

**MFA Hangar 3 Demolition
Section 106 Technical Report**

SHPO# NASA_2019_1216_001

Moffett Federal Airfield,
Santa Clara County, California



Prepared for:
NASA Ames Research Center
Historic Preservation Office

Prepared by:

Stantec Consulting Services,
Inc.

April 29, 2020

Sign-off Sheet

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Abbreviations

ACHP	Advisory Council on Historic Preservation
ADI	Area of Direct Impacts
APE	Area of Potential Effects
APN	Assessor Parcel Number
ARC	Ames Research Center
ARS	Archaeological Resources Study
CAANG	California Air National Guard
CFR	Code of Federal Regulations
CRM	Cultural Resource Manager
DPR	California Department of Parks & Recreation
FAA	Federal Aviation Administration
HPSR	Historic Property Survey Report
ICRMP	Integrated Cultural Resources Management Plan
LTA	Lighter-than-air
LMSD	Lockheed Missile & Space Division
MFA	Moffett Federal Airfield

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NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NASA ARC	NASA Ames Research Center
NATS	Naval Air Transport Services
NAHC	Native American Heritage Commission
NHPA	National Historic Preservation Act of 1966
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
PV	Planetary Ventures, LLC
SOI Qualifications	Secretary of the Interior's Professional Qualifications Standards
SHPO	California State Historic Preservation Officer



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Introduction

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1.0 Introduction

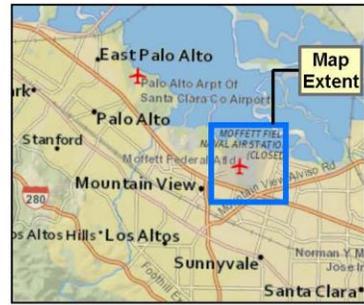
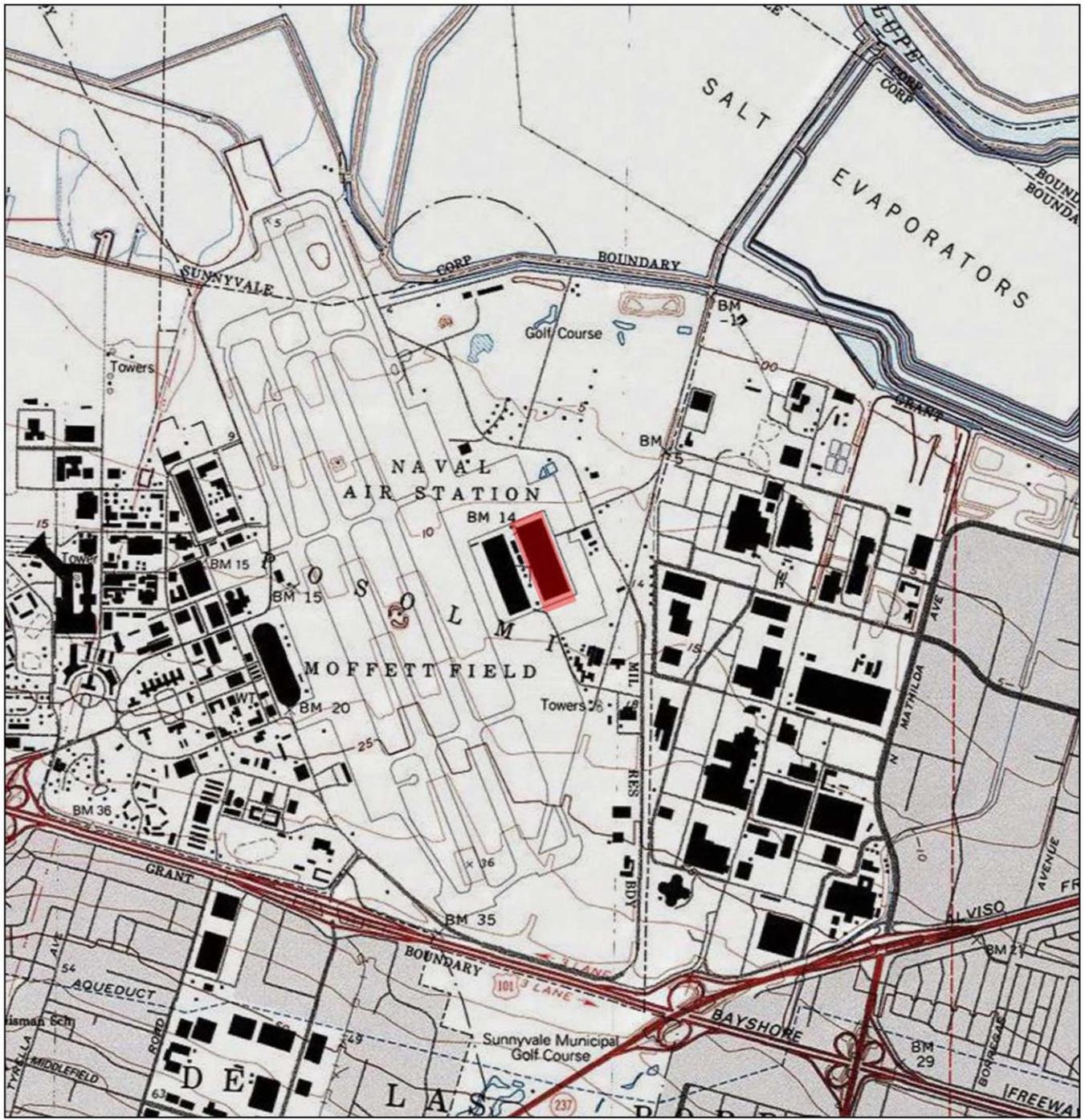
Stantec Consulting Services, Inc. (Stantec) has prepared this technical report on behalf of Planetary Ventures, LLC (PV), which has entered into an Adaptive Reuse Lease with the National Aeronautics and Space Administration (NASA) for the Ames Research Center (ARC) Eastside/ Airfield area at Moffett Federal Airfield (MFA). As the lead federal agency, NASA is responsible for compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), which requires federal agencies to assess effects of undertakings on historic properties. Included in the leasehold is Hangar 3, a large, wood-frame, former dirigible hangar constructed during World War II (**Figure 1**). Hangar 3 is currently unoccupied and supported by a system of large pipe shores, steel exoskeletons, and hydraulic jacks installed during a repair program initiated in 2015 to stabilize the structure and provide asset protection. However, the conducted repair work was unable to alleviate damage and structural deterioration, and the installed shoring system is only intended to provide short-term stabilization (approximately two to three years). Due to its advanced deterioration, PV is proposing to methodically demolish Hangar 3. All work associated with the proposed Hangar 3 Demolition project will be referred to as the “Undertaking.”

This technical report addresses the requirements of Section 106 of the NHPA, per 36 CFR Section 800, to assess the potential of adverse effects on historic properties. It includes a description of the Undertaking, a description of the Area of Potential Effects (APE), the identification of all historic properties within the APE, and an assessment of adverse effects based upon the Criteria of Adverse Effects (36 CFR Section 800.5).

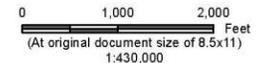
This technical report was prepared by architectural historian Daniel Herrick, MHC, and archaeologist Gilbert Browning, MA RPA, with review by senior architectural historian Garret Root, MA. Mr. Herrick and Root meet the Secretary of the Interior’s Professional Qualification Standards for architectural history and history, and Mr. Browning meets the qualifications for archaeology.



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Project Location



Project Location Prepared by DL on 2020-03-03
Moffett Field, Santa Clara County TR by JC on 2020-03-03
IR Review by DH on 2020-03-03

Client/Project 181710453

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Figure No.
1

Title
Project Location Map

- Notes**
1. Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
 2. Data Sources: Stantec 2019.
 3. Background: Copyright © 2013 National Geographic Society, i-cubed National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

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Background

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2.0 Background

In 1931, the US Navy selected the current site of MFA to construct Naval Air Station (NAS) Sunnyvale as a dedicated west coast center for the Navy's dirigible rigid airship program.¹ The airfield campus featured a series of Spanish Colonial Revival style military buildings centered around the monumental Hangar 1. The large steel-frame structure was composed in the Streamline Moderne style and designed to house the USS *Macon*, which operated at the base until it crashed into the Pacific Ocean in 1935. Following the loss of the USS *Macon*, the Navy transferred the airfield to the US Army Air Corps, which operated the property as an observation and training facility in the years leading up to World War II. The Army transitioned the use from dirigible to fixed wing aircraft. Upon US entrance to World War II in 1941, the Navy reassumed control of the airfield renaming it Moffett Field after the Rear-Admiral William Moffett. The renamed airfield became the center for the new Lighter-than-air (LTA) coastal defense program.

In 1942, construction began on two new dirigible hangars, Hangars 2 and 3. The nearly identical structures utilized a standardized design used at a number of bases including NAS Santa Ana, California and NAS Tillamook, Oregon. Both hangars are large timber framed structures that are over 1,100' long, 375' wide, and 170' tall. They are defined by a large parabolic roof clad with exterior corrugated aluminum panels that enclose the main hangar volume, which is supported by 51 regularly spaced Douglas Fir wood arched trusses. The trusses are set on concrete bents located along the east and west elevations, which contain the two-story peripheral shed structures that housed office and operations spaces in the hangar. At the north and south elevations are the large multi-panel sliding doors, which roll on a metal track system and are supported by a large wood box beam on concrete towers. A clamshell aluminum standing seam roof with wood sheathing connects the main hangar structure to the box beam at both the north and south elevations. Unlike Hangar 1 and its steel construction, Hangars 2 and 3 were constructed of wood as steel was used by other wartime efforts. Construction of Hangar 2 began first, followed quickly by Hangar 3 (**Figure 2**). While Hangar 2 was constructed on an impressive schedule of 372 days, Hangar 3 was constructed in just 208 days. Because of this expedited construction for Hangar 3, it is not as well constructed as Hangar 2.²

¹ The following section was derived from AECOM, *Historic Property Survey Report for the Airfield at NASA Ames Research Center, Moffett Field, California*, prepared for NASA Ames Research Center (November 2013). Any additional sources will be cited accordingly.

² Page & Turnbull, "Hangar 3 Re-use Guidelines" (2006), 30.



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Figure 2: Ca.1943 aerial photograph showing Hangar 2 (left) and Hangar 3 (right) under construction. Source: Moffett Field Historical Society.

By the end of World War II in 1945, the LTA program was rendered obsolete, and MFA's mission returned to use of fixed wing aircraft. In 1947, the Naval Air Transport Service (NATS) utilized Hangar 3 for housing and maintenance of aircraft (**Figure 3**). With the outbreak of the Korean War, MFA supported several jet aircraft squadrons, which continued to operate at the airfield until 1961.

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Figure 3: 1947 Aerial Photograph of MFA, looking southeast with Hangars 2 and 3 in the background. Source: Moffett Field Historical Society.

In 1963, MFA became the command center, administration, and training facility for Pacific anti-submarine operations resulting in stationing of several squadrons of Orion P-3 Anti-submarine aircraft. Hangar 2 and 3 housed the Orion P-3 aircraft and supported this mission until 1994, when MFA was decommissioned by the Navy and transferred to NASA ARC, which had been operating nearby and sharing the airfield since the 1940s. The California Air National Guard (CAANG) partially occupied Hangar 3 through the 1990s, although the building remained largely vacant and under-utilized.

In 1988, both Hangar 2 and Hangar 3 were determined individually eligible for listing on the National Register of Historic Places (NRHP) for significance associated with events during World War II, and for their overall engineering and design. In 1994, both hangars



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were listed on the NRHP as a contributor the NAS Sunnyvale Historic District as excellent examples of military engineering and design during World War II.

2.1 Repairs & Existing Conditions

Exploration of potential reuse for Hangar 3 began in 2006, resulting in preparation of documents related to existing conditions, reuse opportunities, and rehabilitation. At the time, an assessment of the structural system determined that Hangar 3 did not meet life-safety performance requirements and noted that major structural damage may occur in the event of a seismic event. It was recommended that full seismic testing should be conducted to further assess the structural deficiencies of the building. However, according to an in-depth structural analysis report, prepared by KPFF Consulting Engineers in August 2013, it does not appear that any additional study was conducted over those years (see **Appendix A.1** the 2013 Due Diligence Report).³ The 2013 KPFF report noted that Hangar 3 exhibited very poor truss system conditions, especially in comparison to Hangar 2. This included observable cracks in the wood members, as well as distortion and displacement throughout the main chords; recommendations to document, investigate, and repair 68 members of the truss system were made in support of rehabilitating of Hangar 3.⁴

In May 2015, NASA initiated Section 106 Consultation for the Hangars 2 and 3 Core and Shell Rehabilitation Project, which proposed a finding of no adverse effect to the structure. In a letter dated August 27, 2015, the California State Historic Preservation Officer (SHPO) concurred with the finding that the proposed work, including structural repairs, would not result in an adverse effect to either structure (SHPO #: NASA_2015_0605_001). However, since submittal of the Section 106 materials and subsequent concurrence on the finding of no adverse effect, the quickly degrading structural conditions at Hangar 3 have greatly changed the scope of work proposed for the structure.

By June 2015, worsening structural conditions were observed by structural engineers, including truss deflection, increased cracking, and a partial collapse of select trusses underneath the monitor roof. An immediate structural analysis was conducted by PV's structural engineer, KPFF, and a series of stabilization repairs were started in August 2015, followed by additional emergency repairs that begun in February 2016.⁵ In May 2016, KPFF prepared an additional conditions assessment and emergency repair document in response to the degrading structure (see **Appendix A.2** for the 2016 Emergency Truss repair Narrative).⁶ Additional structural investigations discovered new damage was spreading throughout the chords and was not previously observed or

³ KPFF, "Building 46 (Hangar 2) and Building 47 (Hangar 3) Due Diligence Phase 1 report," August 9, 2013.

⁴ KPFF, "Damage Progression Timeline - DRAFT " July 6, 2017.

⁵ Repair timeline confirmed during a telephone call between PV and the repairs contractor on March 31, 2020.

⁶ KPFF, "Hangar 3 Emergency Truss Repairs Narrative," May 26, 2016.

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reported during due-diligence exercises.⁷ Furthermore, the document outlines an opinion regarding the structural condition, which states that “based on the progressing downward movement of the trusses observed in Hangar 3, there is a threat of partial collapse of the upper portions of the roof which may lead to progressive collapse of other portions of the truss.”⁸ In response, an emergency truss repair program was developed to stabilize the degrading condition of the structure, and outlined in the document.



Photograph 1: East elevation of Hangar 3, looking southwest. Note the dip in the roofline at center, indicating the partial roof failure.

The Emergency repair measures performed, starting in February 2016, include the following:

- Installation of temporary steel pipe shoring system within the interior volume of Hangar 3. Two sets of 36” pipe shores were installed from trusses 9 to 26, totaling 24 shores. These were anchored into the existing Hangar 3 concrete decking and

⁷ Repair timeline confirmed during a telephone call between PV and the repairs contractor on March 31, 2020.

⁸ KPFF, “Hangar 3 Emergency Truss Repairs Narrative,” May 26, 2016.



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attached to truss members.

- Installation of 17 steel exoskeletons (in between each truss from 9.5 to 25.5). The roof is currently supported by the steel exoskeletons, which are connected to the damaged trusses and jacking system.
- Portions of the trusses were repaired, both in the areas of the exoskeleton and in less severely damaged areas. Some timber members that were deteriorated beyond repair were unable to be completely removed due to accessibility and safety concerns, and were ultimately repaired in place.
- Repairs in place included: upper and lower timber chord members, vertical and diagonal web members, battens, and attachment hardware, including but not limited to shear plates, split rings, and bolts. New battens were added over the damaged areas, particularly in the main area of damage spanning between trusses 9 to 26.
- Some original Douglas Fir members were replaced in kind, while some new Douglas Fir members were bolted to the existing to support further degradation of the damaged members. Other members were temporarily affixed with glulam (composite glue-laminated wood) instead of to Douglas Fir.
- The box beam structure south end, which was deflecting, was re-leveled and the south hangar doors were made manually operational. Areas of wood roof sheathing at the south end of the hangar above the box beam were modified as necessary following the releveling process.⁹

Following the execution of these repairs, structural engineers continued to observe the conditions of the hangar. To allow this observation work to continue, a large, movable observation access tower and deck was installed at the area between trusses 9 to 26, where the critical area of damage was observed and where the pipe shoring system had been installed (**Photograph 2**). Further observation revealed that following the emergency repairs, damage continued to progress through the structural system to previously undamaged areas (see **Appendix A.3** for the 2017 Damage Progression Timeline). Through early 2017, major damage and cracking was observed at chords, and 50 additional truss members were exhibiting severe damage.¹⁰ Subsequent assessment of the of the structure by PV's structural engineer KPFF determined that varying levels of damage to the structural system exist beyond the truss repairs, and that the broader structural system has existed well beyond its service life.¹¹

⁹ Repairs confirmed during a telephone call between PV and the repairs contractor on March 31, 2020.

¹⁰ KPFF, "Damage Progression Timeline - DRAFT " July 6, 2017.

¹¹ KPFF, "Moffett Federal Airfield Hangar 3 – Mountain View, California, Structural Site Observation," August 21, 2019.

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In May 2017, the structure was deemed unsafe and unoccupiable, and NASA and CAANG were notified and asked to vacate Hangar 3. Currently, the structure is only accessible by select construction personnel. The extensive level of repairs required to stabilize Hangar 3 would involve a vast and cost prohibitive repair program K based upon the progression damage throughout the structure, would not guarantee structural stability if executed. The structural engineers also noted that in its current unrepaired state, Hangar 3 is far more vulnerable to sustaining further damage and partial collapse from seismic or high wind load events. According to an August 2019 site observation memorandum provided by KPFF, the hangar in its current state, is unoccupiable and uninsurable, and the level of work required to bring the structure to a limited occupiable use is “*extensive and undefinable, and further, the necessary work would be cost-prohibitive and is therefore not salvageable.*” (see **Appendix A.4** for the August 2019 memorandum)¹²

¹² Ibid.



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Description of the Undertaking
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Photograph 2: Interior volume Hangar 3 showing the hydraulic jack system which runs the length of the main structure and the repair scaffolding deck at center.

3.0 Description of the Undertaking

The Undertaking will involve the systematic, controlled demolition of Hangar 3. Prior to demolition activities, the site and structure will be inspected for hazardous materials. Any materials containing asbestos or other hazardous compounds will be removed and disposed of in an appropriate manner. Additionally, active utility infrastructure connected to Hangar 3 will be identified and disconnected. Existing transformers and above grade electrical would be disconnected and demolished in no other loads are fed downstream. All underground NASA communication infrastructure and vaults would be protected during demolition. All existing service connections would be capped. Above ground water lines serving Hangar 3 would be drained, terminated, and capped at the

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connection to the service line. Disconnecting utilities will occur at-grade and will not involve below grade activities.

Per Federal Aviation Administration (FAA) requirements, pre-demolition activities may also include installation of temporary airspace obstruction lights, used to alert aircraft of obstacles and to avoid penetrations to airspace, until new obstruction lights are installed on Hangar 2. These lights will likely be installed along the monitor roof of Hangar 2 and attached along the existing guard rail. The obstruction lights will utilize existing electrical feeds, which extend to Building 55. The temporary obstruction lights would also require replacing the existing electrical panel in Building 55 (located approximately 50' from the west elevation of Hangar 3). The new panel would be installed within the main interior volume and will reuse existing conduits. Also, at Building 55, the exterior envelope may be temporarily covered by plywood to protect the building from damage that could result from demolition activities. If required, the plywood protection be installed around the perimeter of the building, extending up along the east, north, and south elevations. Protection would likely be installed away from the building envelope and anchored into the surrounding concrete surface. If plywood is to be connected to the building, connection points would be minimized in size and limited to specific locations to reduce the disturbance to the envelope. Any connection points would be repaired to match the existing conditions following the removal of the plywood protection.

Demolition of Hangar 3 will involve systematic removal of materials, starting with the massive hangar doors located at the north and south facades, which will be carefully dismantled and lowered into the immediate vicinity of the subject elevation. After, demolition will extend from south-to-north, removing the truss systems and primarily lowering materials within the interior volume and existing footprint of the structure. If, however, this approach is not feasible because of the structural condition of Hangar 3, supportive scaffolding will be used to safely provide the necessary controls. Once all of the trusses are removed, the concrete bents and brick masonry shed structures will be demolished, as well as the existing door towers, box beam, and door tracks. All above-ground elements of the structure will be removed, except for the concrete slab of Hangar 3; there is no below-grade work associated with the Undertaking. All removed materials, if unsalvageable, will be transported offsite to appropriate disposal facilities.

To secure the demolition site and protect adjacent structures, temporary fencing will be installed, creating a perimeter that will extend around the hangar. This staging area will largely coincide with the existing fencing installed around the Hangar. The temporary fencing will be an 8' high chain link fence set into concrete jersey barriers, which will be placed onto the surrounding paved surfaces to form the perimeter around the entire staging area; no physical anchoring to the existing surfaces will occur. Following demolition, all temporary fencing will be removed and any damage to the paved surfaces will be repaired in kind, restoring them to their existing condition.



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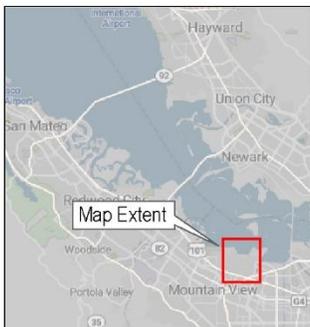
Area of Potential Effects
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4.0 Area of Potential Effects

The APE is located within the expanded NAS Sunnyvale Historic District on the east side of the airfield (**Figure 4**). For the current Undertaking, the APE boundaries coincide with the Eastside/Airfield area of MFA, in which Hangar 3 is located, and extends into portions of the neighboring City of Sunnyvale to the east. The location and size of the APE accounts for both potential direct and indirect effects to any historic properties, particularly those within the boundaries of the expanded NAS Sunnyvale Historic District.

The APE includes the Project footprint, which is primarily defined by the footprint of Hangar 3 and the demolition staging areas, which extend around the Hangar and largely align with the existing fence line. These areas account for where direct physical effects associated with the Undertaking may occur. This area, defined as the Area of Direct Impacts (ADI), will extend outwards approximately 30' from the east and west elevations of the hangar. At the north and south elevations, the ADI boundary will extend approximately 200' and 170', respectively. The ADI also includes the adjacent Building 55 and select locations along the roof monitor of Hangar 2, where upgrades associated with the temporary aviation obstruction lights will be installed. The majority of work will be located at and above grade with no ground-disturbing activities; vertical boundaries of the APE are limited to the grade of the existing concrete slab of Hangar 3.

The APE also accounts for indirect effects, such as visual and atmospheric alterations to the historic setting and sense of place for historic properties. The APE boundaries largely coincide with the Eastside/Airfield area of MFA, where Hangar 3 is most visible. New and intensive mid-to-high rise commercial development around MFA block visual corridors and limited indirect effects on the eastern and southern boundaries, whereas Hangar 2 and Hangar 1 obstruct views of Hangar 3 to the west. The north boundary of the APE follows the NASA ARC property boundary along San Francisco Bay, respectively. The east boundary extends to include the east adjacent commercial buildings and the Lockheed Martin facilities located in Sunnyvale, California.



- Area of Direct Impacts (ADI)
- Area of Potential Effects (APE)
- Expanded NAS Sunnyvale Historic District



Project Location
 T64.05, R02.0W, Sec 11-14
 USGS 7.5min Quad:
 Mountain View

Client/Project

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Figure No.

4

Title

Undertaking Area of
 Potential Effects (APE)

Notes
 1. Dept. of the Interior, USGS Topographic Map, Mountain View, CA (2018).

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Identification of Historic Properties
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5.0 Identification of Historic Properties

Per 36 CFR Section 800.16(1)(1), “historic properties” may include any district, site, building, structure, or object that is listed, or eligible for listing, in the NRHP.

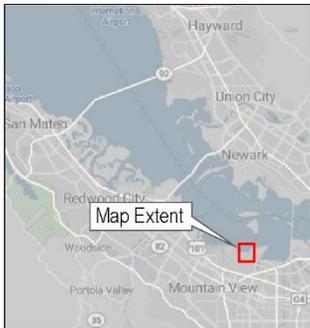
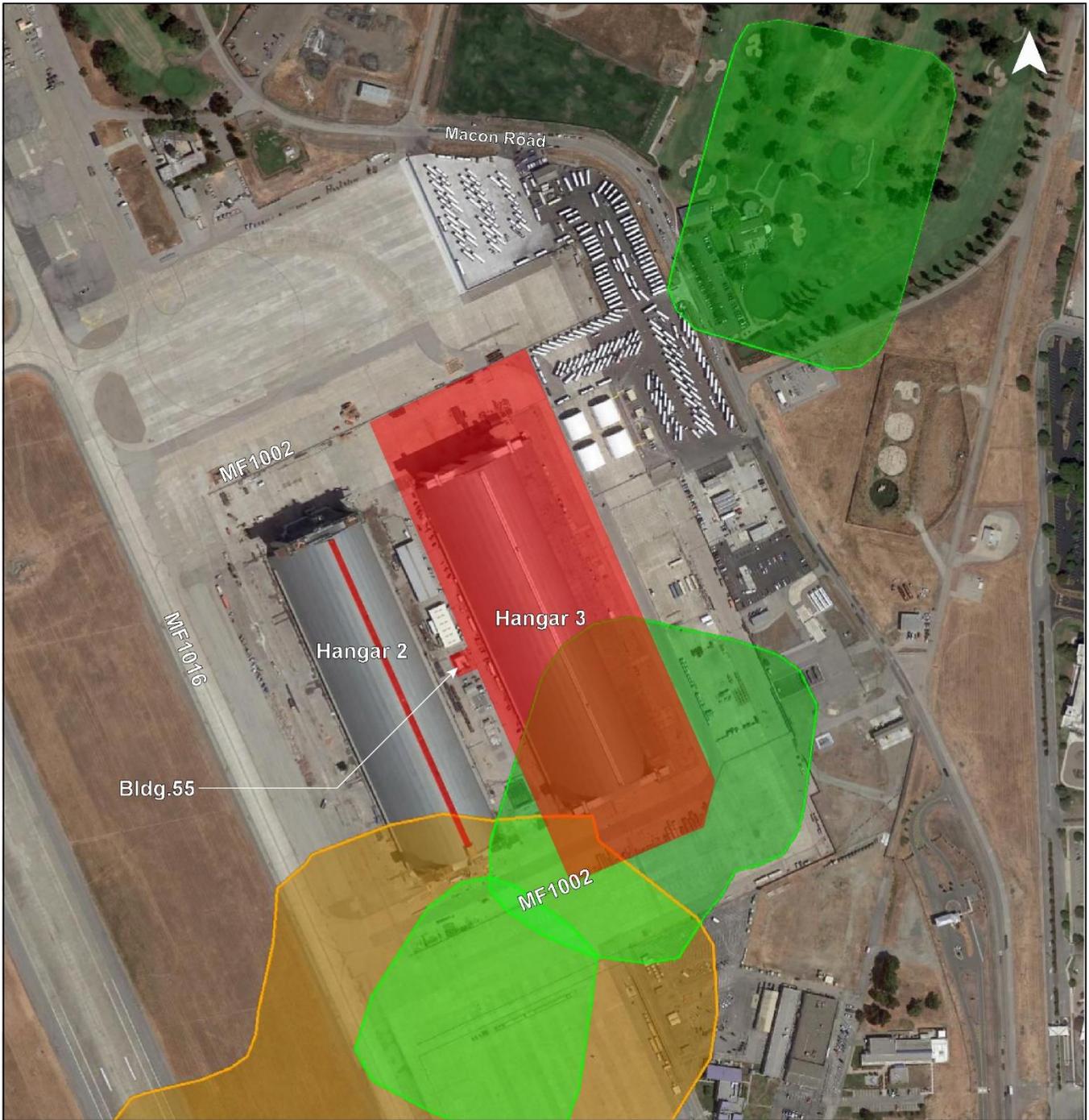
5.1 Archaeological

In February 2017, AECOM prepared the *NASA Ames Research Center Archaeological Resources Study (ARS)*, which identified potential archaeological resources throughout the NASA Ames Research Center property, including MFA. The ARS is intended to support the NASA Ames Research Center’s Integrated Cultural Resources Management Plan (ICRMP), which provides guidance for the treatment of cultural resources, both archaeological and built environment, on the NASA Ames property. The ARS, the contents and methodology of which was agreed upon by the SHPO in June 2017 (SHPO # NASA_2015_0928_001), includes a thorough collection of previous archaeological and geotechnical studies, previously recorded resources, historical maps and photographs, Sacred Land Files searches from the Native American Heritage Commission (NAHC), and other forms of documentation, to outline and identify the potential for archaeological resources throughout the site. Based upon these records, an archaeological sensitivity map was created that illustrates particular areas where archaeological properties are more likely to be extant. The identified areas of sensitivity are organized into four categories:

- Heightened Historic-era Archaeological Sensitivity
- Heightened Prehistoric-era Archaeological Sensitivity
- Heightened Geoarchaeological Sensitivity
- Low Archaeological Sensitivity

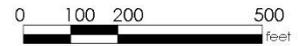
According to the ARS, the Undertaking is partially located within areas identified as having both Heightened Historic-era and Prehistoric-era Archaeological Sensitivity, meaning there is the potential for below ground resources to be extant, although there are no known archaeological sites in the ADI. In its existing condition, the entirety of the ADI is paved with no observable exposed soil, rendering a pedestrian archaeological survey ineffective (**Figure 5**).

Although the ADI is partially located in areas of heightened archaeological sensitivity for both Historic-era and Prehistoric-era resources, there are no ground-disturbing activities proposed. Therefore, there is no potential to effect below-ground historic properties in the APE.



Notes
 1. Dept. of the Interior, USGS Topographic Map, Mountain View, CA (2018).

- Undertaking Area - Area of Direct Impacts (ADI)
- Heightened Prehistoric-era Archaeological Sensitivity
- Heightened Historic-era Archaeological Sensitivity



Project Location
 106.05, R02.0W, Sec 11-14
 USGS 7.5min Quad:
 Mountain View

Client/Project

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Figure No.
5

Title

Areas of Archaeological
 Sensitivity

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Identification of Historic Properties
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5.2 Built Environment

5.2.1 Moffett Federal Airfield

Numerous studies have documented and evaluated historical significance of the built environment at MFA. The following outlines historic surveys and studies relevant to the Undertaking and the associated historic properties identified within the APE.

5.2.1.1 NRHP-Listed NAS Sunnyvale Historic District

In 1994, the NAS Sunnyvale Historic District was identified and listed on the NRHP (**Appendix B.1**). The discontinuous historic district comprised the original 1930s portion of MFA, also known as Shenandoah Plaza, which centered around Hangar 1 and the western portion of the MFA property, as well as the eastern side of the airfield surrounding Hangars 2 and 3. The discontinuous historic district was determined significant under Criteria A and C for its associations with the development of US Naval aviation prior to World War II, and for its unifying architecture exhibited by the collection of Spanish Colonial Revival style and for the significant engineering exhibited by Hangar 1, as well as Hangars 2 and 3. The historic district is listed with a period of significance spanning 1930 to 1943, which coincides with the construction of the Shenandoah Plaza portion of MFA, as well as Hangars 2 and 3.

The APE is centered around Hangar 3 and includes the eastern portion of the district, as well as the eastern most properties of the Shenandoah Plaza portion of the district.

5.2.1.2 Historic Property Survey Report for the NASA Ames Research Center, Moffett Field, California (AECOM, 2013)

In 2013, AECOM prepared the *Historic Property Survey Report for the Airfield at NASA Ames Research Center, Moffett Field, California* (HPSR), which identified the NRHP-eligible expanded NAS Sunnyvale Historic District that encompassed the entirety of MFA, primarily the runway network and buildings directly associated with the operation of the airfield and the significant missions (**Appendix B.2**). The historic district was identified as significant under Criteria A (events) and C (architecture) with a period of significance spanning from 1930-1961. While the revised boundaries of the expanded historic district were concurred upon by SHPO on June 6, 2013, the contributing status of specific properties to the district has not received formal concurrence. However, SHPO, California Office of Historic Preservation staff, and NASA have agreed upon

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Identification of Historic Properties

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recognizing the identified historic district and the contributors outlined in the 2013 AECOM HPSR as historic properties for the purposes of Section 106 consultation.¹³

The current Undertaking's location is within the boundaries of the expanded NAS Sunnyvale Historic District. There are several contributing properties located within the identified APE.

5.2.2 Stantec Desktop Survey of East Adjacent Parcels Sunnyvale, California (2019)

In December 2019, Stantec architectural historians and archaeologists performed a desktop survey of the area located directly east of MFA in Sunnyvale, California, that is included in the indirect APE. This involved visiting the Northwest Information Center (NWIC) to find previous historic evaluations and reports specific to the area. While records for surrounding areas were found for a variety of previous studies, none were specific to the built environment properties located within this specific portion of the APE. Additional research was conducted, which involved examining and reviewing various public records, including Santa Clara County records, City of Sunnyvale planning documents, and Environmental Impact Reports that were prepared for projects in this specific area.

The following table (**Table 1**) and map (**Figure 6**) outlines the existing built environment properties located within the east adjacent parcels in Sunnyvale, California. The table includes the address, assessor parcel number (APN), common name of the property, year built, and any relevant information related to historic status or potential NRHP evaluations.

Table 1: Built Environment Properties within the East portion of the APE in Sunnyvale, California.

Bldg .#	Address	APN	Name	Year Built	Evaluation Status
A	1080 Enterprise Way, Sunnyvale, CA	110-57-002	Moffett Towers Club	2008	Under 50 years, not NRHP eligible
D	1110 Enterprise Way, Sunnyvale, CA	110-57-007	Moffett Towers I-D	2008	Under 50 years, not NRHP eligible

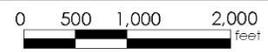
¹³ SHPO letter to Keith Venter, Historic Preservation Officer at NASA ARC, "Section 111 Outlease for Hangar One and Moffett Federal Airfield, NASA Ames Research Center, Moffett Field CA" SHPO Reference: NASA_2013_0417_001 (June 6, 2013).



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E	1120 Enterprise Way, Sunnyvale, CA	110-57-004	Moffett Towers I-E	2008	Under 50 years, not NRHP eligible
F	1140 Enterprise Way, Sunnyvale, CA	110-57-005	Moffett Towers I-F	2008	Under 50 years, not NRHP eligible
G	1180 Enterprise Way, Sunnyvale, CA	110-57-006	Moffett Towers I-G	2008	Under 50 years, not NRHP eligible
P3	1180 Enterprise Way, Sunnyvale, CA	110-57-000-B1	Moffett Towers I, Parking Garage #3	2008	Under 50 years, not NRHP eligible
P4	1180 Enterprise Way, Sunnyvale, CA	110-57-000-B1	Moffett Towers I, Parking Garage #4	2012	Under 50 years, not NRHP eligible
-	1111 Lockheed Martin Way, Sunnyvale, CA	110-01-026	Lockheed Missiles & Space Campus	1965	Over 50 years, not previously evaluated



- Undertaking Area - Area of Direct Impacts (ADI)
- Area of Potential Effects (APE)
- Stantec 2019 Built Environment Desktop Survey Area
- NAS Sunnyvale Historic District Boundaries (NRHP Listed)
- Expanded NAS Sunnyvale Historic District Boundaries (NRHP Eligible)
- Lockheed Martin Missile & Space Division Campus



Project Location
T06.05, R02.0W, Sec 11-14
USGS 7.5min Quad:
Mountain View

Client/Project

**MFA Hangar 3 Demolition
Section 106 Technical Report**

Figure No.
6

2019 Built Environment
Desktop Survey Properties

Notes
1. Dept. of the Interior, USGS Topographic Map, Mountain View, CA (2018).

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Of these properties, the majority are recently constructed commercial office buildings and supporting parking garages. These buildings are not 50 years old and do not meet the age threshold requirement for NRHP eligibility and were not investigated. However, the northwest portion of the Lockheed Martin Missiles & Space campus is also located in the APE. While the full survey and evaluation of these high profile and sensitive technical facilities was not within the scope of this effort, the following section outlines the approach taken with these properties for the purposes of the Hangar 3 Demolition Section 106 consultation effort.

5.2.2.1 Lockheed Martin Missiles & Space Campus, Sunnyvale

The Lockheed Corporation was originally founded in San Francisco, California, by brothers Allan and Malcom Loughead in 1912, as the Loughead Aircraft Manufacturing Company. The company eventually folded, but was reinvented as the Lockheed Aircraft Company in 1926. Two years later, Lockheed relocated to Burbank, California, and became an important aircraft development and manufacturing company responsible for major developments in aviation from the 1920s through World War II. At the end of the War, Lockheed was a predominant defense contractor and was responsible for developing some of the most advanced aviation and aerospace programs for the US during the Cold War.

In 1956, the Lockheed company purchased over 400 acres in Sunnyvale, California. The location, considered ideal for its proximity to Stanford University and the facilities at NASA ARC, was developed for the Lockheed Missiles & Space Division (LMSD). Founded in 1955, the LMSD was contracted by the federal government to develop the US Navy's ballistic missile program, as well the US Air Force's advanced military satellite systems and advanced warning systems. Of the programs developed at LMSD campus, the most famous and well known include the Polaris missile program, as well as the recently declassified CORONA program, which was the first satellite surveillance program developed during the Cold War.¹⁴ To facilitate the advanced research and development and manufacturing activities at Sunnyvale, Lockheed constructed a vast campus of facilities in the area directly east of MFA. The northwest corner of this campus is located within the APE. This portion of the campus features several large facility buildings, as well as a variety of support structures and recreational facilities. The initial buildings appear to have been constructed in 1965 and were subsequently expanded over the following years, reaching its current configuration by the 1980s.

Due to the highly sensitive nature of the facility and the ongoing programs, a full survey and evaluation of the property for potential NRHP eligibility was not conducted. However, given the advanced nature and high-profile research and development that has occurred at the property, this study assumes that the property would likely be

¹⁴ The History Factory, *Innovation with Purpose: Lockheed Martin's First 100 Years* (Washington DC: Lockheed Martin Company, 2013), 121-123.

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eligible for listing in the NRHP per the Advisory Council on Historic Preservation's (ACHP) guidance on applying NRHP criteria on scientific facilities, specifically as a property "associated with events that have made a significant contribution to, and are identified with, or that outstandingly represent the broad national patterns of United States history and from which an understanding and appreciation of those patterns may be gained."¹⁵ Additionally, while the campus in its current configuration is not yet 50 years of age, the nature of the programs administered at the facilities by LMSD have the potential to be of exceptional significance and could qualify under Criteria Consideration G: Properties that have achieved significance within 50 years. As such, the LMSD campus is being treated as a historic property for the purposes of this Section 106 Consultation only. Future evaluation of the property should be conducted to fully assess the historical significance and integrity of the campus.

5.2.3 Historic Properties in the APE

The following table (**Table 1**) and map (**Figure 7**), outlines the built environment historic properties located within the APE by number and name, as well as the year they were constructed, their historic status and history of previous evaluations. Only Hangar 3 is located within the ADI.

Table 2: Historic Properties Within the Undertaking APE

Bldg. #	Bldg. Name (Current/ Historic)	Year Built	Historic Status
01	Hangar 1	1931-33	<ul style="list-style-type: none">• Individually eligible to NRHP• NRHP-listed Contributor to NAS Sunnyvale Historic District
32	North Floodlight Tower	1934	<ul style="list-style-type: none">• NRHP-listed Contributor to NAS Sunnyvale Historic District
33	South Floodlight Tower	1934	<ul style="list-style-type: none">• NRHP-listed Contributor to NAS Sunnyvale Historic District
46	Hangar 2	1942	<ul style="list-style-type: none">• Individually eligible to NRHP• NRHP-listed Contributor to NAS Sunnyvale Historic District
47	Hangar 3	1943	<ul style="list-style-type: none">• Individually eligible to NRHP• NRHP-listed Contributor to NAS Sunnyvale Historic District

¹⁵ Advisory Council on Historic Preservation, *Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities* (Washington DC: Advisory Council on Historic Preservation, 1991), 30.



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55	Heat Plant	1943	<ul style="list-style-type: none"> NRHP-listed Contributor to NAS Sunnyvale Historic District
69	Inert Ammunition Storage	1943	<ul style="list-style-type: none"> Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District Evaluated as ineligible in Section 106 consultation for the Defense Support Fuel Point Closure project; however, SHPO did not concur with these findings and continued to be treated as a historic property.¹⁶
70	Fuse & Detonator Magazine	1943	<ul style="list-style-type: none"> Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District
71, 72, 73, 74	High Explosive Magazines	1943	<ul style="list-style-type: none"> Identified as contributors to the potentially eligible expanded NAS Sunnyvale Historic District
105	Airfield Lighting Vault	1947	<ul style="list-style-type: none"> Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District
106	Aircraft Compass Calibration Pad	1947	<ul style="list-style-type: none"> Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District
143, 147	High Explosive Magazines	1951	<ul style="list-style-type: none"> Identified as contributors to the potentially eligible expanded NAS Sunnyvale Historic District
158	Flight Operations Building & Tower	1954	<ul style="list-style-type: none"> Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District
329	Ultra-High Frequency/ Very High Frequency Receiver Building	1958	<ul style="list-style-type: none"> Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District
442	Ordnance Handling Pad	1956	<ul style="list-style-type: none"> Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District

¹⁶ AECOM, *Historic Property Survey Report for the Ames Research Center Defense Fuel Support Point Closure Project, Moffett Field, California* (April 2016).

