REQUEST FOR DETERMINATION OF ELIGIBILITY
ATLAS 576 G
VANDENBERG AIR FORCE BASE, CALIFORNIA

SEPTEMBER 20, 1993

DAMES & MOORE

MANAGEMENT SUMMARY

The Request for Determination of Eligibility for the Atlas 576 G facility documents the results of an historic architectural and engineering survey of the Atlas 576 G missile launch complex at Vandenberg Air Force Base, Lompoc, California, including a literature search and site field investigation, conducted for the U.S. Air Force between August 17 and September 8, 1993, in conjunction with proposed modifications for Building 1930 at the facility. The Air Force held a review meeting for the Draft Determination on September 14, 1993, at Vandenberg. Revisions resultant from that meeting are incorporated into the Final Determination herein presented.

Interpreted as eligible for the National Register of Historic Places at the national level of significance, the Atlas 576 G launch complex is comprised of 32 site components. Of these, 31 are interpreted as contributing to the complex's potential eligibility. One component is interpreted as non-contributing.

The proposed project will alter Building 1930 on its interior through partition wall changes, ceiling replacement, addition of new light fixtures and carpeting, changes to the bathroom, renovation of the heating system, and addition of a H-configured bridge crane. The crane is approximately 32 feet by 17 feet, 8 inches in its planned dimensions, with six 4-foot, 6-inch concrete footings. It will be placed in the north end of Building 1930, in a space currently used as storage and an open-plan workshop. A 1000-square foot addition will be added to the south end of the building. On the exterior the window and door pattern for Building 1930 will be altered. The proposed project will also alter Building 1931 through the replacement of its lighting system. Minor expansion of the surrounding parking area, enlarging it by four vehicular spaces, will accompany an asphalt overlay adjacent to Buildings 1930 and 1931.

Building 1930 has undergone interior change over time, including previous repartitioning. The proposed renovation does not change the roof line, the eave details or the siding type. The most significant exterior change is that of the 1000-square foot addition to the south. This addition is designed to be completely compatible with the existing structure, however, and does not affect the historic integrity of Building 1930. The most significant interior change is the implacement of the bridge crane to the north. This implacement, however, is within an original open workshop and simply further articulates the historic use of that shop. Proposed lighting renovations to Building 1931, minor expansion of the parking lot and asphalt overlay also do not appear to affect the historic integrity of the Atlas 576 G site. Under the condition that the new windows and doors for Building 1930 are designed to be similar in size, placement and detailing to those currently existing, Dames & Moore recommends a tentative finding of no adverse effect for the project.

INTRODUCTION

Dames & Moore conducted an historic architectural and engineering survey of the Atlas 576 G missile launch site at Vandenberg Air Force Base (VAFB), Santa Barbara County, California, on August 17-20, 1993. Following Air Force review of the Draft Request for Determination of Eligibility for Atlas 576 G, Dames & Moore attended a meeting at Vandenberg AFB on September 14, 1993, conducting a final on-site field inspection of the launch site that same day. [Figs. 1 and 2]. The survey, with subsequent research and National Register of Historic Places evaluation, complies with the Federal National Historic Preservation Act (NHPA) of 1966, as amended in 1986 and 1992, Section 106.

The scope of work included on-site field investigation (with black and white, and color slide, photography), archival review of extant as-builts at the VAFB Civil Engineering vault, oral interviews at VAFB, and both background and detailed research, with the production of an analytical report in draft and final format evaluating the gathered information against the National Register of Historic Places criteria.

PROJECT DESCRIPTION AND LOCATION

A proposed renovation project is located at the 576 G site, Vandenberg Air Force Base, Lompoc, California. Building 1930, historically known as the Utility Building, and Building 1931, historically known as the Instrumentation Building, will undergo minor change. Proposed changes for Building 1930 include the addition of 1000-square feet to its southern facade, as well as interior changes focused on repartitioning, a new ceiling and carpeting, renovated lighting and heating systems, and implacement of a bridge crane. Changes are also proposed for the window and door patterns; with respect to these changes, design has not been fully detailed. Proposed changes to Building 1931 include only a renovation of the lighting system. Other site changes are restricted to the addition of four vehicular parking spaces for the lot adjacent to Buildings 1930 and 1931, along with a new asphalt overlay for the parking lot.

HISTORIC CONTEXT

The principal sources for the following historical context summary are M.M. Dart, *History of the Lompoc Valley, California*, unpublished M.A. thesis, University of California, Berkeley, 1954; Paul Friedman, *Draft Cultural Resource Evaluation Report of Space Launch Complex 3 East, Vandenberg Air Force Base, California*, Santa Barbara: Dames & Moore, July 30, 1991; Jacob Neufeld, *Ballistic Missiles in the United States Air Force 1945-1960*, Washington, D.C., 1990; Thomas L. Martin, Jr. and Donald C. Latham, *Strategy for Survival*, Tucson, Arizona, 1963; and cited articles from *Aviation Week*.

Development of Vandenberg Air Force Base

The Spanish period began ca.1542 when Juan Cabrillo sailed up the California coast. In 1769 the Gaspar de Portola expedition passed through what is now VAFB on its way overland from San Diego to Monterey. This party noted the small Chumash village of Nocto near Point Pedernales. Spanish colonization of Alta California proceeded through Mexico as a joint venture between church and state. A series of missions were constructed in the region by the Franciscan order, and were associated with military presidios and agricultural pueblos. The original Mission La Purisima Conception, located within the modern town of Lompoc, was created in 1787 and was moved to a site on Los Berros Creek after an earthquake in 1812. Livestock grazing on lands now included in VAFB was conducted in support of mission activities.
The missions brought great change to the lives of the native inhabitants. By 1803 La Purisima had removed the Chumash from Nocto, and in 1804 the mission's neophyte population reached its peak of over 1500 people. California was incorporated into the newly independent Republic of Mexico following the revolution of 1821. In 1833 the Mexican government began secularization of the mission system, and civil authorities in California confiscated mission lands from the church in 1834. Between 1837 and 1845, eleven secular ranchos were formed from the 200,000 acres formerly controlled by Mission La Purisima.

After California gained statehood within the United States in 1850, the land now occupied by Vandenberg AFB remained in rural ranch use derivative of its original Spanish occupation. Several small coastal communities existed in the general vicinity. In 1896 the Southern Pacific Railroad was completed south as far as the community of Surf and the town of Lompoc. In 1901 the Southern Pacific coastal line was opened between San Francisco and Los Angeles.

The U.S. Army acquired 92,000 acres along the California coast between Point Sal and Point Arguello in 1941 as a military reservation. Soon named Camp Cooke, the base was used during the Second World War to train armored units, infantry, anti-aircraft artillery, combat engineers and ordinance groups, with some 36,000 troops stationed on base at any one time. It also had a prisoner of war camp. After the war, in June 1946, Camp Cooke was placed in care-taker status. In August 1950, following North Korea's invasion of South Korea in June, the base was reactivated. During the Korean War Camp Cooke was utilized for armored infantry training. In February 1953 the base was again deactivated.

In 1957, 65,000 acres at the northern end of Camp Cooke, including Burton Mesa, were transferred to the United States Air Force, and became known as Cooke Air Force Base. The air force base was first managed by the Air Research and Development Command, until the Strategic Air Command took over as base host in January 1958. That same year the facility was renamed Vandenberg Air Force Base. The 1st Bombardment Division, inactive since the end of World War II, was given new life in March 1957, as the 1st Missile Division. The 1st Missile Division was assigned to VAFB to train missile launch crews, support test launches and maintain tactical ballistic missile capabilities. The 392nd Air Base Group was given the task of being base house-keeper, in charge of general operations. The Air Force Ballistic Missile Division (AFBMD) established a field office at VAFB in 1958. Assigned to the AFBMD at VAFB in 1960 was the 6565th Test Wing, utilized to support both ballistic missile test launches and the space program. The 576th Strategic Missile Squadron was activated in 1958 to conduct the Atlas Intercontinental Ballistic Missile (ICBM) program at VAFB.

By the end of 1959 an airfield and 13 missile launch complexes had been built at Vandenberg (now North Vandenberg). Initial construction included seven Thor Intermediate Range Ballistic Missile (IRBM) pads with three blockhouses (in three launch complex configurations—today, SLC-1, SLC-2 and SLC-10; originally, four launch complexes were planned, with ten pads and four blockhouses). Also at Vandenberg were the first ICBM military training and test sites for the Atlas and the Titan—with six Atlas pads and seven Titan I silos. [Fig. 3]

Vandenberg AFB's primary mission was the training of ballistic missile units; its secondary mission, in emergency conditions, was the launching of ICBMs (once these were functional—replacing the stop-gap measure of the IRBM in Britain and elsewhere). Vandenberg's geographic siting was unique within the continental U.S. South-facing Purisima Point offered a launch site that sent missiles and satellites into space without crossing any land mass. Vandenberg also offered launch into polar orbit. For surveillance purposes, polar orbit was, and is, unsurpassed as a flight pattern. The polar, or high-inclination, orbit gave worldwide coverage every 24 hours. Vandenberg is the only plausible launch site for polar orbit in the continental U.S. The U.S.S.R. has a similar military ballistic missile and surveillance satellite base utilizing polar orbit. Located near Sweden in the northwestern part of the U.S.S.R., Plesetsk parallels Vandenberg, and, like Vandenberg, is unique to its country. Plesetsk existed from at least 1966 (the Western discovery date of a high-inclination orbiting pattern originating from the U.S.S.R.). No official reference or recognition was given to Plesetsk in the West until 1987.

The Thor IRBM launch complexes were the first under construction at North Vandenberg, including site 75-1 (SLC-2), 75-2 (SLC-10) and 75-3 (SLC-1). The first Atlas launch complexes built at North Vandenberg were originally designated in the 65 series, and, like the Thor complexes, were under construction in 1957. The first test launch of a Thor IRBM occurred from Space Launch Complex 2E (SLC-2E) on December 16, 1958. The first launch of an Atlas ICBM by an all-U.S. military crew, a demonstration shot of an Atlas D missile, occurred on September 9, 1959, from pad 2 of Atlas ABRES-A.

In December 1957 the Secretary of Defense directed that 20,000 acres at the southern end of Camp Cooke, including Lompoc Mesa, be transferred to the U.S. Navy, for the expansion of missile testing activities under the control of the Naval Air Missile Test Center (NAMTC) at Point Mugu. The NAMTC also assumed responsibility for the Pacific Missile Range, established at the same time. NASA opened a test facility at Point Arguello in 1960. In 1958 the 1st and 2nd Medium Anti-Aircraft Missile battalions from the Twentynine Palms Marine Base conducted training with the Terrier surface-to-air missiles off of mobile launchers at Point Arguello. The launching area for the Terrier and Hawk missiles was located south of the Santa Ynez River, at the northwest corner of the facility. A radiosonde launching facility (July 1958) and a launch complex for the Atomic Energy Commission (August 1959) were also constructed at the Naval Missile Test Facility at Point Arguello. The Navy further had two launch complexes built to handle Atlas rocket boosters for the USAF.

The Naval Missile Test Facilities at Point Arguello were transferred to the USAF completely in 1964, becoming known as South Vandenberg. The USAF also took over the Pacific Missile Range, then renamed the Western Test Range. South Vandenberg was further expanded in 1966, when the USAF purchased 15,000 acres of the Sudden Ranch, south of Point Arguello. During the early 1980s South Vandenberg saw a flurry of activity related to construction of the Space Transportation System for a west coast Space Shuttle launch site. SLC-6 was built on the former Sudden Ranch property to handle shuttle launches. By 1986 $3.3 billion had been expended on shuttle related facilities at South Vandenberg. The project was put on hold after the Challenger accident.

Atlas

Development at Vandenberg AFB

The 576th Strategic Missile Squadron commanded a full Atlas military configuration at Vandenberg AFB. The squadron was considered the basic operational unit, with facilities set up per squadron. An evolutionary number of missile launch complexes were constructed for each squadron, the whole being the manageable complement of missiles that a squadron could be expected to launch effectively during a time of attack. The first U.S. Atlas squadrons commanded nine missiles or fewer; the second squadrons, 10; the final fully developed squadrons, 12. At Vandenberg AFB, the Atlas 576th squadron commanded nine launch sites. The Atlas missile, SM-65, initially named the launch sites. The first Atlas launch complex under design and construction was that of Atlas A (SM65-1; 576 A; Atlas ABRES-A), a soft site comprised of three unprotected missiles maintained on alert in a vertical position with servicing mobile gantries (three launch pads). The second Atlas launch complex designed and built was that of Atlas B (SM65-2; 576 B: Atlas ABRES-B), under construction overlapping completion of Atlas A. Atlas B was also considered a soft site, and was comprised of three missiles maintained in a horizontal position sheathed by above-ground concrete coffins, raised to a vertical position at launch (three launch pads). The third Atlas launch complex was constructed as a test facility for a semi-hardened Atlas. With two launch pads, Atlas C (SM65-T; 576 C) and Atlas F (O.S.T.F. No. 1; 576 F) maintained its missiles below ground in semi-hard training coffins with sliding decks flush with the surface. Again the missile was elevated to a vertical position at launch. The Atlas 576 F site was originally designated as an Operational Suitability Test Facility, or O.S.T.F., with the Atlas 576 C its training site. Atlas A and B were under construction between 1957 and 1959, with Atlas C and F in use in early 1961. Three Atlas fully hardened sites, silos with single missiles, were under construction in 1959-61, with completion in 1962. The silos, O.S.T.F. No. 2 (576 G), Atlas D and E (SM65-T2A / 576 D and SM65-T2B / 576 E) completed the Vandenberg 576 squadron of 11 missiles. (*AW*: September 25, 1961, pp. 179-83.) [Appendix A: Fig. 5]

The size of the commanded missile grouping was intended to allow functioning under intense launch demands, with two out of three missiles at each triple-configured site able to fly, and ideally, in a grouping of 10-to-12 missiles, with one missile held in reserve. (*AW*: June 1, 1959, pp. 79-80.) Atlas 576 C and F housed Atlas E missiles, and like the three silos housing Atlas F missiles, depended upon inertial guidance, while Atlas 576 A and B housed Atlas D missiles and relied on radio command guidance. Each of the 576 A, B, C, D and E complexes, as well as the O.S.T.F. complexes 576 F and G, featured a launch operations building/launch control center (blockhouse).

Development at Cape Canaveral

Cape Canaveral supported a grouping of four Atlas missile launch complexes for a research and development program, each with a single launch pad. Built between 1956 and 1958, the Canaveral Atlas launch sites preceded those at Vandenberg. Atlas launch complex 11 was the first Atlas facility in the U.S., with the first missile launched from its soft, gantry pad on June 11, 1957. Complex 11 tested the experimental Atlas A, B and C missiles. Complex 12, 13 and 14 followed, testing the Atlas D, E and F missiles. Each of the complexes featured a launch operations building, launch stand, gantry service structure, fuel storage area, LOX storage area, deluge collection pond, ready room, guard house, water facilities, nitrogen and helium areas, electric generator and camera pads. The launch station configuration was distinctly different from that developed at Vandenberg, with blockhouses designed as igloo-shaped structures. (*AW*: March 17, 1958, pp. 22-23.) As of 1983, Complex 11 had been partially salvaged, with Complex 12 completely salvaged. Complexes 13 and 14 had been abandoned in place. (Butowsky: 1983, pp. 7-11.) Radio command guidance systems directed the Canaveral Atlas missiles, with MOD-1, MOD-2 and MOD-3 guidance facilities constructed. No Atlas F silos were constructed at Canaveral. (Neufeld: 1990, pp. 205-06.)

Development at U.S. Air Force Bases

Atlas squadrons were set up at 10 U.S. Air Force bases. Following the operational status of the Atlas ABRES-A pad 2 on September 9, 1959, at Vandenberg Air Force Base, the three Atlas squadrons at Warren AFB near Cheyenne, Wyoming, and Offutt AFB near Omaha, Nebraska, were scheduled to become operational during March, August and November 1960. With some delays, an Atlas missile was made operational at Warren and placed on alert on April 30, 1960. Strategic Missile Squadrons for Atlas included the 576th at Vandenberg, the 564/549th at Warren, the 565th at Offutt, the 567th at Fairchild (Spokane, Washington), the 548th at Forbes (Topeka, Kansas), the 550th at Schilling (Salina, Kansas), the 551st at Lincoln (Lincoln, Nebraska), the 577th at Altus (Altus, Oklahoma), the 578th at Dyess (Abilene, Texas), the 579th at Walker (Roswell, New Mexico), and the 556th at Plattsburgh (Plattsburgh, New York). The Air Force bases supported the evolutionary variety of soft-to-hardened missile launch stations with those at Fairfield and Forbes being of semi-hardened type, configuring nine missiles each with one central blockhouse, and those of Schilling, Lincoln, Walker, Dyess, Altus and Plattsburgh being of fully hardened, silo type, configuring 12 missiles each with one central blockhouse. (Neufeld: 1990, pp. 234-35; *AW*: June 20, 1960, p. 106.)

METHODOLOGY

The historic architectural and engineering survey and National Register of Historic Places eligibility evaluation was conducted by Dr. Karen J. Weitze, August 17 to September 8, 1993. Dr. Weitze completed a background literature search prior to VAFB site investigations. Ms. Marcie Lilburn, Dames & Moore, accompanied Dr. Weitze as a field and research assistant during the site investigations of August 17-20, 1993.

Following the site visit, Dr. Weitze completed documentary research for the structures associated with Atlas 576 G and evaluated all built elements against the criteria of the National Register of Historic Places. A draft Request for Determination of Eligibility was submitted to the Air Force on September 9, 1993.

CONCLUSIONS

The Atlas 576 G missile complex at Vandenberg AFB, inclusive of 31 contributing components and one non-contributing component, appears to be potentially eligible for the National Register of Historic Places at the national level of significance. Of outstanding historic significance, the complex maintains its historic integrity. The Atlas 576 G facility at Vandenberg is the only Operational Suitability Test Facility, or O.S.T.F., built in the United States for the initial research and development of the inertially-guided, silo-launched Atlas F ICBM. As designed and constructed, the 576 G facility is also physically unique, with distinctions in its launch control center and personnel tunnel, as well as through the inclusion of an instrumentation building on site.

VICINITY MAP

SCALE: NONE

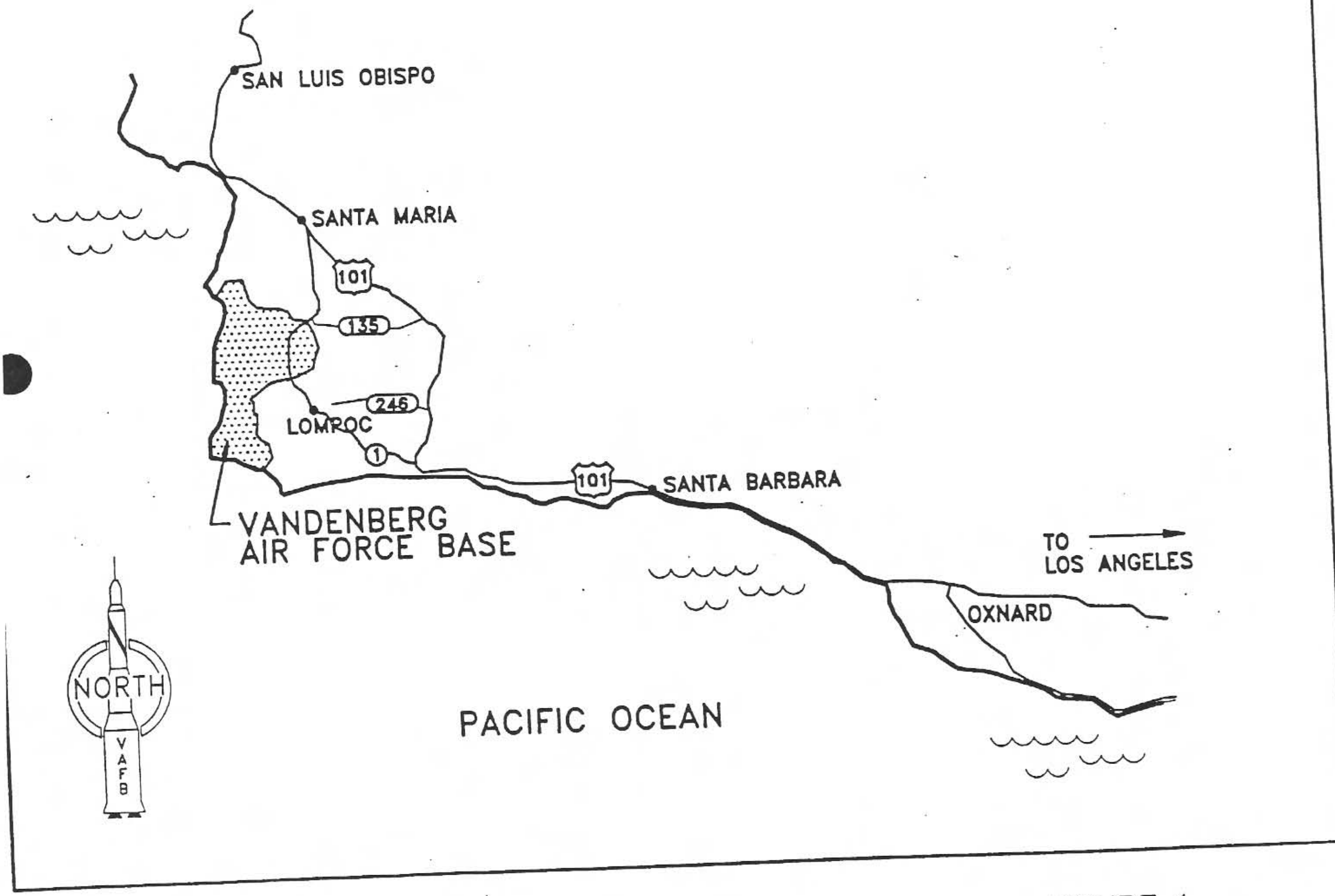
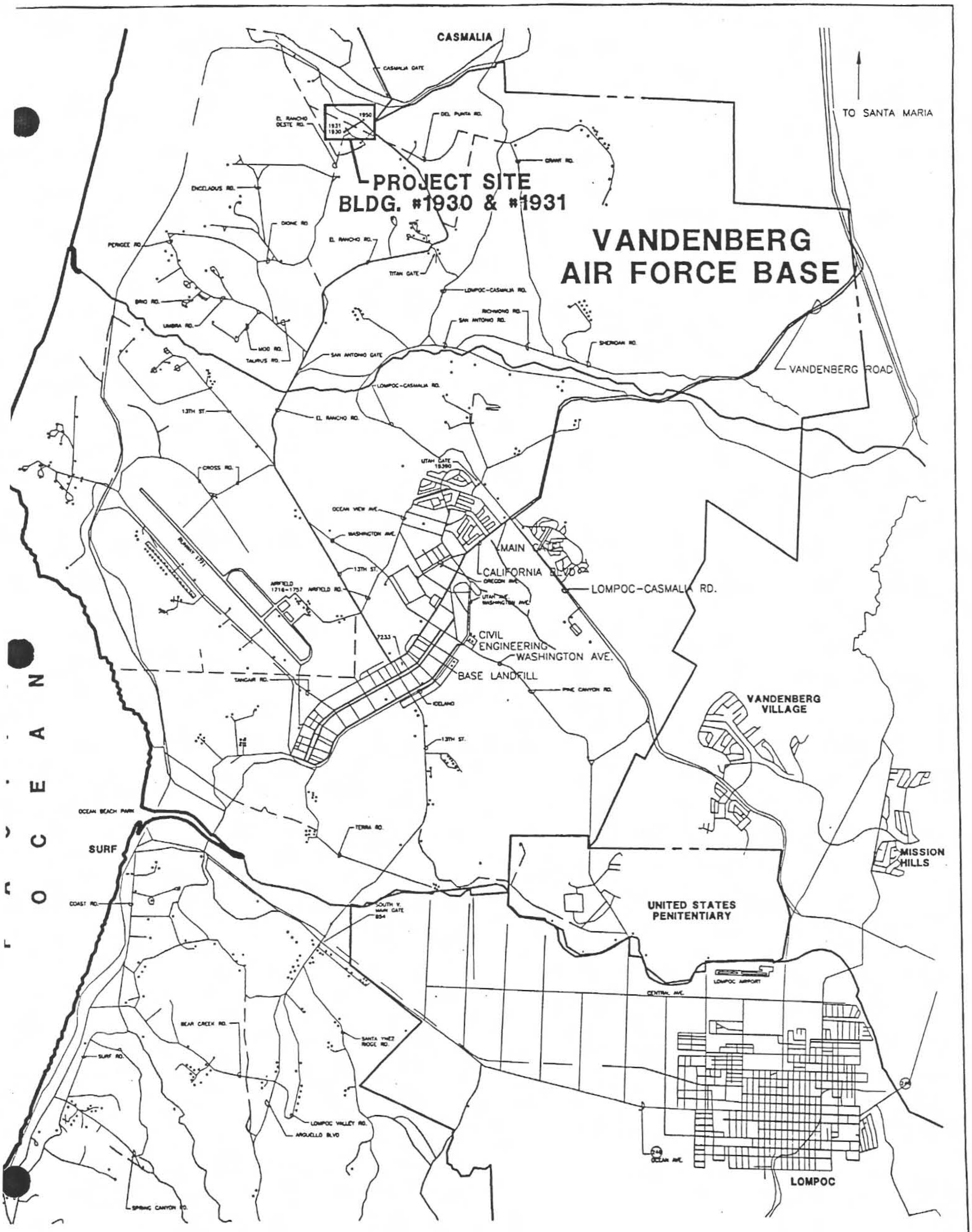


FIGURE 1



LOCATION MAP

FIGURE 2

APPENDIX A

and a sloped attic varying from three feet to 4 feet, 9 inches. Walls vary in thickness from one to 1.5 feet. As built in 1959-60, the instrumentation building was almost entirely above ground. In 1961 an attic was added as a structural space containing steel girders and cross beams atop the original reinforced concrete slab roof of 1959-60. A second, low-pitched side gable reinforced concrete slab roof caps the added attic space. The attic provides additional bunkering for the instrumentation building. Also in 1961, at the time of the attic placement, both the instrumentation building and the launch control building were jointly covered with a substantial earthen berm, providing more bunkering. The capped instrumentation building retains two facades above ground, that of the north and that of the west.

