APPENDIX F
SECTION 106 CONSULTATION

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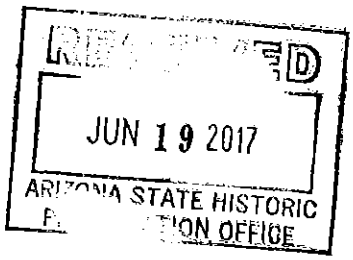
2016-0641 (137396)

U.S Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Airports Division

Mailing Address:
15000 Aviation Boulevard
Lawndale, CA 90261

June 6, 2017



Ms. Kathryn Leonard
Arizona State Historic Preservation Officer
Arizona State Parks
1100 W. Washington Street
Phoenix, Arizona 85007

Attention: Mr. David Jacobs

Dear Ms. Leonard:

Proposed Airfield Safety Enhancement Project
Tucson International Airport, Tucson, Pima County, Arizona
Section 106 Coordination

The Federal Aviation Administration (FAA) is preparing an Environmental Impact Statement (EIS) for the Tucson Airport Authority's (TAA) proposed Airfield Safety Enhancement Project and associated land transactions at Tucson International Airport (TUS) (the Project). TUS is located in the City of Tucson and is owned and operated by TAA. The FAA's proposed federal actions for the Project include approving TAA's Airport Layout Plan and approving TAA's application for federal funding assistance. The United States Air Force and National Guard Bureau are Cooperating Agencies for preparing the EIS.

The Project includes the following components:

Construction of a Full Length Parallel Runway 11R/29L that is 10,996 feet long by 150 feet wide about 800 feet from the centerline of Runway 11L/29R; Construction of a new Centerline Parallel Taxiway between the two runways; Construction of a New Outboard Parallel Taxiway; Displace the Runway 11L Arrivals Threshold; Construction of connector and bypass taxiways; Close Taxiway A2; Construct/maintain the Arizona Air National Guard Extended Blast Pads for Runways 11L/29R and 11R/29L; Installation of associated drainage improvements; Transfer of about 58 acres from USAF Plant (AFP) 44 to the TAA (Parcel F), and about 150 acres of TAA Land to USAF AFP-44 and convey ultimately up to 291 acres from TAA land to the USAF (Parcel H); Demolition of 12 Earth Covered Magazines on AFP-44; Construct replacement earth covered magazines elsewhere on AFP-44; and Construction of a Munitions Storage Area for the Arizona Air National Guard on Parcel H.

Description of the Areas of Potential Effects for the Project:

In designating the Area of Potential Effects (APE) for Direct Effects from the Project, FAA included (1) the portions of TUS and Air Force Plant 44 that would experience physical disturbance from the Project, and (2) any areas that would be used for staging equipment and supplies during construction. FAA determined these boundaries by consulting with the TAA, the USAF, and NGB on their plans for the proposed Project.

In designating the Indirect Effects APE (airport noise), FAA included the areas around TUS that experience aircraft over flights, including existing developed and undeveloped land uses. We have enclosed two exhibits depicting the APE and another depicting the proposed Project from our Purpose, Need, and Alternatives Working Paper to help illustrate where the Project is located. FAA will include this information in the EIS.

FAA is seeking comments from your office on the acceptability of the APE's under Title 36, Code of Federal Regulations Section 800.4, *Identification of Historic Properties.*

If you have any further questions about this matter, please call me at 310/725-3615.

Sincerely,

David B. Kessler, AICP
Regional Environmental Protection Specialist

Enclosures: Figure 3-X - APE for the proposed undertaking.
Exhibit 11 – Proposed Action from Purpose, Need, and Alternatives Working Paper

Cc: PHX-600; APP-400, USAF, NGB

I concur with FAA's delineation of the Area of Potential Effects for the proposed undertaking as described above.

Arizona SHPO

19 JUNE 17
Date

Chris Babb

From: Dave.Kessler@faa.gov
Sent: Monday, October 17, 2016 3:45 PM
To: Lorraine.Herson-Jones@faa.gov; jaclyn.johnson@faa.gov; Frank.Smigelski@faa.gov; Jessica.Rankin@faa.gov; Chris Babb; jeffrey.mccann@us.af.mil; greg.j.hoffman2.mil@mail.mil; Rob Adams
Subject: FW: Juan Bautista de Anza National Historic Trail near Tucson, Arizona

Team – Please see the response from NPS below.

David B. Kessler, M.A., AICP
U.S. Department of Transportation
Federal Aviation Administration
Regional Environmental Protection Specialist
Airports Division – Western-Pacific Region
Voice: 310-725-3615
email: dave.kessler@faa.gov

From: Weldon, BriAnna [mailto:brianna_weldon@nps.gov]
Sent: Monday, October 17, 2016 12:34 PM
To: Kessler, Dave (FAA)
Subject: Re: Juan Bautista de Anza National Historic Trail near Tucson, Arizona

Hi Dave,

Thank you for sending along the scoping document so I could take a second look.

There are no concerns from the Anza Trail for this project.

It's a developed area and this would not result in any significant impact to the Anza Historic Corridor or Recreational Trail.

BriAnna

On Mon, Oct 17, 2016 at 10:55 AM, <Dave.Kessler@faa.gov> wrote:

Here is the scoping package for the Tucson EIS.

Please take a look at it and see if it helps.

Dave

David B. Kessler, M.A., AICP

U.S. Department of Transportation

Federal Aviation Administration

Regional Environmental Protection Specialist

Airports Division – Western-Pacific Region

Voice: 310-725-3615

email: dave.kessler@faa.gov

From: Weldon, BriAnna [mailto:brianna_weldon@nps.gov]
Sent: Monday, October 17, 2016 7:47 AM
To: Kessler, Dave (FAA)
Cc: Johnson, Jaclyn (FAA); Herson-Jones, Lorraine (FAA); Smigelski, Frank (FAA); Rankin, Jessica (FAA); Ratcliff, Mia (FAA)
Subject: Re: Juan Bautista de Anza National Historic Trail near Tucson, Arizona

Hi Dave -

Yes, it is my mistake that the trail of concern is to the west of the project area. I think what I was responding to was the existence of the Anza Trail Recreation Route (hashed line) near the project and if there will be impacts to the viewshed of the corridor and recreation trail. Let's get on the phone - I don't think that there will be a significant impact but I've learned my lesson to respond.

I'm free this week Monday - Wednesday 8am - 3:30pm Pacific Time.

Thanks,

BriAnna

On Fri, Oct 14, 2016 at 5:32 PM, <Dave.Kessler@faa.gov> wrote:

Hello Ms. Weldon – I would like to follow up on a letter I received from Melissa Trechik concerning scoping comments for an Environmental Impact Statement the Federal Aviation Administration is preparing at Tucson International Airport, in Tucson, Arizona. I've attached the letter so you can see what I'm referencing. I would like to talk to you in the coming week to make sure we have a common understanding of the proposed project and how we will evaluate any impacts to NPS controlled resources.

We note the letter describes the designated corridor for the Juan Bautista de Anza National Historic Trail as "following the Santa Cruz River, approximately **two miles to the east** of the proposed project area." [emphasis added]

I've found this map on the NPS's website: https://www.nps.gov/juba/planyourvisit/maps.htm

It indicates the trail goes through Mission San Javier del Bac.

However, when I search this website, http://www.anzahistorictrail.org/visit/explorer. I can zoom up on the location of the trail and it shows the trail to the WEST of the airport. Below is a screen shot of the trail.

Juan Bautista de Anza
National Historic Trail

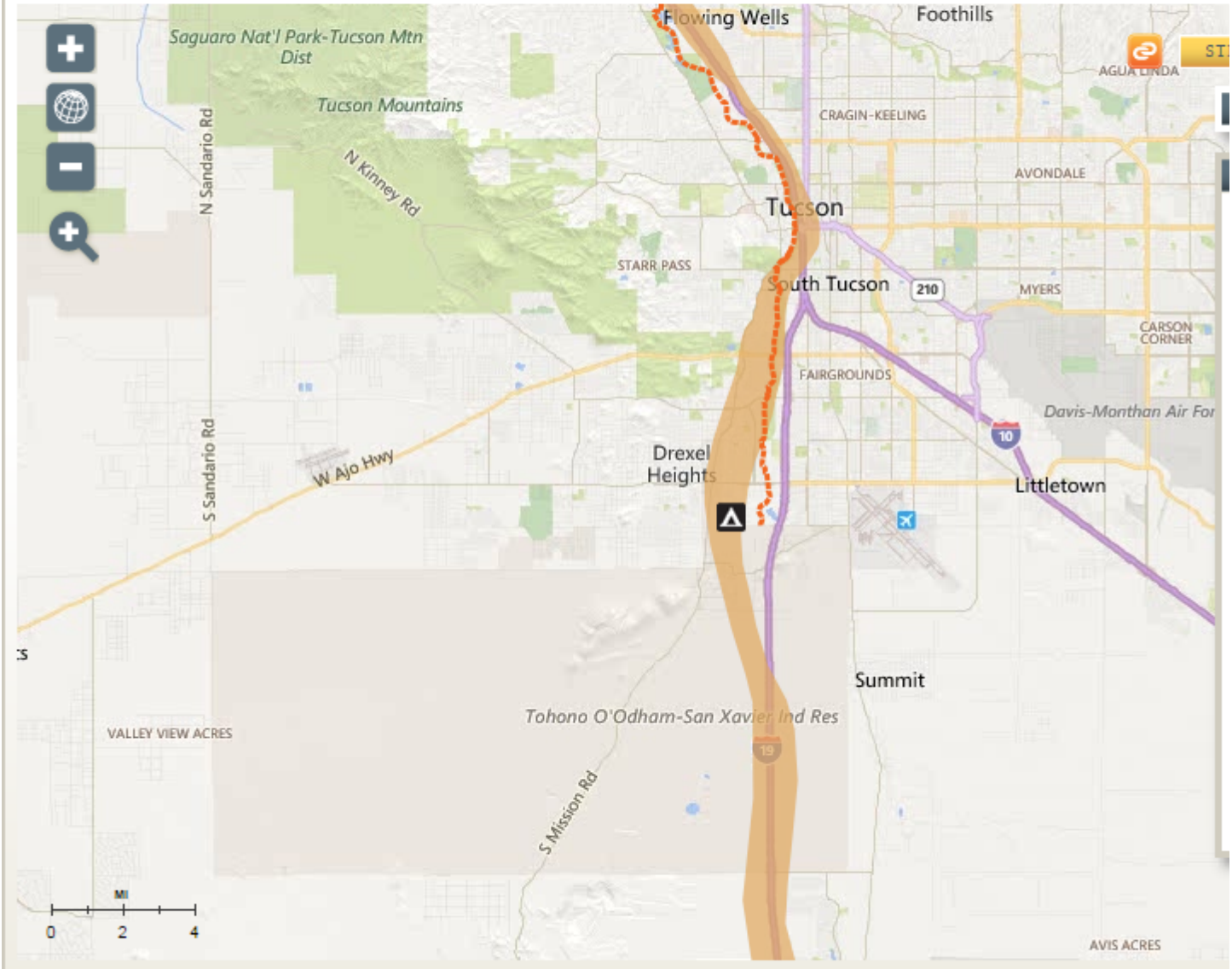
VISIT | EXPERIENCE | INVOLVE | NEWS | EVE

EXPLORE – Follow the Anza Expedition

Quick Search
Click the map for information

Trip Planner
Choose What to See

Trail Explorer
Learn About the Expedition



Oct. 14, 1775

Camp # 19

I would like to verify the location of the trail in relation to the Tucson International Airport. I've found information that shows the Mission and the trail appear to be about 4.5 miles ***West*** of the airport, west of Interstate 19. The proposed project will occur primarily on existing airport property, so I would like to explore the concerns the NPS may have about potential impacts to the trail and mission from the proposed project.

When would be a good time for me to call you so we can discuss this? I want to make sure my EIS team is reviewing the correct resource.

Thanks.

David B. Kessler, M.A., AICP

U.S. Department of Transportation

Federal Aviation Administration

Regional Environmental Protection Specialist

Airports Division – Western-Pacific Region

Voice: 310-725-3615

email: dave.kessler@faa.gov

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BriAnna Weldon ~ Outdoor Recreation Planner
Juan Bautista de Anza National Historic Trail
415/623.2343

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BriAnna Weldon ~ Outdoor Recreation Planner
Juan Bautista de Anza National Historic Trail
415/623.2343

U.S Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Office of Airports

Federal Aviation Administration
15000 Aviation Blvd. Room 3012
Lawndale, CA 90261

February 12, 2018

Ms. Kathryn Leonard
Arizona State Historic Preservation Officer
Arizona State Parks
1100 W. Washington Street
Phoenix, Arizona 85007

Attention: Mr. David Jacobs

Dear Ms. Leonard:

Proposed Airfield Safety Enhancement Project
Tucson International Airport
Tucson, Pima County, Arizona
Section 106 Coordination
SHPO Coordination Number: 2016-0651 (137396)

The Federal Aviation Administration (FAA), as lead federal agency, along with the United States Air Force (USAF), and National Guard Bureau (NGB), as cooperating agencies, are preparing an Environmental Impact Statement (EIS) for the Tucson Airport Authority's (TAA) proposed Airfield Safety Enhancement Project and associated land transactions at Tucson International Airport (TUS). The EIS is being prepared under the National Environmental Policy Act (NEPA) of 1969, as amended. TUS is located in the City of Tucson and is owned and operated by the TAA.

The USAF owns land, immediately west of TUS, known as Air Force Plant 44 (AFP-44). The USAF leases AFP-44 to Raytheon Missile Systems, which operates AFP-44 for the manufacture of various explosives and munitions. The USAF's purpose and need in this process is to maintain the operational capabilities and capacities of AFP-44. Under the Proposed Undertaking, Earth Covered Magazines (ECMs) located on AFP 44 would have to be demolished to protect airport safety areas. An ECM is a specific structure that is used to store explosives. Land identified as Parcel "F" would be transferred from AFP 44 to TAA in order include the appropriate runway dimensional safety areas on airport property. This would require demolition of the ECMs on Parcel "F." TAA would also transfer a parcel of airport land identified as Parcels "G" and Parcel "H" ultimately to the USAF for AFP 44. These parcels would incorporate the various USAF safety arcs onto USAF property. Incorporation of USAF safety arcs onto USAF property would help to ensure continued operational capabilities of AFP 44 while accommodating the proposed safety enhancement project at TUS. Therefore, the USAF's purpose of the Proposed Action is to maintain AFP-44 operational capabilities while removing 6 ECMs from Parcel "F" and 6 ECMs directly adjacent to Parcel "F".

The NGB's purpose and need is to maintain NGB safety standards and operational capabilities at the Tucson Air National Guard Base. More specifically, NGB needs to meet required separation distances for its Munitions Storage Area (MSA). The existing MSA at the Tucson Air National Guard Base, at the north end of TUS, does not meet the USAF separation distances required for explosive operations and exposes non-munitions personnel to explosive hazards. Relocating the MSA to Parcel H would accommodate the required Quantity-Distance (QD) clear zone arcs that are required in accordance with United States Air Force Manual 91-201, *Explosive Safety Standards*.

The purpose of the proposed undertaking is to enhance the overall safety of aircraft operations at the airport and includes the following components:

Construction of a Full Length Parallel Runway 11R/29L that is 10,996 feet long by 150 feet wide about 800 feet from the centerline of Runway 11L/29R; Construction of a new Centerline Parallel Taxiway between the two runways; Construction of a New Outboard Parallel Taxiway; Displace the Runway 11L Arrivals Threshold; Construction of connector and bypass taxiways; Close Taxiway A2; Construct/maintain the Arizona Air National Guard Extended Blast Pads for Runways 11L/29R and 11R/29L; Installation of associated drainage improvements; Transfer of about 58 acres from USAF Plant 44 (AFP-44) to the TAA (Parcel F), and about 150 acres of TAA Land to USAF AFP-44 and convey ultimately up to 291 acres from TAA land to the USAF (Parcel H); Demolition of 12 Earth Covered Magazines on AFP-44; Construct replacement earth covered magazines elsewhere on AFP-44; and Construction of a Munitions Storage Area for the Arizona Air National Guard on Parcel H.

The Federal action requiring compliance with NEPA is approval of the TAA's Airport Layout Plan depicting the proposed undertaking, approval of further processing of an application for federal financial assistance to pay for the proposed undertaking and release of federal obligations for certain lands TAA would like to dispose of. Federal funding for the proposed undertaking would come from the Airport Improvement Program.

1. Background and Area of Potential Effects

TUS is a commercial service airport owned by the TAA. The airport accommodates scheduled air carrier services as well as general aviation aircraft activity. TUS also accommodates flight operations of F-16 Fighting Falcon aircraft from the Arizona Air National Guard from the Tucson Air National Guard Base.

The bulk of the ground disturbing activity of the proposed undertaking would occur on existing Airport property. Ground disturbing activities would occur on AFP-44 for demolition and replacement of ECMs as described above. The other area for ground disturbing activities would occur on the eastern portion of Parcel H for the NGB's proposed MSA.

On June 6, 2017, FAA provided your office with its designation of a Direct Area of Potential Effects (APE) – for physical disturbance from the proposed undertaking. The Direct APE includes and any areas that would be used for staging equipment and supplies during construction. FAA also designated an Indirect APE for airport noise for the

proposed undertaking. Your office concurred with FAA's designation of both the Direct and Indirect APE. We have enclosed a copy of our letter dated June 6, 2017 with the SHPO's signed and dated concurrence for your use.

2. Native American Consultation.

FAA contacted the following Native American Tribes concerning this proposed undertaking: Gila River Indian Community, Hopi Tribe of Arizona, Pascua Yaqui Tribe of Arizona, Tohono O'odham Nation, San Xavier District of the Tohono O'dham Nation, and Yavapai-Apache Nation of Camp Verde Indian Reservation. FAA received one reply from the Hopi Tribe requesting continued consultation if the Proposed Undertaking has the potential to adversely affect prehistoric sites. FAA did not receive any other comments from the Tribes.

In the event any archaeological resources be discovered during construction, an unanticipated discovery plan will be implemented. In the event a find is made within the Direct APE, work within 50 feet of the find will be temporarily suspended until a qualified archaeologist can assess the find consistent with 36 CFR § 800.13.

3. National Register Eligibility Determinations.

Harris Environmental Group, Inc., prepared the enclosed a Class III Cultural Resources Investigation, dated 8 February 2018, in support of FAA's determinations and findings of effect. The Class III Cultural Resources Investigation states a total of 21 known archaeological sites, and 17 known structures are within the Direct Effects Area of Potential Effects (APE) shown on Figure 1-2. Two sites located in Parcel H: Size AZ BB 13:839(ASM) and AZ BB: 13:851(ASM) were not evaluated. However, both sites can be avoided by construction of the NGB's proposed Munitions Storage Area. Based on the information in the Class III Cultural Resources Investigation, FAA has determined the there are no historic properties listed or eligible for inclusion into the National Register of Historic Places (NRHP) within the Direct APE. FAA has also determined the existing wood frame Triple Hangar building, located in the Indirect APE remains eligible for listing on the NRHP under Criterion A (*Association with Events that have made significant contribution to the broad patterns of our history*) and Criterion C (*That embody the distinctive characteristics of a type, period, or method of construction*)[1]. FAA makes these determinations also on behalf of both the USAF for the proposed work on AFP-44 and the NGB for the proposed work on Parcel H.

FAA seeks the Arizona SHPO's concurrence with this determination of eligibility.

4. Assessment of Adverse Effects on Historic Properties.

While the Triple Hangar building is eligible for inclusion into the NRHP under Criterion C, the proposed Airfield Safety Enhancement Work would occur east of the structure near the runways. Based on the information contained the Class III Cultural Resource Investigation, FAA makes the following finding: **No historic properties affected** by the proposed undertaking within the Direct APE. The proposed undertaking would not

[1] 36 CFR § 60.4

directly affect the Triple Hangar building. The Triple Hangar is exposed to noise from existing aircraft operations, consistent with a structure located at an airport. Therefore, FAA also makes a **No Adverse Effect** finding by the proposed undertaking on the Triple Hangars within the Indirect APE. FAA makes these findings also on behalf of both the USAF for the proposed work on AFP-44 and the NGB for the proposed work on Parcel H.

FAA seeks the SHPO's concurrence with these findings.

FAA asks the SHPO to review the information provided in this letter, and the enclosures. If you agree with the FAA's eligibility determination and finding of project effect, please indicate your concurrence by signing and dating in the space indicated below and returning the letter to this office at the address above.

If you have any further questions about this matter, please call me at 310/725-3615.

Sincerely,

David B. Kessler, AICP
Regional Environmental Protection Specialist

Enclosures:
Enclosure 1 – June 6, 2017 Area of Potential Effect Letter from FAA to Arizona SHPO.
Enclosure 2 – A *Class III Cultural Resources Investigation for Proposed Airfield Safety Enhancement Project, Tucson International Airport, Pima County, Arizona*, dated 8 February 2018

Cc:PHX-600; USAF, NGB

I concur with FAA's NRHP eligibility determinations and findings of effect by the proposed undertaking as described above.

_____ _____

Arizona SHPO **Date**

CLASS III CULTURAL RESOURCES INVESTIGATION FOR PROPOSED AIRFIELD SAFETY ENHANCEMENT PROJECT, TUCSON INTERNATIONAL AIRPORT PIMA COUNTY, ARIZONA

Prepared for:
Federal Aviation Administration (FAA)
Western Pacific Region
15000 Aviation Boulevard
Lawndale, California 90261

Prepared by:
Harris Environmental Group, Inc.
58 East 5th Street
Tucson, Arizona 85705-8362

8 February 2018 (Revised)
HEG Project No. 16-121

All information contained in this document is the property of FAA, United States Air Force, National Guard Bureau, and Landrum & Brown. Disclosure of the locations of historic properties to the public may be in violation of both federal and state laws. Applicable United States laws include, but may not be limited to, Section 304 of the National Historic Preservation Act (16 U.S.C. 470w-3) and the Archaeological Resources Protection Act (16 U.S.C.§ 470hh). In Arizona, applicable state laws include, but may not be limited to, Arizona Revised Statute Title 39, Section 125.

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REPORT ABSTRACT

Report Title: Class III Cultural Resources Investigation for Proposed Airfield Safety Enhancement Project, Tucson International Airport (TUS or Airport) Tucson, Pima County, Arizona

Project Name: TUS Proposed Airfield Safety Enhancement Project Environmental Impact Statement

Project Location: Tucson, Pima County, Arizona

Project Locator UTM: 504496 E, 3553707 N (NAD 83)

Project Sponsor: Federal Aviation Administration, United States Air Force, National Guard Bureau

Sponsor Project Number(s): N/A

Lead Agency: Federal Aviation Administration

Other Involved Agencies: United States Air Force, National Guard Bureau, Pima County, City of Tucson

Applicable Regulations: National Environmental Protection Act (NEPA); Section 106 of the National Historic Preservation Act

Funding Source: Federal

ASLD ROW Application Number: N/A

Description of the Project/Proposed Undertaking: The Federal Aviation Administration (FAA) is preparing an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) of 1969 to evaluate potential impacts of the proposed Airfield Safety Enhancement Project at Tucson International Airport (Proposed Undertaking). The EIS is being prepared in compliance with the FAA policies for implementing NEPA in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*.

The Proposed Undertaking includes the construction of a new air carrier runway parallel to the primary Runway 11L/29R. This new runway would replace the existing general aviation Runway 11R/29L. The purpose of the project is to enhance the safety of the airfield by eliminating areas in which risk of runway collision and incursion are heightened.

Construction of an additional runway will simplify the current airfield's complex geometry, thus, enhancing the overall safety of the runway and its operations.

The key project elements include the following as shown on **Figure 1-1**:

- Relocate Runway 11R/29L to the southwest and construct it to a total length of 10,996 feet and width of 150 feet
- Construct new full-length parallel taxiway between Runway 11L/29R and Runway 11R/29L
- Construct supporting connector taxiways between Runway 11R/29L and both outboard and centerline parallel taxiways
- Construct bypass taxiways for Runways 11L and 11R
- Closure of segments of taxiway A2 between taxiway A and Runway 3/21 and taxiway A2 and Runway 3/21
- Construct/maintain Arizona Air National Guard (AANG) extended blast pads for Runways 11L/29R and 11R/29L
- Construction of additional drainage detention areas to support additional impervious pavement areas
- Construction of replacement Earth Covered Magazines on U.S. Air Force Plant 44
- Construction of a Munitions Storage Area on land identified as "Parcel H" by the National Guard Bureau

Project Area/Area of Potential Effects (APE): The Indirect APE covers approximately 12,400 acres and is defined as the area where both direct and indirect impacts may result from the development of the Proposed Action. The Indirect APE boundary was developed using a composite of airport noise contours. Furthermore, a buffer area was added to square off the boundary to follow roadways where available.

The Direct APE covers approximately 1,500 acres (607 ha) and is defined as the area where direct impacts may result from the Proposed Undertaking. The Direct APE boundary was developed using the area of physical disturbance of the alternatives because physical disturbance is contemporaneous, closer in distance, and individual in nature. The Arizona SHPO concurred with FAA delineation of the APE via letter on June 19, 2017.

Legal Description: The Direct APE is within the Gila and Salt River Baseline and Meridian Township 15 South, Range 14 East, Sections 17-21, 28, 29, 32 and 33 (see Table 1-1) on the Tucson SW USGS 7.5-minute quadrangle.

Land Jurisdiction: TUS is owned and operated by the Tucson Airport Authority. The land the airport is located on is owned by the City of Tucson. Air Force Plant (AFP) 44 is owned by the United States Air Force.

Total Acres: The Direct APE consists of approximately 1,500 acres (607 ha).

Acres Surveyed: A total of 436.37 acres (176.59 ha) of City of Tucson property on TUS was surveyed in support of this study. In addition, work involved the evaluation of 12 structures on AFP 44 (U.S. Air Force).

Acres Not Surveyed: No archaeological survey was completed on the portion of the Direct APE designated Parcel G and H, as this area was surveyed in 2013 by SWCA (Rawson and Hesse 2014). An Integrated Cultural Resource Management Plan (ICRMP) was completed on AFP 44 property in 2014. The ICRMP states that no further archaeological studies are required on AFP 44 (Peyton 2014:1-1), thus no archaeological survey was completed on AFP 44. Harris Environmental's survey was restricted to the portion of the Direct APE on TUS (City of Tucson property) that was considered safe to access. Approximately 868 acres on the Airport were not surveyed due to safety concerns. The Direct APE for this Proposed Action does NOT include the existing wooden structures known as the Triple Hangars, which were previously determined eligible for the National Register of Historic Properties (NRHP). The Triple Hangars are within the Indirect APE for the Proposed Undertaking.

Consultant Firm/Organization: Harris Environmental Group, Inc.

Project Number: HEG Project No. 16-121

Permit Number(s): Arizona Antiquities Act Blanket Permit 2017-016bl

Date(s) of Fieldwork: August 16, 17, 18, 23, 24, and 25, 2017

Number of IOs Recorded: 11

Number of Sites Recorded: 11 sites and 12 structures

Eligible Sites: None

Ineligible Sites: 11 sites (AZ BB:13:773[ASM], AZ BB:13:774[ASM], AZ BB:13:775[ASM], AZ BB:13:779[ASM], AZ BB:13:836[ASM], AZ BB:13:972[ASM], AZ BB:13:973[ASM], AZ BB:13:974[ASM], AZ BB:13:975[ASM], AZ BB:13:976[ASM], AZ BB:13:977[ASM]) and 12 structures (Air Force Plant 44 Buildings 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882)

Unevaluated Sites: None

Sites Not Relocated: Two sites (AZ BB:13:771[ASM], AZ BB:13:778[ASM]) (Previously identified sites not relocated in subsequent surveys and not included in summary table).