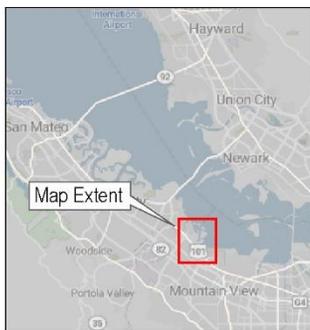
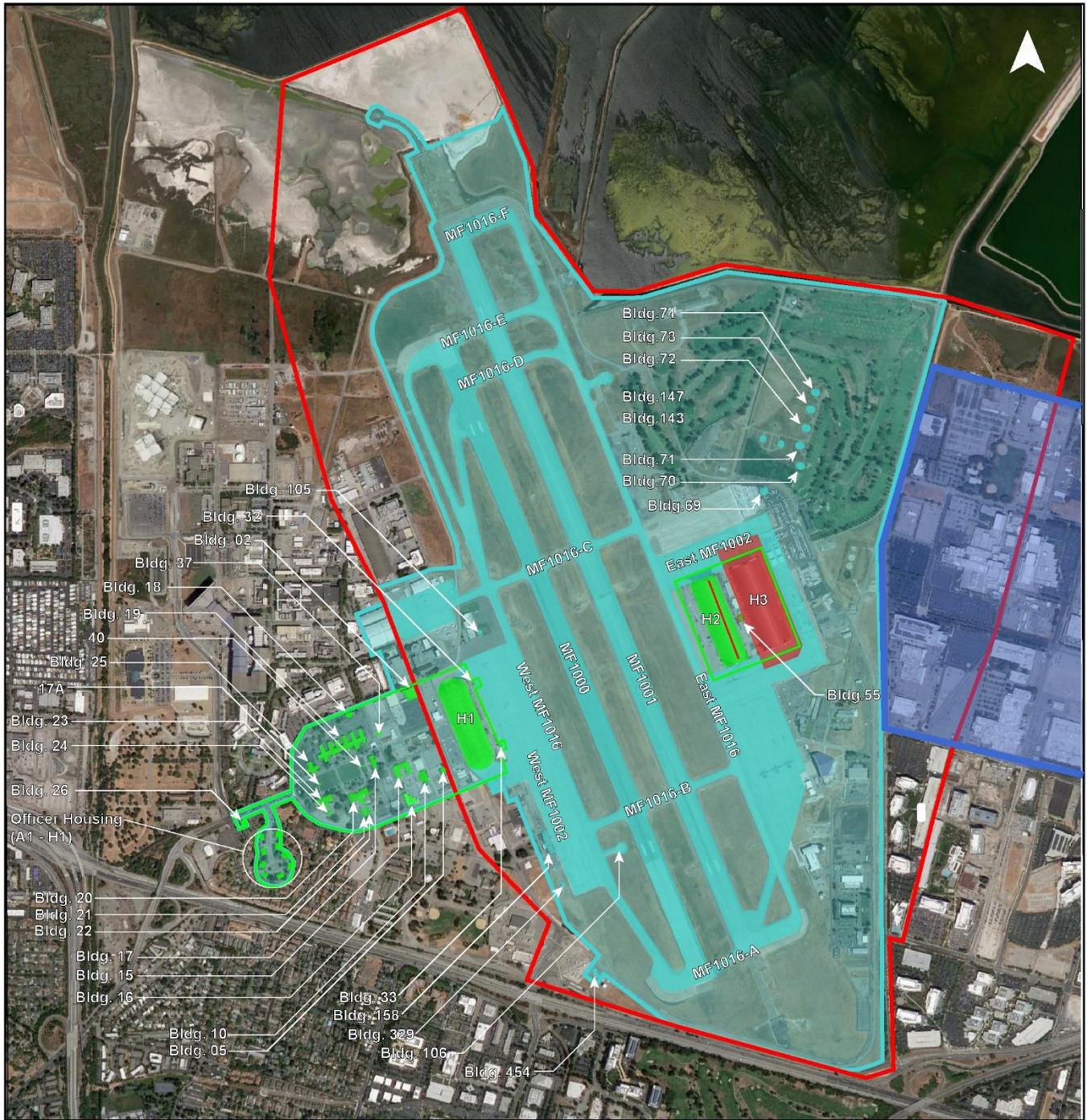
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454	Ultra-High Frequency/ Very High Frequency Transmission Building	1960	<ul style="list-style-type: none">Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District
MF1000	Runway 32L/ 14R	1938	<ul style="list-style-type: none">Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District
MF1001	Instrument Runway 14L/ 32R	1945	<ul style="list-style-type: none">Identified as a contributor to the potentially eligible expanded NAS Sunnyvale Historic District
MF1002	Aircraft Parking Aprons	1945	<ul style="list-style-type: none">Identified as contributors to the potentially eligible expanded NAS Sunnyvale Historic District
MF1016	Parallel & Connecting Taxiways	Ca.1946	<ul style="list-style-type: none">Identified as contributors to the potentially eligible expanded NAS Sunnyvale Historic District.
-	Lockheed Missile & Space Campus	Ca.1965	<ul style="list-style-type: none">Not formally evaluated, but presumed NRHP-eligible for the purposes of this Section 106 Consultation





Notes
 1. Dept. of the Interior, USGS Topographic Map, Mountain View, CA (2018).

- Undertaking Area - Area of Direct Impacts (ADI)
- Area of Potential Effects (APE)
- NAS Sunnyvale Historic District Boundaries (NRHP Listed)
- NAS Sunnyvale Historic District Contributing Property (NRHP Listed)
- Expanded NAS Sunnyvale Historic District Boundaries (NRHP Eligible)
- Expanded NAS Sunnyvale Historic District Contributing Property (NRHP Eligible)
- Lockheed Missile & Space Campus (Presumed NRHP Eligible for the purposes of this Section 106 Consultation)



Project Location
 104.05, RD2.0W, Sec11-14
 USGS 7.5min Quad:
 Mountain View

Client/Project

**MFA Hangar 3 Demolition
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Figure No.

7

Title

**Built Environment Historic
 Properties**

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5.2.3.1 Affected Historic Properties

The following section outlines the identified historic properties within the APE that have the potential to be affected by the Undertaking (**Figure 7**). Of the identified built environment properties, only Hangar 3, Building 55 and small portions of the east Aircraft Parking Apron (East MF1002) and Hangar 2 are located within the ADI (**Figure 8**).

NAS Sunnyvale Historic District

As outlined in Section 5.2.1.1, the original NAS Sunnyvale Historic District was listed on the NRHP in 1994, and determined significant under Criteria A and C for its associations with the development of US Naval aviation prior to World War II, and for its cohesive collection of Spanish Colonial Revival style buildings and the engineering associated with the hangars. In 2013, the expanded NAS Sunnyvale Historic District was identified and determined eligible for listing on the NRHP with an expanded period of significance of 1930-1961, which included the 1950s jet operations of the early Cold War. The expanded district included large swaths of the MFA property that were left out of the original NRHP-listed district, primarily the central airfield and the eastside portion of the airfield, which includes the munitions handling network of magazines and associated safety buffer zone at the northeast corner of the property.

Contributing elements of the NAS Sunnyvale Historic District located within the APE includes all of the contributing airfield features – two runways (MF 1000, MF1001), aircraft parking aprons (MF 1002) on the east and west sides of the airfield, various taxiways (MF 1016), and other features (Buildings 106 and 442) – which are primarily defined by their expansive, flat paved surfaces with axial siting and open setting. Also included are the supportive airfield operations buildings (Buildings 105, 329, 454), which are typically simple, prefabricated buildings that house the communication and electrical equipment for the airfield instrumentation, save for the Flight Operations Building & Tower (Building 158), which is a larger two-story building with Mid-Century architectural detailing and prominent control tower. Of the original Shenandoah portion of the westside of the airfield, only Hangar 1 and the two small supporting floodlight towers (Buildings 32 and 33) are located within the APE. On the eastside of the airfield, the entirety of the Hangar 2/3 Precinct is included within the APE, as are the surrounding areas associated with the munitions handling network, which includes the concrete magazines (Buildings 70-74, 146, 147) set within the center of the Golf Course, as well as the simple, inert ammunition storage building (Building 69), located north of Hangars 2 and 3.



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Of the various identified character-defining features, the following are those that are most relevant within the context of the APE and the Undertaking (see **Appendix B.2** for complete list of character-defining features):¹⁷

- Flat topography with broad open views across the aviation areas.
- Expansive, linear system of airfield runway features, including the two parallel runways, associated taxiway network, and the compass calibration pad.
- Long views along the airfield towards San Francisco Bay and the salt ponds
- Collection of historic aviation facilities along the perimeter of the airfield. This includes both contributing and non-contributing elements, as the general massing and appearance solidify the spatial organization and character of the airfield.
- Visual dominance of Hangar 1 from throughout the airfield.
- Views to Hangar 2 and 3, which frame the eastside of the airfield and spatially balance Hangar 1 to the west. The three hangars are of primary significance and are their massing and appearance support the historic character and integrity of the airfield.
- Ammunition storage and handling features at the northeast corner of the airfield, which include the regularly spaced bunker-like magazines and simple storage facilities, all set within the open space of the safety buffer zone.
- Structures associated with aviation lighting, including the two distinct Hangar 1 floodlight towers and simple, utilitarian operations shelters.
- Collective design of buildings and structures and the aesthetics of “futuristic grandeur.”
- Ongoing aviation use.

Hangar 1

Hangar 1 is a large, steel framed dirigible hangar located on the westside of the airfield at MFA. Constructed between 1932 and 1933, Hangar 1 was designed to house the USS *Macon*, which was a large dirigible aircraft that operated at MFA until it crashed into the Pacific Ocean in 1935. Over the following decades, it continued to house aircraft and support the various missions that occurred at the airfield. The Streamline Moderne inspired structure continues to be the most prominent and iconic historic structures at MFA (**Photograph 3**).

¹⁷ AECOM, “Historic Property Survey Report,” 5.4-5.5.

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Photograph 3: North and east elevations of Hangar 1, looking south.

The structure has been determined individually eligible for listing on the NRHP for significance associated with Naval history and for its unique engineering and architectural design. In 1994, Hangar 1, as well as the adjacent Moderne style Floodlight Towers (Buildings 32 and 33), was listed on the NRHP as a contributor to the NAS Sunnyvale Historic District.

The most significant character-defining features of the structure include its size and massing, Streamline Moderne style, the “clam shell” doors, the steel exoskeleton structural system, the visual prominence within MFA, and its relationship to the entirety of the sight, particularly to the adjacent Buildings 32 and 33, as well as Hangars 2 and 3, located on the opposite side of the airfield.¹⁸ When it was first identified, the original cladding was considered a character-defining feature, but was removed in the late 2000s; however, efforts to rehabilitate the structure are underway.

¹⁸ Page & Turnbull, Inc. “Hangar One, Moffett Field, California – Re-Use Guidelines,” prepared for NASA/ Ames Research Center (August 24, 2001), 3-4.



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Hangars 2 & 3 – Buildings 46 & 47

Hangars 2 and 3 are large, wood framed dirigible hangars located on the eastside of the Airfield. Constructed between 1942 and 1943, Hangars 2 and 3 are nearly identical hangars based upon a standardized plan that was utilized for similar hangars located at a handful of other airfields that were in operation during World War II (**Photograph 4**). Hangar 2, located directly east adjacent to the airfield, was constructed first, whereas Hangar 3 was constructed second. Both were designed to facilitate the LTA coastal defense program at MFA during World War II, and both was used to house fixed wing aircraft that operated out of MFA over the following decades.

In 1988, both hangars were determined individually eligible for listing on the NRHP for significance associated with events during World War II, and for their overall engineering and design. In 1994, Hangars 2 and 3 were each listed on the NRHP as contributors to the NAS Sunnyvale Historic District as excellent examples of military engineering and design during World War II. In 2013, Hangars 2 and 3 was also identified as contributors to the NRHP-eligible expanded NAS Sunnyvale Historic District, which also includes the airfield features at MFA that were significant to the various missions that took place between 1933-1961.

The most significant character-defining features of both hangars include the distinctively large massing; parabolic roof with corrugated aluminum siding; massive sliding hangar doors with supporting concrete towers, wood box beams, and adjoining clamshell roof; the flanking brick masonry sheds; wood frame truss construction set on repeating concrete bents; expansive interior concrete decking; and the vast open interior volumes. Additionally, the two structures are unique for the parallel siting and nearly identical composition, which creates the paired hangars appearance.

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Photograph 4: South and east elevation of Hangar 3 with Hangar 2 in the background.

Building 55 – Heat Plant

Building 55, located between Hangar 2 and 3 on the eastside of the airfield, was constructed in 1943 as the boiler room and shared heat plant for the two structures. The simple single-story, double-height building was listed on the NRHP in 1994 as a contributor to the original NAS Sunnyvale Historic District. Character-defining features of Building 55 include the square layout and box-like massing, the elongated brick masonry chimney, and its utilitarian style with unadorned stucco wall planes and limited divided-light fenestrations. As a building directly associated with Hangars 2 and 3, the spatial relationship between Building 55 and the two structures, both in terms of its placement between the hangars, and its notably small visual presence in comparison to the monumental paired structures (**Photograph 5**).



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Photograph 5: South and west elevation of Building 55 with Hangar 3 in the background, facing northwest.¹⁹

MF 1002 – Aircraft Parking Apron

The East MF1002 aircraft parking apron is an expansive, paved surface located on the eastside of the airfield extending along the East Parallel Taxiway from the CAANG property northwards and surrounding Hangars 2 and 3. Originally constructed in 1942 as a location for aircraft parking, the Navy expanded East MF1002 to accommodate increased aircraft operations at MFA with the southern apron expanded in the mid-1950s and the northern portion expanded ca.1980.

The predominant character-defining feature of East MF1002 is the flat, paved surface organized in a repeating, squared grid pattern. At the center of many repeating squares are embedded aircraft tie downs (**Photograph 6**). While the entirety of the Parking Apron features this repeating pattern, character-defining spaces are those that were constructed within the 1933-1961 period of significance of the expanded NAS

¹⁹ Photograph courtesy of PV, 2014.

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Identification of Historic Properties

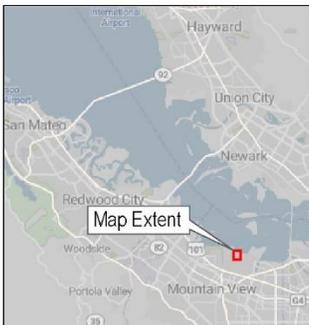
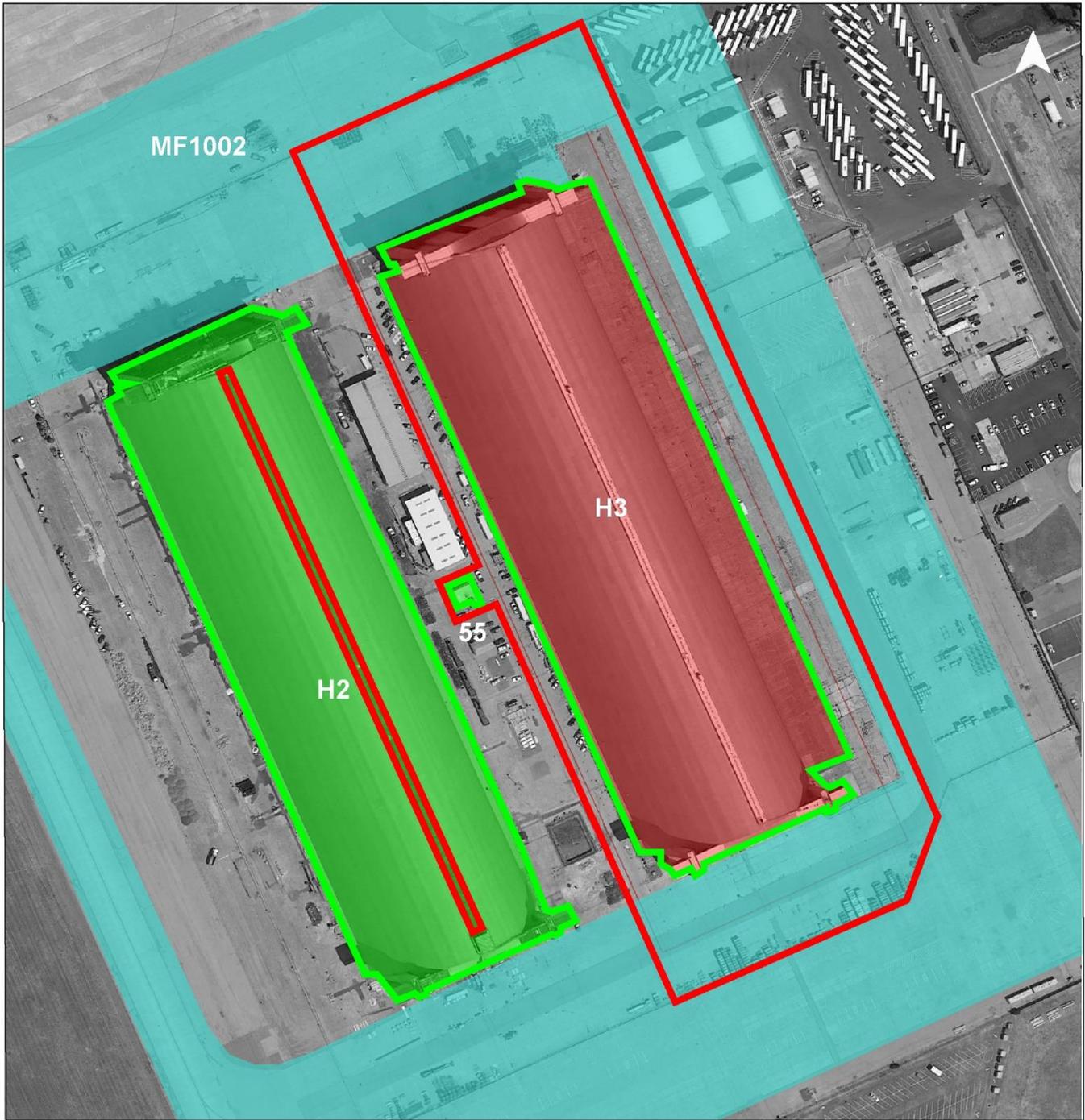
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Sunnyvale Historic District. This includes the areas directly surrounding the hangars and to the south along the current CAANG cantonment area.

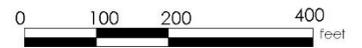


Photograph 6: North portion of East MF1002 exhibiting typical conditions; note Hangar 3 north façade at right.





-  Undertaking Area - Area of Direct Impacts (ADI)
-  Area of Demolition
-  NAS Sunnyvale Historic District Contributing Property (NRHP Listed)
-  Expanded NAS Sunnyvale Historic District Contributing Property (NRHP Eligible)



Project Location
T06.05, R02.0W, Sec 11-1-14
USGS 7.5min Quad:
Mountain View

Client/Project

**MFA Hangar 3 Demolition
Section 106 Technical Report**

Figure No.
8

Title
Undertaking Area/
Area of Direct Impacts (ADI)

Notes
1. Dept. of the Interior, USGS Topographic Map, Mountain View, CA (2018).

6.0 Assessment of Effects

Per 36 CFR 800.5(a)(1) of the NHPA, the Criteria of Adverse Effects are applied to assess potential effects of the Undertaking on historic properties located within the associated APE:

(1) Criteria of adverse effect. An Adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.

The following analysis takes into consideration potential direct and indirect effects in relation to the integrity of historic properties located in the APE.

6.1 Archaeological Properties

In terms of archaeological historic properties, there will be no direct effects. Although the Project footprint is located in identified areas of heightened archaeological sensitivity, there are no ground disturbing activities associated with the Undertaking. The demolition scope includes removing the Hangar 3 structure to the existing concrete pad only with no below grade work.

Therefore, the Undertaking will not result in adverse effects on any as yet discovered below-ground resources.

6.2 Built Environment Properties

6.2.1 Hangar 3

The Undertaking will have direct effects on Hangar 3, primarily through the demolition and removal of all above-ground elements associated with the structure. Hangar 3 is a significant historic property at MFA, and its removal will result in the complete loss of all of its character-defining features, aspects of historical integrity, and sever its ability to convey its significance, ultimately disqualifying it from listing on the NRHP.



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Therefore, the Undertaking will result in an adverse effect on Hangar 3.

6.2.2 Hangar 2

The Undertaking will not have direct adverse effects on Hangar 2. A small portion of Hangar 2 is located within the ADI, including select areas along the monitor roof where temporary obstruction lighting may be installed per FAA requirements. This will likely involve attachment to the existing guard rail system. The areas where anchors are connected to the guard rails will be small and will not diminish the overall integrity of the feature, nor of Hangar 2. Upon removal of the temporary lighting, the connection points will be repaired to match the existing materials. The lights will utilize existing electrical networks and will not require any additional interventions that would result in an adverse effect. Additionally, the installation of temporary obstruction lighting will not result in an indirect adverse effect. These temporary elements will be aesthetically utilitarian and standard in design to all aviation facilities, and will not diminish character-defining features of Hangar 2, nor create a visual change that would diminish the overall setting, feeling, design, or association of Hangar 2.

The Undertaking, specifically the demolition of Hangar 3, will result in indirect adverse effects on Hangar 2. One of the primary character-defining features of Hangar 2 is the distinctive parallel spatial organization with Hangar 3 along the eastside of the airfield, which creates the iconic paired appearance. The removal would substantially disrupt this spatial organization and remove a significant element of the Hangar 2/3 Precinct, and ultimately result in diminished integrity of design for Hangar 2. Also, while the Undertaking would not result in any direct and physical alterations to the structure, the loss of the neighboring Hangar 3 would change significant visual and spatial character-defining elements of Hangar 2 associated with its historical significance. This will result in a diminished integrity of setting, feeling, and association.

Overall, Hangar 2 will retain sufficient integrity to continue qualifying for listing on the NRHP, both as an individual structure and as a contributor to the NAS Sunnyvale Historic District. Hangar 2 will not be physically altered in way that will affect its ability to convey its individual significance, and the remainder of the district will remain in its existing condition, and contribute to the integrity of setting, feeling, and association for Hangar 2. However, the visual loss of Hangar 3 will greatly alter the spatial organization of Hangar 2 and will diminish several aspects of historic integrity, particularly design, setting, feeling, and association.

Therefore, the Undertaking will result in an adverse effect on Hangar 2.

6.2.3 Building 55

At Building 55, direct work involves the installation of the temporary plywood protection and the potential replacement of the electrical panel in support of the proposed aircraft

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Assessment of Effects

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obstruction lights. The plywood protection would be installed around the building to provide a barrier from potential loose debris resulting from the demolition activities at the neighboring Hangar 3. While the exact nature of the plywood installation is unknown, any and all attachments to the building itself will be limited to preserve the existing materials, and all connection points will be repaired to match the existing conditions following the removal of the plywood. A new electrical panel will replace the existing one within Building 55, and will not have a direct effect on the exterior of the building or its character-defining features. Additionally, the new panel will likely reuse the existing electrical conduits and system, and will not involve the addition of new openings or alterations to the building envelope. Therefore, the direct alterations to Building 55 will not result in adverse effect.

The Undertaking will have indirect adverse effects Building 55. Building 55 was specifically designed as a shared heating plant for both Hangars 2 and 3. The removal of Hangar 3 will diminish the integrity of design by removing one of these key structures, while also drastically changing the character-defining visual and spatial relationship of the building between the two monumental hangars. This loss of Hangar 3 will change these character-defining spatial and visual features of Building 55 that will result in diminished integrity of setting, feeling, and associations as a shared heating plant from the World War II-era. Therefore, the diminished integrity of Building 55 caused by the Undertaking will result in adverse effect.

Despite adverse effects caused by the Undertaking, Building 55 will retain its physical aspects of integrity and its associations with Hangar 2 and the other contributors of the NAS Sunnyvale Historic District; it will still qualify for listing on the NRHP. However, the demolition of Hangar 3 will result in diminished integrity of design, setting, feeling, and association.

Therefore, the Undertaking will result in an adverse effect on Building 55.

6.2.4 East MF 1002

At East MF 1002, the Undertaking will not have direct adverse effects on the historic property. Select areas will be utilized for staging purposes and demarcated with a temporary chain-link fencing system set on jersey barrier supports, which will not be physically anchored to the paved surface of East MF 1002, and will not directly alter the historic property. Demolition activities at Hangar 3 involve depositing debris and removed materials towards the center of the structure, and will not result in materials falling onto the paved surfaces of East MF 1002. In the event that repairs to the character-defining gridded, paved surface of East MF 1002 are required, all repairs will be in-kind and will match the existing conditions of the feature. Therefore, the direct alterations of the Undertaking at East MF1002 will not result in an adverse effect.



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Similar to Hangar 2, East MF1002 was specifically designed, oriented, and operated around Hangar 3. While the Undertaking would have no effect on the overall character-defining features, the visual loss of Hangar 3 would disrupt the spatial organization of the apron, which was specifically constructed and oriented around Hangars 2 and 3. Although MF 1002 will remain in its existing physical condition and will continue to contribute to the NRHP-eligible district, the visual alteration caused by the removal of Hangar 3 would result in a visual and spatial disruption that will leave the property disconnected from the airfield. This will result in diminished integrity of setting, design, feeling, and association of East MF 1002.

Therefore, the Undertaking will result in an adverse effect on MF 1002.

6.2.5 Hangar 1

Constructed in 1933 as the original dirigible hangar at MFA, Hangar 1 is of primary significance within the original and expanded NAS Sunnyvale Historic Districts. The structure is not located within the ADI, and no scope associated with the Undertaking will result in direct alterations to Hangar 1, leaving the structure in its existing condition.

Unlike Hangars 2 and 3, Hangar 1 was designed and constructed independently a decade prior and does not have the same direct associations with Hangar 3 in the same way as Hangar 2. As such, the removal of Hangar 3 will not diminish the integrity of design for Hangar 1, which will be retained in its existing condition. Additionally, Hangar 1 is located on the westside of the airfield and is visually separated from Hangar 3 by both the airfield and Hangar 2, which borders the airfield and blocks many of the view corridors to the Hangar 3 (**Figure 7**). While this visual separation of Hangar 1 and Hangar 3 reduces the overall indirect effect of the Undertaking on Hangar 1, the arrangement of all three hangars is a significant aspect of the historic setting and spatial organization of each individual hangar, as well as the larger NAS Sunnyvale Historic District. The removal of Hangar 3 will result in diminished integrity of setting, feeling, and association of Hangar 1, and, therefore, will result in an adverse effect.

Despite the diminished integrity of setting, feeling, and association resulting from the removal of Hangar 3, Hangar 1 and its immediate surroundings will not be physically altered. Hangar 1 will continue to convey its significance as a the most significant structure at MFA, and as a primary contributor to the NAS Sunnyvale Historic District. Additionally, the area surrounding Hangar 1 will be retained in its existing condition, and contribute to the integrity of setting, feeling, and association of the structure. As such, Hangar 1 will continue to qualify for the NRHP, despite the adverse effects resulting from the Undertaking.

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6.2.6 NAS Sunnyvale Historic District

As described in previous sections, Hangar 3 is a primary contributor to the NAS Sunnyvale Historic District. Constructed in 1943, Hangar 3 was a key structure from World War II through the Cold War. As such, Hangar 3 was central within the property and has direct associations with how the remainder of the airfield was ultimately designed, constructed, and used. Specifically, within the NAS Sunnyvale Historic District, Hangar 3 is noted as a central character-defining feature for its visual prominence within the district. Also, its massing and overall aesthetics are considered a significant and unifying component within the landscape that lends to the broader historic character and integrity of the district.

While the majority of the NAS Sunnyvale Historic District and its contributors will remain in its existing condition following the completion of the Undertaking, the demolition of Hangar 3 will result in the visual loss of a primary contributing and character-defining element. This will greatly alter the spatial relationships within the district, as well as disrupting the visual and aesthetic qualities throughout the airfield. Therefore, the demolition of Hangar 3 will both directly and indirectly affect the NAS Sunnyvale Historic District in a way that diminishes its overall historical integrity, particularly the integrity of design, materials, workmanship, setting, feeling and association.

Furthermore, the loss of Hangar 3 will result in the visual alterations within the setting of several of the contributing structures within the APE and not discussed individually above. This includes the following:

- Eastside ammunition magazines and storage facilities (Buildings 66-74, 143, 147),
- Airfield features, including runways and taxiways (MF 1000, MF 1001, MF 1016, Buildings 106 & 142),
- Airfield operations and support buildings (Buildings 105, 158, 329, & 454).

These features are set outside the Hangar 2/3 Precinct and are not within the ADI. While they will not be directly affected by the Undertaking, the visual loss of Hangar 3 will result in diminished integrity of setting, feeling, and association, resulting in adverse effects.

6.2.7 Lockheed Martin Missile & Space Campus

The Lockheed Martin Missile & Space Campus is located northwest of Hangar 3, beyond the property boundaries at MFA. The collection of buildings is located in a secure area and supports the advanced research and development, testing, and manufacturing activities that occur at the property. While a formal significance evaluation was not conducted of the property, the nature of the property and the work at



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the campus suggests that it is likely historic, and is being treated as such for the purposes of this Section 106 consultation effort.

As a highly advanced technical facility, the property is inherently inward looking and has no significant associations or relationship specifically with Hangar 3. The proximity of the campus in relation to the airfield is noteworthy as many Lockheed projects underwent testing using the airfield as a staging ground, but Hangar 3 is unrelated to the Lockheed mission. Therefore, the spatial organization between the campus and the airfield will be retained following the demolition of Hangar 3 and the integrity of setting, feeling, or association will not be diminished. Therefore, the Undertaking will not result in an adverse effect on the Lockheed Martin Missile & Space Campus.

6.3 Summary

As described above, the Undertaking will have adverse effects on historic properties. The demolition of Hangar 3 will result in the complete physical loss of a historic property, constituting an adverse effect to the structure, as well as the broader NAS Sunnyvale Historic District to which it is a NRHP-listed contributor. Although small portions of East MF1002 are located within the ADI, this area is used primarily as a staging site and will be repaired in kind following the completion of all work. Small portions of Building 55 and Hangar 2 are also located in the ADI, although the proposed physical work occurring at these locations will not result in adverse effects to either property. Additionally, all work is occurring above ground, so no ground disturbing activities will have the potential to disrupt any unknown archaeological resources.

In terms of indirect effects, Hangar 3 is part of a large collection of historic properties at MFA, especially in relation to the neighboring Hangar 2 and Building 55, East MF 1002, Hangar 1 on the west side of the airfield, and the expanded NAS Sunnyvale Historic District. The demolition of Hangar 3 will result in diminished integrity of setting, design, feeling, and association with the adjacent Hangar 2, Building 55, and East MF1002, all of which are directly associated with Hangar 3 through their placement and historic use. Also, as one of the primary contributing buildings within the NAS Sunnyvale Historic District, the removal of Hangar 3 will alter the visual qualities and spatial organization of the district. The visual and spatial disruption will result in diminished integrity for the NAS Sunnyvale Historic District and its contributing properties. Therefore, the Undertaking will result in adverse effects to several historic properties, including Hangar 2, Building 55, East MF1002, Hangar 1, and the broader NAS Sunnyvale Historic District.²⁰

While the Undertaking will result in adverse effects throughout the site, the only affected property that will not retain significant historic integrity to qualify for listing on the NRHP

²⁰ Note: while the Undertaking will result in adverse effects throughout the site, the only property that will not retain significant historic integrity to qualify for listing on the NRHP is Hangar 3.

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is Hangar 3. All other historic properties will retain sufficient, albeit diminished, integrity to qualify for listing despite adverse effects resulting from the Undertaking.

7.0 Resolution of Adverse Effects

In order to resolve adverse effects under Section 106, it is the lead federal agency's responsibility to consult with SHPO and other interested parties in finding solutions to avoid, minimize, or mitigate adverse effects to historic properties.

The previous emergency repair and stabilization efforts at Hangar 3 were conducted with the goal of avoiding and minimizing further structural damage to the historic property. However, these efforts were unsuccessful, and demolition of the structure is required to remove the hazardous conditions associated with the current structural state. As such, Section 106 consultation among NASA ARC, the SHPO, and consulting parties is necessary to determine appropriate mitigation measures and establish an agreement to resolve adverse effects of the Undertaking.

The following section lists potential interested parties for Section 106 consultation for the Undertaking, as well as preliminary mitigation measures developed to resolve the adverse effects that may be incorporated into a future Memorandum of Agreement (MOA).

7.1 Interested Parties

In a letter dated December 13, 2019, NASA ARC initiated Section 106 consultation with the SHPO and provided a list of potential consulting parties for review and comment. The potential interested parties include a collection of local government departments in the surrounding communities of Sunnyvale and Mountain View, California, as well as several non-profit organizations with missions dedicated to promoting history and historic preservation at MFA, Silicon Valley, and the broader San Francisco Bay Area. In a response letter dated January 23, 2020, the SHPO provided no other suggestions related to potential consulting parties.

Letters were mailed to several of the potential consulting parties to assess interest on March 19, 2019 (**Appendix C.1**). These letters included a brief background on Hangar 3 and the existing conditions, a description of the Undertaking, and location map. The letter requests that all parties interested in consulting on the Undertaking contact the NASA ARC Cultural Resources Manager (CRM). All responses sent to the CRM are asked to include the name of the organization, the name and contact information of the primary contact, and a formal statement of election to participate in the Section 106 consultation process. The list of parties that were sent letters includes the following:

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- The Moffett Field Historical Society
- The City of Sunnyvale, California
- The City of Mountain View, California
- Sunnyvale Historical Society
- Mountain View Historical Association
- History San Jose
- Silicon Valley Historical Association
- California Preservation Foundation
- National Trust for Historic Preservation

As of the date of publication of this technical report, the City of Mountain View and the Moffett Field Historical Society have elected to participate as consulting parties in the Section 106 consultation process for this Undertaking (**Appendix C.1.1**).

It is recognized that residents of the State of California are currently under a Shelter-in-Place order from the Office of the Governor in response to the outbreak of the Covid-19 Virus, and that many of the interested parties may not have access to formal mail deliveries. Therefore, email correspondence to the remaining potential interested parties was submitted on April 29, 2020 to fully confirm interest in participating in Section 106 consultation for this Undertaking (**Appendix C.2**). All responses and a list of confirmed interested parties will be provided to SHPO during the preparation of a draft MOA.

7.2 Preliminary Mitigation Measures

The following section has been developed with the intent of providing a preliminary list of appropriate mitigation measures to inform ongoing Section 106 consultation.

7.2.1 Development of Mitigation Measures

In developing mitigation measures to resolve adverse effects, there are several factors that should be considered. According to the ACHP, creative and effective mitigation measures for resolving adverse effects under Section 106 should address the following considerations:

1. *Consider the significance of the affected property.* Mitigation should be generally related to the significance of the property that is being adversely affected. Things to consider include areas of significance, integrity, qualifying characteristics, and boundaries. Compare the importance of one historic property relative to other properties of its type. Those properties that have a greater level of significance generally warrant greater levels of mitigation.
2. *Consider the public benefit.* The National Historic Preservation Act recognizes that preservation is a public interest so ideally mitigation will provide a public benefit to the community in which the resource is located. Educational materials benefit the public by increasing knowledge of and appreciation for the past. Local consulting parties are usually aware of the preservation needs of their community and therefore are useful, indeed critical,

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resource for mitigation ideas that can best benefit the public.

3. *Consider the needs of all parties.* The primary focus of consultation should be on meeting the needs of those consulting parties who ascribe importance or value to a property. This is especially true of traditional cultural properties and properties that are significant to local communities.
4. *Consider mitigation that enhances knowledge and protection of historic properties.* When a building has been adequately documented, consider alternative mitigations that enhance the knowledge of and/or protection of similar property types. Rather than (or in addition to) documenting a building that is to be removed, consider the historic contexts or survey updates. This could also involve the development of educational programs or the preservation of archaeological sites outside of a project area.
5. *Consider cost.* The cost of mitigation should be proportionate to the property's significance and integrity and the scale of the effects of the project. Also keep in mind that the use of public monies must be justifiable. Finally, there must also be a clear connection between the resource affected and the mitigation plan and it must be demonstrable that the mitigation is in the public interest.

All of these factors have been considered in developing mitigation measures for resolving adverse effects for the Undertaking. Direct effects include the loss of Hangar 3 itself. Indirect effects will largely be through the visual disruption of spatial organizations and overall setting through the loss of Hangar 3 in relation to Hangar 2, Building 55, and other contributing properties on the eastside of the airfield, as well as in relation to the broader expanded NAS Sunnyvale Historic District.

7.2.2 Proposed Mitigation Measures

Using the ACHP considerations outlined above, the following proposed mitigation measures have been developed as suggestions for the resolution of adverse effects to be determined through Section 106 consultation. It should be noted, not all of these suggestions may be required as part of the Section 106 consultation process. Our experience allows us to anticipate that documentation under a National Park Service program, exploring salvage opportunities, and creating an interpretive component will be a baseline for mitigation, the exact implementation of any of these components will be determined through Section 106 consultation which may allow for alternative or additional interesting approaches and engaging outcomes for the public.



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7.2.2.1 Documentation

A) Traditional Documentation - HAER

For the demolition, it is proposed that Hangar 3 and the surrounding area be documented per the standards and guidelines of a National Park Service, Historic American Engineering Record (HAER) program. Each program has a different level that dictates the level of effort required. Given the significance of Hangar 3 as both an individual structure and as a contributor to the broader NAS Sunnyvale Historic District, Level I documentation, which requires full format high quality archival photographs of the Hangar and its setting, a detailed written report, and a set of measured drawings, is appropriate. All of the materials should be formatted for submittal to the Library of Congress; additional copies of the materials should be prepared and submitted to appropriate local repositories, such as the Moffett Field Historical Society, the Sunnyvale Public Library, and the Mountain View Public Library, and other relevant archives in the South Bay region.

The following outlines proposed strategies and conditions for the documentation, which Stantec recommends be included within the prepared stipulations of an eventual MOA:

- Materials should be prepared by an architectural historian and/or historic architect who meets the Secretary of the Interior's Professional Qualifications Standards (SOI Qualifications) for architectural history, history, or historic architecture.
- Photographs and field measurements for the measured site plans must be completed prior to the demolition of Hangar 3.

B) Traditional Documentation – NRHP Nomination Amendment for the expanded NAS Sunnyvale Historic District

As outlined previously, the original NAS Sunnyvale Historic District is a discontinuous historic district that was identified and listed on the NRHP in 1994. The original historic district omits the central airfield features, and additional study of the property has provided an expanded period of significance, complete with contributing properties not included in the 1994 NRHP district nomination. To promote the preservation of the expanded NAS Sunnyvale Historic District, a NRHP Nomination Amendment should be prepared and submitted to the Keeper of the NRHP.

C) Non-Traditional Documentation

Stantec further recommends Hangar 3 be documented using three-dimensional (3D) scanning technology to capture both the exterior and interior (where possible), as well as various vantage points of the overall setting of the Hangar 2/3 Precinct. Digital 3D documentation is a powerful tool in creating immersive virtual reality modelling that can be implemented in future interpretive programs.

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7.2.2.2 Salvage Opportunities

A potential mitigation measure is the preparation of a Salvage Report for materials within Hangar 3. The report should be prepared by an architectural historian and/or historic architect who meets the SOI Qualifications for their respective fields. The report should focus on the feasibility for removing significant materials or character-defining features of the Hangar and salvaging those for future reuse. However, it is noted that the demolition of this structure is a complicated undertaking and that many of the materials within Hangar 3 are hazardous. These challenges should be analyzed within the salvage report.

Potential reuse for salvageable materials may include the following:

- Development and construction of landscape elements at Moffett Field and NASA Ames Research Center, such as site furnishings, wayfinding materials, and art installations.
- Reuse of selected materials on Hangar 2 for maintenance purposes.
- Use for future interpretive elements at a variety of museums and civic institutions throughout the region.
- Donation for reuse as part of public arts programs. In the event that materials are salvageable and safe for reuse, materials could be used by artists in public art projects to create unique installations within civic settings of surrounding municipalities, including at educational institutions and local aviation settings, such as the San Jose and San Francisco International Airports.

7.2.2.3 Historic Interpretive Materials

A) Physical Interpretive Materials

As a mitigation measure, Stantec recommends that historic interpretive materials be incorporated into future plans for the site, specifically for the open spaces and at publicly accessible areas, such as the Bay View Trail, or at the Moffett Field Museum operated by the Moffett Field Historical Society. Although the exact level and medium of interpretation is yet to be determined, the following initial design criteria are proposed as part of future stipulations:

- Interpretive materials should be publicly accessible and placed either on-site or at appropriate perimeter locations that are deemed safe, accessible, and appropriate.
- Interpretive materials may take a variety of forms and mediums within the landscape, including signage, art installations, and site furnishings.
- In all instances, physical elements should consider and reflect upon character-defining features of the NAS Sunnyvale Historic District, such as architectural vocabulary and materials.



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- Interpretive materials will be consistent with any design guidelines or master plans that pertain to NASA Ames Research Center.

B) Coordination with institutions

Consulting parties should coordinate with a variety of local institutions in the development of interpretive materials. Specifically, the Moffett Field Historical Society may have an interest in the potential salvage of existing artefacts within the Hangar that may be of noteworthy importance to the former occupants and operations at the property. Most notably, there are several murals and amateur pieces of artwork related to the former squadron located throughout the building. If salvage is feasible, these may be of interest to the Moffett Field Historical Society for inclusion in their on-site museum, or other educational institutions throughout the region.

8.0 Conclusion

The Undertaking, which involves the demolition of Hangar 3, will result in the complete loss of the subject structure's historic integrity and will disqualify it from its current listing on the NRHP. Additionally, as a primary contributor to the NAS Sunnyvale Historic District, the demolition of Hangar 3 will result in diminished integrity for the district and the identified NRHP-listed and NRHP-eligible contributors within the APE, particularly for the immediately surrounding and operationally linked properties of Hangar 2, Building 55, and East MF1002, as well as Hangar 1. Therefore, it is apparent that the Undertaking will result in adverse effects on historic properties.

In support of ongoing consultation efforts, a list of preliminary mitigation measures has been developed for review. These are intended to provide a foundation for future Section 106 consultation.

9.0 References

Advisory Council on Historic Preservation. *Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities*. Washington DC: Advisory Council on Historic Preservation, 1991.

AECOM. *Historic Property Survey Report for the Airfield at NASA Ames Research Center, Moffett Field, California*. Prepared for NASA Ames Research Center (November 2013).

AECOM, *Historic Property Survey Report for the Ames Research Center Defense Fuel Support Point Closure Project, Moffett Field, California* (April 2016).

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KPFF. "Building 46 (Hagar 2) and Building 47 (Hangar 3) Due Diligence Phase 1 Report." August 9, 2013.

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<http://nps.gov/nr/publications/bulletins/nrb15/index.htm>

SHPO Letter to Jonathan Ikan at NASA ARC. "Hangar 3 Demolition Project, Moffett Federal Airfield, NASA Ames Research Center, Santa Clara County – NASA_2019_1216_001." January 23, 2020.

SHPO Letter to Keith Venter, Historic Preservation Officer at NASA ARC, "Section 111 Outlease for Hangar One and Moffett Federal Airfield, NASA Ames Research Center, Moffett Field CA - NASA_2013_0417_001." June 6, 2013).