The interior is divided into two rooms, the instrumentation area and the mechanical equipment room. The instrumentation area is a 50-foot by 40-foot space, originally designed to house a U configuration of instrument cabinets with a center group of consoles. The mechanical equipment room, to the west, is a 15-foot by 40-foot, 8-inch space. Entry to the instrumentation room is at the northwestern corner, with an emergency blast door exit at the northeastern corner. Two entrances access the mechanical equipment room, from the north and from the west. The instrumentation building is connected to the launch silo by underground cables and conduits; its purpose was to run extensive checks upon the equipment within the silo. The building is in good condition today and is occupied with military personnel. Cabinets and consoles have been removed, but interior spacing remains little modified.

(5) Air Intake and Exhaust Vents (Bechtel Corporation: 1959) [Fig. 6, 27 Pl. 11-13, 15, 17]

Two air vents, an intake and an exhaust, service the launch control center area. The vents sit on the south and north sides of the reinforced concrete shell that encases the steel crib two-story center. They are placed in the surrounding eight-foot wide aggregate secondary shell that further encases the reinforced concrete cylindrical structure. Each vent is 10 inches in diameter and is cane-shaped as it extends from the 1961 earthen berm added on site. Air vents are unaltered and intact.

(6) Earthen Berm and Sandbag Revetment (Bechtel Corporation: 1959-60, 1961) [Fig. 6, 27-28; Pl. 19]

The earthen berm and sandbag revetments covering the launch control center and surrounding the instrumentation building were moved in place in two major stages. In 1959-60, an original berm surrounded the launch control center on its north, south and west sides, with an access area on the east. As designed and built, the instrumentation building to the near west was fully above ground. In 1961 both the launch control center and the instrumentation building were given three-to-four-foot secondary roofs, with a single new berm covering both structures. The instrumentation building remained above ground on its north and west faces, with substantial sandbag revetments. In addition to providing enhanced protection for the launch control center and the instrumentation

REQUEST FOR DETERMINATION OF ELIGIBILITY
ATLAS 576 G, VANDENBERG AIR FORCE BASE, CALIFORNIA

Name

historic: SM-65 O.S.T.F.; WS-107 A-1 O.S.T.F.; O.S.T.F. No. 2; 576 G; VAFB Bldgs. 1930-35 [Bldg. Complex 1935]
common: Atlas 576 G

Location

street & number: Vandenberg Air Force Base
city, town: Lompoc x **vicinity of** **congressional district**
state: California **code:** 06 **county:** Santa Barbara **code:** 083

Classification

Category	Ownership	Status
district	x public	x occupied
x building(s)	private	unoccupied
x structure(s)	both	work in progress
site	**Public Acquisition**	**Accessible**
object	in process	x yes: restricted
	being considered	yes: unrestricted
		no

Present Use

agriculture	x military	transportation
commercial	museum	other:
educational	park	
entertainment	private residence	
x government	religious	
industrial	x scientific	

Owner of Property

name: United States Air Force
street & number: Vandenberg Air Force Base
city, town: Lompoc x **vicinity of** **state:** California

Location of Legal Description

courthouse, registry of deeds, etc.: United States Air Force/ LEER
street & number: Building 516, Bolling Air Force Base
city, town: Washington **state:**D.C. 20032

Representation in Existing Surveys

None

Has this property been determined eligible? **yes** x **no**

Description

Condition

	excellent	x	deteriorated		unaltered	x	original site	
x	good		ruins	x	altered		moved	date
	fair		unexposed					

The Atlas 576 G launch complex at Vandenberg Air Force Base was in design as of August 1, 1959. Earliest as-builts denote the project as "WS-107 A-1 O.S.T.F. (Silo), Vandenberg, AFB, California." WS-107 A-1 referenced Weapon System 107 A, one of the names given to the Atlas Intercontinental Ballistic Missile (ICBM). WS-107 A was actually a sequential military designation for the Atlas. The name Atlas had originated in 1951 following the signing of a contract between the U.S. Air Force and Convair for Project MX-1593, and is reported as representing Convair's parent company, the Atlas Corporation. (Neufeld: 1990, pp. 68-70.) Project MX-1593 was a preliminary two-phase study to develop the long range missile. From 1954 through 1956 the Atlas became designated SM-65, "Strategic Missile 65." Between 1957 and 1962 SM-65 and WS-107 A were used somewhat interchangeably to reference the Atlas, with a transition toward WS-107A. The Atlas 576 G launch complex at Vandenberg is mapped during its planning and construction almost solely as WS-107 A-1 O.S.T.F.. (*AW*: March, 1955-61.)

The O.S.T.F. labeling, pronounced "ostiff," was a shortened reference to the launch site's particular research and development purpose, "Operational Suitability Test Facility." Missile specialists planned the O.S.T.F. as a hardened I.C.B.M. launch test site, one protected as fully as possible by a location below the ground's surface. Both the Titan and the Atlas I.C.B.M. programs sponsored O.S.T.F.s at Vandenberg AFB, with that of the Titan (SM-68) under construction a year earlier in July 1958. [Fig. 3] (*A.W.*: October 26, 1959, p. 71.) No below-ground O.S.T.F.s were built at Cape Canaveral. Military personnel and engineers alike soon streamlined the meaning of O.S.T.F. to Operational Silo Test Facility. (*A.W.*: February 15, 1960; March 7, 1960, p. 135; September 25, 1961, pp. 179 and 183.) The second designation was not completely appropriate, however, due to the existence of two types of O.S.T.F.s at Vandenberg AFB, only one of which was a silo.

Built to launch the Atlas F missile, the Atlas 576 G launch complex was Vandenberg's second Atlas O.S.T.F. and is commonly referenced as O.S.T.F. No. 2. The first O.S.T.F., O.S.T.F. No. 1, is also a hardened site, with its below-ground coffin-type launch facility built for Atlas E, the predecessor missile to the Atlas F. Both O.S.T.F. No. 1 and No. 2 had training launch sites, T.F.s, planned immediately adjacent, designated SM 65-T and SM 65-T2 A and B. [Fig. 4] For O.S.T.F. No. 1, SM 65-T (the Atlas 576 C complex) provided a single below-ground coffin launch pad. For O.S.T.F. No. 2, SM 65-T2 A (the Atlas 576 D complex) provided a training silo to the immediate south. As planned, SM 65-T2 B was to be built as a second training silo to the further south of O.S.T.F. No.

2; as built, the second silo was sited to the near south of the Thor SLC 2, fully disassociated from O.S.T.F. No. 2. Also built, and sometimes confused with the O.S.T.F., was the "Silo Launch Test Facility." At least one S.L.T.F. was built for Titan, distinct from the O.S.T.F.s and T.F.s; the S.L.T.F. focused on the achievement of firing the missile from the bottom of the silo rather than elevating it to the surface first. (*A.W.*: February 15, 1960; March 7, 1960, p. 135; April 4, 1960, p. 70.)

During 1963 the Atlas O.S.T.F. No. 2 formally received the name 576 G, in reference to its Strategic Missile Squadron, the 576th. O.S.T.F. No. 1 became 576 F. The 576th squadron operated 11 Atlas launch pads at Vandenberg AFB: three at 576 A (gantry), three at 576 B (above-ground coffin), one at 576 C (below-ground coffin; originally a training facility for O.S.T.F. No. 1), one at 576 D (silo; originally a training facility for O.S.T.F. No. 2), one at 576 E (silo; originally planned as a training facility for O.S.T.F. No. 2 and built as a S.L.T.F.), one at 576 F (silo; originally O.S.T.F. No. 1), and 576 G (silo; originally O.S.T.F. No. 2). The 576th squadron, like that of the 395th for Titan at Vandenberg, was both a training and operational military unit.

Atlas 576 G was the fourth generation Atlas missile complex built at Vandenberg Air Force Base. As designed and constructed the full historic complex consisted of one distinct site with over 30 components. The 576 D (SM 65-T2 A) complex to the immediate southeast is directly related to the 576 G site, as its training silo. Also related, but geographically isolated to the far southwest, the 576 E (SM 65-T2 B) complex served as the second training silo for 576 G. [Fig. 5]

The period of historic significance for the Atlas 576 G complex is defined as 1959 to 1965, spanning the first design and construction phase through the final Atlas F launch on site.

The Atlas 576 G complex includes 31 contributing components, 1959-64, and one non-contributing component, moved to its current location post-1965. The non-contributing component is a small, temporary cluster of structures comprised of a truck trailer and a partially open steel shed. Now used for paint and corrosive storage, the cluster pre-dates 1965 in its original construction and was likely in part a mobile service trailer unit(s) for either an as yet unidentified I.R.B.M. or I.C.B.M. launch complex at Vandenberg, or possibly for the 576 G site itself.

As the first and only O.S.T.F. designed and constructed for testing the Atlas F missile, the 576 G launch complex at Vandenberg AFB is of national historic significance, possessing substantial integrity and interpreted as potentially eligible for the National Register of Historic Places.

Contributing Components

Contributing components of the Atlas 576 G launch complex at Vandenberg Air Force Base are interpreted to include 31 extant site features. The complex is in varied condition, with some components in good condition and others deteriorated through disuse. A small proportion of the contributing components are extant only as foundations. These components contribute as historic archaeological features of the launch site, offering a resoundingly complete physical interpretation of the 576 G facility as built. Alterations, and layered modifications common to most missile launch complexes, are largely absent due to the single continuous period of historic significance, 1959-65. Only interior room and equipment changes to the Instrumentation Building (4) and the Utility Building (7) evoke the site's use post-1965.

(1) Silo (Bechtel Corporation: 1959) [Fig. 6-21; Pl. 1-5]
Building 1935

The Atlas 576 G silo is defined by a vertical cylindrical hole 181 feet, 8 inches deep and 64 feet in diameter. Reinforced concrete lines the hole, varying in thickness from six feet for the first 26 feet below the surface, tapering to three feet for the next 12 feet to the level of the personnel entrance tunnel, continuing at a three-foot thickness for another 13 feet, 7 inches, and, after another brief tapering, descending to the bottom of the silo at a two-foot thickness. The reinforced concrete base of the silo is 60 feet in diameter, with a minimum thickness of 7 feet, 8 inches. A large sump pump sits in the silo floor in the southern quadrant of the structure. Interior depth of the silo is 174 feet; interior diameter 52 feet, both standard measurements for Atlas F silos. The silo is the equivalent of a 15-story building below ground. (*Military Engineer*: November-December 1962, p. 401.)

Inside the reinforced concrete silo walls an octagonal steel crib structure is suspended by eight paired oversized mechanical springs functioning as four shock isolators. The shock isolators are placed in pairs at 90 degree angles around the silo in suspension brackets attached to the interior of the silo walls. A rattle space of 18 inches surrounds the crib to allow its movement during ground shock. Eight levels, with two sub-levels between levels seven and eight, define the interior of the crib, with four 22-foot and four 13-foot angled wall surfaces on each floor. All flooring is grated steel. The shock isolators hang between the first and fifth floors. Of oversized height, the floors contain the equipment needed to service and launch the Atlas F missile, arranged in a U configuration around the rectangular missile launch storage cavity. The missile launch storage cavity is offset from the center of the silo to the northeast and was originally capped with a 30-inch thick reinforced concrete side-hinged, center-opening door. A rectangular personnel and equipment elevator, with adjacent counterweight, sits inside the northwest wall of the crib; a spiral staircase of five-foot diameter sits inside the crib in the east corner. The staircase services the seventh to the first levels, with no at-ground exit. A ladder continues the staircase from the seventh level to the silo base floor.

The eight levels, with two sub-levels, are designed in an inverted ordering, with deepest level that of level eight. In a 14-foot space between the silo base floor and level eight, drainage devices, air conditioning equipment and aluminum ductwork spiral up from the center. Between the eighth and seventh levels, gaseous nitrogen, gaseous oxygen, liquid oxygen (LOX), liquid nitrogen, pressurized helium, and a liquid nitrogen/helium heat exchanger are configured in the U-shaped space around the missile launch cavity between the elevator shaft and the spiral staircase. A 47-foot space, the nitrogen, oxygen and helium storage area is filled with tanks in a vertical arrangement. The LOX tank, a 45-foot long container, is upended in the silo; in the earlier Atlas 576 A, B and C launch facilities the LOX tank is sited horizontally. LOX had to be pumped aboard the Atlas F missile at 297 degrees below zero just prior to the launch. LOX required extreme cleanliness in addition to cryogenic conditions; any contamination would cause explosion. Holding 18,600 gallons of LOX, the Atlas F missile's LOX tanks could be filled in just under five minutes, following another nearly five minute period needed to fill the 11,500-gallon RP-1 fuel tanks. Fueling, combined with other tasks, consumed 13 minutes and 50 seconds of the 15-minute launch time. For all test launches, an hour's holding period was required for systems' checkout before resuming the final one minute and 10 seconds of the launch sequence, with the LOX and RP-1 tanks then topped with the final 0.5% of the fuel. (Neufeld: 1990, pp. 202-03; *A.W.*: February 25, 1963, p.78.) A smaller LOX topping tank, also positioned vertically, stands next to the primary LOX tank between levels seven and eight. A total of six tanks are individually positioned vertically, with the heat exchanger also thus arranged. In addition, seven horizontally placed gaseous nitrogen and oxygen tanks are stacked in a single vertical column. Above the tanks, on the seventh level, sits prefabricated encased equipment for monitoring the filling and emptying of the tanks directly below.

The two intermediate levels between those of the seventh and eighth, levels 7A and 7B, service the launcher platform at its third and fourth levels. The launcher platform supports the launch mount and continues up two more levels to a point between the crib's sixth and seventh levels. An elevator raises the four-level launcher platform with the mounted missile to the surface of the silo for launch. A flame deflector is contained on level two of the launcher platform. (USAF *T.O.*: OSTF-2, May 15, 1964.) In addition, a four-level work platform continues above the four-level launcher platform between crib levels six and two. The levels of the work platform are retractable and facilitated further systems checkouts for the stored missile; its second and third levels are staggered between crib levels five and six, and four and five.

Above the seventh level the silo is further defined by servicing components of the Atlas F missile, with intermediate speciality platforms between the levels as required. Within the 13-foot, 6-inch space between the seventh and sixth levels an enclosed collimator platform is cantilevered from the northwest crib wall. A collimator sight tube protrudes from the enclosure providing a light-proof optical line of sight between the guidance port of the missile in place on the launch mount and the trunnion-mounted collimator. From the collimator northwestwards, a second sight tube extends more than 100 feet to a theodolite station above ground. The sixth level is the stationary in-silo base for the launcher mount, as well as for the launcher mount elevator and its counterweight. In addition, the sixth level provides access to work platform levels three and four in the 15-foot, 6-inch space between crib levels five and six.

Spacing between the fourth and fifth, and third and fourth, levels is consistent at 15 feet, 6 inches. The fifth level houses fuel oil tanks, including a fuel oil storage day tank, a dirty lube oil storage tank, a diesel starting air receiver tank, and a clean lube oil storage tank. The fourth level houses water pumps and tanks, including water chiller units, chilled water pumps, an emergency water pump, condenser water pumps, hot water pumps, a utility water pump, a fog system pump, a hot water expansion tank, and a utility water hydro-pneumatic tank. The launch mount area, the personnel elevator, the two counterweights for each elevating system, and the spiral staircase occupy the remaining space around the missile cavity on both the fourth and fifth levels. Level five also provides access to work platform level two.

Spacing between the second and third, and first and second, levels is staggered at 15 feet, 6 inches, and 17 feet. Level three houses motor generators, emergency missile power batteries, power-supply and distribution units, a control-monitor group, an air blast closure system pressurization control rack, guidance system monitors, and a re-entry vehicle prelaunch monitor and interface facilities. All level three aerospace ground equipment (AGE) is mounted in closed cabinets. A cavity beneath the raised flooring for level three stores the electrical cables leading to the equipment. Level two also houses AGE, including hydraulic manifolds, hydraulic control panels, accumulator racks, exhaust plenum vent control panels, essential and nonessential motor control centers, a hydraulic reservoir, and hydraulic reservoir control panels. Again equipment is mounted in closed cabinets. (USAF *T.O.*: OSTF-2, May 15, 1964.)

The uppermost level in the 576 G silo is 10 feet, 7 inches in height and contains the launcher platform drive, launcher platform drive controls, logic racks and launcher platform motor control centers. Cabinets enclose all equipment except the launcher platform drive. The drive consists of the motors, cables, cable drums, gears and mechanical equipment used to raise and lower the launcher platform. (USAF *T.O.*: OSTF-2, May 15, 1964.) Above the suspended steel octagonal crib structure a six-foot reinforced concrete cap protects the silo at the ground's surface. Interior paint scheme for the 576 G silo was Federal Standard No. 595 green for all grating, plates, piping, supports, handrails, metal doors, blast doors, stairwell and ladders. Three distinct shades were specified by code, but not named in the as-builts.

Atlas F silos required 30 months to construct under ideal conditions. The Vandenberg AFB Atlas O.S.T.F. No. 2 and its two training silos, 65-T2A and 65-T2B, (576 G, D and E), sustained their first launches in 1962 and 1963. The late launch dates were due in part to construction delays, with the 576 G and E silos launching in August 1962. Below ground electrical cables, as well as air, water and fuel conduits, also complicated construction. The silo featured major parallel cables and conduits to the launch control center, to the instrumentation building, to the electrical substation, and to the large water storage tank and firex pump. Lines also ran to ancillary below-ground water and fuel storage tanks. Above ground, three major pieces of portable equipment were also necessary to service the silo: the guided missile semitrailer, the trailer-mounted guided missile erector, and the semitrailer-mounted pneumatic test set. The guided missile semitrailer moved the missile onto the site, positioned on northwest axis to the silo and secured to steel mounting plates for vertical placement of the missile into the silo. The guided missile erector was also secured on site to steel mounting plates, its apparatus extending across the silo from the southeast and lifting the missile from its semitrailer bed onto the launch mount raised to the top of the silo. The pneumatic trailer provided pressurization to the missile propellant tanks during handling operations. (USAF *T.O.*: OSTF-2, September 4, 1964.)

Today the silo is intact, with removal only of its silo doors at the ground surface. Floor-by-floor status of the structure below ground is unknown, although it is assumed that most of the original equipment and tanks remain in place. Removal of the silo's interior features would be extremely cumbersome, if not impossible, without completely gutting the structure from the top down. The hazardous waste materials stored in the tanks make it additionally unlikely that these have been removed. Finally, from the first construction drawings forward, it was understood that the site offered a high water table relative to the depth of the silo. In 1959 the water table was noted as existing at 33 feet, 2 inches below the ground surface. Today the silo is about 80% full of water, correlating with the known water table.

(2) Personnel Entrance Tunnel (Bechtel Corporation: 1959) [Fig. 6, 22; Pl. 8-10]

A galvanized corrugated steel entrance tunnel descends from a reinforced concrete headwall at the ground's surface to the near southeast of the launch control center and instrumentation building. In addition to the headwall's 9-to-12-inch thickness, a blast door protects the entrance above ground. The tunnel levels off at four platforms, with each descent about 12 feet. Platforms are six, 12, 12, and 13 feet in running length, respectively, before entry into the launch silo on level two beneath the exhaust vent. Total descent is 36 feet, 8 inches, with a total tunnel length of 97 feet. The tunnel turns at a 45 degree angle toward the silo after the third platform for the final 12 feet of descent. The first linear segment of the tunnel is 66 feet long, the second 31 feet. When the blast door at the surface is open, daylight reaches to approximately the first platform. Height of the tunnel is 7 feet, 8 inches, with a round-headed profile. The tunnel is intact today, with ground water having risen from inside the silo to a point not far below the fourth platform at 24 feet, 3 inches below the ground's surface. Above about 28-to-30 feet, the tunnel is dry.

(3) Launch Control Center (Bechtel Corporation: 1959) [Fig. 6-7, 23-25; Pl.11-16]
Building 1932

The launch control center is defined by a vertical cylindrical hole, 31 feet deep and 44 feet in diameter. Reinforced concrete of approximate two-foot thickness lines the hole, inclusive of both the slab base and roof of the structure. As built, the roof slab was flush with the ground's surface. A rectangular stairwell, 10 feet by eight feet and 37 feet, 7 inches deep is attached to the center on the east. As built, 9 feet, 1 inch of the stairwell extended above the ground surface. Stairwell walls are also of two-foot thickness, with the exception of that portion of the wall above ground facing the silo. The silo-facing wall is approximately three feet thick. A T.V. camera was mounted on a post support on the stairwell roof. Below the stairwell an additional seven-foot deep, concrete-lined cell holds a sewage pump. Interior dimensions of the launch control center concrete shell are 27 feet deep, 40 feet in diameter. The center is the equivalent of a two-story building, with partial basement, fully below ground. The launch control center housed the launch crew of three-to-five men who controlled the launch of an Atlas F missile from the launch silo to the east.

Inside the reinforced concrete launch control center walls a circular steel crib is suspended by four oversized air cylinder spring supports functioning as shock isolators. The shock isolators are placed at approximate 42-43 degree angles around the rim of the concrete roof slab, anchored into the slab about three feet from the outer edge of the concrete side walls. A rattle space of a foot along the sides, two feet at the top, and four feet at the base allowed a presumed possible deflection of 10 inches vertically and five inches horizontally should major ground shock occur. The shock isolators suspend an enclosed 21-foot steel structure. A single oversized reinforced concrete double mushroom column is centered inside the steel crib, and distributes the compressive weight applied to the roof slab. The column is eight feet in diameter through its mushroom base and mushroom cap, with a four-foot diameter shaft.

The steel crib are is divided into two levels, that of the upper eight feet in height, the lower 13 feet. Subdivided by partition walls, the first level contained a future training and briefing room, a medical supplies room, the toilets, a kitchen, mess facilities, the heating, air conditioning and ventilating equipment room, and a hallway. An emergency hatch accessed the second level below, with an escape hatch through the steel crib roof and the reinforced concrete slab roof to the ground surface above. The second level contained an office, the launch control room, the communications equipment room and a battery room. Three floor hatches accessed the underside of the crib. Entry and exit from both the first and second levels is through the attached stairwell, stepping across the open rattle space between the outer reinforced concrete walls of the primary structure and the interior suspended steel crib. Original interior paint scheme for the launch control center featured lusterless sea foam green for all walls except those of the latrine, with glossy eye rest green trim and semi-gloss wainscotting, and lusterless white ceilings. The latrine was painted a powder blue with glossy white ceiling and dixie grey trim. All baseboards were painted black. Floors were linoleum.

On the west side of the launch control center, a communications manhole accesses an 8-foot, 2-inch deep reinforced concrete-lined rectangular cell housing electrical conduits. The cell protrudes from the cylindrical concrete shell for the launch control center and apparently is only accessed through the manhole cover.

In 1961 an attic space was added to the launch control center, paralleling that added to the adjacent instrumentation building to the west. A space of approximately three-to-four feet, the attic provided extra bunkering for the structure. A second earthen berm augmented the original berm that surrounded the launch control center on its north, south and west faces, with added dirt atop the attic space. The 1961 berm jointly covered both the launch control center and the instrumentation building; as designed and built only the launch control center had been below ground; its original roof slab had been flush with the ground surface.

Personnel originally accessed the launch control center through a blast door on the west face of the stairwell, above ground, with an entry access area at the southeastern base of the berm. This entry design was similar to that of the personnel entrance tunnel to the silo to the southeast. In 1961, at the time of the berm addition, the entrance to the launch control center was changed. The as-built west entry was closed, with an eight-foot wide, 16-foot, 4-inch tunnel extended north from the stairwell through the protective earth. A new blast door separated the tunnel from a similar-length sandbagged revetment open to the sky and continuing out from the tunnel to the access road around the launch control center area on its north face. In 1964 the entry tunnel was extended 10 feet further north, with a 90-degree second nine-foot wide extension of 14 feet, 6 inches to yet another blast door facing west. A bin-type steel retaining wall was set in place, with compacted fill material, along the north face of the berm, fronting the 1961 tunnel entry. In addition an eight-foot by 14-foot concrete-walled new entry area further protected this second west entrance, providing access from the north to the completed tunnel extension.