In addition, SWCA recorded 10 sites within the southern portion of the Direct APE in 2013 (Rawson and Hesse 2014). This area was not surveyed by Harris Environmental in 2017, and these sites were not revisited or reevaluated. Harris Environmental recorded five structures within the Direct APE in 2007. These structures were not revisited or reevaluated by Harris Environmental in 2017. These 10 sites and five structures are included in the summary table for reference.

Site Summary Table:

Land Jurisdiction	Identification Status	Site Number	Eligibility Status/Criterion/ Criteria	Recommended Treatment
Pima County	Previously recorded*	AZ BB:13:449(ASM)	Not Evaluated (Determined Ineligible – 2000)	None
Pima County	Previously recorded*	AZ BB:13:631(ASM)	Not Evaluated (Determined Ineligible – 2000)	None
Pima County	Previously recorded*	AZ BB:13:632(ASM)	Not Evaluated (Determined Ineligible – 2000)	None
Pima County	Previously recorded*	AZ BB:13:633(ASM)	Not Evaluated (Determined Ineligible – 2000)	None
Pima County	Previously recorded*	AZ BB:13:634(ASM)	Not Evaluated (Determined Ineligible – 2000)	None
Pima County	Previously recorded*	AZ BB:13:635(ASM)	Not Evaluated (Determined Ineligible – 2000)	None
Pima County	Previously recorded*	AZ BB:13:636(ASM)	Not Evaluated (Determined Ineligible – 2000)	None
Pima County	Previously recorded*	AZ BB:13:637(ASM)	Not Evaluated (Determined Ineligible – 2000)	None
City of Tucson	Previously recorded	AZ BB:13:773(ASM)	Determined Ineligible – 2007	None
City of Tucson	Previously recorded	AZ BB:13:774(ASM)	Determined Ineligible – 2007	None
City of Tucson	Previously recorded	AZ BB:13:775(ASM)	Determined Ineligible – 2007	None
City of Tucson	Previously recorded	AZ BB:13:779(ASM)	Determined Ineligible – 2007	None
City of Tucson	Previously recorded	AZ BB:13:836(ASM)	Recommended Ineligible	None
Pima County	Previously recorded*	AZ BB:13:839(ASM)	Not Evaluated**	Avoidance
Pima County	Previously recorded*	AZ BB:13:851(ASM)	Not Evaluated**	Avoidance
City of Tucson	Newly recorded	AZ BB:13:972(ASM)	Recommended Ineligible	None
City of Tucson	Newly recorded	AZ BB:13:973(ASM)	Recommended Ineligible	None
City of Tucson	Newly recorded	AZ BB:13:974(ASM)	Recommended Ineligible	None
City of Tucson	Newly recorded	AZ BB:13:975(ASM)	Recommended Ineligible	None
City of Tucson	Newly recorded	AZ BB:13:976(ASM)	Recommended Ineligible	None
City of Tucson	Newly recorded	AZ BB:13:977(ASM)	Recommended Ineligible	None

Land Jurisdiction	Identification Status	Site Number	Eligibility Status/Criterion/ Criteria	Recommended Treatment
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 871	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 872	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 873	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 874	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 875	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 876	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 877	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 878	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 879	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 880	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 881	Determined Ineligible – 1996	None
US Air Force (AFP 44)	Previously recorded*	AFP 44 Building 882	Determined Ineligible – 1996	None
City of Tucson	Previously recorded***	TUS Structures D-111 and D-101-9/10	Not Evaluated (Determined Ineligible – 2007)	None
City of Tucson	Previously recorded***	TUS Structure D-4	Not Evaluated (Determined Ineligible – 2007)	None
City of Tucson	Previously recorded***	TUS Structure D-5	Not Evaluated (Determined Ineligible – 2007)	None
City of Tucson	Previously recorded***	TUS Structure D-6	Not Evaluated (Determined Ineligible – 2007)	None
City of Tucson	Previously recorded***	TUS Structure D-7	Not Evaluated (Determined Ineligible – 2007)	None

*Recorded by SWCA in 2013. Not revisited or reevaluated by Harris Environmental in 2017.
**SWCA did not evaluate these sites for NRHP eligibility in 2013.
***Recorded by Harris Environmental in 2007. Not revisited or reevaluated by Harris Environmental in 2017.

Comments:

This cultural resource study was completed in accordance with Arizona SHPO –Class III survey standards in support of an Environmental Impact Study for proposed improvements at TUS and was prepared for the FAA. Harris Environmental's cultural resource investigation included a pedestrian survey of all accessible land within the Direct APE on Airport property, owned by the City of Tucson. The Arizona SHPO concurred with FAA designation of the Direct APE on June 19, 2017. In addition, Harris Environmental's investigation included evaluation of twelve structures on U.S. Air Force (AFP 44) property.

No archaeological survey was completed on the portion of the Direct APE designated as Parcel G and H, as this parcel was surveyed in 2013 by SWCA (Rawson and Hesse 2014). Additionally, no archaeological survey was completed for this project on AFP 44 property, as the 2014 ICRMP for this property states that no further archaeological studies are needed (Peyton 2014). Harris Environmental's survey was restricted to the portion of the Direct APE on Airport property (the land the airport is on is owned by the City of Tucson) that was considered safe to access.

Harris Environmental's survey recorded 11 archaeological sites and 11 isolated occurrences within the survey area. Two previously recorded archaeological sites within the survey area were not relocated. In addition, Harris Environmental evaluated 12 structures on AFP 44 property within the Direct APE.

Previous studies have recorded 10 additional sites and five additional structures within the APE in areas not surveyed by Harris Environmental in 2017. In total, there are 21 known sites and 17 known structures within the Direct APE (see Site Summary Table).

The 11 sites, 12 structures, and 11 isolated occurrences recorded by Harris Environmental as part of this project are not recommended eligible for listing on the NRHP. The five structures and eight of the sites previously recorded within the Direct APE that were not revisited by Harris Environmental were previously determined not eligible for the NRHP because they did not meet the eligibility requirements. Two of the sites within the Direct APE that were not revisited by Harris Environmental have not been evaluated for NRHP eligibility because they were in an area previously surveyed. Harris Environmental recommends that these two unevaluated sites, AZ BB:13:839 (ASM) and AZ BB:13:851(ASM) be avoided by this project.

If the two unevaluated sites are avoided by project activities, Harris Environmental recommends a ***No Historic Properties Affected*** finding for the Proposed Undertaking. Although this report provides an overview of previous studies and previously recorded resources within the full APE, Harris Environmental is not responsible for the results or findings of any previous study. For information on the results of archaeological survey projects previously completed on the portions of the APE, please refer to those reports.

Unanticipated Discovery Plan

If previously undocumented buried cultural resources are identified during ground-disturbing activities, all work in the immediate vicinity of the discovery should stop until the find can be confirmed by a professional archaeologist and evaluated for its significance. If human remains and/or funerary items are found on TAA property, Arizona Revised Statutes (ARS) 41-865 and ARS 41-844 require that the Arizona State Museum be notified of the discovery, so that cultural groups who claim cultural or religious affinity to them can make appropriate arrangements for the repatriation and reburial of the remains.

If human remains, funerary items, sacred objects, or objects of cultural patrimony are found on USAF lands, the appropriate USAF official should be notified of the discovery in order to follow guidelines pursuant to the Native American Graves Protection and Repatriation Act (43 Code of Federal Regulations § 10.4) and the "Unanticipated Discoveries Plan for Archaeological Resources at AFP 44, Pima County, Arizona".[1]

[1] Sterner, Matthew. Unanticipated Discoveries Plan for Archaeological Resources at Air Force Plant 44, Pima County, Arizona. Statistical Research, Inc., Tucson, 2005.

CHAPTER 1: INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an EIS pursuant to the National Environmental Policy Act (NEPA) of 1969 to evaluate potential impacts of a proposed airport development program at TUS. The EIS is being prepared in compliance with the FAA policies for implementing NEPA in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.* Harris Environmental Group, Inc. (Harris Environmental) was contracted to conduct a Class III Cultural Resources Survey of the Direct APE.

Proposed Action

The Proposed Action includes the construction of a new air carrier runway parallel to the primary Runway 11L/29R. This new runway would replace the existing general aviation Runway 11R/29L. The purpose of the project is to enhance the safety of the airfield by eliminating areas in which risk of runway collision and incursion are heightened, especially at two hot spots identified on the airfield. Construction of an relocated runway will simplify the current airfield's complex geometry because the new runway will have its ends aligned with Runway 11L/29R, thus, enhancing the overall safety of the airport and its operations.

The key project elements include the following as shown on **Figure 1-1**:

- Relocate Runway 11R/29L to the southwest and construct it to a total length of 10,996 feet and width of 150 feet
- Construct new full-length parallel taxiway between Runway 11L/29R and Runway 11R/29L
- Construct supporting connector taxiways between Runway 11R/29L and both outboard and centerline parallel taxiways
- Construct bypass taxiways for Runways 11L and 11R
- Closure of segments of taxiway A2 between taxiway A and Runway 3/21 and taxiway A2 and Runway 3/21
- Construct/maintain Arizona Air National Guard (AANG) extended blast pads for Runways 11L/29R and 11R/29L
- Construction of additional drainage detention areas to support additional impervious pavement areas
- Construction of replacement Earth Covered Magazines on U.S. Air Force Plant 44
- Construction of a Munitions Storage Area on land identified as "Parcel H" by the National Guard Bureau

Area of Potential Effects

The Direct APE includes approximately 1,500 acres and includes all areas that may experience ground disturbance as part of the proposed action. The project area is within the Gila and Salt River Baseline and Meridian, Township 15 South, Range 14 East, Sections 17-21, 28, 29, 32 and 33 on the Tucson SW U.S. Geological Survey (USGS) 7.5-minute quadrangle **(Figure 1-2)**.

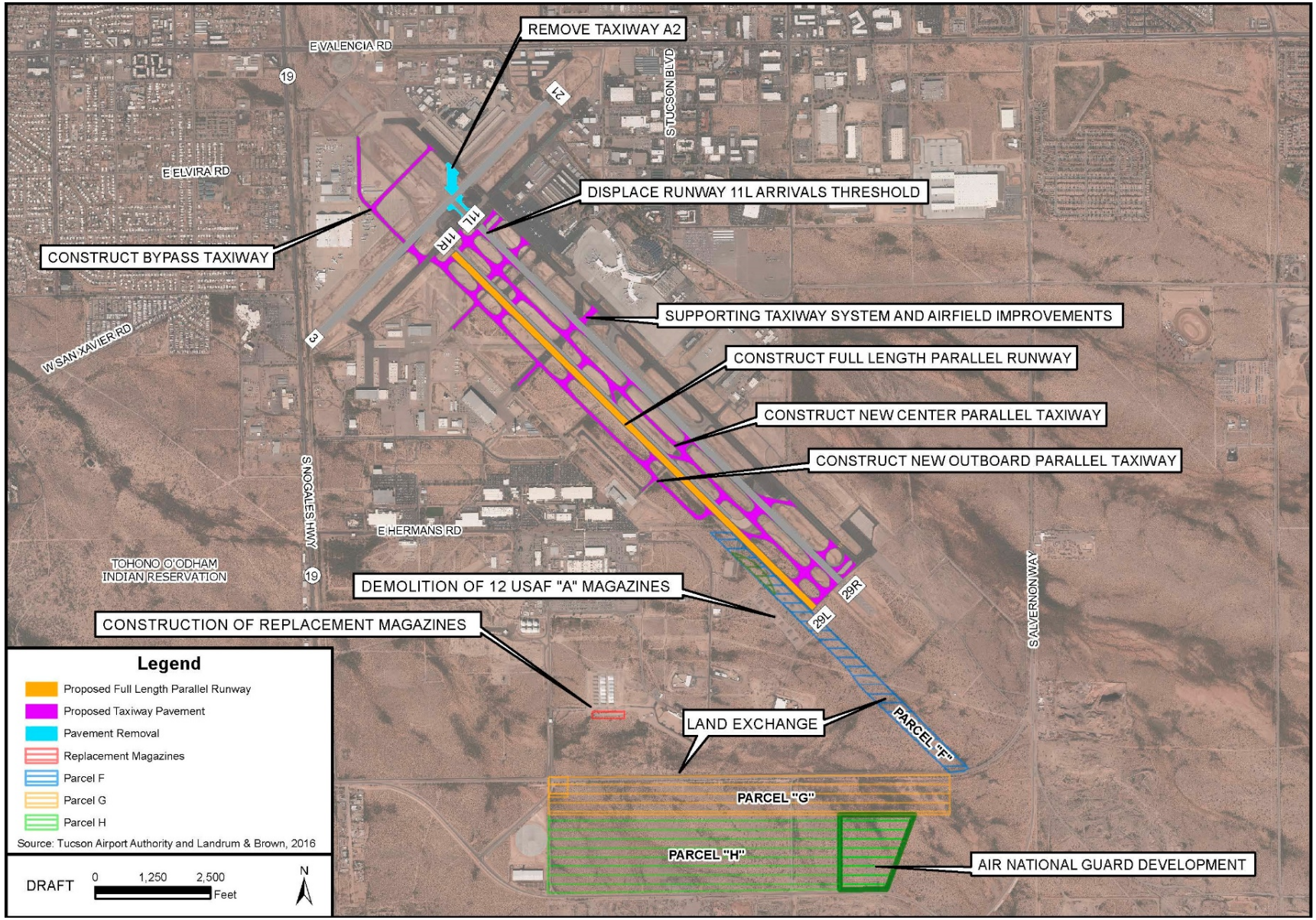

Figure-1-1. Proposed action.

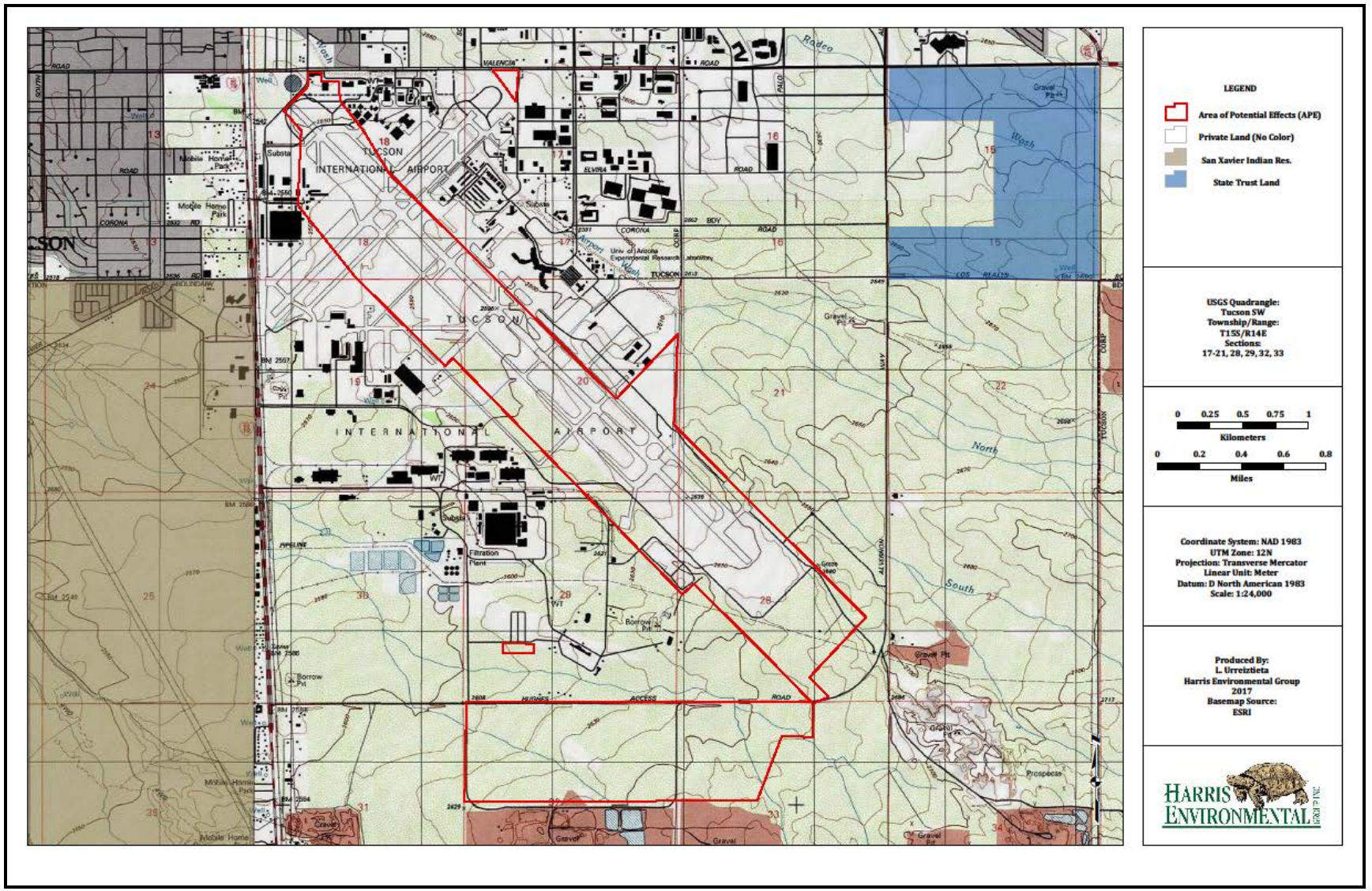

Figure 1-2. Overview of APE on USGS topographic quadrangle.

Regulatory Context

NEPA requires preparation of an EIS for major Federal actions significantly impacting the quality of the human environment. NEPA, specifically Section 102 (2) (C), directs all federal agencies to include a detailed statement on Federal actions significantly affecting the quality of the human environment. According to NEPA, such statements must identify the following:

- any adverse environmental effects which cannot be avoided should the proposed action be implemented,
- alternatives to the proposed action,
- the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- any irreversible and irretrievable commitments of resources which would be involved should the proposed action be implemented (NEPA 1969).

The legislative basis for treating historic properties that could be impacted by federal actions is found in Section 106 of the National Historic Preservation Act ([NHPA]; 36 CFR Part 800, August 5, 2004, Public Law 89-665, October 15, 1966; 16 U.S.C. § 470 et seq.). The NHPA also encourages coordination with the NEPA process [36 CFR Section 800.2(a)(4)]. 36 CFR Part 800 defines the procedures federal agencies follow to meet statutory requirements under the NHPA. Section 106 of the NHPA "*requires federal agencies…take into account the effects of their actions (undertakings) on historic properties.*" They are instructed to determine if potentially affected properties qualify for inclusion on the NRHP and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on actions that could impact historic resources. The procedures established in Section 106 help ensure the compliance process involves consultation between federal agencies planning projects and other government agencies, sovereign powers, and private interests concerned with potential impacts to historic resources. The objective of the consultation process is *"to identify historic properties potentially affected by an undertaking, assess its effects and seek ways to avoid, minimize or mitigate adverse effects"*.

The NHPA expresses a "*general policy of supporting and encouraging the preservation of prehistoric and historic resources for present and future generations, directing federal agencies to assume responsibility for considering such resources in their actions"* (NHPA 1966). The NHPA recognizes cultural and historic properties similarly to natural resources and requires agency evaluation of impacts to these in areas potentially affected by their actions. The NHPA does not dictate preservation of historic resources, but it requires federal agencies to consider the impacts of their actions on historic properties. It also sets forth a coherent strategy for resource protection, mitigation of loss, and the integration of both state and federal agencies in the decision-making process.

The Historic Sites Act of 1935 [16 U.S.C. §§ 461-467] serves as the basis for the American Buildings Survey, Historic American Engineering Record, and Historic American Landscapes Survey. One of the most important functions is the Historic Landmarks

Program through which the Secretary can use historic and archaeological surveys to make determinations of national significance. The Historic Sites Act also provides for cooperative agreements, protection of historic resources, and rehabilitation of historic and prehistoric sites, buildings, and properties of national historical or archaeological significance.

This project also falls under the purview of the Arizona Historic Preservation Act of 1982 (A.R.S. 41-861 ff). This Act directs the Arizona State Historic Preservation Office (SHPO) to assist government agencies with the identification and nomination of eligible properties to the Arizona Register of Historic Places as they are identified.

In compliance with FAA environmental orders, impacts on historic properties stemming from this project were inventoried and considered, in Tables 7-3 and 7-4.[2,3] Historic properties listed or eligible for inclusion in the NRHP and properties listed or eligible for the Arizona State Register of Historic Places were taken into consideration.

Other relevant federal legislation includes the Antiquities Act, the Archaeological Resources Protection Act, and the Native American Graves Repatriation Act. These laws define what is protected and outlines penalties for offenses. The Antiquities Act of 1906 makes it illegal to disturb archaeological materials on federal land and penalizes for the collection, excavation, and destruction of historic, prehistoric, or other protected cultural resources. It also establishes a permit system for archeological investigations. The Archaeological Resources Protection Act (ARPA) of 1979 protects archeological resources and sites on public including federal lands and Native American tribal land. It sets up guidelines and procedures to obtain permits to excavate archeological sites on public lands. ARPA also acknowledges federal ownership of objects excavated from federal lands. The Native American Graves Repatriation Protection Act (NAGPRA) establishes procedures for federal agencies and tribes to work together to identify and return culturally affiliated Native American human remains, sacred objects, and objects of cultural patrimony to tribes. The legislation also gives Native American burial sites greater protection.

The Arizona State Museum (ASM) administers the Arizona Antiquities Act and state laws concerning the discovery of human remains. The ASM issues permits only for archaeological work on Arizona State land. State regulations covering archeological discoveries and historical preservation are covered in the Arizona Revised Statutes, Title 41. Arizona Antiquities Act permits are not required, and will not be issued, for work on private, tribal, or federal lands. A state permit might be required on lands other than state lands when a state agency provides state funding to facilitate a project activity.

[2] FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures.*
[3] FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*

CHAPTER 2: CULTURE HISTORY

TUS Runway Expansion Historic Contexts: Theoretical Orientation

The NRHP is the nation's official list of cultural resources worthy of preservation. The NRHP is central in efforts to identify, evaluate, and preserve America's historic and archeological resources. Properties eligible for listing on the NRHP include districts, archaeological deposits dating to both prehistoric and historic times, buildings, structures, and other cultural objects viewed significant in American history, architecture, archeology, engineering, or culture.

The identification of historic properties begins by examining historic maps and other available archival records to see if historic or prehistoric resources have previously been recorded within a proposed project's area of potential effects Indirect APE. Archival research is then followed by physical examination of the Direct APE and systematic documentation of any properties discovered. In Arizona, the ASM together with the SHPO, provide explicit guidelines to ensure systematic coverage of proposed project areas for cultural resources, as well as guidelines for documenting and treating historic and prehistoric properties.

If historic properties are identified within a proposed project area, the significance of the historic property is evaluated. This evaluation is accomplished by applying NRHP eligibility criteria[4]. The U.S. National Park Service's National Register Bulletin #15 lists the criteria applied in determining NRHP eligibility (National Park Service 1990). For properties to be considered eligible for inclusion in the NRHP they must exhibit one or more of the following criteria:

> **A.** association with events that have made a significant contribution to the broad patterns of our history;
>
> **B.** association with the lives of significant persons in our past;
>
> **C.** distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> **D.** (has) yielded or may be likely to yield, information important in history or prehistory.[5]

Both implicit and explicit in all four criteria is the concept of time depth associated with significant people, places, or events. For eligibility, a property must be more than 50 years old.[6] The consideration of people, places, and things throughout time is

[4] See 36 CFR § 60.4
[5] National Park Service, 1990
[6] See 36 CFR § 60.4

fundamental in identifying important historic contexts in America's past: *"...historic contexts are those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within history or prehistory is made"*.[7] Moreover, Criterion D allows for the likelihood that new information about the past can be revealed if an historic property is subject to detailed investigation.

Critical in the development of the historic context of the Proposed Undertaking is the concept of a cultural landscape. Human activity shapes, and to varying degrees redefines, the natural landscapes they use to fulfill their needs. Actions of human beings shape, and to varying degrees redefine, the natural landscapes they utilize to serve need. The natural desert landscape where the Airport was originally built and modified over time is significantly altered as a result of different kinds of human actions. To interpret the findings of this study, it is important to examine how TUS land was changed over time. This provides us with a baseline to interpret the features, structures, and sites found as a result of this survey. Goodwin and Associates (1995) noted the importance of applying broader historical patterns in determining significance for the sites, structures, and landscapes associated with American military installations. Their argument is applicable to modern aviation settings too:

> *Understanding these broad patterns of history is crucial to the identification and evaluation of historic properties. Historic contexts provide an organizing framework for understanding history. This framework forms the basis for cultural resource identification, evaluation, and management activities under the NHPA. Without an appropriate context, an historic property is identified and evaluated in a vacuum that does not allow adequate assessments of relative significance* (Goodwin and Associates 1995).

Proposed Undertaking

Based on the concepts of historic context and cultural landscape, the historic context defined for the Proposed Undertaking is: *Historic Aviation in Southern Arizona, the Development and Evolution of Tucson International Airport*. This study will investigate southern Arizona aviation from a statewide and national perspective to place the historic remains found in the APE into meaningful historic contexts, which can be used to determine property significance.

In addition to the area's historic-period importance, prehistoric activity is also clearly evident on the landscape. Ample evidence verifies prehistoric use of the broad expanse of desert on the east side of the Santa Cruz River (e.g. Altschul et al. 1999; Knoblock 1994). In addition, historical-period settlement and range of human activities are well-documented during the historic era (ca. mid-1800s to 1950).

Culture History

Prehistoric use of the Santa Cruz River in the vicinity of TUS can be related to three general time periods: the Paleoindian period, the Archaic period, and the Formative period. Each period is associated with relatively broad intervals of time and each reflects

[7] National Park Service, 1990

distinctive traits and patterns of land use. Information used in defining these cultural horizons comes from a variety of research sources from southern Arizona and across the western United States. These three periods are broadly contemporaneous across many parts of the American Southwest. The main difference between regions involves the extent to which different cultural groups relied on agriculture and sedentary settlement through time.

Paleoindian Period (pre-11,500 B.P. to 8,000 B.P.)

Sometime prior to 11,000 years ago Plains-adapted, North American big-game hunters expanded into the central portion of the American Southwest. Throughout the southernmost reaches of Arizona, these groups likely encountered unexploited desert grassland with abundant water and large game animals (e.g., mammoth, bison, horse, and tapir). Likely not coincidental, human entry into this area of western North America coincided with the terminal Pleistocene, and a *Late Wisconsin* "…*climate dominated by moisture" associated with "…a dramatic expansion of woodland, chaparral, and cold desert plants…" at a time of "…increased winter precipitation and reduced summer temperatures…"(*Van Devender and Spaulding 1979:708). While Paleoindian surface artifacts can be found throughout Arizona (Huckell 1982), deeply buried kill and processing sites have been discovered principally along segments of the San Pedro River in southeastern Arizona (Hemmings 1970; Haynes 1987). Important sites identified along the San Pedro River include Naco (Antevs 1953; Haury et al. 1953), Escapule (Hemmings and Haynes 1969), Murray Springs (Haynes 1974, 1976, 1978, 1979, 1980, 1981), and Lehner (Haury 1956; Haury et al. 1959; Haynes 1982; Mehringer and Haynes 1965). In the Tucson Basin, isolated Paleoindian points have been found at the Valencia Site (Doelle 1985:181), in the Avra Valley (Huckell 1982), and in the San Xavier District south of Tucson.