Appendix A KPFF Structural Engineering Documents for Hangar 3

A.1 KPFF, “Building 46 (Hangar 2) & Building 47 (Hangar 3) Due Diligence Phase 1 Report” (August 9, 2013)



Building 46 (Hangar 2) and Building 47 (Hangar 3)

Due Diligence Phase 1 Report

August , 2013

Building history

Hangars 2 and 3 are the world's largest freestanding wood-frame structures constructed by the U.S. Navy in 1942 to aid the WWII efforts and the "lighter-than-air" (LTA) program. These hangars are integrated with a total of 17 other identical hangars that were constructed across the U.S. to house dirigibles such as the USS Macon and the USS Akron. To conserve metal resources for the war efforts, the 17 hangars were primarily constructed of wood and concrete, as shown in Figure 1. Hangars 2 and 3 are officially addressed as Buildings 46 and 47, respectively, on the NASA Ames Research Center historic properties.



Figure 1. 1942 Hangar 2 Construction.

The primary structural aspects of Hangars 2 and 3 involve 51 timber arches that are spaced 20 feet on center and rise above the slab on grade approximately 170 feet to the arch outer chord. The timber arches are orientated in the transverse direction and connected at the base to a two-story transverse concrete bent. The concrete bents are located on concrete pile caps and timber piles with an allowable load capacity of 12 tons each. The outer and inner footings of the bent consist of 3 and 12 piles, respectively, where 3 piles in each group were battered to resist an outward dead and wind thrust loads. The arches and the concrete bents are supported in the longitudinal direction by timber cross braces. However, at various locations throughout the hangars, the cross braces have been retrofitted with either steel braces or steel cables. Two inch diagonal tongue and groove timber sheathing encloses the hangars on the outer chords of the arches, as well as the exterior roof assembly of an asphaltic material and corrugated aluminum. The latter was a replacement in 1956 for the original tarpaper rolled roofing.

The doors at the north and south ends of each hangar consist of six aluminum and wood frame sliding panels. These doors are guided by rails on slab as well as through a transverse box beam spanning between two concrete towers. The box beam is a double-height wood truss sheathed with wood diagonal tongue and groove patterns. The box beam is approximately 20 ft square and cantilevers 20 ft beyond

each tower, as shown in Figure 2. The tower and box beam assembly are attached to the timber hangar through anchor bolts embedded into the concrete towers. The supporting structure for the hangar doors is a free standing structure and separated from the timber hangar by a gap separating the two structures. Similar to the concrete bents, the towers are supported on concrete pile caps and timber piles with an allowable load of 30 tons each. A total of 816 piles were used for all towers of a single hangar. The main footprint of both hangars is approximately 266'x1000'. A two-story annex building measuring 62'x1000' was added to the east side of Hangar 3 in 1945 for additional office and shop space.



Figure 2. 2013 Hangar 2 (nearest hangar) and Hangar 3.

Numerous problems arose during the design and construction phases of the hangars. The primary challenge at the time was the lack of knowledge in detailing, fabricating, treating, and handling the mass amount of timber required. Research and testing were not allocated by the project because it was considered part of the Accelerated Public Works Program of the Navy in aid of the war efforts.

Documents reviewed

1. Ambrose Group, Inc. (2012).
2. Page & Turnbull, Inc. (2006), "Re-use Guidelines," NASA Ames Research Center, [Hangars 2 & 3].
3. Supplements to Page & Turnbull, Inc. (2006)
 - a. Degenkolb (2006) [Chapter 5]
 - b. Flynn et al. (2002), "An Initial Evaluation of Douglas Fir Wood Components in Hangars 2 and 3 at the NASA/Ames Research Center," UC Forest Products Laboratory.
 - c. Dolei and Team (2000), "Encompassing Synopsis of the Condition and Feasible Utility of Blimp Hangars 2 & 3."
 - d. BAMSI, Inc. (1984), "Hangar 3 Exerpts of Moffett Field Hangar Life Safety Evaluation," Moffett Field Development Project, Plant Engineering Office.
 - e. Rutherford & Chekene (R&C) (1982) [Analysis for only Hangar 3]
 - f. R&C (1984-'85) [Analysis for only Hangar 2]
4. Neal, Donald W. (1986), "Restoration of Navy LTA (Lighter than air) Hangars", Conf. Proceed. in Evaluation and Upgrading of Wood Structures: Case Studies, ASCE, pp. 1-12.
5. Amirikian, A. (1943), "Navy Develops All-Timber Blimp Hangar," ASCE Civil Engineering, Vol. 13, No. 10 and 11.

Summary of previous reports

Numerous assessments of the wood conditions have been documented over the years. The most recent documentation was in 2012 by Ambrose Group, Inc. for only Hangar 2. A thorough non-invasive and non-destructive visual inspection was completed for the interior structural members of the hangar, as well as for the interior of the box beams and overhead catwalks. The inspection noted visual signs of warping and splitting of the main trusses, with the largest crack measured 3.5" wide by 10' in length. In addition, there were multiple cases of missing and compromised fasteners, splitting of tieback and brace members, deflection of the exterior horizontal joints, signs of water staining, and timber shedding throughout the hangar. Similarly, the condition of the box beams showed signs of water intrusion and timber shedding. Splitting was also observed on the cross bracing within the south box beam. The catwalks and ladders used to ascend to the upper catwalk appeared to be in fair and slightly less fair condition, respectively. However, both contained age cracks and showed signs of vertical and lateral deflections when walking on, according to the report.

Page & Turnbull's 2006 Re-Use Guidelines for Hangars 2 and 3 included a detailed description of the historical context, the structural and non-structural systems and their conditions, as well as the re-use methodology. Page & Turnbull advised that the hangars do not comply with the ASCE 31-03 Life Safety performance level. If an earthquake were to occur, major structural damage could result. Therefore, a Full Building Tier 2 analysis was recommended. In addition, the report stated that the members were overstressed due to wind loading. The report recommended that further analysis should follow the guidelines of the California Historical Building Code (CHBC) for seismic and ASCE 7 for wind. The CHBC states that the seismic forces to be used for evaluation and possible strengthening need not exceed 0.75 times the seismic forces prescribed by the 1995 edition of the California Building Code (CBC). The seismic forces would be computed based on R_w forces tabulated in the CBC for similar lateral force resisting systems. Based on past history with this type of construction, there is potential of complete collapse during a major earthquake, excessive wind, or small fire within the vicinity.

Page & Turnbull and the NASA Ames project managers suggested three new uses for Hangar 2 and 3. The possibly scenarios were:

- Scheme 1: Missile Defense Command Center (Low Occupancy, High-Level Security)
- Scheme 2: Federal Emergency and Management Agency Storage Facility (Low Occupancy, Low-Level Security)
- Scheme 3: Public Use Sports Arena and Club (High Occupancy, Low-Level Security)

For each scheme, Page & Turnbull listed recommended improvements based on the level of occupancy and security. The improvements addressed issues of structural inspection/repair, fire protection, emergency systems, MEP, accessibility, egress, doors, windows, new raised topping slab, and new architectural finishes. However, it is recommended that NASA Ames compile a complete analysis for the re-use impacts regarding code issues, structural and system upgrades, accessibility requirements, hazardous materials abatement, envelope repairs, and the alterations of the historic fabric. In addition, because Hangar 2 and 3 are considered historic buildings, all work to the hangar should comply with The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings.

As a section within the re-use guidelines, Page & Turnbull (2006) reference Degenkolb (2006) in Chapter 5 regarding the historical context of the structural systems and a chronological documentation of the structural retrofits and analyses conducted. The report makes note of the hangars having an original design loading, which is similar to the data presented in Amirikian (1943), of the following:

Earthquake = 10% x W

Wind = 10 psf windward + 1 psf suction at the base + 24 psf suction at top of arch

Hoist = 5 kips at panel points near catwalks

Live = Not considered

The considered load combinations were D, D+W, D+EQ, and D+Hoist+0.5W

Also, the allowable material specifications for the original timber design was:

Arch trusses = 1400 psi bending, 1100 psi compression

Other members = 1200 psi bending, 1000 psi compression

In addition, Degenkolb (2006) performed a limited ASCE 31-03 analysis, assuming Site Class D soils, to confirm the general conclusions from previous analyses. The results of this study were identical to those provided by R&C (1984-'85), who conducted a full dynamic analysis of Hangar 2. The corresponding R&C analyses assumed stick models depicting the response of the structure as well as considered foundation stiffness by springs. For a single arch frame in the transverse direction, the truss was modeled as a beam to reduce the number of members analyzed. A similar concept was conducted for the bottom chord bracing in the longitudinal direction. The concrete tower and door structures were analyzed by hand calculations.

The results from R&C analyses are summarized by the following:

- The concrete bents were severely overstressed in bending and inadequately reinforced for ductile behavior.
- All connections of the longitudinal bracing trusses were overstressed.
- The horizontal members of the longitudinal trusses were determined inadequate.
- The concrete door towers were overstressed in bending at the top and base.

The retrofit schemes presented by R&C (1984-'85) involve the addition of concrete wall infill to every third existing concrete bent, construction of a new concrete diaphragm at the top of the concrete bents, strengthening of all overstressed longitudinal bracing connections and horizontal members with steel tubes, and construction of two new concrete struts to brace each tower.

However, to preserve the historical structural context of the hangars, Degenkolb provided an alternative retrofit scheme of strengthening the concrete bents and towers along with the installation of a new pile foundation. In addition, Degenkolb addressed the inadequate spacing of the seismic joint separating the timber hangar from the tower and box beam assembly, as well as documenting that no calculations have been performed on the expandable hangar doors. R&C estimated the overall structural and non-structural repair for only Hangar 2 was [REDACTED] and [REDACTED], respectively. However, it was assumed that similar retrofit costs and analysis results were applicable for Hangar 3.



In 1982, R&C performed an analysis of only Hangar 3 as defined by FEMA 178 (NEHRP Handbook for Seismic Evaluation of Existing Buildings, 1982). The results concluded that the structure did not satisfy the criteria for minimum NEHRP Life Safety performance. Concern was raised on a soft story in the concrete frames because of inadequate reinforcing, inadequate connections of the diagonal bracing, and a complete lack of connection from the diaphragm to the concrete foundation. In addition, it was observed that two adjacent arches contained 1" cracks on the bottom and top chords around the location of the apex. The recommendations emphasized the damaged arches were life safety hazards and must be repaired. The retrofit schemes for Hangar 3 followed the same guideline as the 1984 retrofits, but with the addition of strengthening to the two-story building annex.

Degenkolb (2006) performed an analysis considering the effects of wind and gravity. The results showed overstressed wood braces throughout the hangars under wind loading. However, Degenkolb highlighted that their analysis was limited and recommended that prior to hangar re-use, a comprehensive wind analysis must be performed using ASCE 7 wind design criteria. In addition, Degenkolb advised that Hangars 2 and 3 are susceptible to severe seismic shaking but are not located within the near-field effects of any fault systems. A site specific geotechnical analysis was not performed. However, both hangars are vulnerable to soil liquefaction as classified by the Association of Bay Area Governments.

Degenkolb also noted that Hangar 2 contains structural select Douglas-fir wood with Minalith fire retardant treatment (FRT). The latter was observed by teeth pressed incisions into the wood, as well as fibers littered on the surface of the wood and throughout the floors. On the contrary, Hangar 3 does not have the same FRT and the wood is an alternate species of Douglas-fir. This was validated in the UC Forest Products Laboratory report by Flynn et al. (2002). Further analyses of the wood in Hangar 3 indicate a darker appearance when compared to Hangar 2, as well as a lack of teeth pressed incisions. However, crystals were noted on the surface of the wood indicating a salt based FRT formulation used in Hangar 3. It was also noted that if either of the wood is burned, the low toxicity Chromium III existing within the wood converts to Chromium IV and thus is more toxic (Flynn et al., 2002).

Table 1. Retrofit cost projection for hangar code compliance (Dolci and Team, 2000)

Function	Hangar 2	Hangar 3	Total
Maintenance/Repair M.E.&P.			
Structural/Seismic Upgrades			
Fire Protection			
Roof Repair			
Hazard Remediation			
Code Compliance (M&E), OSHA (occupational Safety), ADA			
Total			
Demolition			

Dolci and Team (2000) provided retrofit cost projections for the hangars (see Table 1). In addition, they noted that Hangar 3 was in better condition than Hangar 2. KPFF Consulting Engineers do not support this statement based on the recent site visit observations. Dolci and Team also studied an alternative use for 747 aircraft and stated that the existing 10" concrete slab floor of the hangars cannot support a fully loaded 747 aircraft. It was recommended that the floor be removed and replaced with a 14.5" reinforced concrete slab if this use was being considered.

Neal (1986) discusses the 1981 assessment and retrofits for Hangars 2 and 3. Between the two hangars, there were a total of 1,513 minor repairs, 18 damaged frame members, and 36 locations of buckling at the arch frames. No structural analysis was conducted by the Navy, but rather the retrofit efforts were confined to restoring the distressed members to their original condition. The retrofit solution for buckled members involved additional glulam bypass members. Neal indicates there was no secondary buckling following the repair of a buckled chord segment.

Summary of recent site visit

KPFF conducted a site visit for Hangars 2 and 3 on July 31 and August 1, 2013, accompanied by Ronald Anthony, wood scientist of Anthony & Associates. It was observed that Hangar 3 appears to be in worse condition than Hangar 2. A large number of timber arches were strengthened by additional timber bypass members, clamps, stitch bolts, and steel cables, as shown in Figure 3. These restoration efforts were primarily completed by Power-Anderson, Inc. in 1981-87, as mentioned in Neal (1986) and Page & Turnbull (2006), and thereafter in 1995 by Philo & Sons, Inc.

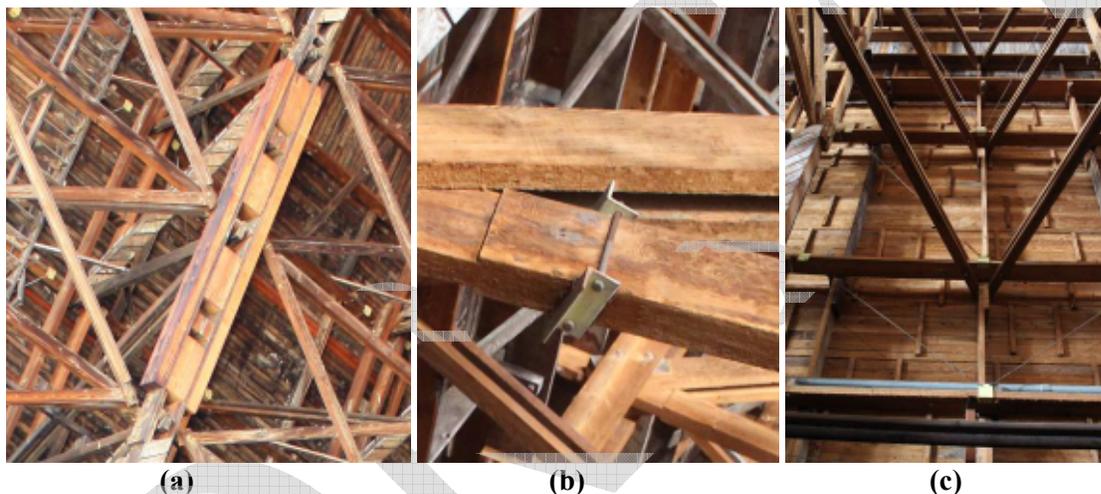


Figure 3. Retrofit techniques observed throughout Hangars 2 and 3 (a) Strengthening of arch chords by addition of glulam bypass members (b) Clamps and stitch bolts to close small cracks (c) Replacement of wood sag braces with steel cables and bolts.

However, to the best of our knowledge, there is no documentation within past 10 years of a full assessment to the condition of Hangar 3. Our recent site visit observed additional cracks in the wood and distortions of the main arch chords near the apex of multiple arches. This is shown in Figure 4 for the specified arch lines and nodal positions. For reference, the arch lines range from 1 to 51, where line 1 depicts the southernmost arch and line 51 represents the northernmost arch. The nodal positions describe the vertical locations of the horizontal joints. Node 0 and node 36 are respectively defined at the base of the arch on the east and west sides (top of the concrete bent). The arch apex is depicted as node 18.

As seen in Figure 4, a significant amount of cracking and out-of-plane distortion is observed on the bottom and top chords of the timber arches. The most prominent cracks are located in the bottom chord of arch 21 at node 16 and in the top chord of arch 22 at node 16. Both cracks widths are approximately 8” and contribute to the appearance of torsionally warped members. The latter could be a direct result of the out-of-plane relative distortion, as seen between nodes 16 and 17 within the bottom chord of arch 22.

This general observation is emphasized in Figure 5 with the relative lateral displacement between the apex of the arch and a theoretical reference line connecting adjacent arch nodes. Similar results are also displayed in Figure 6 for the top chord of arch 18.

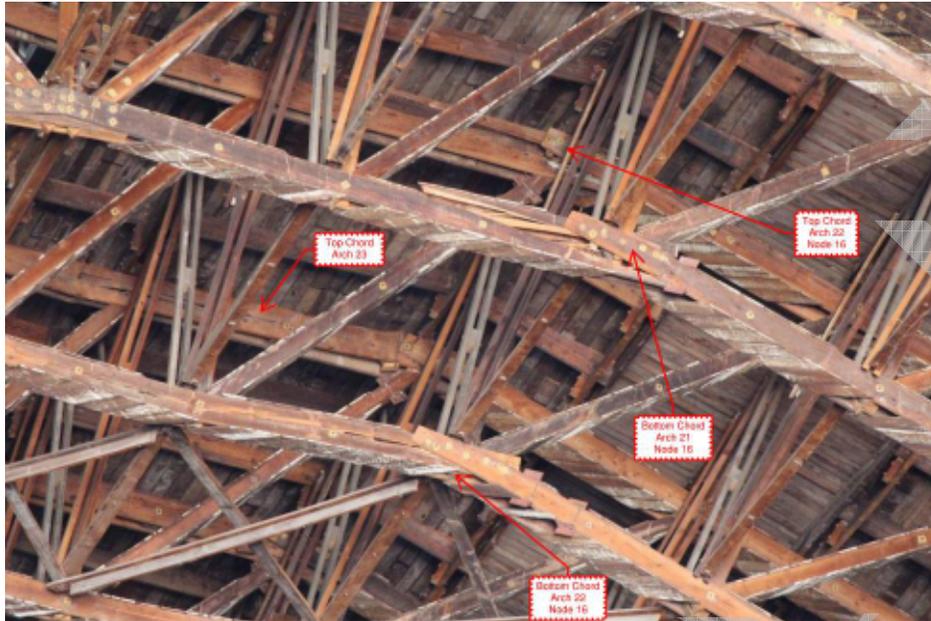


Figure 4. Observed cracks and distortion of the timber arch bottom and top chords in Hangar 3.



Figure 5. Relative lateral displacement between arch apex and reference line for Hangar 3 single arch.

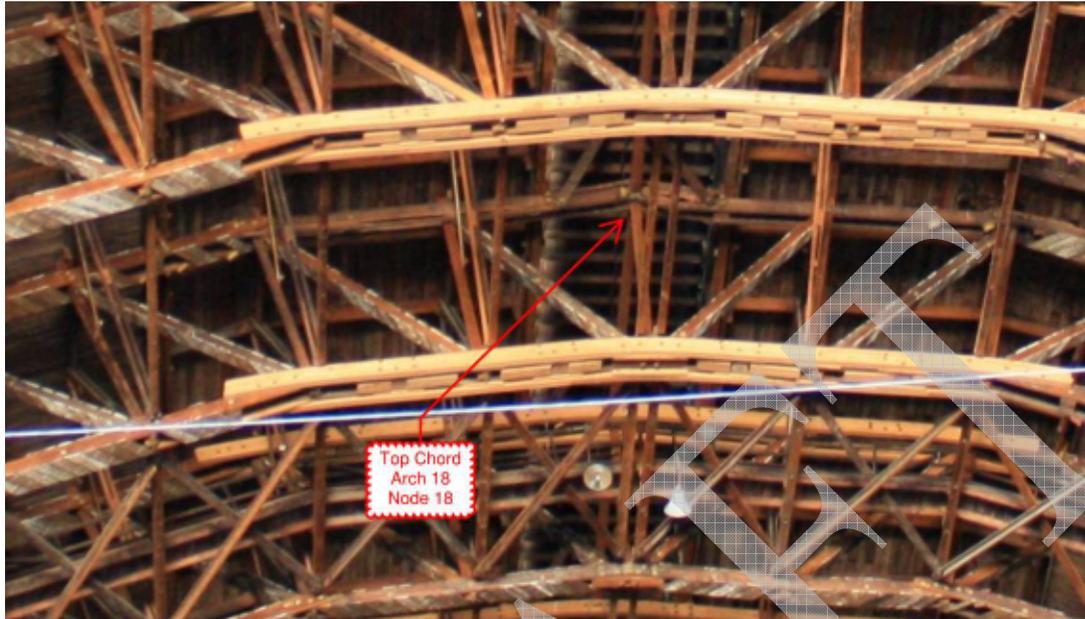


Figure 6. Observed cracks and lateral displacement of arch top chord in Hangar 3.

In addition, it was observed that the apex of numerous arches contain a consistent trend of node 18 displacing relative to the adjacent nodes supporting the monitor (exterior protrusion of the hangar at the apex outer chord). This is displayed in Figure 5 for arch 11, Figure 6 for arch 18, and Figure 7 for arches 21 and 22. The latter contains blue sketch-up arrows displaying the relative lateral displacement of the nodes, where node 18 appears to display south. It is unknown whether or not if all of the observed cracks and distortions propagated from the 1-5 retrofits or if their origin emanated within the past couple of months.



Figure 7. General trend of relative lateral displacement at the arch apex top chord in Hangar 3.

Hangar 2 did not have the extent of distress as seen in Hangar 3. There was only one location where the main arches were strengthened by glulam bypass members. This location was on arch line 14 and between nodes 28 and 30. The only visual signs of distress were observed through end splits of cross braces, as shown in Figure 8. This distress was common at locations where the fasteners were too close to the end grains.



Figure 8. Example location of end split in cross brace member within Hangar 2.

It was also observed while walking through the office spaces that various concrete bents in Hangar 2 are braced in the weak axis with steel HSS horizontal and cross braces. This was documented by Page &

Turnbull (2006). However, wide flange steel shapes were also observed for additional reinforcement of the concrete bents in the strong axis, as shown in Figure .

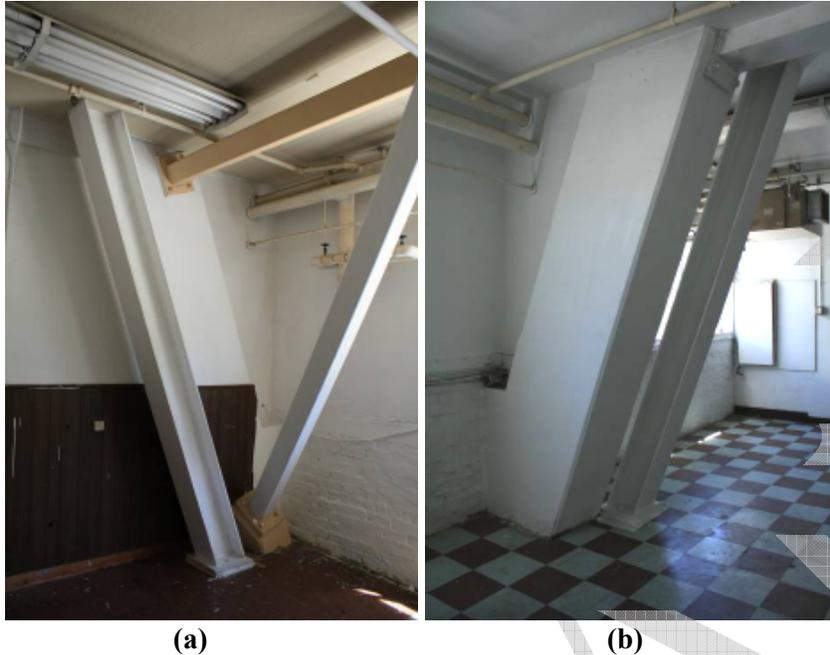


Figure 9. Hangar 2 office space retrofits (a) Longitudinal HSS and Lateral I-Shape bracing (b) Lateral I-Shape and HSS bracing.

While on the recent site visit, it was also observed that the doors on the southwest corner of Hangar 3 were open while all other doors between both hangars were closed. Therefore, future observations must verify if the doors are operable. In addition, the existing corrugated aluminum sheathing was detached at various locations along the roof of Hangars 2 and 3, as shown by example in Figure 10.



Figure 10. Example location of detached corrugated aluminum sheathing on roof exterior of Hangar 2.



Anthony & Associates provided the following preliminary recommendations through email:

1. “For analysis purposes, the wood species appears to be Douglas-fir in both hangars.
2. For analysis purposes, the grade of the members appears to be Select Structural, Structural Joists & Planks.
3. There appears to be little distress to the timbers in Hangar 2. Some end splits are present when the fasteners are close to the end grain. Seasoning checks are common, but not problematic.
4. Access was quite limited, but there were no signs of visible deterioration due to wood decay fungi. It is likely that there are isolated areas of decay where roof leaks have occurred.
5. As we observed together, there are failures, particularly in the bottom chords of the trusses near the peak of the roof in Hangar 3, that should be further investigated.
6. The effect of the fire-retardant treatment (Minalith in Hangar 2, unknown in Hangar 3) is uncertain. I need to look into this further, but that is likely beyond the scope of this work.”

Summary of recommendations

Based on our review of the existing documents and our site visits, KPFF makes the following recommendations:

1. KPFF concurs with the general retrofit recommendations provided by Rutherford & Chekene, Degenkolb, and Page & Turnbull. Associated pricing can be used as a ROM estimate scaled to today’s dollars. However because of the limitations and assumptions previously presented, KPFF recommends a complete seismic and wind analysis of both hangars using current codes.
2. KPFF recommends immediate correction for the alignment and bracing of the previously mentioned arches for in and out-of-plane movement. Methods of adding glulam bypass members as well as clamps and stitch bolts to the connections provide good potential for restoring the arches back to their original strength. However, it is recommended to monitor adjacent connections and members during restoration as load redistribution could be a potential hazard.
3. KPFF recommends full documentation of all member split end locations. The retrofit techniques will involve clamps, stitch bolts, and some form of epoxy injection.
4. KPFF recommends a survey of the condition of the existing roofing, followed by proposed methods of repair or replacement.
5. KPFF recommends that the project team researches whether the hangar doors are currently operable, and for the team to assess the usable life and anticipated maintenance required for the continued operation of the hangar doors.
6. KPFF recommends a thorough investigation with full accessibility to all interior/exterior structural members and connections for condition assessment and retrofit documentation.
7. KPFF requests a complete set of structural drawings for Hangars 2 and 3, and including all documentation for the Hangar 3 building annex.
8. KPFF recommends a site specific geotechnical assessment for the risk of bay mud consolidation and/or liquefaction effects.

The following content was redacted from this public posting:

Appendix A.2 KPFF: Hangar 3 Emergency Truss Repairs Narrative (May 26, 2016)
Appendix A.3 KPFF, Hangar 3 Damage Progression & Repairs Timeline (July 6, 2017)

MFA HANGAR 3 DEMOLITION SECTION 106 TECHNICAL REPORT

Appendix A KPFF Structural Engineering Documents for Hangar 3
April 29, 2020

A.4 KPFF, “Moffett Federal Airfield Hangar 3 – Mountain View, California, Structural Site Observations” (August 21, 2019)



August 1, 2019

Sallie Lim
Director
Legal Department / Google Inc.
1600 Amphitheater Pkwy
Mountain View, CA 94043

VIA Email: sllie@google.com

Gary S. McKitterick, Esq.
Partner
Allen Matkins Leck Gamble Mallory & Natsis, LLP
1900 Main Street, 5th Floor
Irvine, CA 92614-7311

VIA Email: gmckitterick@allenmatkins.com

Subject: Moffett Federal Airfield Hangar 3 – Mountain View, California
Structural Site Observation

Dear Ms. Lim and Mr. McKitterick:

As part of the quarterly Hangar 3 structural assessment, I've recently conducted a site visit on behalf of Planetary Ventures to visually observe the general condition of the existing hangar structure and the temporary shoring devices that were left in place when the work was terminated. After walking the entire Hangar 3 structure, I have prepared the following comments, observations and conclusions:

Overall Comments:

1. The original intent of the emergency truss repair program was to return the damaged and broken arched trusses to their original deficient state.
 - . The emergency truss repair program was ultimately abandoned due to the numerous severely damaged arched trusses as well as the damage progression to undamaged trusses which continued to occur during the installation of the required repairs.
3. Once abandoned, additional shores were installed, shoring support elements were left in place and the shoring platform was positioned in a manner to provide asset protection. These steps were meant to be a temporary or short term solution to assist with the protection of the damage elements.
4. The structure remains unsafe and is very vulnerable to further damage or partial collapse while left in its current unrepaired state.



Observations:

5. Upon arrival at the site, the hangar was locked up and not accessible as previously recommended.
6. We did not observe any wood material or other debris which had fallen from the existing framing to the hangar deck below.
7. It was not apparent that further damaged had appeared since our last site visit and the monitoring program has been discontinued.

Conclusions:

8. Overall, the hangar structure has existed well past its original design life. Varying levels of damage exist to other parts of the timber framing, beyond that of the work outlined in the Emergency Truss Repair work. Subsequently, the level of repair required to return the hangar to its original deficient state is excessive and cost prohibitive.
9. The shoring and platform shoring, which were left in place as a means of providing short term asset protection were only intended to be short term. Previous discussions had placed the time limit describing "short term" at roughly -3 years maximum.
10. Further, in its current unrepaired state, the structure is far more vulnerable to sustaining further damage and even experiencing partial collapse of areas from earthquake and/or high wind loading.
11. Finally, it is my professional opinion, that the structure left in its current unrepaired and unsafe condition is likely uninsurable.

Based on my discussion above, it remains my professional opinion that the hangar is unsafe, should not be occupied and could become a potential site hazard from seismic and/or high wind forces. In addition, the work required to return the hangar to a limited Occupiable use level, is extensive and undefinable and further, the necessary work required would be cost-prohibitive and is therefore not salvageable.

This concludes my structural site visit observation report and status update on the existing hangar 3 structure. Please feel free to contact me if you have further questions or comments.

Very truly yours,

A handwritten signature in blue ink, appearing to read "Blake W. Dilsworth". The signature is fluid and cursive, with a prominent initial 'B'.

Blake W. Dilsworth, S.E.
Principal

Appendix B Historic Property Information

B.1 NAS Sunnyvale Historic District National Register of Historic Places Nomination (1994)



United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name United States Naval Air Station Sunnyvale, California- Historic District
other names/site number U. S. Naval Air Station Moffett Field - Central Historic District

2. Location

street & number Central District not for publication
city, town Naval Air Station Moffett Field vicinity
state California code CA county Santa Clara code CA 085 zip code 94035

3. Classification

Ownership of Property		Category of Property		Number of Resources within Property	
<input type="checkbox"/> private	<input type="checkbox"/> public-local	<input type="checkbox"/> building(s)	<input checked="" type="checkbox"/> district	Contributing	Noncontributing
<input type="checkbox"/> public-State	<input checked="" type="checkbox"/> public-Federal	<input type="checkbox"/> site	<input type="checkbox"/> structure	<u>40</u>	<u>54</u> buildings
		<input type="checkbox"/> object		<u>1</u>	<u> </u> sites
				<u>2</u>	<u> </u> structures
				<u>43</u>	<u> </u> objects
					<u>54</u> Total

e of related multiple property listing: _____

Number of contributing resources previously listed in the National Register 1

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this nomination request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property meets does not meet the National Register criteria. See continuation sheet.

Signature of certifying official _____ Date _____

State or Federal agency and bureau _____

In my opinion, the property meets does not meet the National Register criteria. See continuation sheet.

Signature of commenting or other official _____ Date _____

State or Federal agency and bureau _____

5. National Park Service Certification

I, hereby, certify that this property is:

entered in the National Register.
 See continuation sheet.

determined eligible for the National Register. See continuation sheet.

determined not eligible for the National Register.

removed from the National Register.

other, (explain:) _____

6. Function or Use

Historic Functions (enter categories from instructions)

Defense Naval Facility
Air Facility

Current Functions (enter categories from instructions)

Defense Naval Facility
Air Facility

7. Description

Architectural Classification
(enter categories from instructions)

Late 19th and 20th Century Revivals
Mission/Spanish Colonial Revival
Other: Dirigible Hangar
WW II Blimp Hangar (2)

Materials (enter categories from instructions)

foundation concrete
walls stucco
roof clay tile
other terra cotta panels

Describe present and historic physical appearance.

SITE DEFINITION

The site consists of a large number of buildings that were constructed over an approximately 60 year time frame from the early 1930's until today. The buildings are clustered in a formal campus-like layout that is defined by a western-facing gated entrance and a very well tended landscape which includes mature specimen trees, shrubs, and manicured lawns.

The site can be easily divided into its stylistic components that also define the different eras of construction over the base's lifetime.

The oldest and most historically significant buildings, from an architectural and engineering standpoint that form a coherent core, include the formal cluster of buildings dating from 1933 that lead up to, and include, the imposing Hangar #1 (the original dirigible hangar) and WWII Blimp Hangars. This area of the base is bounded by Bushnell Road on the north, the automobile parking spaces behind Sayre Avenue on the east, Westcoat Road on the south; and the entry, Clark Road, on the west. The central area is laid out in an axial plan in a northeasterly direction with the original buildings symmetrically placed along a grand central greensward. In addition to this very defined central space where the earliest major base buildings are located, there is an equally significant adjunct of 9 officers' residences clustered around Berry Drive just to the south of the main gated entrance in another formally laid out plan with grass medians, a grass island at the end of the southern cul-de-sac, and a characteristically suburban curved residential street. In keeping with the symmetry that was so strong to the original plan, another unbuilt residential complex was originally planned for the northern side of the entrance drive.

These earliest buildings, which were designed by the Navy Department Bureau of Yards and Docks, exemplify California's most popular contemporary architectural style of the 1920's and early '30's. They are constructed in a late Spanish Colonial Revival architectural style (a style that was equally as popular in government construction in the eastern sections of the United States during the 1920's and into the early 1940's), as well as aspects that presage the modern designs of the Internationalist styles which would predominate in American architecture for the next thirty-five years (from approximately 1940 to 1975) .

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: NOMINATION

PROPERTY US Naval Air Station Sunnyvale, California, Historic District
NAME: t

MULTIPLE
NAME:

STATE & COUNTY: CALIFORNIA, Santa Clara

DATE RECEIVED: 1/13/94 DATE OF PENDING LIST: 1/26/94
DATE OF 16TH DAY: 2/11/94 DATE OF 45TH DAY: 2/27/94
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 94000045

NOMINATOR: FEDERAL NAVY

REASONS FOR REVIEW:

APPEAL: N DATA PROBLEM: N LANDSCAPE: N LESS THAN 50 YEARS: N
OTHER: Y PDIL: N PERIOD: N PROGRAM UNAPPROVED: N
REQUEST: N SAMPLE: N SLR DRAFT: Y NATIONAL: Y

COMMENT WAIVER: N

ACCEPT RETURN REJECT 2/24/94 DATE

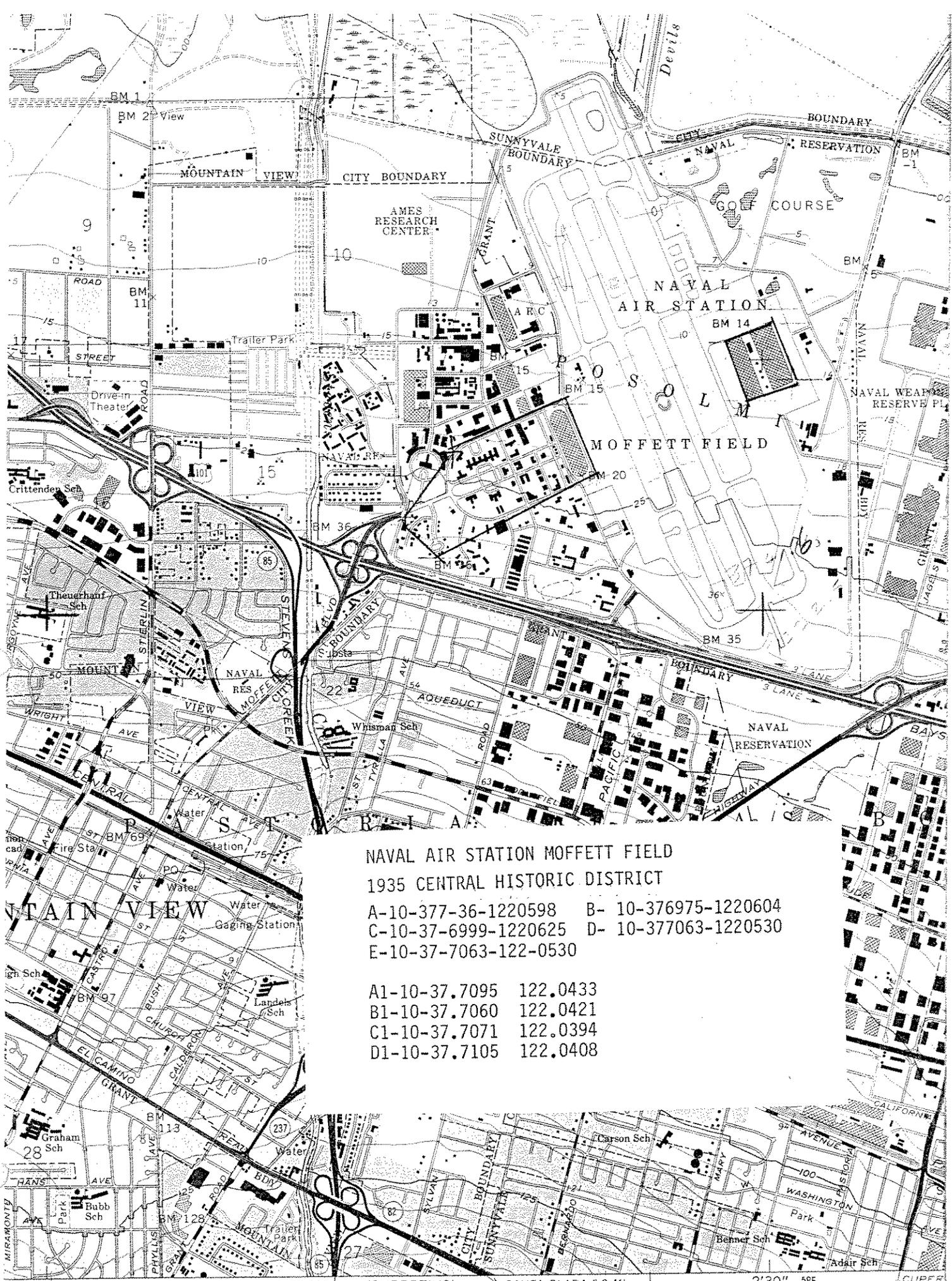
ABSTRACT/SUMMARY COMMENTS:

The U.S. Naval Air Station Sunnyvale, California Historic District is eligible under NR criteria A and C in the areas of Military History, Architecture, and Engineering. The discontinuous district represents a rather unique and significant episode in the development of U.S. naval aviation prior to World War II. The Sunnyvale base was one of two Naval Air Stations built to port lighter-than-air dirigibles during the 1930s. Dirigible Hangar #1, the later blimp hangars # and #3, and their accompanying support buildings all represent excellent examples of early twentieth-century military planning, engineering, and construction.

The three enormous airship hangars represent significant engineering accomplishments and they are among a limited number of extant historic airship facilities in the United States. The core of the historic Naval Air Station--centered on a landscaped "common" and dominated by the looming airship hangars--remains largely intact and includes fine regional examples of Spanish Colonial Revival design.

RECOM./CRITERIA Accept A+C
REVIEWER Paul R. Buisson
DISCIPLINE Historian
DATE 2/24/94

DOCUMENTATION see attached comments Y/N see attached SLR Y/N



NAVAL AIR STATION MOFFETT FIELD
 1935 CENTRAL HISTORIC DISTRICT

A-10-377-36-1220598 B- 10-376975-1220604
 C-10-37-6999-1220625 D- 10-377063-1220530
 E-10-37-7063-122-0530

A1-10-37.7095 122.0433
 B1-10-37.7060 122.0421
 C1-10-37.7071 122.0394
 D1-10-37.7105 122.0408

HISTORIC DISTRICT BUILDING LIST

<u>Building</u>	<u>Contributing/ Non-Contributing</u>	<u>Building</u>	<u>Contributing/ Non-Contributing</u>
1	C	79	NC
2	C	81	NC
3	NC	85	NC
5	C	86	NC
6	C	87	NC
12	NC	93	NC
13	NC	115	NC
14	NC	117	NC
15	C	123	NC
16	C	133	NC
17	C	175	NC
18	C	333	NC
19	C	338	NC
20	C	346	NC
21	C	350	NC
22	C	351	NC
23	C	367,389	NC
24	C	396	NC
25	C	440,460	NC
26	C	470	NC
29	NC	472	NC
31	NC	478,482	NC
32	C	493	NC
33	C	498	NC
34	NC	499	NC
36	NC	501	NC
37	C	509	NC
38	NC	510	NC
40	NC	527	NC
44	NC	542	NC
45	NC	553	NC
46	C	566	NC
47	C	567	NC
55	C	569	NC
64	NC	570	NC
67	NC	753	NC
76	NC	941	NC
		942,943	NC

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 7 Page 2

This hybrid style forms a unifying element that not only holds the myriad of architectural uses together, but gives the entire complex a very satisfying central theme. The style is highly ornamented in the most significant buildings (such as the Administration and Bachelor Officers' Quarters) and stripped of ornament, but no less supportive of the whole in the smaller out buildings and garages. Interestingly, the building that is the raison d'etre of the entire Naval Air Station, Hangar #1, eschews any historicism in its design, but rather reflects the highest Streamline Moderne forms of modern technology at its finest.

Another slightly newer cluster of buildings is also defined by their distinctive architectural style which reflects the most popular designs of their time. These buildings are those structures which were built in the 1940's and early '50's and that are designed in a very plain International style of architecture defined by the simple stripped geometrical forms of the structures. These interesting examples are located at a few scattered sites within the original plat noted above (i.e. the Post Office, #67, for example), as well as being set in a long row along Dailey Road between the original campus plan and the Bayshore Freeway (#152). Other noteworthy buildings include the Control Tower (#158) at the far eastern edge of the site and the original Chapel Building (#86), which is a reinterpreted hybrid style that exhibits aspects of both a stripped Spanish Colonial Revival design and ornament hinting at more of a Mission Revival style. Additionally, two slightly smaller, but no less impressive hangars (Hangar #2 and #3), were constructed across the runways to the east of Hangar #1. These buildings were designed for the smaller blimps that replaced the huge rigid framed dirigibles of the 1930's for which Hangar #1 was designed. They also were designed in a much more prosaic and conventional architectural style than the metal sheathed futuristic Hangar #1.