Today the launch control center is unoccupied, with interior equipment removed. Structural features, including the steel crib, double mushroom column, shock isolators, stairwell, blast doors, and expanded tunnel, are in place. Interior partition walls are damaged, but also intact. The building is dry and appears to have sustained little damage from the water table just below its base flooring.

(4) Instrumentation Building (Bechtel Corporation: 1959) [Fig. 6, 26; Pl. 17-18]
Building 1931

The one-story reinforced concrete building, with partial basement and attic addition, is 68 feet, 4 inches long by 43 feet wide. Primary height is 10 feet, 6 inches, with a three-foot, six-inch basement under the instrumentation room, building, the berm served as a secondary windbreak for the silo launch area. Minor changes to the berm occurred again in 1964 when the 1961 tunnel entrance to the launch control center was extended, with new west-facing entry. The berm is in good condition today and is little altered from its 1961 configuration.

(7) Utility Building (Bechtel Corporation: 1959) [Fig. 6, 27-32; Pl. 19-22]
Building 1930

The utility building is a one-story, prefabricated steel structure 101 feet, 10.5 inches by 50 feet, 2.5 inches. Design details include a moderately pitched side gable roof, narrow overhanging eaves and steel sash windows. The structure sits on a concrete slab foundation to the west of the earthen berm covering the instrumentation building and the launch control center. In 1966, the Strategic Air Command added several new interior walls to create more individual offices from the large center common area. A small shed-roof addition has also been added on the north face of the building. In good condition today, the utility building is largely unaltered in its exterior appearance. Historically the building provided additional office space for the 576 G site.

(8) Prefabricated Steel Building (Strategic Air Command: 1964) [Fig. 6, 30; Pl. 23-24]

A prefabricated steel building of 54- by 100-foot dimensions was added to the 576 G site on a concrete slab foundation in 1964. Now removed, the building served as added facility support. The slab foundation is extant today, with a small cluster of ca.1959 trailers at the west end of the slab. The trailers store paint and corrosives for the Air Force and are discussed under item 32 below.

(9) Parking Area [4] (Bechtel Corporation: 1959-62) [Fig. 6, 27-28, 30-32; Pl. 17-18, 20, 24-26]

Four parking areas were designed for the 576 G site, 1959/62. Two of the areas, that to the immediate north of the earthen berm and that to the north of the location for an unidentified building (27) just outside the security fence, are paved. Two other, much larger parking areas were graded for the 576 G site. One of these remains to the north of OSTF Road outside the security fence; the other, to the south of OSTF Road, is now overgrown by iceplant.

(10) Sand Filter [2] (Bechtel Corporation; Strategic Air Command: 1959; 1964) [Fig. 6, 28, 30-31; Pl. 27]

Two rectangular sand filters are sited behind the utility building to the west and southwest. The earliest, that to the southwest, was put in place with the first construction, in 1959-61, with dimensions of approximately 55 by 55 feet. The second, that to the west, was put in place in 1964, with dimensions of 40 by 50 feet. Both are shallow fields laid with drainage tile, with tile pipes extending vertically for ventilation. Both service septic tanks to the east and north.

(11) Septic Tank [2] (Bechtel Corporation; Strategic Air Command: 1959; 1964) [Fig. 6, 27-28, 30-31; Pl. 19, 22]

Two septic tanks service the 576 G site. The first sits to the southeast of the utility building and drains to the sand filter to the south of the utility building. The second, a 1000 gallon tank, was added with the second sand filter in 1964. The 1964 tank sits to the west of the utility building, draining to the sand filter to the southwest of the utility building. Both are underground units.

(12, 13, 14) Theodolite Station/Collimator Sight Tube (Bechtel Corporation: 1959-61) [Fig. 6, 27,33; Pl. 28-29]

The theodolite station is comprised of two components, the structure enclosing the capping of the collimator sight tube and the theodolite. The first structure encased the rectangular 23-inch by 16-inch opening for the 10-inch diameter collimator sight tube. The collimator sight tube is on northwest axis from the launch cavity of the launch silo. Distance from the center of the launch cavity to the sight tube cap is approximately 104 feet, 11 inches along the ground surface. The sight tube angles up from the trunnion-mounted collimator on a platform cantilevered between the sixth and seventh levels of the launch silo. The angle of the sight tube is noted as varying between a 50 degree maximum and a 49 degree minimum. The collimator is located 99 feet, 7.75 inches below the ground's surface, vertically. The sight tube provided a light proof line of sight from the collimator to the theodolite station. Pivoting in its trunnion mount, the collimator correlated measurements off a target point on the Atlas F missile underground and from the theodolite station at the ground's surface. A theodolite, in conjunction with the collimator, allowed for adjustments to the Atlas F's inertial guidance before launch. The theodolite, abutting the sight tube capping structure to the northwest, contained precision optical-electronic instruments to align the stable platform of the Atlas F inertial guidance. The theodolite structure would have been a reinforced concrete building about eight feet in height. Apertures in the theodolite structure's walls would have been aligned with azimuth terrestrial reference points, with the Arma guidance optics pier due west and with true north and Polaris (the North Star). The American Bosch Arma Company developed and manufactured components of the guidance optics in conjunction with the Perkin Elmer Corporation. (*Guided Missiles Directory*: 1963, pp. 22-25.)

The theodolite station today exists only as a concrete foundation. The foundation features two rectangular components, that for the sight tube capping structure measuring 4 feet, 8 inches by 5 feet, 4 inches and that for the theodolite approximately seven by eight feet. The foundation, as it remains today, provides valuable historic archaeological evidence of required distances and angles for the Atlas F guidance, as it was developed in its first silo launch setting.

(15) TV Camera and Floodlight [4] (Bechtel Corporation: 1959) [Fig. 6, 27, 32; Pl. 29-33, 49]

To monitor and record launch activity at the Atlas 576 G site, four TV towers complemented the launch area. The primary camera sat atop the stairwell to the launch control center. Three additional cameras, with floodlights, were placed around the launch area. Camera No. 1 sits to the near northeast of the primary camera, at the base of the launch control center earthen berm. Camera No. 2 sits to the northeast of the launch silo at the juncture with OSTF Road. Camera No. 3 sits to the southeast of the launch silo just beyond the launch activity area. Reinforced concrete bases for the cameras measure 5 feet by 5 feet by 3 feet, 6 inches for camera no. 1, and 4 feet by 4 feet by 2 feet for cameras no. 2 and 3. Each base is buried about half its depth. Steel camera stands measured five feet for cameras no. 1 and 3, and four feet for camera no. 2. Although only the concrete base and steel stand remains for the primary camera, and only the concrete bases for cameras no. 1-3, these provide valuable historic archaeological evidence for the as-built placement of visual monitoring equipment on the first Atlas F silo launch site.

(16) Catch Basin (Bechtel Corporation) [Fig. 6, 27-28, 31; Pl. 1]

A sloped concrete catch basin, with center grated drain, sits to the southwest of the launch silo. Concrete apron for the basin measures 25 by 30 feet. The drain handled contaminated water washed away from the launch area. Today the catch basin is unaltered.

(17) Ventilation Shaft [3] (Bechtel Corporation: 1959) [Fig. 6, 27, 33-34; Pl. 34]

Three ventilation shafts sit at 40, 90 and 45 degree angles around the launch silo from southwest to northwest. Each shaft measures 6 feet, 9 inches square at the ground's surface. A ladder runs the entire length of each shaft. Beginning at the southwest, an air intake shaft extends 20 feet deep. Air intake shaft side walls are nine inches thick, with a one-foot thick base. At the bottom of the shaft a four-foot duct continues the air intake into the silo on level one. A fill and ventilation shaft continues the shaft sequence, extending 59 feet, 6 inches deep to level four of the silo. Its side walls are nine inches thick paralleling the six-foot thickness of the adjacent silo, then enlarging to two feet paralleling the tapered and diminished silo walls of three-to-two feet. Base thickness of the shaft is two feet, with a two-foot duct hole continuing the shaft vertically for cable access. At the northwest, an air exhaust shaft extends 27 feet deep. Air exhaust shaft side walls are nine inches thick, with a one-foot thick base. At the bottom of the shaft a four-foot duct continues the air exhaust into the silo on level two. The air exhaust shaft stops its vertical descent immediately above the entry of the personnel tunnel into the silo. The three ventilation shafts exist today, partially filled with debris, but apparently unaltered.

(18, 19, 23) Water Storage Tank [2], Valve Box [2], Firex Pump Station (Bechtel Corporation: 1959, 1960)
[Fig. 6, 27-28, 31-32, 34-36; Pl. 1, 2, 8, 25, 35-38, 41]
Building 1934

Two water storage tanks service the 576 G site. The first, a small below-ground tank put in place in 1959, sits to the northwest of the launch silo at the juncture of OSTF Road. Its above-ground valve box is immediately adjacent. The second water storage tank, placed on site in 1960, is a large, above-ground structure sitting to the east/southeast of the launch silo. Cylindrical, the above-ground tank is of 20-foot diameter and 20-foot height. The 1960 tank accompanies the firex pump station that provided additional deluge water for the launch area around the silo. Its valve box is immediately adjacent. Today each of these water storage components exists, with the 1959 valve box obscured by iceplant. The 1960 tank, valve box and firex pump station are currently undergoing alterations to accommodate a new water line. The foundation for the hose reel sits at the east corner of the launch silo, with all the pump water line reducers angled around the circular configuration of the silo.

(20) Fuel Catchment Tank Enclosure (Bechtel Corporation: 1959) [Fig. 6, 32; Pl. 39-40]

A rectangular reinforced concrete box, open to the sky with grillwork, originally housed a fuel catchment tank, and was connected via fuel line underground to the launch silo. Today the box exists, unaltered, but the fuel catchment tank has been removed. Evidence of the fuel line trench can be seen in the replaced asphalt road surfacing adjacent.

(21) Diesel Oil Storage Tank (Bechtel Corporation: 1959) [Fig. 6, 27, 28, 32, 34, 36; Pl. 41]

A large diesel oil storage tank sits underground to the northeast of the launch silo in alignment with the edge of the launch area. Dirt covers the location today; it is assumed that the tank is still in place.

(22) Cooling Tower (Bechtel Corporation: 1959) [Fig. 6, 27-28, 32, 34, 36; Pl. 42]

The foundation for the 576 G cooling tower remains in place to the northeast of the launch silo, now obscured by iceplant. Dimensions of the foundation are 16 by 18 feet. A drainage ditch is dredged around the base of the foundation. Originally water lines ran from the cooling tower to the northwest, in the direction of the launch control center. No as-builts or photographs were discovered illustrating the tower itself. Exact functioning of the cooling tower is unknown, although it is most likely that it serviced the computer equipment in the launch control center; its foundation provides valuable historic archaeological evidence of the first water system for the silo test site. The large water storage tower to the east of the silo, added in 1960, likely augmented the original function of the cooling tower.

(24) Electrical Substation (Bechtel Corporation: 1960) [Fig. 6, 36; Pl. 43]

A small electrical substation stands just outside the security fence at the eastern corner of the 576 G site. The substation services the firex pump station and the launch silo. Electrical conduits run westerly, turning northwesterly at a motor starter adjacent to the firex pump station.

(25) I.R.S.S. Checkout Facilities (Bechtel Corporation: 1961) [Fig. 5, 6, 37; Pl. 44-46]

Supportive of the COTAR missile tracking system at Vandenberg, the I.R.S.S. checkout facilities relayed data on the launched missile's three-dimensional position during its first, and initial portions of its second, stage of flight. COTAR, a system of *correlated tracking and ranging*, used fields of antennas placed in X configurations. In 1960 two COTAR fields existed at Vandenberg, one to the southeast (no. 1) and one to the southwest (no. 2) of the 576 G site. Two additional I.R.S.S. buildings, one the ICC [Instrumentation Control Center] and the other the CDT [Command Destruct Transmitter Building], were sited to the east of COTAR field no. 1. A tracking and transmitting station existed to the northeast of the same field. I.R.S.S. appears to be the acronym for *initial range safety system*. The range safety officer was responsible for decisions to abort the missile during its flight, should initial tracking information indicate a safety hazard. The I.R.S.S. checkout facilities provided a radar system locked on the missile optically, with two referential optical sights located directly behind the missile's line of flight and at right angles to it. (*AW*: October 26, 1959, p. 76.)

The physical I.R.S.S. checkout facilities at the 576 G site consisted of a north-south cable tray aligned from the edge of the silo to the perimeter of the silo launch area, a radar antenna at the southern end of the tray, and a checkout point directly behind the missile's line of flight. The cable tray conveyed information to the antenna for relay to the ICC and CDT facilities on base. The tray is 76 feet, 5 inches long, and 1 foot, 7.5 inches in width. The foundation for the radar antenna is 4 feet, 3 inches deep, with 2-foot, 8-inch square surface dimensions. Three steel footings of 9-inch height top the concrete base, with the mounted antenna further extending the height of the tower. At a right angle to the antenna, 36 feet distant to the northwest, a second concrete footing two feet deep, with a one-foot square surface dimension, supported optical equipment. The full height of the second tower was 2 feet, 6 inches above the ground's surface. The cable tray is intact today [without its steel grate covering], with concrete foundations also present.

(26) Sentry Booth (Bechtel Corporation: 1959) [Fig. 6, 27, 28, 31, 32, 36; Pl. 47]

A small, one-story, wood-frame sentry booth sat at the northern edge of the swing gate entry into the secured 576 G site. Dimensions for the structure were 14 by 14 by 8 feet, 7 inches. Details included a flat, sloping roof, with overhanging eaves, and 1/1 double-hung windows for each facade. A single door accessed the building from the south. A 5-foot wide concrete walkway extended from OSTF Road to the booth. Interior space was partitioned as a ready room and a toilet. Today no foundations remain for the booth, although the site exists with no new construction.

(27) Building [Unknown Designation] (General Dynamics[?]: 1961-62) [Fig. 6, 31; Pl. 48]

A three-part building sat to the south of OSTF Road just outside the security fence at the swing gate entrance to the 576 G site. Noted on one as-built as having been added to the location before late 1962, the building may have been the training facility for the Atlas F. The dimensions of the complex are approximately 135 by 55 feet, with three individual rectangular units of approximately 30 by 60, 55 by 25 and 45 by 25 feet set at alternating right angles to one another. In 1961 General Dynamics built three Atlas F missile procedure trainers for the Air Force, delivering them to the 576th missile squadron at Vandenberg in 1962. Designated the T-601, the trainers duplicated the electric equipment cabinets, controls and instruments used by the five-man crew during an Atlas F silo launch. The trainers were prefabricated, shipped to Vandenberg in 43 crates on four semitrailers, each. They required an installation area of 40 by 75 feet, suggesting building dimensions of lesser width and length. (*Guided Missiles*: 1963, p. 32.) An existing as-built for altering the trainer at 576 D shows three end-to-end rectangular buildings of approximately 25 by 50 feet , 25 by 55 feet, and 25 by 50 feet; these dimensions are nearly coincident with those for the differently aligned units shown for the 576 G site. Although not known for certain, it appears that the undesignated building shown on a late-1962 576 G as-built [for landscaping at the entire site] is that of a three-trainer T-601 facility. Nothing remains on the site today but broken pieces of concrete foundation.

(28) Security Fence [with Swing Gate] (Bechtel Corporation: 1959) [Fig. 3, 4, 6, 28, 31; Pl. 47, 49]

A barbed-wire security fence surrounds the 576 G launch site, closing off the access road at the sentry booth with a center-opening, steel pole swing gate. Secured behind the fence are all components of the 576 G facility except the electrical substation, the building of unknown designation [T-601 trainer(?)], OSTF Road, portions of drainage ditches lining the road, and two parking areas. The fence encloses a rectangular area of 685 by 470 feet, existing unaltered today.

(29) OSTF Road (1959) [Fig. 3, 4, 6, 27, 28, 31, 32; Pl. 49]

OSTF Road connects the 576 G launch site to El Rancho Road from the east. El Rancho Road was laid out as the access road to the Titan and Atlas F sites in 1958-59. OSTF road, renamed Astral Road today, is 18 feet wide, entering the 576 G complex running northwesterly and circling the earthen berm encasing the launch control center and the instrumentation building. As built, the road entered the parking area for the utility building, the instrumentation building and the launch control center, but did not complete the circle. A connecting segment for the road was completed in 1961, with changes to the earthen berm and to the adjacent drainage ditches at that time. In alignment with the collimator sight tube, a separate, truncated segment of road allowed for the guided missile semitrailer to align itself with the silo and unload the missile. Steel mounting plates secured the semitrailer in place while the missile was moved from the trailer into the silo. OSTF Road [Astral Road], and its related on-site components, exist unaltered today.

(30) Drainage Ditch (1959-64) [Fig. 6, 27, 31; Pl. 11]

Multiple drainage ditches augment the 576 G site. Primary ditches, originally with small check gates, line both sides of OSTF Road, line the guided missile semitrailer unloading area, the eastern and southern portion of the silo launch area, extend southerly from the southern corner of the earthen berm toward the sand filters and extend northwest and westerly behind the parking area at the berm. Ditches were altered in 1961 and in 1964 to accommodate changes to the earthen berm, but remain largely historically intact today.

(31) Windbreak (Strategic Air Command: 1962) [Fig. 6, 31; Pl. 12, 26, 47, 50]

A double-row windbreak, 1200 feet in length, runs along the northwestern edge of the 576 G site. Two rows of trees, one of eucalyptus and one of monterey pine, are planted close together, with each row defined by staggered groups of trees. Approximately 120 trees were planted in each row originally. Similar windbreaks were planted at the 576 D and 576 E sites, all in 1962. (At the 576 E site, two rows of 90 trees each were planted. No as-builts remain identifying the windbreak for 576 D , although the feature is present on the landscape.) The Atlas F missile was an extremely light vehicle, unfueled. Its stainless steel structure was pressurized, with outer skin "thinner than a dime" and "likened to a football." (*Guided Missiles*: 1963, p. 19.) The three 576 D, E and G windbreaks were all planted eight to 15 months before any launches occurred. It is assumed that the windbreaks were needed to buffer the unfueled Atlas F missile during unloading and implacement in the silo. Winds are typically high at Vandenberg.

Today an opening in the windbreak exists at the terminus of the guided missile semitrailer unloading area. A bleacher has been placed on the unloading area, and the break in the trees allows viewing of Minuteman missile launches to the north. Although some trees have died in the 30 years since their planting, most are healthy and mature. The windbreak is largely intact today.

Non-Contributing Components:

(32) Paint Storage Building [Temporary] (post-1965 in placement)
[Fig. 6, 38-39; Pl. 51-52]

A group of three small steel structures are clustered at the northwestern end of the concrete foundation for the prefabricated steel building of 1964 (8). These include a semitrailer of late 1950s date, similar to the pneumatic test trailer used during the placement of the missile into the silo. The middle structure is also of late 1950s type, while the third structure is of more recent construction. The trailer may be related to the 576 G facility during its period of significance, but is here considered a non-contributing component. Today the structures are used to store paint and corrosive materials gathered from off-site locations at Vandenberg.

Conclusion

The Atlas 576 G launch complex is comprised of 31 contributing, and one non-contributing, components. Of the 31 contributing components, 23 are fully present, six exist as concrete foundations and two exist as iceplant-covered sites. Those components that exist only as foundations or sites contribute to the value of the launch complex as historic archaeological locations. In particular, the foundations for the theodolite station, with its collimator sight tube capping; for the four TV cameras; for the cooling tower; for the electrical substation; and for the I.R.S.S. checkout facilities provide detailed information about scientific sight and locational distances required at the first U.S. silo built for the Atlas F missile. In the cases of the prefabricated steel building and the building outside the security fence, these locations offer documentation of site components not well detailed on extant as-builts. Only the site of the sentry booth is of negligible contribution.

The 576 G launch site historically functioned as OSTF No. 2 at Vandenberg AFB, with two training silos, 576 D and E, directly related to its historic purpose and functioning. The Atlas 576 D, E and G were designed and constructed simultaneously, with the training silos of only slightly differing layout from that of the OSTF. (Fig. 40) The 576 E site is geographically dislocated from the 576 G site and cannot be considered of any physical relationship to the 576 G complex, as built. The 576 D site, however, is adjacent to the 576 G site to the near southeast and is within its viewshed. As a training silo for the OSTF, 576 D could be considered a part of a single, larger, inter-related launch complex for the Atlas F. The 576 D launch complex has not been evaluated against the criteria of the National Register of Historic Places, and is not under evaluation here. At some future date, such an evaluation should occur, possibly as an expansion of this study. (Kirkish: 1990.)

Significance

Period	Areas of Significance			
prehistoric		archeology-prehistoric		landscape architecture
1400-1499		archeology-historic		law
1500-1599		agriculture		literature
1600-1699		architecture	x	military
1700-1799		art		music
1800-1899		commerce		philosophy
x 1900-		communications		politics/government
		conservation		religion
		economics	x	science
		education		social/humanitarian
	x	engineering		transportation
		exploration/settlement		theater
		industry		other
		invention		

Specific dates: 1959-65 **Builder/Architect:** Bechtel Corporation

The Atlas missile developed as a distant relative of the German A4 (V-2) fired successfully in late 1942. During 1944-45 about 6,000 V-2 rockets were built, and in 1946 the first study contract on the MX-774 long-range missile was let to Consolidated-Vultee (subsequently the Convair division of General Dynamics Corporation). The 1946 research concentrated on issues of stabilization, guidance and a power plant for a 5,000-mile missile. In 1949, the Defense Department reduced the Convair contract to just guidance research; Convair used its own corporate funds to continue research on actual missile weaponry until resumption of the MX-1593 long-range missile in 1951. During the interim 1947-50 period, the U.S.S.R. had begun tests of the V-2 (1947), the U.S. initiated construction of a missile test range at Cape Canaveral Air Force Station in Florida (1950), and the Korean War opened, stimulating the Cold War (June 1950). Nonetheless, U.S.-directed Convair priorities were only for the realization of an effective missile within a relaxed one or two decades. During 1952-53, prompted by actions in Korea, a scientific breakthrough in thermonuclear technology reduced the multi-thousand pound nuclear bomb to a light-weight, high-yield warhead, encouraging the development of a long-range missile with nuclear payload.

Beginning in 1952 a major U.S. government study analyzed concepts and technology for the intercontinental ballistic missile (ICBM), with a Strategic Missile Evaluation Committee established by the Air Force in 1953 with scientist Dr. John von Neumann appointed chairman (Teapot Committee). The next year, 1954, the Teapot Committee called for the establishment of a development-management group for strategic missile programs. Within the Air Force there followed an Air Research and Development Command and an Air Material Command, with the Western Development Division subsumed under both. The Air Force advanced three long-range missile programs, one as a stop-gap (the Thor IRBM) and two as potential ICBMs (the Atlas and the Titan). Before the close of 1954 Cold War fears were further fanned by the testimony of Dr. James Rhyne Killian, Special Assistant to the President for Science and Technology, before a House Subcommittee on Military Operations. In December 1954 the U.S. government decided upon the Atlas XSM-65 configuration, typically referenced as the SM-65, Strategic Missile 65.

The perceived need for a missile strategy accelerated during 1955 with the Killian Report setting forth the notion of a missile gap between the U.S. and the U.S.S.R. During that same year the U.S.S.R. began construction of the Baikonur facility near Tyura-Tam, developing it as an equivalent to the U.S. Cape Canaveral. The Pentagon authorized the Air Force to expedite development of the IRBM to fill the missile gap and to continue testing toward an operational ICBM. The IRBM was intended for placement in Britain and the European NATO countries as a viable deterrent to U.S.S.R. demonstrated capabilities. The Thor IRBM was planned for a 1500-mile range, with the Atlas (Convair) and Titan (Martin) planned for a 5,000-mile range. The Thor, Atlas and Titan, in the research and development stages, focused on an interchangeability of components and systems to speed success. Late in the year the U.S. government officially made the Atlas of highest research and development priority.

During 1956 events continued to accelerate. Egypt seized the British-controlled Suez Canal with U.S.S.R. tacit-backing, while the U.S.S.R. invaded Hungary. In an *Aviation Week* article of March 12, 1956, entitled "Soviet Advances Force U.S. Missile Pace," author David A. Anderton noted that the U.S. missile program had been altered abruptly. The cause for alarm was the repeated U.S.S.R test firing of an IRBM (900-mile range) with guidance. Interestingly, the success of the U.S.S.R. stimulated the addition of another layer of U.S. bureaucracy, with the appointment of a top new position called out in an organization chart as "Missile Czar" and placed laterally to the Secretary of Defense. By early 1957 the Missile Czar had been formalized as the "Special Assistant for Guided Missiles. (*AW*: February 25, 1957, p.99.) In August the Air Force conditionally accepted the Convair's Atlas, then designated "Atlas missile 1-A. (*Guided Missiles* : 1963, p.18.) In mid-November the Department of Defense transferred part of Camp Cooke, California, to the Air Force to create the first American ICBM base, Vandenberg AFB. (U.S. House of Representatives, Committee on Science and Astronautics: 1961, p. 27.)