Archaic Period (10,000 B.P. to 1,400 B.P.)

The Archaic period across North America dates to variable intervals across the continent; however, it generally dates from 1,000 to 3,000 years following the end of the Pleistocene climatic epoch (ca. 9,000 - 10,000 years ago [Van Devender 1977:191]). This period continues until the appearance of fully aboriginal agricultural lifeways associated with domesticated crops, ceramic vessels, and aggregate villages. In the Southwest, this period ends anywhere from 1,800 to 2,100 years ago. The Archaic period for North America was originally viewed as a time when descendants of Paleoindian big-game hunters began inhabiting more localized environments. During this time, colder and moister climate regimes associated with the last glacial epoch had ended and conditions were approaching the patterns associated with the Holocene climatic epoch. Smaller game animals and a diversity of plant resources, became the new focus in North American subsistence routines. During the same period, populations grew and lived in large, more permanent villages close to available resources. Near the end of this shift toward sedentism, agricultural crops were beginning to become more common and ceramic technologies were innovated and widely disseminated. Over time, agricultural foodstuffs would be increasingly emphasized over wild resources. In the American Southwest, this evolutionary trajectory is used to explain the emergence of the major culture regions of the prehistoric Southwest. The Mogollon/Western Pueblo of the central

highlands in east central Arizona and west central New Mexico, the Anasazi of the Four Corners region, and the Hohokam of the Salt/Gila Basin in southern Arizona.

Early Archaic

In the southern basin and range landscapes in Arizona, remains corresponding to the earliest part of the Archaic period seem confined to isolated locations in southeastern and southwestern Arizona. In southeastern Arizona, early investigators identified a simple complex of slab grinding stones associated with a limited range of flaked-stone tools and Pleistocene megafauna, which they termed the Sulphur Springs stage of the Cochise Cultural Tradition (Sayles 1983; Sayles and Antevs 1941). This stage was thought to date to before 10,000 years ago, and was considered to reflect a mixed hunting and gathering cultural tradition coeval with the earlier big-game hunting traditions.

Questions regarding dating and contextual reliability of Early Archaic sites emerged as more research was conducted in southeast Arizona (Dean 1987; Whalen 1971). Waters' (1986a, 1986b) re-evaluation of the geochronology of the drainage where the Sulphur Springs stage was first defined, refined the period to occurring between ca. 10,000 to 8,000 years ago. This timeline suggests that Sulphur Springs cultural materials were not associated with Pleistocene megafauna, a hypothesis strengthened by subsequent research elsewhere in Arizona (Waters 1989; Woosley and Waters 1990). Investigations at Ventana Cave in southwestern Arizona identified an Early Archaic basal cultural level at approximately 11,000 years ago, yielding flaked stone chopping, scraping, and cutting tools (Haury 1950; Haury and Hayden 1975). Remains positively associated with the Early Archaic in the Tucson Basin have not been recovered (Huckell 1984:137-138).

Middle Archaic

More information is available on the Middle Archaic period (8,000 to 3,500 years ago) occupation of the Tucson Basin. In the Tucson Basin, the Middle Archaic is recognized primarily on projectile point styles found in open-site contexts (Sliva 1996:38-41). Other chronological associations are inferred from the presence of these point styles in dated contexts elsewhere in Arizona or throughout Western North America. Middle Archaic projectile point styles occurring in the Tucson Basin include "*Chiricahua and other side-notched types, San Jose/Pinto, Gypsum, and Elko…and a long tapering-stemmed variety, which appears to be different from Gypsum [termed Cortaro*]" (Freeman 1999:78; Huckell 1984; Roth and Huckell 1992). Middle Archaic sites have been recorded and investigated in montane, foothill, and upper bajada areas in mountain ranges surrounding the Tucson Basin (Dart 1986; Downum et al. 1986; Huckell 1984; Roth 1988; Tagg et al. 1984). They also have been found in floodplain settings (Gregory 1999; see Freeman 1999:83 for more Santa Cruz River information sources).

At the site of Los Pozos on the Santa Cruz River, Gregory (1999:112-114) identified two separate occupations dating to the Middle Archaic. They were interpreted as reflecting two different temporal groups who occupied this location over varying intervals and pursued different resource objectives. The Middle Archaic strata at the site contained a limited groundstone assemblage, with botanical remains indicating that seeds were collected and brought to the site for processing and consumption. It is suggested that plant utilization emphasized small, starchy seeds from floodplain grasses as well as the

collection of mesquite beans (Gregory 1999). Faunal materials recovered from these sites include both large and small game, which were hunted and brought back to the site for processing. The principal animals acquired were rabbits and deer (Gregory 1999:85-86).

The presence of maize in the Middle Archaic strata identified at Los Pozos dating to approximately 4050 years ago suggests early acquisition of this cultigen in the Tucson Basin (Gregory 1999:118). Through time, it is hypothesized that maize became integrated into the mixed agricultural and gathering economies of the Archaic period (Mabry 1998). Other plants included mesquite, Graminae (mainly saltbush and seepweed), chenopods, amaranths, tansy mustard, and horse purslane. These plants were harvested mainly in floodplain and riparian environments and supplemented with rabbits and other small mammals, which were the most important source of meat.

Late Archaic

The Late Archaic period (3,500 to 1,400 years ago) in the Tucson Basin (and throughout southern Arizona), is the best documented stage of the Archaic period. Recent, detailed summaries of the material and cultural traits associated with this period can be found elsewhere (Lyon and Senior 2003:20-22). The Late Archaic is divided into temporal substages, although questions about the viability of these distinctions are often raised (see Gregory 1999). The latter portion of the Late Archaic dating between ca. A.D. 200 and 600 is sometimes subdivided even further and is often referred to as the Early Ceramic period. In the Tucson Basin, this horizon is distinguished by the Agua Caliente and Tortolita phases. Examination of the sites and material culture associated with these stages shows that the substantive temporal change among Late Archaic sites is found in ceramic vessel forms and increased variation in decorative ceramics.

Late Archaic habitation structures consist of oval-to-round houses-in-pits. They typically contain large (and sometimes numerous) interior storage pits, hearths, and evidence for food and resource processing. Houses appear to be arranged in relation to other houses and site features. The appearance of large, communal pit houses and courtyards are apparent; however, questions surround the relationship between feature locations and the social implications of these arrangements (Gregory 1999). Macrobotanical remains at Late Archaic sites show reliance on plants such as cheno-ams (mainly amaranth), tansy mustard, Graminae, mesquite, maize, and saguaro fruit (Gregory 2001).

The predominance of mesquite beans in the record also suggests that Late Archaic groups made intensive use of floodplain resources. Large quantities of saguaro fruit suggests that occupants of the floodplain also made use of resources in the bajadas. The ubiquity of these plants points to a resource-collecting strategy based on seasonal harvesting and foraging activities. Maize is the most frequently-identified cultigen in macrobotanical and pollen remains at Late Archaic period sites. Other cultivated plants included squash (or wild gourd) and tobacco (Mabry 1998).

Some of the meat consumed during the Late Archaic came from large game animals such as deer and bighorn sheep. Jackrabbits were a common food, and were available in

disturbed landscapes and agricultural fields. Archaeological remains also indicate birds, reptiles, and fish were used as food (Gregory 2001).

The Late Archaic represents a stage of significant prehistoric change across southern Arizona particularly within the Tucson Basin. Recent investigations in floodplain villages dating to this stage show increased exploitation of cultivated foods, changes in village structure and arrangements which indicate increasingly year-round (fully sedentary) occupations (Mabry 1998:757-791), use of ceramic technologies (Heidke et al. 1998; Mabry 1998:779-785), and early canal irrigation.

Formative Period (1,400 B.P. to 550 B.P.)

The final prehistoric period in the Tucson Basin is distinguished as the Formative period. It is composed of several temporal phases that generally correspond with the Hohokam time periods identified in the Salt-Gila Basin (Table 2-1). Tucson Basin Hohokam have traditionally been defined in relation to the Hohokam cultural tradition of the Salt-Gila Basin. Early views centered on hypothesized movements of groups out of northern Mexico into the Salt-Gila area, where Hohokam cultural developments first began. Eventually, Hohokam groups moved into adjacent areas of southern and southeastern Arizona, where they came to cultural prominence over time (Gladwin et al. 1937; Grebinger 1971; Haury 1976). Current researchers place less emphasis on tracing Hohokam migrations throughout southern Arizona and focus more on detailed studies of localized adaptations within the contexts of a regional Hohokam trade and exchange network (Doyel 1977; Wilcox 1979). Regardless, the chronologies between these two areas significantly overlap, and developmental trends are comparable with trends usually beginning first in the Phoenix Basin and later appearing in the Tucson Basin (e.g., ballcourt villages and platform mound communities). Thus, it is useful to present both chronologies to facilitate discussion of the important trends and primary temporal distinctions in these two areas of the Hohokam tradition.

Pioneer Period (A.D. 600 to 750)

The earliest sites containing evidence of Hohokam traits in the Tucson Basin come from the northern and western portions of the basin (Bernard-Shaw 1989; Craig 1988; Czaplicki and Ravesloot 1989; Dart 1986; Deaver 1996; Fish et al. 1992). Most of the features and deposits associated with Hohokam remains in these settings represent isolated, eroding, or disturbed contexts, a number of which were found in lower, buried levels at sites evidencing more extensive, later prehistoric use. However, relevant remains include decorated red-on-gray and buffware ceramics, which are types more commonly associated with the earliest ceramic intervals in the Salt-Gila Basin.

Table 2-1. Salt-Gila and Tucson Basin Hohokam time periods and phases (dates following Dean 1991 and Lyon and Senior 2003).

Salt-Gila Basin		Tucson Basin	
Period	**Phase**	**Period**	**Phase**
Pioneer *ca. A.D. 1 to 750*	Red Mountain *ca. A.D. 1 to 300*	(Late Archaic)	
	Vahki *A.D. 300 to 500*	Early Ceramic *ca. A.D. 200 to 600*	Agua Caliente *ca. A.D. 200 to 425*
	Estrella *A.D. 500s*		Tortolita *A.D. 425 to 600*
	Sweetwater *A.D. 600s*	Pioneer *A.D. 600 to 750*	Estrella/Sweetwater *A.D. 600s*
	Snaketown *A.D. 700s*		Snaketown *A.D. 700s*
Colonial *A.D. 700 to 975*	Gila Butte *A.D. 775 - 850*	Colonial *A.D. 700 to 1000*	Canada del Oro *A.D. 700 to 850*
	Santa Cruz *A.D. 850 - 1000*		Rillito *A.D. 700 to 1000*
Sedentary *A.D. 975 to 1150*	Sacaton *A.D. 975-1150*	Sedentary *A.D. 1050 to 1200*	Rincon A.D. *A.D. 1050 to 1200*
Classic *A.D. 1200 to 1500*	Soho *A.D. 1200-1350*	Classic *A.D. 1150 to 1450*	Tanque Verde *A.D. 1150 to 1300*
	Civano *A.D. 1350-1500*		Tucson *A.D. 1250 to 1450*

Colonial Period (A.D. 700 to 1000)

The Rillito phase of the Colonial Period is the first appearance of Hohokam ballcourt villages in the Tucson Basin. Ballcourts served numerous integrative village functions, and were the focus of village irrigation, economic, and social life (Wilcox 1991). Ballcourt villages in the Tucson Basin dating to this period occur along the Santa Cruz River, and near permanent water sources in the northern and southern portions of the basin (Doelle and Wallace 1991; Downum 1993; Ravesloot and Czaplicki 1988). Tucson Basin ballcourt villages represent clusters of structures arranged in small farming settlements (referred to as farmsteads) associated with nearby canals, check-dams, trash mounds, field houses, rock-lined garden areas, and resource procurement and processing areas. Ballcourts were typically located near the center of the farmsteads and associated activity areas.

Sedentary Period (A.D. 1050 to 1200)

The Sedentary Period in the Tucson Basin is characterized by the Rincon phase, which can be divided into Early, Middle, and Late temporal subphases (Wallace 1986). Overall, the early part of the Rincon phase is represented by clear population growth and local geographic expansion. This period represents an elaboration on the cultural patterns established during the Rillito phase. Site structure is increasingly representative of an integrated relationship of houses and communal village features. In addition, villages occur along secondary drainages and throughout the bajada. Evidence for intensified agricultural production is evident in canal realignments and the appearance of rock pile-covered fields. These data imply strategies to increase rainfall harvesting and runoff diversion into previously-unexploited areas of arable land (Doolittle 2000; Doolittle and Neely 2004).

The Middle and the Late Rincon phases have been characterized as the beginning of the dissolution and reorganization of Hohokam society in the Tucson Basin (Doelle and Wallace 1991). Many of the changes in material culture and settlement observed in the Tucson Basin mirror changes occurring in the Salt-Gila Basin, and other Hohokam areas across southern Arizona. Abandonment begins at some of the largest and oldest Hohokam villages along the Santa Cruz River during the Late Rincon phase (Doelle and Wallace 1986). Abandonment at large settlements in the eastern Tucson Basin also begins in this phase (Elson 1986). Populations appear to have dispersed into smaller social aggregates throughout the Tucson Basin. At these remaining settlements, new architectural traits (such as above-ground wall construction using adobe) and burial practices (including inhumation alongside more traditional cremations), begin to appear in the archaeological record.

Classic Period (A.D. 1150 to 1450)

The Tanque Verde and Tucson phases divide the Hohokam Classic period in the Tucson Basin. During this time the Tucson Basin Hohokam again appears to mirror closely developments taking place in the Salt-Gila Basin. Early in the Tanque Verde phase sites are characterized by large, evenly-spaced platform mound communities distributed along an extensive portion of the Santa Cruz River floodplain. Large centralized platform mounds composed of adobe-walled cells containing large volumes of earth are built adjacent to domestic architecture. Aggregate communities shift from an emphasis on the "house-in-pit" to semi-subterranean or full above-ground walls using adobe. Frequently wooden posts and large boulders are used to provide wall support and reinforcement. In some communities, aggregates of habitation and storage rooms within a circumscribed area were joined together during construction. During this time at Casa Grande Ruins (along the Gila River near Coolidge), aggregates of adjacent domestic rooms and connected storage structures were often enclosed by large, thick adobe compound walls (Ambler 1961; Fewkes 1912). In the Tucson Basin, several large Classic Period sites have been identified including University Indian Ruin (Hayden 1957), Whiptail Site (Gregonis et al. in progress), Gibbon Springs (Slaughter and Roberts 1996), and Tanque Verde Ruin (Zahniser 1966).

Cerros de trincheras is another distinctive site type appearing in the Tucson Basin during the Tanque Verde phase. These sites contain artificially-terraced hillslopes, habitation structures, and small compounds with agricultural plots. Associated features are found on terraced flats divided by water catchment and diversion features. Gridded agricultural gardens (or areas exhibiting open arable land) are often found at the terraced base of many of these hillslope sites. This unique site type is documented principally in southwestern Arizona extending south into the central portion of the Mexican state of Sonora (Downum et al. 1994). Historically viewed as defensive village structures (Hoover 1941; Sauer and Brand 1931; Wilcox 1979), in the Tucson Basin these sites are generally associated with emphasized agricultural production and nearby large platform mound communities.

During the final phase of the Classic period in the Tucson Basin, evidence points to abandonment of many of the smaller Late Classic period communities followed by population consolidation at selected community locations (Doelle and Wallace 1991). By the middle of the 15th century, evidence for Hohokam use of the Tucson Basin is non-existent. Recent views regarding Hohokam abandonment of the Tucson Basin have focused on evidence for possible environmental changes that could have impacted prehistoric agricultural production at this time (Fish et al. 1992:23; Freeman 1997; Waters 1988; Waters and Ravesloot 2001). Earlier views present the impact of Western Pueblo and the Salado culture influences in southern Arizona as another important factor in the Hohokam abandonment of the Tucson Basin and these hypotheses appear to remain relevant (Haury 1945; Hawley 1930; Johnson 1965; Young 1967). For example, a constellation of new architectural, ceramic, and other material cultural traits appear in the Tucson Basin (and elsewhere across southern Arizona) prior to the beginning of the Classic period. This grouping of traits is often attributed to the Salado culture of the Tonto-Globe area of Arizona (Clark et al. 2006). If the acceptance of new traits among the Tucson Basin Hohokam (or integration of Hohokam and Western Pueblo peoples in the Basin) resulted in significant changes in agricultural strategies, significant environmental variations might have further contributed to Classic period abandonment.

Protohistoric and Historic Periods (A.D. 1450 to 1950s)

Upon the arrival of Spanish explorers in southern Arizona in the 1600s, southeastern Arizona was peopled by Native American groups culturally and linguistically affiliated with the O'odham (Pima) of northern Sonora. In Sonora, O'odham populations were encountered at the headwaters of the Santa Cruz and Altar Rivers. Northern extensions of these groups were encountered in Arizona along the Santa Cruz, San Pedro, and Gila Rivers by Father Kino. He termed these Piman groups "Sobaipuri" (Bolton 1936; Doelle 1984; Doelle and Wallace 1990).

Most Sobaipuri in southern Arizona resided in small rancherias, although larger villages occurred along the San Pedro and Santa Cruz Rivers, where irrigation agriculture was a subsistence focus. Away from major drainages, groups practiced extensive runoff agriculture, and exploited a wide range of natural plants and animals (DiPeso 1953; Masse 1981; Seymour 1989, 1993).

The connection between the O'odham and the prehistoric Hohokam is a matter of long-standing debate. Some investigators view the O'odham as direct descendants of southern Arizona Hohokam (Bandelier 1892; Doyel 1979, 1991; Ezell 1963; Haury 1945, 1950, 1976; Hayden 1957). A lternatively, others have documented too many differences between these cultures to accept the connection (Fontana 1976; Masse 1981; Rea 1997; Turner 1993). Arizona O'odham oral tradition suggests arrival from Mexico during the Hohokam Classic period. Inter-group conflicts are said to have ensued between the two cultures following contact, with the O'odham eventually expelling the Hohokam from southern Arizona (Bahr et al. 1994).

The historic era in southeast Arizona begins in the 1690s with the mission of Father Kino and Jesuit efforts to spread the Catholic faith among native inhabitants of the Pimeria Alta (northern Sonora and southern Arizona). Along the San Pedro and the Santa Cruz Rivers in southeast Arizona, Father Kino ministered principally to inhabitants occupying larger O'odham rancherias. Ultimately, as a result of his service in Arizona, missions and visitas were established in areas of Native American population aggregation along the San Pedro and the Santa Cruz (Bronitsky and Merritt 1986:265).

A presidio was established along the Santa Cruz at Tubac, which later became a Spanish fort from which defensive responses to Apache raiders coming from the north could be initiated. In 1757, the first European settlement in the area of Tucson was established near the Santa Cruz River and 40 miles upstream from Tubac, somewhere near the current downtown Tucson area (Sonnichsen 1982:7). This mission, intended to minister to the local Native American populations eventually became an outpost of Tubac, thus providing Spanish settlers and missionaries farther south with advanced notice of Apache movements and activities that could affect their settlement. It was not until the mid-1770s that an actual *presidio* was under construction in the Tucson area; it was ultimately completed in the 1780s.

The mission and presidio system grew in size under Spanish control, while garrisoned troops remained regularly engaged in skirmishes with the Apache. The presidio passed from Spanish to Mexican rule in the early 1820s, but it still largely served as a staging location for periodic battles with the Apache in Arizona, the Yaqui in northern Sonora and periodic O'odham uprisings along the Gila River. By the early to mid-1850s, following the U.S.-Mexican War and the Gadsden Purchase, a large part of Arizona territory (including Tucson) was acquired by the American government. Shortly thereafter, U.S. troops took over command of the Spanish presidio at Tucson, along with a handful of American settlers and tradesmen. By 1860, the U.S. Census documented 620 Americans in residence in Tucson (Sonnichsen 1982:59), although most of the arable land being farmed along the western side of the Santa Cruz remained under ownership by Mexican families (Wagoner 1975).

Late Historic Period

The Late Historic period (1860s – 1950s) represented a time of expanded land use by a variety of settlers with diverse backgrounds and interests. European and Mexican farmers first began settling along the Gila, San Pedro, and the Santa Cruz Rivers, where agriculture could be pursued using the adjacent floodplains, flats, and river terraces. Ranching throughout southern Arizona became a significant enterprise, contributing to the economy of urban Tucson from the mid-1800s through the first few decades of the 20th century. Mining also stimulated the early Tucson area economy, eventually providing employment for many people as mining enterprises were acquired by large-scale interests and became open to public purchase. Finally, the evolution of transportation from horse-drawn wagons to stages, railroads, and vehicles propelled by the internal combustion engine, paved the way for development of the modern state of Arizona.

Farming and Ranching

Farming and ranching in southern Arizona began in the mid-1700s with the arrival of Spanish settlers. During this time, farmers principally maintained plots along the Santa Cruz River near the Presidio and Mission San Augustín located near today's downtown Tucson (Sheridan 1995). Spanish era (1730s to 1821) and Mexican era (1821 to 1852) ranching encompassed far greater portions of southern Arizona, but the threat of Apache raiding largely kept ranching confined to the Santa Cruz River valley (Sheridan 1995:127).

As a result of the Treaty of Guadalupe-Hidalgo in 1848 (ending the Mexican-American war) and the Gadsden Purchase in 1853 (which gave the U.S. lands south of the Gila River), more than five million acres of government land were acquired by the United States. Much of this was considered public land, part of which was going to be used to construct a transcontinental railroad connecting the east and west coasts; at the same time, a much larger part was intended to serve as a basis for American settlement.

As with most historic-period developments in southern Arizona, significant changes in farming and ranching did not occur until the end of the Civil War (1870s and thereafter). By this time, large and contiguous western territories were acquired from Mexico and population numbers had increased across the West. Threats from attack by Native American residents of the territory began diminishing. Laws facilitating private ownership of public lands across the West were determined applicable by Washington lawmakers and Federally-sponsored cadastral surveys of the West were initiated.

During the mid- to late-1800s, several Mormon communities were established in southern Arizona whose fundamental economic basis was farming and livestock husbandry. Founding communities were established where the towns of Safford, Mesa, Tempe, and Phoenix would eventually become cities. As the influx of American and European settlers increases throughout southern Arizona after the American Civil War, many non-Mormon populations were attracted to established settlements. Those in the south-central part of the state, in particular, would soon become the location of important population centers.

Farming outside the reaches of major waterways in southern Arizona during the 19th century typically involved homestead locations adjacent to washes. Dry farming techniques were applied at times, although without a great deal of success (see discussion in Hadley and Sheridan 1995: 210-211). In areas like Cienega Creek southeast of Tucson, where conditions favored relatively shallow water tables (Eddy and Cooley 1983), natural springs could be accessed and ditches could be used to irrigate arable rangeland. In southern Arizona, water for agriculture was mostly obtained from underground aquifers through drilling. Large-scale crop irrigation in this area of the state, however, did not become viable until after World War II (WWII) because of several factors, including technological improvement in well-drilling, increased deep-well pumping efficiency, and lower power costs for operating equipment (Kelso et al. 1973:22).

In the Basin and Range province of southeastern and southern Arizona, agricultural endeavors have characteristically served as secondary, although highly complementary, economic enterprises to the primary rural way of life. As Hadley and Sheridan note for the San Rafael Valley in southeastern Arizona:

> In arid and semiarid lands, agriculture and stock raising develop in symbiosis with each other because natural forage often is insufficient to keep stock alive during dry years or certain seasons of the year…the critical period for most ranges in the study area was late winter and early spring, when ranchers often had to provide supplementary feed for their cattle (1995:195).

Prior to WWII the "cattle industry was one of the most important contributors to the Arizona economy" (Collins 1996:2). Historically, early Spanish and Mexican settlers in southern Arizona from the early 1600s to the mid-1800s established the adaptations and material culture from which American cattle ranching in southern Arizona would emerge by the late 1840s (Collins 1996:6-15; Sheridan 1995:127-129). Wagoner (1952:37) identified the first major development in American ranching in southern Arizona as "*the merging of the northward expansion of the Spanish settlements with the westward movement from the Atlantic Coast."* The merging of these uniquely Spanish, Mexican, and American traditions produced three consistent trends in southern Arizona Ranching:

1. small-family ranches (owning 100 cattle or less) could support self-sustaining human adaptations across many southern Arizona grasslands,
2. given the arid southern Arizona climate, ranchers intent on making ranching "big business" in the territory realized that large tracts of open grazing land, associated with as many natural water sources as available, were necessary to ensure success, and
3. the historic combination of small and business ranching in southern Arizona permitted the industry to sustain through numerous environmental, economic, and political setbacks over time, making it a viable industry that enriches the State of Arizona, and still reflects its rich multi-cultural ranching heritage (Shaw et al. 2007).

American cattle ranching in southern Arizona is divided into three important temporal intervals: The Pioneer Cattle Industry (1848-1880), The Boom Years (1880-1891), and The Foundation of the Modern Cattle Industry (1891-1950) (Collins 1996). Each of these stages represents developmental episodes in an ongoing American cultural adjustment to the northernmost extension of the Sonoran Desert into North America.

Ranching: Pioneer Cattle Industry Period (1848-1880)

During the Pioneer period in American Arizona Ranching (1848-1880; Collins 1996), the earliest ranches established in the southern part of the state represented a combination of small, single family "subsistence ranches" (families and "small operators with a homestead, a few hundred cattle, and little more" [Sheridan 1995:131]) alongside holdings where ranchers (also with their families, but often with partnering families) envisioned expansion. Regardless of a rancher's intents, or the ultimate size of their holdings, pioneer ranches were primarily acquired legally by way of the 1862 Homestead Act. Under the Act, 160 acres could be claimed and residents could obtain sufficient land

and water to raise cattle along with other stock, feed, fruits, and vegetables to maintain relative self-sufficiency. More ambitious ranchers also diversified extractive techniques to feed their families, provide food for their ranch staff, as well as raise fodder to provide supplemental livestock feed. In the Tucson area the diversion of the Santa Cruz River's runoff resulted in the establishment of "small ranches along the river, and before long, represented the dominant economic force" (Ayres 1984:225).

Pioneer ranchers aspiring to larger cattle enterprises often sought to acquire land where water sources occurred, thus allowing them to control surrounding areas. Adjacent areas could be obtained from neighboring land holders by applying for General Land Office (GLO) patents on land known not to have been legally acquired, outright purchase of land from squatters, or by limiting downstream access to water, thus forcing abandonment of desired tracts of land. In addition, grazing rights on unpatented public lands were typically understood to extend to whoever controlled the water source that delivered moisture to the range (Limerick 1987:72; Sheridan 1995:131).

Ranching: the Boom Years in Arizona Cattle Ranching (1880-1891)

The Boom Years (1880-1891; Collins 1996) in southern Arizona Cattle Ranching can be viewed as a time when entrepreneurial ranchers gained prominence. Backed by capital investors from the east (or overseas), completion of the transcontinental Southern Pacific Railroad, combined with increasing restrictions on grazing rights in adjoining states, turned the grasslands of southern Arizona into sites for big business. As Sheridan (1995:133) notes, *"…the major function of the railroads during the early 1880s was to ship cattle into Arizona, not to haul them away."* The objective was to bring cattle to Arizona where open grasslands could be used to produce larger herds of cattle. Aspiring Arizona business ranchers moved rapidly to increase personal cattle stocks, focusing on purchase of both beef and dairy cattle, and acquired larger tracts of grazing land adjacent to existing holdings under the Desert Land Act of 1877. This Act increased the Homestead Act allotment from 160 to 640 acres, and under its provisions, ambitious ranchers often persuaded employees or family members to apply for land patents on lands adjoining theirs and, once acquired, deed these to the rancher.