A building that provides visual compatibility with the 1930's Spanish Colonial Revival buildings is the Chapel. This is due both to its physical location within the historic district, as well as to its architectural design, which is much more compatible with the older buildings on the base rather than the later International styled buildings. Early photos of the building illustrate a structure whose basic form of rather simply pitched cruciform plan appears to be very standard designed archetype military base chapel of the 1940's. But to this basic form, the designers add very site specific detailing which, though not technically a re-creation of the Spanish Colonial Revivals around it, very handsomely picks up hints of the building characteristics of the older structures. These details include, most importantly, the cupola which mimics the tower on the Administration Building, and the projecting curvilinear portico with its stone-like entry frame which takes directly from the Spanish Colonial Revival interpretations surrounding. The end result is an almost textbook example of a successfully designed new structure sensitive to an established architectural campus. Because the chapel was constructed well after the 1933 period it is not a contributing building to the historic district.

Because the International style buildings are less than 50 years old and are not individually exceptional, they will not qualify for listing in the National Register at this time and will not be discussed in any detail. This group consists of buildings 148-156, 158 and building 67.

United States Department of the Interior
National Park Service

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In addition to these two major stylistic groupings, there are a number of other buildings on the site that have been constructed over the past approximately 50 years that fill up the site, but do not represent very fine examples of architectural design. These buildings are characterized by their utilitarian function, such as the number of Quonset huts (#111, #118 and #119) found throughout the site, as well as the plethora of small wooden and stucco buildings with little discernible styling that comprise much of the barracks, enlisted housing, shopping and warehousing spaces (#E-52, #E-13, #E-29, #347, #223, #245, and #244).

Thus from a specific design standpoint, the site can be divided into the following five main components that comprise its strongest identifying features:

- A. Original Spanish Colonial Revival Design
- B. Significant Engineering Features (Hangars #1,#2,)
- C. Miscellaneous Supportive Design Features
- D. Post 1935 buildings designed in the Spanish Colonial Revival Style
- E. International Style Buildings from the 40's

Out of these five categories, the proposed historic district from the 1930's will include all those features identified with item "A, B & C" immediately above.

A. ARCHITECTURAL DESCRIPTION OF THE SPANISH COLONIAL REVIVAL-DESIGNED ORIGINAL BASE BUILDINGS.

The original plan of Moffett Field was constructed in an architectural style that had as its antecedent the exuberant and capricious ornamentation applied by the 17th Century architect, Jose Churriguere, and eloquently revived by Bertram Goodhue in the design for the 1915 San Diego Panama Pacific Exposition. The Navy first attempted the style at Chollas Heights Radio Transmission Station in 1916 and followed with Goodhues' Marine Corps Recruit Depot, c. 1920, Naval Air Station North Island, c.1921, and his sketches for the Naval Training Center in San Diego, a year or so later. This form of Spanish Colonial Revival design reached its zenith at the end of the 1920's and was gradually losing favor to the modern designs of the mid-to-late 1930's. By the 1940's only some very late examples, usually transitional in styling that reflected the rise of both modern schools of architecture (Moderne and Deco styles, as well as the later International or Bauhaus-influenced styles) were being built.

The complex of original buildings that comprise the heart of the Naval Air Station Moffett Field are examples of late Spanish Colonial Revival design reflecting a much more severe example of this style with strong influences of the more modern style precepts, as well as hints of Eastern Colonial designs. The resulting hybrid significantly alters the original architecture of this style.

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These buildings are characterized as essentially two-storied white or off-white stucco structures that are capped by very low-pitched Spanish tile roofs, which are punctuated by projecting chimneys, air ducts and, in the case of the true centerpiece building, the Administrative Building (#17), a richly ornamented, roof pavilion where corner columns support a decorated dome. The buildings are all rectangular in plan with either central projecting spaces or corner wings. Wall surfaces are very plain with the major break up of space occurring either in the location of rectangular-shaped windows, slightly projecting stringcourses between the floors, round arched entryways or arcaded ornamentation styled to look like granite around the major entry doors and surrounding significant window spaces.

It is the variation of the above major design elements that define the original base architecture. The two most handsome entrances are the round arched arcades that distinguish both the aforementioned Administration Building and the equally impressive Bachelor Officers' Quarters (#20). Repeated ornamentation include the flattened urn motif, various cartouches, and quarter-foil windows found along the exterior surfaces of all the major structures. The juxtaposition between the flat surfaces of the exteriors contrasting with the florid ornament around the major doors and windows provide the perfect tension that distinguishes the Spanish Colonial Revival style. A notable somewhat stripped example of this style is the impressive original Aircraft Tower (#18).

Some of the minor out-buildings, although stripped of much ornamentation, exhibit sensitive design features such as the low stepped parapets of buildings #22 and #2, the repeated multilight apertures of #10, and the simple, yet distinctive massing of the original portions of #6, which acts to reinforce the common design theme throughout the historic core. All of these original outbuildings significantly reinforce the common design theme of the historic campus.

The second cluster of original buildings, which forms an equally impressive uniform design statement, is found in the earliest residential units of the detached officers housing. In this extremely pleasant space, made so by its luxuriant landscaping and large unbroken lawns, a very simple house plan is repeated with only slight variations. The structures are designed in a very stripped and somewhat severe Spanish Colonial Revival style with two-storied, rectangular plan residences joined to a garage, either a one or two storied garage, by an arcade. The roof lines are low pitched gables that are sheathed in red Spanish tiles and punctuated by end fireplaces. Apertures are symmetrically placed on the structures with the dominant design characteristically reserved for the front entry. Windows are generally rectangular in shape, double hung and 3 over 2 in design. As with the major buildings on the working base section, here two stringcourses and various door surrounds provide the major contrast to the very simple stucco walls. Additionally, a similarly designed structure forms a prominent security building at the front gateway.

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B. DESCRIPTION OF THE ORIGINAL ENGINEERING FEATURES (HANGARS #1, #2, AND #3)

Completely separate in design, but of such striking style and size as to warrant separate discussion are the three buildings that form the raison d'être of the entire complex. The three hangars are of such proportions that for this reason alone they warrant the title "landmark". Aesthetically, the original hangar, which was constructed to hold USS MACON, a dirigible, is of such a unique design that it stands apart even from its later sister buildings. Hangar #1 is a metal sheathed behemoth whose rounded shape is both the epitome of the aerodynamically influenced Streamline Moderne style as well as a stylistic cousin to the huge airship that originally berthed inside the mammoth hangar.

Above all other buildings found on the Moffett Field site, Hangar #1 is without question the most significant building both architecturally and historically. It is one of the major buildings of Northern California, and has been recognized as an Engineering Landmark by the American Society of Civil Engineers.

Hangars #2 and #3 are significant more for their size than their unique styling or design. They represent more prosaic attempts at constructing very large military hangars. Similarly designed structures are found on Marine Corps Air Station, Tustin, California and at Coos Bay, Oregon. The more common design does not, however, detract from the sheer magnitude of the two huge buildings side by side. Along with Hangar #1, these two buildings help define the south San Francisco Bay Area from all distant directions.

C. DESCRIPTION OF THE OTHER SUPPORTIVE DESIGN ELEMENTS (I.E. LANDSCAPING, GATEWAYS, ARTWORK AND ITEMS OF INTEREST IN THE LANDSCAPE, STREET LIGHTING, AND SIGNAGE)

The third and final group of elements add immeasurably to the quality of design cohesion that characterizes the Naval Air Station Moffett Field site. These elements support the physical layout of the site plan as well as the quality of the original historical architecture. They also help define the campus-like quality of the base as well as unify the disparate building styles and types.

Most prominent of these supportive elements is the landscaping. The ubiquitous mature trees, the huge green spaces, and the careful placement of plants and shrubs which add immeasurably to the mise-en-scene. The luxuriant and well tended landscape is the first feature which one experiences after passing through the entry gate. Early photos of the site show a very desolate natural landscape which was essentially bay lowlands. Blueprint plans from April 29, 1933 illustrate the importance that a unifying and coordinating landscaping plan for the air station had in forming the basis for today's superlative luxuriant landscape. There could be no doubt that the existing grounds could not have been produced without a well conceived original plan.

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Of almost equal importance in differentiating the site from its surroundings is the entry wall and gate itself (#36). Although very restrained in design, the gate forms a physical entrance into the unique area from the very bland surrounds. It should be noted that the wall, gateway, and gatehouse all derive from the original base architectural design plan.

Street furniture, interesting items on the landscape, and street lighting also add to the unique quality of the site. The furniture includes a detached community message board, a sundial and an historic anchor, both in front of building #25, as well as within the central greensward. The street lighting still retains its original bases, but the lamps themselves, from a later '50's design, are somewhat inconsistent with the Spanish Colonial Revival buildings of the historic core. Replacement with a more original form should be encouraged.

Signage too helps add to the unifying elements of the site. It is, most prominently in the historic core, understated in blue with gold lettering which is very supportive of original high design standards. Such attention to detail should also be encouraged to continue. For it is in the sum of all of these disparate features that the whole of a unique and memorable built environment results.

INDIVIDUAL SITE DESCRIPTIONS:

The following descriptions define the special design characteristics that distinguish the architecturally significant buildings from the 1933 plan (with two notable exceptions being a description of the 1943 designed Hangars #2 and #3).

HANGAR # 1: BUILDING #1

The site consists of a very large (1140'x308'x194') single-story, dirigible hangar that is constructed with three hinged steel truss arches and "X" cross bracing that is sheathed in large metal plates and set on a huge rectangular-oriented, elliptical shaped, floor plan and designed in a slightly flattened parabolic form. The structure further exhibits four rows of very large rectangularshaped and horizontally-oriented window bands along its two dominating eastern and western facing flanks. These apertures appear flush with the immense metallic skin of the building and greatly add to the very futuristic aerodynamic effect of the design.

Of particular engineering note are the hangar doors that run the full height of both the north and south-facing elevations. These doors are retractable and form a halfdome shape when closed.

The building exhibits a very clean, Streamline Moderne design which perfectly mimics the form of the airships themselves. Located perpendicular to the axis of the station plan this dominate structure provides the focus of the 1933 station plan.

The mammoth structure designed to hold fully inflated giant dirigible airships from the 1930's military fleet (such as USS MACON) was actually constructed in 1932 preceding the buildings of the surrounding base which date from 1933. The structure is important due to its unique use (dirigible hangar), beautifully executed Streamline Moderne architectural design, ingenious

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engineering construction; and for its very size that still dominates a greatly urbanized Santa Clara County in the 1990's. From all aspects of national landmark status criteria, this building qualifies on its own. When added within the context of the surrounding supporting campus plan, the entire ensemble forms a very unique sense of place within the built environment and continues to exhibit national prominence.

HANGAR #2 AND #3: BUILDINGS #46 AND #47

The site consists of twin hangars that were designed for the, blimp fleet during WWII. They are of treated California redwood frame construction, configured on a rectangular plan in a more flattened parabolic form than Hangar #1; and characterized by their immense, moderately pitched porticoes at each of the north and south-facing hangar doors. These dominating entries are supported by very large concrete piers at each of the four corners. The twin buildings are set on a site plan that is directly oriented with the earlier Hangar #1, which is due west. The scale of the structure is exemplified by their dimensions, which at 1,075'x297'x171' (180,518 sq. ft.) make them slightly smaller than their predecessor, but still very impressive on the landscape. The use of wood construction instead of a steel truss system was in response to the war effort. Like most west coast military facilities constructed after 1941, metal was used very sparingly to conserve the resource for use in constructing ships and armament.

The design of these two buildings is in a much more conservative architectural style than the futuristic form of Hangar #1. These later hangars are almost domestic in their gabled porticoes. They definitely lack the daring and ingenuity of the other hangar's form and they are much less a unique design to the area. In fact, four other structures of like design were built on the west coast during World War II, to house the blimps used to patrol the Pacific coastal waters of the United States. Two in Coos Bay, Oregon which are no longer owned by the Federal Government and two on what is now Marine Corps Air Station, Tustin in Southern California. All four of these structures have been nominated to the National Register.

Although not of equal architectural or design merit as Hangar #1, these two like-structures are significant from both an historic perspective (as excellent extant examples of WWII blimp hangars) as well as an architectural/engineering perspective (they are after all buildings of incredible size and stature upon the landscape). The twin structures further add to the important design whole of the best of the original 1933 plan and the just slightly less impressive structures from the 1940's which help in-fill much of the site. They were completed in 1943. The combined visual power of Hangars #1, #2, and #3 form a physical presence upon the urbanscape which still dominates the low horizontal design of the Santa Clara Valley.

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ADMINISTRATION BUILDING: BUILDING # 17

The site consists of a two-story structure that is constructed on a shallow cruciform rectangular floor plan which is built of wood and sheathed in stucco with red Spanish tile roofing and terra cotta ornamentation, especially notable in the window and door surrounds. The building is the most prominently sited structure within the 1933 campus plan. It is set in the very heart of the open grassy median as a definite center point to the original plan. Its architectural design represents a late example of Spanish Colonial Revival style with some modifications that give it a kinship with Eastern military bases of the same vintage (that were designed in dry formal interpretations of Colonial Revival).

The building is 148'x41 'x37' and contains 18,954 sq. ft. The structure is characterized by the features which define all of the original buildings: the very low pitched, slightly hipped and tiled roofline. Exterior walls are flat and devoid of ornament, save a stringcourse running the entire perimeter of the building and separating the two stories. The eave line is very shallow. Windows are simple, rectangular in plan, vertical in orientation, multi-paned and double hung. Overscaled terra cotta ornamentation define the major front and back entrances, as well as the centered second story window. The main or west-facing entrance projects out from the main structure and exhibits a triple round-arched, recessed entrance.

Ornamental urns, pilasters and floral design (characteristic of Churrigueresque Spanish architecture of the 17th Century) add a much needed ornamental counterpoint to the very simple and severe basic design.

A further feature which distinguishes this structure among all of the others in the original campus plan is the small centered Bell Tower. This small belvedere is capped by a diminutive, red-colored dome and distinguished by very flat arches at each of its four faces. This architectural style is much more characteristic of the colonial designs of the Eastern United States and is a major factor in classifying the overall base design as a modified Spanish Colonial Revival style.

With the nearby Bachelor Officers Quarters and the Married Officers' Residencies, the Administration Building, (which is also historically referred to as the Admirals Quarters) is the most architecturally important building from the original 1933 construction (excluding Hangar #1). This building sets the design criteria that is followed throughout the original campus plan. It acts both as a handsome example of hybrid revivalist architecture which is prominently set at the most important axial juncture of the site and as one of the most lavishly ornamented of Moffett Field's original structures. As such, the Administration Building is a key to the historic fabric of the site.

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BACHELOR OFFICERS QUARTERS: BUILDING #20

The site consists of a large, two-storied structure that was constructed on an irregular rectangular shaped site plan which is actually symmetrical in form. The building exhibits a more ornamented interpretation of a hybrid Spanish Colonial Revival architectural design. It is characterized by the same basic features that distinguish all of the original buildings. The roofline is lowpitched and sheathed in red Spanish tile, the eave is fairly shallow, wall surfaces are unadorned white stucco; and window shapes are paired rectangular forms which are double hung, 3 over 2 in form. Major entrances are distinguished by terra cotta facing that emulates granite. Three large round arches provide the building with a very elegant entryway. Flat unadorned pilasters separate these arches. They are further adorned with flat urn detailing. The characteristic stringcourse separates the two floors. A rear wing projects toward the south.

The structure is sited symmetrically across from the equally prominent, but slightly less architecturally impressive, Bachelor Enlisted Quarters (#19) which has been greatly enlarged with a rather bland International Style addition at both ends. The structure is further enhanced by a well conceived and equally well maintained landscape plan.

Along with the cluster of major buildings that are set along the formal axis of North and South Akron Roads, the BOQ helps define the high quality design character that distinguishes the historic core of Moffett Field. The structure is an extremely fine example of historicist architecture of the 1930's and remains a key element in the cohesion of the base's physical form.

GYMNASIUM: BUILDING #2

The site consists of a very large, single-story, plaster-sheathed, steel framed building that is constructed on a slightly irregular rectangular floor plan with a flat roof that is distinguished by slightly projecting stepped parapets that hint at the utilitarian designs of the original campus plan of 1933. The roof is wood sheathing on steel beams. This structure exhibits a ubiquitous projecting stringcourse encircling the building, as well as the very plain beige plaster walls. The major design feature on this essentially utilitarian structure is in the window placement. Here, the structure is characterized by very tall, horizontally-banded, multi-paned apertures which act to break up the surface of the exterior walls either as centered indentations on large expansions of plaster or as repeated forms which act almost like columns along the major side elevations.

This structure avoids, as do all of the original functional outbuildings, the Spanish Colonial Revival design of the major living areas of the base. Interestingly, it provides a handsome architectural bridge between the very futuristic Streamline Moderne design of Hangar #1 and the more historicist styles of the original campus plan.

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The site is significant both historically and architecturally. It was originally constructed to be a balloon hangar which justifies its extremely large interior single story space (19,691 sq. ft., 130'x88'x63'). Additionally, the building sets the reserved design criteria for the outbuildings on the base which handsomely support their more ornamental Spanish Colonial Revival contemporaries. Features which characterize these original outbuildings include flat roofs, shallow parapets which are slightly stepped; and severely unadorned exterior walls. Windows are rectangular in form and provide the dominant design ornamentation.

Although these buildings do not provide the obvious ornamentation, stylistic historicism or landscaped surroundings of the more apparently significant original Spanish Colonial Revival structures, they exemplify an extremely sophisticated design criteria of their own which greatly adds to the overall cohesion of the existing campus. In their own right, the Gymnasium, along with similarly designed original 1933 outbuildings such as the Garage (buildings #21 and #22), are major factors from the original 1933 design which make NAS Moffett Field so architecturally distinguished.

BUILDING #23, INSTRUCTION BUILDING

Fronting on Akron Road, the former dispensary is one of the buildings that defines the original architectural design and is symmetrically placed, opposite building #25, to balance the entrance to the base's formal plan. The two story, above grade, building is basically a "T" form executed with the typical elements of the Spanish Colonial Revival architecture, low pitched tile roof, stucco sheathing and terra-cotta ornamentation. The front facade has a central entrance recessed behind three arched openings that form an arcade. Terra-cotta surrounds decorate the three windows above the entry and the doors at the east and west ends. The building, originally the base dispensary, was enlarged by the U.S. Army's Air Corps in 1936, when extensions were added to the rear and the east end. The building is 105 feet by 96 feet and 10,995 square feet of floor space.

Of the original buildings, #23 and #25 are significant because of their representation of the Spanish Colonial Revival design and for their locations at the entrance of the working station. Opposite each other, across the central lawn mall, these buildings provide symmetry to the original plan.

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BUILDING #25 THEATER

The theater, two stories over a basement, is a typical example of the significant supporting buildings that define the original architecture. The "T" form is executed with a low pitched tile roof, stucco sheathing and terra-cotta ornamentation. The typical protected entry is behind an arcade that, in this case, is projected forward. The fenestration, again typical of the dominant style, is symmetrical for all floors except those voids above the entrance. Here the pattern changes to a band of windows divided into three elements that balance the three arches of the arcade. The building is 150 feet by 110 feet in an irregular plan that accommodates 7,745 square feet of floor space.

BUILDINGS #21, #22 AND #24 - GARAGES

This group of detached garages are supportive elements in the historic district. Each is one story and is constructed using typical materials and simple forms of the ancillary buildings. Buildings #21 and #22 retain the original use and design, including corner parapets. The buildings, located behind Building #20, are almost identical, 98 feet by 24 feet with garage door openings facing each other. Building #24, located behind Building #23, was the ambulance garage. It is smaller 45 feet by 30 feet. The large garage door openings have been infilled and the interior space modified for administrative offices.

The garages are significant supportive buildings that compliment the architecture of the larger buildings. Building #24 retains the original mass and form but, the alterations have changed its appearance as a garage.

BUILDING #10 - HEAT PLANT

One of the original buildings, the heat plant is a large industrial building of block massing in an irregular "T" form that is two stories in height. A single story element fits into the south west corner. Typical of power plant design, the dominate feature is the fenestration. This building has window banks that extend to the second story. A coursing separates the massing with smaller rectangular windows above the band. In keeping with the dominant architecture, this utilitarian building is decorated with a simple surrounds at the entrances. Flat arches top the tall window banks. The glazing is rectangular pane divided mullions. Most of the first floor windows have transoms that are operable. While the upper rows are all operable. A second coursing divides the lower portion of walls at about four feet, the basement line. Building #10, is sheathed in stucco with a flat roof. This building is a handsome version of a utilitarian industrial design.

The heat plant is one of the original buildings. It is significant as an example of the dominate architectural design stripped to the essence, entrance surrounds and arched windows, for industrial use.

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STRUCTURE #5 - Water Tower:

Supported by a tall steel frame, the water tank is topped with a conical roof. The traditional red and white checkered paint defines this classic industrial design. One of the original structures, the water tower is a functional and visually distinctive feature.

BUILDINGS A THROUGH I AND ANCILLARY GARAGES A-1 THROUGH I-1

REPRESENTATIVE SINGLE FAMILY RESIDENCES (COMMANDING, SENIOR AND JUNIOR MARRIED OFFICERS QUARTERS):

The original 1933 detached residential structures are all designed in a like architectural style of which any single building represents an archetype for the whole. The example used here is site #A1, which is referred to in the 1933 landscape plan as the "Commanding Officers' Quarters".

The site consists of a very simple, two-storied, rectangular-planned single family residence that is constructed of wood frame with a low gabled red Spanish tiled roof over a very plain stuccoed exterior (which is punctuated by a formal placement of both windows and doors). A simple chimney adorns the western facade. An attached single-storied, round-arched breezeway connects the residence with a large, two-storied, rectangular-planned garage set slightly behind the main structure.

Stylistically, the residence reflects all of the specific design criteria which unifies all of the original 1933 Spanish Colonial Revival architecture on the base. Windows are almost flush with the plain exterior walls. They are also essentially rectangular in shape, double hung, multi-paned and symmetrically placed along the facades. A colored, projecting stringcourse separates the two stories. The front entry is the most prominent exterior feature with a slightly recessed almost flat arched entry with projecting surrounds. An ornamental sidelight window is balanced by a large wrought iron projecting lamp on both sides of the main entrance.

Landscaping is characteristically both formal and very well maintained. The very large mature trees add immeasurably in setting apart the residential quarter as an oasis amid the functioning base. The open greenswards that distinguish the street directly tie in with the more formal axial plan of the rest of the base. The curved street pattern illustrates the influence of contemporary suburban design on such residential planning even on a military base.

The original 1933 detached residences form a key architectural component in the significant whole that distinguishes the site plan of the naval air station. Along with the verdant landscaping and extra wide spacing, this enclave of buildings helps define all that is special about the site from a design perspective.

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CONTROL TOWER: (AEROLOGICAL BUILDING FLIGHT CONTROL TOWER) BUILDING #18

The site consists of a moderately-sized (3590 sq. ft.), two-storied building with a centered third story, hexagonal-shaped Control Tower. The structure is designed on a slightly varied rectangular floor plan with a very minimal attempt at exterior ornamentation. It is another of the utilitarian structures from the original plan that exhibits hints of the Spanish Colonial Revival design of the major buildings (in the centered round arch, the overscaled twin wrought iron Spanish styled lamps on both sides of the entry and the ubiquitous terra cotta surrounds ornamenting the front door). Otherwise, this structure is very simple in its design. Its walls are unadorned plaster. Windows are slightly recessed, rectangular in plan, multi-paned, double hung and symmetrically placed along the exterior facade.

The hexagonal tower is, along with the projecting metal tower above, the most distinguishing feature of the structure. It is characterized by its band of vertically oriented windows on each of the eight faces, as well as the iron railing which caps the flat-roofed tower from above.

The building's significance is due both to its history as the original Control Tower for the air station, as well as to its architectural design which once again exemplifies the sophisticated aspects of the original 1933 plan. The structure provides a transition between the more historically refined Spanish Colonial Revival architecture and the simple, yet equally impressive, more modern styles of the utilitarian outbuildings. It is the cohesion provided by the interaction between these two styles that provide the stylistic excellence of the historic core plan.

TWIN SMALL TOWERS (FLOOR WATCHTOWERS): BUILDINGS #32 AND #33

These two twin sites (#32 and #33) consist of very small, two-storied towers that are distinguished by their very unusual design. They are towers that are distinguished by their very unusual design. They are very small structures (578 sq. ft., 14'x14'x25') that appear to be composed of a standard two-story rectangular tower with flat roof joined to a slightly smaller two-storied rounded tower with like flat roof that is capped with metal railing. The buildings are very simple in form. There are really no specific architectural embellishments. They exhibit all of the standard features of the utilitarian structures on the base without any ornament. Recessed, double-hung, multi-paned windows provide the major characteristic design feature which ties them into the surrounding historic core buildings. A prominent projecting stringcourse characteristically separates the two floors.

The significance of these two small utilitarian buildings is primarily in their unique function and form. They are very site specific and add a distinctive counterpoint to all of the rectangular shaped structures on the base. They are architectural curiosities that add immeasurably to the historic and architectural importance of the site.

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INTERIOR SPACES:

Naval Air Station Moffett Field has been in continuous use since it was constructed. During the years the interiors of the buildings were altered to accommodate changes in uses and space requirements. The alterations have redesigned the original interior space plans, removed the original surfaces and changed the spacial feeling of the interiors. Due to the alterations, the interiors do not retain architectural integrity or historic significance.

NON-CONTRIBUTING BUILDINGS

Within the boundary of the historic district the number of non-contributing buildings exceeds the number of significant buildings and structures. This unusual ratio does not diminish the significance or integrity of the district. Most of the non-contributing buildings were constructed after the period of significance and are primarily small utilitarian constructions. The Chapel and heating plant, buildings 86 & 87 were constructed after the period of significance yet are designed in the idiom of the district. Thus, Naval Air Station Moffett Field, despite the imbalance in numbers of contributing and non-contributing buildings, maintains exceptional integrity of the 1933 station plan and architectural design.

The International style buildings were predominately constructed after 1944 and are not 50 years old. Therefore, they are not eligible for listing at this time. The Post Office, building #67, constructed in 1943, one of the finest examples of this style, is not significant as an individual building and should be included with the later International style buildings.

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SIGNIFICANT AND CONTRIBUTING BUILDINGS

<u>BLDG. #</u>	<u>CURRENT USE</u>	<u>ORIGINAL USE</u>
1	Hangar #1	Hangar #1
2	Gymnasium	Balloon Hangar
5	Water Tank	Water Tank
10	Heat Plant Building	Storehouse
15	PW Shop	Fire Station/Laundry/Garage
16	PW Shop	Locomotive Crane Shed
17	CPWP Administration	Administrative Building
18	NAV RES Administration	Aereological Center
19	BEQ	BEQ/Brig
20	BOQ	BOQ/Mess Hall & Galley
21	BOQ Detached Garage	BOQ Detached Garage
22	BOQ Detached Garage	BOQ Detached Garage
23	Instruction Building	Dispensary E
24	Administrative Office Building	Ambulance Garage
25	Base Theater/Recreation Service/Thrift Shop	Bowling Alley/Recreation Building
26	Gate House/Iron Fence	Gate House/Iron Fence
32	Storage	Tank House
33	Storage	Water Tower
37	Scale House	Scale House
A, A1	Officers Housing and Garages	Housing and Garages
B, B1		
C, C1		
D, D1		
E, E1		
F, F1		
G, G1		
H, H1		
I, I1		
46	Hangar #2	Hangar #2
47	Hangar #3	Hangar #3
55	Heat Plant for Hangars #2 and 3	Heat Plant for Hangars #2 and #3

SIGNIFICANT OBJECTS

40	Flagstaff/Commons Memorial Anchor	Flagstaff and Commons Anchor
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Several factors contributed to the commissioning of the U.S. Naval Air Station Sunnyvale on April 8, 1933. Of foremost importance was the vision for the future of aircraft and influence of Admiral William A. Moffett. Appointed by President Harding on July 25, 1924, to be the first as Chief of the Naval Bureau of Aeronautics, Admiral Moffett had already established himself the proponent for increased Naval aircraft as an integral component of the Navy's ability to control the seas off the coasts of the United States. In the 12 years that Admiral Moffett lead the bureau, the U.S. Navy was catapulted into the lasting interlocking strategy of Naval presence in the air as well as the sea. But he also spoke of the future in commercial aviation. In the 1920's, he appears fascinated with the lighter than air technology of the dirigibles. The success of the zeppelins in WWI contributed to the development of the larger dirigibles. This was however, marred by the disasters resulting from the flammability of the hydrogen used to fill the chambers. Each country involved in the hydrogen filled dirigibles experienced tragedy. A memorial plaque in Shenandoah Plaza at Moffett Field commemorates USS SHENANDOAH that was lost with a crew of 14 on September 3, 1925. The largest of the dirigibles, HINDENBERG, burst into flames over Lakehurst, New Jersey in 1937, culminating a series of tragic losses involving the dirigibles and hydrogen. Helium, produced only in Texas and Kansas, had been known to be a reasonable replacement for hydrogen, but was prevented from export by the 1925 Helium Export Act. Moffett began a lobbying campaign to have the U.S. Navy use helium filled dirigibles to patrol the coasts. In Moffett's plan, these giant rigid frame airships would provide the long range observation for the surface Navy below. He believed the dirigibles could be fashioned to carry small planes and might even be equipped with bombs. The idea was not far-fetched. The technology of the 1920's allowed dirigibles which could stay aloft for 14 days and fly 10,000 miles. The lobbying proved successful with the 1926 congressional authorization for two Naval dirigibles capable of carrying aircraft and a new aircraft base for the west coast. The dirigibles were to be built by the Goodyear-Zeppelin Corporation in Akron, Ohio. The first to be completed was based at Lakehurst, New Jersey. The selection of the site and construction of a base to service the second would be undertaken on the west coast.

The west coast site appeared to be slated for Camp Kerney near San Diego when the northern California politicians realized the opportunities to be created and forced the federal planners to accept applications from the entire west coast. Applications were received from 997 locations. San Francisco mayor, James Rolph, saw the benefit to the Bay Area even though his city did not have a site suitable for the base. The appeal was for 2,000 acres with unobstructed approaches, clean water, rail access and good flying weather was heard by Mrs. Laura Whipple, a recently established real estate broker from the East Bay. Familiar with the Sunnyvale area, she selected the Rancho Unigo, a former Indian Reservation, that seemed to meet all the criteria. Appointing herself "Chairman of the Landholders Commission", she obtained an option for 1,750 acres at the price of nearly \$500,000. She wired San Jose congressman, Joseph Free, that a perfect site for the dirigible base had been located and optioned. The proposal from San Diego offered free land; in order for the Sunnyvale site to be selected the same offer would have to be made. Under

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the leadership of presidents of the Chambers of Commerce from Mt. View and San Jose, a campaign to raise the funds and solidify the offer went forward. The newspapers, including the San Jose Mercury Herald, were enthusiastically in support of the proposal and offered publicity and public relations material to support the proposal. After three years of study and debate, it was time for a decision. On December 28, 1930, the vote registered by the House Naval Affairs Committee for H.R. 6810, introduced by Congressman Free, selected Sunnyvale by 18 to 1 and Camp Kerney as the auxiliary base. As a member of the West Coast Naval Airship Base Board, Moffett had favored Sunnyvale while the Secretary of the Navy, Charles F. Adams, preferred Camp Kerney.

Once selected, the issue remained to raise the money to purchase the land. Under the leadership of A. M. Mortensen, President of the San Jose Chamber of Commerce, the funds were raised and on August 2, 1931, the Chamber's check for \$476,165.90 completed the purchase of 1000 acres of the Rancho Unigo. Also on August 2, 1931, the land was transferred to the U.S. Navy for \$1.00. This completed a long and arduous partnership between the cities of the Bay Area to gain the prestige, jobs and economic interests that would follow the base.

The budget for constructing the base was \$5,000,000. The U.S. Navy of Yards and Docks would be responsible for the design and coordinate the construction. Lt. Commander Earl Marshall was given the responsibility. Ernest Wolf, an experienced engineer from the Goodrich Zeppelin Corporation, was to be the Associate Engineer. Hangar #1, as it would be called, was the most important building and received the first attention. The design had been refined in Akron by Dr. Hugo Ekener, to form a rounded building that followed the form of the dirigible. Enormous curved doors on each end would slide over the building, rolling on 40 wheels over standard gauge railroad track, and propelled by 150 hp electric motors, thus minimizing the turbulence and problems encountered with past designs. In fact, it was the window patterns that dictated the north-south orientation and siting of Hangar #1; the rest of the base followed. Of the \$2,250,000 budgeted for the hangar, \$1,116,044 was awarded to the Wallace Bridge and Structural Steel Company of Seattle to fabricate the steel for the structure and doors. Seims-Heimers, Inc. of San Francisco bid \$398,937 for the roofing, windows and siding on the airdock that would measure 1,133 feet long, 308 feet wide and 198 feet high. The floor area is just over eight acres. A structural space frame, the design and construction of this hangar remain a feat unparalleled in the engineering of enclosed space.

Railroad tracks ran through the hangar, culminating at the mooring tower. The tower secured the dirigible to the ground by mooring lines. This tower has been removed. The other large structure that was necessary for the dirigible was the helium tank that was located in front of the hangar.

The plan for the base and the design of the buildings was also undertaken by the Naval Bureau of Yards and Docks.

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The style for the buildings, Spanish Colonial Revival, is reflective of the popularity of the revival movement and the desire of the local politicians to have the base designed in the "California Style" of white stucco walled buildings with red tile roofs. The plan and building design was very formal, an axial orientation with the bemoth hangar to the east and the base extending west. Following the Spanish influence, a large plaza is the central element with the most ornately decorated building, the Administration Building, at the head of the plaza behind the flag pole and in front of the hangar. On the south side of the plaza were located the dispensary and Bachelor Officers' Quarters. To the north were the recreation building and the barracks. To the southwest on the cul-de-sac were located the nine officers' houses and garages. Extending to the east, and south, behind this formal plaza arrangement were the utilitarian buildings, fire station, garage, laundry boiler plant, locomotive and crane shed, shops, helium storage and water tower. To the north were the commissary, store house, gas station, balloon shed and storage buildings. Directly behind the Administration Building was the cafe (later the Officers' Club), and of course, the Hangar. The base was designed in anticipation of the importance of the automobile. Broad roads, large parking areas and garages were incorporated in the plan.

Landscaping was carefully planned to mature in harmony with the buildings and circulation elements. The area considered the Naval Air Station Sunnyvale Historic District maintain the integrity of the original design and represent one of the finest formal plans for a government facility in California. It was a forward-thinking plan with expansion to occur outside the formal plaza, thus the quality of design has been maintained. The original base is a one-of-a-kind facility in the Santa Clara Valley with great importance in the architectural heritage, facility planning and economic growth of the region.

The primary significance of the historic district is the association with the "lighter than air" dirigible program. The dirigibles, to be the eyes in the sky for the Navy, were in operation for a relatively short time. USS MACON, one of the two dirigibles constructed for the Navy, was christened by Mrs. William Adger Moffett (wife of Admiral Moffett) on March 11, 1933. An article about the landing in Sunnyvale was reported in the October 15, 1933 edition of the San Francisco Chronicle that read, "30,000 Thrilled as the MACON Moors at Home Station." The sister dirigible, AKRON, had been lost on April 13, 1933, making the MACON the last dirigible. For 16 months, USS MACON was a common sight over the Santa Clara Valley as it performed in a number of military maneuvers with the Pacific Fleet. Admiral Moffett had been well aware that the slow moving dirigibles could be of great benefit when assigned as an observatory for the fleet, but were vulnerable if used in maneuvers with the fleet. Shortly after arriving at Sunnyvale, USS MACON was deployed on tactical maneuvers with the Pacific Fleet. Equipped with an internal hangar and steel frame hoist termed a "trapeze", USS MACON carried four small fighter planes. The Sparrowhawks (F9C) were bi-plane fighters developed specifically to be carried in the dirigible by Curtis. Each weighed only 2,500 pounds with a pilot. As an airborne carrier, the dirigible was a hulking target that "failed to demonstrate military usefulness," according to the Commander in Chief of the United States Fleet, Admiral David Sellers. While returning from maneuvers with the fleet on February 12, 1935, USS MACON experienced a structural failure and crashed into the Pacific. Of the 83 crew, only 2 were lost. It was the headline in the San Francisco Chronicle the next day that told the story, "Dirigible Doomed as Defense Factor, Officials Say." The era of dirigibles was over, the only remaining element of the Moffett five year plan was Hangar #1 and the base at Sunnyvale.

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During this period, the U.S. Army Air Corps operated a limited number of blimps in conjunction with observation exercises. In September, 1935, seven months after USS MACON went down, the Army assumed control of the base and Hangar #1. The facility was used by the Army for pursuit and observation activities until 1940 when it was converted to the West Coast Air Corps Training Facility. During this period, the dispensary was enlarged and barracks were added.

Shortly after the outbreak of WWII, the base was returned to the U.S. Navy. In April, 1942, the base was recommissioned Naval Air Station Moffett Field.

The return to Naval Command was to provide expanded facilities for small blimps and balloons used for coastal observation. Hangars #2 and #3 were constructed for blimps in 1942. They are included in the historic district because of the use as a lighter than air facility, and for their architectural/engineering importance.

One of the most recognizable landmarks in the San Francisco Bay Area, Hangar #1 and the original base are significant in the history of Naval Aviation, defense and in the development of the Santa Clara Valley. From the original base and because of the facility location and landing field, NASA Ames Research Center is located to the north adjacent to the original plaza boundary and at the north boundary of the historic district. It is far easier to measure the importance of the dirigible in Naval Aviation and defense history than it is to measure the enormous impact upon the growth of the defense and space industry in Northern California because of the original location of this base with the 1000+ acres.

The Naval Air Station Sunnyvale Historic District is recommended for listing in the National Register of Historic Places at the National Level of significance under Criteria A, as the only base designed specifically for the Navy to home port USS MACON, the only dirigible in the fleet, a significant contribution to the broad pattern of our history; and under Criteria C, a facility plan and architectural design that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

The landscape plan (Y&D drawing No. 115840) was approved on April 29, 1933. This plan shows the base in its entirety.

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ZONE 10	E	37.7063	122.0530
	A1	37.7095	122.0433
	B1	37.7060	122.0421
	C1	37.7071	122.0394
	D1	37.7105	122.0408

State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

HISTORIC RESOURCES INVENTORY

IDENTIFICATION AND LOCATION

1. Historic name _____
- * 2. Common or current name Non-contributing buildings (1940-1944) within the NAS Moffett Field Historic District.
- * 3. Number & street Buildings: #64, #67, #86, #87 Cross-corridor _____
City _____ Vicinity only _____ Zip _____ County _____
4. UTM zone A _____ B _____ C _____ D _____
5. Quad map No. _____ Parcel No. _____ Other _____

Ser. No. _____
National Register status _____
Local designation _____

DESCRIPTION

6. Property category _____ If district, number of documented resources _____
- * 7. Briefly describe the present physical appearance of the property, including condition, boundaries, related features, surroundings, and (if appropriate) architectural style.

These buildings represent a later group, located throughout the station and with these four examples in the area of the NAS Moffett Field Historic District, that is defined by distinctive architectural styles that reflect the most popular designs of the time.

Building #86 - Chapel and #87 Chapel Heat Pump, are executed in a slightly Mission Revival design that is an extension of the Spanish Colonial Revival architecture of the Historic District. Located between the Officers Housing Area and the central buildings of the 1933 base, the buildings are architecturally compatible with the 1933 Historic District.

Buildings #64 and #67 are examples of the International Style with the Post Office #67 a particularly fine example.

*Attach photo envelope here
Put address and photo date on rear of photo

8. Planning agency _____
9. Owner & address _____

10. Type of ownership _____
11. Present use _____
12. Zoning _____
13. Threats _____

Send a copy of this form to: State Office of Historic Preservation, P.O. Box 942896, Sacramento, CA 94296-0001

* Complete these items for historic preservation compliance projects under Section 106 (36 CFR 800). All items must be completed for historical resources survey information.

8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:

nationally statewide locally

Applicable National Register Criteria A B C D

Criteria Considerations (Exceptions) A B C D E F G

Areas of Significance (enter categories from instructions)

Military
Engineering

Period of Significance

1930-1935
1942-1946

Significant Dates

Cultural Affiliation

Significant Person

Moffett, William Adger; Admiral

Architect/Builder

U.S. Navy Bureau of Yards and Docks

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

In the nation's quest to provide security for the lengthy expanse of it's coastlines the opportunity for air reconnaissance was realized by the futuristic Admiral William A. Moffett. Through his efforts, two Naval Air Stations were commissioned in the early 1930's to port the two U.S. Naval Airships (dirigibles) he believed capable of this challenge. The Naval Air Station Sunnyvale was the Pacific Coast location selected, designed and developed to port USS MACON (ZRS 5). The immense structure, Hangar #1, designed to house USS MACON, with its larger counterpart in Akron, Ohio, remain the two largest structures in the United States without internal support. At the onset of WWII, the base was expanded with Hangars #2 and #3 which were designed to accommodate the smaller blimps and balloons used for reconnaissance, until the range of heavier than air aircraft (airplanes) was sufficient to patrol the coast. The significance of the U.S. Naval Air Station Sunnyvale Historic District is attributed to the association with the expanding defense capabilities of the U.S. Navy, the engineering technology found in lighter than air ships, the design of the hangar and system for porting the dirigible and in the plan and architectural style of the station designed to support this defense technology. The significance of Hangar #1, was recognized when it was designated a Naval Historical Monument. It has been designated a California Historic Civil Engineering Landmark, by the San Francisco section, American Society of Civil Engineers, and has been determined eligible for listing in the National Register of Historic Places by the U.S. Navy in consultation with the California State Historic Preservation Officer. The entire historic district is supported for listing in the National Register of Historic Places at the national level of significance under Criterion A for the association with coastal defense and naval technology that has made a significant contribution to the broad patterns of our history; and Criterion C reflecting the distinctive type, period, method of construction and high artistic values that are represented in the 1933 station plan and buildings. In 1942, the station was recommissioned, U. S. Naval Air Station, Moffett Field, in recognition of the significant contribution to naval history by Admiral Moffett, contributions that have gained him the unofficial title, "Father of Naval Aviation."