In May 1957 Convair broke ground for a $41-million missile plant near La Jolla to handle the research, development and production of the SM-65 Atlas. Located in Sòrrento Canyon and named Convair-Astronautics, the plant was sited near an Air Force static test facility for the Atlas, also under construction. Convair-Astronautics also housed the new Convair Department of Scientific Research headed by Dr. Charles R. Critchfield. Earlier Convair work toward the Atlas had occurred at the company's San Diego Plant I. (*AW*: May 7 and July 23, 1956, p. 31 and 58.) Convair static-tested Atlas systems at the North American Aviation test site in the Santa Susana Mountains northwest of Los Angeles, at the Air Force Flight Test Center on Edwards Air Force Base in the

Southern California Mohave Desert (known as "Rocket Base" and constructed in 1950), at the Convair test site at Point Loma near La Jolla, at a second Convair test site in Sycamore Canyon northeast of San Diego, and at the Air Force Missile Test Center at Patrick AFB in Florida. (*AW*: April 23, May 14, August 6, November 19, December 2 and December 9. 1956, pp. 37-38, 59, 143-44, 34, 26-28, and 50-51.)

Simultaneously during 1957, construction began on the WS-107A Operational Base for the SM-65 at Vandenberg AFB. The Atlas ICBM facility featured two distinct components, a guidance station and a launch station. Planning and design for the guidance station was underway in early January, with planning and design for the launch station beginning in April. Construction proceeded during 1957-58. On December 17, 1957, the third launched Atlas missile sustained the first successful flight of about 600 miles from Cape Canaveral. (U.S. House of Representatives, Committee on Science and Astronautics: 1961, p.37.) Convair's Atlas, designated SM-65 in 1954, was renamed the WS-107A (Weapon System 107A). The Atlas WS-107A Operational Base (Atlas ABRES-A and MOD-1 Guidance) distinguished itself from the test-configured Atlas site at Cape Canaveral; Atlas at Vandenberg was to be an ICBM test location with development as an on-alert military site.

Guidance was an essential element of the Atlas missile system, with early and continued justifications for both radar command guidance and inertial guidance. Convair developed the Atlas missile first as a command guidance vehicle, supporting the choice through command guidance's greater accuracy and control. Convair had concentrated on guidance since 1948, developing its own command guidance system AZUSA. AZUSA was ultimately considered as a back-up command guidance system for the one selected by the U.S. government, General Electric's and Burroughs' MOD-1. (G.E. concentrated its guidance research and manufacture at its Missile Guidance Product Section within G.E.'s Heavy Military Equipment Department, Syracuse, New York, while the Burroughs computer equipment was developed at that company's Ballistic Missile Division, Paoli, Pennsylvania. The G.E. Missile Guidance Product Section was set up shortly after award of the 83-million dollar Atlas guidance contract in April 1957.) Both MOD-1 and AZUSA were constructed at Cape Canaveral, with MOD-1 providing radar command guidance and AZUSA providing impact prediction.

The MOD-1 guidance station at Cape Canaveral was completed and operational for use in Atlas testing by April 1958. (*AW*: April 28, 1958, pp. 74-81; February 9, 1959, pp. 65-73.) Counter-arguments began almost immediately for inertial guidance for the Atlas. Although command guidance did offer high accuracy (predicted to be between three and 10 times that of inertial guidance and functionally twice that of inertial guidance in 1960), it required a large spatial ground layout, could not guide salvos of missiles at the same time and was thought to be a possible security risk for enemy radar-jamming. Both the Thor IRBM and the Titan ICBM used inertial guidance and by early 1960 an all-inertial guidance Atlas had been successfully launched. (*AW*:

May 12, 1958, pp. 92-103, March 14, 1960, p. 35, April 4, 1960, p. 79, and May 2, 1960, pp. 159-62;*Guided Missiles* : 1963, p.18.)

At Vandenberg AFB the second Atlas complex, 65-2 (Atlas ABRES-B), continued to use radio command guidance, with the G.E. MOD-3. MOD-1 had evolved quickly into MOD-2 and MOD-3. The MOD-2 and MOD-3 guidance configurations used only two legs of the X layout required for MOD-1. (*AW*: February 25, 1963, pp. 61-62.) The first two military-use radio command guidance stations (MOD-1 and MOD-3) in the U.S. were built at Vandenberg AFB, with a third G.E. command guidance station constructed at Offutt AFB, Omaha, Nebraska, by November 1960.

Inertial guidance for Atlas was predicted to become as accurate as radio command guidance by 1965, and at Vandenberg the change to inertial guidance (American Bosch Arma Corporation: Arma inertial guidance) came with the Atlas E and F missiles. The Perkin-Elmer Corporation developed the complementary optical alignment system (theodolite and electro-collimator equipment) required by Atlas inertial guidance. (*AW*: September 12, 1960, pp. 85-87.) The third Atlas launch site on base, O.S.T.F. No. 1 (576 F), used inertial guidance for the launching of the Atlas E missile. Its training site, a semi-hard below-ground coffin launch site like O.S.T.F. No. 1, also relied on inertial guidance. Inertial guidance continued to be used for the Atlas silo launch series, O.S.T.F. No. 2 (576 G) and its training silos (576 D and E). (*AW*: September 25, 1961, pp. 179, 183.)

The evolution from the Atlas D missile, launched from the Atlas ABRES-A and Atlas ABRES-B pads, to the Atlas E and F missiles, launched from the 576 C, D, E, F and G pads, involved more than the change from radio command guidance to inertial guidance. As the missile itself was altered to a more sophisticated and accurate ICBM, its physical launch facilities changed from the soft gantry and above-ground coffin sites of the Atlas D (Atlas ABRES-A and ABRES-B) to the semi-hardened below-ground coffin sites of Atlas E (576 C and F). The final evolution was that of a fully hardened site, the below-ground silo planned for the Atlas F. First discussions of the "unitary concept" appeared in *Aviation Week* in May 1959. At that time the silo was labeled a "jump into the future." The unitary idea focused on a below-ground silo, with each silo requiring its own launch control center, or blockhouse. The intent was to build and operate silos at remote locations across the U.S. In mid-1959, the silo concept for the Atlas F left open its actual launch procedures. One interpretation planned for the Atlas F to be elevated to the surface of the silo for firing; a second interpretation planned for firing from the bottom of the silo. Artists' drawings for the first unitary silo illustrated a cylindrical silo distinct from its underground fuel tanks and launch control center (LCC). Personnel reached the LCC via a tunnel from the surface, but were connected to the silo only via cables and conduits. (Fig. 53) (*AW*: May 25, 1959, pp. 102.)

Aviation Week of September 14, 1959, announced that research and development work for the unitary concept had been initiated; the announcement closely followed the first successful operational firing of an Atlas missile from the

Atlas ABRES-A launch site (pad 2) at Vandenberg AFB on September 9. The Los Angeles District, Corps of Engineers, had planned to issue their call for bids to construct a silo at Vandenberg simultaneous with the launch. The bid call was delayed, however, due to unfinished plans and specifications. Bechtel Corporation had been hired to design the silo site, entitled an Operational Suitability Test Facility, or O.S.T. F. Bechtel's first signed drawings are dated August 1, 1959, for the 576 G facility. The job was thought to be a $750,000 job; by early 1960 silo costs per squadron (12 silos with LCCs) were running about 44 million, escalating the cost to approximately 3.66 million per silo. Early discussions of the silo inconsistently described it as of 145-to-164-foot depth, although from the August 1959 drawings forward silo depth was just under 182 feet. Completion time for construction of the first silo, 576 G, was to be 120 days, or four months. Government reports later noted that more than 30 months were required to build an Atlas silo. (*AW*: September 14, 1959, p. 27; March 7, 1960, p. 139; *Guided Missiles*: 1963, p. 31.)

By February 1960 a second set of artists' drawings for the Atlas underground silo appeared in *Aviation Week*. (Fig. 54) The renderings showed the design of the training and operational silos, with the LCC connected via tunnel to the silo itself. Interestingly, no above-ground access is illustrated, either via personnel tunnel to the silo or via tunnel or stairwell to the LCC. The O.S.T.F. (576 G) was a research and test silo, and as such was of unique design from that of the training and operational silo. Its silo had a fully separate personnel tunnel, while its LCC was not connected via tunnel to the silo. In addition, the O.S.T.F. included an instrumentation building in its earthen berm with the LCC to accommodate detailed systems' checkouts. Thus, the O.S.T.F. at Vandenberg was one of a kind, with its design not described in *Aviation Week*. The journal did note, however, that a full-scale mockup, above ground, was under construction at the Convair plant in San Diego in two sections. The mockup would allow experimentation with equipment placement on the interior levels of the 15-story silo before actual construction occurred at Vandenberg's O.S.T.F. and training silos, 576 G, D and E. (*AW*: February 22, 1960, pp. 54-55; June 20, 1960, p. 107.)

A final artists' rendering appeared in *Aviation Week* in September 1961. (Fig. 55) Illustrating only the training and operational silo and launch control center, the drawing did accurately portray the personnel tunnel connecting the silo and the LCC, with above-ground access shown through an ascending section of the tunnel above the LCC. This configuration resembles the original, as-built, entry via the stairwell to the O.S.T.F., 576 G, LCC. The 576 G entrance to the LCC was modified in 1961 and 1964 to a tunnel entry through an augmented earthen berm. The 1961 artists' rendering accurately shows a tunnel connecting the LCC and the silo, but again it should be noted that this arrangement was not that built for the O.S.T.F., 576 G. (*AW*: September 25, 1961, p. 147.)

Atlas F silo launch complexes were designed and built for Vandenberg AFB (California: 3), Shilling AFB (Kansas: 12), Lincoln AFB (Nebraska: 12), Altus AFB (Oklahoma: 12), Dyess AFB (Kansas: 12), Walker AFB (New Mexico: 12) and Plattsburgh AFB (New York: 12). Only one O.S.T.F., that of 576 G at Vandenberg, was constructed in the entire system. The inertially-guided Atlas F ICBM became operational, along with the Titan I ICBM, between April and December 1962. At Vandenberg, personnel used a unique test missile, named "Water Bird," to checkout the mechanics of silo launch in early 1962. Water Bird was an steel shell identical in size and shape to the Atlas F, filled with 28,000 gallons of water. The mock missile was lowered into the silo (presumably the 576 G facility) empty, then filled with water to the weight and distribution of a fueled Atlas F. The Water Bird tests were to ascertain working tolerances for the electrical and launch platform drives. (*Guided Missiles*: 1962, p. 28-29.)

The first Atlas F silo launch occurred at Vandenberg on August 1, 1962, from the 576 E site; the launch, nicknamed "His Nibs," was successful. A second Atlas F silo launch followed from the O.S.T.F., 576 G, on August 10, 1962; nicknamed "Crash Truck," the first launch from the 576 G site was reported a failure. Atlas F silos became operational during the following months at Shilling (September 9, 1962), Lincoln (September 15, 1962), Altus (October 9, 1962), and Dyess (November 15, 1962). A second launch from Vandenberg's 576 G site on November 14, 1962, nicknamed "Action Time," was reported as successful. (*AW*: February 25, 1963, p. 78.) The Atlas F training silo, 576 D, launched for the first time on March 15, 1963. A total of seven Atlas F launches occurred at the 576 G site. In addition to the two of August 1962, there was the launching of "Kendall Green" on March 21, 1963, that of "Hot Rum" on October 3, 1963, that of "Day Book" on December 18, 1963, that of "High Ball" on April 3, 1964, and that of "Pilot Light" on January 8, 1965. The 576 D and E sites launched two and four missiles, respectively. The second 576 E launch blew up on the pad, destroying most of the facility. The Atlas F ICBMs were taken off alert at all U.S. bases between early February and early April 1965. (Neufeld: 1990, pp. 234-35.) The 576th strategic missile squadron commanded the Atlas missiles at Vandenberg AFB. No launches have occurred at the 576 G site since 1965.

Bibliographical References

Books and Published/Printed Sources

Butowsky, Harry A., *Cape Canaveral Air Force Station* , National Historic Landmark, National Park Service, Division of History, Washington, D.C., January 24, 1983.

Chapman, John L., *Atlas. The Story of a Missile*, New York: Harper & Brothers, 1960.

Dames & Moore, Inc., *Historic Architectural and Engineering Survey Report. Atlas ABRES-A. Vandenberg Air Force Base, California*, Austin: Dames & Moore, Inc., March 26, 1993.

Dames & Moore, Inc., *Request for Determination of Eligibility. SLC-2W and SLC-2 Blockhouse Structures. Vandenberg Air Force Base, California*, Austin: Dames & Moore, Inc., October 2, 1991.

Guided Missiles Volume & Directory, Washington, D.C.: Government Data Publications, 1962.

Guided Missiles Volume & Directory, Washington, D.C.: Government Data Publications, 1963.

Kirkish, Alex N., *Draft Cultural Resources Survey and Effect Evaluation for the HAVE STARE Tracking and Imagery Radar System Project. Vandenberg Air Force Base, California*, Vandenberg Air Force Base: Environmental Management, September 6, 1990.

Martin, Thomas L. and Donald C. Latham, *Strategy for Survival*, Tucson: University of Arizona Press, 1963.

Neufeld, Jacob, *Ballistic Missiles in the United States Air Force, 1945-1960*, Washington, D.C.: Office of Air Force History, 1990.

Versar, Inc., *A Historical Significance Assessment and Effects Determination of Space Launch Complex 3. Vandenberg Air Force Base, California*, Columbia, Maryland: August 18, 1992.

U.S. House of Representatives, Committee on Science and Astronautics, *A Chronology of Missile and Astronautic Events*, Washington, D.C.: U.S. Government Printing Office, 1961.

Government Publications

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

National Park Service, *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, Washington, D.C.: U.S. Government Printing Office, 1991. (Reference to consideration of space launch complexes in "Properties that have Achieved Significance within the Last Fifty Years," p.41-43.)

National Park Service, *National Register Bulletin 22: Guidelines for Evaluating and Nominating Properties that have Achieved Significance within the Last Fifty Years*, Washington, D.C.: U.S. Government Printing Office, 1991.

United States Air Force, List of Atlas F launches from Vandenberg AFB, 1962-81. [Provided by Jeffrey Geiger, Base Historian, Vandenberg Air Force Base, August 20, 1993.]

United States Air Force, *Technical Manual/Organizational Maintenance. Missile Weapon System. Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579. Corrosion Control and Treatment*, December 15, 1962, changed May 15, 1964.

United States Air Force, *Technical Manual/Organizational Maintenance. Missile Weapon System. Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579. Missile Handling*, March 1, 1962, changed September 4, 1964.

Primary Source Articles from *Aviation Week and Space Technology* [listed chronologically]

"U.S. Missiles," v. 60, no. 11, March 15, 1954, p. 80.

"U.S. Missiles," v. 62, no. 10, March 14, 1955.

"Convair Creates Basic Research Organization under Critchfield," v. 64, no. 7, February 13, 1956.

"U.S. Missiles and Pilotless Aircraft," v. 64, no. 11, March 12, 1956, p. 217.

David A. Anderton, "Soviet Advances Force U.S. Missile Pace," v. 64, no. 11, March 12, 1956, pp. 98-103.

"Atlas Engine is Fired by Rocketdyne," v. 64, no. 17, April 23,1956, pp. 37-38.

"New Plant for Atlas," v. 64, no. 19, May 7, 1956, p. 31.

"Convair Fires Atlas ICBM Engine," v. 64, no. 20, May 14, 1956, p. 59.

"Plant Layout Settled for Atlas," v. 65, no. 4, July 23, 1956, p. 58.

"Ballistic Missile Chronology," v. 65, no. 6, August 6, 1956, p. 105.

"Edwards Rocket Base to Test Captive Ballistic Powerplants," v. 65, no. 6, August 6, 1956, pp. 143-144.

Evert Clark, "Convair will use Four Atlas Bases," v. 65, no. 21, November 19, 1956, p. 34.

"U.S. Missile Organization," v. 66, no. 8, February 25, 1957, p. 99.

"U.S. Missiles," v. 66, no. 8, February 25, 1957, pp. 224-25.

"Convair Missile Contracts Awarded," v. 66, no. 17, April 29, 1957, p. 33.

Irving Stone, "Human Factors Stressed in Atlas Plant," v. 66, no. 20, May 20, 1957, pp. 53-57.

Irving Stone, "Work Begins on First IRBM-ICBM Base," v. 66, no. 21, May 27, 1957, pp. 68-70.

"Atlas Test Stand Site at Pt. Loma, Calif.," v. 67, no. 22, December 2, 1957, p. 27.

"Static Facility Complete. Prepares Ballistic Missiles for Launching," v. 67, no. 23, December 9, 1957, pp. 50-51.

"USAF Reports Successful Atlas Launching," v. 67, no. 25, December 23, 1957, pp. 22-23.

"U.S. Missiles," v. 68, no. 9, March 3, 1958, pp. 195-96.

Richard Sweeney, "Value in Atlas Flight Data," v. 68, no. 10, March 17, 1958, p. 20.

"Support Complex Surrounds Atlas Missile Launch Site," v. 68, no. 11, March 17, 1958, pp. 22-23.

"Atlas Transporter Positions Missile in Service Tower," v. 68, no. 13, March 31, 1958, pp. 28-29.

Philip J. Klass, "How Command Guidance Controls Atlas," v. 68, no. 17, April 28, 1958, pp. 74-81, cover.

"Optical Tooling Devices Check Missile for Correct Alignment," v. 68, no. 18, May 5, 1958, pp. 73-77.

Richard L. Sweeney, "Missile Countdown is Complex Procedure," v. 68, no. 18, May 5, 1958, pp. 64-68.

Philip J. Klass, "Titan Guidance Reliable, Accurate," v. 68, no. 19, May 12, 1958, pp. 92-103.

"GE Atlas Guidance Jamming Danger Cut," v. 68, no. 26, June 30, 1958, p. 48.

"Guidance Changes Made on Atlas, Titan," v. 69, no. 4, July 28, 1958, p. 22.

Richard Sweeney, "AZUSA is Precise Aid for Range Safety," v. 70, no. 6, February 9, 1959, pp. 65-73.

"Atlas' Flexibility Permits Varied Bases," v. 70, no. 21, May 25, 1959, pp. 102-11.

Richard Sweeney, "Integrated Support Expedites Launching," v. 70, no. 22, June 1, 1959, pp. 70-80.

"Radar Tracker Developed for Atlas ICBM Squadrons," v. 70, no. 24, June 15, 1959, p. 95.

Evert Clark, "Atlas Fuel Flow Problems Delay Operational Capability 60 Days," v. 71, no. 1, July 6, 1959, p. 27.

"Azusa Mark II Missile Impact Predictor Equipment Improved," v. 71, no. 4, July 27, 1959, p. 81.

"Atlas Near Operational Status," v. 71, no. 9, August 31, 1959, p. 27.

"All-SAC Crew Fires Initial Atlas ICBM," v. 71, no. 11, September 14, 1959, p. 32.

"Bids Sought to Build Atlas Silo," v. 71, no. 11, September 14, 1959, p. 27.

William S. Reed, "Vandenberg Trains USAF Missile Crews," v. 71, no. 17, October 26, 1959, pp. 69-87.

"USAF Plans Six Hardened Atlas Sites," v. 72, no. 8, February 22, 1960, p. 54-55.

Russell Hawkes, "Missile Grows as Weapon, Political Issue," v. 72, no. 10, March 7, 1960, pp. 125-31.

Richard Sweeney, "Ground Support Stresses Silos, Hard Site," v. 72, no. 10, March 7, 1960, pp. 135-39.

"U.S. Missiles," March 7, 1960, v. 72, no. 10, p. 179 (foldout).

"Atlas, Titan, Polaris Tests," v. 72, no. 11, March 14, 1960, p. 35.

"Arma Guidance Gets First Airbourne Test [for Atlas 42-D]," v. 72, no. 14, April 4, 1960, p. 79.

"Atlas Ground Support Equipment Installed," v. 72, no. 14, April 4, 1960, p. 70.

Michael Yaffee, "Missile Support Becomes Prime Cost Item," v. 72, no. 14, April 4, 1960, pp. 65-70.

Philip J. Klass, "ICBM Guidance Techniques Compared," v. 72, no. 18, May 2, 1960, pp. 159-62.

"SAC Cuts ICBM Crews, Maintenance," v. 72, no. 25, June 20, 1960, pp. 110-12.

"SAC Shapes Missile Force for Survival, Fast Reaction," v. 72, no. 25, June 20, 1960, pp. 104-109.

"Atlas Launched with GE RVX-2A," v. 73, no. 8, August 22, 1960, p. 37.

"Atlas Guidance Aligned Optically," v. 73, no. 11, September 12, 1960, pp. 85-87.

"Third Atlas Radio Guidance Site Now Operational," v. 73, no. 21, November 21, 1960, p. 27.

"U.S. Missiles," March 13, 1961, v. 74, no. 11, pp. 185-86.

"Ranges Exceeding 10,000 Miles Predicted for Atlas-E ICBM," v. 72, no. 12, March 21, 1961, p. 34.

"AF Group Prepares, Equips ICBM Sites," v. 75, no. 13, September 25, 1961, pp. 150-59.

"Atlas ICBM Geared to Total Deployment," v. 75, no. 13, September 25, 1961, pp. 143-49.

"Vandenberg Coordinates Ballistic Effort," v. 75, no. 13, September 25, 1961, pp. 179-183.

"Atlas F Launched from Prototype Silo," v.77, no. 6, August 6, 1962, p. 35.

"Advanced Missile Re-entry Flight Tests Planned," v. 77, no. 24, December 10, 1962, pp. 27.

George Alexander, "Atlas Accuracy Improves as Test Program is Completed," v. 78, no. 28, February 25, 1963, pp. 54-78.

Additional Primary Source Articles

T. J. Hayes, III, "ICBM Site Construction," *The Military Engineer*, v. 54, no. 362, November-December 1962, pp. 399-403.

Drawings and Photograph Files [listed chronologically]

Bechtel Corporation, "WS 107 A-1 OSTF (SILO). Vandenberg AFB California."

"Launch Complex. Excavation Plan & Sections," drw. no. 3199-1-S-1, August 1, 1959.

"Launch Complex. General Arrangement. Plans & Elevations," drw. no. 3199-1-S-2, August 1, 1959.

"Launch Complex. Miscellaneous Concrete Details," drw. no. 3199-1-S-6, August 1, 1959.

"Launch Complex. Silo Reinforcing. Sections & Details Sheet 1," drw. no. 3199-1-S-3, August 1, 1959.

"Launch Complex. Silo Reinforcing. Sections & Details Sheet 1," drw. no. 3199-1-S-17, August 1, 1959.

"Launch Complex. Launching Silo. Personnel Entrance Section & Details," drw. no. 3199-1-S-7, August 29, 1959.

"Launch Complex. Launching Silo. Personnel Entrance Section & Details," drw. no. 3199-1-S-13, August 29, 1959.

"Launch Complex. U.G. Land Lines & Conduit Plan," drw. no. 3199-3-E-1, October 1, 1959.

"Launch Complex. Launching Silo. Propellant Loading System Piping. Level 8 Plan. El 866'-0" to 849'-0"," drw. no. 3199-1-M-3, November 1, 1959.

"Launch Complex. Communications Manhole and TV Supports," drw. no. 3199-3-C-14, November 14, 1959.

"Launch Complex. Grading & Paving Plan," drw. no. 3199-3-C-4, November 14, 1959.

"Launch Complex. Sentry Booth. Details," drw. no. 3199-3-A-1, November 14, 1959.

"Launch Complex. Site Plan," drw. no. 3199-3-C-1, November 14, 1959.

"Launch Complex. Launch Control Center. Test Suspension System," drw. no. 3199-2-S-16, November 20, 1959.

"Launch Complex. Instrumentation Building. Floor Plan," drw. no. 3199-9-A-1, November 24, 1959.

"Launch Complex. Launch Control Center. Floor Plans," drw. no. 3199-2-A-2, November 24, 1959.

"Launch Complex. Launch Control Center. Schedules & Gen. Notes," drw. no. 3199-2-A-1, November 24, 1959.

"Launch Complex. Launch Control Center. Section & Details," drw. no. 3199-2-A-3, November 24, 1959.

"Launch Complex. Utility Building. Elevations & Fnd. Plan," drw. no. 3199-8-A-2, November 24, 1959.

"Launch Complex. Launching Silo. H.V. & A.C. Equip. & Ductwork. Plan at Level 4," drw. no. 3199-1-M-72, December 1, 1959.

"Launch Complex. Launching Silo. H.V. & A.C. Equip. & Ductwork. Plan Below Level 8," drw. no. 3199-1-M-82, December 1, 1959.

"Launch Complex. Launching Silo. H.V. & A.C. Facility Piping. Plan at Level 6," drw. no. 3199-1-M-92, December 1, 1959.

"Launch Complex. Launching Silo. Schedules & Details," drw. no. 3199-1-A-21, December 1, 1959.

"Launch Complex. Launching Silo. Spiral Stairway & Generator Enclosure," drw. no. 3199-1-A-20, December 6, 1959.

"Launch Complex. Silo Crib. Grating Plans & Details Sheet 4," drw. no. 3199-1-S-30, December 17, 1959.

"Off-Site Utilities. General Plan," drw. no. 3199-4-C-1, December 30, 1959.