The period of greatest geographic expansion and economic success in southern Arizona cattle ranching began its decline almost as soon as it began. The contributing factors were a combination of natural and economic forces such as arroyo cutting, drought, and a national economic depression. Protracted drought not only affected cattle ranching through diminishing reliable water sources, but it also appears to have exacerbated a regional cycle of arroyo cutting and entrenchment that removed grazing lands and biomass. It appears that when southern Arizona grasslands were grazed to near natural limits in the 1880s, an epicycle of annual drought concurrently began. This not only directly reduced grassland productivity through diminished effective moisture, but also resulted in reduced landmass and biomass as a result of arroyo downcutting and grassland erosion. Some scholars typically date the end of the boom era in southern Arizona cattle ranching to the time of severe droughts in the early 1890s, when an estimated 50 to 75 percent of rangeland cattle died (Wagoner 1952:53; Sheridan 1995:141). However, it appears more likely that this disaster was a combination of inter-related natural and social forces. These forces included the opening of the western

United States to broader market exploitation with the advent of the railroad; the pressure from national, regional, and local markets to exploit fully (and thus overstock and overgraze) the southern Arizona landscape; the onset of a cycle of arroyo cutting and grassland erosion; and a national depression in the 1890s that discouraged Arizona ranchers from removing cattle from their rapidly desiccating rangelands to avoid significant financial loss (Collins 1996; Cooke and Reeves 1976; Hastings and Turner 2003:248-277; Sheridan 1995:141-143).

Ranching: Foundation of the Modern Cattle Industry (1891-1950)

For many in the ranching business, as well as in government, the southern Arizona ranching disasters of the 1880s resulted in the realization that traditional American ranching practices in the Arizona desert required better management. For example, ranchers like Walter Vail, who had established a near one-million-acre ranch within the Cienega Valley southeast of Tucson, had recognized this fact well before the boom years, and began taking steps to implement change. Vail and other ranchers with similar vision generally sought to:

- shift their focus in stock breeding practices and land use by moving away from raising various stock breeds to focus strictly on “superior beef animals” (e.g. Herefords), and then shipping their stock to other parts of the country for fattening (Collins 1996:39),
- begin widespread construction of irrigation and water catchment structures across grassland holdings to ensure a more equitable distribution of water to cattle, as well as to minimize continued overuse of areas where natural water occurred, and
- formally support lawmakers in enacting stricter state and federal regulations to control access to and use of public grazing lands (Collins 1996:47).

All of these factors would become paramount in changing the nature of the ranching industry in southern and southeastern Arizona into the contemporary enterprise it represents today (Collins 1996:39-49).

Although changing cattle breeds to those better adapted to the arid conditions of the Sonoran Desert significantly aided long-term sustainability of ranching (Collins 1996:39-40), moves to distribute water more equitably across the landscape aided this process even more significantly. With increased emphasis on the construction of small-scale dams, stock tanks, and wells on rangelands during the Modern era, the long drought that took place between the 1930s and the 1950s did not result in level of destruction that occurred when similar conditions prevailed in the early 1890s.

The Taylor Grazing Act was signed into law on 28 June 1935 as part of President Franklin Roosevelt’s New Deal legislation. The purpose of this act was to "stop injury to the public grazing lands...to provide for their orderly use, improvement and development..[and] to stabilize the livestock industry dependent on the public range." To achieve these objectives, the Secretary of the Interior was authorized to establish grazing districts on public lands. The lands within these districts were classified for their potential grazing use, while agricultural lands remained open for homesteading. In 1934 and 1935, President Roosevelt issued a series of Executive Orders that essentially withdrew all

remaining public lands for such classification. The Secretary was authorized to develop any regulations necessary to administer existing grazing districts, including leases, fees, range improvement projects, and cooperative agreements with nearby landowners. The law created a Division of Grazing (renamed the Grazing Service in 1939) to administer the law, but that agency was not particularly effective. In 1946, the agency merged with the GLO to create the Bureau of Land Management (BLM).

Mining

Over the course of the historic era, precious metal extraction in Arizona contributed significantly to the economic growth of the state and helped fuel periodic population growth and the geographic spread of population (Keane and Rogge 1992). The geology of Arizona conditioned its precious metal reserves, similar to those in southern Nevada and parts of California, to contain mixed gold, silver, lead, and copper deposits. Such conditions frequently allowed continued mining operations at a given location even though a particular, preferred precious metal source was expended. Concurrently, miners and mining companies were afforded the opportunity to rework old mine locations and associated tailings in certain locations to extract minerals not originally mined. Both of these factors helped contribute to the sustainability of mining in Arizona and ensured that occasional revitalization of the industry would help contribute to the state's economic well-being and growth. American era mining strikes in the early 1860s across central and southern Arizona had the greatest impact on the Tucson area. With gold and silver discoveries from Prescott in the northwest to Tombstone in the southeast, Tucson's midway location between these mountain and desert areas of the state transformed it into a "supply point" for many early mining ventures (Sonnichsen 1982:68).

Mining also contributed to the historic economy of the Tucson area in a more direct way. Silverbell was a copper mining settlement once located on the west side of the Santa Cruz River in the Avra Valley, less than 40 miles west of Tucson. The mine was in operation from 1860 to the 1920s. Approximately 3,000 occupants resided in Silverbell at its peak. The town's boom period began in 1902 when E. B. Gage, W. F. Staunton, and the Development Company of America consolidated claims in the area and formed the Imperial Copper Company. After 1904, copper ores recovered at Silverbell were shipped on the Southern Arizona Railroad to the nearby Southern Arizona Smelting Company. The Imperial Copper Company prospered until 1911 when a shaft fire and financial problems forced it into bankruptcy. The American Smelting and Refining Company operated at Silverbell from 1915 to 1921, halting operations there when low market prices made mining copper ore unprofitable. Sporadic copper mining kept the smelter and the railroad in operation until 1934 (Varney 1998).

The genesis of the Southern Arizona Smelting Company (SASCO) sprang from the small work camp that developed around the construction of a smelter financed by the Imperial Copper Company. The smelter was intended to process ores recovered from the mines at Silverbell and Picacho Peak. The original location consisted of a few wood and canvas cabins, an adobe boarding house, mess hall, and a row of company buildings. The population eventually reached 600 (Berg 1999; Varney 1998). From its inception, the smelter suffered economic hardships. At the time of its construction the nation was suffering an economic downturn that resulted in low copper prices and difficulty in

obtaining workers and materials. In addition, the quality of the Silverbell ore declined with increased depth over time. By controlling costs, expanding capacity, and improving the smelting process, the managers were able to break even financially, but the operation of the smelter was always a financial struggle that continued to worsen as copper prices and ore grade declined. Disaster struck in May 1909 when the silver mines at Tombstone flooded and the clean-up costs proved to be a financial burden that could not be recouped. This led to a lack of funds for the Silverbell mines which stopped shipping ore in 1909. The parent company, Developmental Company of America (DCA), was forced into bankruptcy in 1911.

With the rise of copper prices during World War I (WWI), the American Smelting and Refining Company (ASARCO) began to acquire stocks and deeds of the DCA. By 1918, the town of Sasco had a population exceeding 1,000. The Asarco holdings were directly linked to the war demands and when the fighting came to end in 1918, the closure of the mine soon followed. In early 1919, the smelter was shut down and the Silverbell mine was closed in 1921 (Berg 1999).

Transportation

From the 1840s through the 1880s, Arizona made the transition from horse-drawn freight and stage lines to the railroad as the main mode of transportation and shipping. Some 50 years later, the next revolution in American transportation, the automobile, would lead to the beginnings in establishing Arizona's modern network of state and interstate highways. The final revolution in American transportation, the airline industry, would further integrate Arizona with the rest of the country, as well as join it to the rest of the world.

Overland Stage Lines

In the 1840s and 1850s mail delivery between the East and West coasts was conducted by steam ships sailing from New York to Panama where the mail was moved overland across the isthmus and then continued on by ship to California. The mail was scheduled for a 30-day delivery, but it usually took longer. Not only was the mail typically running behind schedule, but it also was very expensive. Mail rates varied from $0.12 to $0.80 per ounce (Trafzer 1980). In today's dollars, mailing a letter would cost $1.98 to $13.19 per ounce in 1840 and $2.53 to $16.89 per ounce in 1850. Residents on both coasts petitioned the federal government for improvements in the mail delivery system or an alternate method of mail delivery (Trafzer 1980).

In 1857, the federal government awarded a mail contract to James Birch for the immediate establishment of an overland mail route from San Antonio, Texas to San Diego, California, a distance of 1,475 miles. The San Antonio and San Diego Stage Company was formed and stages were rolling by July 24 of that year. In addition to the mail contract, passenger service also was available to those with enough money to book passage and who were ready to rough-it. One-way fare on the San Antonio and San Diego Stage Company, which included meals, was $200 (about $3,910.50 by today's standards). Conditions were wretched for passengers who often complained about poor food, bad accommodations, filth, dust, intense heat, breakdowns, too little sleep, too much walking, and the constant threat of Indian attacks (Trafzer 1980). On occasion, passengers were

forced to ride the mules in particularly difficult portions of the route. This practice of riding the mules earned the stage line the nickname the "Jackass Mail." The San Antonio and San Diego Stage Company chose mules over horses because they were stronger and more durable. Despite the efforts of Birch, the stage company was slow and inefficient (Trafzer 1980; Wagoner 1975).

Less than a year after Birch's operation began, Birch died and his government contract was transferred to John Butterfield. Unlike Birch, Butterfield was not under contract to begin hauling mail immediately, but had a year in which to buy equipment, hire personnel, and organize. Controversy surrounded the proposed routing of the project, which was split along regional lines (the north half of the country versus the south half). A southern route was eventually chosen by Postmaster General Aaron V. Brown (Trafzer 1980; Wagoner 1975).

The 2,700-mile Butterfield Overland Mail route ran from St. Louis to San Francisco. The Butterfield Overland Mail was a well-run and efficient operation that delivered mail in about 23 days and was rarely late. Unlike the San Antonio and San Diego Stage Company, the Butterfield Stage line used both horses and mules to pull its coaches. The first stages left on 15 September (east bound) and 16 September 1858 (west bound). The first stage stop in Arizona, from the east, was Apache Pass. A former passenger, Waterman L. Ormsby, described Tucson at that time as "…*a small place, consisting of a few adobe houses. The inhabitants are mainly Mexicans. There are but few Americans, though they keep the two or three stores and are elected to the town offices"* (Ormsby 1942). Arizona stations west of Tucson included Point of Mountain, Picacho Pass, Sacaton, Maricopa Wells, Gila Ranch Station, Murderer's Grave, Oatman Flats, Dutchman Station (also referred to as Flap-Jack Ranch or Stanwix's Ranch), Grinnell's Station (also referred to as Texas Hill), Peterman's (also referred to as Mohawk), Filibusters' Camp, Swiveller's Ranch (also referred to as Snivelly's Ranch or Gila City), Fort Yuma and Arizona City (formerly Colorado City and now Yuma). In 1861, with the outbreak of the Civil War, the course was moved northward, passing through Sandy Pass, Wyoming and Salt Lake City, Utah. The Pony Express took over mail delivery in 1860 (Trafzer 1980; Wagoner 1975).

Railroads

Railroad operation in the United States began in the 1820s, although it took nearly 20 years for it to become a predominant form of transportation. In the 1850s, Congress identified the need for a cross-country railroad, but it wasn't until the 1880s that the tracks reached the Tucson area. The arrival of the transcontinental railroad in southern Arizona was monumental as Tucson was no longer geographically and economically isolated.

The owners of Central Pacific Railroad (CPR) were known as the "Big Four" (Collis Huntington, Charles Crocker, Leland Stanford, and Mark Hopkins). They were instrumental in developing the portion of the transcontinental railroad that crossed Arizona. The Southern Pacific Railroad (SPRR) was founded under the parent company CPR. Eventually the SPRR became so large that it subsumed the parent company (Janus 1989; Myrick 1975). Of all the railroads, the SPRR had the greatest impact on the growth of Tucson and Arizona (Myrick 1975).

Several smaller railroad companies proposed railroads from the mainline of the SPRR, although most never came to fruition. In the early 1880s, the Arizona Narrow Gauge Railroad (ANG) was proposed to connect Tucson and Globe. After political controversy, Apache raiding, and delayed supplies, only ten miles of track were laid and 30 miles were graded by 1886. The railroad was re-named the Tucson, Globe, and Northern Railroad Company in 1887, but the project was never finished (Myrick 1975).

The mining industry was the source of several small railroad projects throughout southern Arizona, as there was a need to connect small mining towns like Tombstone, Bisbee, and Silver Bell with larger towns (like Tucson). The El Paso and Southwest Railroad (EP&SW) was financed in large part by the Phelps Dodge Company, who had significant mining interests throughout the area. This line connected Tucson to Dawson, New Mexico. Eventually this line was acquired by the SPRR (Myrick 1975; Twilling and Keane 2003).

The Arizona Southern Railroad serviced the Silverbell Mining District from 1904 to the 1930s. The line connected with the SPRR at Red Rock and ran southwest to Silverbell mine. Rolling stock for the line consisted of four locomotives, two passenger-cabooses, three flatcars with water tanks, and twenty 50-ton dump cars. Financial problems shut the mines in 1911 and the rolling stock sat idle for several years. When the mines reopened in 1916 to feed the demand for copper during WWI, the four original locomotives were scrapped, and two used engines were bought from the New Central Railroad. The line was never profitable, and in 1933 the Arizona Southern Railroad ceased operation and the rail was pulled in 1934.

The Twin Buttes Railroad Company (TBRR) was incorporated in 1904 and connected Tucson to Twin Buttes (near Sahuarita). Washouts were a continuous threat to the railroad grade. In 1908, three washouts occurred in an 11-day period; grades were carved away and tracks were 20 to 30 feet out of alignment. As with all railroads tied to the mining industry, the fortunes of the TBRR fluctuated with the ore market. The TBRR serviced the mines in the Twin Buttes area until 1934.

Arizona Highway System

The arrival of Henry Ford's Model T in 1907 brought with it increased automobile ownership throughout the country. Between 1900 and 1930, the number of cars owned in the United States rose from 8,000 to 230 million. Stemming from this increase was the need for more and better roads for automobile travel. The earliest roads were dirt roads or gravel roads created for wagon travel. Federal and State governments quickly identified the need to improve those roads, as well as construct new ones (Keane and Bruder 2003). In 1912, Arizona state legislature passed the first state road law which designated 1,500 existing miles of roads as a state highway system. This was intended to supplement the two north-south and east-west territorial highways. During this time, several organizations were formed to promote "good roads" across the country. The most significant of these groups was the National Good Roads Association. The railroad industry was initially supportive of this movement because the construction of new roads would increase railroad volume to bring supplies. However, as the highway system improved and the trucking industry began to compete with the railroads in the 1930s, railroads became more critical of highway projects. Private organizations also worked to

promote cross-country routes known as "Booster Highways." Four of these routes passed through Tucson along a similar route to modern Interstate 10: the Bankhead Highway, the Old Spanish Trial, the Dixie Overland Highway, and the Borderland Route (Keane and Bruder 2003).

The "Seven Percent System" was passed by Congress as part of the Federal Highway Act in 1921. This allocated federal dollars to match state dollars to construct or improve seven percent of highways in each state. A provision of this act was that the improved roads had to connect with other federally-funded roads. Approximately 1,500 miles of Arizona highways were improved as part of this system (Keane and Bruder 2003). Federal monies continued to be the main source of funding for Arizona road improvements between 1917 and 1939.

The Arizona State Highway Department, Arizona State Highway Commission, and Motor Vehicle Departments were established in 1927; also in the 1920s, the modern system of numbered highways was put to use (Twilling and Keane 2003). Arizona began issuing drivers licenses in 1925. This required the completion of a form mailed to the office. A drivers test was not required until the 1930s (Keane and Bruder 2003).

Tucson Basin Population Growth and Urban Development (1920s-1950s)

Prior to WWII, urban growth in the City of Tucson was largely a reflection of rural southern Arizona's economic success. From the 1800s until the 1930s, the city principally served as a commercial hub for three of the state's most significant industries: ranching, farming, and mining. After WWII, the City of Tucson experienced a boom in economic diversity and prosperity (as was true for many cities throughout the western United States). This was accompanied by unprecedented population growth, subdivision expansion, and other forms of financial growth. The underpinnings for this boom in Tucson financial and population growth were actually established before the war years (1941-1945), stimulated by the United States War Department and their recognition that this area was ideal for testing newly-developed aircraft and training service pilots.

With the end of WWI (1917), American sentiment for funding the nation's military significantly diminished. A large war debt also limited the nation's ability to spend money on the military. The 1920s ended with the Great Depression, and the public, along with government agencies and officials, became even more reluctant to spend money on the military (Goodwin and Associates 1995:73). However, by the late 1930s, with war in Europe appearing imminent, President Roosevelt advocated to Congress the need to rebuild National Defenses (White 1980:1). As a result, increased demand for war materials (even before the U.S. officially entered WWII) contributed to ending the economic Depression of the 1920s and 1930s (Collins et al. 1993:44). Much of this economic success can be associated with Roosevelt's "New Deal" and the partnerships that government established with private American enterprise. Such partnerships would prove highly beneficial in equipping and re-supplying the nation's military for war in Europe. During the years following the Great Depression, government agencies and private business joined forces to help put people back to work. By the late 1930s, government agencies used the contractual mechanisms established with the business sector during the Depression to mobilize for war. As early as 1940, through the Defense

Plant Corporation, government agencies had already began contracting with private firms to build needed facilities and manufacture desired armaments (White 1980:6).

For Arizona, early military mobilization resulted in an almost immediate productive boost in mining and cotton farming. However, the most important economic boom associated with the pre-war and early-war years would come with the leasing of state and municipal lands to the military for base construction and government subsidies for the construction of aircraft and armament plants (Sheridan 1995:269-273). The almost immediate influx of military personnel into the major cities in southern Arizona, along with construction workers seeking new employment, would help fuel not only rapid population growth, but also expansion in the service and manufacturing sectors.

According to the U.S. Census, significant population increase in Tucson did not occur until after WWII when the population rose from approximately 50,000 residents in 1950 to over 200,000 residents in 1960. The population continued to increase substantially in all subsequent decades thereafter. Figure 2-1 shows the geographic distribution of new population growth within Tucson (by 20-year intervals) from 1930 to 1990; revealing the fact that the city's population growth in the post-WWII years tended to be toward the east and then northwest of earlier growth centers (City of Tucson 2006). Growth in the 1990s, as well as into the 21st century, has tended to represent in-fill, with only marginal expansion along the outer edges of the eastern and northwestern areas of the city. City population expansion in the last 15 years also has occurred west and south of the original city's center.

As with earlier modern periods in American history, settlement distributions have been determined largely by major transportation corridors in proximity to production, resource, and population centers (Ames 2002). It has been suggested that as new residents migrated to the Tucson region (in the 1900s) they first settled along the north and south corridors (along State Highway 89/90) and then later arrivals began to move eastward. By 1970, development was constrained by federally-owned lands in the east and development trends began to reverse and flow in a northwest direction.

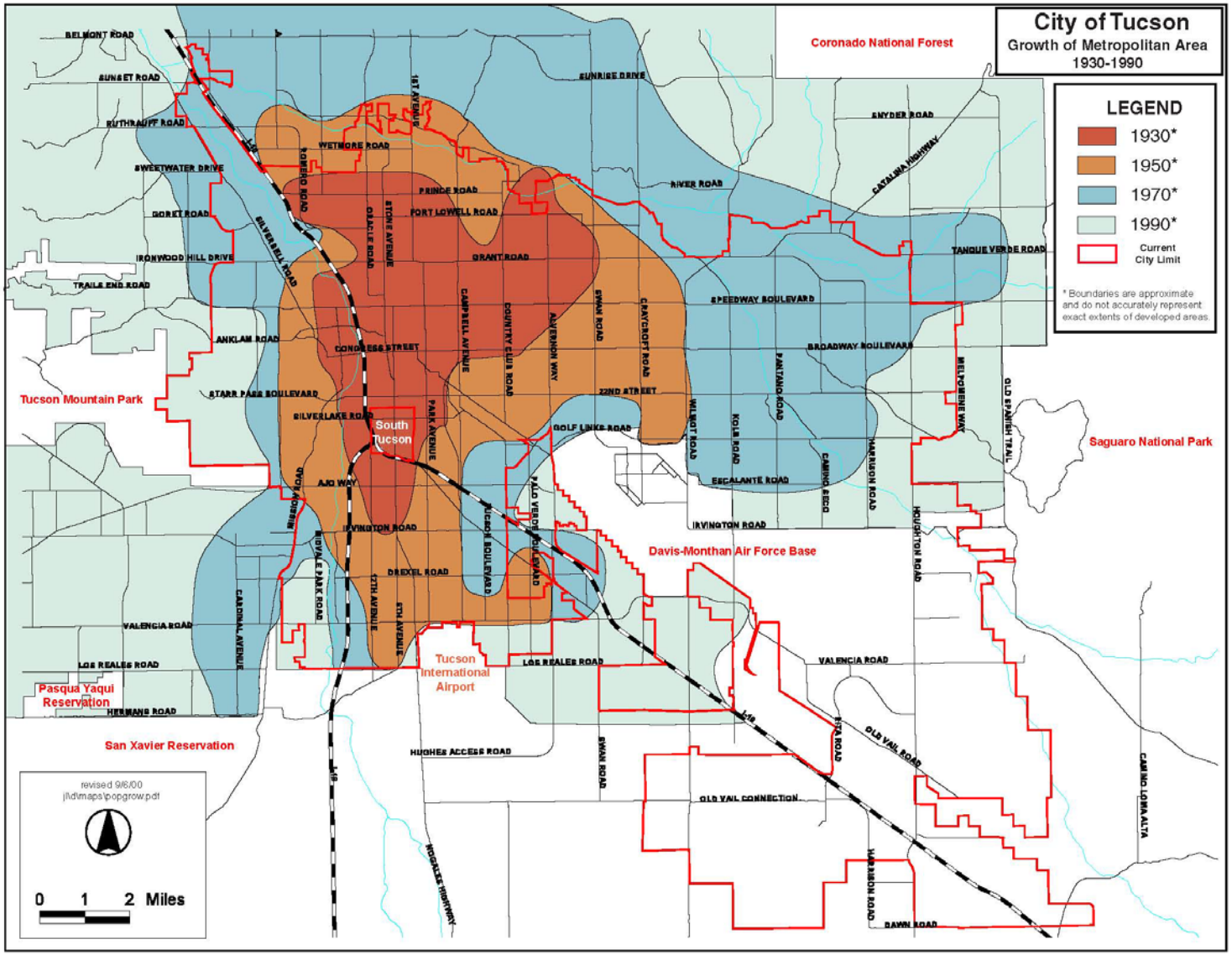

Figure 2-1. City of Tucson growth of metropolitan area 1930-1990 (Source: City of Tucson 2006).

Historic Aviation in Southern Arizona, the Development and Evolution of the TUS

Numerous excellent histories on the history of aviation can be found in a variety of sources (Anderton 1978; Gibbs-Smith 1960, 1966; Gwynn-Jones 1991; Jakab 1990; Tucson Daily Citizen 1955). It is important for this project to understand the role of aviation's influence in Arizona.

Aircraft flight in Tucson actually began as part of a broader national trend of commercially-sponsored exhibition flights throughout the United States during the earliest part of the 20th century (Reinhold 1982:12-19). These events occurred while American aviation was still in its infancy (Sonnichsen 1982:164-165). The first exhibition flight came to Tucson in 1910 and was one of many air shows that were sponsored across southern Arizona between 1910 and 1911 (Reinhold 1982:12-19).

By 1915, air mail was delivered to Tucson. Only four years later (1919), the City of Tucson leased land between Oracle Road and Stone Avenue to build its first airport (Sonnichsen 1982:167). This airport served private, commercial, and U.S. airmail functions, as well as U.S. Army aviators patrolling the international border. Southern Arizona airports also served numerous mercenary fliers who worked for different political factions in Mexico as the Mexican Revolution spread across the state of Sonora (Reinhold 1982:31-51). Ultimately, the first Tucson airport also served as a major refueling stop for U.S. Army planes bound for California or Texas, before being sent overseas to participate in combat operations in Europe during WWI.

Tucson was named an official U.S. Army landing site late in 1919 and was encouraged by the Army Air Service to establish a new airfield. Two months later, the city acquired property four miles south of town along Nogales Highway to be developed, with the Army's supervision, into a fully modern airport (Reinhold 1982:74). The newly-built airport was originally named Macauley Field (later re-named Fishburn Field and eventually Tucson Municipal Flying Field). This would become the first municipally-owned facility of its kind in the United States (Sonnichsen 1982:167). It continued to serve the full range of private, commercial, and military aircraft that it had previously served. In addition, the "first company in the State having aviation as a primary interest" — Arizona Aviation Company (Reinhold 1982:74) — was founded in Tucson, and land was leased at the new airport for its operation.

Before Tucson's new airport was even fully developed (between 1923 and 1924), Reinhold (1982:77-78) notes that the "…Aviation Committee of the Tucson Chamber of Commerce realized that their new municipal airport, though still only partially developed, was becoming inadequate for the new, larger, and faster military ships." As a result, two full sections of land southeast of downtown Tucson were acquired for future airport development. On 23 September 2 1927, Davis-Monthan Field (DM) was dedicated, thus creating the largest, city-owned airfield in the United States (covering 1,280 acres). It was established to serve as a joint-use facility with the city paying 80 percent of its maintenance cost, and the Army paying the remaining 20 percent along with "a reimbursement of $1 a year for lease privileges" (Reinhold 1982:96).

The land where the present TUS exists was chosen in 1940 when "it became apparent that military requirements would ultimately require the removal of all civil activity at DM" (Tucson Daily Citizen 1955). This new city airfield had been in use by private pilots before WWII (Reinhold 1982), and was locally known as “Tucson Municipal Airport No. 2.” Located south of the downtown Tucson area, a portion of this area was leased by the Vultee Corporation in the 1940s to facilitate a government contract to prepare military bombers for war. Around that time, the Consolidated Aircraft Corporation (CAC) received a government contract to "modify B-24 Liberators…, and began modification work at DM. However, DM’s rapid growth as an army air base necessitated a search for new quarters for CAC’s operations. Tucson Municipal Airport No. 2, then under construction on TUS’s present site, was the most logical choice…" (Majewski 1995:3) The Vultee Corporation merged with CAC in 1943 and completed ultimate expansion and renovations. The newly-merged company was named Consolidated Vultee, which was shortened to Convair sometime after the war. During the war, Consolidated Vultee assembled and made final combat modifications to B-24 Liberator Bombers before they were sent into combat operations. Further, it is noted:

> A contract was subsequently let for the construction of two 400-foot hangars. These were begun early in the summer of 1942 and completed sufficiently to allow occupation in November of that year. The first B-24 Liberators moved into the hangars that month, and modification lines were set up in both hangars soon thereafter. [By summer 1943]...the two original hangars were extended to 700 feet, and a third hangar was built to the west, adjoining the others. The hangars now comprised three 700-foot hangars, with an overall width of 760 feet. The exteriors of the buildings remain essentially unchanged since their expansion in 1943… (Majewski 1995:6).

