while also minimizing the potential for wildlife-human interactions through design features. Please contact Project Evaluation Program for more information on living with urban wildlife.

During planning and construction, minimize potential introduction or spread of exotic invasive species. Invasive species can be plants, animals (exotic snails), and other organisms (e.g. microbes), which may cause alteration to ecological functions or compete with or prey upon native species and can cause social impacts (e.g. livestock forage reduction, increase wildfire risk). The terms noxious weed or invasive plants are often used interchangeably. Precautions should be taken to wash all equipment utilized in the project activities before and after project activities to reduce the spread of invasive species. Arizona has noxious weed regulations (Arizona Revised Statutes, Rules

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R3-4-244 and R3-4-245). See Arizona Department of Agriculture website for restricted plants <http://www.azda.gov/PSD/quarantine5.htm>. Additionally, the U.S. Department of Agriculture has information regarding pest and invasive plant control methods including: pesticide, herbicide, biological control agents, and mechanical control: <http://www.usda.gov/wps/portal/usdahome>. The Department regulates the importation, purchasing, and transportation of wildlife and fish (Restricted Live Wildlife), please refer to the hunting regulations for further information http://www.azgfd.gov/h_f/hunting_rules.shtml.

During the planning stages of your project, please consider the local or regional needs of wildlife in regards to movement, connectivity, and access to habitat needs. Loss of this permeability prevents wildlife from accessing resources, finding mates, reduces gene flow, prevents wildlife from re-colonizing areas where local extirpations may have occurred, and ultimately prevents wildlife from contributing to ecosystem functions, such as pollination, seed dispersal, control of prey numbers, and resistance to invasive species. In many cases, streams and washes provide natural movement corridors for wildlife and should be maintained in their natural state. Uplands also support a large diversity of species, and should be contained within important wildlife movement corridors. In addition, maintaining biodiversity and ecosystem functions can be facilitated through improving designs of structures, fences, roadways, and culverts to promote passage for a variety of wildlife.

Minimization and mitigation of impacts to wildlife and fish species due to changes in water quality, quantity, chemistry, temperature, and alteration to flow regimes (timing, magnitude, duration, and frequency of floods) should be evaluated. Minimize impacts to springs, in-stream flow, and consider irrigation improvements to decrease water use. If dredging is a project component, consider timing of the project in order to minimize impacts to spawning fish and other aquatic species (including spawning seasons), and to reduce spread of exotic invasive species. We recommend early direct coordination with Project

Evaluation Program for projects that could impact water resources, wetlands, streams, springs, and/or riparian habitats.

Planning: consider impacts of lighting intensity on mammals and birds and develop measures or alternatives that can be taken to increase human safety while minimizing potential impacts to wildlife. Conduct wildlife surveys to determine species within project area, and evaluate proposed activities based on species biology and natural history to determine if artificial lighting may disrupt behavior patterns or habitat use.

The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

Trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herptofauna (snakes, lizards, tortoise) from entering ditches.

Recommendations Disclaimer:

1. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project.
2. These recommendations are proposed actions or guidelines to be considered during **preliminary project development**.
3. Additional site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or

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new project proposals.

5. The Department is interested in the conservation of all fish and wildlife resources, including those Special Status Species listed on this receipt, and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.

6. Further coordination requires the submittal of this initialed and signed Environmental Review Receipt with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map).

7. Upon receiving information by AZGFD, please allow 30 days for completion of project reviews. Mail requests to:

**Project Evaluation Program, Habitat Branch
Arizona Game and Fish Department
5000 West Carefree Highway
Phoenix, Arizona 85086-5000
Phone Number: (623) 236-7600
Fax Number: (623) 236-7366**

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1. This Environmental Review and project planning website was developed and intended for the purpose of screening projects for potential impacts on resources of special concern. By indicating your agreement to the terms of use for this website, you warrant that you will not use this website for any other purpose.
2. Unauthorized attempts to upload information or change information

on this website are strictly prohibited and may be punishable under the Computer Fraud and Abuse Act of 1986 and/or the National Information Infrastructure Protection Act .