"Launch Complex. Silo to L.C.C. Interconnecting Utilities," drw. no. 3199-3-C-15, December 31, 1959.

"Launch Complex. Launching Silo. H.V. & A.C. Equip. & Ductwork. Plan at Level 5," drw. no. 3199-1-M-73, January 3, 1960.

Bechtel Corporation, "WS 107 A-1 Operational Base. Unitary Silo. Launching Silo. General Arrangement. Plan and Section," drw. no. AFBMD-1-A-22.3, January 8, 1960.

Atlas 576 G: As-Builts and T.O.s
Vandenberg AFB, Lompoc, California

Figure 7: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Excavation Plan & Sections," drw. no. 3199-1-S-1, August 1, 1959.

Figure 8: Bechtel Corporation, "WS 107 A-1 Operational Base. Unitary Silo. Launching Silo. General Arrangement. Plan and Section," drw. no. AFBMD-1-A-22.3, January 8, 1960.

Figure 9: USAF, General Dynamics, Convair, "Silo and Launch Control Center," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576 D, E, 577, 578, 579, Corrosion Control and Treatment*, May 15, 1964.

Figure 10: Bechtel Corporation, "WS 107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Launching Silo. P.L.S. Vessels & Prefabs. Location & Orientation," drw. no. 3199-1-M-113, January 10, 1960.

Figure 11: USAF, General Dynamics, Convair, "Launcher Platform," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Corrosion Control and Treatment*, May 15, 1964.

Figure 12: USAF, General Dynamics, Convair, "Maintenance Platform," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Corrosion Control and Treatment*, May 15, 1964.

Figure 13: Bechtel Corporation, "WS 107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Launching Silo. H.V. & A.C. Equip. & Ductwork. Plan at Level 5," drw. no. 3199-1-M-73, January 3, 1960.

Figure 14: Bechtel Corporation, "WS 107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Launching Silo. H.V. & A.C. Quip. & Ductwork. Plan at Level 4," drw. no. 3199-1-M-72, December 1, 1959.

Figure 15: USAF, General Dynamics, Convair, "Level Three," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Corrosion Control and Treatment*, May 15, 1964.

Figure 16: USAF, General Dynamics, Convair, "Level Two," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Corrosion Control and Treatment*, May 15, 1964.

Figure 17: USAF, General Dynamics, Convair, "Level One," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Corrosion Control and Treatment*, May 15, 1964.

Figure 18: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Silo to L.C.C. Interconnecting Utilities," drw. no. 3199-3-C-15, December 31, 1959.

Figure 19: USAF, General Dynamics, Convair, "Position of Guided Missile Semitrailer, Missile Erector, and Semitrailer Mounted Pneumatic Test Set in Relation to Silo," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Missile Handling*, September 4, 1964.

Figure 20: USAF, General Dynamics, Convair, "Guided Missile Semitrailer," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Missile Handling*, September 4, 1964.

Figure 21: USAF, General Dynamics, Convair, "Trailer Mounted Guided Missile Erector," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Missile Handling*, September 4, 1964.

Figure 22: Bechtel Corporation, "WS 107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Launching Silo. Personnel Entrance Section & Details," drw. no. 3199-1-S-13, August 29, 1959.

Figure 23: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Launch Control Center. Section & Details," drw. no. 3199-2-A-3, November 24, 1959.

Figure 24: USAF, General Dynamics, Convair, "Launch Control Center," *T.O.: Squadron Complexes OSTF-2, 550. 551, 556, 576D, E, 577, 578, 579, Corrosion Control and Treatment*, May 15, 1964.

Figure 25: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Launch Control Center. Floor Plans," drw. no. 3199-2-A-2, November 24, 1959.

Figure 26: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Instrumentation Building. Floor Plan," drw. no. 3199-9-A-1, November 24, 1959.

Figure 27: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Grading & Paving Plan," drw. no. 3199-3-C-4, November 14, 1959.

Figure 28: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Plot Plan," drw. no. 3705-3-C-1, April 17, 1961.

Figure 29: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Utility Building. Elevations & Fnd. Plan," drw. no. 3199-8-A-2, November 24, 1959.

Figure 30: Strategic Air Command, "Vandenberg Air Force Base, California. Replace Launch Support Facility OSTF II (576 G). Plot Plan, Details & Sections," drw. no. 138-4, January 7, 1964.

Figure 31: Strategic Air Command, "Vandenberg Air Force Base, California. Repair Erosion & Drainage Missile Sites. 65 OSTF #2. Sprigging, Seeding & Tree Planting," drw. no. 12-2, January 26, 1962.

Figure 32: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. U.G. Land Lines & Conduit Plan," drw. no. 3199-3-E-1, October 1, 1959.

Figure 33: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. General Arrangement. Plans & Elevations," drw. no. 3199-1-S-2, August 1, 1959.

Figure 34: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Firex System. Site Location & Piping Plan at Grade," drw. no. 3199-5-M-2, October 26, 1960.

Figure 35: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Firex System. Pumping Sta. Piping Plan & Sections," drw. no. 3199-5-M-3, October 14, 1960.

Figure 36: Bechtel Corporation, "WS 107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Firex System. Plot Plan, Legend & Symbols," drw. no. 3199-5-E-1, November 18, 1960.

Figure 37: Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California. I.R.S.S. Checkout Facilities. Plan & Details Sheet 2," drw. no. 3865-3-C-2, August 23, 1961.

Figure 38: USAF, General Dynamics, Convair, "Pneumatic Test Semitrailer," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D, E, 577, 578, 579, Missile Handling*, September 4, 1964.

Figure 39: USAF, General Dynamics, Convair, "Pneumatic Test Semitrailer at Silo," *T.O.: Squadron Complexes OSTF-2, 550, 551, 556, 576D,E, 577, 578, 579, Missile Handling*, September 4, 1964.

Figure 40: Bechtel Corporation, "WS 107 A-1 65-T2 (SILO). Vandenberg AFB California. Launch Complex. Firex System. Site D. Plot Plan, Legend & Symbols," drw. no. 576-D-5-E-1, November 18, 1960.

Bechtel Corporation, "WS 107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Launching Silo. P.L.S. Vessels & Prefabs. Location & Orientation," drw. no. 3199-1-M-113, January 10, 1960.

Bechtel Corporation, "WS-107 A-1 65-T2 (SILO). Vandenberg AFB California. Launch Complex. Excavation Plan & Sections," drw. no. 576-X3-C-20, March 29, 1960.

Bechtel Corporation, "WS 107 A-1 OSTF (SILO). Vandenberg AFB California. Launch Complex. Launching Silo. Missile Area Enclosure Sht. 1," drw. no. 3199-1-A-19, April 2, 1960.

Bechtel Corporation, "WS-107 A-1 OSTF-2. Vandenberg AFB California. Lompoc-Casmalia-OSTF Road. Vicinity Map," drw. no. 3199-48-C-1, June 30, 1960.

Bechtel Corporation, "WS-107 A-1 65-T2 (SILO). Vandenberg AFB California."

"Launch Complex. Communications Manhole and Sight Tube End Cap Details," drw. no. 576-3-C-3, August 16, 1960. [Reference for sight tube end cap for OSTF No. 2; the components were designed identically.]

"Launch Complex. Firex System. Site E. Plot Plan, Legend & Symbols," drw. no. 576-D-5-E-1, November 18, 1960.

"Launch Complex. Firex System. Site E. Plot Plan, Legend & Symbols," drw. no. 576-E-5-E-9, November 18, 1960.

Bechtel Corporation, "WS-107 A-1 OSTF (SILO). Vandenberg AFB California."

"Launch Complex. Firex System. Pumping Sta. Piping Plan & Sections," drw. no. 3199-5-M-3, October 14, 1960.

"Launch Complex. Firex System. 45,000 Gal. Storage Tank," drw. no. 3199-5-M-8, October 22, 1960.

"Launch Complex. Firex System. Site Location & Piping Plan at Grade," drw. no. 3199-5-M-2, October 26, 1960.

"Launch Complex. Firex System. Plot Plan, Legend & Systems," drw. no. 3199-5-E-1, November 10, 1960.

"Launch Complex. Launch Control Center. Earthwork & Grading Plan," drw. no. 3705-3-C-2, April 5, 1961.

"Launch Complex. Launch Control Center. Earthwork & Paving," drw. no. 3705-3-C-3, April 8, 1961.

"Launch Complex. Instrumentation Building. Auxiliary Roof Framing," drw. no. 3705-9-S-1, April 15, 1961.

"Launch Complex. Plot Plan," drw. no. 3705-3-C-1, April 17, 1961.

"I.R.S.S. Checkout Facilities. Plan & Details Sheet 2," drw. no. 3865-3-C-2, August 23, 1961.

Strategic Air Command, "Vandenberg Air Force Base, California."

"Repair Erosion & Drainage. Missile Sites. 576 E Complex. Sprigging, Seeding & Tree Planting, Details," drw. no. 12-2, sheet 10 of 21, January 26, 1962.

"Repair Erosion & Drainage. Missile Sites. 65 OSTF #2. Sprigging, Seeding & Tree Planting," drw. no. 12-2, sheet 11 of 21, January 26, 1962.

"Alter Training & Storage Building 576-D. Architectural," drw. no. 129-2, February 23, 1962.

"Replace Launch Support Facility. OSTF II (576 G). Plot Plan, Details & Sections," drw. no. 138-4, January 7, 1964.

"Extend Entrance LCC 576 G. Plot Plan & Details," drw. no. 135-5, August 28, 1964.

"Modifications to Bldg. 1930," drw. no. VAB-138-4/5a, June 26, 1966.

Interviews

Karen J. Weitze with Jeffrey Geiger, Base Historian, Vandenberg Air Force Base, August 19, 1993.

Karen J. Weitze with Sergeant Jay Pritchard, Atlas 576 G, August 17, 19 and 20, 1993.

Geographical Data

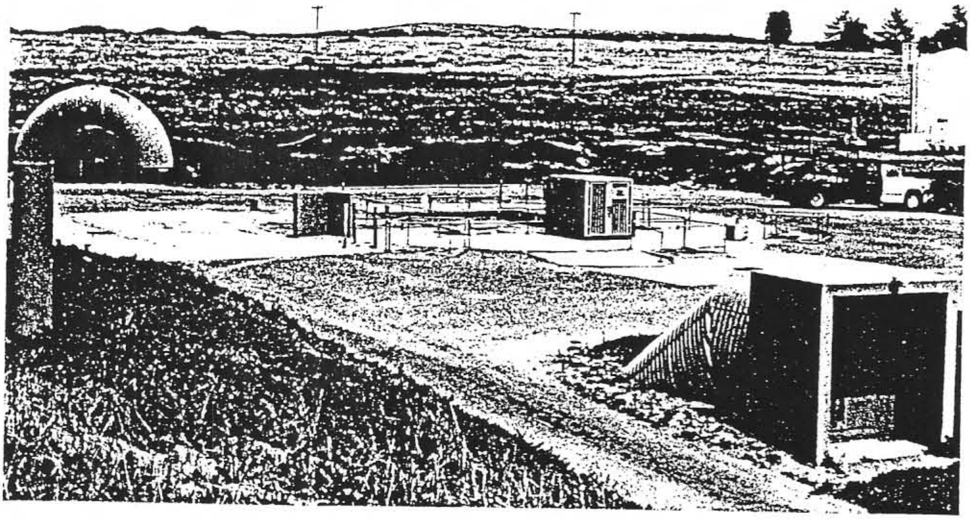
Quadrangle name: Surf

Verbal boundary description:

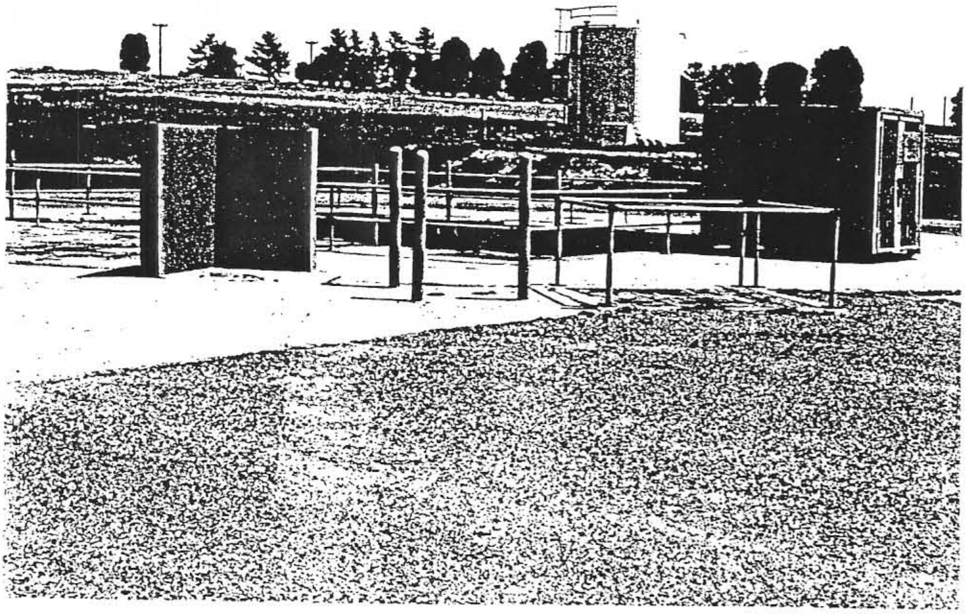
The boundary for Atlas 576 G facility immediately circumscribes the 32 contributing and non-contributing components of the launch site, within and outside the security fence for the property inclusive of OSTF Road to its juncture with El Rancho Road.

Prepared By

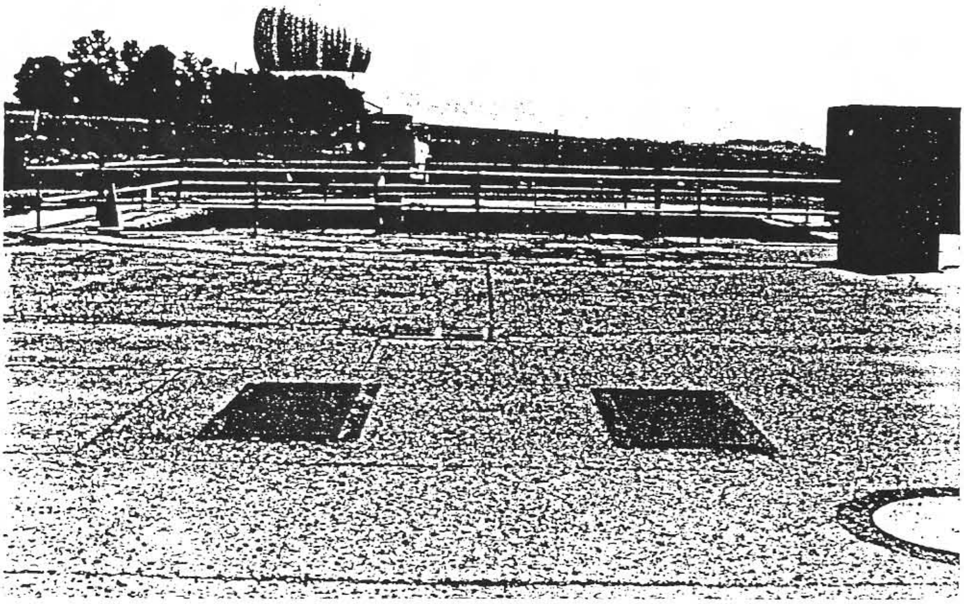
name/title: Karen J. Weitze
organization: Dames & Moore
street & number: 8310 Capital of Texas Highway North
city: Austin
telephone: (512)346-9891
date: September 20, 1993
state: Texas 78731



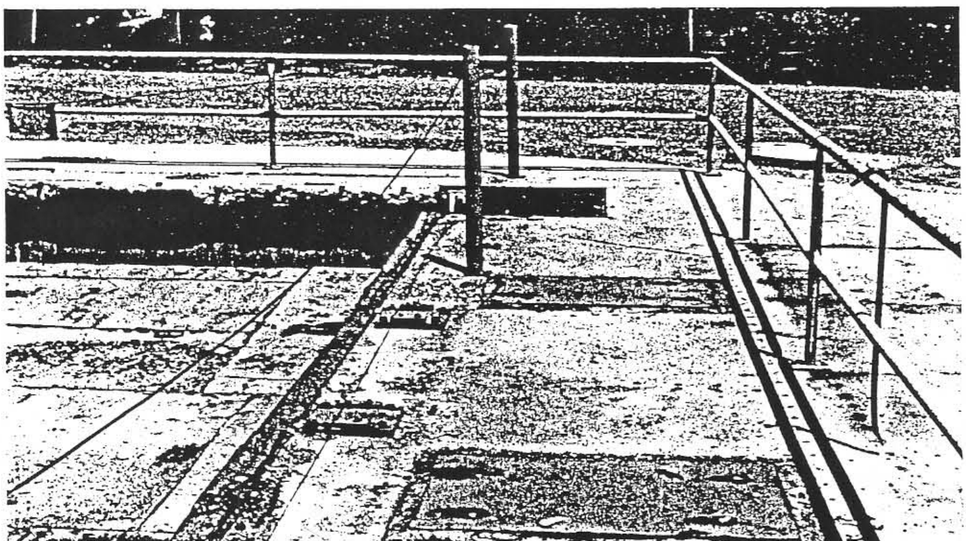
Pl 1: Silo, catch basin, middleground; personnel entrance tunnel foreground right; air intake vent, foreground left; water storage tank and firex pump, background, right. Looking east. (Weitze: 1993)



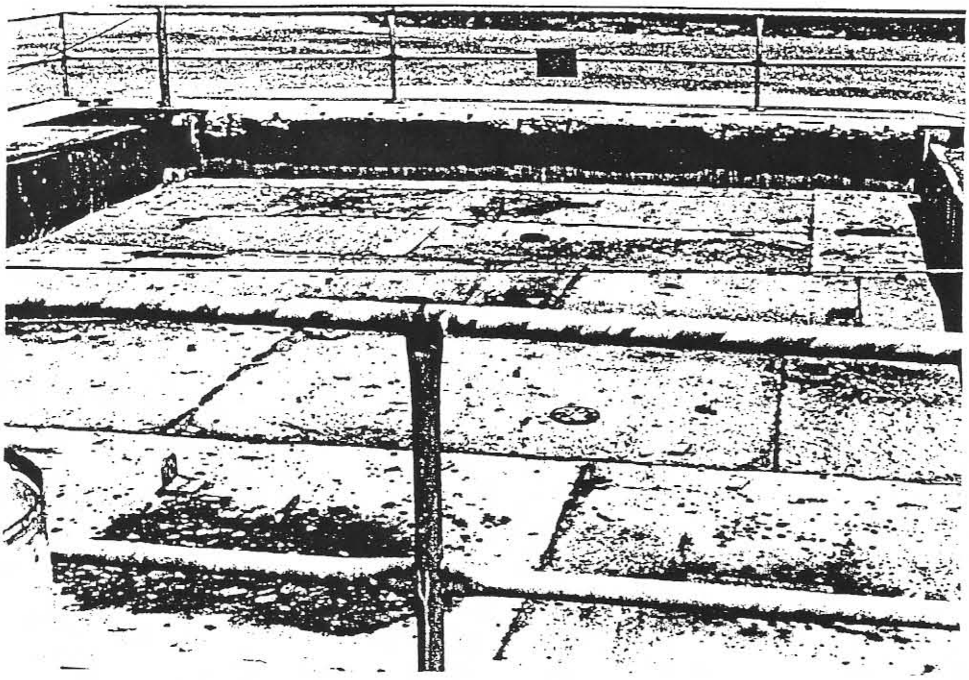
Pl 2: Silo, middleground; blast wall, guard posts, ventilation shaft (exhaust), middleground; water storage tank and firex pump, background. Looking southeast. (Weitze: 1993)



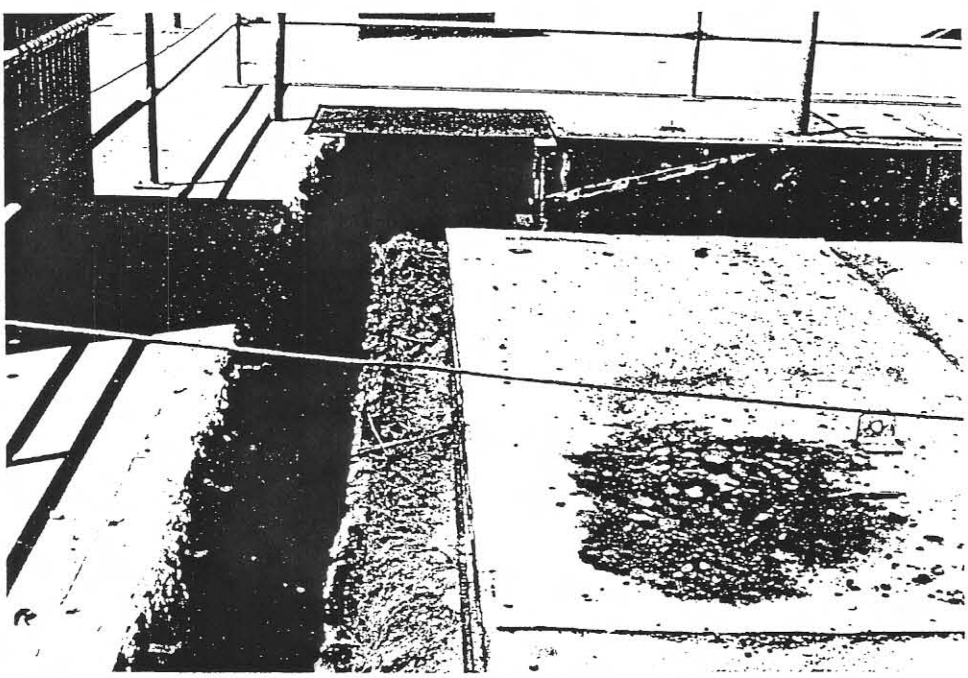
Pl 3: Silo, middleground; mounting plates for guided missile semitrailer, foreground; windbreak and radome at 576 D, background left. Looking southeast. (Weitze: 1993)



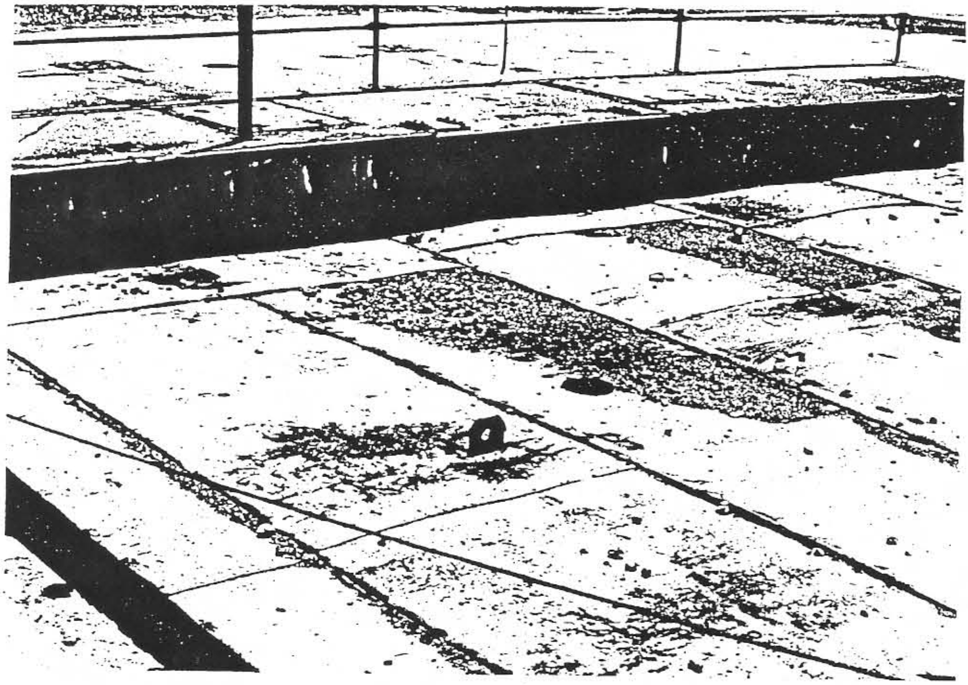
Pl 4: Silo: missile erector mounting plates, right; silo door edge, left; silo door corner hinge mount, background. Looking northeast. (Weitze: 1993)



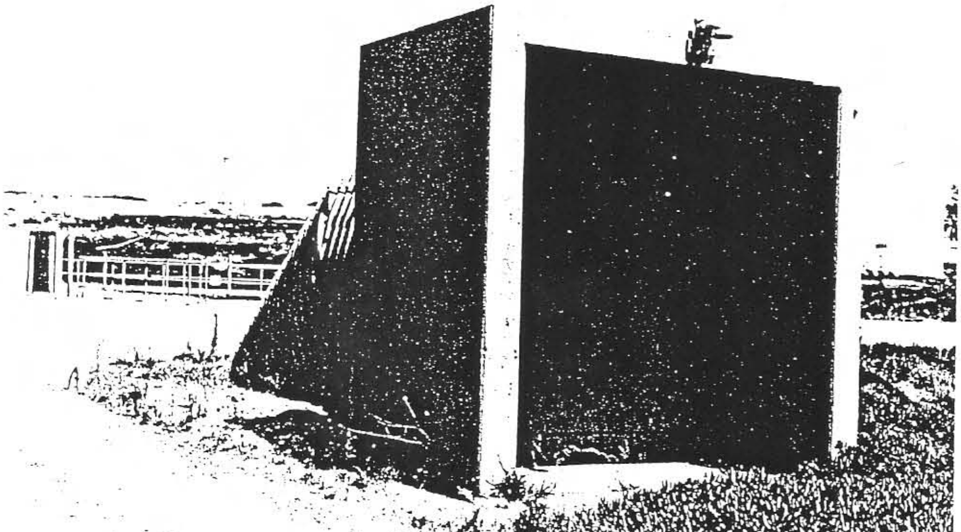
Pl 5: Silo: parameters of silo doors (missile launch storage cavity). Looking east. (Weitze: 1993)