In addition to the new hangars, expansion at this time resulted in construction of a large warehouse, inflammable storage building, armament building, new airport traffic control tower, ammunition building, a separate administration building, installation of a cafeteria in the hangars and construction of several auxiliary buildings. It also called for extensive laying of concrete aprons and extension of runways. The hangars “employed thousands of employees, and in the 1940s was running three shifts a day…” (Majewski 1995:11).

The presence of Consolidated Vultee at the site of the new Tucson Municipal Airport in the 1940s set the stage for the critical role the Tucson airport would play in the economic and industrial development of the City of Tucson through the Cold War Era and up to the present day. The City of Tucson’s decision in 1948 to charter the airport’s operation with a group of private, civic-minded businessmen created the TAA. Subsequent development of airport-based carrier services and associated facilities, construction of new buildings to house light industry and aerospace technologies, along with petroleum production sales, produced an international airport with facilities today covering 8,244 acres, operating three runways, and employing nearly 13,000 Tucson residents.

CHAPTER 3: BACKGROUND RESEARCH

Before fieldwork was conducted, archaeological site records were checked using the Arizona Site File (AZSITE) Cultural Resource Inventory (the ASM's cultural resources electronic data base). General Land Office (GLO) maps and historic U.S. Geological Survey (USGS) maps also were reviewed.

Previous Surveys

Previous cultural resource project records were examined for the study area, which includes the Direct APE and a one-mile buffer around the Direct APE. Research indicated that 48 projects have been conducted in this area (**Table 3-1, Figure 3-1a and Figure 3-1b**). These projects were prompted by transmission and utility line installations, airport improvements, road construction and maintenance, materials pit purchase (for the extraction of aggregate), quarry construction, residential and commercial development, landfill construction, detention basin construction, airport expansion, park construction, land acquisition, cell tower construction, raceway construction, and archaeological research. All projects were non-collection pedestrian surveys, except for ASM project number 1985-86, which was a collection-survey, and 1996-418, which only involved monitoring. The projects did not involve testing or data recovery activities.

Table 3-1. Previous archaeological surveys in the APE vicinity.

ASM Project #	Institution	Reason for Survey	Size	Findings	Reference
1980-33	ASM	No information	480 acres	No sites No isolated occurrences (IOs)	Madsen 1980
1982-207	Complete Archaeological Service Associates	Transmission line installation	80 miles of 100 ft.	12 sites IOs not recorded	Hammack 1983
1983-157	ASM	Road construction	2.6 miles of 148 ft.	1 sites 2 IOs	Dart 1983
1983-163	ASM	Detention basin	173 acres	No sites No IOs	Perrine 1983
1984-143	ASM	Road construction	13 acres	No sites No IOs	Madsen 1984a
1984-162	ASM	Materials pit purchase	60 acres	No sites No IOs	Madsen 1984b
1985-86	ASM	Raceway construction (Collection survey)	540 acres	No sites No IOs	Madsen 1985
1985-145	Institute for American Research	Development	100 acres	No sites 11 IOs	Mayro 1985
1987-177	Archaeological Research Services	Road improvements	2.5 miles	No information	Bontrager 1987
1988-120	ASM	Landfill construction	556 acres	3 sites IOs not recorded	Madsen 1988
1989-40	Archaeological Consulting Services	Cable installation	200 ft. of 10 ft.	No sites No IOs	Adams 1989
1992-218	Desert Archaeology	Airport improvements	450 acres	No sites 40 IOs	Baar 1992
1993-116	Tierra Right-of-Way Services	Quarry construction	80 acres	No sites No IOs	Roth 1993
1993-213	Cultural and Environmental Services	Park construction	365 acres	No sites 3 IOs	Slawson 1993
1993-237	Desert Archaeology	Intersection widening	0.89 acre	No sites No IOs	Eppley 1993
1994-133	Desert Archaeology	Utility installation	0.7 mile of 30 ft.	No sites No IOs	Swartz 1994
1994-170	Statistical Research	State land purchase	1,200 acres	16 sites 41 IOs	Knoblock 1994
1994-260	Desert Archaeology	Proposed landfill expansion	380 acres	6 sites 37 IOs	Freeman 1994

ASM Project #	Institution	Reason for Survey	Size	Findings	Reference
1995-72	Archaeological Consulting Services	Fiber optic cable installation	65 miles of 50 ft.	12 sites 12 IOs	Adams and Hoffman 1995
1995-148	Desert Archaeology	Waterline maintenance	10.8 miles of 20 ft.	No sites No IOs	Swartz 1995
1996-418	Tierra Right-of-Way Services	Fiber optic installation (Monitoring)	1,600 ft.	No sites No IOs	Lenhart 1996
1997-318	Desert Archaeology	Water main installation	1.25 miles	No sites No IOs	Sliva 1997
1998-108	Old Pueblo Archaeology Center	Development	5.2 acres	No sites No IOs	Dart 1998
1998-495	SWCA	Utility installation	3.3 miles of 100 ft.	No sites 2 IOs	Desruisseaux 1998
1999-102	Desert Archaeology	Utility installation	0.5 mile of 20 ft.	No sites No IOs	Eppley 1999
1999-159	Desert Archaeology	Airport expansion	400 acres	8 sites 36 IOs	Dutt 1999
1999-354	Desert Archaeology	Water main installation	0.75 mile of 30 ft.	No sites No IOs	Diehl 1999
1999-441	SWCA	Plant expansion	114 acres	No sites No IOs	Keane 1999
1999-574	Statistical Research	Evaluation of site	1,080 acres	7 sites No IOs	Altschul et al. 1999
2000-37	Desert Archaeology	Landfill expansion	160 acres	3 sites 9 IOs	Swartz 2000
2000-49	Old Pueblo Archaeology Center	Sewer line installation	14.6 miles of 100 ft.	No sites 40 IOs	Jones 2000
2000-330	Aztlan Archaeology	Development	9.7 acres	No sites No IOs	Slawson 2000
2000-413	Desert Archaeology	Waterline installation	1.8 miles of 30 ft.	No sites 5 IOs	Ruble 2000
2000-691	SWCA	Land acquisition	150 acres	No sites 5 IOs	Archer 2000
2000-823	Archaeological Research Services	Road maintenance	14.2 miles	4 sites 21 IOs	Wright 2000
2001-340	Aztlan Archaeology	Cell tower construction	No information	No information	Slawson 2001
2001-400	Desert Archaeology	Water main inspection	1 acre	No sites No IOs	Diehl 2001
2001-478	Aztlan Archaeology	Construction	5 acres	No Info.	No Information
2001-520	Old Pueblo Archaeology Center	Road improvement	21.9 ft.	No sites No IOs	Goldstein 2001
2001-746	SWCA	Asphalt plant expansion	46 acres	No sites No IOs	Doak and Hesse 2001
2002-252	Desert Archaeology	Water pipe placement	5 acres	No sites No IOs	Ruble 2002
2003-818	The Louis Berger Group	Prison construction	4 miles	No Info.	Hohmann 2002
2003-917	The Louis Berger Group	Prison construction	640 acres	4 sites 34 IOs	Hohmann 2001
2003-1139	Old Pueblo Archaeology Center	Development	158 acres	4 sites 76 IOs	Jones and Dart 2003
2003-1494	Harris Environmental Group	Storage yard construction	30 acres	No sites 2 IOs	Twilling 2003
2005-1107	Harris Environmental Group	Proposed runway 11R/29L relocation	704 acres	18 sites, 82 IOs	Twilling 2007
Unknown*	Logan Simpson	Invasive species management	Unknown	No information	Remington 2013
Unknown*	SWCA	Road relocation	1,596 acres	35 sites 185 IOs	Rawson and Hesse 2014
SHPO-2003-0825	Professional Archaeological Services and Technologies	No Information	No Information	No Information	Stephen 2002
SHPO-2003-2011	SWCA	Cell tower construction	1 acre	No Information	Tucker 2003

* Projects with an asterisk do not have locational data on AZSITE, thus they are not shown in Figures A-1 and A-2.
Note: Highlighted rows indicate projects that covered portions of the APE.

Seven previous projects have covered portions of the Direct APE (1992-218.ASM, 1994-170.ASM, 1999-159.ASM, 2002-252.ASM, 2005-1107.ASM, and two projects that have not be assigned ASM numbers). The most recent of these were conducted by Harris Environmental, SWCA, and Logan Simpson.

In 2007, Harris Environmental surveyed a section of the current project Direct APE as part of an earlier iteration of this project, the development of an EIS to evaluate the potential impacts of a proposed airport development program at TUS (Twilling 2007). Harris Environmental's 2007 survey covered 704 acres and recorded eighteen archaeological sites, 82 IOs, and fourteen structures. Six of these sites are within the current project Direct APE (AZ BB:13:771[ASM], AZ BB:13:773[ASM], AZ BB:13:774[ASM], AZ BB:13:775[ASM], AZ BB:13:778[ASM], AZ BB:13:779[ASM]). These sites were recommended not eligible for listing on the NRHP. Five structures were also evaluated and also recommended not eligible for listing on the NRHP.

In 2014, SWCA surveyed 1,596 acres for a Pima County Department of Transportation project to relocate East Hughes Access Road, just south of TUS (Rawson and Hesse 2014). The new roadway is known as Aerospace Parkway. As part of the project, 35 sites and 185 IOs were recorded in an area currently designated Parcel G and H.

In 2013, Logan Simpson surveyed access roads on TAA property prior to road use for buffelgrass mitigation activities. The number of acres surveyed is not defined in the memorandum submitted by Logan Simpson to the TAA (Remington 2013). The survey documented three previously recorded sites and two new sites, all of which are historic in age.

Previous Sites

Previous site records were examined for the area near and including the Direct APE. A total of 76 previously-recorded archaeological sites were identified (**Table 3-2 and Figures A-1 and A-2 in Appendix A**). These sites include prehistoric artifact scatters, rock features, hearths, historic ranching structures, historical-period trash scatters, a railroad, and a historic road.

Table 3-2. Previously-recorded archaeological sites in vicinity of APE.

ASM Site Number	Description	Size	Activity	Recorder/Year	NRHP Status	
					Recommendation	Opinion
AZ BB:13:59	Buried prehistoric hearths and fire cracked rock	No info.	Survey 1967; Excavation 1979	1970	Not evaluated	---
AZ BB:13:63	Prehistoric sherd scatter	30 m^2	Survey	1973	Not Eligible (2003)	SHPO*
AZ BB:13:130	Prehistoric sherd and lithic scatter	150 m^2	Survey	1980	Not evaluated	---
AZ BB:13:131	Prehistoric lithic scatter	100 m^2	Survey	1980	Not evaluated	---
AZ BB:13:446	Rock features and lithics	1,500 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:448	Rock features associated with lithics	400 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:449	Historic trash scatter (1950s)	16 m^2	Survey	Knoblock 1994	Not eligible (2000)	SHPO
AZ BB:13:451	Rock features with associated lithics	6,400 m^2	Survey	Knoblock 1994	Not eligible (2000)	SHPO
AZ BB:13:452	Historic/modern trash accumulation	25,600 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:453	Rock features with associated sherds and lithics	7,500 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:454	Rock features with associated lithics and fire cracked rock	2,250 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:455	Rock features with associated lithics	4,900 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:456	Rock features with associated lithics	No info.	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:457	Rock features with associated lithics	10,200 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:458	Rock features with associated lithics	4,400 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:459	Historic trash scatter and prehistoric rock pile with associated lithics	11,700 m^2	Survey	Knoblock 1994	Eligible (1994)	Recorder
AZ BB:13:460	Rock features with associated lithics	No info.	Survey	Knoblock 1994	Not eligible (2000)	SHPO
AZ BB:13:469	Rock features with associated lithics	No info.	Survey	Freeman 1994	Unevaluated (2000)	SHPO
AZ BB:13:551	Historic artifact scatter (1940s)	25 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:552	Two historic Pima potbreaks	18 m^2	Survey (surface collected)	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:553	Large prehistoric site (aceramic) containing rock features with associated lithics.	140,000 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:579	Multiple-episode historic trash scatter (one dates ca. 1890s-1920s)	400 m^2	Survey	Altschul et al. 1999	Not eligible (1999)	Recorder
AZ BB:13:580	Historic trash scatter	75 m^2	Survey	Altschul et al. 1999	Not eligible (1999)	Recorder

Table 3-2. *(continued).*

ASM Site Number	Description	Size	Activity	Recorder/Year	NRHP Status	
					Recommendation	Opinion
AZ BB:13:581	Historic trash scatter containing cans and assorted glass	9 m^2	Survey	Altschul et al. 1999	Not eligible (1999)	Recorder
AZ BB:13:582	Prehistoric artifact and fire-cracked rock scatter	375 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:583	Historic ranching structures and features with trash scatter	7,400 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:584	Isolated privy with associated historic artifacts	81 m^2	Survey	Altschul et al. 1999	Not eligible (1999)	Recorder
AZ BB:13:585	Isolated rock alignments	88 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:586	Prehistoric sherd and lithic scatter (Sedentary –Classic Hohokam with Tanque Verde Red-on-Brown and Rincon Red-on-Brown)	200 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:587	Prehistoric rock ring (possible hearth) with associated sherd and lithic scatter	540 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:588	Prehistoric rock features with associated lithic scatter	220 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:589	Prehistoric rock ring (some fire cracked rock) with associated plainware sherds and lithics	7,000 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:590	Historic ranching site	320,000 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:591	Prehistoric circular hearth and one plainware sherd	9 m^2	Survey	Altschul, et al. 1999	Not eligible (1999)	Recorder
AZ BB:13:592	Prehistoric fire cracked rock scatter and ash stain	40 m^2	Survey	Altschul et al. 1999	Not eligible (1999)	Recorder
AZ BB:13:593	Prehistoric hearth with fire cracked rock and artifacts	100 m^2	Survey	Altschul et al. 1999	Not eligible (1999)	Recorder
AZ BB:13:594	Prehistoric fire cracked rock with associated artifacts	450 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:595	Prehistoric rock alignments and piles	375 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:596	Prehistoric rock ring with plainware sherds and lithics	375 m^2	Survey	Altschul et al. 1999	Eligible (1999)	Recorder
AZ BB:13:631	Prehistoric rock features and lithics	150 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:632	Prehistoric rock features and lithics	18 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:633	Prehistoric rock features and lithics	10 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:634	Prehistoric rock features, ceramics and lithics	3,526 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:635	Prehistoric rock features and lithics	660 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:636	Prehistoric rock features and lithics	45 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:637	Prehistoric rock features and lithics	660 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:638	Prehistoric rock features	45 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:645	Historic road alignment	2,700 m^2	Survey	Dutt 1999	Not eligible (2000)	SHPO
AZ BB:13:649	Rock features associated with lithics	15 m^2	Survey	Swartz 2000	Unevaluated (2000)	SHPO

Table 3-2. *(continued).*

ASM Site Number	Description	Size	Activity	Recorder/Year	NRHP Status	
					Recommendation	Opinion
AZ BB:13:651	Isolated rock features	500 m^2	Survey	Swartz 2000	Unevaluated (2000)	SHPO
AZ BB:13:653	Old Nogales Highway	Unknown	Survey	Wright 2000	Unevaluated (2000)	Recorder
AZ BB:13:679	Twin Buttes Railroad	No info.	Survey	Swartz 2000	Eligible (2000)	Recorder
AZ BB:13:690	Alvernon Way (Historic In-Use Road)	2,150 x 280 ft	Survey	Hesse and Rawson 2014	Not eligible (2014)	Recorder
AZ BB:13:718	Historic bottle scatter (WWII-era)	10 m^2	Survey	Jones and Dart 2003	Not evaluated	---
AZ BB:13:719	Isolated rock feature	900 m^2	Survey	Jones and Dart 2003	Not eligible (2003)	Recorder
AZ BB:13:720	Prehistoric rock circle associated with sherds and lithics	403,200 m^2	Survey	Jones and Dart 2003	Not eligible (2003)	Recorder
AZ BB:13:722	Prehistoric rock circle associated with sherds	100 m^2	Survey	Jones and Dart 2003	Not eligible (2003)	Recorder
AZ BB:13:768	Historic debris scatter containing glass, metal and ceramics	2,296 m^2	Survey	Twilling 2007	Not eligible (2007)	Recorder
AZ BB:13:769	Historic debris scatter containing glass, metal, modern cobble features	7977.9 m^2	Survey	Twilling 2007	Not eligible (2007)	Recorder
AZ BB:13:770	Dense mid-20th century debris scatter, primarily domestic and gustatory glass, metal and ceramics; possibly associated with demolished restaurant in vicinity	3017.5 m^2	Survey	Twilling 2007	Eligible (2007)	Recorder
AZ BB:13:771	Small historic debris scatter, primarily glass and metal cans	630 m^2	Survey	Twilling 2007	Not Eligible (2007)	SHPO
AZ BB:13:773	Small historic debris scatter, primarily glass and metal cans, along with milled lumber and lightbulbs; historic rock features	39 m^2	Survey	Twilling 2007	Not Eligible (2007)	SHPO
AZ BB:13:774	Small historic debris scatter, primarily scrap metal fragments	126 m^2	Survey	Twilling 2007	Not Eligible (2007)	SHPO
AZ BB:13:775	Historic debris scatter, razed structure, primarily architectural objects	986 m^2	Survey	Twilling 2007	Not Eligible (2007)	SHPO
AZ BB:13:776	Fire-damaged historic debris scatter, primarily architectural artifacts in poor condition	546 m^2	Survey	Twilling 2007	Not Eligible (2007)	Recorder
AZ BB:13:777	Small historic debris scatter	27 m^2	Survey	Twilling 2007	Not Eligible (2007)	Recorder
AZ BB:13:778	Historic or modern rock clusters with milled lumber- possible signage remnants	280 m^2	Survey	Twilling 2007	Not Eligible (2007)	SHPO
AZ BB:13:779	Historic or modern rock clusters with milled lumber- possible signage remnants	270 m^2	Survey	Twilling 2007	Not Eligible (2007)	SHPO
AZ BB:13:785	Small historic debris scatter (ca. 1920-1960), with one prehistoric pottery sherd	6.3 m^2	Survey	Twilling 2007	Not Eligible (2007)	Recorder
AZ BB:13:786	Small historic debris scatter (ca. 1920-1960	42.64 m^2	Survey	Twilling 2007	Not Eligible (2007)	Recorder

Table 3-2. *(continued).*

AZ BB:13:787	Historic debris scatter, razed structure, primarily architectural objects	4588.28 m^2	Survey	Twilling 2007	Not Eligible (2007)	Recorder
AZ BB:13:788	Historic debris scatter (ca. 1930-1950)	910 m^2	Survey	Twilling 2007	Not Eligible (2007)	Recorder
AZ BB:13:789	Historic debris scatter (ca. 1930-1950)	76.8 m^2	Survey	Twilling 2007	Not Eligible (2007)	Recorder
AZ BB:13:790	Historic debris scatter (ca. 1920-1960)	128 m^2	Survey	Twilling 2007	Not Eligible (2007)	Recorder
AZ BB:13:836	Historic debris scatter (ca. 1940-1960)	No info.	Survey	Remington 2014	Not Eligible (2014)	Recorder
AZ BB:13:839	Prehistoric rock pile features with one flake and one sherd	500 m^2	Survey	Rawson and Hesse 2014	Not evaluated	---
AZ BB:13:851	Prehistoric rock pile features with one flake	300 m^2	Survey	Rawson and Hesse 2014	Not evaluated	---

General Land Office (GLO) Records

Records indicate that five land patents were filed with the GLO for Township 15 South, Range 14 East, Sections 17, 18, 19, and 20 (**Table 3-3**) (BLM 2006). A review of GLO maps showed no evidence of any homesteads within the APE (GLO 1871, 1873a, 1873b, 1892, 1921a, 1921b, 1932, 1955). Four unnamed historic-period roads are located south and west of the APE within the San Xavier Indian Reservation boundaries in Sections 24, 25, and 36 of Township 15 South, Range 13 East (GLO 1892, 1921a).

Table 3-3. Land patents within the survey area.

Accession/ Serial No.	Year	Patentee	Total Acres	Authority	Township, Range, and Section	Aliquot Parts
021689	1920	George Philip Bedford	161.6	May 20 1862: Homestead Entry Original (12 Statute 392)	T15S, R14E, Sec. 19	NW¼ of NW¼; SW¼ of SW¼; NW¼ of SW¼; SW¼ of SW¼
449312	1914	Ernest J. Freilinger	121.5	April 24, 1820: Sale Cash Entry (3 Statute 566)	T15S, R14E, Sec. 18	SW¼ of SW¼; NW¼ of SW¼; SW¼ of SW¼
1061416	1933	Philip A. Contzen	360.1	December 29, 1916: Homestead Entry Stock Raising (39 Statute 862)	T15S, R14E, Sec. 18	NW¼ of NW¼
AZPHX 0022528	1915	State of Arizona	5879.39	June 10, 1910: Quant and Spec Grant Selection (36 Statute 557)	T15S, R14E, Sec. 17, 18, 19	Sec. 18: E½; E½ of W½ Sec. 19: E½; E½ of W½ Sec. 17: Whole Section
AZPHX 0022529	1915	State of Arizona	6400	June 10, 1910: Quant and Spec Grant Selection (36 Statute 557)	T15S, R14E, Sec. 20, 21, 28, and 29	Sec. 20: Whole Section Sec. 21: Whole Section Sec. 28: Whole Section Sec. 29: Whole Section

CHAPTER 4: METHODS AND ENVIRONMENTAL SETTING

The survey was conducted on 16-18 and 23-25 August 2017 by archaeologists Alyssa Colan, Seth Alison, and Allison Talbot according to standards for pedestrian surveys set by the ASM. These standards allow a person to achieve 100 percent coverage of a corridor 20 m (66 ft.) wide in a single pass. One hundred percent coverage of the project area was achieved by conducting multiple transects at 15 m intervals across the Direct APE.

Surveyed Areas

While the Direct APE totals approximately 1,500 acres, as described in the EIS guiding this project, Harris Environmental surveyed a total of 436.37 acres (176.59 ha). The discrepancy in acreage between the APE and the areas surveyed is due to access restrictions at TUS and the adequacy of previous surveys and reports.

Survey crews were accompanied by a TAA escort while on the Airfield at all times for security and safety purposes. Survey crews were still restricted to safety zones. Areas with airplane traffic were off limits and were not surveyed due to hazardous conditions. It was apparent these areas have been graded and cleared and were previously disturbed due to the construction of the airport facilities, including runways, taxiways, and safety areas.

No archaeological survey was completed on the portion of the Direct APE designated as Parcel G and H, as this area was surveyed in 2013 by SWCA (Rawson and Hesse 2014). No archaeological survey was completed on AFP 44, owned by the U.S. Air Force. An Integrated Cultural Resource Management Plan (ICRMP) was completed on AFP 44 property in 2014. According to the ICRMP, "*Archaeological inventory and data recovery at AFP 44 are complete, the research potential of all identified archaeological sites has been satisfied, and no further archaeological studies are required*" (Peyton 2014:1-1).

Survey Methods

During the survey, archaeologists carefully examined all surface and soil exposures within the project area. Several paved areas cross the Direct APE. These were not surveyed.

Any artifacts or features that appeared older than 50 years were evaluated to determine if they constituted an archaeological site or a cultural resource eligible for inclusion in the NRHP. According to the criteria established by the ASM, a site can be of virtually any size and exhibit a variety of artifacts and features (ASM Site Definition Policy). However, sites must contain at least one of the following:

- Thirty or more artifacts of a single artifact class within an area 15 meters (49 ft.) in diameter, except when all pieces appear to originate from a single source (e.g., one ceramic vessel, one core, or one glass bottle, etc.).
- Twenty or more artifacts that include at least two artifact classes (e.g., sherds, lithics, or historic artifacts, etc.), within an area 15 meters (49 ft) in diameter.
- One or more archaeological features in association with any number of artifacts.

- Two or more temporally associated archaeological features without artifacts.

Artifacts and features that do not qualify as sites are typically recorded as isolated occurrences (IOs). These consist of a single artifact, an individual feature, or a widely-dispersed artifact scatter of extremely low density. An isolated feature is defined as a non-portable object that has no other features or artifacts within a 100-meter (328 ft.) diameter of its location. Field documentation of IOs is limited to recording the type of find and its universal trans mercator (UTM) coordinates.

Environmental Setting

The surveyed area is in the Basin and Range physiographic province. The province is characterized by mountain ranges on a northwest-southeast axis that are separated by broad alluvial valleys. Elevations vary from about 2,540 ft. above mean sea level (amsl) at the northwestern end to 2,690 ft. amsl at the southeastern end. The surveyed area is near the interface of a lower alluvial fan terrace and the Santa Cruz River floodplain, and contains Sonoran Desert scrub communities in the Arizona Upland subdivision (Brown 1994; Brown and Lowe 1980). The surveyed area is chiefly comprised of three soil units that are predominantly sandy loams. These units combined occur throughout 95 percent of the study area and include Cave soils and Urban land, Sahuarita and Mohave soils and Urban land, and Yaqui soils (Cochran and Richardson 2003).

Vegetation observed within the APE included blue paloverde (*Parkinsonia florida*), buckwheat (*Eriogonum* sp.), buffalo gourd (*Curcubita foetidissima*), burroweed (*Isocoma tenuisecta*), catclaw acacia (*Acacia greggii*), canyon ragweed (*Ambrosia ambrosioides*), cholla (*Opuntia* sp.), creosote (*Larrea tridentata*), desert broom (*Baccharis sarothroides*), desert hackberry (*Celtis pallida*), desert holly (*Acourtia nana*), desert mistletoe (*Phoradendron californicum*), desert night-blooming cereus (*Peniocereus greggii*), desert zinnia (*Zinnia acerosa*), evening primrose (*Oenothera* sp.), fishhook barrel (*Ferocactus wislizenii*), four-wing saltbush (*Atriplex canescens*), foothills paloverde (*Parkinsonia microphylla*), golden-spined hedgehog (*Echinocereus engelmannii*), greythorn (*Zizyphus obtusifolia*), ground cherry (*Physalis* sp.), hog potato (*Hoffmanseggia glauca*), mariola (*Parthenium incanum*), mesquite (*Prosopis* sp.), Mormon tea (*Ephedra trifurca*), netleaf hackberry (*Celtis reticulata*), ocotillo (*Fouquieria splendens*), Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*), saguaro (*Carnegiea gigantea*), Santa Rita prickly pear (*Opuntia violacea* var. *santa-rita*), shrubby coldenia (*Tiquilia canescens*), silverleaf bahia (*Bahia absinthifolia*), silverleaf nightshade (*Solanum elaeagnifolium*), snakeweed (*Gutierriezia sarothrae*), soaptree yucca (*Yucca elata*), triangle-leaf bursage (*Ambrosia deltoidea*), velvet mesquite (*Prosopis velutina*), virgin's bower (*Clematis drummondii*), whitethorn acacia (*Acacia constricta*), western black willow (*Salix [nigra] gooddingii*), wolfberry (*Lycium* sp.), and woolymat (*Tidestromia lanuginosa*).

A safety area is present along the edges of runways and taxiways. These areas have been graded, cleared of vegetation, and compacted to accommodate the occasional passage of an airplane and to remove fire hazards, improve visibility, and facilitate security.

CHAPTER 5: ARCHAEOLOGICAL SITES

A total of 11 archaeological sites were identified by Harris Environmental within the survey area (**Figure A-3 in Appendix A**). Individual site maps can be found in Appendix A. Six of these sites were newly recorded, while five were previously recorded sites that were revisited and evaluated. Two previously recorded sites were not relocated within Harris Environmental's survey area because they could not be found during the pedestrian survey. Eleven isolated occurrences were recorded within the survey area.