See continuation sheet

9. Major Bibliographical References

Gragg, Dan The Guide to Military Installations, Harisburg, PA; Stackpole Books, 1983
Payne, Stephen M., Santa Clara County: Harvest of Change, Santa Clara, CA; Windsor Publicati
1987

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Histoirc Civil Engineering Landmarks of San Francisco and Northern California, 125th
Annual Conference, American Society of Civil Engineers, San Francisco Section,
Sponsor, 1977.

Ifft, Jerry. The Era of Dirigibles at Moffett Field, 1987; California Room, Martin Luther
King, Jr. Memorial Library, San Jose, CA

Interviews:

Benjamin Mandweiler, NAS, Moffett Field, Public Works Department
Lt. Col. Robert N. Maupin, USAF. Ret.

See continuation sheet

Previous documentation on file (NPS):

- preliminary determination of individual listing (36 CFR 67)
has been requested
- previously listed in the National Register
- previously determined eligible by the National Register
- designated a National Historic Landmark
- recorded by Historic American Buildings
Survey # _____
- recorded by Historic American Engineering
Record # _____

Primary location of additional data:

- State historic preservation office
- Other State agency
- Federal agency
- Local government
- University
- Other

Specify repository: _____

10. Geographical Data

Acreege of property 124 Acres (approximately)

UTM References

A	1 0	3 7 7 0 3 6	1 2 2 0 5 9 8
	Zone	Easting	Northing
C	1 0	3 7 6 9 9 9	1 2 2 0 6 2 5

B	1 0	3 7 6 9 7 5	1 2 2 0 6 0 4
	Zone	Easting	Northing
D	1 0	3 7 7 0 6 3	1 2 2 0 5 3 0

See continuation sheet

Verbal Boundary Description

The Naval Air Station Sunnyvale includes all of the 1933 original base plan with the addition of the 22.5 acre detached area containing hangars #2 and #3. The boundary line begins at the Main Gate, including the entrance gate and fence, proceeds along Clark Road to Berry Road where the boundary turns south to encircle the quarters A through H, north behind quarter F to Westcoat Road, east to Sayre Ave., north to Bushnell Road and west to Clark Road. A detached area is included in the historic district to incorporate hangars #2 and #3 with a 25 foot band of land around the pair.

Boundary Justification

The boundary includes the limits of development in the 1933 base plan for the Naval Air Station Sunnyvale, as prepared by the Navy Department, Bureau of Yards and Docks, and the area incorporating hangars #2 and #3 that are associated with lighter than air military aircraft.

See continuation sheet

11. Form Prepared By

name/title Bonnie Bamberg
organization Urban Programmers date November 9, 1991
street & number 1174 Lincoln Avenue telephone 408-971-1421
city or town San Jose state California zip code 95125

MFA HANGAR 3 DEMOLITION SECTION 106 TECHNICAL REPORT

Appendix B Historic Property Information
April 29, 2020

B.2 AECOM, Historic Property Survey Report (2013)

Historic Property Survey Report for the Airfield at
**NASA Ames Research Center,
Moffett Field, California**



Prepared for:
NASA Ames Research Center

Prepared by:
AECOM
300 California Street, Suite 400
San Francisco, CA 94104

AECOM

November 26, 2013

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B	Selected Existing Conditions Photographs
C	Preliminary Inventory of Contributing Airfield Features
D	Period Plans

ACRONYMS AND OTHER ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ARC	Ames Research Center
B.P.	Before Present
CANG	California Air National Guard
FASRON	Fleet Aircraft Service Squadron
HPSR	historic property survey report
HRPP	historic resources protection plan
ICRMP	integrated cultural resources management plan
LTA	lighter-than-air
NACA	National Advisory Committee for Aeronautics
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NAS Sunnyvale Historic District	Naval Air Station Sunnyvale Historic District
Navy	U.S. Department of the Navy
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
RFP	request for proposals
SHPO	State Historic Preservation Officer
U.S. 101	U.S. Highway 101

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF REPORT

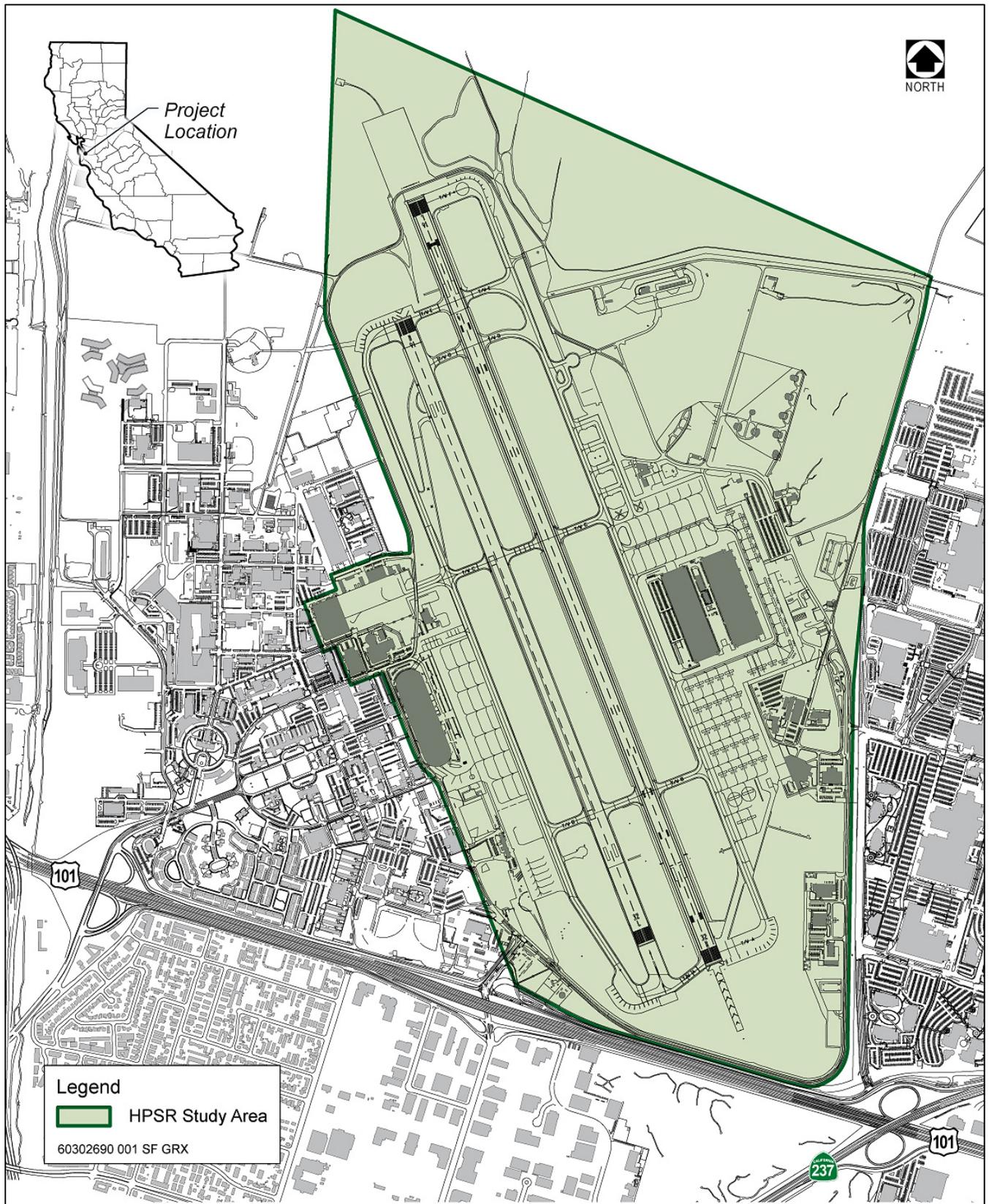
This historic property survey report (HPSR) was undertaken by AECOM on behalf of the National Aeronautics and Space Administration (NASA) Ames Research Center (ARC). The HPSR supports NASA's compliance with Section 110 of the National Historic Preservation Act (NHPA) and with other laws and regulations. This report has been prepared as part of ongoing consultation between NASA and the California State Historic Preservation Office (SHPO) regarding the National Register of Historic Places (NRHP) eligibility of the Airfield area of the NASA ARC as a contributing feature of the Naval Air Station Sunnyvale Historic District (NAS Sunnyvale Historic District). In addition, the HPSR will provide NASA and its potential tenant(s) or lessees with more specifics about which physical features of the Airfield are to be treated in accordance with historic preservation standards. The HPSR will be used to support the completion of consultation on NRHP eligibility with the SHPO, and will also to provide baseline information to potential lessees regarding the Airfield.

1.2 STUDY AREA DESCRIPTION

Located in Santa Clara County, California, on the south side of lower San Francisco Bay, the NASA ARC lies between the cities of Sunnyvale and Mountain View. Portions of the site now called NASA ARC have been known in the past as Naval Air Station (NAS) Sunnyvale and NAS Moffett Field (or Moffett Field). In this report, the facility is referred to by its appropriate historical name in the description of each historical period, and otherwise is generally referred to as NASA ARC.

Within NASA ARC there are several functional areas: the NASA Ames Campus in the northwest quadrant; the former U.S. Department of the Navy (Navy) housing and support area in the southwest quadrant; the NAS Sunnyvale, California National Register Historic District (NAS Sunnyvale Historic District) in the central area west of and including Hangar 1, as well as Hangars 2 and 3; and the Airfield area, including the munitions magazines and safety buffer zone, which compose the entire eastern half of the facility. The Airfield includes two parallel runways and associated Hangars 1, 2, and 3 and the safety buffer zone northeast of the runways.

The approximately 1,160-acre HPSR study area is bounded on the north by San Francisco Bay wetlands and salt ponds, on the west by the NAS Sunnyvale Historic District and the NASA ARC, at the south by U.S. Highway 101 (U.S. 101), and on the east by a heavily developed industrial park (see Figure 1, "HPSR Study Area").



Source: Data compiled by AECOM in 2013

Figure 1. HPSR Study Area

2.0 METHODOLOGY

The HPSR provides an overview of and justification for the eligibility of the Airfield for inclusion in the NRHP as an extension of the NAS Sunnyvale Historic District. The following sections describe the methods used to conduct further research on the context and site history of the Airfield, the sources and methods used to compile an inventory of the Airfield's historic-period components, identification of character-defining and contributing features, and the criteria applied during the evaluation of whether the Airfield is eligible for listing in the NRHP.

2.1 RESEARCH METHODS

The physical history of the Airfield was developed based on archival research completed at the NASA ARC Aviation Management Office and the Moffett Field Historical Society Museum. Archival materials collected from these repositories included historic drawings and photographs from the previous reports and studies, and Navy historical publications.

Section 4.0, "Inventory," was developed based on materials provided by NASA, consisting of a master inventory of all buildings and structures in the HPSR study area, site plans, and various reports and studies completed for the NASA ARC. The project team conducted an overview survey of the Airfield on June 13, 2013, for project scoping, and a reconnaissance survey on June 24, 2013. Project team members photographed buildings and structures in the study area that were constructed in 1963 or earlier (the 50-year cutoff). Because the scope of the HPSR is focused on providing a discussion of the character-defining features of the Airfield at SHPO's request, this report does not include comprehensive photo documentation or California Department of Parks and Recreation survey forms. For selected photographs, see Appendix A, "Selected Historic Photographs," and Appendix B, "Selected Existing Conditions Photographs."

2.2 EVALUATION CRITERIA AND GUIDELINES

Section 5.1, "Statement of Significance," defines the historic significance of the Airfield, including a period of significance, based on NRHP criteria. Properties listed in the NRHP must be significant to American history, architecture, archaeology, engineering, or culture, and must exhibit integrity of location, design, setting, materials, workmanship, feeling, and association. To be eligible for listing, a property must meet one or more of the following criteria:

- A. Be associated with events that have made a significant contribution to the broad patterns of our history
- B. Be associated with the lives of persons significant in our past
- C. Embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- D. Have yielded, or may be likely to yield, information important in prehistory or history.

In addition to considering significance as defined in the NAS Sunnyvale Historic District's NRHP nomination form and subsequent studies, several National Register bulletins were consulted during the evaluation of significance and the integrity assessment for the Airfield. National Register Bulletin 15, "How to Apply the

National Register Criteria for Evaluation” (NPS 1997), provided overall direction. Bulletin 15 outlines the evaluation criteria and discusses how to evaluate properties within applicable historic contexts, define the significance of historic properties, and evaluate their integrity. National Register Bulletin 18, “How to Evaluate and Nominate Designed Historic Landscapes” (NPS n.d.), and Bulletin 43, “Guidelines for Evaluating and Documenting Historic Aviation Properties” (NPS 1998a), also provided important guidance relevant to the HPSR study area.

2.2.1 Guidelines for Integrity Assessment

In Section 5.2 of this HPSR, the integrity of the Airfield is assessed based on a comparison of existing and historic conditions. The National Park Service defines integrity as the authenticity of a landscape’s historic identity, evinced by the survival of physical characteristics that existed during its period of significance. Historical integrity is evaluated to determine whether the characteristics and features that defined the landscape during the historic period are present. The seven qualities of historic integrity defined by the National Register Program are *location, setting, feeling, association, design, workmanship, and materials*. Of the seven qualities, the most essential for historic landscapes are setting, feeling, association, and design.

2.2.2 Guidelines for Identification of Character-Defining and Contributing Features

A primary goal of the survey is to identify the historic character of the Airfield’s landscape. *Historic character* is the quality of a historic landscape that imparts its historic associations, and is created by the assembly of *character defining features* that communicate the visual aspects, features, materials, and spaces associated with the property’s history. The Airfield has a distinctive character supported by the character-defining features that tell its story. Character-defining features are identified in Section 5.3.

Some features of the Airfield’s landscape may be identified as *contributing features* for NRHP listing purposes. These are discussed as they relate to historic landscape character in Section 5.3. This study provides a preliminary identification of contributing features, including those with known dates of origin within the historic period of significance, and known to retain integrity. Some smaller resources such as lighting, and those with an indirect relationship to significance such as roads and sidewalks, were not evaluated in this study. Also, please note that some types of landscape characteristics such as views and vegetation, despite helping to define historic character, are not technically eligible for the NRHP because of the NRHP’s narrower focus on buildings, structures, objects, and sites. These types of resources are addressed as “character defining” when relevant.

The difference between a *contributing feature* and a *character-defining feature* requires some explanation. According to the National Park Service *Guide to Cultural Landscape Reports*, a contributing feature is “a biotic or abiotic feature associated with a landscape characteristic that contributes to the significance of the cultural landscape” (NPS 1998b). Individual buildings, roads, vegetation (specimens, groups, or communities), or small-scale features are contributing features. Noncontributing features either are non-historic (postdating the period of significance) or have lost their integrity (because of condition issues or other factors). Within the set of contributing landscape features, character-defining features represent the following (NPS 1998b):

...[the most] prominent or distinctive aspect(s), quality(ies), or characteristic(s) of a historic property that contributes significantly to its physical character. Structures, objects, vegetation, spatial relationships, views...may be such features.... The term “character-defining feature” was conceived to guide the

appropriate treatment and management of historic structures (and later of cultural landscapes), so that features conveying historic character would be retained by treatment activities.

In addition, a recommended eligible boundary is identified for the Airfield site based on its significance and integrity.

2.3 PREVIOUS STUDIES

2.3.1 U.S. Naval Air Station Sunnyvale Historic District

The NAS Sunnyvale Historic District was listed in the NRHP in 1994. The district's periods of significance are 1930-1935 and 1942-1946, and it is listed under Criteria A and C in the areas of Architecture and Engineering/Military. Under Criterion A, the NRHP nomination describes the district as representing a "unique and significant episode in the development of U.S. naval aviation prior to World War II...one of two Naval Air Stations built to support lighter-than-air dirigibles during the 1930s" (Urban Programmers 1994). Under Criterion C, the district is considered a good regional example of military design in the Spanish Colonial Revival style. It encompasses the 1933 original installation area to the west of the Airfield, as well as the 22.5-acre discontinuous area containing Hangars 2 and 3, which are associated with lighter-than-air military aircraft in World War II. The NRHP nomination calls Hangars 1, 2, and 3 "excellent examples of early twentieth-century military planning, engineering and construction" (Urban Programmers 1994). Other contributing elements contained in the district include the original Spanish Revival buildings, as well as later buildings in the same style and International style buildings of the 1940s. In total, according to the NRHP nomination form, 40 buildings, one structure, and two objects contribute to the district, and 54 noncontributing buildings are present within its boundary.

Hangar 1 is noted on the NRHP nomination form as "a metal sheathed behemoth whose rounded shape is both the epitome of the aerodynamically influenced Streamline Moderne style as well as a stylistic cousin to the huge airship that originally berthed inside the mammoth hangar" (Urban Programmers 1994).

Although the 1994 nomination form does not clearly specify significance under Criterion A, a later study (NASA 2013a) identified its significance for association with important events in U.S. history. The NASA Web site for Hangar 1 notes that the NAS Sunnyvale Historic District has been determined eligible under "Criterion A for its association with coastal defense and naval technology that has made a significant contribution to the broad pattern of our history" (NASA 2012).

2.3.2 Other Established Significance Themes

A variety of additional designations and evaluations provide other aspects and types of significance recognition for the resources at the Airfield. For example, according to the NASA Web site for Hangar 1, "The historic significance of Hangar 1 was also recognized when it was designated a Naval Historical Monument. It has been designated a California Historic Civil Engineering Landmark by the San Francisco section, American Society of Civil Engineers" (NASA 2012).

In 2013, the NASA ARC submitted a statement of the Airfield's historical significance to the SHPO and the federal Advisory Council on Historic Preservation (ACHP). The Airfield and its component features were

determined to be eligible for the NRHP under Criterion A, and to contribute to the adjacent NAS Sunnyvale Historic District. The nomination has not been formally updated to include these areas.

Numerous other resources at NASA ARC have been identified as eligible, although they are also not listed in the NRHP. A 1998 study of Cold War resources at the Airfield provides eligibility determinations. Please see the table in the Appendix C, "Preliminary Inventory of Contributing Airfield Historic Resources," for more information about the status of individual resources.

3.0 SITE PHYSICAL HISTORY

3.1 DEVELOPMENTAL HISTORY

3.1.1 Pre-airfield Period (to 1930)

The earliest well-documented entry and spread of native peoples throughout California occurred at the beginning of the Paleo-Indian Period (12,000–8000 years Before Present [B.P.]), and social units are thought to have been small and highly mobile. Known sites have been identified in the contexts of ancient pluvial lakeshores and coastlines, as evidenced by such characteristic hunting implements as fluted projectile points and flaked stone crescent forms. Prehistoric adaptations over the ensuing centuries have been identified in the archaeological record by numerous researchers working in the Bay Area since the early 1900s, as summarized by Fredrickson (1974) and Moratto ([1984] 2004).

Few archaeological sites have been found in the Bay Area that date to the Paleo-Indian Period or the subsequent Lower Archaic (8000–5000 B.P.) time period, probably because of high sedimentation rates and sea level rise. However, archaeologists have recovered a great deal of information from sites occupied during the Middle Archaic Period (5000–2500 B.P.). By this time, broad regional subsistence patterns gave way to more intensive procurement practices. Economies were more diversified, possibly including the introduction of acorn-processing technology, and populations were growing and occupying more diverse settings. Permanent villages that were occupied throughout the year were established, primarily along major waterways. The onset of status distinctions and other indicators of growing sociopolitical complexity mark the Upper Archaic Period (2500–1300 B.P.). Exchange systems became more complex and formalized, and evidence of regular sustained trade between groups was more prevalent.

Several technological and social changes characterize the Emergent Period (1300–200 B.P.). Territorial boundaries between groups became well established, and it became increasingly common for distinctions in an individual's social status to be linked to acquired wealth. In the latter portion of this period (500–200 B.P.), exchange relations became highly regularized and sophisticated. The clamshell disk bead became a monetary unit, and specialists arose to govern various aspects of production and material exchange.

The Middle Archaic, Upper Archaic, and Emergent Periods can be broken down further, according to additional cultural manifestations that are well represented in archaeological assemblages in the Bay Area:

- *Windmiller Pattern* (5000–1500 B.P.) peoples placed an increased emphasis on acorn use and on a continuation of hunting and fishing activities. Ground and polished charmstones, twined basketry, baked clay artifacts, and worked shell and bone were hallmarks of Windmiller culture. Widely ranging trade patterns brought goods in from the Coast Ranges and trans-Sierran sources, as well as from closer trading partners.
- *Berkeley Pattern* (2200–1300 B.P.) peoples exhibited an increase in the use of acorns as a food source, compared to what was seen previously in the archaeological record. Distinctive stone and shell artifacts differentiated this period from earlier or later cultural expressions. Burials were most often placed in a tightly flexed position and frequently included red ochre.
- The *Augustine Pattern* (1300–200 B.P.) reflected increasing populations, resulting from more intensive food procurement strategies, as well as from a marked change in burial practices and increased trade activities.

Intensive fishing, hunting and gathering, complex exchange systems, and a wider variety in mortuary patterns are all hallmarks of this period.

Ethnographic and archaeological research indicate that the NASA ARC falls within the traditional boundaries of the Ohlone, whose territory stretched from San Francisco Bay at the north to the southern tip of Monterey Bay, extending 60 miles inland (NASA 2002b). The primary social organization of this group was centered around the patrilineal family unit, with a focus on patrilocality, and sovereign tribelets were often defined by territorial holdings (Bennyhoff 1977). The NASA ARC is located on Ramaytush and Tamyen (Tamien) lands of the Ohlone sphere of influence and has been specifically associated with the Posol-mi tribelet (a place name likely associated with the Rancho Posolmi, below) (NASA 2009; Kroeber 1925). The total number of individuals residing in this area has been estimated to be as high as 1,200 at the time of European contact; however, the combined effects of missionization and European-borne diseases had a heavy toll on these communities, nearly decimating the population and traditional practices (NASA 2009).

In 1772, the Spanish, led by Juan Bautista de Anza, began exploring the inner coastal region of California. Later, Spanish settlers established a permanent presence by constructing missions and presidios. When Mexico became independent from Spain in 1822, the Spanish missions were secularized and their lands were redistributed to private individuals by way of land grants. Large parcels were developed into cattle ranches, maintained by Mexican grantees.

In 1844, the Rancho Posolmi, on which NASA ARC lands are contained, was granted to Lopez Iñigo (also Indigo or Ynigo), a Native American documented as living in the vicinity of present-day Mountain View and farming what would become NASA ARC lands as early as 1834 (NASA 2009; Garaventa et al. 1991). The grant was later patented in 1881, at which time the grant was known to have been divided into three parts: 448.02 acres to Iñigo's descendants, 847.98 acres to Robert Walkinshaw, and 400 acres to Thomas Campbell. Research indicates that the known remains of buildings associated with these ranchos are located outside of the NASA ARC land holdings. Iñigo is thought to have lived on-site until his death in 1864, and a marker entitled the "Inigo Grave Site" [*sic*] was erected by the Mountain View Pioneer and Historical Association on the perimeter road near the northeast corner of what was then known as NAS Moffett Field (Garaventa et al. 1991). Although the marker is no longer standing, Iñigo's interment is believed to be located within the boundaries of resource CA-SCI-12/H (see Section 4.2.5, "Archaeological Sites").

3.1.2 U.S. Navy Dirigible Operations (1931–1935)

The agricultural land that would become NAS Sunnyvale was purchased with funds raised by local citizens and civic leaders who were enthusiastic about the prospect of a naval airfield coming to the area. The civic group sold the land to the Navy for \$1, and NAS Sunnyvale was officially established on August 2, 1931.

Construction began on NAS Sunnyvale in October 1931 (see Appendix D, "Period Plans"). Hangar 1, the massive steel-frame structure built to house the dirigible USS *Macon*, the flagship for NAS Sunnyvale, was completed in April 1933. North and south of Hangar 1, two mooring circles were built to control and secure the *Macon*. The nose of the dirigible would attach to a telescoping mooring mast and the tail fin would attach to a stem beam (or bolster beam); the stem beam and mooring mast were attached to a track that allowed the *Macon* to be rotated and moved in and out of Hangar 1. West of Hangar 1, the Navy built a campus of buildings to support dirigible operations on the airfield. The Spanish Colonial-style buildings built in the area now known as the NAS

Sunnyvale Historic District were based on designs by the Naval Bureau of Yards and Docks. East of Hangar 1, closer to San Francisco Bay, the former agricultural land was cleared and leveled, and an airfield with a single narrow runway was built. This small runway was originally used by F9C *Sparrowhawks*, small biplane fighters that accompanied (and could be carried by) the USS *Macon*. Within a short time, the original runway was expanded and two more small runways were added. NAS Sunnyvale was formally commissioned on April 12, 1933.

The USS *Macon* arrived at NAS Sunnyvale in October 1933 and was stationed there until February 1935, when the dirigible was damaged during a mission off the coast of Point Sur, California, and crashed in the Pacific Ocean. Soon after the crash, the Navy terminated its dirigible program and the airfield at NAS Sunnyvale was transferred to the U.S. Army Air Corps.

3.1.3 U.S. Army Air Corps (1935–1942)

In September 1935, the Navy transferred the airfield to the U.S. Army Air Corps for use in pursuit and observation operations. When the Airfield was occupied by the Army Air Corps, the Airfield's focus moved from lighter-than-air (LTA) operations to heavier-than-air aircraft used in pursuit and training operations. The Army Air Corps used bigger aircraft that required longer and wider runways, including the P-36 *Hawk* and BT-13 *Valiant*. In 1938, the Army Air Corps removed the older runway system and built a 2,140-foot-long runway (Runway 14R-32L) using 3-inch-thick asphalt concrete. Historic photographs taken during this period show a wide runway bordered on the west side by an apron or taxiway marked by diagonal lines. Parking areas surrounding Hangar 1 were unpaved earth (Veronico 2006).

In 1940, anticipating the outbreak of World War II, the Army Air Corps converted the airfield to become its West Coast training headquarters. In 1941, to accommodate larger aircraft used to train pilots and their support crew, Runway 14R-32L was extended again.

3.1.4 Navy Lighter-than-Air Operations and World War II (1942–1947)

After the bombing of Pearl Harbor in December 1941, the Navy reassumed control of the airfield, which was renamed the U.S. NAS Moffett Field, or simply Moffett Field. LTA operations were needed by the military once again, and Moffett Field became devoted exclusively to LTA aviation, primarily for reconnaissance and surveillance of the Pacific coast. Moffett Field was the headquarters for Fleet Airship Wing Three, composed of three LTA bases on the West Coast: Tillamook, Oregon; Santa Ana, California; and Sunnyvale, California. The first blimps arrived at Moffett Field as part of the West Coast's first LTA squadron, ZP-32, which launched its first patrol flight over the Pacific coast in February 1942 (Veronico 2006). Moffett Field was also used to train new airship pilots, using free balloons and blimps.

With the increase in LTA activity at Moffett Field, Hangar 1 was once again filled to capacity with K- and L-class nonrigid airships. In 1942, construction started on the first of two new enormous wood-frame hangars on the east side of the runways, which by this time had been expanded and reconfigured by the Army Air Corps (see Appendix D). Hangars 2 and 3 were completed in 1943 and used by the Navy Station Assembly and Repair Department to assemble, erect, store, and maintain blimps and balloons (Gleason 1958). LTA operations continued at Moffett Field until August 1947 when the program was deemed obsolete and terminated, making Moffett Field an exclusively heavier-than-air base (Gleason 1958).

Also during this period, the Navy started to focus more attention on expanding the base, including adding facilities for ammunition storage and heavier-than-air aircraft. In April 1942, the Navy purchased 225 acres east of the airfield, presumably to construct an ammunition storage area (Gleason 1958). In 1943, the Navy built a large munitions storage and loading area off the northeast corner of the airfield. The Navy chose this area because most munitions arrived at the Airfield by boat along the ferry channel, and because that was the most lightly occupied part of the airfield (NASA 2013a). The munitions area included five magazines (now known as 070 to 074), a small bunker, an inert ammunition storage building, and nine fortified combat ammunition loading circles. The four magazines were concrete bunkers with cylindrical roofs set into a concrete front wall; lying 8 feet across from the door of these magazines was a matching berm with headwall that served as a blast deflector in case of accidental explosion. Concrete ramps were built to facilitate the transport of munitions from these magazines to the aircraft being readied for their missions. A safety buffer zone was outlined within the explosion arc of these magazines.

Beginning in 1943, the Navy started the first in a series of major changes to the airfield and surrounding areas after the Naval Bureau of Yards and Docks allotted \$1.12 million for new construction at Moffett Field (Gleason 1958). By this time, the Navy was flying larger and powerful aircraft such as the PV-1 *Ventura* and Army B-26 *Marauders*, which required more modifications to the runway (Veronico 2006). In May 1944, Runway 14R-32L was extended to its present length with 11-inch Portland cement concrete, anticipating greater use by fixed-wing aircraft in the postwar period (NASA 2013a).

3.1.5 Navy Transport Operations (1945–1950)

After World War II, Moffett Field became home to Squadron 4 of the Naval Air Transport Service, with support operations dedicated to aircraft maintenance and overhaul. It was during this period that most of the current-day airfield was built. Beginning in 1945, the Navy spent millions of dollars for improvements and new construction at Moffett Field (Gleason 1958) (see Appendix D). The airfield was expanded and extended to accommodate the Navy's largest transport aircraft, including a huge four-engine transport plane called the R5D *Skymaster* (Gleason 1958). In 1946, Runway 32R-14L was built of 8-inch-thick reinforced concrete to an original length of 7,425 feet. The west and east parallel taxiways were built, along with many of the parking aprons. In 1947, high-intensity approach, taxiway, and runway lights were added to the airfield (Gleason 1958) (see Appendix D). In the late 1940s, two more air transport squadrons (Squadrons 3 and 5) were commissioned at the base, making Moffett Field the largest Naval Air Transport Service base on the West Coast. Squadron 5—the first squadron in the Navy to have nuclear-weapon capabilities—flew the large patrol bombers P2V *Neptune* and AJ *Savage* (Gleason 1958).

Moffett Field's Naval Air Transport Service overhaul and repair operations were closed down in October 1949 (Gleason 1958).

3.1.6 Korean War and Navy Jets (1950–1961)

The Korean War started in June 1950 and Moffett Field became the home base for aircraft carrier squadrons and their fighter jets. Jets were first introduced by the U.S. military during World War II, but did not appear at Moffett Field until 1950 with the arrival of the F3D *Skynight*, the Navy's first operational jet night fighter. Navy carrier squadrons stationed at Moffett Field used the airfield for training purposes, including simulated carrier landings. (Runways were equipped with emergency arresting gear similar to the equipment used to stop planes on aircraft carriers.) Moffett Field was also used to train pilots on new jet aircraft before they were first introduced into operational squadrons. Almost every new supersonic jet fighter aircraft in the Navy or U.S. Air Force inventories

in the early 1950s was flight-tested at Moffett Field (NASA 2013a). To support the new jets stationed at Moffett Field, two new squadrons were commissioned in March 1951 to provide maintenance services: Fleet Aircraft Service Squadron (FASRON) 10 was one of the first all-jet Fleet Aircraft Service squadrons in the Navy. One of its main roles was to repair damaged aircraft serving in the Pacific Fleet. The FASRON groups used Hangars 2 and 3 for maintenance operations.

In June 1951, to accommodate jet operations at Moffett Field, the Navy embarked on the largest post-World War II expansion program at the airfield (see Appendix D). Because jet aircraft flew much faster and at higher altitudes than propeller-powered aircraft, the airfield at Moffett Field needed to be modified.

Both runways were extended and resurfaced at least once; Runway 32R-14L was extended to 9,200 feet (Navy 1954). Taxiways were expanded, parking and apron areas were added, and new supply, transportation, garage, and barracks buildings were constructed (Gleason 1958). The Flight Operations Building (158) was completed in February 1954 (Gleason 1958). In October 1956, a cutting-edge, high-speed refueling system (MF1003) was added to the apron area north of Hangar 2. This system allowed eight aircraft to be refueled simultaneously at the rate of 5 minutes per plane.

The northeast area of the airfield near the coastline and magazines also saw changes during this period. Three new high-explosive magazines were built along Marriage Road (143, 147, and 528), and an ordnance handling pad (442) was added to the northeast side of the airfield. In 1953, an extensive fuel transport and storage system was completed. The barge canal, dock, wharf, and pipeline system enabled the Navy to bring in large amounts of fuel by barge directly from the refinery, rather than by truck or railroad; fuel was piped from the barge to underground storage tanks in the fuel farm east of Hangar 3, saving time and money. In 1960, a golf course was built within the safety buffer zone surrounding the magazines as an acceptable low-occupancy use (NASA 2013a).

Jet operations at Moffett Field were so extensive that the base was designated a master jet base in 1953 (the first of nine such Navy bases), and operational units on-site reached an all-time high in 1955. However, by the early 1960s, the Navy's operational priorities had changed, and the focus shifted from fighter jets to anti-submarine warfare. Jet operations at Moffett Field ended in 1961.

3.1.7 Navy Antisubmarine Warfare Operations (1962–1994)

In November 1962 Moffett Field was selected as the West Coast's training center for the Navy's anti-submarine warfare in the Pacific Ocean. The training was centered on the new propeller-driven anti-submarine aircraft, the Lockheed P3 *Orion*. The Pacific Fleet's first *Orion* arrived at Moffett Field in late January 1963, and for the next three decades the P3s would be a common sight over Moffett Field (Navy 1963). Pilots and technical crews were trained on the *Orion* in an area of the airfield nicknamed "Orion University," two World War II buildings in the California Air National Guard (CANG) outlease area reconfigured for this use (654, 655, and 669) (see Appendix D).

The P3 *Orion* had an internal bomb bay that could house torpedoes, nuclear weapons, and various other mines, missiles, and bombs. To store the weapons used for the *Orion* missions, specifically Mark 46 torpedoes, cluster bombs, and Bullpup or Harpoon missiles, the Navy added a new magazine facility to the safety buffer zone in 1965 (561 and 484-492). In 1973 Moffett Field became the headquarters of the Commander Patrol Wings, U.S.

Pacific Fleet, responsible for patrolling 93 million square miles of ocean from Alaska to Hawaii (see Appendix D).

In 1991, the Base Realignment and Closure Commission recommended the closure of Moffett Field as a naval air station. On July 1, 1994, Moffett Field was closed to military operations, renamed Moffett Federal Airfield, and transferred to NASA (with the exception of the military housing units, which were transferred to the U.S. Air Force).

3.1.8 Moffett Federal Airfield (1994–Present)

The munitions storage area is currently used to support operations of the CANG 129th Rescue Wing, and to store explosives used by NASA ARC researchers working on the research gun ranges, both the horizontal ballistic ranges and the vertical impact gun range. It also encompasses the Moffett Golf Course, a full 18-hole regulation course that is open to federal and military personnel and retirees and is currently managed by the Ames Exchange. The golf course site is a critical portion of the 28% of green space required in the NASA ARC's programmatic environmental impact statement and record of decision (2002) for the *NASA Ames Development Plan*. There are plans to rebuild some magazines to prevent the explosive safety arc area from impinging on the San Francisco Bay Trail, in line with local, state, and federal efforts to open the Bay Trail to the public (see Appendix D).

3.1.9 National Advisory Committee for Aeronautics and NASA (1939–Present)

In December 1939, the National Advisory Committee for Aeronautics (NACA) began construction of the Ames Aeronautical Laboratory off the northwest corner of the airfield. One of the first buildings constructed at Ames Aeronautical Laboratory was a hangar for research aircraft, now called the Flight Research Facility N210, marking the beginning of NACA's (and later NASA's) association with the airfield. In October 1940 NACA's first research aircraft—a North American O-47 observation plane—arrived at the airfield. By 1941, some of NACA's now-famous wind tunnels were complete and in operation, testing airflow of high-speed fighter aircraft during World War II.

In the mid-1940s, NACA added a second aircraft hangar (N211) to supplement N210 and extended the ramps and taxiways connecting the airfield to the NACA area. Around this time NACA was constructing more wind tunnels and had started a vigorous flight test program on the airfield. One such program, focusing on deicing technologies, won the Collier Trophy in 1946 and validated technology important to the air war in the Pacific during World War II.

The airfield improvements during the Navy Transport period (1945–1950), especially the addition of a longer runway (32R-14L), allowed a significant expansion in NACA's flight test program. Soon after the end of World War II, the NACA flight test program focused on problems with high-speed aircraft. Before Chuck Yeager broke the sound barrier in the Bell X-1 in 1947, NACA test pilot George Cooper (a fighter pilot with the Army Air Force in World War II) broke the sound barrier in dives of aircraft over Moffett Field. The supersonic research carried out by NACA at Moffett Field in the 1940s resulted in some of the most significant advancements in aeronautical engineering up to that time (Anderson n.d.).

NACA was renamed NASA in 1958. In the 1960s, the NASA ARC continued its research program, the airfield was the site of extensive research into short takeoff and landing technologies and vertical takeoff and landing

aircraft. In 1965, the Army located its Aeromechanics Laboratory at Moffett Field, and the airfield became the primary site for research on helicopters during the latter years of the Vietnam War. In the mid-1970s, NASA made a major commitment to advancing the technology of tilt-rotor aircraft, and the XV-15—the forerunner of the V-22 *Osprey*, which is now in service with the U.S. Marine Corps along with the U.S. Air Force inventory throughout their theaters of operation—was test-flown at Moffett Field.

The NASA ARC hosted a fleet of airborne science aircraft at Moffett Field that made major discoveries in the discipline of infrared astronomy, and on which the earliest instruments for high-altitude observation of Earth were validated. The airfield became the staging area for some of the most significant earth sciences missions of the 1970s and 1980s.

In 1998 the aircraft that NASA ARC used for earth science and infrared astronomy were transferred to the Dryden Flight Research Center. NASA's flight test helicopters remained at Moffett Field, and the airfield found other uses.

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4.0 INVENTORY

4.1 OVERVIEW OF EXISTING CONDITIONS

The Airfield is part of the NASA ARC at Moffett Field, located on the south shore of San Francisco Bay, 35 miles south of San Francisco. The NASA ARC is situated between the Santa Cruz Mountains to the west and the foothills of the Diablo Range to the east. Immediately north of the NASA ARC is an extensive series of wetlands and historic salt ponds. Vehicular access to the NASA ARC is from U.S. 101, a major south-north artery running from California to the state of Washington. Approximately 1,780 acres compose the NASA ARC; the Airfield, with all its component features, occupies 971 of these acres.

The Airfield encompasses features directly associated with the facility's historic core area, which served aircraft, transport, research, maintenance, and training missions, and which has evolved to continue to serve these uses throughout its history. The Airfield's historic features have enabled its ongoing use by dirigibles, balloons, airplanes, rotorcraft, and jets over the decades. These features include circulation elements used by aircraft, such as runways, taxiways, parking mats, compass calibration pads, ramps, repair aprons, and hardstands; buildings used to house aircraft, such as hangars; and buildings and structures involved in aviation operations, such as fuel transport and storage systems, repair shops, control towers, and aids to navigation (such as airport lighting).

Many of the surrounding areas are closely related to—if not directly a part of—the Airfield. Related features include research and training facilities that rely on their adjacency to aviation areas, as well as those that indirectly support aviation functions, such as administrative facilities; open spaces that provide safety buffers between the flight zone and munitions storage; and hazardous elements of a military airfield such as fueling areas, munitions storage and loading, and areas used by test vehicles.

4.2 AIRFIELD FEATURES

The spatial organization, circulation, historic buildings and structures, views, archaeological sites, and land uses at the Airfield are described below, including a description of existing conditions and brief overview of their evolution over time.

4.2.1 Spatial Organization

Spatial organization is the arrangement of elements that define and create spaces in the landscape. This is an essential aspect of a functional landscape such as the Airfield, because much about the Airfield's appearance today is driven by the patterns needed to support the spatial requirements of historic functions. The landscape has been dedicated to aviation uses since the inception of NAS Sunnyvale in the early 1930s, and the Airfield continues to be arranged to support this use today. When first constructed, the installation was centered on Hangar 1 and the associated dirigible-mooring circles to the north and south. Less than a decade later, the focus had moved to the east after the U.S. Army Air Corps constructed the first iteration of the Airfield's modern runway system. The spatial organization that exists in 2013 was largely established in the mid-1940s after construction of Hangars 2 and 3, the safety buffer zone, the magazines in the far northeast corner of the property, and the area south of Hangars 2 and 3 that now encompasses the CANG site.

Spatially, the Airfield is composed of the following features: the broad, open runways and associated taxiways, compass calibration pad, aircraft parking aprons at hangars, and refueling pads; the monolithic Hangars 1, 2, and 3 that frame the runways on two sides; the open landscape of the safety buffer zone surrounding the group of earthen-bermed ammunition magazines and associated structures to the northeast, including a golf course with a few buildings; the CANG area, including a hangar and open paved aircraft parking apron; and the NASA/NACA hangars with a similar aircraft parking apron.

The Airfield's landscape is defined along most of its edges by the groups of buildings in adjacent areas, including the three large hangars and the CANG and NACA/NASA buildings. Many of these date to the historic period; their massing and location help define the extent of the aviation areas as they have existed over decades.

4.2.2 Circulation

Circulation on the Airfield is defined primarily by the aviation features such as runways and taxiways. There are also vehicular roads and associated pedestrian sidewalks.

The runway system has two main taxiways at the east and west edges and six shorter taxiways crossing the concrete runways perpendicularly. There are five major parking aprons (or ramps): directly east of Hangar 1, north of Hangars 2 and 3, north of Hangar 1 at the NACA/NASA site, at the former high-speed fueling pits on the northeast side of the runways, and in the CANG area.

The vehicular roadways are an important feature of the Shenandoah Plaza area in the current NAS Sunnyvale Historic District, forming a symmetrical, Beaux-Arts circulation pattern that drives the layout of the buildings in the area. However, the roads in the Airfield area are secondary to aviation circulation in the landscape, and have been so throughout the installation's history.