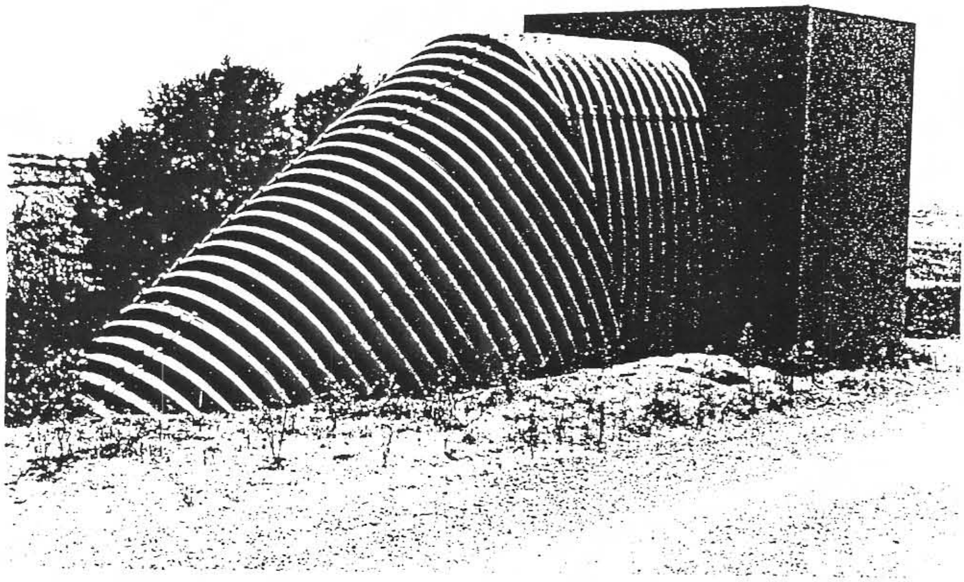
Pl 6: Silo: silo door hinge. Looking northwest. (Weitze: 1993)



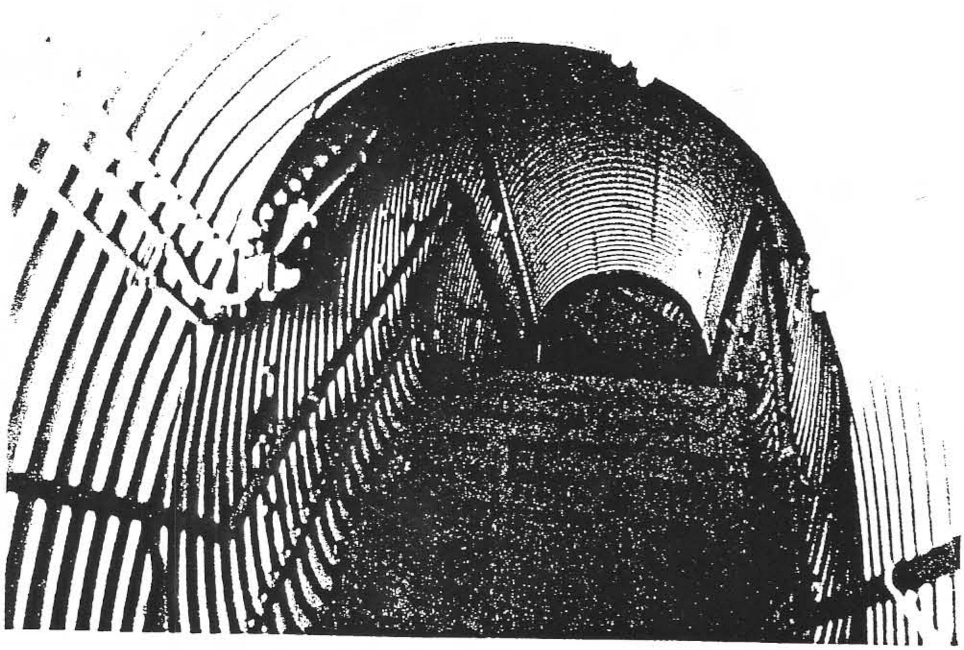
Pl 7: Silo: parameters of silo doors (missile launch cavity). Looking south. (Weitze: 1993)



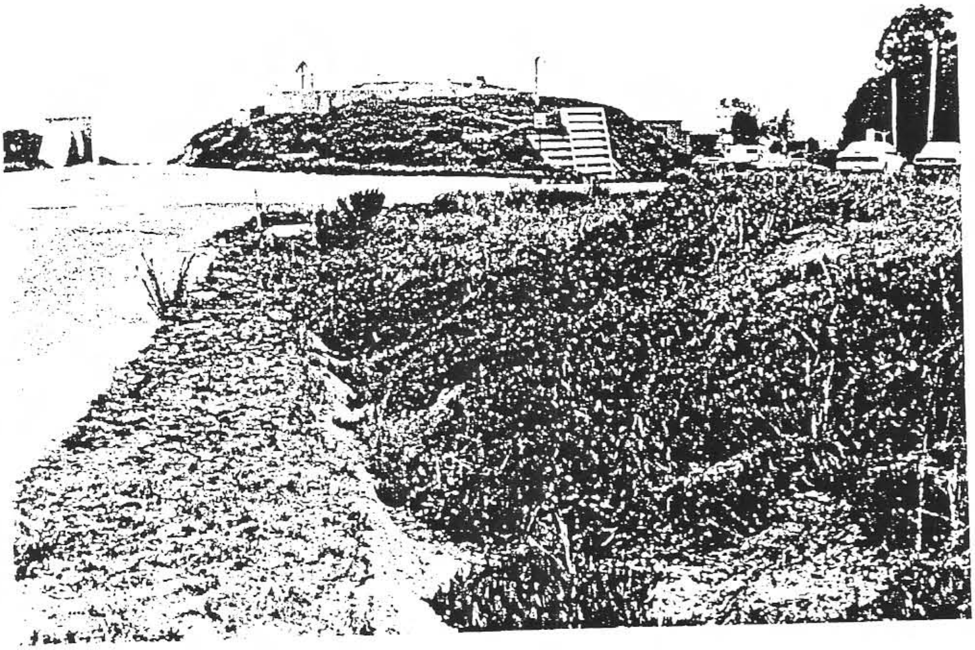
Pl 8: Personnel tunnel entrance. Looking east. (Weitze: 1993)



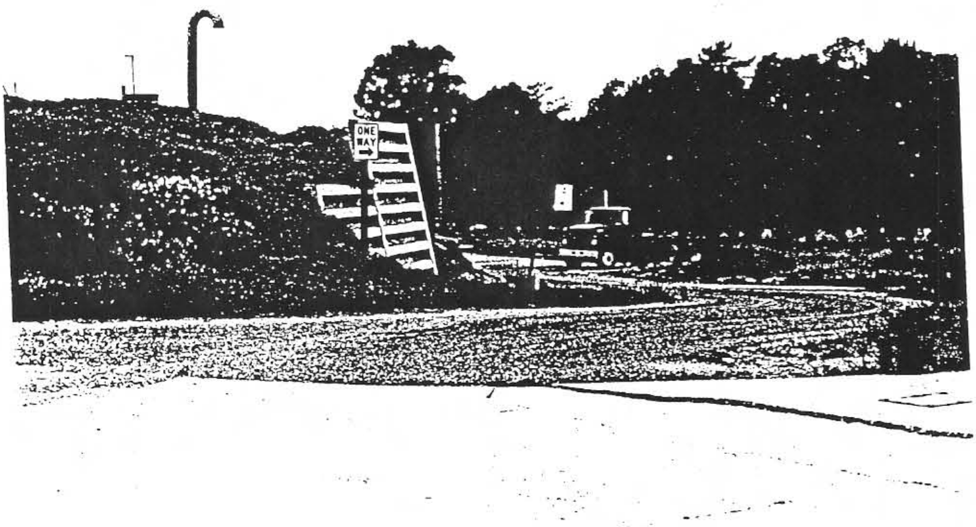
Pl 9: Personnel tunnel entrance. Looking south/southwest. (Weitze: 1993)



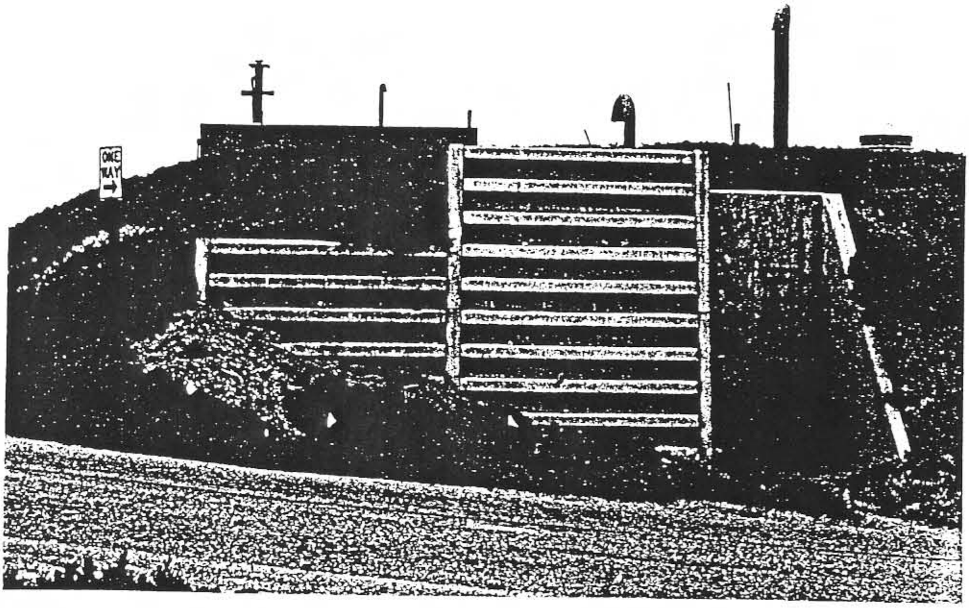
Pl 10: Personnel tunnel entrance. Interior from near ground surface looking into the tunnel. (Weitze: 1993)



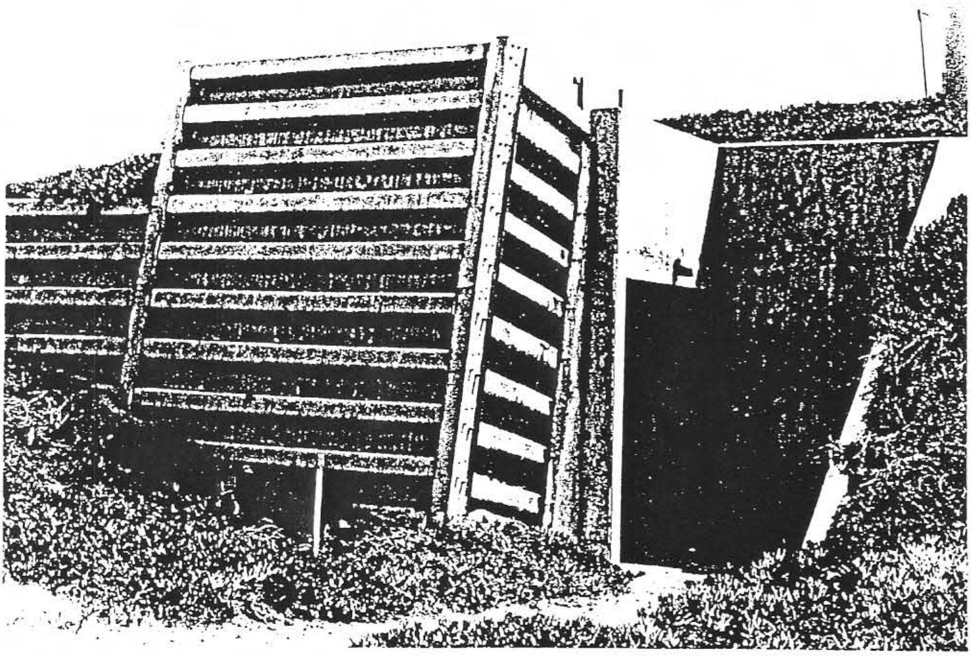
Pl 11: Earthen berm covering launch control center; personnel entrance tunnel left; OSTF Road ditch, foreground. Looking west/ southwest. (Weitze: 1993)



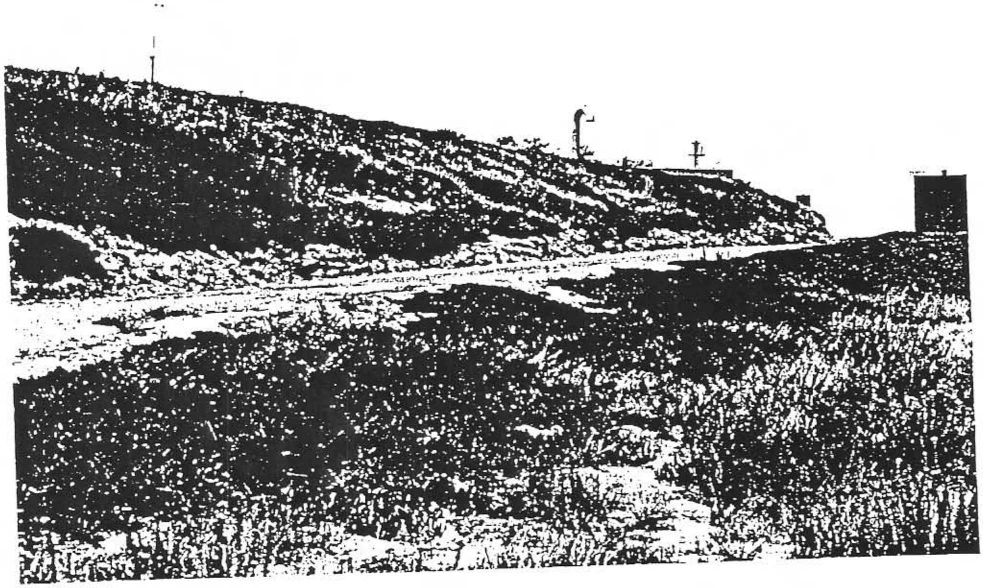
Pl 12: Launch control center; air exhaust vent; windbreak, right. Looking west. (Weitze: 1993)



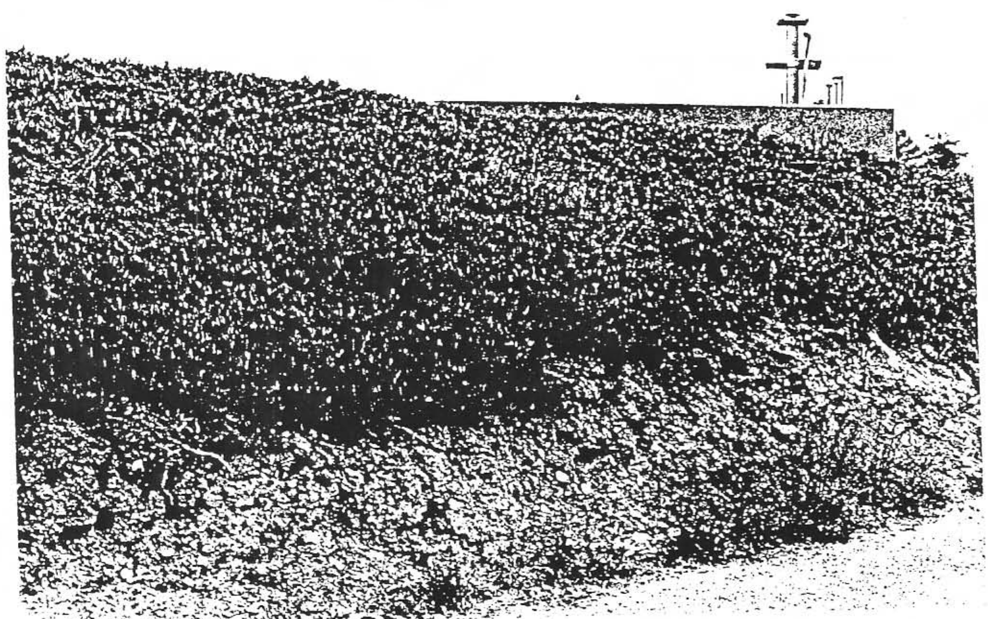
Pl 13: Launch control center; entrance tunnel extension. Background: stairwell above berm; air intake and exhaust vents, escape hatch. Looking south. (Weitze: 1993)



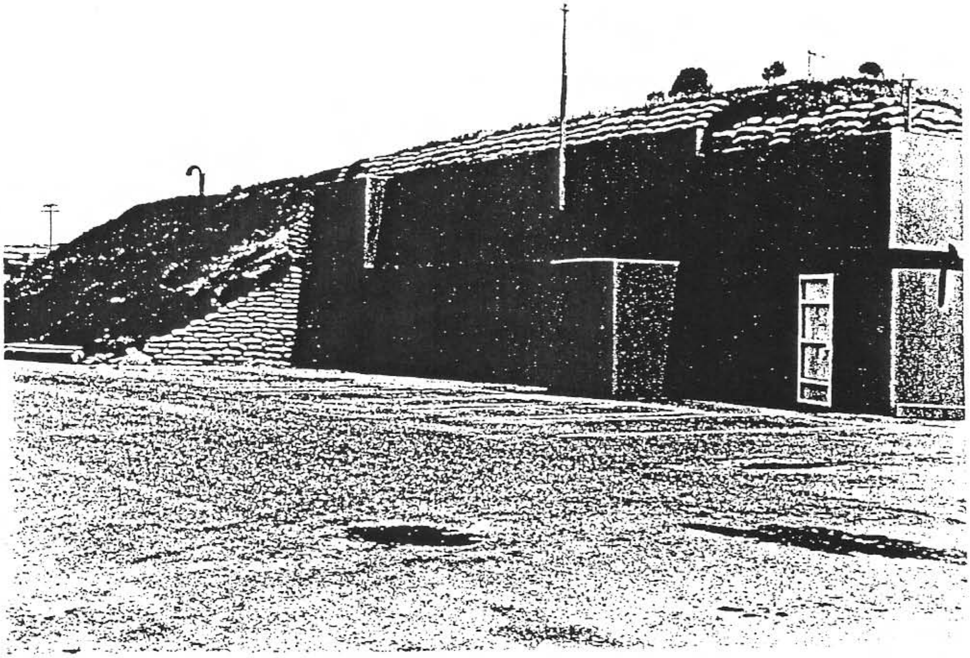
Pl 14: Launch control center; entrance tunnel extension. Looking south. (Weitze: 1993)



Pl 15: Earthen berm covering launch control center. Right: air intake vent; stairwell above berm; personnel entrance tunnel. Looking north. (Weitze: 1993)

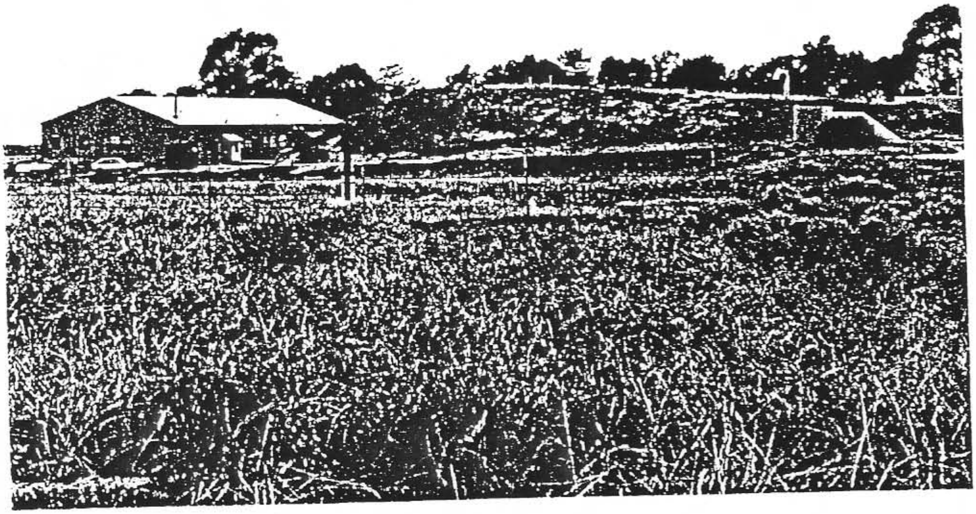


Pl 16: Earthen berm covering launch control center; stairwell above berm. Looking north. (Weitze: 1993)

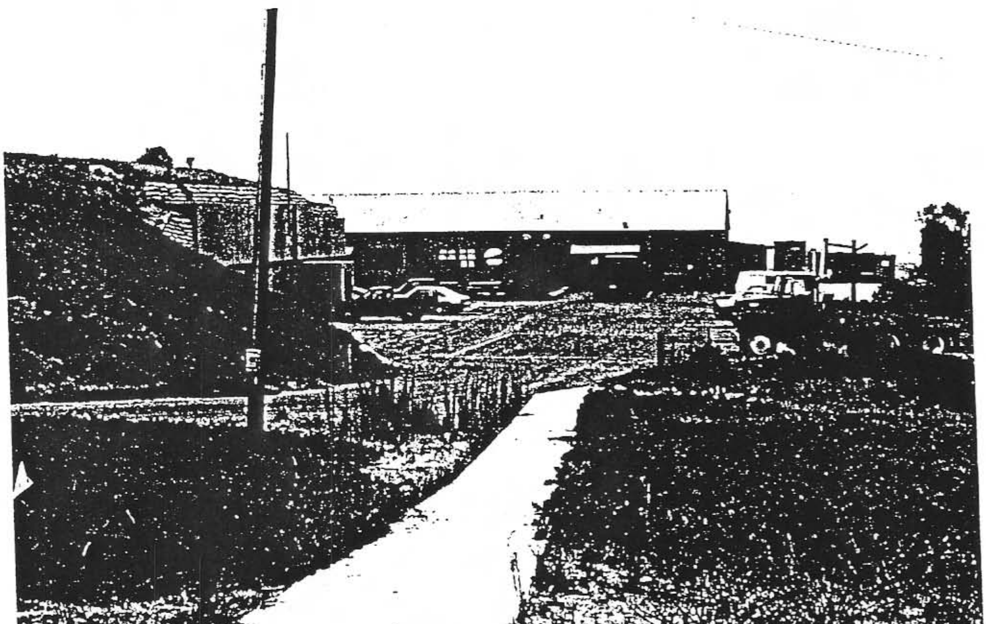


Pl 17: Instrumentation Building. Looking east. (Weitze: 1993)

Pl 18: Instrumentation Building. Looking east/southeast. (Weitze: 1993)

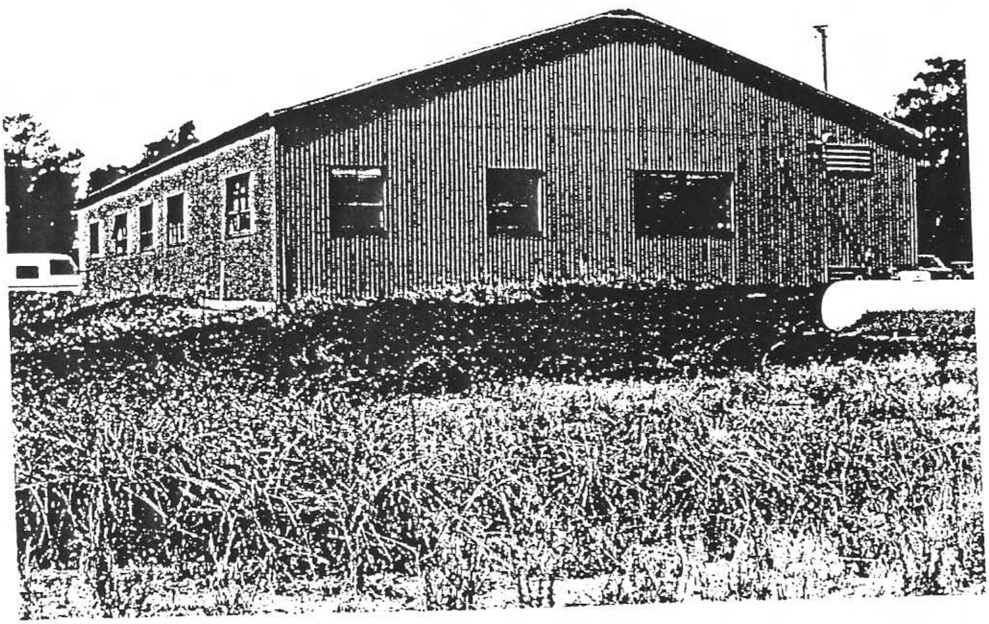


Pl 19: Earthen berm; utility building, left; septic tank, far left; personnel entrance tunnel, right. Looking northwest. (Weitze: 1993)