In addition, 10 archaeological sites have been recently recorded in portions of the Direct APE not surveyed by Harris Environmental for this project. These sites are summarized at the end of this chapter. Thus, a total of 21 archaeological sites are known to exist within the Direct APE (**Figure A-4 in Appendix A**).

Newly Recorded Sites

AZ BB:13:972(ASM)

Site Type(s): Historic Debris Scatter/Waste Pile
Cultural/Temporal Affiliation: Historic European-American
Site Dimensions: 118 ft. (36 m) by 26 ft. (8 m)
NRHP Recommendation: Ineligible

Site Description

AZ BB:13:972(ASM) is a multi-component site with historic and prehistoric artifacts, located on a flat ground surface. Vegetation observed near the site includes creosote and mesquites trees, along with cholla and barrel cacti. The site is located west of the TUS runway (**Figure 5-1 and Figure A-5 in Appendix A**). Soils within the site consist of sandy silt interspersed with small pebbles. The site is in good condition.

Artifacts

Artifacts within the site were primarily within two concentrations; the first consists of five (5) fragments of scrap metal and stove pipe parts (Figure 5-2), and the second concentration consists of approximately 50 fragments of amber and colorless bottle glass (Figure 5-3). One colorless glass bottle base displays the makers mark attributed to the Owens-Illinois bottle company (1920s to 1950s), and a second amber base displays an unidentified UM makers mark with the number 518 next to it. Three prehistoric artifacts were identified within the site, outside of these concentrations. Two sherds were identified; one is a red-on-buff rim sherd with outcurving (Figure 5-4). The other is a plain ware body sherd. One purple chert tertiary flake was recorded within the site.

NRHP Recommendations

This site represents small twentieth century waste piles from two dumping events. The site is limited in scope and the artifacts are fragmentary with little diagnostic utility. The scatter of material shows no visual evidence for buried artifacts and a subsurface deposit is unlikely. Therefore, Harris Environmental recommends AZ BB:13:972(ASM) ineligible for listing on the NRHP. No additional work is recommended for this site.

Figure 5-1. AZ BB:13:972(ASM): Overview of site, facing north.

Figure 5-2. AZ BB:13:972(ASM): Concentration of stove pipes and parts, facing southeast.

Figure 5-3. AZ BB:13:972(ASM): Glass concentration, facing east.

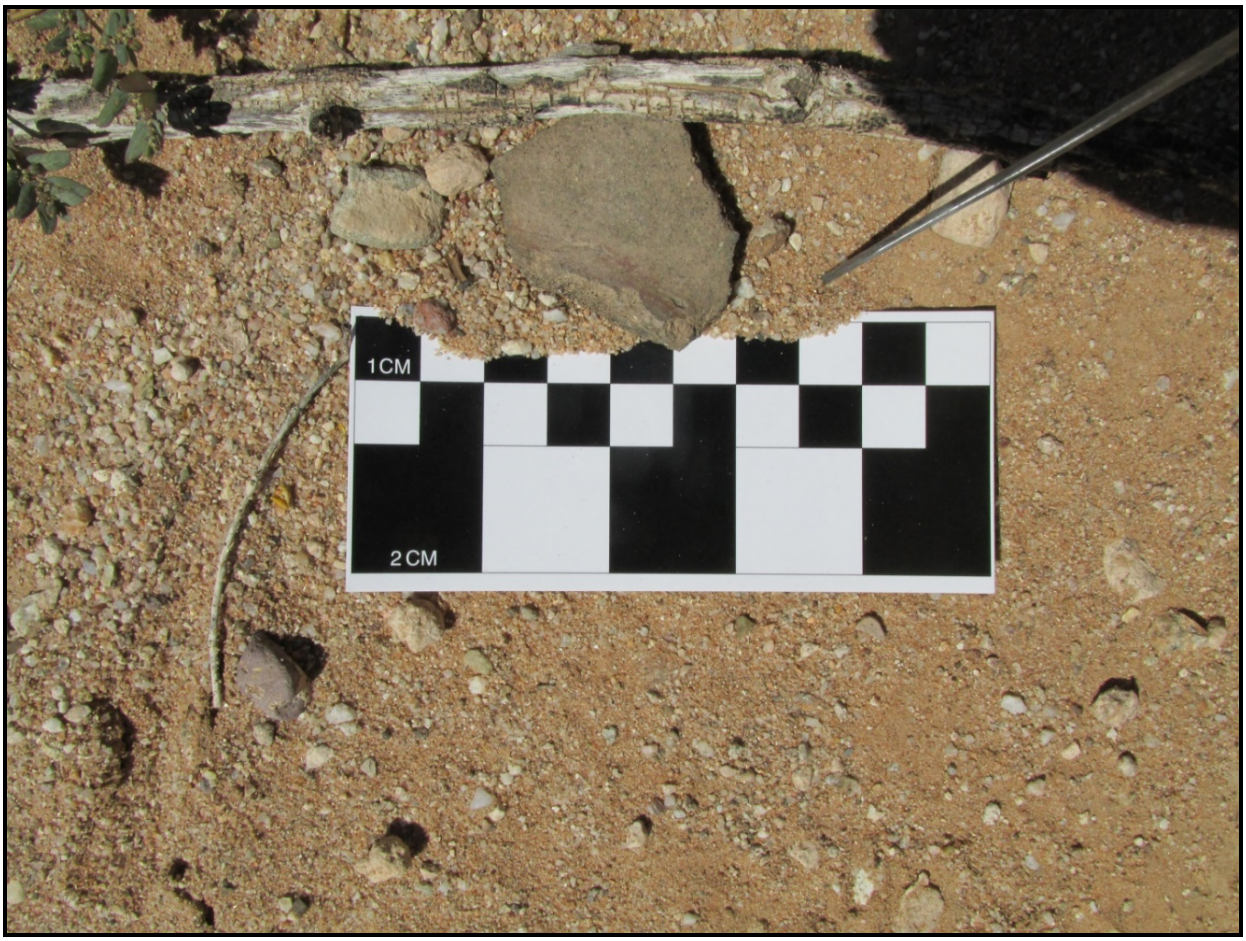

Figure 5-4. AZ BB:13:972(ASM): Red-on-buff sherd with outcurving.

AZ BB:13:973(ASM)

Site Type(s): Historic Debris Scatter/Waste Pile
Cultural/Temporal Affiliation: Historic European-American
Site Dimensions: 16 ft. (5 m) by 10 ft. (3 m)
NRHP Recommendation: Ineligible

Site Description

AZ BB:13:973(ASM) is a moderate surface scatter of historic and modern scrap metal. It is located on a flat ground surface, with creosote and mesquite trees along with cholla and barrel cacti nearby. The site is located west of the TUS runway (**Figure 5-5 and Figure A-6 in Appendix A**). The site is in good condition.

Artifacts

Artifacts comprising AZ BB:13:973(ASM) include over 100 metal fragments of unidentified white and ferrous metal, as well as three paint cans, one aerosol can, one paint can lid, and five to 10) amber and colorless glass fragments (Figure 5-5). The artifacts are concentrated within a five meter by three meter area.

NRHP Recommendations

The site consists of a large, surficial dump pile of scrap metal and glass fragments. The site is interpreted to represent a secondary disposal area representing multiple dumping episodes. As a result, the cultural material here is removed from its point of generation which cannot be determined (see Sullivan and Griffith 2005:32-33). The site offers limited data potential. Based on these observations, Harris Environmental recommends that AZ BB:13:973(ASM) is ineligible for listing on the NRHP. No additional work is recommended.

Figure 5-5. AZ BB:13:973(ASM): Overview of site and large pile of scrap metal and paint cans, facing south.

AZ BB:13:974(ASM)

Site Type(s): Historic Debris Scatter/Waste Pile
Cultural/Temporal Affiliation: Historic European-American
Site Dimensions: 243 ft. (74 m) by 194 ft. (59 m)
NRHP Recommendation: Ineligible

Site Description

AZ BB:13:974(ASM) is comprised of a large and dense deflated historic debris scatter. Four prehistoric sherds were also identified within the site. The site is located in the middle of a creosote flat characterized by cacti, paloverde trees, and mesquite trees. The site is located south of the TUS runway (**Figure 5-6 and Figure A-7 in Appendix A**). The soils are sandy silt topsoil. The site is in very good condition, although some artifacts are partially buried.

Artifacts

The artifacts that comprise the site include several complete bottles (see list, below), however the primary material type is metal, with over 10,000 pieces of scrap metal and metal objects including nails, belts, washers, bolts and nuts, as well as soup cans, aerosol cans, and a cigarette tin. The assemblage includes one battery, four fragments of milled lumber ranging from approximately eight to 24 inches (20.32-60.96 cm) in length, as well as colorless and amber bottle glass fragments and approximately 20 fragments of a broken ceramic insulator. In addition, one large magnesium or lead cylinder in fragments (**Figure 5-7)** was also recorded. For plain ware body sherds were recorded within the site.

Complete bottles recorded within AZ BB:13:974(ASM) include:

- A cylindrical, machine-made amber bottle measuring 7 ½ inches by 2 ½ inches (19.05 by 5.08 cm), with a maker's mark attributed to the Glass Containers Corporation (ca. 1935-1960s) (**Figure 5-8**).
- A colorless, externally-threaded cylindrical jar measuring 4 ½ inches by 2 ¾ inches (11.43 by 6.99 cm), with a maker's mark attributed to the Maywood Glass Company (ca. 1930-1959). The maker's mark includes the numbers 2707 and 8 on either side of the MG makers mark (**Figure 5-9**)
- A colorless, machine-made, "Dandy"-style flask embossed with the label for Old Mr. Boston Rocking Chair Whiskey measuring 7 inches by 3 ¼ (17.78 by 8.26 cm) (**Figure 5-10**). This type of whiskey was in production ca. 1933-1986.

NRHP Recommendations

This site consists of a large historic refuse scatter with four isolate prehistoric sherds. Diagnostic artifacts indicate that the site was used in the early-to-mid twentieth century (ca. 1930s-1950s), and likely was an area of refuse deposit for multiple depositional events during this time. The high amount of architectural and machinery-related artifacts (including nails and other fasteners, as well as paint cans, batteries and various fragments of scrap metal), along with a light density of domestic and/or personal items (liquor bottles, ceramics and other glass fragments) indicate that the primary association is with a domestic or commercial building that may have been demolished in the vicinity. The site

is interpreted to represent a secondary disposal area, representing multiple dumping episodes. As a result, the cultural material here is largely fragmentary and removed from its point of generation, which cannot be determined (see Sullivan and Griffith 2005:32-33). The site offers limited data potential. Based on these observations, Harris Environmental recommends that AZ BB:13:974(ASM) is ineligible for listing on the NRHP. No additional work is recommended.

Figure 5-6. AZ BB:13:974(ASM): Site overview, facing east.

Figure 5-7. AZ BB:13:974(ASM): Broken magnesium or lead cylinder, 1 ¼ inches thick, facing south.

Figure 5-8. AZ BB:13:974(ASM): Brown glass bottle, Glass Containers Corporation (ca. 1935-1960s), 7 ½ inches by 2 ½ inches.

Figure 5- 9. AZ BB:13:974(ASM): A Maywood Glass Co. clear mason jar (ca. 1930-1959) with the numbers 2707 and 8 on either side of the MG maker's mark, 4 ½ inches by 2 ¾ inches.

Figure 5- 10. AZ BB:13:974(ASM): Old Mr. Boston Rocking Chair Clear Whiskey bottle (ca. 1933-1986), measuring 7 inches by 3 ¼ inches, unknown date.

AZ BB:13:975(ASM)

Site Type(s): Historic Debris Scatter/Waste Pile
Cultural/Temporal Affiliation: Historic European-American
Site Dimensions: 98 ft. (30 m) by 82 ft. (25 m)
NRHP Recommendation: Ineligible

Site Description

AZ BB:13:975(ASM) is a moderately-sized historic debris scatter, characterized by one main artifact concertation, measuring three feet (one meter) by seven ft. (two meter), with a few surrounding artifacts. The site is set near a small wash on a creosote flat, south of the TUS runway (**Figure 5-11 and Figure A-8 in Appendix A**). Soil within the site consists of beige sandy silt interspersed with small rhyolitic gravels and pebbles on a flat modern ground surface. Paloverde trees, barrel cacti, and ocotillo surrounded the site. The site is in good condition.

Artifacts

The main artifact concentration is a dense deposit of mostly fragmentary glass, ceramic, and metal artifacts, totaling approximately 200. The majority of these are fragments of commercially produced food packaging, including food cans and several complete or partially complete bottles. These items include an Oscar Meyer sausage tin lid marked with the words “Keep Refrigerated”, measuring 3 ¼ inches by 4 inches (8.26 by 10.16 cm), as well as a jam jar embossed with the slogan “Our Welch’s sure helps make you strong” and a picture of music notes, cartoon clown, and a flexing child. One Pepsi Co. bottle base was also discovered with an Owens-Illinois maker’s mark and “DURAGLASS” written on the bottom (ca. 1940-1963) (Lindsey 2017). Another Pepsi Co. base was found and labeled “Tucson, Arizona”. Other glass artifacts associated with food or drink include a broken Coke bottle, and a small (¾ by 2 by 4 inches [1.9 by 5.08 by 10.16 cm]) tapered brown extract bottle embossed with “Schilling” on the base, a mark attributed to the A. Schilling Company (in operation under that name ca. 1881-1946) (Rathmell 2001). Ceramics observed include one broken plate imprinted with “Royal Chine Underglaze” on the base, and one seafoam green and partially melted coffee mug, among many other historic sherds.

A total of four medicine bottles were recorded – two colorless, one rectangular the other cylindrical, both with the same maker’s mark attributed to the Hazel-Atlas Glass Company (in operation ca. 1902-1964). The other two are small, cylindrical green medicine bottles embossed with “20 O S 4 200 PW” on the base.

Other artifacts include an oval-shaped metal flask, a gas can, one wire coat hanger, metal wiring wrapped up in coils, and various green glass, undecorated whiteware ceramic fragments and approximately 10 metal cans (**see Figure 5-11**).

NRHP Recommendations

The site consists of a large, surficial dump pile of scrap metal and glass fragments that date loosely to the early-to-mid twentieth century. The site is interpreted to represent a secondary disposal area representing multiple dumping episodes. As a result, the cultural

material here is removed from its point of generation which cannot be determined (see Sullivan and Griffith 2005:32-33). The scatter of material shows no visual evidence for buried artifacts and a subsurface deposit is unlikely. The site offers limited number data potential. Based on these observations, Harris Environmental recommends that AZ BB:13:975(ASM) is ineligible for listing on the NRHP and no additional work is recommended.

Figure 5-11. AZ BB:13:975(ASM): Site overview, facing west.

AZ BB:13:976(ASM)

Site Type(s): Historic Debris Scatter/Waste Pile
Cultural/Temporal Affiliation: Historic European-American
Site Dimensions: 387 ft. (118 m) by 285 ft. (87 m)
NRHP Recommendation: Ineligible

Site Description

AZ BB:13:976(ASM) is located on a flat ground surface, with creosote, acacia bushes, small shrubs and mesquites trees, along with cholla and barrel cacti in the vicinity. Sandy silt top soil surrounds the site, and the landform has a northern aspect. The site is located south of the TUS runway (**Figure 5-12 and Figure A-9 in Appendix A**). The site is in good condition and consists of a small artifact concentration (**Figure 5-13**). Cultural materials include various fragments of glass and ceramics and metal cans.

Artifacts

The assemblage includes one complete amber, machine-made bottle with an Owens-Illinois symbol makers mark on the bottom and the numbers “20 51 8B” and “DURAGLASS” labeled as well as the numbers “27716B”. The numbers that accompany the Owen’s Illinois mark indicate the plant where the bottle was manufactured. The code “20” indicates the plant in Oakland, California, which began operation in 1946 (Lockhart 2004). The use of the embossed word “DURAGLASS” on this and one other bottle base indicates these bottles were manufactured between ca. 1940-1963 (Lindsey 2017).

Other food-related artifacts observed include a coffee mug base with the words “Vitrified Jac-Tan Jackson China” within an arrowhead type of symbol, one two-inch (5.08 cm), triangular base 5 ½ inch (13.97 cm)-tall Owens-Illinois bottle with the word “Norwich” embossed on the sides of it, one amber Owens-Illinois medicine bottle measuring one by one-inch (2.54 x 2.54 cm) on the base and three inches (7.62 cm) tall. One colorless oval base embossed with “WINE” and the maker’s mark of a capital “B” in a circle, attributed to the Brockway Glass Company (in use beginning in 1925) (Toulouse 1971). Many fragments of Coca-Cola bottles were observed, along with 100-200 metals cans, likely food storage.

Two medicine bottles are included in the assemblage, one colorless with iridescent glass measuring one by one inches (2.54 x 2.54 cm) on its base and four inches (10.16 cm) tall and embossed with the numbers “74” on the base. A second small medicine bottle (¾ inch [1.9 inch] round base, two inches [5.08 cm] tall), embossed with “TCWCO” a mark attributed to the T.C Wheaton Company (in operation since 1888) (Toulouse 1971), and “TYPE III” “USA” “31”.

In addition to the historic artifacts, one lithic flake was also observed within AZ BB:13:976(ASM). The secondary chert percussion flake shows evidence of being unifacially worked on one side.

NRHP Recommendations

The site is a large dump pile primarily consisting of fragmentary historic artifacts, representing a large, surficial dump pile of scrap metal and glass fragments that date loosely to the early-to-mid twentieth century. The site is interpreted to represent a secondary disposal area representing multiple dumping episodes. As a result, the cultural material here is removed from its point of generation, which cannot be determined (see Sullivan and Griffith 2005:32-33). The scatter of material shows no visual evidence for buried artifacts. The one prehistoric artifact occurs in isolation. The site offers limited data potential. Based on these observations, Harris Environmental recommends that AZ BB:13:976(ASM) is ineligible for listing on the NRHP and no additional work is recommended.

Figure 5-12 AZ BB:13:976(ASM): Overview of site, facing south. The feature in the background is an FAA operated VOR antenna.

Figure 5-13. AZ BB:13:976(ASM): Artifact concentration of mainly glass and ceramics, facing west.

AZ BB:13:977(ASM)

Site Type(s): Historic Debris Scatter/Waste Pile
Cultural/Temporal Affiliation: Historic European-American
Site Dimensions: 75 ft. (23 m) by 75 ft. (23 m)
NRHP Recommendation: Ineligible

Site Description

AZ BB:13:977(ASM) is a small historic waste pile on a mostly flat ground surface with a western aspect. A small wash runs east-west just north of the site, which is surrounded by creosote and mesquites trees along with cholla and barrel cacti. The site is located south of the TUS runway 11L/29R (**Figure 5-14 and Figure A-10 in Appendix A**). Sandy silt top soil with small rhyolitic gravels and pebbles surrounds the site. A large ocotillo is located to the northwest of the site. AZ BB:13:977(ASM) is in good condition

Artifacts

Artifacts at the site are primarily architectural in function, including a large metal bolt measuring 1 inch by 2 inches (2.54 by 5.08 cm), large fragments of chicken wire, and many sheets of asphalt/composition roofing tile, one metal hinge with a spring attached and one light bulb socket with two outlets. Domestic artifacts include approximately 20 cans of various sizes, approximately 20 fragments of amber and colorless glass, including the base of one Owens-Illinois bottle.

NRHP Recommendations

The site is a large, surficial dump pile of architectural and a few domestic items with low diagnostic utility. The site is interpreted to represent a secondary disposal area representing multiple dumping episodes. As a result, the cultural material here is removed from its point of generation which cannot be determined (see Sullivan and Griffith 2005:32-33). The scatter of material shows no visual evidence for buried artifacts and a subsurface deposit is unlikely. The site offers limited data potential. Based on these observations, Harris Environmental recommends that AZ BB:13:975(ASM) is ineligible for listing on the NRHP, and no additional work is recommended.

Figure 5-14. AZ BB:13:977(ASM): Site overview, facing west

Previously Recorded and Relocated Sites within the Direct APE

AZ BB:13:773(ASM)

AZ BB:13:773(ASM) was recorded by Harris Environmental in 2007 as a historic waste pile with rock cluster features. Artifacts consisted of approximately 150 glass fragments, 40 cans, 50 scrap metal fragments, seven complete whole bottles, five milled lumber fragments, and four light bulbs. Two rock clusters were identified in 2007 and are described as concentrations of limestone cobbles and smaller gravels with grass and bushes growing out of them. It is possible they once functioned as location markers or sign post bases, as milled lumber is scattered near the features. The site was recommended ineligible for listing on the NRHP in 2007, and the SHPO concurred.

Site Condition

The site is in similar poor condition to that recorded in 2007 (**Figure A-11 in Appendix A**). The artifacts were relocated and remain in fragmentary, scattered condition. The rock features appear to be historic or modern and have dispersed slightly since the previous survey. The site remains ineligible for listing on the NRHP and no further work is recommended.

AZ BB:13:774(ASM)

AZ BB:13:774(ASM) was originally recorded by Harris Environmental in 2007 as a historic debris site consisting of two concentrations. The artifacts that were found in 2007 included approximately 60 cans, 60 glass fragments, and 900 fragments of scrap metal and metal strapping. The site was recommended ineligible for listing on the NRHP in 2007, and the SHPO concurred.

Site Condition

Although two artifact concentrations were originally recorded within the site, the current survey only identified one (**Figure A-12 in Appendix A**). The second artifact concentration that was not relocated may have been obscured by thick vegetation near the site or may have merged with the artifact concentration that was relocated, such that they are no longer distinguishable. The site is in poor condition. Only a few of the artifacts were recognizable within the concentration. The site remains ineligible for listing on the NRHP and no further work is recommended.

AZ BB:13:775(ASM)

AZ BB:13:775(ASM) was recorded by Harris Environmental in 2007 as a waste pile representing a razed structure. No structural foundation or footer was present. The site comprised approximately 10,000 artifacts, all of which are construction related and include nails, bolts, window glass, concrete, cans, wire, glass insulator fragments, and milled lumber. One feature, a low berm made of rocks and concrete, was recorded within the site and interpreted as the remnant of a structure. The site was recommended ineligible for listing on the NRHP in 2007, and the SHPO concurred.

Site Condition

The site was found to be larger than previously described, perhaps due to erosion sheet washing (**Figure A-13 in Appendix A**). The artifact and features recorded are consistent with those described in 2007. The site is in poor condition and remains ineligible for listing on the NRHP. No further work is recommended at this time.

AZ BB:13:779(ASM)

AZ BB:13:779(ASM) was recorded by Harris Environmental in 2007 as four historic rock clusters, mainly formed with rhyolitic cobbles, with no associated artifacts. These clusters may represent the remains of modern or historic location markers or sign posts. Similar rock features are present in the area and these features possibly served a similar purpose. Milled lumber was also discovered in the vicinity of the site. The site was recommended ineligible for listing on the NRHP in 2007, and the SHPO concurred.

Site Condition

The current four rock formations appear closer than originally mapped, perhaps due to erosion, or mapping error (**Figure A-14 in Appendix A**). The site is in poor condition and remains ineligible for listing on the NRHP. No further work is recommended at this time.

AZ BB:13:836(ASM)

AZ BB:13:836(ASM) was originally recorded by Logan Simpson in 2013 as a historic trash scatter located on the south side of an access road (**Figure A-15 in Appendix A**). The site consisted of approximately 55 sanitary cans of different shapes and sizes, one mini cone-top beverage can, approximately 150 colorless glass fragments, approximately 130 amber glass fragments, 50 green glass shards, two brown glass jug fragments, approximately 10 cobalt glass colored fragments, around 30 ceramic white ware fragments, and five large fragments of an orange-painted ceramic vessel (Kittelson 2013). Nearly all the artifacts are located in an artifact concentration near the road. Logan Simpson recommended the site ineligible for listing in 2013.

Site Condition

The site condition is moderately good. The site does not appear to have changed since it was recorded in 2013. It remains ineligible for listing on the NRHP and no further work is recommended.

Previously Recorded Sites within the Direct APE Not Relocated

AZ BB:13:771(ASM)

AZ BB:13:771(ASM) was recorded by Harris Environmental in 2007 as a small historic waste pile with approximately 100 artifacts, dating between 1930 and 1950. The site was located on both sides of a small asphalt road. The site was noted as being in good condition. Harris Environmental searched the previously recorded site area and searched extensively along the sides of the asphalt road in 2017, but the site was not relocated. It is possible that the site was cleared away as part of Airfield maintenance activities along the road. The site was recommended ineligible for the NRHP in 2007. Harris

Environmental recommends no further work at this site, as it appears to have been destroyed.

AZ BB:13:778(ASM)

AZ BB:13:778(ASM) was recorded by Harris Environmental in 2007 as two small rock clusters and scatter fragments of milled lumber. The two rock features were considered historic or modern features and were interpreted as possible sign posts or location markers. Harris Environmental searched the previously recorded site area in 2017, but could not relocate the site. The site was recommended not eligible for the NRHP in 2007. The site may have been covered by vegetation or may have been affected by maintenance activities on the Airfield. Harris Environmental recommends no further work at this site.

Sites Recorded by SWCA within the Direct APE (Not Revisited by Harris Environmental)

AZ BB:13:449(ASM)

AZ BB:13:449(ASM) was originally recorded by Statistical Research, Inc. (SRI) in 1994 as a historical trash scatter (Montgomery and Knoblock 1994). SWCA revisited the site in 2013 and found it much as previously described (Rawson and Hesse 2014:A-10). The site included domestic trash and was considered likely the result of wildcat dumping. Based on their observations, SWCA stated there was a very low potential for subsurface deposits. SRI recommended the site not eligible for the NRHP in 1994. The SHPO concurred that the site was ineligible in 2000 (SHPO Undertaking 2000-1615). SWCA did not evaluate the site's eligibility in 2013. Harris Environmental did not revisit or evaluate this site as part of the current project because the area had previously been surveyed.

AZ BB:13:631(ASM)

AZ BB:13:631(ASM) was originally recorded by Desert Archaeology, Inc. (Desert) in 1999 (Dutt 1999). The site was described as two rock piles and a scatter of 10 lithic artifacts. SWCA revisited the site in 2013 (Rawson and Hesse 2014:A-16). The site was found to be in good condition. The features were identified, but only four artifacts were recorded, one of which was a bifacial core tool. The site was interpreted as prehistoric, though the function of the rock clusters is unknown. Based on SWCA's observations, they stated there was a very low potential for subsurface deposits. Desert recommended the site not eligible for the NRHP in 1999 and the SHPO concurred in 2000 (SHPO Undertaking 2000-1615). SWCA did not evaluate the site's eligibility in 2013. Harris Environmental did not revisit or evaluate this site as part of the current project.

AZ BB:13:632(ASM)

AZ BB:13:632(ASM) was originally recorded in 1999 by Desert as consisting of one rock pile and two flakes (Dutt 1999). SWCA revisited the site in 2013 and identified the rock pile and six lithic artifacts (Rawson and Hesse 2014:A-20). The site was found to be in good condition. SWCA interpreted it as a small prehistoric site, with the rock pile potentially from a roasting pit. Based on their interpretations, SWCA considered the site to have a very low potential for subsurface deposits. The site was recommended

ineligible for the NRHP in 1999 by Desert, and the SHPO concurred in 2000 (SHPO Undertaking 2000-1615). SWCA did not evaluate the site's eligibility in 2013. Harris Environmental did not revisit or evaluate this site as part of the current project.