The NASA ARC and the Airfield are accessed by two primary entrances, one on Moffett Boulevard and one on Ellis Street—both major exits off U.S. 101. The Airfield is encircled by a single contiguous loop road that, starting west of Hangar 1, is called Cummins Road. As the road encircles the Airfield to the south it becomes Macon Road, wrapping around the south end of the runways and Hangars 2 and 3, then heading north to the northernmost magazine in the safety buffer zone. Secondary roads in the Airfield area consist of the East Patrol Road, which follows the easternmost boundary of NASA property; Marriage Road, which bisects the southern magazine area and the golf course; the North Perimeter Road, which wraps around to the north of the runways and back south toward Hangar 1; and Zook Road, which runs along the westernmost border of the Airfield until it connects with Cummings Road to the west of Hangar 1. These roads are generally two lanes and paved with asphalt; some have associated sidewalks and concrete curbs. The paving and configuration of many of the roads in the Airfield area have changed over time as runways were extended and other aviation use-driven functions evolved. There are smaller roads as well, such as the one leading from the safety buffer zone to the ordnance handling pad; access roads within the CANG area; vehicular parking areas; and a road leading between Hangars 2 and 3.

4.2.3 Buildings and Structures

An inventory of contributing buildings and structures that lie within both the current NAS Sunnyvale Historic District and the Airfield's proposed extension is provided in Appendix C. This inventory lists the name and

facility number for each feature and indicates the current use of that feature. The inventory also indicates whether each feature is believed to contribute to the Airfield's significance, and thus supports the Airfield's qualification for listing in the NRHP.

The most visible buildings and structures at the Airfield continue to be the ones that have been present since the historic period of significance. Buildings and structures at the edges of the open aviation areas provide a visual break and a spatially defined edge to the open runway, taxiway, and apron areas. Most of the views at the Airfield are dominated by the massive steel-frame structure of Hangar 1, which also serves as the anchor to the west side of the runway system. The vast Hangars 2 and 3, with their wood-frame structures and aluminum panels, are equally imposing, anchoring the east side of the runways. More than a hundred other buildings and structures, both historic and nonhistoric, stand within the Airfield area. Of these, a few in addition to the large hangars stand out as unique. For example, the north and south floodlight towers (Buildings 32 and 33, constructed in 1934) served as original aviation-operation buildings in the 1930s. Another building in the study area that merits mentioning is Airfield Flight Operations Building 158, located south of Hangar 1 and used for all communication and navigation related to airfield activity. Constructed in 1954, the Airfield Flight Operations Building is a two-story concrete building with a three-story observation tower. Other unique structures at the Airfield include the bunker-like "igloo"-style ammunition magazines constructed in 1943, and a fuel-distribution system constructed in the 1950s, which includes a berthing wharf and pier, pipes, bridges, storage tanks, and high-speed fueling pits.

The portion of the Airfield with the most buildings constructed after 1963 is the CANG area, located in the southeast corner of the Airfield. Although the CANG area contains some buildings constructed before 1963, most of the buildings were constructed in the 1970s and 1980s. Aside from Hangars 1–3, the CANG buildings are the largest buildings within the Airfield. The CANG area contains various administrative and aviation-operations buildings, an expansive modern hangar building constructed in 2003, maintenance and storage buildings, and a building dedicated to CANG civil engineering. Post-1963 buildings located within the safety buffer zone surrounding the original 1940s magazines include a large magazine to the north with seven magazines constructed in 1965, a missile magazine added in 1976, and miscellaneous associated facilities. Another magazine was added adjacent to the original 1940s magazines in 1970. Other areas within the Airfield that contain post-1963 buildings include the alley between Hangars 2 and 3 and the areas north and northeast of the hangars; the fuel farm area east of Hangars 2 and 3; the golf course; and a small handful of buildings west of the runways.

Many of the fueling features appear to no longer be operational and their individual conditions and historic integrity have not yet been determined. All other existing buildings, structures, and features at the Airfield are related to operations and communications, training and operations (CANG), storage, utilities, security, and entertainment (golf course).

4.2.4 Views

Views of Hangar 1 are considered paramount at the Airfield, and are available from many locations. Hangar 1 can also be seen from U.S. 101, and it is widely recognized as an iconic Bay Area landmark. Notable views of Hangar 1 include those from the main gate entrance at Moffett Boulevard to the NASA ARC; from the runways; and from Hangars 2 and 3. Another notable view at the Airfield is the expansive, open view from the south end of the runways looking north toward San Francisco Bay. The panoramic view of the entire Airfield from the control tower at the Flight Operations Building is also important.

4.2.5 Archaeological Sites

Archaeological sites that have been found at the NASA ARC provide a context for understanding what other as-yet-undiscovered sites may be encountered (for example, during construction or other ground-disturbing activities). A total of 10 archaeological sites are reported to be located within the boundaries of the former Moffett Field and the NASA ARC: CA-SCI-12/H, CA-SCI-14 through CA-SCI-17, CA-SCI-19 through CA-SCI-21/H, CA-SCI-24, and CA-SCI-18/H (Garaventa et al. 1991; NASA 2002b). Most of these resources were recorded in 1912, but the Basin Research investigation (Garaventa et al. 1991) states that few have been reidentified, although multiple field investigations have been conducted. One possible exception is Resource CA-SCI-20H, composed of a diffuse scatter of shell fragments, but a specific aboriginal use or cultural association could not be determined.

Historic maps suggest that archaeological deposits related to a landing and connecting road, stage stop, and dwellings dating to the 1850s to the 1890s may be present near the Airfield. The 1991 Basin Research study failed to identify these and concluded that none of the sites within Moffett Field appeared eligible for inclusion in the NRHP (Garaventa et al. 1991; NASA 2002b). With the exception of Resources CA-SCI-12/H, CA-SCI-21, and CA-SCI-24, these sites were reported to be near the airfield, and have likely been long since destroyed. Basin Research further stated that, given the level of disturbance caused by the installation of modern infrastructure (electrical and telephone distribution systems, water and sewer systems, and gas lines), little potential exists for encountering intact archaeological resources.

4.2.6 Land Uses

During the decades since its inception in 1930, the Airfield has been used for a variety of aviation purposes, serving LTA craft (dirigibles, balloons, and blimps), airplanes, jets, and rotorcraft. In recent years, NASA has continued to use the Airfield without major modifications. Existing military tenants continue to be based at existing facilities, and to use the Airfield for aviation training; local police and county sheriff's departments base their patrol helicopters there as well. In addition, the Airfield is used by private entities to transport satellites to launch facilities, and transport patients and organs to local hospitals. The Airfield is often used by transient military aircraft, by NASA aircraft conducting flight research, and aircraft from the 89th Military Airlift Wing. Also, Aero Flight Dynamics Directorate helicopters occupy the NASA ramp at N248 and use the Airfield. None of the current land uses have required the addition of intrusive new construction that would diminish the character and setting of the Airfield and its historic contextual relationships to adjacent historic properties.

5.0 EVALUATION

5.1 STATEMENT OF SIGNIFICANCE

The Airfield is nationally significant under Criterion A as the central core facility of aviation-related research programs, as well as significant transport, training, and other aviation uses at the property. The Airfield's landscape is composed of a collection of buildings and structures that contribute to the adjacent NAS Sunnyvale Historic District under Criterion A. The Airfield's inclusion in the existing historic district expands the district's currently defined significance to include World War II and ongoing use of the Airfield for Cold War–era NACA, NASA, and military missions.

5.1.1 Period of Significance

The NAS Sunnyvale Historic District was listed in the NRHP under Criteria A and C in the areas of Architecture and Engineering/Military with a period of significance of 1930-1935 and 1942-1946; the Airfield and all building and structures located within that area were excluded from the district boundary.

The Airfield and its contributing features appear to be eligible for listing in the NRHP under Criterion A as an extension of the NAS Sunnyvale Historic District. Furthermore, it is recommended that the period of significance under Criterion A for the NAS Sunnyvale Historic District should be revised to 1930-1961. This revised period of significance reflects the significant modifications to the Airfield that occurred between 1935 and 1942—a period initially excluded from the NRHP nomination—and adds 1946-1961, which corresponds to the Airfield's continuous association with significant Navy and NASA missions during World War II and subsequent early NACA/NASA missions during the Cold War. The revised period of significance (1930 to 1961) would primarily apply to those features within the district that functionally relate to the operations of the Airfield.

As discussed previously in Section 3.1, “Developmental History,” the current form of the runways began to take shape as the Airfield was modified to accommodate heavier-than-air craft for the U.S. Army Air Corps beginning in the mid-1930s. This modification included removing the older LTA runways and introducing Runway 14R-32L in 1938. With the introduction of the major runway that would shape the configuration of the Airfield as it is still seen today, the period of significance justifiably includes the years between 1935 and 1942, which were omitted from the original NAS Sunnyvale Historic District NRHP listing. The Airfield continued to take on its current configuration with major building campaigns in 1945 (for the Navy transport missions) and 1951 (for the Navy jets' missions). Changes to the configuration of the aviation areas over time reflect changing technologies and needs. These changes retained the Airfield's place at the cutting edge of scientific and aviation research and permitted its continuing use. Therefore, the changes throughout the period of significance are part of the site's character and reflect its central function.

5.1.2 Relevant Theme Studies and Contexts

Resources associated with the Airfield are mentioned in a National Park Service National Historic Landmarks theme study, *American Aviation Heritage*, which identified Moffett Field as significant. It was recommended for further study as an important representative of military aviation, specifically LTA craft, for the World War II period (1939–1945) (NPS 2004):

During World War II, the field at Sunnyvale, commonly known as Moffett Field, served as the navy's west coast lighter-than-air operations center and as the headquarters for the Commander, Fleet Airships Pacific. It also served as the primary training site for blimp pilots in the United States, all free balloon (untethered) training, and as an assembly center for Goodyear blimps from approximately 1942 to 1944. Now known as the NASA Ames Research Center, NASA administers the field's historic resources including three dirigible hangars: Hangar #1, the original hangar built in 1932 for the storage of the airship Macon and training World War II airship pilots, and the World War II era Hangars #2 and #3.

Context studies help to place the Airfield within the bigger picture of significant events and movements in American history. A major study of this type is the *NASA-wide Survey and Evaluation of Historic Facilities in the Context of the U.S. Space Shuttle Program: Roll-up Report*. In addition, the ACHP provided a "Program Comment for World War II and Cold War Eras (1939–1974) Ammunition Storage Facilities" that provides references to context and guidance on historic ammunition facilities, which may apply to the magazines located on the northeastern portion of the Airfield (ACHP n.d.).

5.1.3 Additional Considerations for Significance

Ongoing operations at the Airfield since 1961 continue to carry the mission of the facility forward. This continuing use, however, is not considered to confer eligibility, because of the 50-year cutoff for NRHP eligibility. The property has not been identified as exceptionally significant for events after 1961, so Criterion Consideration G (for significant sites less than 50 years old) is not applicable. However, the passage of time may render later events at the Airfield significant as researchers gain historical perspective on the value of these events to the bigger picture of American history. It is therefore recommended that the significance be periodically reevaluated to determine whether the end date should be moved forward.

5.2 INTEGRITY ASSESSMENT

The Airfield's landscape is defined to a great degree by its continuous evolution to serve the needs of aviation research for nearly a century. The layout of aviation areas has been modified over time to accommodate new types of aircraft and allow the facility to continue to carry out its historic mission of cutting-edge aviation research. As the ACHP notes (ACHP 1991):

Many of the facilities and much of the equipment associated with scientific or engineering advancements remain in active use today, but need to be continuously upgraded and modified to stay at the cutting edge of technology.... a balance must be struck between the needs of active scientific and technological facilities and the need to preserve the physical evidence of America's scientific heritage.

The U.S. Army Corps of Engineers, in *Guidelines for Documenting and Evaluating Historic Military Landscapes: An Integrated Landscape Approach* (Loechl et al. n.d.), identifies the ongoing use of historic facilities as an important aspect of retaining their integrity. If consistent use continues to sustain these functional landscapes, some changes to the physical fabric to support the ongoing historic core mission (and similar or related uses) are expected and may not detract from the historic integrity of the property. Also noted in this study are the differences between "core" mission facilities, which are essential to the historic purpose of the landscape, and support facilities, which are secondary. When considering issues of significance and integrity, core facilities are considered more crucial to sustaining this type of historic landscape's historic identity (Loechl et al. n.d.).

As a result, sites such as the Airfield (significant historic military, scientific and technological resources) have a greater degree of flexibility than some other kinds of historic properties to allow judicious, thoughtful changes to support ongoing uses. The upgrading of obsolete aviation features to continue the mission of the Airfield does not have the same negative impacts to integrity that would occur should unrelated new construction destroy historic aviation features. Because the changes have accrued in a way that retains the relationships among the Airfield's character-defining features and supports its ongoing aviation missions, the property retains overall integrity. Historic integrity would not be diminished by interior changes to buildings and structures within the District that contribute to Criterion A (that is, buildings and structures lacking NR design significance), if they are not individually listed. The primary function of these resources as character-defining features is their exterior massing and character in the larger landscape of the Airfield. Likewise, typical changes to non-contributing buildings and structures that would be necessary to support ongoing uses are unlikely to have an impact on the integrity of the overall district, although this should be guided by future preservation planning projects and guidance (such as found in an Integrated Cultural Resources Management Plan [ICRMP]).

The Airfield retains its integrity of location because it remains in its original geographic location. Its setting has been slightly diminished by new development in the vicinity since the 1960s. Still, the visual relationships—most importantly to Hangar 1, but also to the bay and salt ponds to the east and north, and to Shenandoah Plaza and other features of the NAS Sunnyvale Historic District to the west—remain similar to their historic appearance before 1961, and continue to define the site's setting as they have since the 1930s. Therefore, integrity of setting is retained.

The Airfield's integrity of feeling is retained because the ongoing aviation use of the property and the associated features and activities evoke a sense of its continuing historic use, even though the military airship period is long past. In recent years, commercial airship use has provided continuity of historic activities, which also supports integrity of feeling.

The Airfield retains integrity of association because Hangar 1 and other character-defining features are present to represent the many different significant aviation activities that occurred there throughout the historic period.

Integrity of design is retained, and remains most evident in Hangars 1, 2, and 3 as well as other buildings and structures. The integrity of design related to Hangar 1 has been somewhat diminished because of the loss of the exterior cladding of the structure; it resembles its historic appearance less closely with the siding missing. However, this is a reversible condition, because the siding may be replaced. Although some larger landscape features such as the aviation paved areas have changed substantially since the 1930s, they have changed only slightly since the end of the period of significance in 1961. Specific safety-related historic design associated with these kinds of facilities is evident in the layout and features of the munitions storage area, such as the bermed "igloo" storage bunkers and the use of a buffer zone of standard width to ensure that safety objectives for facility design were met.

Integrity of workmanship and materials have both been diminished because of the loss or replacement of materials such as aviation area paving and the siding of Hangar 1; however, these aspects are less important to the integrity of large landscapes such as this (as noted in National Register Bulletin 40 [NPS 1999]).

5.3 IDENTIFICATION OF HISTORIC CHARACTER AND CHARACTER-DEFINING FEATURES

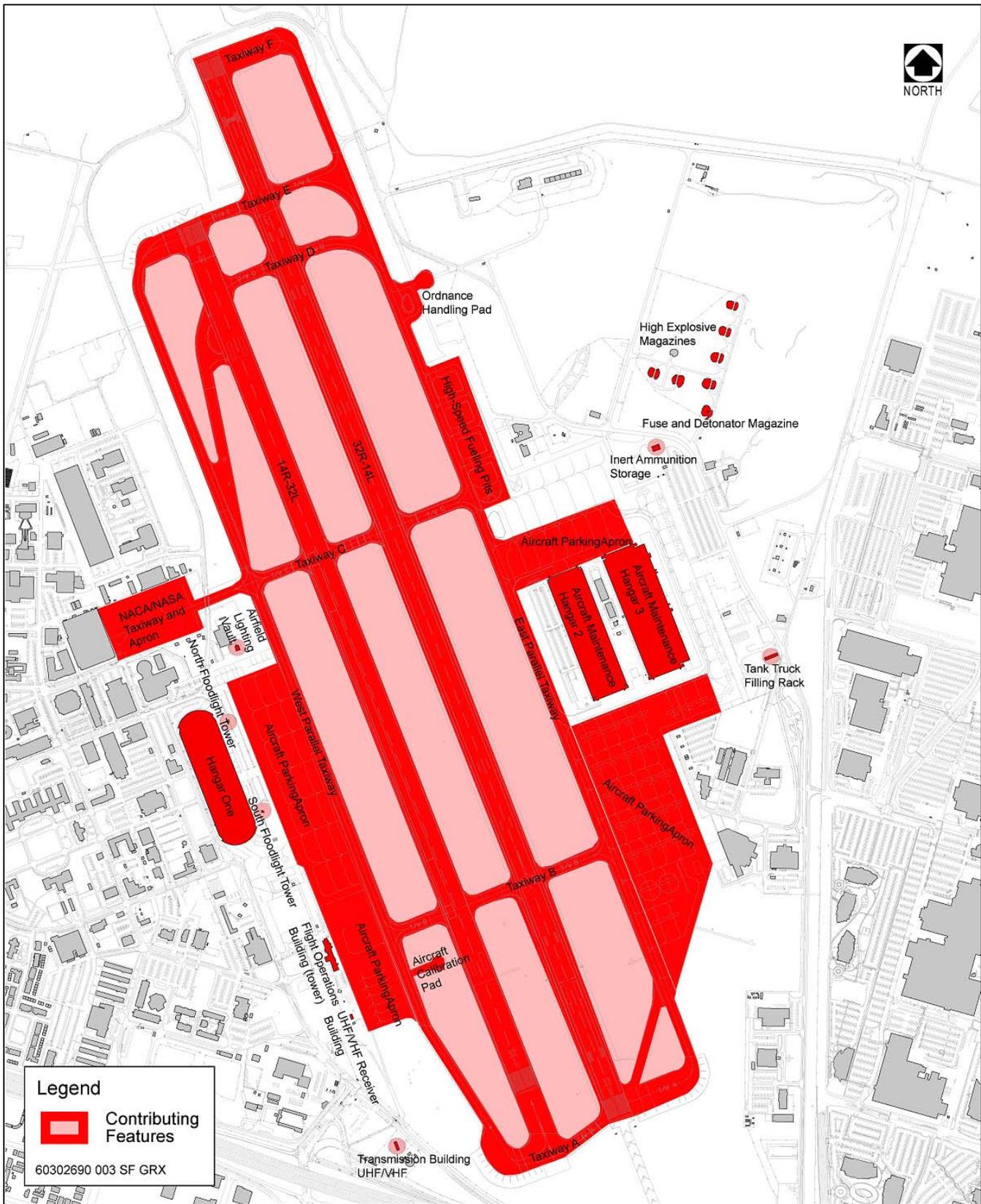
The Airfield encompasses the features directly associated with the Airfield's core aviation mission, which has evolved throughout its history. These features include facilities that served the station's dirigibles, balloons, airplanes, and rotorcraft from the Airfield's construction in 1930 through World War II and the early NACA/NASA years. Many of the features in surrounding areas, though not part of the Airfield, are closely related to it. These include research and training facilities that rely on their adjacency to aviation features, as well as resources such as administrative facilities that indirectly support aviation functions. In addition, views to Hangar 1 from all areas are widely recognized as significant, because Hangar 1 is an iconic landmark in the broader landscape including the NASA ARC and beyond.

The large-scale, monolithic, high Modern appearance of Hangar 1 and the utilitarian, hard-edged character of the Airfield create a distinctive contrast with the finer-textured Shenandoah Plaza area with its Spanish Colonial–Revival architecture, symmetrical road system, and formal plantings. The visual character of the Airfield area throughout the Airfield's history has been open and expansive, hard-surfaced, and functional. The runways were historically large, flat, open, linear features designed to be highly visible from the air, oriented for optimal takeoff and landing based on prevailing winds and surrounding topography. The size and configuration of aviation features were modified over time, driven by the requirements of different types of aircraft that were in use. In the 1930s, Hangar 1 was the central feature of the dirigible-focused aviation area, with tracks extending from its end doors to mooring circles on the north and south. As the Airfield's mission left LTA craft behind and shifted to focus on airplanes and rotorcraft, the small runway system became more important and the tracks and mooring circles were removed. The runway system expanded to a large rectangular field in the 1940s and then gained more well-defined circulation, with longer runways and adjacent taxiways, as it was extended to accommodate additional aircraft types through the 1950s. Throughout these alterations, the Airfield's relationship to and views of Hangar 1 have remained its dominant character-defining feature.

Some contributing buildings and structures are noted below as they relate to the Airfield's historic landscape character. A preliminary inventory of contributing features is provided in Appendix C. This table lists the buildings and structures located within the Airfield area that are known to date to the period of significance, retain integrity, and relate to the significance of the Airfield and/or the existing NAS Sunnyvale Historic District. Some secondary features, such as roads and sidewalks, lighting, belowground features, pipes associated with former fueling systems, and antennae were not evaluated at this time because of the limited availability of information about their integrity and relationship to significance.

Character-defining features of the Airfield are as follows (Figure 2, "Airfield Contributing Features"):

- Flat topography.
- Broad, open views across aviation areas.
- Long views to the salt ponds and San Francisco Bay.
- The expansive, linear system of aviation circulation, dominated by the two parallel concrete-paved runways and their associated taxiways. Associated contributing structures include Runway 14R-32L, Instrument Runway 32R-14L, west and east parallel taxiways, and the aircraft compass calibration pad.



Source: Data compiled by AECOM in 2013

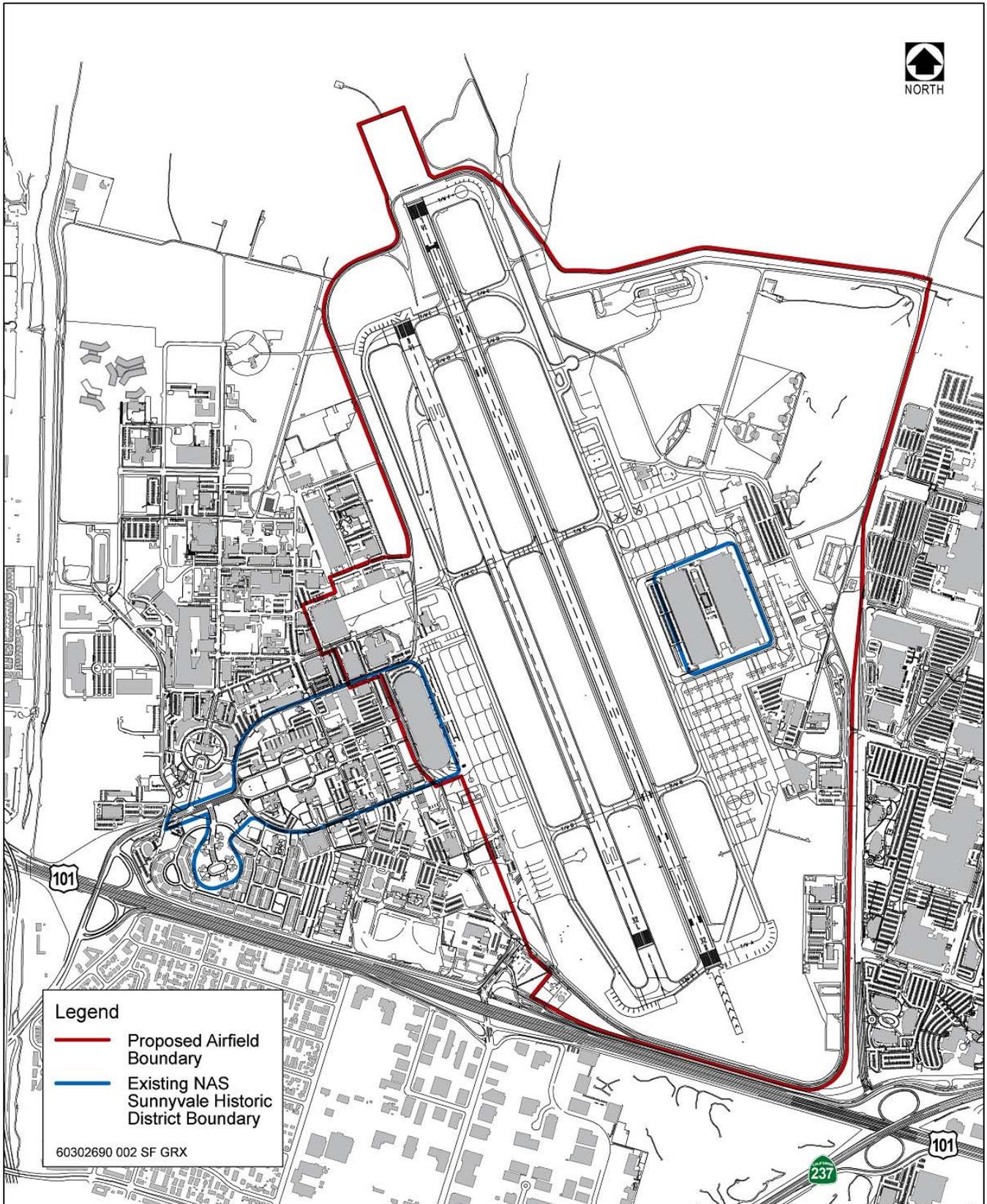
Figure 2. Preliminary Map of Contributing Airfield Features

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- The historic hangars and other aviation facilities that define the edges of the aviation areas. These include Hangars 1, 2, and 3; the NASA/NACA hangar; and the CANG area hangar. Even if some of these buildings and structures do not retain individual integrity (because of factors such as interior renovations or changes to exterior materials), their presence supports the historic spatial character and texture of the Airfield landscape.
 - Visual dominance of Hangar 1 from all areas.
 - Views to aircraft maintenance Hangars 2 and 3, framing the east side of the runway areas and visually balancing Hangar 1 on the west side. The three hangars are all contributing features of the NAS Sunnyvale Historic District, but their massing and exterior appearance support the historic character and integrity of the Airfield and the landscape's spatial arrangement.
 - The concrete aircraft parking aprons, with their grid-like texture, adjacent to the hangars.
 - Historic aircraft fueling features that relate to early-1950s use of the Airfield, including the high-speed fueling pits and tank truck filling rack. These appear to no longer be in use.
 - The features at the northeastern edge of the Airfield that are associated with historic ammunition storage and handling, including the row of four heavily fortified, earthen-walled ordnance magazines; the inert ammunition storage building; the two high-explosive magazines; the ordnance handling pad; the fuse and detonator magazine; and the associated open space of the safety buffer zone that has historically been part of the design specifications for such magazines.
 - The distinctive structures and buildings associated with historic aviation lighting, such as the architecturally unusual north and south floodlight towers adjacent to Hangar 1 and the airfield lighting vault.
 - The collective design of buildings and structures lending a “futuristic grandeur” to the appearance of the Airfield and NAS Sunnyvale Historic District together (Gleason 1958).
 - Ongoing aviation use.

5.4 BOUNDARY JUSTIFICATION

This study recommends that the Airfield and its contributing features are eligible for listing as an extension of the NAS Sunnyvale Historic District, which is already listed in the NRHP. Thus, the discussion of the boundary necessarily suggests the need to expand the boundary of the NAS Sunnyvale Historic District to encompass the Airfield (see Figure 3, “Proposed Revised Boundary, NAS Sunnyvale Historic District”).

The Airfield encompasses historic features directly associated with the facility's core aircraft, transport, research, maintenance, and training mission, which has evolved throughout its history. These features include those used to support operations involving dirigibles, balloons, airplanes, rotorcraft, and jets. The facilities directly associated with this use include circulation features used by aircraft, such as runways, taxiways, parking and repair aprons, and compass calibration pads; buildings used to house aircraft, such as hangars; and buildings and structures directly involved in aviation operations, such as fuel transport and storage systems, repair shops, control towers, and aids to navigation (such as airport lighting). The eligible Airfield also includes research and training facilities that rely on their adjacency to aviation features, as well as resources such as administrative facilities that indirectly support aviation functions; open spaces that provide safety buffers between the flight zone and munitions; and some hazardous elements of a military airfield such as fueling areas, munitions storage and loading facilities, and areas used by test vehicles.



Source: Data compiled by AECOM in 2013

Figure 3. Proposed Revised Boundary, NAS Sunnyvale Historic District

The corresponding boundary line follows the current outer fenceline along the northern, eastern, and southern boundaries of the NASA ARC, inclusive of the vehicular roadway that is used to access the eastern Airfield areas from the operational center of the NASA ARC on the west. The boundary is a bit more complex on the west side, where the Airfield abuts the research center. North of Hangar 1, the boundary corresponds to the current fenceline, which incorporates the small apron in front of historic Hangars 210 and 211 and the flight-related buildings that face this apron. At Hangar 1 the boundary would defer to the existing NAS Sunnyvale Historic District boundary line as it follows the NAS Sunnyvale Historic District to the west and south, and back in to encompass Hangar 1 on the south. Heading in a southerly direction from the southeast corner of Hangar 1, the revised boundary runs parallel to the runways to the point where it meets Cody Road (including the flight operations building), and then meets with the current outer fenceline around the southeast end of the NASA ARC, inclusive of the vehicular roadway and communications structures south of the security guard station.

6.0 TREATMENT

6.1 MANAGEMENT CONTEXT

NASA developed a historic resources protection plan (HRPP) in 2002. The HRPP consists of a 10-year programmatic agreement between NASA ARC, the SHPO, and the Advisory Council on Historic Preservation. The agreement, which became effective November 15, defines the historic preservation management plan for the NASA Research Park, including the NAS Sunnyvale Historic District at Moffett Field (NASA 2002a). The HRPP expired in 2012. NASA ARC is preparing an integrated cultural resources management plan (ICRMP) in accordance with current NASA standards, to serve as the management tool for historic properties for the next decade. The results of this study will be incorporated into the ICRMP.

The ICRMP will also identify other treatment and planning tools that may be necessary for ongoing stewardship of the NAS Sunnyvale Historic District (including the Airfield). Currently 98 acres in the southeast portion of the Airfield are encumbered by a permit to the U.S. Air Force with respect to the CANG Cantonment Area. NASA ARC is considering options for leasing out other portions of the Airfield area. NASA and the U.S. General Services Administration have partnered to issue a request for proposals (RFP) to obtain lease proposals from qualified entities to rehabilitate and adaptively reuse historic Hangar 1 and to operate, manage, and maintain Moffett Federal Airfield (NASA 2013a). The RFP includes a requirement for the lessee to rehabilitate and adaptively reuse Hangar 1 and manage and maintain the Airfield in compliance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for the Treatment of Cultural Landscapes*. The following treatment guidelines are intended to provide NASA and potential lessees with a framework for considering appropriate future uses and treatment approaches for the Airfield's contributing features, in light of its eligible status for inclusion as an extension of the NAS Sunnyvale Historic District.

6.2 TREATMENT APPROACH

The U.S. Department of the Interior currently recognizes four appropriate treatment alternatives for historic properties: preservation, rehabilitation, restoration, and reconstruction. These are defined and discussed in the *Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for the Treatment of Cultural Landscapes* (NPS 1995). Originally, these approaches were developed for historic properties in the NRHP, and were focused on issues specific to buildings and structures. The Secretary of the Interior's guidelines addressing historic landscapes were subsequently developed and appended to these standards. *Guidelines for the Treatment of Cultural Landscapes* were appended to the Secretary of the Interior's standards in 1992, when the standards were revised so that they could be applied not just to buildings and structures, but also to sites, objects, districts, and landscapes.

National Park Service *Director's Order-28: Cultural Resource Management Guideline* (1998), adapted from historic-property treatment guidance, also provides specific guidance for treatment of landscapes. Director's Order 28 provides the following definitions of the four treatment alternatives for cultural landscapes:

- *Preservation* maintains the existing integrity and character of a historic property by arresting or retarding deterioration caused by natural forces and normal use. It includes both maintenance and stabilization. Maintenance is a systematic activity mitigating wear and deterioration of a historic property by protecting its conditions. In light of the dynamic qualities of a landscape, maintenance is essential for the long-term

preservation of individual features and integrity of the entire landscape. Stabilization involves reestablishing the stability of unsafe, damaged, or deteriorated resources while maintaining their existing character.

- *Rehabilitation* improves the utility or function of a historic property, through repair or alteration, to make possible an efficient, compatible use while preserving those portions or features that are important in defining its significance.
- *Restoration* accurately depicts the form, features, and character of a cultural landscape as it appeared at a specific period or as intended by its original constructed design. It may involve the reconstruction of missing historic features and cultural value in themselves.
- *Reconstruction* entails depicting the form, features, and details of a nonsurviving cultural landscape, or any part thereof, as it appeared at a specific period or as intended by its original constructed design. Reconstructing an entire landscape is always a last-resort measure for addressing a management objective and should be undertaken only after consultation.

The recommended landscape treatment approach for the Airfield is rehabilitation. Rehabilitation is the appropriate treatment approach wherever an activity requires physical changes to the landscape, such as large-scale repairs, replacement of historic features, and alterations and additions for a new or continued use (new roads, buildings, or parking, for example).

6.3 TREATMENT GUIDELINES

Guidelines for treatment describe how to accomplish needed changes in the landscape without compromising its historic character. The guidelines outlined below are intended to complement the treatment concepts, and to establish a general approach to historic airfield preservation and continuing use. Guidelines are organized by categories: spatial organization, archaeological resources, views and viewsheds, circulation, historic buildings and structures, small-scale features, land use, topographic modifications, additional studies, and new construction. These sections give general recommended actions to meet the goals of resource preservation.

Rehabilitation standards acknowledge the need to alter or add to a cultural landscape to meet continuing or new uses while retaining the landscape's historic character (NPS 1995):

In Rehabilitation, the historic landscape's character-defining features are protected and maintained. The Secretary of Interior's Standards for Rehabilitation permit the replacement of deteriorated, damaged, or missing features using either traditional or substitute materials. Of the four treatments, only Rehabilitation includes an opportunity to make possible an efficient contemporary use through alterations and additions.

The following general preservation actions are associated with rehabilitation (NPS 1995):

- **Identify, Retain, and Preserve Historic Materials and Features:** Any treatment of historic landscapes begins with identification of the features and materials that are important to the landscape's historic character and must be retained.
- **Protect and Maintain Historic Features and Materials:** Protection generally involves the least degree of intervention and is preparatory to other work; it may be accomplished through permanent or temporary measures. For example, protection includes restricting access to fragile earthworks or cabling a tree to protect

against breakage. Maintenance includes daily, seasonal, and cyclical tasks and the techniques, methods, and materials used to implement them.

- **Repair Historic Features and Materials:** When existing conditions of character-defining materials and portions of features warrant more extensive work, repairing is recommended. Rehabilitation guidance for the repair of historic features and materials begins with the least degree of intervention possible. Repairing also includes the limited replacement in kind of extensively deteriorated materials or parts of features. Using material that matches the historic in design, color, and texture is always the preferred option; however, substitute material is acceptable if the material conveys the same visual appearance as the historic period.
- **Replace Deteriorated Historic Materials and Features:** Following repair in the hierarchy, rehabilitation guidance is provided for replacing an entire character-defining feature with new material because the level of deterioration or damage precludes repair. The preferred option is always replacement of the entire feature in kind. Because this approach may not always be technically, economically, or environmentally feasible, the use of compatible substitute materials can be considered. Whatever level of replacement takes place, the historic features and materials should serve as a guide to the work. Although the rehabilitation guidelines recommend replacing an entire feature that is extensively deteriorated or damaged, they never recommend removing the feature and replacing it with new material if repair is possible.
- **Design for the Replacement of Missing Historic Features:** When an entire feature is missing, the landscape's historic character is diminished. Accepting the loss is one possibility; however, where an important feature is missing, its replacement is always recommended in the rehabilitation guidelines as the first or preferred course of action. Thus, if adequate historical, pictorial, and physical documentation exists so that the feature may be reproduced accurately, and if it is desirable to reestablish the feature as part of the landscape's historical appearance, then planning, designing, and installing a new feature based on such information is appropriate. A second course of action for the replacement feature is to create a new design that is compatible with the remaining character-defining features of the historic landscape. The new design should always take into account the spatial organization and land patterns, features, and materials of the cultural landscape itself; most importantly, the new design should be clearly differentiated so that a false historical appearance is not created.
- **Alterations/Additions for New Use:** When alterations to a historic landscape are needed to assure its continued use, it is most important that such alterations do not radically change, obscure, or destroy character-defining spatial organization and land patterns or features and materials. Such work may also include selectively removing features that detract from the overall historic character. Installing additions to a historic landscape may seem to be essential for a new use; however, the rehabilitation guidelines emphasize that such new additions should be considered only after it is determined that those needs cannot be met by altering secondary (i.e., non-character-defining) spatial organization and land patterns or features. If alternative solutions have been thoroughly evaluated and a new addition is still judged to be the only viable alternative, the addition should be planned, designed, and installed to be clearly differentiated from the character-defining features so that these features are not radically changed, obscured, damaged, or destroyed.

6.3.1 Spatial Organization

Spatial organization is the arrangement of elements that define and create spaces in the landscape. This is an essential part of a functional landscape such as the Airfield. Consider retaining the open qualities of the runways and taxiways, framed by the large Hangars 1, 2, and 3. Avoid adding new, vertical features within the open, broad

expanse of paving. Consider adding any new buildings and structures as infill within other areas. Retain the open areas around the munitions magazines that compose the safety arcs for explosives.

6.3.2 Archaeological Resources

Most of the archaeological resources identified at NASA ARC date to the prehistoric and early historic periods; therefore, they predate the Airfield. Should intact archaeological sites be encountered, much could be learned about the indigenous occupation and subsequent settling of the Sacramento–San Joaquin Delta vicinity. The overall stewardship goal for archaeological sites is protection from disturbance and monitoring of any undertakings that may affect archaeological resources. Any projects involving ground disturbance will adhere to NASA’s unexpected-discovery plan, in accordance with Title 36, Section 800.11 of the Code of Federal Regulations. Similarly, projects will comply with the Native American Graves and Repatriation Act and its implementing regulations.

6.3.3 Views and Viewsheds

Views are a critical aspect of the Airfield’s character. The overall stewardship goal is to retain the views that have consistently been part of the Airfield’s appearance over time. In particular, the open views along and across the runway area, featuring the visually prominent Hangars 1, 2, and 3, and the views of the surrounding setting such as San Francisco Bay and the salt ponds should be preserved. For example, if new, vertical features are being considered for addition to the landscape, avoid placing them along the runway alignments or near the facades of the hangars.

6.3.4 Circulation

Circulation includes roads as well as aviation features such as runways and taxiways. Retain the existing historic patterns of circulation, such as road alignments and widths, and runway and taxiway alignments. Retain and maintain historic paving materials. Consider repairing or replacing damaged and worn historic materials in-kind to preserve the appearance of features such as the concrete runways and historic curbing.

6.3.5 Historic Buildings and Structures

The focus of landscape treatment is on building exteriors and forms as they affect the landscape, not building interiors or detailed structural and engineering recommendations. In general, alterations to contributing buildings and structures that significantly change the massing and exterior appearance may have an impact on the integrity of the District. Retain and maintain the historic Hangars 1, 2, and 3. Maintain the exterior appearance of Hangars 2 and 3, and consider replacing the missing exterior cladding of Hangar 1 with materials that replicate its appearance in the historic period (1930–1961). Coordinate other exterior alterations to contributing buildings with guidance documents such as the ICRMP to ensure compliance with appropriate standards.

6.3.6 Small-Scale Features

Small-scale landscape features include both historic features (such as stone and concrete markers) and nonhistoric ones (such as signs and memorials). Many of these features have changed over time; they largely serve the Airfield’s functional needs, and historic small-scale features were removed as they became obsolete. Identify

historic small-scale features and, if practicable, preserve in-place; if they must be removed, consider moving them to another location if they could serve a memorial or interpretive purpose. If not, document thoroughly before removing.

6.3.7 Land Uses

As noted above, continuing aviation uses fundamentally support the ongoing significance of the Airfield. Insofar as possible, continue to use the Airfield and its associated features for aviation functions. Other uses and activities within buildings and structures that do not require exterior alterations to historic resources may also be appropriate. Avoid introducing incompatible land uses and associated construction within the Airfield area. Refer to guidance provided in historic preservation management documents such as the ICRMP.

6.3.8 Topographic Modifications

Topographic modifications include areas that have been graded. The Airfield is distinguished by its flat topography. Maintain the level character of the area, and avoid adding significant areas of cut and fill as part of construction activities within the Airfield site.

6.3.9 Recommended Studies

Consider undertaking historic structure reports for historic buildings and structures to detail their conditions. Provide technical guidance on material conservation and structural treatment for repair, stabilization, and other future actions. Additional studies may be identified in the ICRMP, which is in progress.