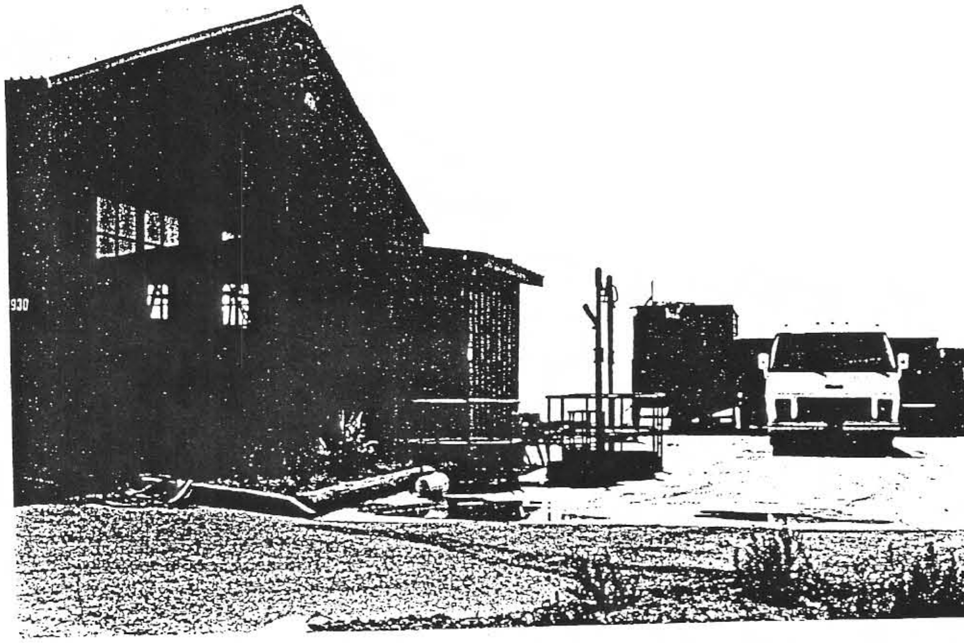


Pl 20: Utility building; instrumentation building and earthen berm, left. Looking southwest. (Weitze: 1993)

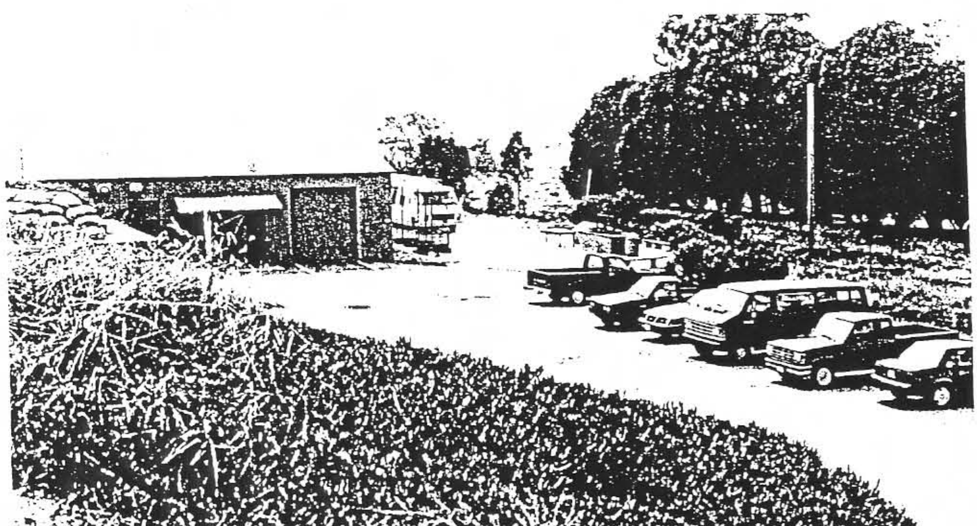
Pl 21: Utility building. Looking west. (Weitze: 1993)



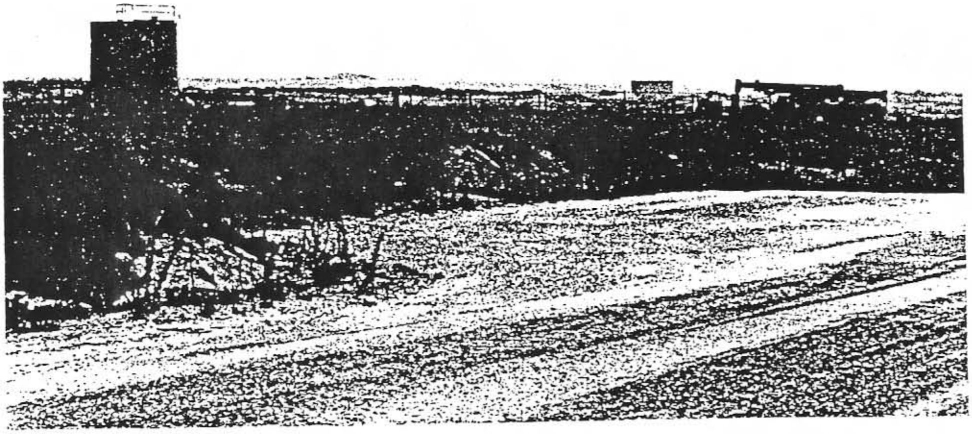
Pl 22: Utility building; septic tank, right. Looking northwest. (Weitze: 1993)



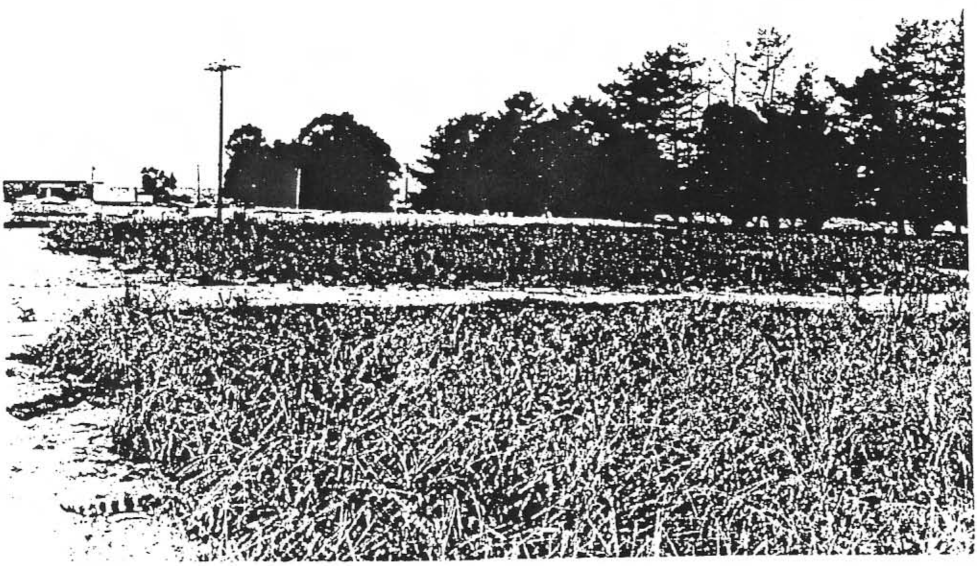
Pl 23: Prefabricated steel building, foundation; utility building with shed addition, left. Looking southwest. (Weitze: 1993)



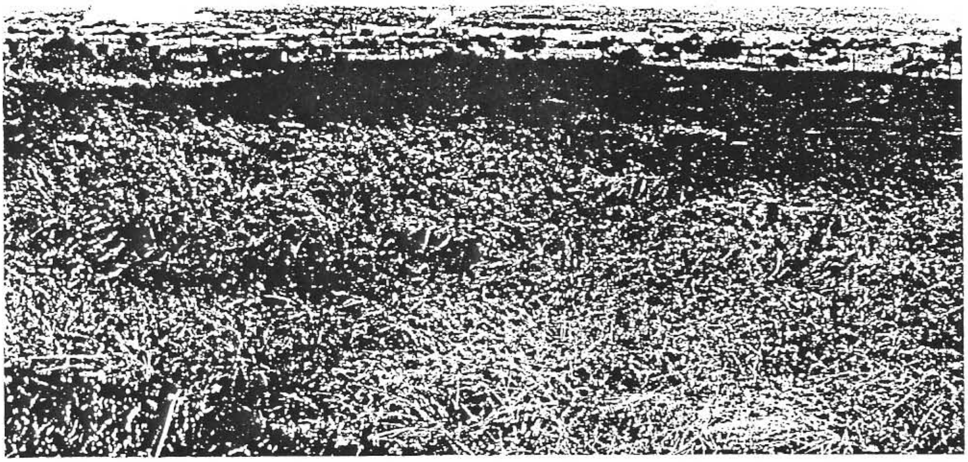
Pl 24: Prefabricated steel building, foundation, right; utility building, left; launch control center, berm with communications manhole, foreground. Looking west. (Weitze: 1993)



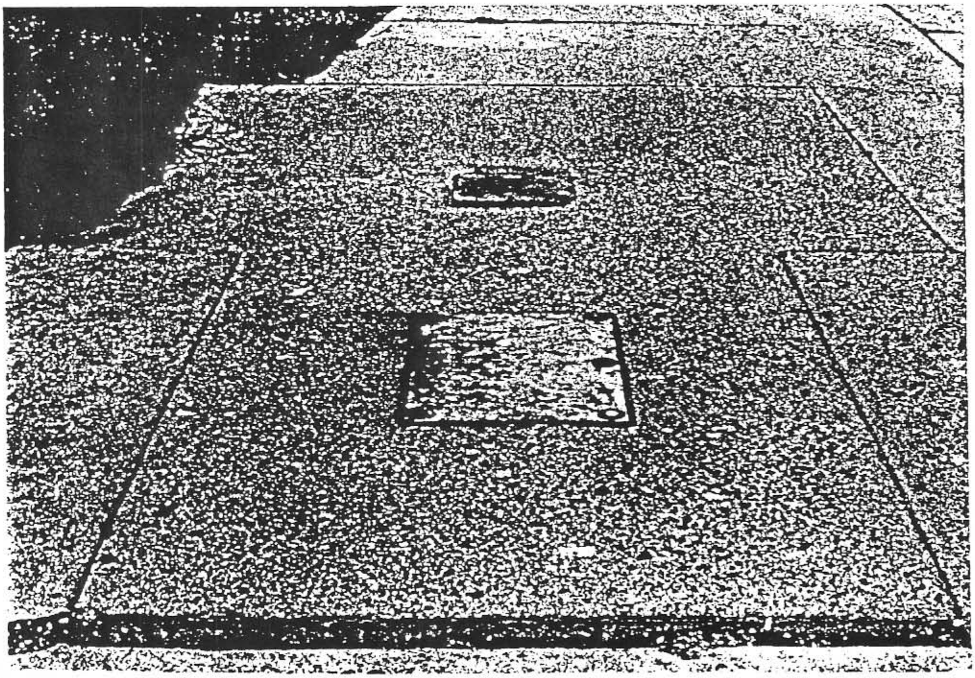
Pl 25: Parking area south of OSTF Road, outside security fence; water storage tank, background. Looking south. (Weitze: 1993)



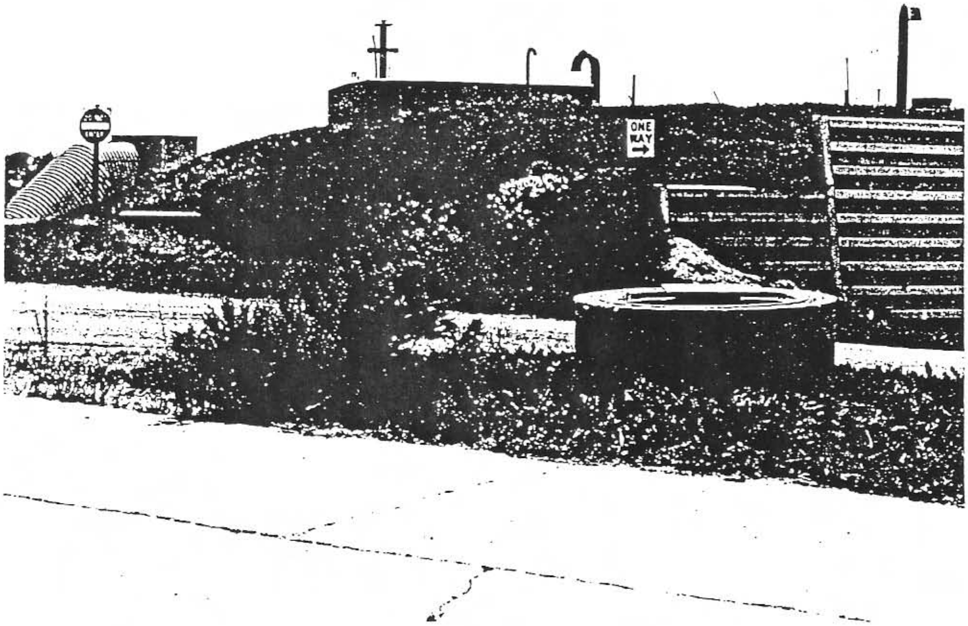
Pl 26: Parking area north of OSTF Road, outside security fence; windbreak, background. Looking west. (Weitze: 1993)



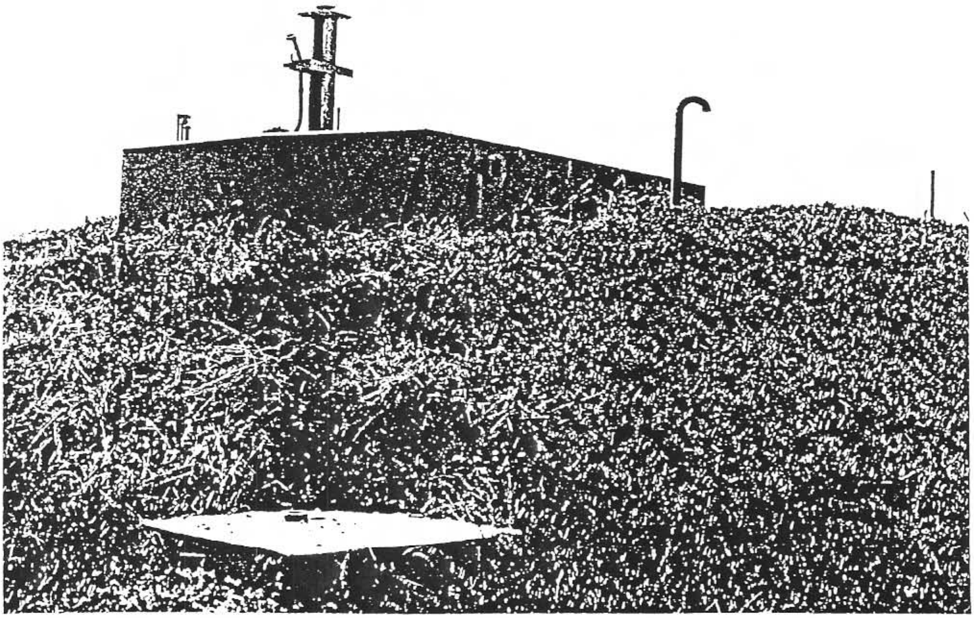
Pl 27: Sand filters: 1959, left; 1964, right. Looking south. (Weitze: 1993)



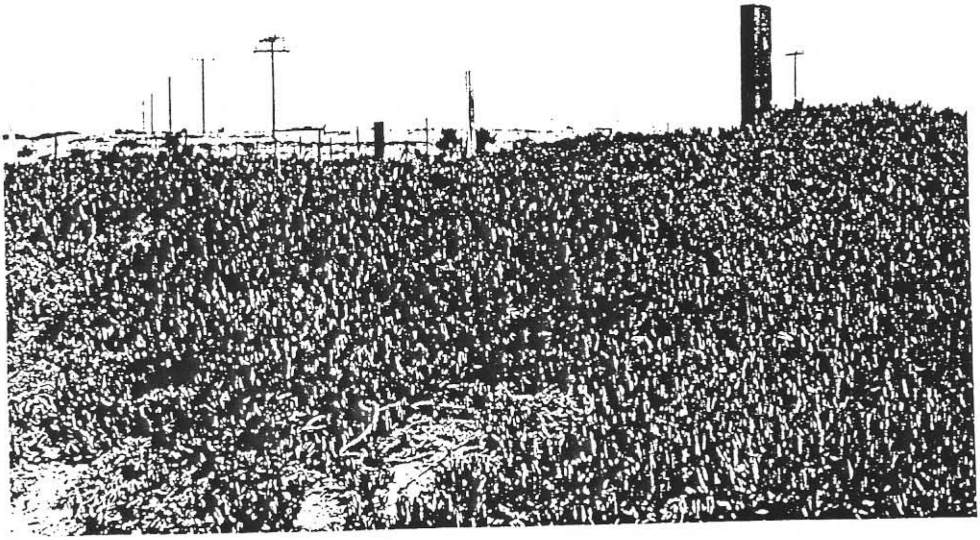
Pl 28: Theodolite station, foundation. Collimator sight tube cap, foreground; theodolite optical equipment base, background. Looking northwest. (Weitze: 1993)



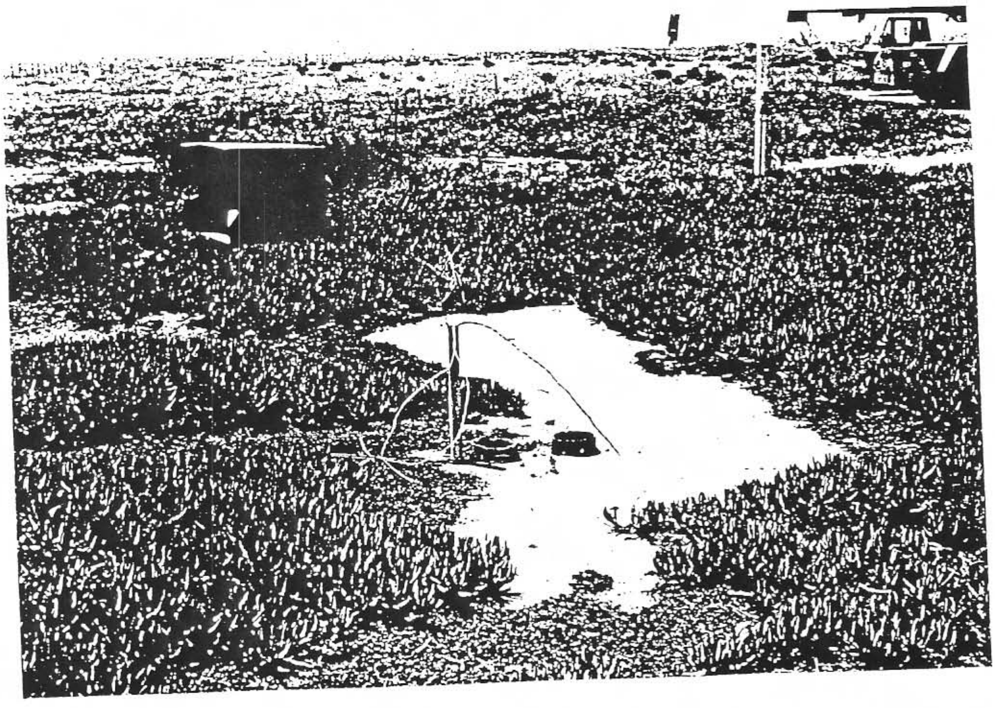
Pl 29: Arma guidance optics pier, foreground; background: personnel entrance tunnel, left; TV camera and floodlight stands, middle; modified entrance tunnel, launch control center, right. Looking south/southwest. (Weitze: 1993)



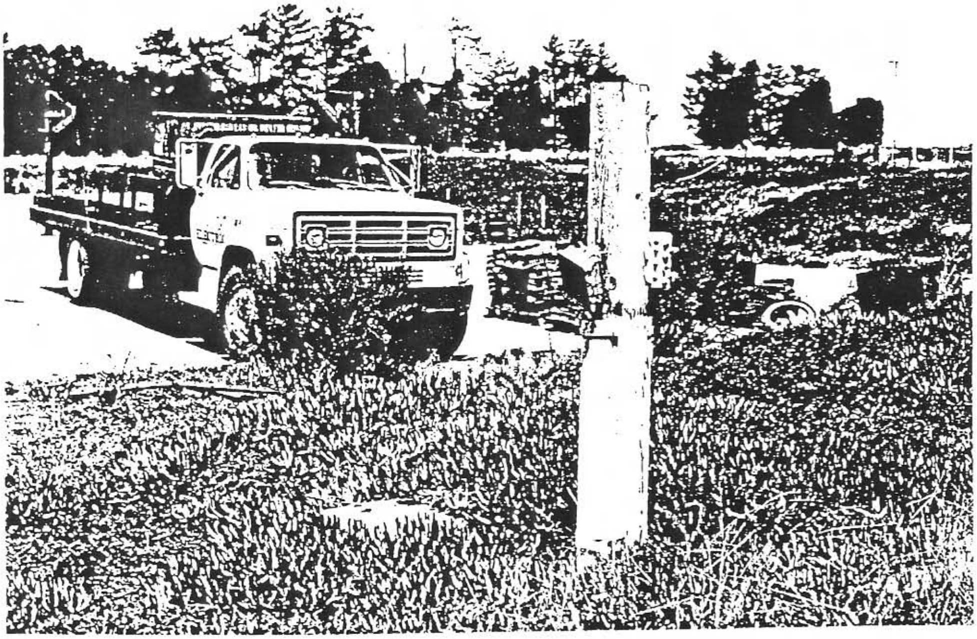
Pl 30: TV camera no. 1 and floodlight, foundations. Looking south. (Weitze: 1993)



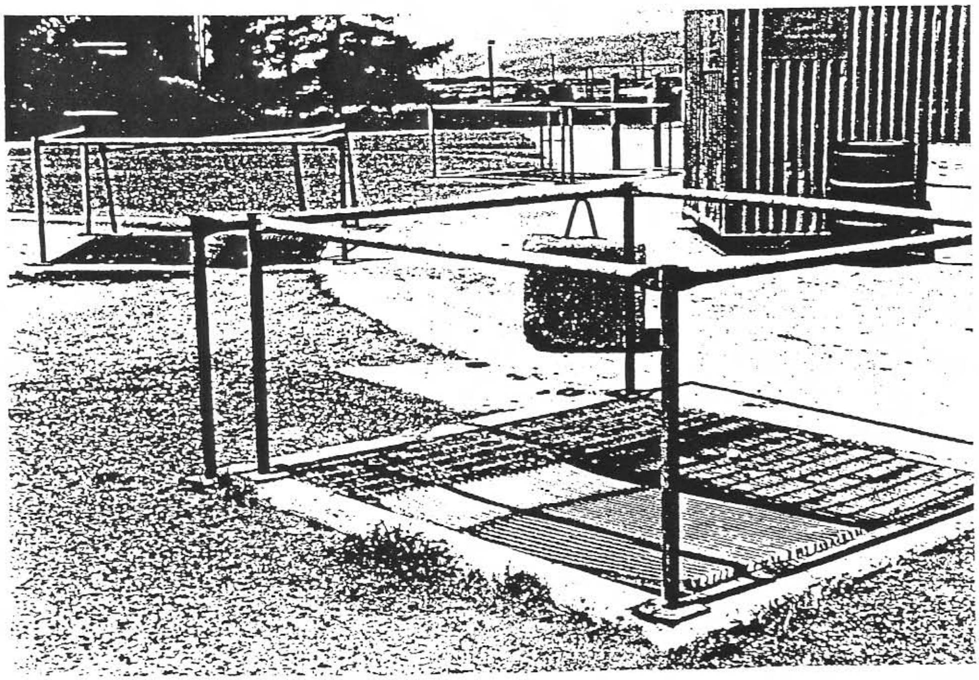
Pl 31: TV camera no. 2, foundation [covered in iceplant]. Looking east. (Weitze: 1993)



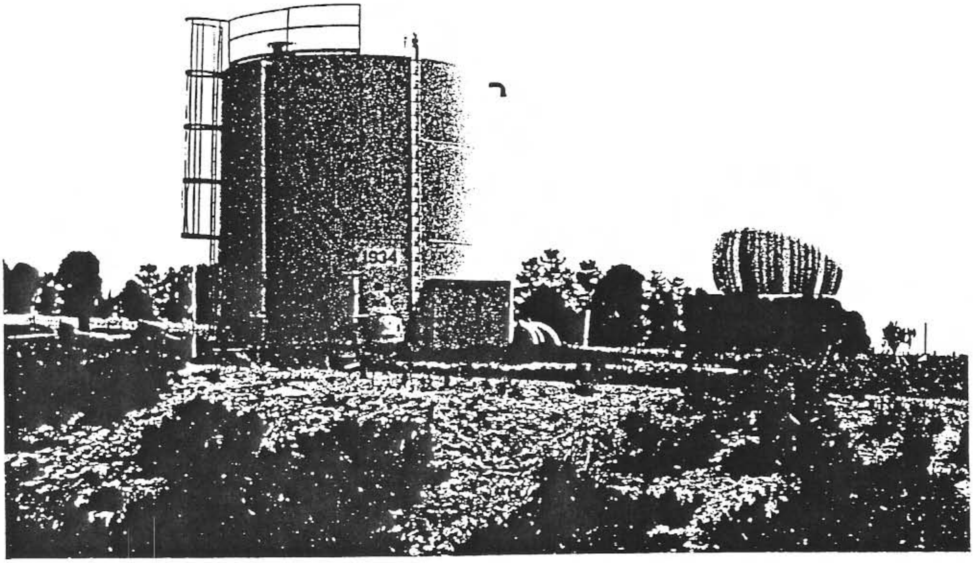
Pl 32: TV camera no. 3, foundation. Looking west. (Weitze: 1993)