3. The Department reserves the right at any time, without notice, to enhance, modify, alter, or suspend the website and to terminate or restrict your access to the website.

4. This Environmental Review is based on the project study area that was entered. The review must be redone if the project study area, location, or the type of project changes. If additional information becomes available, this review may need to be reconsidered.

5. A signed and initialed copy of the Environmental Review Receipt indicates that the entire receipt has been read by the signer of the Environmental Review Receipt.

Security:

The Environmental Review and project planning web application operates on a complex State computer system. This system is monitored to ensure proper operation, to verify the functioning of applicable security features, and for other like purposes. Anyone using this system expressly consents to such monitoring and is advised that if such monitoring reveals possible evidence of criminal activity, system personnel may provide the evidence of such monitoring to law enforcement officials. Unauthorized attempts to upload or change information; to defeat or circumvent security measures; or to utilize this system for other than its intended purposes are prohibited.

This website maintains a record of each environmental review search result as well as all contact information. This information is maintained for internal tracking purposes. Information collected in this application will not be shared outside of the purposes of the Department.

If the Environmental Review Receipt and supporting material are not mailed to the Department or other appropriate agencies within six (6) months of the Project Review Receipt date, the receipt is considered to be null and void, and a new review must be initiated.

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Print this Environmental Review Receipt using your Internet browser's print function and keep it for your records. Signature of this receipt indicates the signer has read and understands the information provided.

Signature: _____

Date: _____

Proposed Date of Implementation: _____

Please provide point of contact information regarding this Environmental Review.

Application or organization responsible for project implementation

Agency/organization: _____

Contact Name: _____

Address: _____

City, State, Zip: _____

Phone: _____

E-mail: _____

Person Conducting Search (if not applicable)

Agency/organization: _____

Contact Name: _____

Address: _____

City, State, Zip: _____

Phone: _____

E-mail: _____

APPENDIX G
Public Involvement



Notice of Public Meetings

Dear Neighbor,

We have applied for City of Mesa Design Review Board and (separate) Public Hearing Officer site plan approval for the proposed City of Mesa Fire Station # 219 at 3361 South Signal Butte Road, which will be located north of Elliot Road on the east side of Signal Butte Road in Mesa, Arizona. The project site is approximately 2.23 acres in size and is part of a larger parcel of land owned by the City of Mesa. The site currently has a Public Facility (PF) zoning. No re-zoning is necessary

This letter is being sent to all neighboring property owners within 300 feet of the boundaries of the City's parcel and to all Registered Neighborhoods and Homeowners' Associations within 1,000 feet of the City's parcel, as required by the Planning Division. You are invited to attend the following two meetings and to provide any input you may have regarding this proposal.

Design Review Board (DRB) Meeting	Planning Hearing Officer (PHO)
<p>Date*: May 6, 2009 Time*: 5:00 p.m. Meeting Location*: 57 E 1st St., City of Mesa Council Chambers, Lower Level Proposed Development: City of Mesa Fire Station No. 219 Address: 3361 S Signal Butte Road Design Review Case No: DR09-09</p> <p>Purpose of the Meeting: Review the building design, landscape plans, parking layout, and site layout.</p>	<p>Date*: May 7, 2009 Time*: 1:30 p.m. Meeting Location*: 55 N. Center Street, Municipal Building, View Conference Room Proposed Development: City of Mesa Fire Station No. 219 Address: 3361 S Signal Butte Road Zoning Case No: Z09-09</p> <p>Purpose of the Hearing: Site plan review.</p>