AZ BB:13:633(ASM)

AZ BB:13:633(ASM) was originally recorded in 1999 by Desert (Dutt 1999). The site was described as one rock feature composed of two distinct piles, which was associated with ten flakes. SWCA revisited the site in 2013 and recorded the feature, as well as three flakes (Rawson and Hesse 2014:A-21). The site was found to be in good condition. The site is interpreted as a prehistoric site with the features possibly being the remnants of roasting pits. Based on their observations, SWCA stated that the site has very low potential for subsurface deposits. Desert recommended the site ineligible for the NRHP in 1999, and the SHPO concurred in 2000 (SHPO Undertaking 2000-1615). SWCA did not evaluate the site's eligibility in 2013. Harris Environmental did not revisit or evaluate this site as part of the current project.

AZ BB:13:634(ASM)

AZ BB:13:634(ASM) was originally recorded by Desert in 1999 (Dutt 1999) as six rock piles and a small prehistoric artifact scatter with sherds and flakes. SWCA revisited the site in 2013 and recorded nine rock piles with fire-cracked rock, 30 flakes, and six sherds (Rawson and Hesse 2014:A-24). The site was found to be in good condition. The site was described as consistent with the model of small resource procurement and processing loci, and the sherds suggest a Hohokam cultural affiliation. Based on SWCA's observations, they stated that there is a very low potential for subsurface deposits. D esert recommended the site ineligible for the NRHP in 1999, and the SHPO concurred in 2000 (SHPO Undertaking 2000-1615). SWCA did not evaluate the site's eligibility in 2013. Harris Environmental did not revisit or evaluate this site as part of the current project.

AZ BB:13:635(ASM)

AZ BB:13:635(ASM) was originally recorded by Desert in 1999 (Dutt 1999) as seven rock piles and 20 pieces of flaked stone. SWCA revisited the site in 2013 and recorded five rock piles with 20 flaked lithics, including a bifacial core tool (Rawson and Hesse 2014:A-27). The site boundary was slightly expanded. The site was found to be in good condition. The site was described as consistent with the model of small resource procurement and processing loci, with the rock piles possibly the remnants of roasting pits. Based on SWCA's observations, they stated that there is a very low potential for subsurface deposits. Desert recommended the site ineligible for the NRHP in 1999, and the SHPO concurred in 2000 (SHPO Undertaking 2000-1615). SWCA did not evaluate the site's eligibility in 2013. Harris Environmental did not revisit or evaluate this site as part of the current project.

AZ BB:13:636(ASM)

AZ BB:13:636(ASM) was originally recorded by Desert in 1999 (Dutt 1999) as a single rock pile associated with eight flakes. SWCA revisited the site in 2013 and identified the rock pile and ten flakes (Rawson and Hesse 2014:A-30). The site was found to be in good condition. The site is consistent with the model of a small resource procurement

and processing loci, with the feature possibly being a roasting pit. Based on their observations, SWCA stated there is low potential for subsurface deposits. Desert recommended the site ineligible for the NRHP in 1999, and the SHPO concurred in 2000 (SHPO Undertaking 2000-1615). SWCA did not evaluate the site's eligibility in 2013. Harris Environmental did not revisit or evaluate this site as part of the current project.

AZ BB:13:637(ASM)

AZ BB:13:637(ASM) was originally recorded by Desert in 1999 (Dutt 1999) as consisting of 13 rock piles and 20 flakes. SWCA revisited the site in 2013 and identified 11 rock piles and 20 flaked stone artifacts, including a small number of cores and tested cobbles, as well as one bifacially flaked chopper (Rawson and Hesse 2014:A-32). The site was found to be in good condition. The site is consistent with the model of small resource procurement and processing loci and the features suggest a probably thermal processing function. Based on SWCA's observations, they stated there was a very low potential for subsurface deposits. Desert recommended the site ineligible for the NRHP in 1999, and the SHPO concurred in 2000 (SHPO Undertaking 2000-1615). SWCA did not evaluate the site's eligibility in 2013. Harris Environmental did not revisit or evaluate this site as part of the current project.

AZ BB:13:839(ASM)

AZ BB:13:839(ASM) was recorded by SWCA in 2013 (Rawson and Hesse 2014:A-52). The site consists of three rock pile features, one flake, and one red-on-brown sherd. The rock features are circular, and two of the three features include rock that appears to be fire-cracked. All of the features were found to be at least partially deflated. The site was described as being in good condition. SWCA interpreted the site was consistent with the model of small resource procurement and processing loci. The sherd suggests a Hohokam cultural affiliation, and the rock piles appear to be thermal processing features. Based on SWCA's observations, they stated there is a very low potential for subsurface deposits. SWCA did not evaluate the site for NRHP eligibility. Harris Environmental did not revisit or evaluate this site as part of the current project.

AZ BB:13:851(ASM)

AZ BB:13:851(ASM) was recorded by SWCA in 2013 (Rawson and Hesse 2014:A-79). The site was described as comprising two rock piles and one flake. The rock pile features were deflated and only one exhibited a small amount of rocks that appeared fire-cracked. The site was described as being in good condition. SWCA interpreted the site was consistent with the model of small resource procurement and processing loci. The features were considered likely the remnants of small thermal features. Based on SWCA's observations, they stated there is very low potential for subsurface deposits. SWCA did not evaluate the site for NRHP eligibility. Harris Environmental did not revisit or evaluate this site as part of the current project.

Isolated Occurrences

A total of 11 IOs were recorded within the project area (**Table A-1 and Figure A-3 in Appendix A**). Four of these (IOs 4, 8, 9 and 11) are single lithic cores: IOs 4 and 8 of rhyolite and IOs 9 and 11 of fine-grained basalt. IO 10 is a single body sherd, very eroded, possibly red-on-buff. IOs 1, 7, and 8 consist of two artifacts each. IO 1 is two historic artifacts, both metal cans. One is a rectangular gas can measuring 7 x 8-3/4 x 9-3/4 inches (17.78 x 22.23 x 24.77 cm), and the second is a Shell Oil can measuring 5-1/2 inches in height by 4 inches diameter (13.97 x 10.16 cm). IO 6 is comprised of two prehistoric lithic artifacts: a single chert projectile point (Gypsum type, Late Archaic, ca. 4500-1450 B.P.) measuring 4 cm x 2.5 cm x 0.5 cm thick (Figure 5-15), and one basalt flake. IO 7 consists of two prehistoric lithic flakes: one of fine-grained basalt and one of rhyolite. IO 2 consists of three prehistoric artifacts: one plain ware body sherd, and two lithic flakes: one fine-grained basalt secondary flake and one white chert tertiary flake. IOs three and five are both comprised of 11 artifacts. IO 3 represents both historic and prehistoric components. The prehistoric component consists of a single plain ware pottery sherd with possible red slip. The isolate also includes 10 historic objects: five metal Pennzoil oil cans and five scrap metal pieces of indeterminate metal. IO five consists of 11 historic artifacts: 10 metal fragments, interpreted to represent fragments of oil cans and miscellaneous scrap metal, one fragment of colorless bottle glass. None of the IOs recorded are recommended eligible for the NRHP, and Harris Environmental recommends no further study at this time.

Figure 5-15. Gypsum projectile point recorded as part of IO 6.

CHAPTER 6: HISTORIC STRUCTURE EVALUATIONS

In addition to the Class III archaeological survey, Harris Environmental was tasked with evaluating 12 structures on AFP 44 property within the Direct APE (**see Figure A-3 in Appendix A**). These structures are all earth-covered magazine structures (ECMs) located within AFP 44 (Buildings 871 through 882). Harris Environmental Architectural Historian, Kate Doak-Keszler, evaluated these twelve structures and completed Arizona Historic Property Inventory forms for each.

Five additional structures are present within the Direct APE, which were not evaluated by Harris Environmental as part of this project. These structures were documented and evaluated by Harris Environmental in 2007 (Twilling et al. 2007). Summaries of these structures are provided at the end of this chapter. Thus, a total of 17 structures have been recorded within the Direct APE (**Figure A-4 in Appendix A)**.

Earth Covered Magazines on AFP 44

A buildings and structures inventory and evaluation of AFP 44 including the 12 ECMs was completed in 1996 by Earth Tech. The 12 ECMs were recommended as ineligible for inclusion in the National Register and the Arizona SHPO concurred. For purposes of this Section 106 coordination, the FAA reviewed the previous determination and is providing a current determination. Documentation about any specific site that is more than five years old must be reviewed and updated, as appropriate.

The ECMs are part of the AFP 44 complex, situated along with production and assembly areas in a bajada near the center of the Tucson Basin. The ECMs consist of 12 buildings Number 871 through 882, constructed in 1955.[8] The structures are situated in two rows facing southwest (**Figures 6-1 and 6-2**). Originally owned by Hughes Missile Systems Company, a subsidiary of Hughes Aircraft Company, AFP 44 was the site of a missile plant built by Phoenix-based Del E. Webb Construction Company in 1951. The U.S. Air Force acquired the complex in 1952, with Hughes retaining the contract to run the plant (Peyton 2014). For storage of explosive materials, ECMs were built on site.

ECMs were the primary type of ammunition storage building constructed during and after World War II. They were originally designed in response to an explosion at Lake Denmark Naval Ammunition Depot in New Jersey in 1926. A fire started by a severe electrical storm spread through the depot and to the nearby Army-owned Picatinny Arsenal. The incident led to new safety regulations for ammunition storage aimed to limit the potential damages from explosions (Kuranda et al 2009).

The 12 ECMs vary in their lengths with headwalls measuring 19 feet high from grade and 85 feet wide. A typical ECM structure is a reinforced concrete barrel arch, designed to direct the force of any explosion up instead of out, preventing a chain reaction in adjacent structures (**Figures 6-4 through 6-7**). The headwall extends approximately two and a

[8] Year of construction of the 12 ECMs provided by USAF.

half feet above the top of the roof, with the wingwalls sloping to the ground, to withstand blast pressures and retain the earth fill covering the structure. Swinging steel doors are centered on the headwall, and the floor and rear blast wall are also reinforced concrete. The entire structure is grounded for lightening protection. A minimum of two feet of earth is required to cover ECMs. Standard ECM dimensions are 25 feet wide internally, and typically come in lengths of 40 feet, four inches, 60 feet, eight inches or 81 feet (Kuranda et al 2009). Those constructed in the 1950s and onward feature double-leaf doors with extended loading docks and ramps to allow for heavy equipment access (Moore 2010).

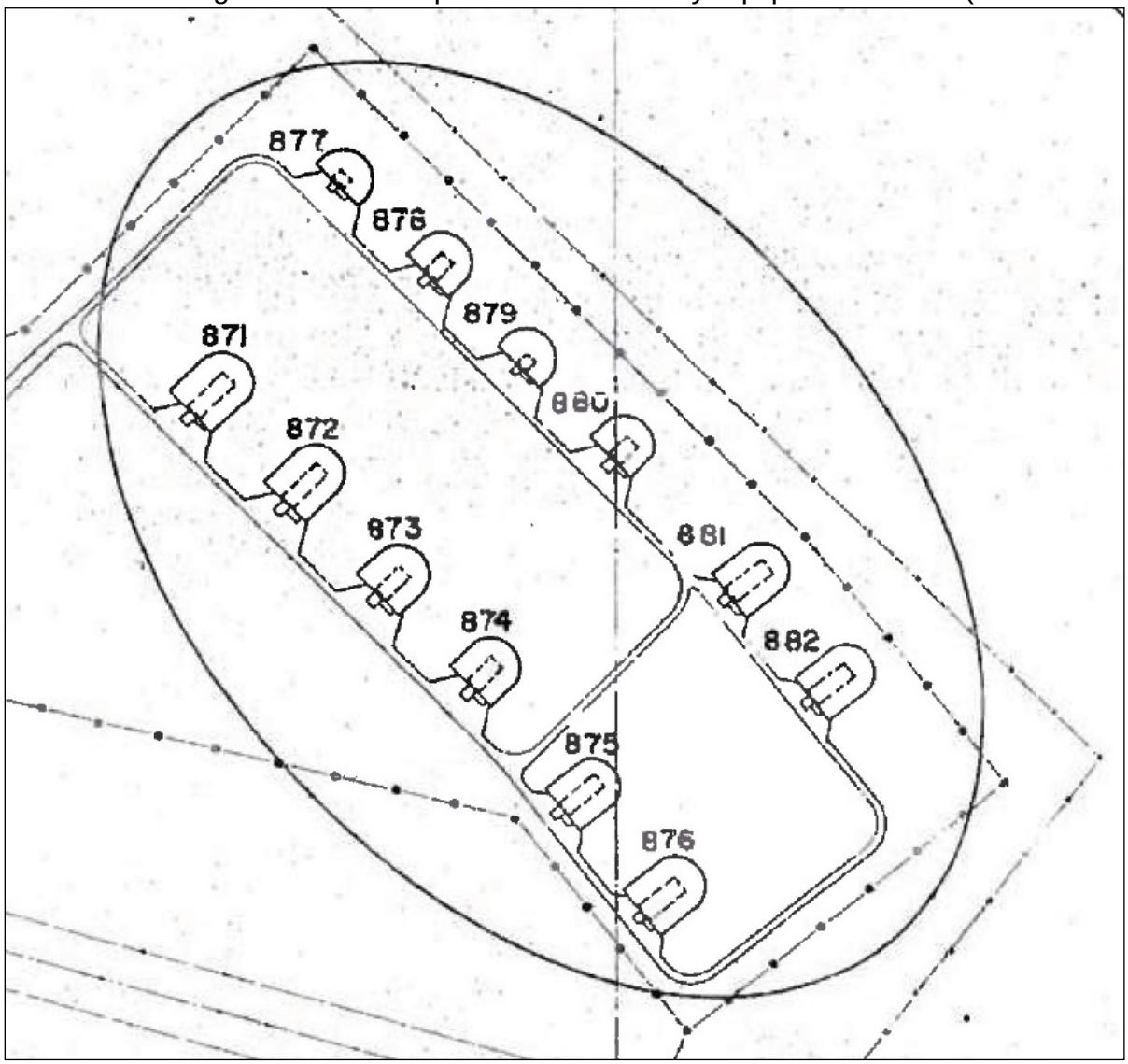

Figure 6-1. Original plans showing the layout and orientation of the 12 ECM structures.

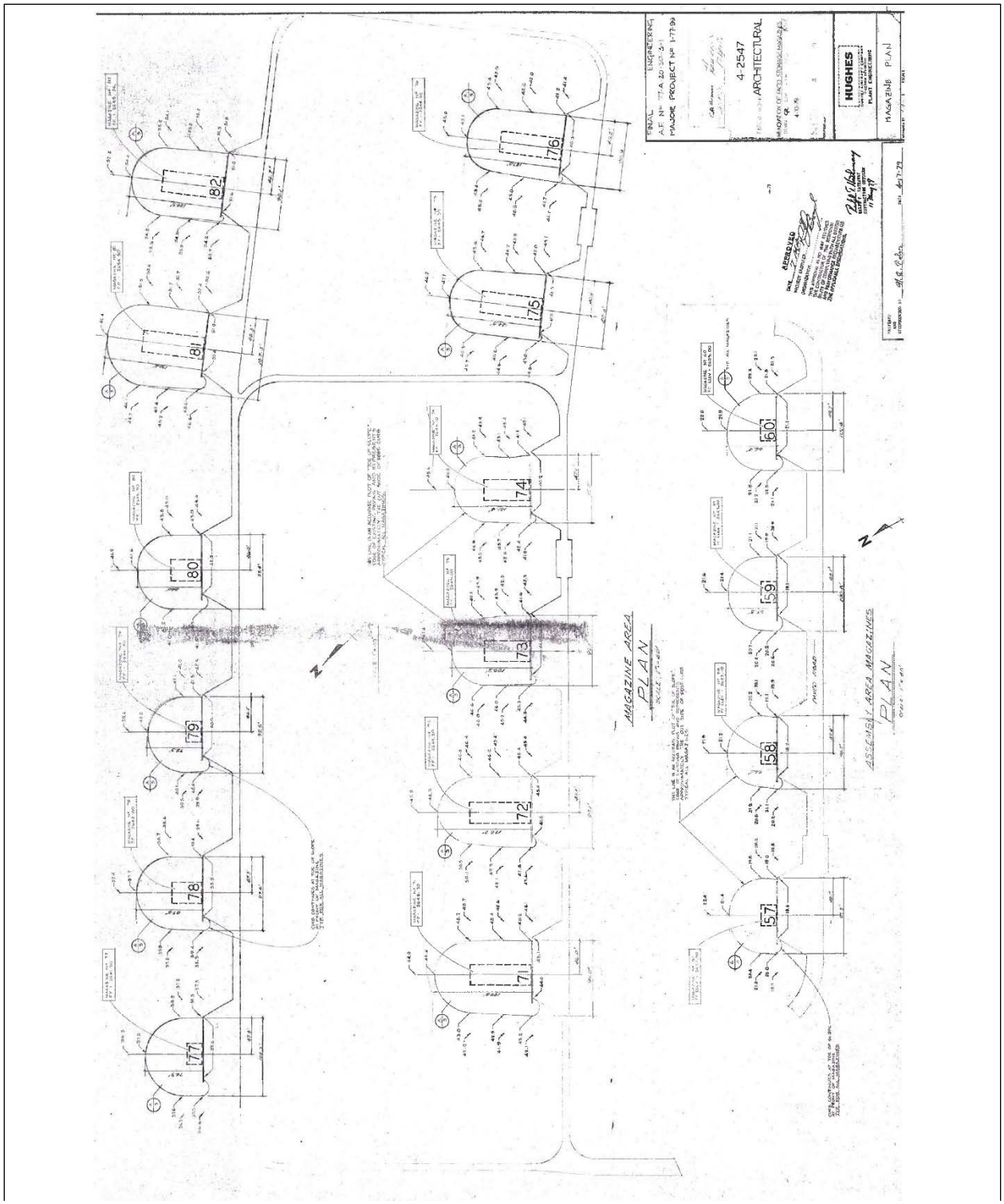

Figure 6-2. Original drawings showing the dimensions and construction of the 12 ECMs.

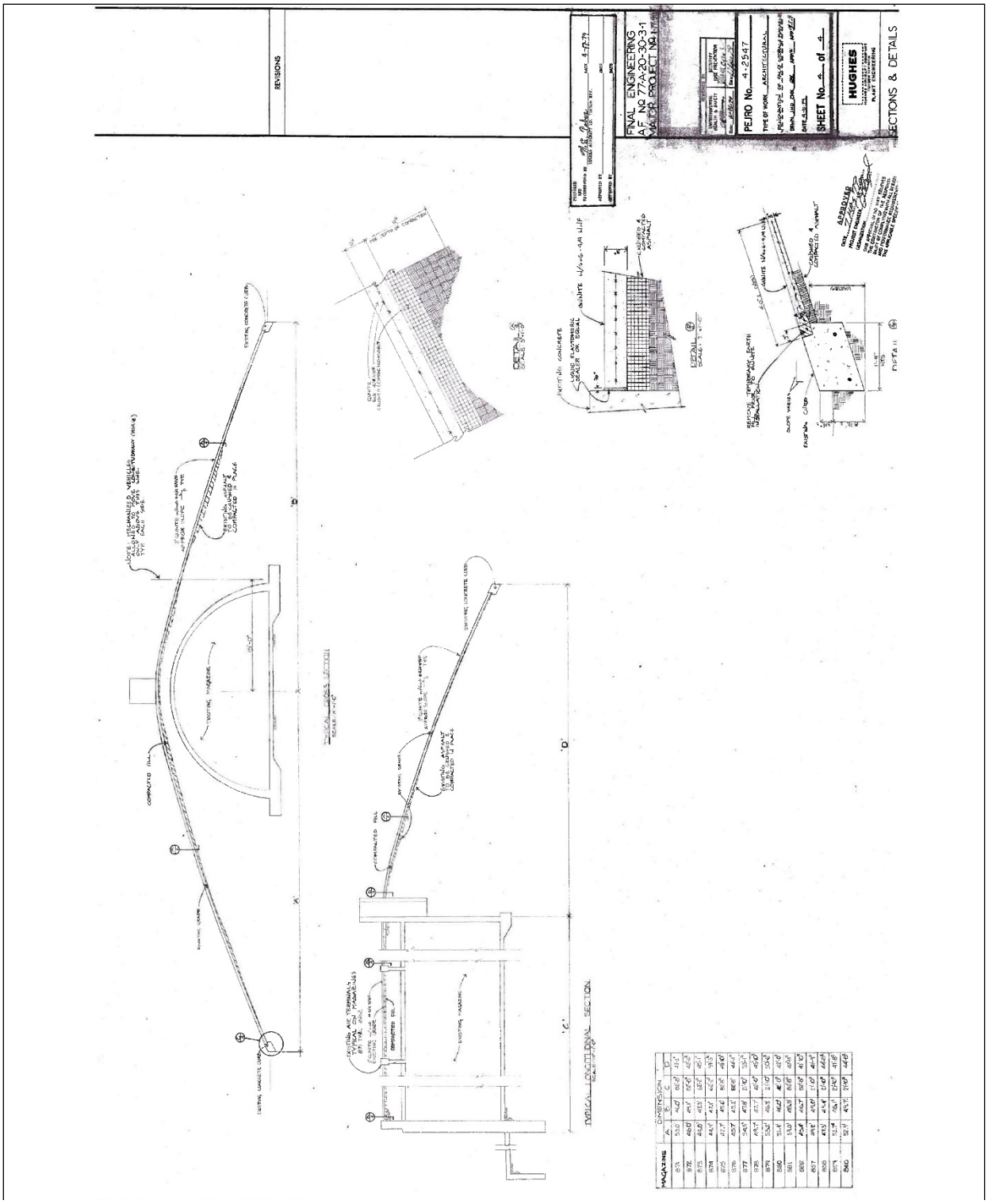

Figure 6-3. Original plans showing the construction of ECMs.

Figure 6-4. ECMs.

Figure 6-5. ECMs.

Figure 6-6. Steel door and reinforced concrete wall of Building 877.

Figure 6-7. Entry and roofline on ECMs.

AFP 44 Building 871

Approaching the ECMs from the southwest, Building 871 is situated first in the first row. The structure is 83 feet deep, and the earth cover extends to a total of 130 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 872

From the southwest, Building 872 is situated second in the first row. The structure is 83 feet deep, and the earth cover extends to a total of 125 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet, has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 873

From the southwest, Building 873 is situated third in the first row. The structure is 62 feet deep, and the earth cover extends to a total of 107 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 874

From the southwest, Building 874 is situated fourth in the first row. The structure is 62 feet deep, and the earth cover extends to a total of 101 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 875

From the southwest, Building 875 is situated fifth in the first row. The structure is 82 feet deep, and the earth cover extends to a total of 123 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete

appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 876

From the southwest, Building 876 is situated sixth in the first row. The structure is 82 feet deep, and the earth cover extends to a total of 127 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 877

From southwest, Building 877 is situated first in the second row. The structure is 22 feet deep, and the earth cover extends to a total of 74 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 878

From southwest, Building 878 is situated second in the second row. The structure is 42 feet deep, and the earth cover extends to a total of 88 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 879

From southwest, Building 879 is situated first in the second row. The structure is 22 feet deep, and the earth cover extends to a total of 72 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 880

From southwest, Building 880 is situated forth in the second row. The structure is 42 feet deep, and the earth cover extends to a total of 84 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 881

From southwest, Building 881 is situated fifth in the second row. The structure is 82 feet deep, and the earth cover extends to a total of 131 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

AFP 44 Building 882

From southwest, Building 882 is situated sixth in the second row. The structure is 82 feet deep, and the earth cover extends to a total of 123 feet. The three-foot-high external loading dock at the front of the structure, originally 13 feet by 20 feet has been extended to 21 feet deep and 22 feet wide. The earth cover has been treated with a layer of spray-applied asphalt soil stabilizer, which is severely deteriorated. The exterior concrete appears in fair condition, no major cracks or spalling but obvious weathering and deterioration of earth cover was observed. The interior was not accessible, and so conditions are unknown.

NRHP Recommendations

While the A Magazine can be seen as part of a broad pattern of ammunition development and storage during the Korean War, the AFP 44 A Magazine ECMs are not associated with a significant event, the product of any master designer or builder, or in any way a distinctive example of this type of utilitarian structure. The FAA's "fresh look" confirms the previous determination made in 1996 that these ECMs are determined ineligible for listing on the NRHP, neither as separate structures, nor as a contributor to a potential historic district.

Previously Evaluated Structures Within the Direct APE (Not Revisited by Harris Environmental)

TUS Structures D-111 and D-101-9/10

Structures D-111 and D-101-9/10 were evaluated by Harris Environmental in 2007 and, at the time, consisted of two adjacent red brick structures with several ramadas (Twilling et al. 2007). An intact ramada was present near the front of structure D-101-9/10. Structure D-111 was a maintenance shop, built in 1944, which covered a total of 2,800 ft^2 (260.1 m^2). Structure D-101-9/10 was an abandoned fire station built in 1953 and covered a total of 2,330 ft^2 (216.5 m^2). Structure D-101-9/10 contained a large cistern, which may have been used to hold water or retardant for the fire station. Two large semi-circular walls were present north of structure D-101-9/10. This structure probably served as a rental car area at one point; the words "*Hertz, return your rental cars to this area"* were faintly written on a wall to the west of the building. Two large cement-lined depressions were present within structure D-111 and a series of cement posts and a concrete pad were to the east. The depressions were rectangular, each measuring approximately 10 ft deep, which were no longer in use. These were in-ground water reservoirs for a fire protection system. Although no evidence remained in 2007, the 1953 and 1960 aerials showed a roof over this area.

A large portion of both of these structures had been dismantled in 2007, and both had undergone periodic structural modifications. Evaluators in 2007 stated that the historic integrity of the structures was significantly affected and the standing portions of both buildings were in poor condition. Structure D-101-9/10 and Structure D-111 were recommended ineligible to the NRHP in 2007, and the SHPO concurred. These structures were not revisited or reevaluated by Harris Environmental in 2017. However, based on modern aerial imagery, structure D-101-9/10 appears to have been demolished.

TUS Structure D-4

Structure D-4 was evaluated by Harris Environmental in 2007 and consisted of an aircraft storage facility oriented east-to-west (Twilling et al. 2007). It formed a "U" shape in connection with two other storage/office structures (Structure D-5 and Structure D-6). This building was in use in 2007 by Velocity Air, which rented the hangars to private entities. These structures were used to house post-WWII Warhawks. Structure D-4 encompassed a total of 18,225 ft^2 (1,693.1 m^2) and was constructed in 1951. The structure was constructed with a wood frame and metal facing. Eight large aircraft bays were present within the structure with rolling metal doors that open to the north. This structure was not considered historically or architecturally significant. This structure was recommended ineligible to the NRHP in 2007, and the SHPO concurred. The structure was not revisited or reevaluated by Harris Environmental in 2017.

TUS Structure D-5

Structure D-5 was evaluated by Harris Environmental in 2007 and consisted of an aircraft storage facility oriented east-to-west (Twilling et al. 2007). Structure D-5 was, at the time, used by Velocity Air which rented the hangars to private entities. According to a Velocity Air employee, these structures were used to house post-WWII Warhawks. The structure

is identical to Structure D-4, but only contains six aircraft bays (which open to the south). The structure encompassed a total of 7,050 ft^2 (654.9 m^2) and was built in 1951. The structure was constructed with a wood frame and metal facing, which is not considered historically or architecturally significant. This structure was recommended ineligible to the NRHP in 2007, and the SHPO concurred. The structure was not revisited or reevaluated by Harris Environmental in 2017.