6.3.10 New Construction

New additions and adjacent or related new construction should be undertaken in such a manner that, should the additions or construction elements be removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

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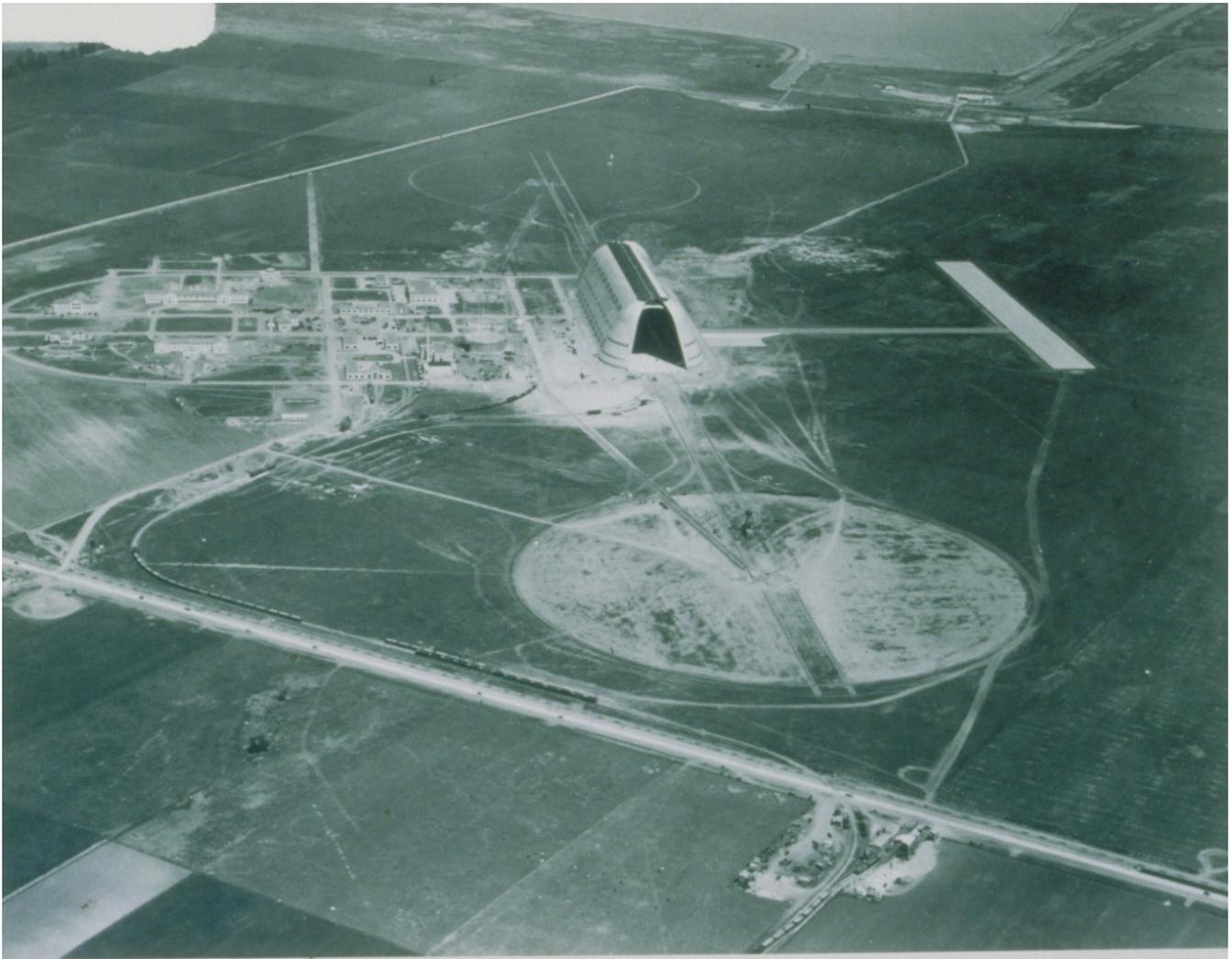
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APPENDIX A

Selected Historic Photographs



Early aerial photograph of NAS Sunnyvale showing Shenandoah Plaza at center left, Hangar 1 with the mooring circles for the *USS Macon*, and the original runway configuration for the *Sparrowhawk* planes at center right, c. 1933 (Source: *Moffett Field Historical Society*)



Aerial photograph of NAS Sunnyvale with Hangar 1 at upper right and larger runway system at center and left, c. 1934-1938
(Source: *Moffett Field Historical Society*)



Aerial photograph of NAS Sunnyvale, c. 1938 (Source: NASA Ames History Office)



Aerial photograph of NAS Moffett Field with new runway configuration and safety buffer zone under construction, July 25, 1943 (Source: NASA Ames History Office)



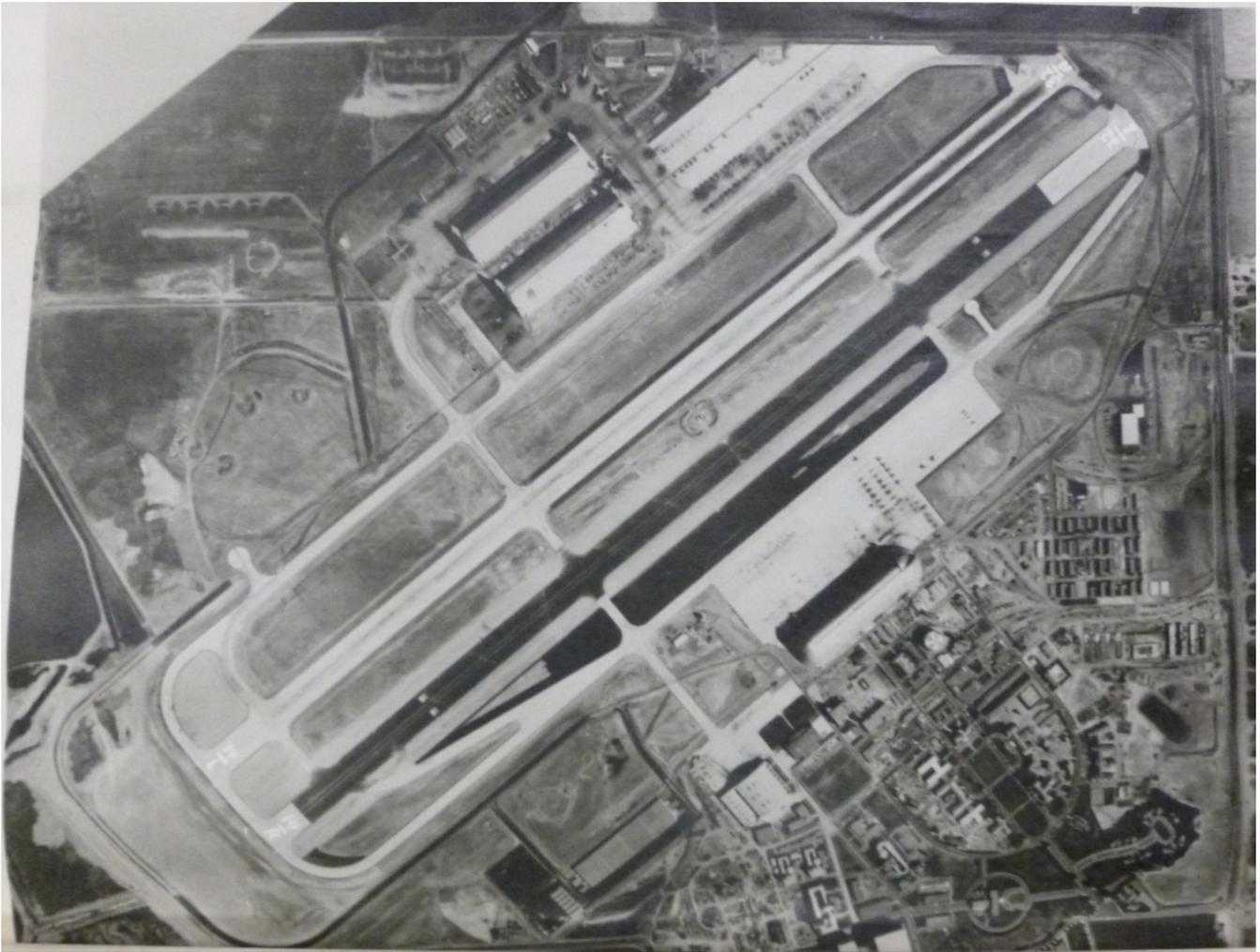
Aerial photograph of NAS Moffett Field showing recently completed Hangars 2 and 3 at center right and future CANG area at lower left, 1944 (Source: *Moffett Field Historical Society*)



Aerial photograph of NAS showing the completed magazines and safety buffer zone, c. 1945 (*Source: NASA Ames History Office*)



Aerial photograph of NAS Moffett Field during Naval Air Transport Service period, 1947. Note taxiway and apron in front of NACA hangars to the left of Hangar 1. (Source: *Moffett Field Historical Society*)



Aerial photograph of NAS Moffett Field after new ramps and taxiways were installed and the runways were extended, 1953
(Source: *Moffett Field Historical Society*)



Aerial photograph of NAS Moffett Field after more modifications to the airfield and extensions to the runways, 1967. Note the addition of the golf course at lower right. (Source: *Moffett Field Historical Society*)

APPENDIX B

Selected Existing Conditions Photographs



Panoramas of the Airfield. Looking north and northeast toward Hangars 1, 2, and 3 (top); looking east toward CANG and south toward the end of the runways (bottom) (Source: AECOM 2013)



View from north end of runways looking south toward Hangars 1, 2, and 3 (*Source: AECOM 2013*)



Detail view of Runway 14R-32L looking south (*Source: AECOM 2013*)



View of east parallel taxiway looking south toward Hangars 2 and 3 (Source: AECOM 2013)



View of magazines 70-74 and surrounding safety buffer zone, looking east (*Source: AECOM 2013*)



View of Hangar 1 looking northwest (Source: AECOM 2013)



View of Hangars 2 and 3 looking northwest (*Source: AECOM 2013*)

APPENDIX C

Preliminary Inventory of Contributing Airfield Features

This list represents a preliminary identification of contributing features. Other features located within the Airfield may date to the period of significance but are not included in this inventory because their construction dates, integrity, or condition could not be determined, or because they could not be accessed during the field survey. Further evaluation to determine if these features are contributors may be required in future studies.

Table C-1. Preliminary Inventory of Contributing Airfield Features

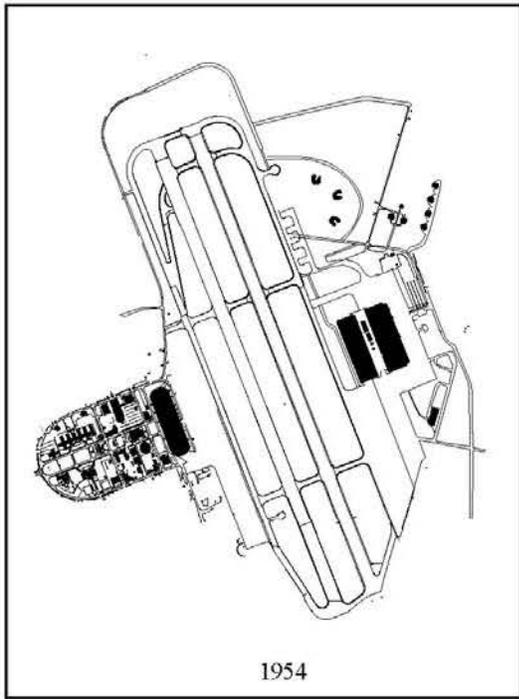
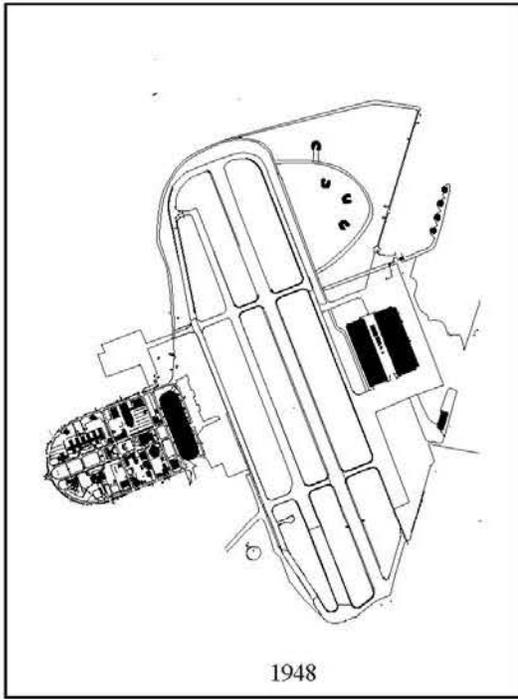
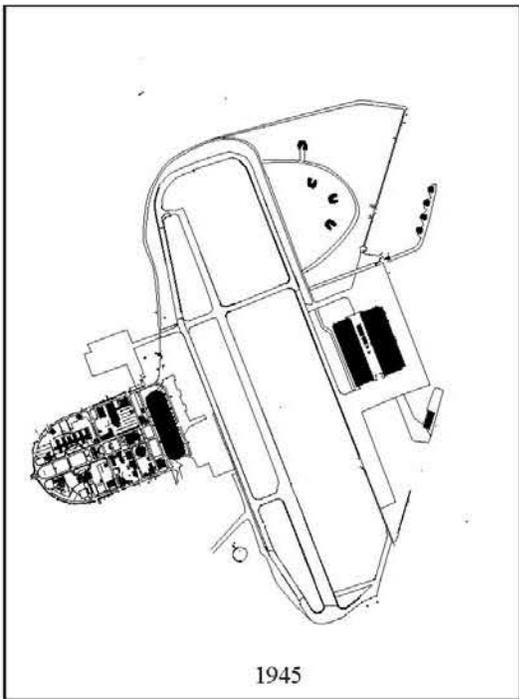
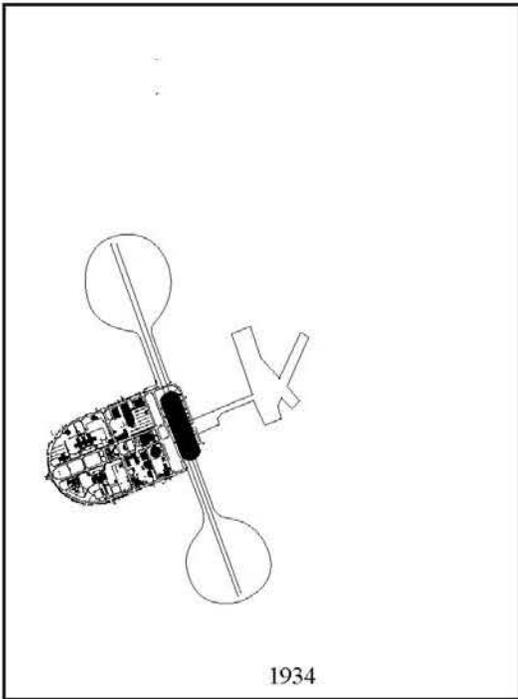
Feature Number	Feature Name	Estimated Construction Date	Historic Use	Contributor to the Existing NAS Sunnyvale NR District?	Proposed New Contributor to NAS Sunnyvale NR District?
001	Hangar One	06/01/1933	Aircraft Maintenance Hangar	YES	NO
032	North Floodlight Tower	01/01/1934	Aviation Operations Building	YES	NO
033	South Floodlight Tower	01/01/1934	Aviation Operations Building	YES	NO
046	Aircraft Maintenance Hangar 2	1943	Aircraft Maintenance Hangar	YES	NO
047	Aircraft Maintenance Hangar 3	1943	Aircraft Maintenance Hangar	YES	NO
069	Inert Ammunition Storage	06/01/1943	Inert Storehouse - Bulk	NO	YES
070	Fuse & Detonator Magazine	03/01/1943	Fuse and Detonator Magazine - Ready Issue	NO	YES
071	High Explosive Magazine	08/01/1943	Explosive Storage (Miscellaneous)	NO	YES
072	High Explosive Magazine	08/01/1943	Explosive Storage (Miscellaneous)	NO	YES
073	High Explosive Magazine	08/01/1943	Explosive Storage (Miscellaneous)	NO	YES
074	High Explosive Magazine	08/01/1943	Explosive Storage (Miscellaneous)	NO	YES
105	Airfield Lighting Vault	12/01/1947	Substation. Historically this transformer provided light for the airfield	NO	YES
106	Aircraft Compass Calibration Pad (Compass Rose)	12/01/1947	Compass Calibration Pad, Surfaced	NO	YES
141	Tank Truck Filling Rack	12/01/1952	Aircraft Truck Fueling Facility	NO	YES
143	High Explosive Magazine	05/01/1951	Explosive Storage (Miscellaneous)	NO	YES
147	High Explosive Magazine	05/01/1951	Explosive Storage (Miscellaneous)	NO	YES
158	Flight Operations Building (Tower)	1954 (Feb)	Flight operations	NO	YES
329	Ultra High Frequency/Very High Frequency (UHF/VHF) Receiver Building	1958	Facilitate air traffic control communications	NO	YES
442	Ordnance Handling Pad	04/01/1956 (Likely 1951 or 1952)	Taxiway (Concrete)	NO	YES

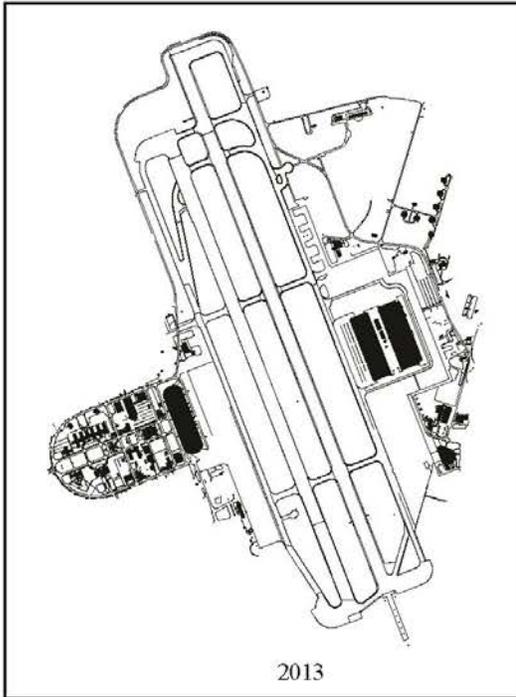
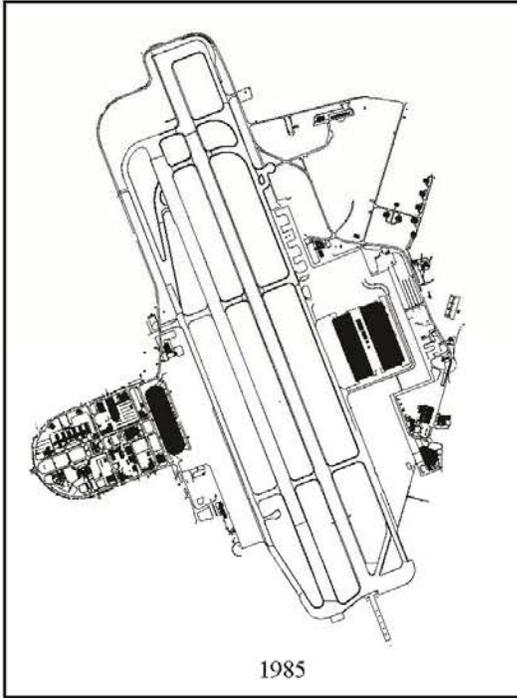
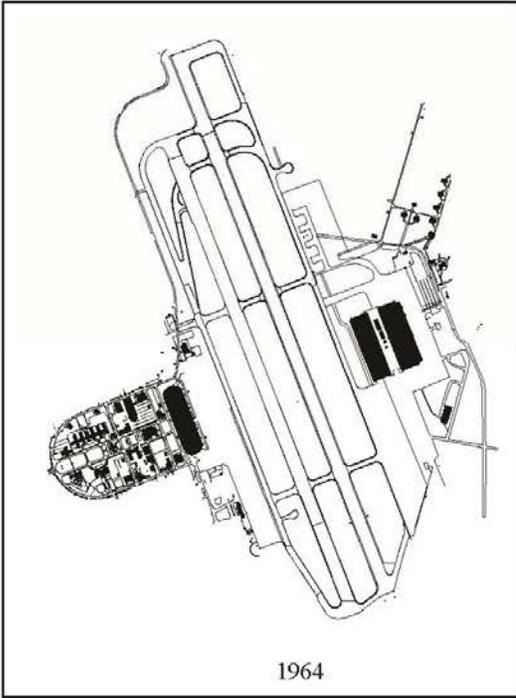
Table C-1. Preliminary Inventory of Contributing Airfield Features

Feature Number	Feature Name	Estimated Construction Date	Historic Use	Contributor to the Existing NAS Sunnyvale NR District?	Proposed New Contributor to NAS Sunnyvale NR District?
454	Transmission Building Uhf/Vhf	12/31/1960	Communications Building. Facilitates air traffic control communications.	NO	YES
MF1000	Runway 32l/14r	Originally Constructed in 1938 (Later Extended)	Runway (Concrete)	NO	YES
MF1001	Instrument Runway 32r/14l	12/31/1945 (Later Extended)	Runway (Concrete)	NO	YES
MF1002	Aircraft Parking Apron	05/01/1945	Aircraft Parking, Access or Maintenance Apron (Concrete)	NO	YES
MF1003	Hi-Speed Aircraft Fueling Pits	12/01/1955	Aircraft Direct Fueling Station	NO	YES
MF1016	West Parallel Aircraft Taxiway	c. 1946	Taxiway (Concrete)	NO	YES
MF1016	East Parallel Aircraft Taxiway	c. 1946	Taxiway (Concrete)	NO	YES
MF1016	Connecting Taxiways	c. 1946	Taxiway (Concrete)	NO	YES

APPENDIX D

Period Plans





Appendix C Interested Party Consultation

C.1 Initial Invitation Letters to Potential Interested Parties (March 19, 2020)

- The Moffett Field Historical Society
- The City of Sunnyvale, California
- The City of Mountain View, California
- Sunnyvale Historical Society
- Mountain View Historical Association
- History San Jose
- Silicon Valley Historical Association
- California Preservation Foundation
- National Trust for Historic Preservation



National Aeronautics and Space Administration



Ames Research Center
Moffett Field, California 94035

March 19, 2020

Herb Parsons
President
Moffett Field Historical Society
P.O.Box 16
Moffett Field, CA 94035-0016

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Mr. Parsons,

In support of its responsibilities under Section 106 of the National Historic Preservation Act of 1966 (NHPA), the National Aeronautics and Space Administration Ames Research Center (NASA ARC) has initiated Section 106 consultation with the California State Historic Preservation Officer (SHPO) regarding the proposed Hangar 3 Demolition Project (Project or Undertaking) located at Moffett Field, Santa Clara County, California (see attached Figure 1 for project location map). Built in 1943, Hangar 3 is listed in the National Register of Historic Places (NRHP) as a contributor to the U.S. Naval Air Station (NAS) Sunnyvale Historic District and is a historic property for the purposes of Section 106 consultation.

In 2014, Planetary Ventures, LLC (PV) entered into a lease agreement with NASA ARC for the MFA premises, including use of Hangar 3 for research and development, such as testing and light assembly uses related to space, aviation, rover/robotics, and other emerging technologies. Initially, potential reuse scenarios for Hangar 3 were explored in 2006, resulting in preparation of documents related to existing conditions, reuse opportunities, and rehabilitation. In 2015, PV submitted plans under Section 106 consultation for the Remediation and Rehabilitation of Hangars 2 and 3, Core and Shell Project. This project intended to rehabilitate elements of Hangars 2 and 3, including the abatement and remediation of hazardous materials, repairs and upgrades to the structural systems, repairs to the exterior envelopes, and a variety of systems upgrades. Initial Section 106 consultation produced a finding of No Adverse Effect to historic properties, and rehabilitation efforts at Hangar 2 are proceeding. However, in 2016, the roof of Hangar 3 partially collapsed, resulting in additional structural analysis. Emergency repairs to the truss system were made, but damage continued to spread throughout the structural system, despite the efforts to contain and stabilize the structure. The extensive damage and advanced deteriorated state of the structure has required stabilization of multiple truss members with a temporary shoring assembly.

Per the recommendations resulting from recent monitoring by structural engineers, Hangar 3 is vulnerable to further damage and partial collapse, particularly in the event of seismic or high wind load events. The potential for collapse of Hangar 3 presents a significant life safety and surrounding property damage risk. Based upon the opinions of the structural engineers, the repairs required to return Hangar 3 to occupancy would be extensive, undefinable, and cost-prohibitive. Currently, Hangar 3 is closed to occupancy and is being stabilized through an extensive internal shoring and hydraulic jacking system, although engineering analysis has demonstrated that this solution is short-term and not sustainable. Therefore, NASA ARC is

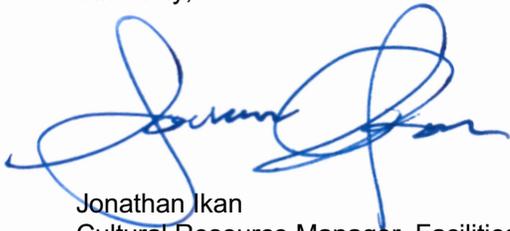
processing a request by PV to demolish Hangar 3, which would qualify as a federal undertaking under Section 106 of the NHPA and would result in an adverse effect.

NASA ARC is contacting you to assess your organization's interest in participating as a consulting party as defined in 36 CFR Section 800.2(c) in the Section 106 of the NHPA review process for the Hangar 3 Demolition Project. If you would like to participate, you may elect to do so by sending written notification by email with the subject heading "Hangar 3 Section 106 Consultation Interested Party" to me at Jonathan.d.ikan@nasa.gov within the next 30 days. Please include the following information:

1. Name
2. Title
3. Organization/Affiliation
4. Address
5. Email address
6. Phone number
7. Statement of election to participate as a consulting party

Please contact me if you have any questions pertaining to this process. I appreciate your attention and look forward to hearing from you regarding this Undertaking.

Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
NASA Ames Research Center, Mail Stop 213-8
Moffett Field, CA 94035
(605) 604-6859
Jonathan.d.ikan@nasa.gov

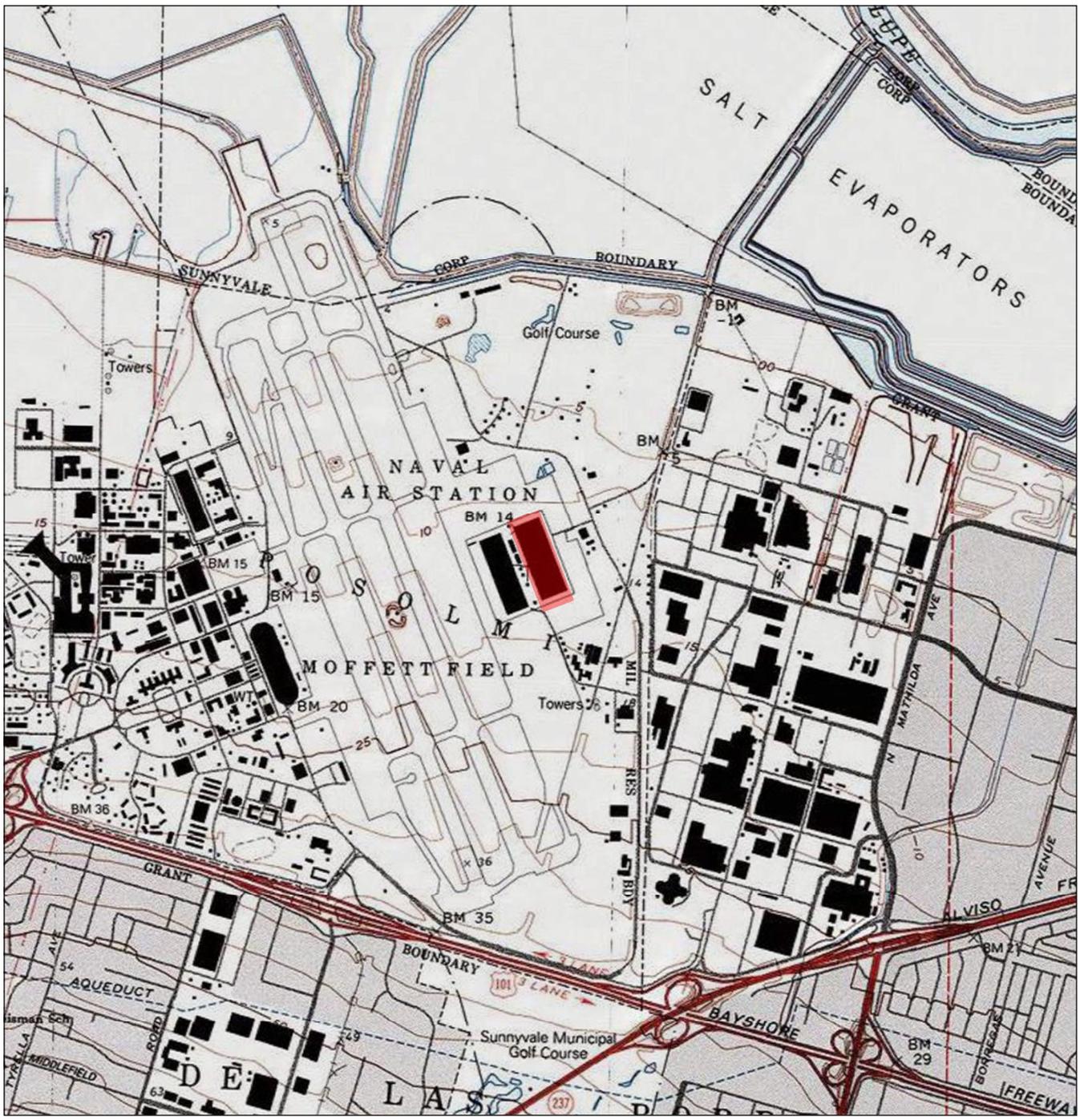
Cc:

Ms. Rebecca Klein, NASA FPO
Environmental Management Division
NASA Headquarters
300 E Street, SW
Washington, DC 20546-0001

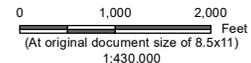
Lease Administration Team
Planetary Ventures
1600 Amphitheater Pkwy
Mountain View, CA 94043

Legal Department/Legal Matters
Planetary Ventures
1600 Amphitheater Pkwy
Mountain View, CA 94043

Attachments:
Figure 1. Regional Project Location Map



Project Location



Project Location: Moffett Field, Santa Clara County
 Prepared by DL on 2020-03-03
 TR by JC on 2020-03-03
 IR Review by DH on 2020-03-03

Client/Project: Planetary Ventures, LLC
 MFA Hangar 3 Demolition Project
 181710453

Figure No. 1

Title: Project Location Map

Notes
 1. Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
 2. Data Sources: Stantec 2019.
 3. Background: Copyright © 2013 National Geographic Society, i-cubed National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

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National Aeronautics and Space Administration



Ames Research Center
Moffett Field, California 94035

March 19, 2020

Trudi Ryan
Community Development Director
City of Sunnyvale
456 W. Olive Avenue
Sunnyvale, CA 94086

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Ms. Ryan,

In support of its responsibilities under Section 106 of the National Historic Preservation Act of 1966 (NHPA), the National Aeronautics and Space Administration Ames Research Center (NASA ARC) has initiated Section 106 consultation with the California State Historic Preservation Officer (SHPO) regarding the proposed Hangar 3 Demolition Project (Project or Undertaking) located at Moffett Field, Santa Clara County, California (see attached Figure 1 for project location map). Built in 1943, Hangar 3 is listed in the National Register of Historic Places (NRHP) as a contributor to the U.S. Naval Air Station (NAS) Sunnyvale Historic District and is a historic property for the purposes of Section 106 consultation.

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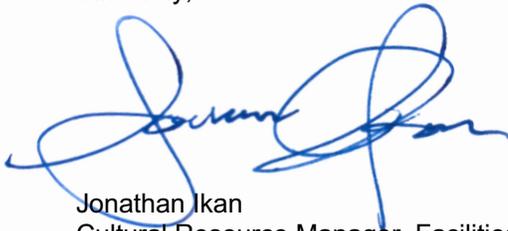
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1. Name
2. Title
3. Organization/Affiliation
4. Address
5. Email address
6. Phone number
7. Statement of election to participate as a consulting party

Please contact me if you have any questions pertaining to this process. I appreciate your attention and look forward to hearing from you regarding this Undertaking.

Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
NASA Ames Research Center, Mail Stop 213-8
Moffett Field, CA 94035
(605) 604-6859
Jonathan.d.ikan@nasa.gov

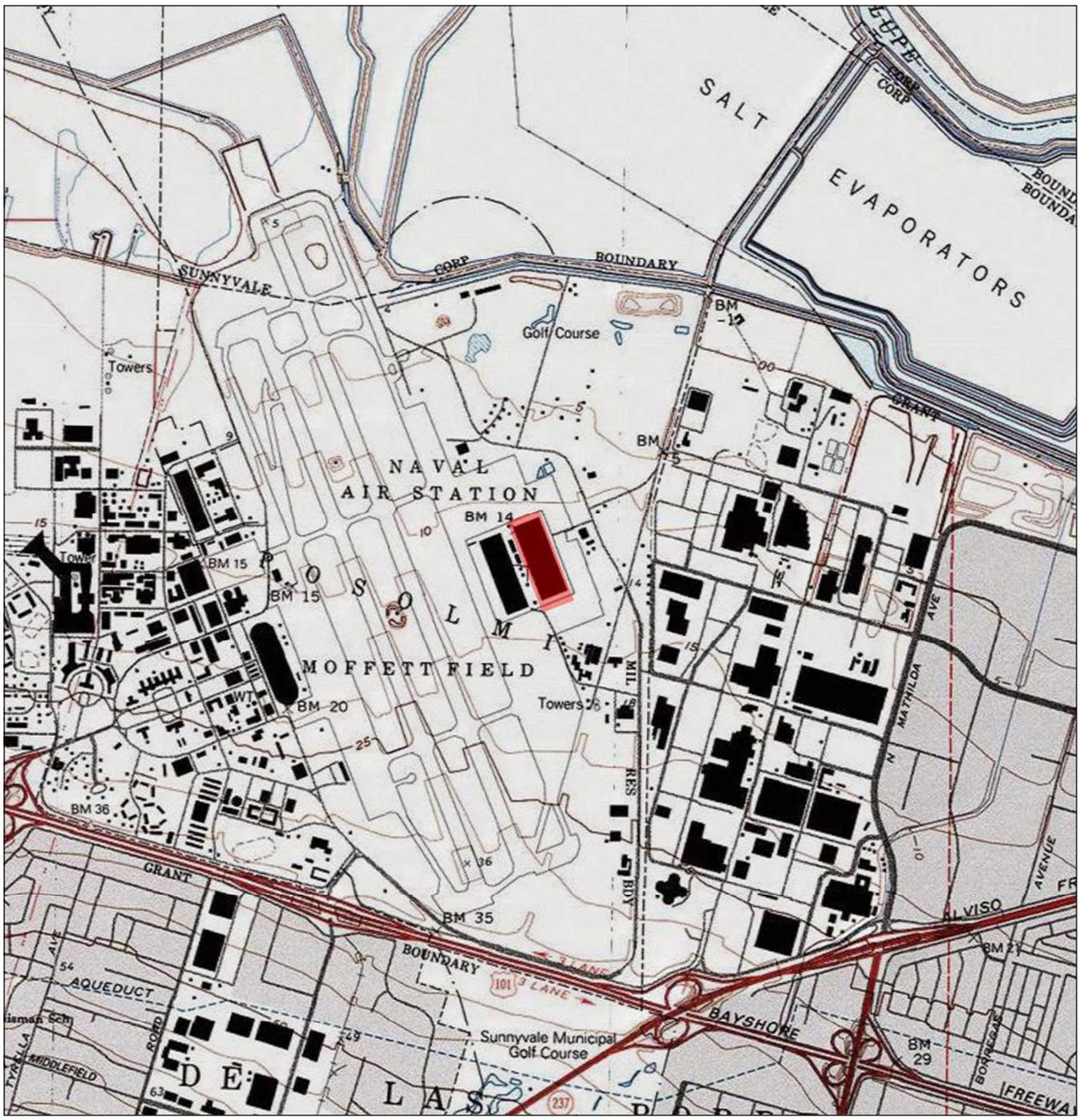
Cc:

Ms. Rebecca Klein, NASA FPO
Environmental Management Division
NASA Headquarters
300 E Street, SW
Washington, DC 20546-0001

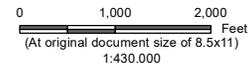
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Project Location: Moffett Field, Santa Clara County
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Client/Project: Planetary Ventures, LLC
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National Aeronautics and Space Administration



Ames Research Center
Moffett Field, California 94035

March 19, 2020

Aarti Shrivastava
Assistant City Manager/Community
Development Director City of Mountain View
500 Castro Street, 1st Floor
Mountain View, CA 94035-0016

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Ms. Shrivastava,

In support of its responsibilities under Section 106 of the National Historic Preservation Act of 1966 (NHPA), the National Aeronautics and Space Administration Ames Research Center (NASA ARC) has initiated Section 106 consultation with the California State Historic Preservation Officer (SHPO) regarding the proposed Hangar 3 Demolition Project (Project or Undertaking) located at Moffett Field, Santa Clara County, California (see attached Figure 1 for project location map). Built in 1943, Hangar 3 is listed in the National Register of Historic Places (NRHP) as a contributor to the U.S. Naval Air Station (NAS) Sunnyvale Historic District and is a historic property for the purposes of Section 106 consultation.

In 2014, Planetary Ventures, LLC (PV) entered into a lease agreement with NASA ARC for the MFA premises, including use of Hangar 3 for research and development, such as testing and light assembly uses related to space, aviation, rover/robotics, and other emerging technologies. Initially, potential reuse scenarios for Hangar 3 were explored in 2006, resulting in preparation of documents related to existing conditions, reuse opportunities, and rehabilitation. In 2015, PV submitted plans under Section 106 consultation for the Remediation and Rehabilitation of Hangars 2 and 3, Core and Shell Project. This project intended to rehabilitate elements of Hangars 2 and 3, including the abatement and remediation of hazardous materials, repairs and upgrades to the structural systems, repairs to the exterior envelopes, and a variety of systems upgrades. Initial Section 106 consultation produced a finding of No Adverse Effect to historic properties, and rehabilitation efforts at Hangar 2 are proceeding. However, in 2016, the roof of Hangar 3 partially collapsed, resulting in additional structural analysis. Emergency repairs to the truss system were made, but damage continued to spread throughout the structural system, despite the efforts to contain and stabilize the structure. The extensive damage and advanced deteriorated state of the structure has required stabilization of multiple truss members with a temporary shoring assembly.

Per the recommendations resulting from recent monitoring by structural engineers, Hangar 3 is vulnerable to further damage and partial collapse, particularly in the event of seismic or high wind load events. The potential for collapse of Hangar 3 presents a significant life safety and surrounding property damage risk. Based upon the opinions of the structural engineers, the repairs required to return Hangar 3 to occupancy would be extensive, undefinable, and cost-prohibitive. Currently, Hangar 3 is closed to occupancy and is being stabilized through an extensive internal shoring and hydraulic jacking system, although engineering analysis has demonstrated that this solution is short-term and not sustainable. Therefore, NASA ARC is

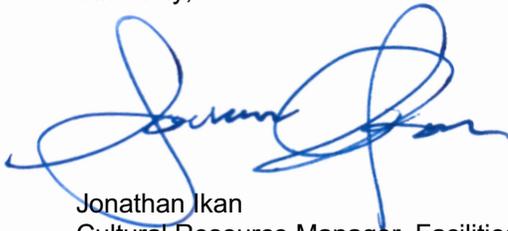
processing a request by PV to demolish Hangar 3, which would qualify as a federal undertaking under Section 106 of the NHPA and would result in an adverse effect.

NASA ARC is contacting you to assess your organization's interest in participating as a consulting party as defined in 36 CFR Section 800.2(c) in the Section 106 of the NHPA review process for the Hangar 3 Demolition Project. If you would like to participate, you may elect to do so by sending written notification by email with the subject heading "Hangar 3 Section 106 Consultation Interested Party" to me at Jonathan.d.ikan@nasa.gov within the next 30 days. Please include the following information:

1. Name
2. Title
3. Organization/Affiliation
4. Address
5. Email address
6. Phone number
7. Statement of election to participate as a consulting party

Please contact me if you have any questions pertaining to this process. I appreciate your attention and look forward to hearing from you regarding this Undertaking.

Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
NASA Ames Research Center, Mail Stop 213-8
Moffett Field, CA 94035
(605) 604-6859
Jonathan.d.ikan@nasa.gov

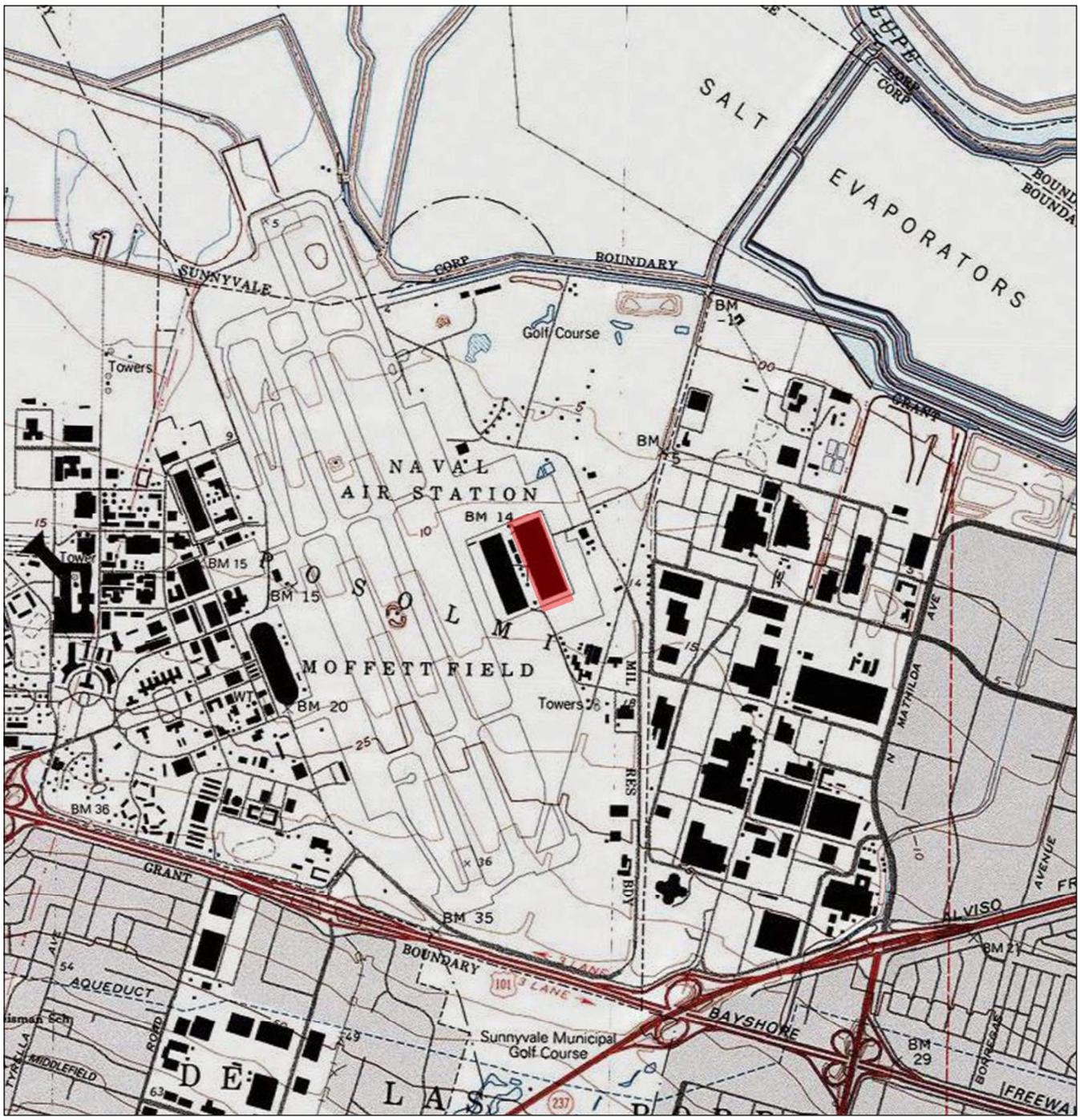
Cc:

Ms. Rebecca Klein, NASA FPO
Environmental Management Division
NASA Headquarters
300 E Street, SW
Washington, DC 20546-0001

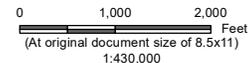
Lease Administration Team
Planetary Ventures
1600 Amphitheater Pkwy
Mountain View, CA 94043

Legal Department/Legal Matters
Planetary Ventures
1600 Amphitheater Pkwy
Mountain View, CA 94043

Attachments:
Figure 1. Regional Project Location Map



Project Location



Project Location Prepared by DL on 2020-03-03
 Moffett Field, Santa Clara County TR by JC on 2020-03-03
 IR Review by DH on 2020-03-03

Client/Project 181710453

Planetary Ventures, LLC
 MFA Hangar 3 Demolition Project

Figure No.
1

Title
Project Location Map

Notes
 1. Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
 2. Data Sources: Stantec 2019.
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National Aeronautics and Space Administration



Ames Research Center
Moffett Field, California 94035

March 19, 2020

Laura Babcock
Director
Sunnyvale Historical Society
P.O. Box 2187
Sunnyvale, CA 94087-0187

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Ms. Babcock,

In support of its responsibilities under Section 106 of the National Historic Preservation Act of 1966 (NHPA), the National Aeronautics and Space Administration Ames Research Center (NASA ARC) has initiated Section 106 consultation with the California State Historic Preservation Officer (SHPO) regarding the proposed Hangar 3 Demolition Project (Project or Undertaking) located at Moffett Field, Santa Clara County, California (see attached Figure 1 for project location map). Built in 1943, Hangar 3 is listed in the National Register of Historic Places (NRHP) as a contributor to the U.S. Naval Air Station (NAS) Sunnyvale Historic District and is a historic property for the purposes of Section 106 consultation.