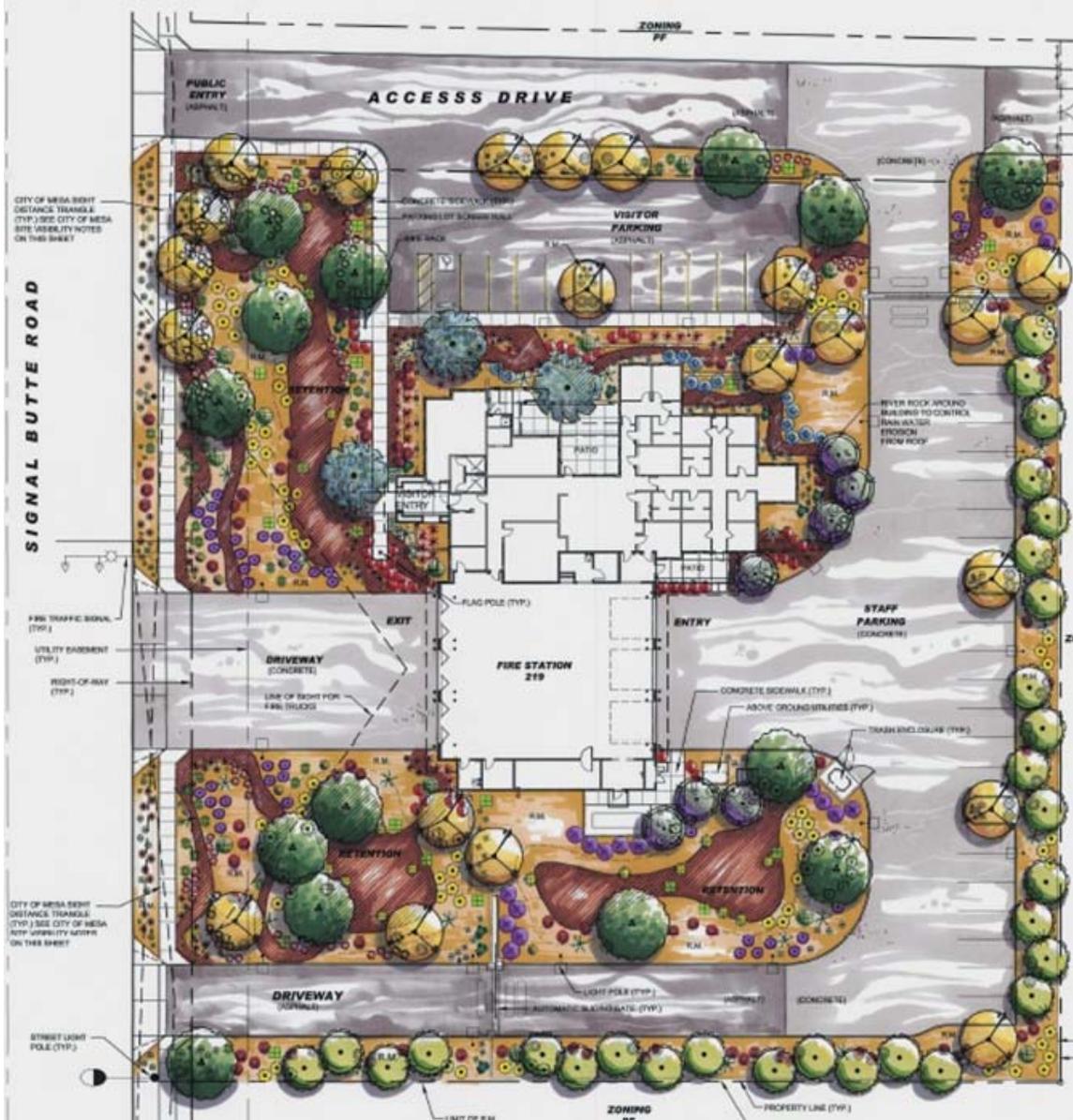
Please note that the DRB does not review or discuss the actual use of the land (such as restaurant, gas station, apartments, office building). The land use issues are addressed by the Planning Hearing Officer, Planning Zoning Board and/or the City Council.

A vicinity map, proposed site plan and views of the proposed building are enclosed for reference. Please contact the Mesa Planning Division at 55 N. Center Street, 1st Floor or call (480) 644-2385 with any questions or comments.

Sincerely,

Shahir A. Safi
City of Mesa Engineering Design

**Call the Planning Division to verify the date and time (480) 644-2385*



North ↑

Site Plan



View of Apparatus Bays from Signal Butte



Birds Eye View Looking Southwest



View of Patio



View of Community Room