TUS Structure D-6

Structure D-6 was evaluated by Harris Environmental in 2007 and consisted of office space and an aircraft storage area (Twilling et al. 2007). This structure connected two other hangars (Structure D-4 and Structure D-5). This structure was aligned north to south and had a single storage bay that opened to the east. The structure encompassed a total of 3,290 ft^2 (305.6 m^2) and was constructed in 1951. The structure was, at the time, used as offices for Velocity Air. This structure was wood-framed with sheet-metal sides and roof. The structure was not considered historically or architecturally significant, and was recommended ineligible to the NRHP in 2007. The SHPO concurred. The structure was not revisited or reevaluated by Harris Environmental in 2017.

TUS Structure D-7

Structure D-7 was evaluated by Harris Environmental in 2007 and consisted of an aircraft storage area used by Velocity Air, which rented the hangars to private entities (Twilling et al. 2007). This structure was associated with two other aircraft storage structures and an office space (Structures D-4, D-5, and D-6). The structure was constructed in 1951 and originally encompassed 25,000 ft^2 (2,322.5 m^2). This wooden structure was remodeled, affecting the structure's integrity and potential historic significance. A portion of the original building was truncated post-1960, dividing the original structure into three separate buildings. This structure was recommended ineligible to the NRHP in 2007, and the SHPO concurred. The structure was not revisited or reevaluated by Harris Environmental in 2017.

CHAPTER 7: SUMMARY

Project Overview

The cultural resources recorded during this survey principally date to the WWII and post-WWII era. Many accumulations of historic trash occur within the survey area, which are apparently associated with construction/demolition at the airport, ancillary airport activities, railroad-related camping, and isolated dumping. Prior to the historic period, the surveyed portion of the airport property was likely used opportunistically by prehistoric populations for limited activities, based on the limited tangible evidence. The lead up to WWII in the 1940s, followed by post-war urban growth in Tucson and the onset of the Cold War, initiated intensified land use at TUS. The airport is located geographically in a flat portion of the floodplain on the east side of the Santa Cruz River away from the nearby mountains. It is also located south of the general direction that Tucson's population expanded during the 1950s through 1990s. This made it an ideal location for an expandable facility to serve the transportation and economic needs of a rapidly growing urban community in the Southwest following WWII.

The landscape of the early 1940s Tucson Airport appeared as little more than an aggregate of landing strips and open clearings crossing the desert (**Figure 7-1**). The range of small private, commercial, and military planes using the airport at this time took off and landed in patterns according to prevailing seasonal winds. By 1942 and 1943, with Consolidated Vultee well-established at the airport and their large assembly hangers and auxiliary buildings in place, the adjacent runway landscape was modified to conform to a more systematic and regulated pattern to facilitate approaches and landings (**Figure 7-2**). After WWII, as guidelines and federal regulations directing commercial aviation were adopted, the approach and landing patterns associated with the Tucson Airport were further formalized and improved with concrete- and asphalt-covered taxi strips, concourses, command and control structures, and emergency pull-outs adjacent to the airport's main take-off and approach (**see Figure 7-2**). Finally, by the late 1950s, commercial aircraft and several national aerospace enterprises secured building space surrounding Tucson's active airfield. In 1967, the TAA terminal was constructed, and the current configuration of the airport landscape and support facilities was established.

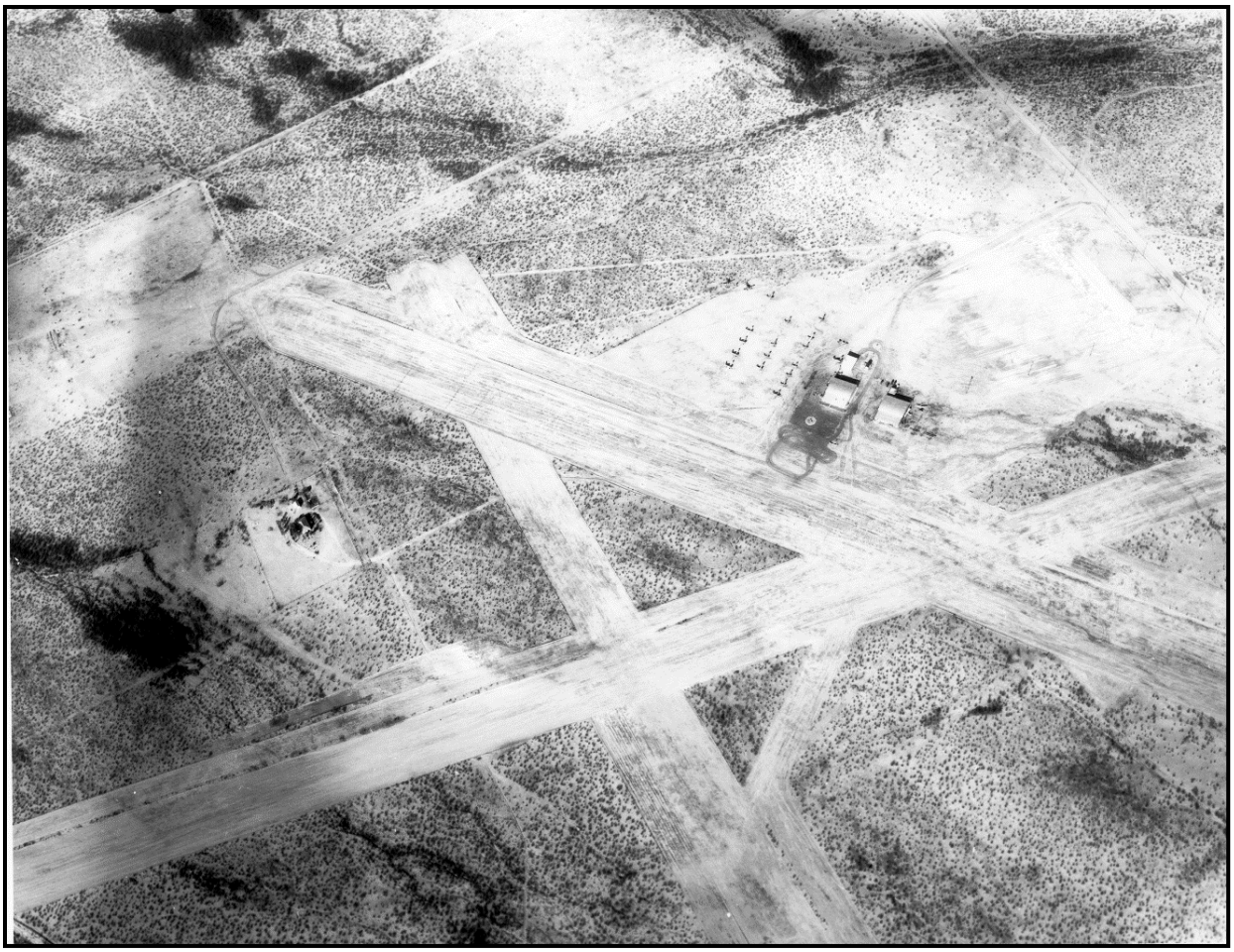

Figure 7-1. Tucson Airport ca. 1940 (photograph #PC177F115-710, on file at Arizona Historical Society).

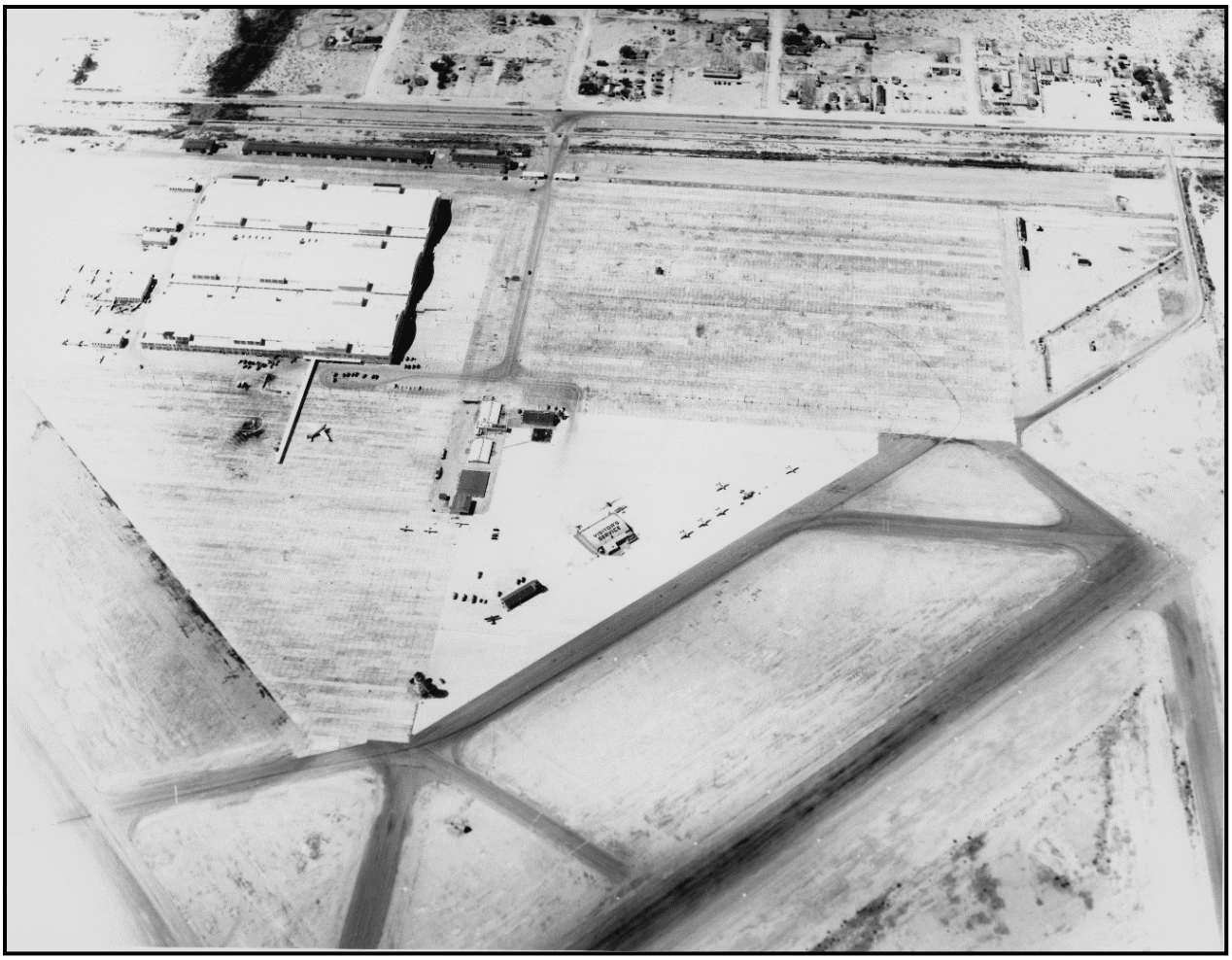

Figure 7-2. Tucson Airport ca. 1943 (photograph #PC177F115-663, on file at Arizona Historical Society).

Summary of Findings

Table 7-1 provides details about the 11 (eleven) archaeological sites visited/revisited as part of this pedestrian survey. **Table 7-2** provides details about the 10 additional sites within the Direct APE, recorded by SWCA in 2013 (Rawson and Hesse 2014), that were not revisited or reevaluated by Harris Environmental as part of this project.

Table 7-3 provides information on the 12 structures on AFP 44 property within the Direct APE that were evaluated by Harris Environmental as part of this project. **Table 7-4** provides information on the five additional structures within the Direct APE, evaluated by Harris Environmental in 2007, which were not revisited or reevaluated by Harris Environmental as part of this project. All known sites and structures within the Direct APE are shown in **Figure A-4 in Appendix A**.

Table 7-1. Summary of Archaeological Sites Identified within the Survey Area

Site Number	Cultural/Temporal Affiliation	Description	NRHP Status
AZ BB:13:773(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile, Rock Features	Determined Ineligible (2007)
AZ BB:13:774(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile	Determined Ineligible (2007)
AZ BB:13:775(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile; Rock Feature	Determined Ineligible (2007)
AZ BB:13:779(ASM)	Historic European-American	Historic Rock Features	Determined Ineligible (2007)
AZ BB:13:836(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile	Recommended Ineligible
AZ BB:13:972(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile	Recommended Ineligible
AZ BB:13:973(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile	Recommended Ineligible
AZ BB:13:974(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile	Recommended Ineligible
AZ BB:13:975(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile	Recommended Ineligible
AZ BB:13:976(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile	Recommended Ineligible
AZ BB:13:977(ASM)	Historic European-American	Historic Debris Scatter/Waste Pile	Recommended Ineligible

Table 7-2. Summary of Archaeological Sites Recorded by SWCA (2013) within the APE

Site Number	Cultural/Temporal Affiliation	Description	NRHP Status
AZ BB:13:449(ASM)	Historic European-American	Historic Debris Scatter	Determined Ineligible (2000)
AZ BB:13:631(ASM)	Prehistoric	Prehistoric Lithic Scatter; Rock Features	Determined Ineligible (2000)
AZ BB:13:632(ASM)	Prehistoric	Prehistoric Lithic Scatter; Rock Feature	Determined Ineligible (2000)
AZ BB:13:633(ASM)	Prehistoric	Prehistoric Lithic Scatter; Rock Features	Determined Ineligible (2000)
AZ BB:13:634(ASM)	Prehistoric Hohokam	Prehistoric Lithic and Ceramic Scatter; Rock Features	Determined Ineligible (2000)
AZ BB:13:635(ASM)	Prehistoric	Prehistoric Lithic Scatter, Rock Features	Determined Ineligible (2000)
AZ BB:13:636(ASM)	Prehistoric	Prehistoric Lithic Scatter; Rock Feature	Determined Ineligible (2000)
AZ BB:13:637(ASM)	Prehistoric	Prehistoric Lithic Scatter; Rock Features	Determined Ineligible (2000)
AZ BB:13:839(ASM)	Prehistoric Hohokam	Prehistoric Lithic Artifact and Ceramic Artifact; Rock Features	Not evaluated
AZ BB:13:851(ASM)	Prehistoric	Prehistoric Lithic Artifact; Rock Features	Not evaluated

Table 7-3. Summary of Structures Recorded by Harris Environmental in 2017

Structure	Description/Function	Year Constructed	Dimensions	Historic Integrity	Architectural Significance	NRHP Status
AFP 44 Building 871	Earth-covered magazine (ECM)-ammunitions storage	1955	83 x 130 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 872	Earth-covered magazine (ECM)-ammunitions storage	1955	83 x 125 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 873	Earth-covered magazine (ECM)-ammunitions storage	1955	62 x 107 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 874	Earth-covered magazine (ECM)-ammunitions storage	1955	62 x 101 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 875	Earth-covered magazine (ECM)-ammunitions storage	1955	82 x 123 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 876	Earth-covered magazine (ECM)-ammunitions storage	1955	82 x 127 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 877	Earth-covered magazine (ECM)-ammunitions storage	1955	22 x 74 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 878	Earth-covered magazine (ECM)-ammunitions storage	1955	42 x 88 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 879	Earth-covered magazine (ECM)-ammunitions storage	1955	22 x 72 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 880	Earth-covered magazine (ECM)-ammunitions storage	1955	42 x 84 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 881	Earth-covered magazine (ECM)-ammunitions storage	1955	82 x 131 ft.	Poor	Low	Determined Ineligible (1996)
AFP 44 Building 882	Earth-covered magazine (ECM)-ammunitions storage	1955	82 x 123 ft.	Poor	Low	Determined Ineligible (1996)

Table 7-4. Summary of Structures Recorded by Harris Environmental in 2007

Structure	Description/Function	Year Constructed	Dimensions	Historic Integrity	Architectural Significance	NRHP Status
TUS Structures D-111 and D-101-9/10	Maintenance Shop/Old Fire Station and Car Rental	1944/1953	2,800 sq ft and 2,330 sq ft	Poor	Low	Determined Ineligible (2007)
TUS Structure D-4	Metal aircraft storage structure	1951	18,225 sq ft	Poor	Low	Determined Ineligible (2007)
TUS Structure D-5	Metal aircraft storage structure	1951	7,050 sq ft	Poor	Low	Determined Ineligible (2007)
TUS Structure D-6	Metal aircraft storage structure	1951	3,290 sq ft	Poor	Low	Determined Ineligible (2007)
TUS Structure D-7	Wood Hangar	1951	25,000 sq ft	Poor	Low	Determined Ineligible (2007)

Recommendations

21 archaeological sites and 17 structures have been identified within the Direct APE. The 11 sites, 12 structures, and 11 IOs recorded by Harris Environmental as part of this project area all recommended not eligible for listing in the NRHP. Of the remaining 10 sites within the Direct APE that were not evaluated by Harris Environmental as part of this project, eight have been previously determined not eligible for listing in the NRHP. Two of these sites have not been evaluated. The five remaining structures within the Direct APE that were not evaluated by Harris Environmental as part of this project were previously determined not eligible for listing in the NRHP.

No further work is recommended for the 19 archaeological sites and 17 structures that are recommended not eligible for listing in the NRHP or that were previously determined ineligible. Harris Environmental recommends that the two unevaluated archaeological sites (AZ BB:13:839[ASM] and AZ BB:13:851[ASM]) be avoided by the project, until such time as they can be evaluated. Due to the location of the ECMs, these sites are not anticipated to be near ground disturbance from construction of the proposed MSA.

If project activities avoid the two unevaluated archaeological sites, Harris Environmental recommends a ***No Historic Properties Affected*** finding. Although this report provides an overview of previous studies and previously recorded resources within the full Direct APE, Harris Environmental is not responsible for the results or findings of any previous study. For information on the results of archaeological survey projects completed on the portions of the Direct APE previously conducted, please refer to those reports.

Unanticipated Discovery Plan

If previously undocumented buried cultural resources are identified during ground-disturbing activities, all work in the immediate vicinity of the discovery should stop until the find can be confirmed by a professional archaeologist and evaluated for its significance. If human remains and/or funerary items are found on TAA property, Arizona Revised Statutes (ARS) 41-865 and ARS 41-844 require that the Arizona State Museum be notified of the discovery, so that cultural groups who claim cultural or religious affinity to them can make appropriate arrangements for the repatriation and reburial of the remains.

If human remains, funerary items, sacred objects, or objects of cultural patrimony are found on USAF lands, the appropriate USAF official should be notified of the discovery in order to follow guidelines pursuant to the Native American Graves Protection and Repatriation Act (43 CFR § 10.4) and the "Unanticipated Discoveries Plan for Archaeological Resources at AFP 44, Pima County, Arizona".[9]

[9] Sterner, Matthew. Unanticipated Discoveries Plan for Archaeological Resources at Air Force Plant 44, Pima County, Arizona. Statistical Research, Inc., Tucson, 2005.

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2016-0641 (141277)

U.S Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Office of Airports

Federal Aviation Administration
15000 Aviation Blvd. Room 3012
Lawndale, CA 90261

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ARIZONA STATE HISTORIC
PRESERVATION OFFICE

February 12, 2018

Ms. Kathryn Leonard
Arizona State Historic Preservation Officer
Arizona State Parks
1100 W. Washington Street
Phoenix, Arizona 85007

Attention: Mr. David Jacobs

Dear Ms. Leonard:

Proposed Airfield Safety Enhancement Project
Tucson International Airport
Tucson, Pima County, Arizona
Section 106 Coordination
SHPO Coordination Number: 2016-0641 (137396)

The Federal Aviation Administration (FAA), as lead federal agency, along with the United States Air Force (USAF), and National Guard Bureau (NGB), as cooperating agencies, are preparing an Environmental Impact Statement (EIS) for the Tucson Airport Authority's (TAA) proposed Airfield Safety Enhancement Project and associated land transactions at Tucson International Airport (TUS). The EIS is being prepared under the National Environmental Policy Act (NEPA) of 1969, as amended. TUS is located in the City of Tucson and is owned and operated by the TAA.

The USAF owns land, immediately west of TUS, known as Air Force Plant 44 (AFP-44). The USAF leases AFP-44 to Raytheon Missile Systems, which operates AFP-44 for the manufacture of various explosives and munitions. The USAF's purpose and need in this process is to maintain the operational capabilities and capacities of AFP-44. Under the Proposed Undertaking, Earth Covered Magazines (ECMs) located on AFP 44 would have to be demolished to protect airport safety areas. An ECM is a specific structure that is used to store explosives. Land identified as Parcel "F" would be transferred from AFP 44 to TAA in order include the appropriate runway dimensional safety areas on airport property. This would require demolition of the ECMs on Parcel "F." TAA would also transfer a parcel of airport land identified as Parcels "G" and Parcel "H" ultimately to the USAF for AFP 44. These parcels would incorporate the various USAF safety arcs onto USAF property. Incorporation of USAF safety arcs onto USAF property would help to ensure continued operational capabilities of AFP 44 while accommodating the proposed safety enhancement project at TUS. Therefore, the USAF's purpose of the Proposed Action is to maintain AFP-44 operational capabilities while removing 6 ECMs from Parcel "F" and 6 ECMs directly adjacent to Parcel "F".

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The NGB's purpose and need is to maintain NGB safety standards and operational capabilities at the Tucson Air National Guard Base. More specifically, NGB needs to meet required separation distances for its Munitions Storage Area (MSA). The existing MSA at the Tucson Air National Guard Base, at the north end of TUS, does not meet the USAF separation distances required for explosive operations and exposes non-munitions personnel to explosive hazards. Relocating the MSA to Parcel H would accommodate the required Quantity-Distance (QD) clear zone arcs that are required in accordance with United States Air Force Manual 91-201, *Explosive Safety Standards*.

The purpose of the proposed undertaking is to enhance the overall safety of aircraft operations at the airport and includes the following components:

Construction of a Full Length Parallel Runway 11R/29L that is 10,996 feet long by 150 feet wide about 800 feet from the centerline of Runway 11L/29R; Construction of a new Centerline Parallel Taxiway between the two runways; Construction of a New Outboard Parallel Taxiway; Displace the Runway 11L Arrivals Threshold; Construction of connector and bypass taxiways; Close Taxiway A2; Construct/maintain the Arizona Air National Guard Extended Blast Pads for Runways 11L/29R and 11R/29L; Installation of associated drainage improvements; Transfer of about 58 acres from USAF Plant 44 (AFP-44) to the TAA (Parcel F), and about 150 acres of TAA Land to USAF AFP-44 and convey ultimately up to 291 acres from TAA land to the USAF (Parcel H); Demolition of 12 Earth Covered Magazines on AFP-44; Construct replacement earth covered magazines elsewhere on AFP-44; and Construction of a Munitions Storage Area for the Arizona Air National Guard on Parcel H.

The Federal action requiring compliance with NEPA is approval of the TAA's Airport Layout Plan depicting the proposed undertaking, approval of further processing of an application for federal financial assistance to pay for the proposed undertaking and release of federal obligations for certain lands TAA would like to dispose of. Federal funding for the proposed undertaking would come from the Airport Improvement Program.

1. Background and Area of Potential Effects

TUS is a commercial service airport owned by the TAA. The airport accommodates scheduled air carrier services as well as general aviation aircraft activity. TUS also accommodates flight operations of F-16 Fighting Falcon aircraft from the Arizona Air National Guard from the Tucson Air National Guard Base.

The bulk of the ground disturbing activity of the proposed undertaking would occur on existing Airport property. Ground disturbing activities would occur on AFP-44 for demolition and replacement of ECMs as described above. The other area for ground disturbing activities would occur on the eastern portion of Parcel H for the NGB's proposed MSA.

On June 6, 2017, FAA provided your office with its designation of a Direct Area of Potential Effects (APE) – for physical disturbance from the proposed undertaking. The Direct APE includes and any areas that would be used for staging equipment and supplies during construction. FAA also designated an Indirect APE for airport noise for the

proposed undertaking. Your office concurred with FAA's designation of both the Direct and Indirect APE. We have enclosed a copy of our letter dated June 6, 2017 with the SHPO's signed and dated concurrence for your use.

2. Native American Consultation.

FAA contacted the following Native American Tribes concerning this proposed undertaking: Gila River Indian Community, Hopi Tribe of Arizona, Pascua Yaqui Tribe of Arizona, Tohono O'odham Nation, San Xavier District of the Tohono O'dham Nation, and Yavapai-Apache Nation of Camp Verde Indian Reservation. FAA received one reply from the Hopi Tribe requesting continued consultation if the Proposed Undertaking has the potential to adversely affect prehistoric sites. FAA did not receive any other comments from the Tribes.

In the event any archaeological resources be discovered during construction, an unanticipated discovery plan will be implemented. In the event a find is made within the Direct APE, work within 50 feet of the find will be temporarily suspended until a qualified archaeologist can assess the find consistent with 36 CFR § 800.13.

3. National Register Eligibility Determinations.

Harris Environmental Group, Inc., prepared the enclosed a Class III Cultural Resources Investigation, dated 8 February 2018, in support of FAA's determinations and findings of effect. The Class III Cultural Resources Investigation states a total of 21 known archaeological sites, and 17 known structures are within the Direct Effects Area of Potential Effects (APE) shown on Figure 1-2. Two sites located in Parcel H: Size AZ BB 13:839(ASM) and AZ BB: 13:851(ASM) were not evaluated. However, both sites can be avoided by construction of the NGB's proposed Munitions Storage Area. Based on the information in the Class III Cultural Resources Investigation, FAA has determined the there are no historic properties listed or eligible for inclusion into the National Register of Historic Places (NRHP) within the Direct APE. FAA has also determined the existing wood frame Triple Hangar building, located in the Indirect APE remains eligible for listing on the NRHP under Criterion A (*Association with Events that have made significant contribution to the broad patterns of our history*) and Criterion C (*That embody the distinctive characteristics of a type, period, or method of construction*)[1]. FAA makes these determinations also on behalf of both the USAF for the proposed work on AFP-44 and the NGB for the proposed work on Parcel H.

FAA seeks the Arizona SHPO's concurrence with this determination of eligibility.

4. Assessment of Adverse Effects on Historic Properties.

While the Triple Hangar building is eligible for inclusion into the NRHP under Criterion C, the proposed Airfield Safety Enhancement Work would occur east of the structure near the runways. Based on the information contained the Class III Cultural Resource Investigation, FAA makes the following finding: **No historic properties affected** by the proposed undertaking within the Direct APE. The proposed undertaking would not

[1] 36 CFR § 60.4

directly affect the Triple Hangar building. The Triple Hangar is exposed to noise from existing aircraft operations, consistent with a structure located at an airport. Therefore, FAA also makes a **No Adverse Effect** finding by the proposed undertaking on the Triple Hangars within the Indirect APE. FAA makes these findings also on behalf of both the USAF for the proposed work on AFP-44 and the NGB for the proposed work on Parcel H.

FAA seeks the SHPO's concurrence with these findings.

FAA asks the SHPO to review the information provided in this letter, and the enclosures. If you agree with the FAA's eligibility determination and finding of project effect, please indicate your concurrence by signing and dating in the space indicated below and returning the letter to this office at the address above.

If you have any further questions about this matter, please call me at 310/725-3615.

Sincerely,

David B. Kessler, AICP
Regional Environmental Protection Specialist

Enclosures:
Enclosure 1 – June 6, 2017 Area of Potential Effect Letter from FAA to Arizona SHPO.
Enclosure 2 – A *Class III Cultural Resources Investigation for Proposed Airfield Safety Enhancement Project, Tucson International Airport, Pima County, Arizona*, dated 8 February 2018

Cc:PHX-600; USAF, NGB

I concur with FAA's NRHP eligibility determinations and findings of effect by the proposed undertaking as described above.

Arizona SHPO 15 FEB 18 **Date**