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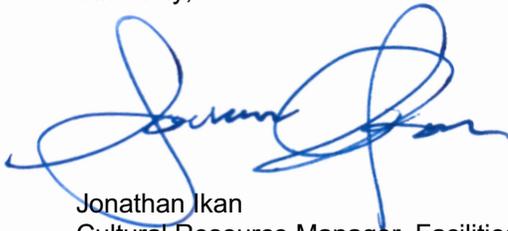
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2. Title
3. Organization/Affiliation
4. Address
5. Email address
6. Phone number
7. Statement of election to participate as a consulting party

Please contact me if you have any questions pertaining to this process. I appreciate your attention and look forward to hearing from you regarding this Undertaking.

Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
NASA Ames Research Center, Mail Stop 213-8
Moffett Field, CA 94035
(605) 604-6859
Jonathan.d.ikan@nasa.gov

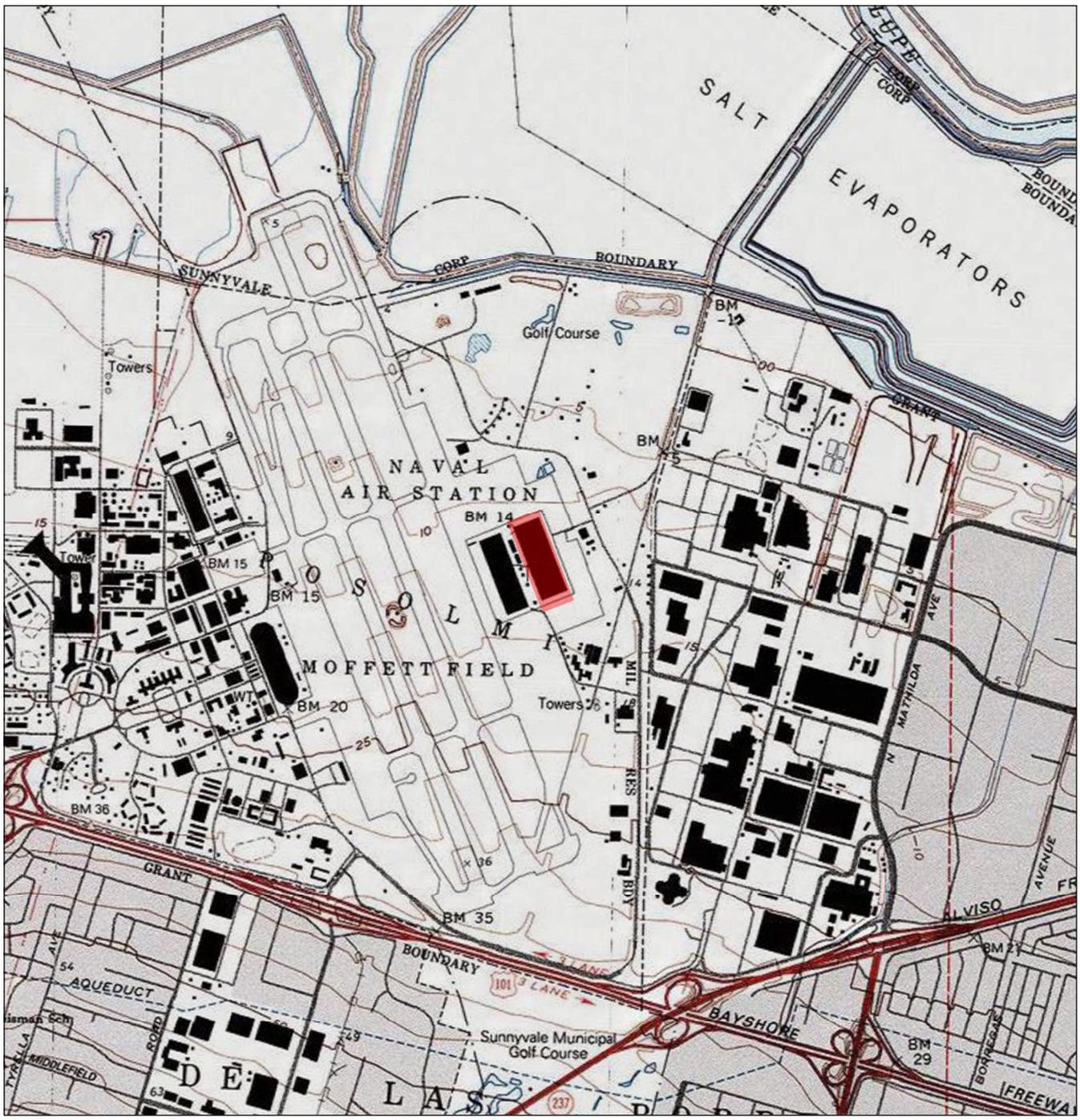
Cc:

Ms. Rebecca Klein, NASA FPO
Environmental Management Division
NASA Headquarters
300 E Street, SW
Washington, DC 20546-0001

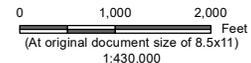
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Mountain View, CA 94043

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Attachments:
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Project Location



Project Location Prepared by DL on 2020-03-03
Moffett Field, Santa Clara County TR by JC on 2020-03-03
IR Review by DH on 2020-03-03

Client/Project 181710453
Planetary Ventures, LLC
MFA Hangar 3 Demolition Project

Figure No.
1

Title
Project Location Map

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National Aeronautics and Space Administration



Ames Research Center
Moffett Field, California 94035

March 19, 2020

Nick Perry
President
Mountain View Historical Association
P.O. Box 252
Mountain View, CA 94042

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Mr. Perry,

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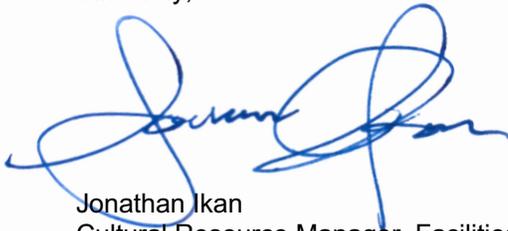
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7. Statement of election to participate as a consulting party

Please contact me if you have any questions pertaining to this process. I appreciate your attention and look forward to hearing from you regarding this Undertaking.

Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
NASA Ames Research Center, Mail Stop 213-8
Moffett Field, CA 94035
(605) 604-6859
Jonathan.d.ikan@nasa.gov

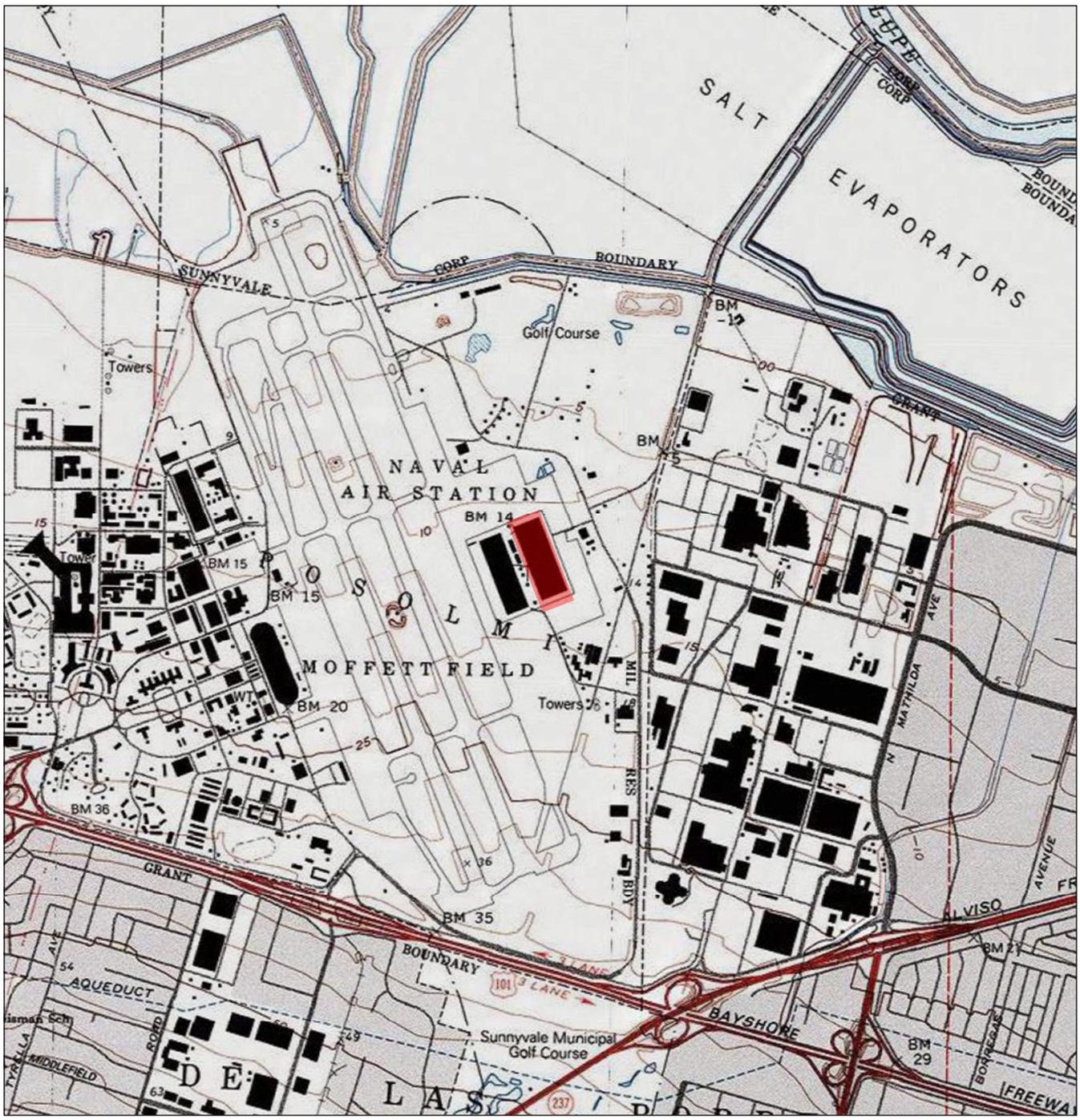
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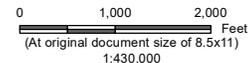
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Mountain View, CA 94043

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Attachments:
Figure 1. Regional Project Location Map



Project Location



Project Location: Moffett Field, Santa Clara County
 Prepared by DL on 2020-03-03
 TR by JC on 2020-03-03
 IR Review by DH on 2020-03-03

Client/Project: Planetary Ventures, LLC
 MFA Hangar 3 Demolition Project
 181710453

Figure No. 1

Title: Project Location Map

Notes
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National Aeronautics and Space Administration



Ames Research Center
Moffett Field, California 94035

March 19, 2020

William P. Schroh, Jr.
President & CEO
History San Jose
1650 Senter Road
San Jose, CA 95112

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Mr. Schroh,

In support of its responsibilities under Section 106 of the National Historic Preservation Act of 1966 (NHPA), the National Aeronautics and Space Administration Ames Research Center (NASA ARC) has initiated Section 106 consultation with the California State Historic Preservation Officer (SHPO) regarding the proposed Hangar 3 Demolition Project (Project or Undertaking) located at Moffett Field, Santa Clara County, California (see attached Figure 1 for project location map). Built in 1943, Hangar 3 is listed in the National Register of Historic Places (NRHP) as a contributor to the U.S. Naval Air Station (NAS) Sunnyvale Historic District and is a historic property for the purposes of Section 106 consultation.

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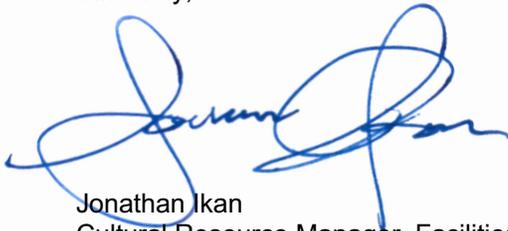
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1. Name
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7. Statement of election to participate as a consulting party

Please contact me if you have any questions pertaining to this process. I appreciate your attention and look forward to hearing from you regarding this Undertaking.

Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
NASA Ames Research Center, Mail Stop 213-8
Moffett Field, CA 94035
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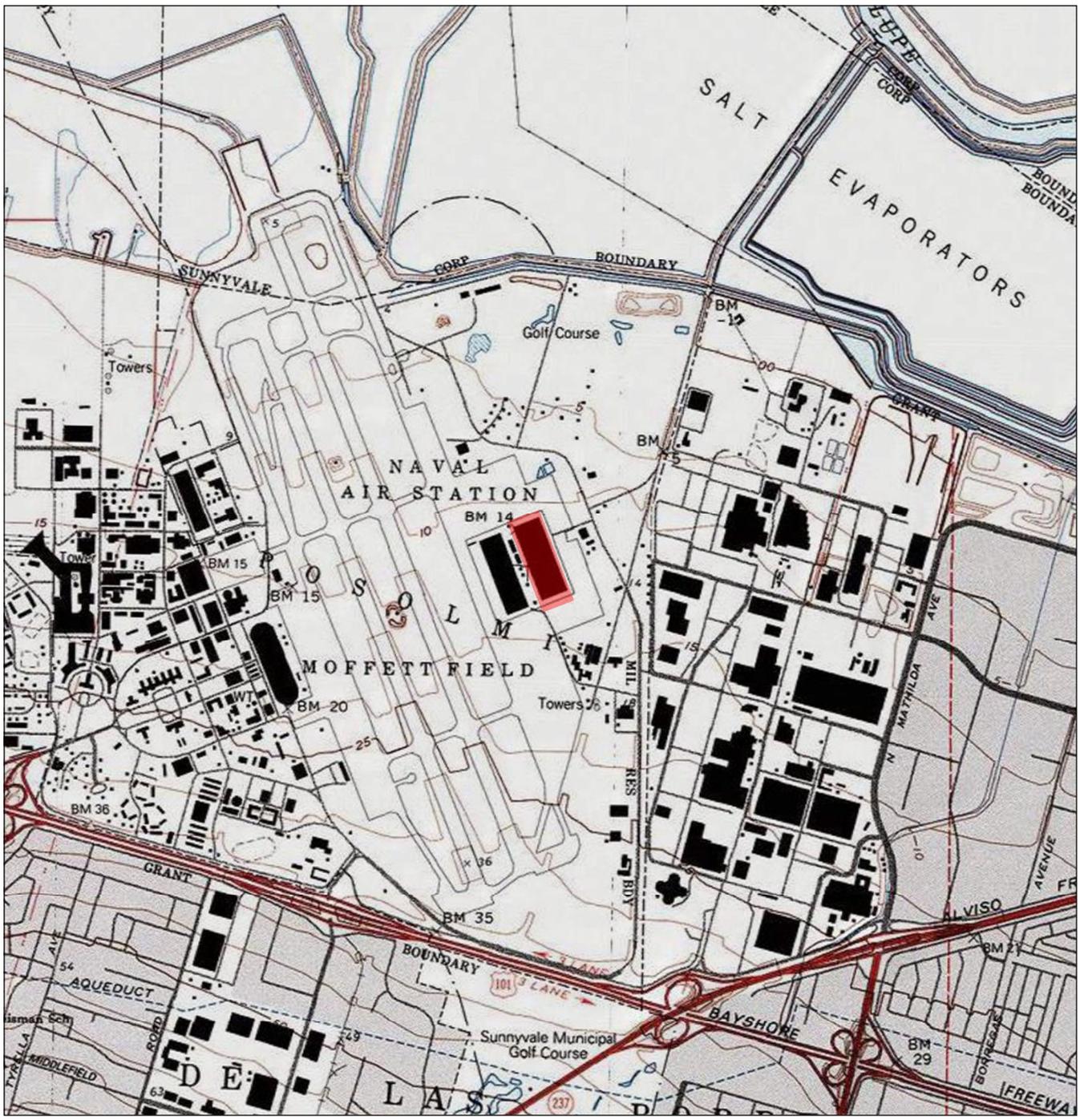
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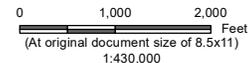
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Attachments:
Figure 1. Regional Project Location Map



Project Location



Project Location: Moffett Field, Santa Clara County
 Prepared by DL on 2020-03-03
 TR by JC on 2020-03-03
 IR Review by DH on 2020-03-03

Client/Project: Planetary Ventures, LLC
 MFA Hangar 3 Demolition Project

Figure No. 1

Title: Project Location Map

Notes
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National Aeronautics and Space Administration



Ames Research Center
Moffett Field, California 94035

March 19, 2020

John McLaughlin
Silicon Valley Historical Society
1134 Crane Street, Suite 216
Menlo Park, CA 94025

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Mr. McLaughlin,

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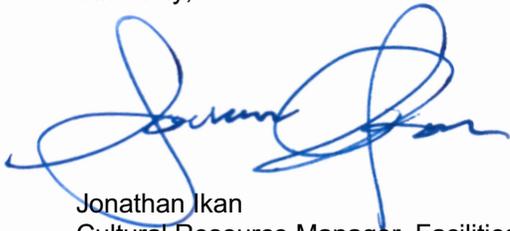
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Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
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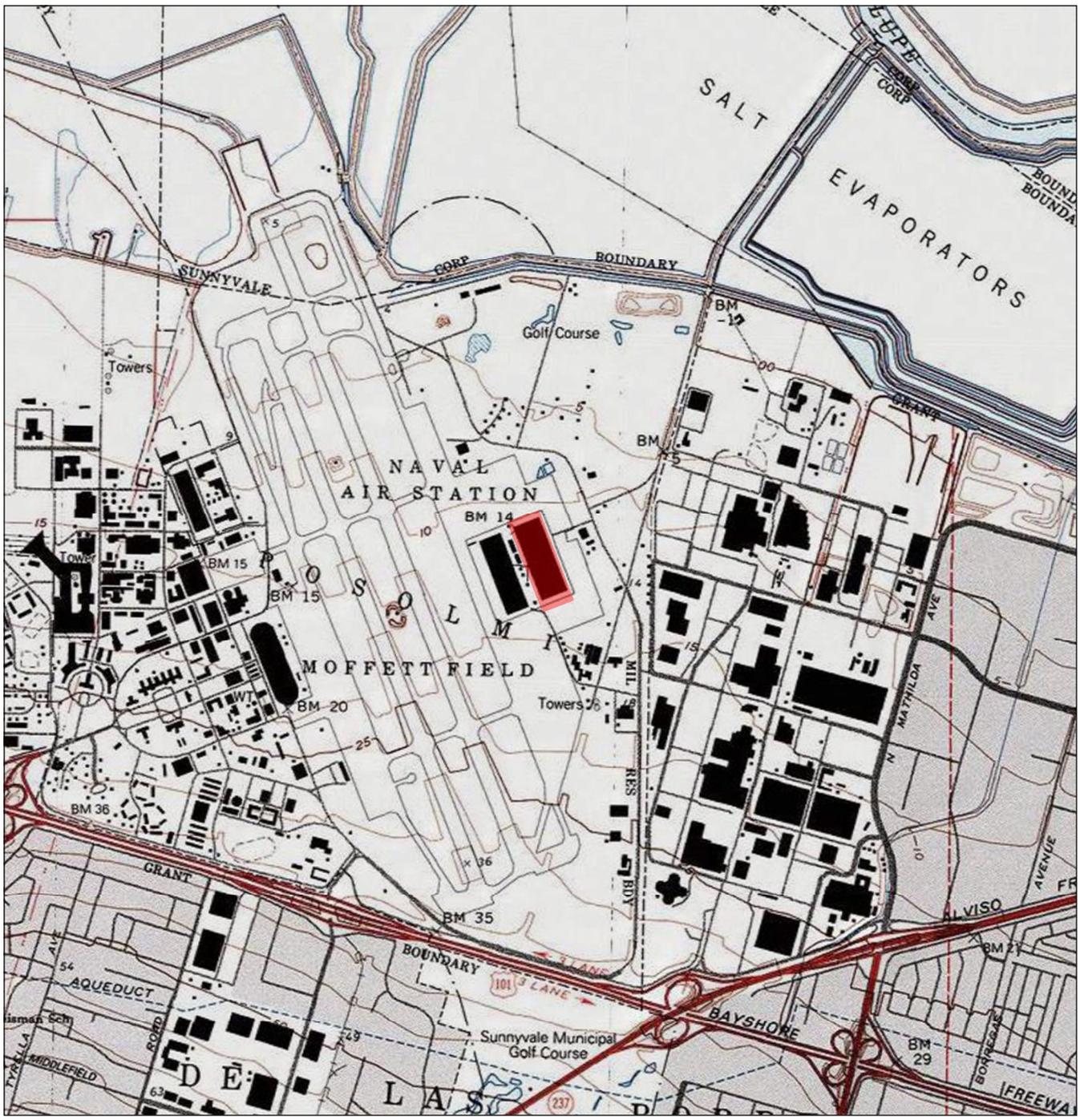
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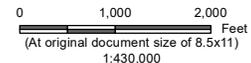
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Figure 1. Regional Project Location Map



Project Location



Project Location: Moffett Field, Santa Clara County
 Prepared by DL on 2020-03-03
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Client/Project: Planetary Ventures, LLC
 MFA Hangar 3 Demolition Project
 181710453

Figure No. 1

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 3. Background: Copyright © 2013 National Geographic Society, i-cubed National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

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National Aeronautics and Space Administration



Ames Research Center
Moffett Field, California 94035

March 19, 2020

Cindy Heitzman
Executive Director
California Preservation Foundation
101 The Embarcadero, Suite 120
San Francisco, CA 94105-1215

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Ms. Heitzman,

In support of its responsibilities under Section 106 of the National Historic Preservation Act of 1966 (NHPA), the National Aeronautics and Space Administration Ames Research Center (NASA ARC) has initiated Section 106 consultation with the California State Historic Preservation Officer (SHPO) regarding the proposed Hangar 3 Demolition Project (Project or Undertaking) located at Moffett Field, Santa Clara County, California (see attached Figure 1 for project location map). Built in 1943, Hangar 3 is listed in the National Register of Historic Places (NRHP) as a contributor to the U.S. Naval Air Station (NAS) Sunnyvale Historic District and is a historic property for the purposes of Section 106 consultation.

In 2014, Planetary Ventures, LLC (PV) entered into a lease agreement with NASA ARC for the MFA premises, including use of Hangar 3 for research and development, such as testing and light assembly uses related to space, aviation, rover/robotics, and other emerging technologies. Initially, potential reuse scenarios for Hangar 3 were explored in 2006, resulting in preparation of documents related to existing conditions, reuse opportunities, and rehabilitation. In 2015, PV submitted plans under Section 106 consultation for the Remediation and Rehabilitation of Hangars 2 and 3, Core and Shell Project. This project intended to rehabilitate elements of Hangars 2 and 3, including the abatement and remediation of hazardous materials, repairs and upgrades to the structural systems, repairs to the exterior envelopes, and a variety of systems upgrades. Initial Section 106 consultation produced a finding of No Adverse Effect to historic properties, and rehabilitation efforts at Hangar 2 are proceeding. However, in 2016, the roof of Hangar 3 partially collapsed, resulting in additional structural analysis. Emergency repairs to the truss system were made, but damage continued to spread throughout the structural system, despite the efforts to contain and stabilize the structure. The extensive damage and advanced deteriorated state of the structure has required stabilization of multiple truss members with a temporary shoring assembly.

Per the recommendations resulting from recent monitoring by structural engineers, Hangar 3 is vulnerable to further damage and partial collapse, particularly in the event of seismic or high wind load events. The potential for collapse of Hangar 3 presents a significant life safety and surrounding property damage risk. Based upon the opinions of the structural engineers, the repairs required to return Hangar 3 to occupancy would be extensive, undefinable, and cost-prohibitive. Currently, Hangar 3 is closed to occupancy and is being stabilized through an extensive internal shoring and hydraulic jacking system, although engineering analysis has demonstrated that this solution is short-term and not sustainable. Therefore, NASA ARC is

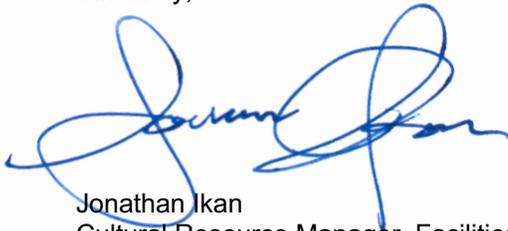
processing a request by PV to demolish Hangar 3, which would qualify as a federal undertaking under Section 106 of the NHPA and would result in an adverse effect.

NASA ARC is contacting you to assess your organization's interest in participating as a consulting party as defined in 36 CFR Section 800.2(c) in the Section 106 of the NHPA review process for the Hangar 3 Demolition Project. If you would like to participate, you may elect to do so by sending written notification by email with the subject heading "Hangar 3 Section 106 Consultation Interested Party" to me at Jonathan.d.ikan@nasa.gov within the next 30 days. Please include the following information:

1. Name
2. Title
3. Organization/Affiliation
4. Address
5. Email address
6. Phone number
7. Statement of election to participate as a consulting party

Please contact me if you have any questions pertaining to this process. I appreciate your attention and look forward to hearing from you regarding this Undertaking.

Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
NASA Ames Research Center, Mail Stop 213-8
Moffett Field, CA 94035
(605) 604-6859
Jonathan.d.ikan@nasa.gov

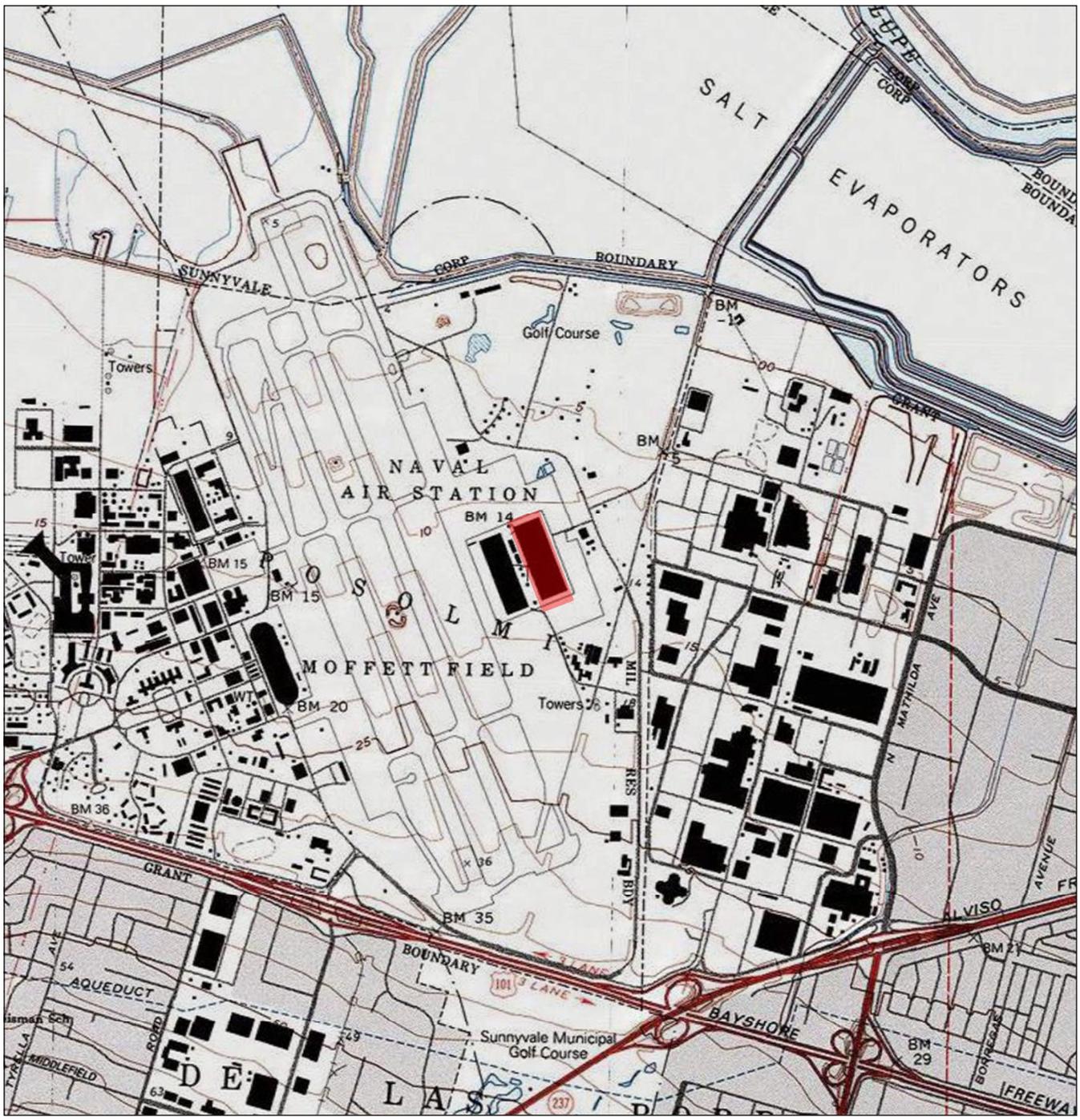
Cc:

Ms. Rebecca Klein, NASA FPO
Environmental Management Division
NASA Headquarters
300 E Street, SW
Washington, DC 20546-0001

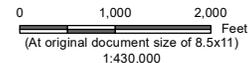
Lease Administration Team
Planetary Ventures
1600 Amphitheater Pkwy
Mountain View, CA 94043

Legal Department/Legal Matters
Planetary Ventures
1600 Amphitheater Pkwy
Mountain View, CA 94043

Attachments:
Figure 1. Regional Project Location Map



Project Location



Project Location Prepared by DL on 2020-03-03
Moffett Field, Santa Clara County TR by JC on 2020-03-03
IR Review by DH on 2020-03-03

Client/Project 181710453

Planetary Ventures, LLC
MFA Hangar 3 Demolition Project

Figure No.
1

Title
Project Location Map

- Notes**
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National Aeronautics and Space Administration



Ames Research Center

Moffett Field, California 94035

March 19, 2020

Christina Morris
Field Director
National Trust for Historic Preservation, Los Angeles Office
700 Flower Street, Suite 1100
Los Angeles, CA 90017

Subject: Section 106 Consultation for the Proposed Hangar 3 Demolition Project at NASA Ames Research Center, Moffett Field, Santa Clara County, CA (NASA_2019_1216_001)

Dear Ms. Morris,

In support of its responsibilities under Section 106 of the National Historic Preservation Act of 1966 (NHPA), the National Aeronautics and Space Administration Ames Research Center (NASA ARC) has initiated Section 106 consultation with the California State Historic Preservation Officer (SHPO) regarding the proposed Hangar 3 Demolition Project (Project or Undertaking) located at Moffett Field, Santa Clara County, California (see attached Figure 1 for project location map). Built in 1943, Hangar 3 is listed in the National Register of Historic Places (NRHP) as a contributor to the U.S. Naval Air Station (NAS) Sunnyvale Historic District and is a historic property for the purposes of Section 106 consultation.

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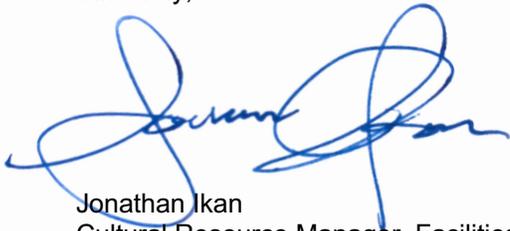
processing a request by PV to demolish Hangar 3, which would qualify as a federal undertaking under Section 106 of the NHPA and would result in an adverse effect.

NASA ARC is contacting you to assess your organization's interest in participating as a consulting party as defined in 36 CFR Section 800.2(c) in the Section 106 of the NHPA review process for the Hangar 3 Demolition Project. If you would like to participate, you may elect to do so by sending written notification by email with the subject heading "Hangar 3 Section 106 Consultation Interested Party" to me at Jonathan.d.ikan@nasa.gov within the next 30 days. Please include the following information:

1. Name
2. Title
3. Organization/Affiliation
4. Address
5. Email address
6. Phone number
7. Statement of election to participate as a consulting party

Please contact me if you have any questions pertaining to this process. I appreciate your attention and look forward to hearing from you regarding this Undertaking.

Sincerely,



Jonathan Ikan
Cultural Resource Manager, Facilities Engineering Branch
NASA Ames Research Center, Mail Stop 213-8
Moffett Field, CA 94035
(605) 604-6859
Jonathan.d.ikan@nasa.gov

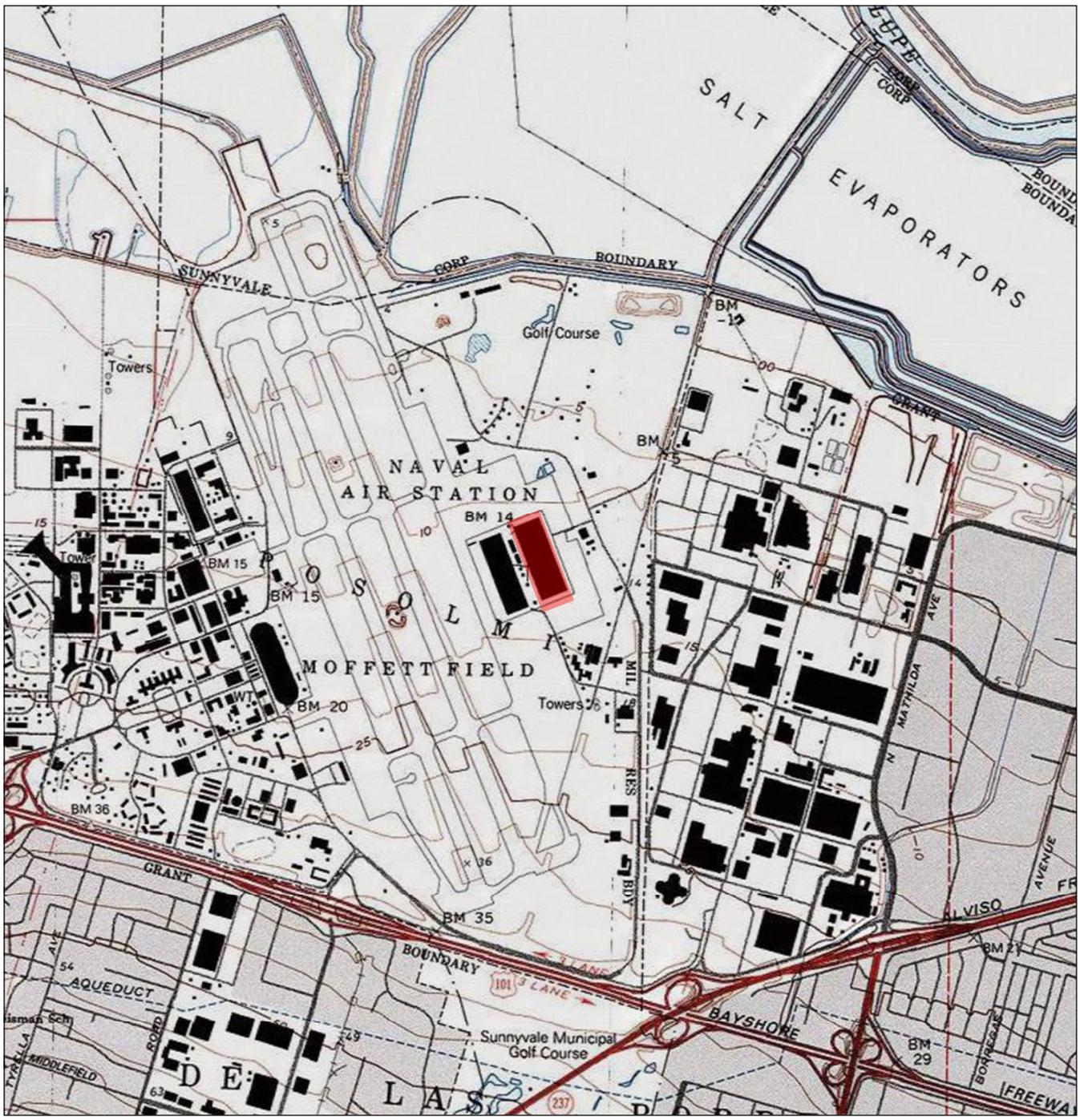
Cc:

Ms. Rebecca Klein, NASA FPO
Environmental Management Division
NASA Headquarters
300 E Street, SW
Washington, DC 20546-0001

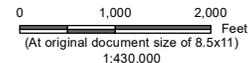
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Attachments:
Figure 1. Regional Project Location Map



Project Location



Project Location Prepared by DL on 2020-03-03
Moffett Field, Santa Clara County TR by JC on 2020-03-03
IR Review by DH on 2020-03-03

Client/Project 181710453

Planetary Ventures, LLC
MFA Hangar 3 Demolition Project

Figure No.
1

Title
Project Location Map

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MFA HANGAR 3 DEMOLITION SECTION 106 TECHNICAL REPORT

Appendix C Interested Party Consultation
April 29, 2020

C.1.1 Responses from Potential Interested Parties Invitation Letters (Spring 2020)

- The Moffett Field Historical Society
- The City of Mountain View, California

The following content was redacted from this public posting:

Appendix C.1.1
Response Letters from Potential Interested Parties

C.2 Follow-up Emails to Interested Parties (April 29, 2020)

- The City of Sunnyvale, California
- Sunnyvale Historical Society
- Mountain View Historical Association
- History San Jose
- Silicon Valley Historical Association
- California Preservation Foundation
- National Trust for Historic Preservation



The following content was redacted from this public posting:

Appendix C.2
Follow-up Emails to Interested Parties
(Specific Letters Showing Interested Party Email Addresses)

Herrick, Daniel

From: Herrick, Daniel
Sent: Wednesday, April 29, 2020 4:55 PM

Cc: Ikan, Jonathan D. (ARC-JCE); Meiser, Trina
Subject: Invitation to participate in Section 106 Consultations at NASA Ames Research Center, Moffett Field - Hangar 1 and Hangar 3 Projects
Attachments: 2020-03-19_NASA Moffett Field_Hangar 3_S106 Invitation Letter_City of Sunnyvale.pdf; 2020-02-18_NASA Moffett Field_Hangar 1_S106 Invitation Letter_City of Sunnyvale.pdf

Dear Ms. Ryan,

I am writing on behalf of Jonathan Ikan, Cultural Resource Manager at NASA Ames Research Center in support of two ongoing projects occurring at Moffett Field in Santa Clara County, California. Currently, Planetary Ventures, LLC (PV) has entered into a long-term lease at Moffett Field and is proposing two separate projects that are both undergoing Section 106 Consultation with the California State Historic Preservation Officer (SHPO), for compliance with the National Historic Preservation Act of 1966 (NHPA).

In support of Section 106 consultation, you and your organization are being contacted to assess your interest in participating as a potential consulting party under one or both of the proposed projects. The proposed projects include:

- 1) **Hangar 1 Rehabilitation Section 106 Consultation:** Constructed in 1933, Hangar 1 is a large, steel framed dirigible aircraft hangar that is listed on the National Register of Historic Places as a contributor to the NAS Sunnyvale Historic District for its associations with naval aviation history and its engineering/design. Remediation efforts were conducted in 2002, which included the removal of the original cladding system, which included asbestos, PCBs, and lead-based paint. However, further remediation is required at the steel structure. Following completion of the remediation activities, rehabilitation work will include recladding the 1933 structure with a new metal skin, glazing, and roof system, all of which are being designed with period appropriate aesthetics.
- 2) **Hangar 3 Demolition Section 106 Consultation:** Hangar 3 is one of two wood framed dirigible hangars that was constructed at Moffett Field between 1942 and 1943, and is listed on the National Register of Historic Places as a contributor to the NAS Sunnyvale Historic District for its associations with naval aviation history and its engineering/design. Originally slated for rehabilitation in 2015, Hangar 3 has since exhibited advancing structural deterioration, including partial roof collapse and progressive damage to the truss system. Despite extensive efforts to repair and alleviate the issues, structural engineers have assessed that the condition of the hangar has continued to deteriorate. Although it is temporarily stabilized, Hangar 3 continues to pose a potential life safety and surrounding property damage risk, including the neighboring Hangar 2, which is also historic and currently undergoing rehabilitation. As such, strategic and controlled demolition of Hangar 3 is proposed to remove the hazardous conditions.

Formal letters with additional background information, project descriptions, and location maps regarding these projects were dated and mailed on February 18th, 2020 and March 19th, 2020, respectively. Electronic PDF copies of these letters have been attached to this email for your records and review.

In light of recent events and limitations regarding the access to workplace mailboxes, our team is reaching out to follow-up on the willingness of your organization to participate in the ongoing Section 106 consultation as a consulting party. If you are interested, please respond to this email with the following information:

1. Name and title of main point of contact for consultation purposes.
2. Contact information, including phone and email address.
3. Statement of interest/election to consult as a consulting party under Section 106.
4. Identify which project(s) you would like to be a consulting party (may select one or both).

If you have any further questions or concerns, please feel free to respond to our team, or reach out directly to Jonathan Ikan (email: jonathan.d.ikan@nasa.gov, phone #: (650) 604-6859).