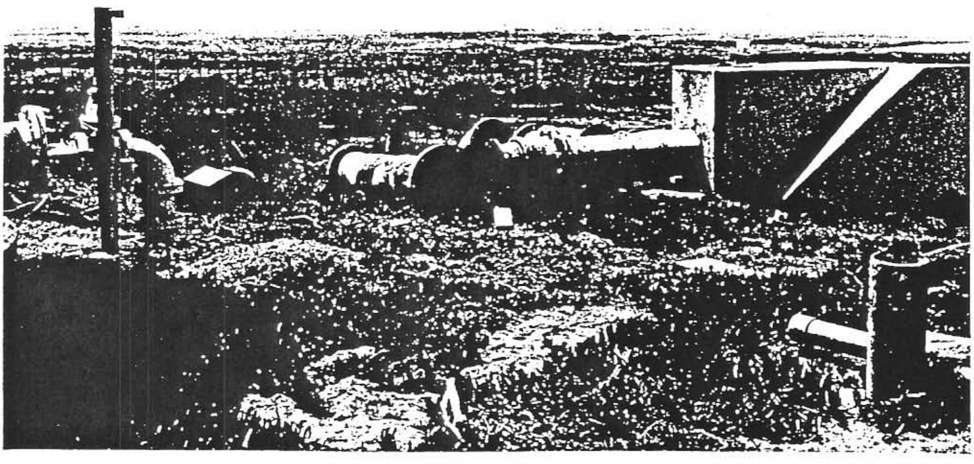
Pl 33: TV camera no. 3, floodlight, foundation. Looking northeast. (Weitze: 1993)



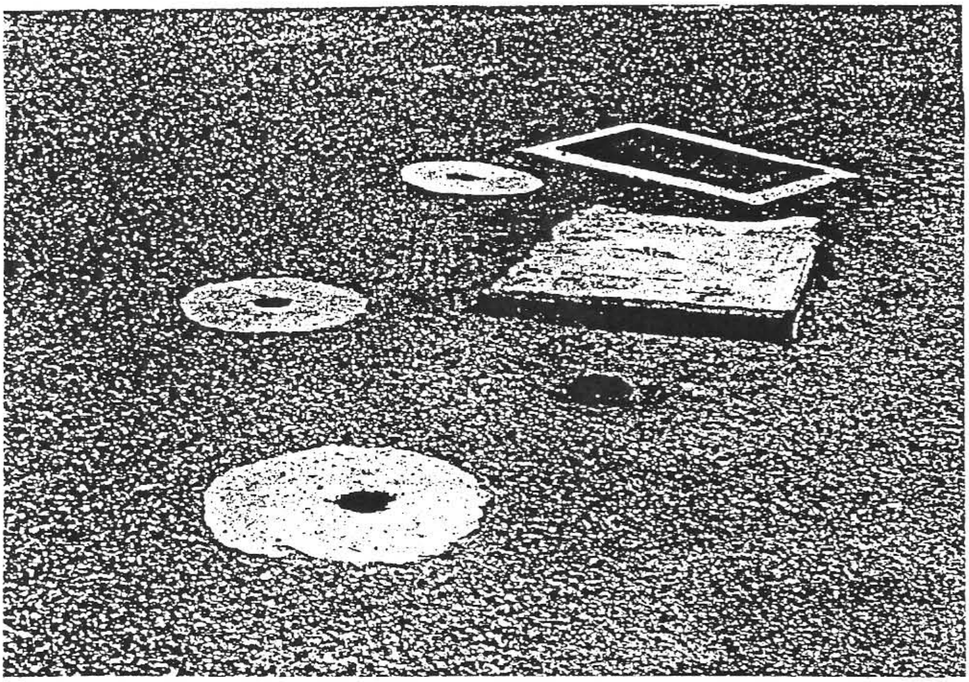
Pl 34: Ventilation shafts. Looking north/northwest. (Weitze: 1993)



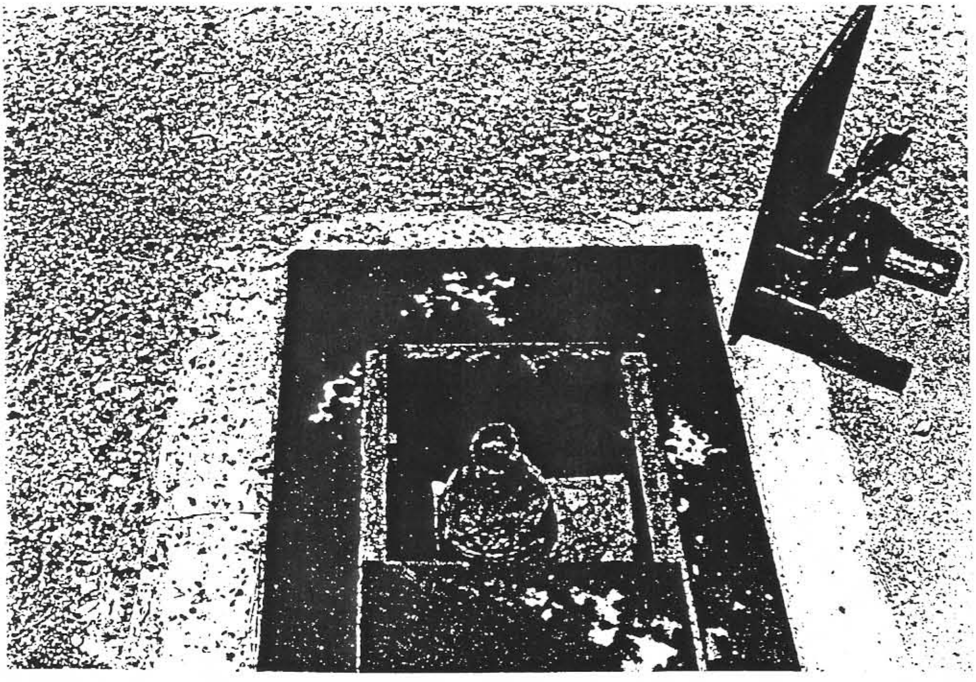
Pl 35: Water storage tank; firex pump station, middleground; 576 D radome, background. Looking southeast. (Weitze: 1993)



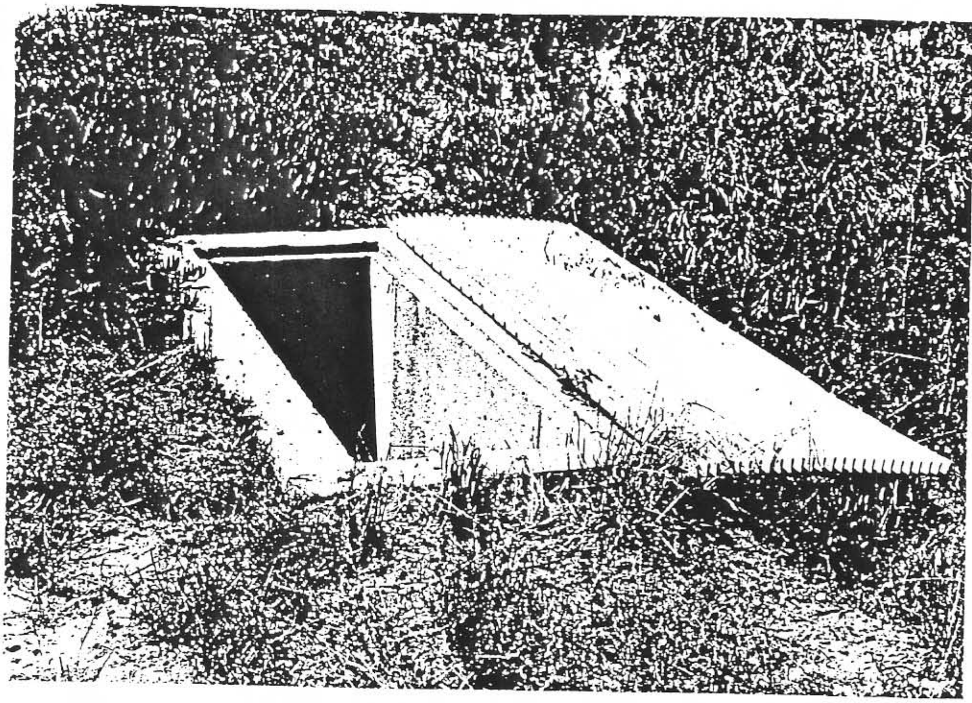
Pl 36: Firex pump station. Looking west. (Weitze: 1993)



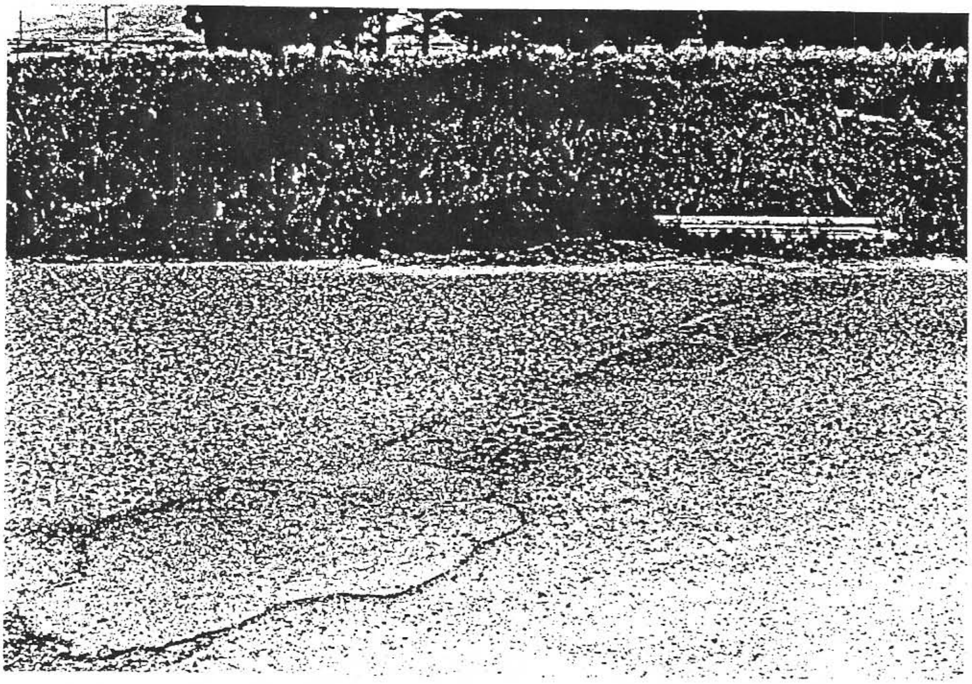
Pl 37: Hose reel foundation; reducer; guard post holes, east corner of the silo. Looking south. (Weitze: 1993)



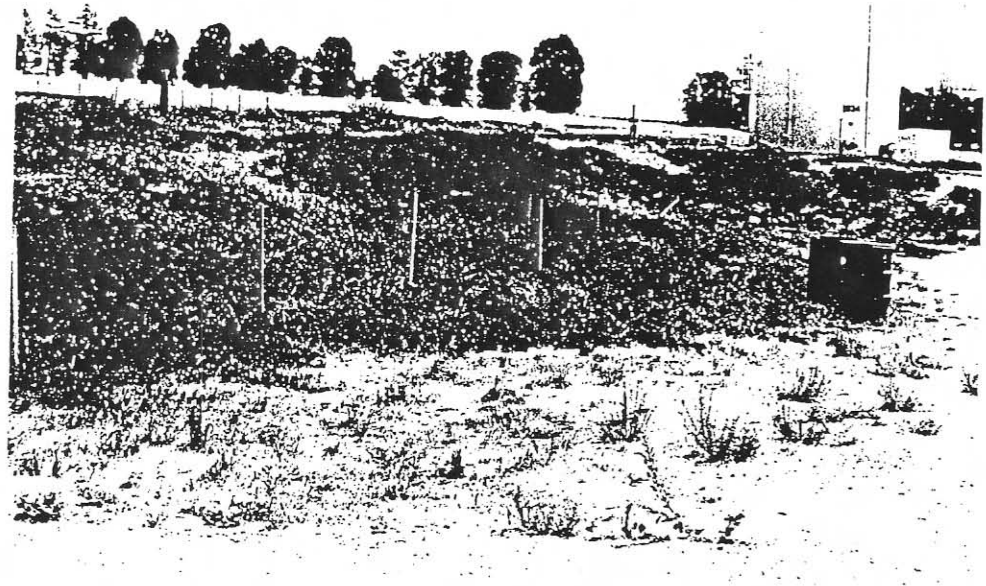
Pl 38: Reducer, north corner of the silo. Looking down. (Weitze: 1993)



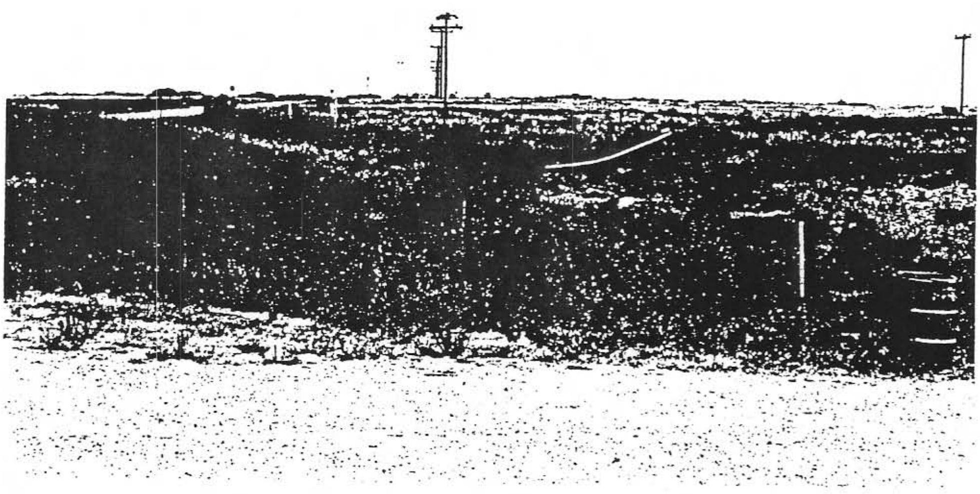
Pl 39: Fuel catchment tank enclosure. Looking west. (Weitze: 1993)



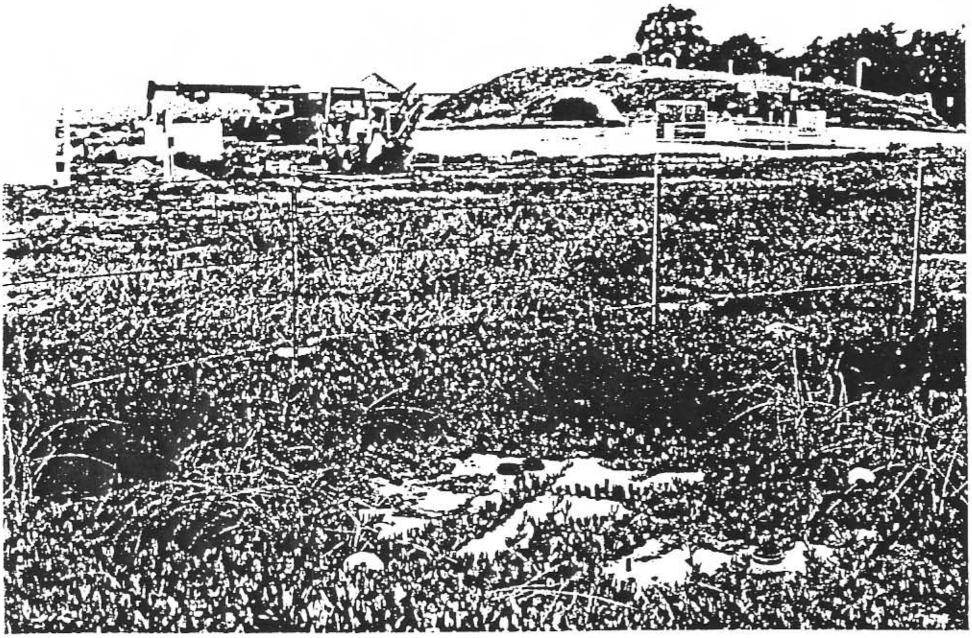
Pl 40: Fuel line trench to fuel catchment tank enclosure. Looking north. (Weitze: 1993)



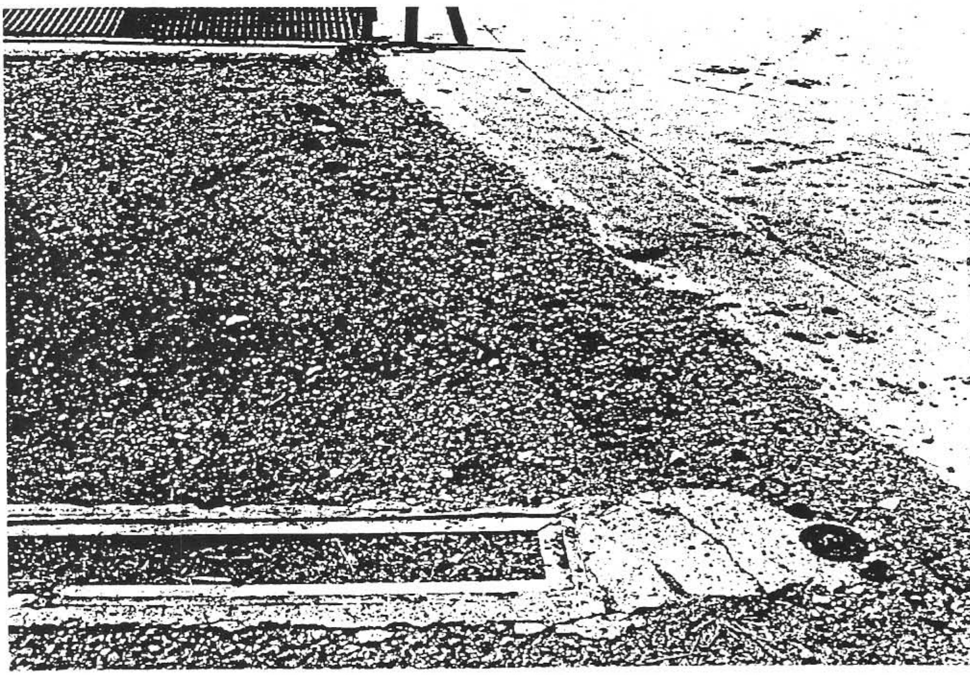
Pl 41: Site of diesel oil storage tank; water storage tank, background. Looking east/southeast. (Weitze: 1993)



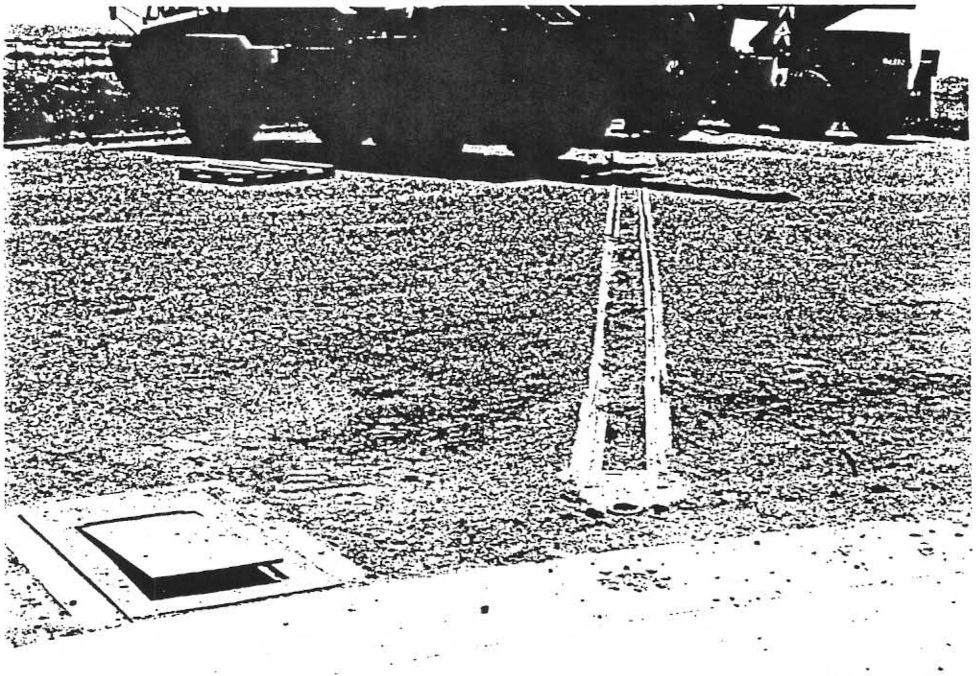
Pl 42: Cooling tower, foundation [obscured by iceplant]. Looking east. (Weitze: 1993)



Pl 43: Electrical substation, foundation. Looking west. (Weitze: 1993)

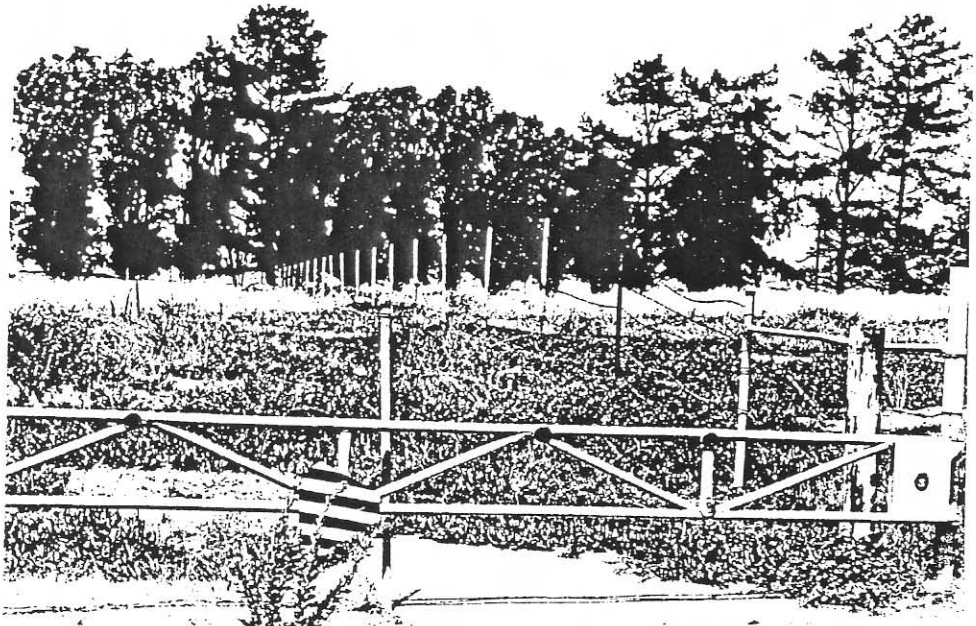


Pl 44: I.R.S.S. checkout facilities: cable tray and silo connection, south corner of the silo. Looking down. (Weitze: 1993)

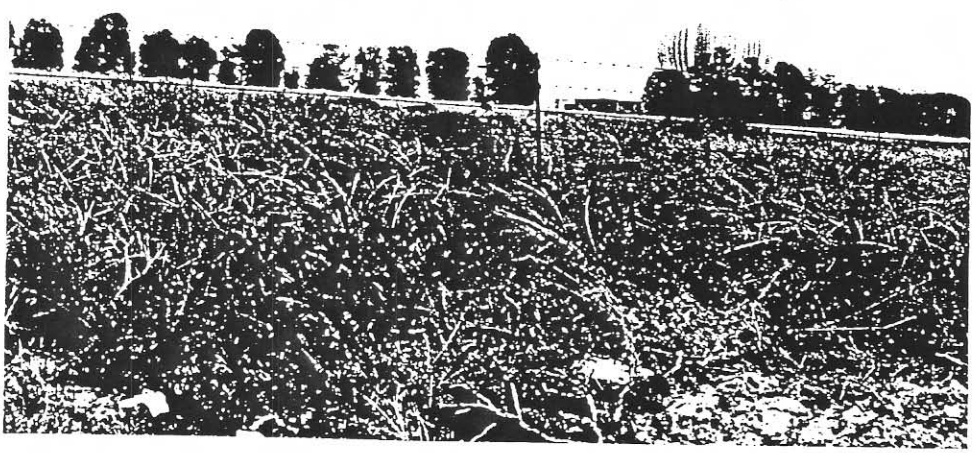


Pl 45: I.R.S.S. checkout facilities: silo connection and cable tray, south corner of the silo; reducer, foreground. Looking south. (Weitze: 1993)

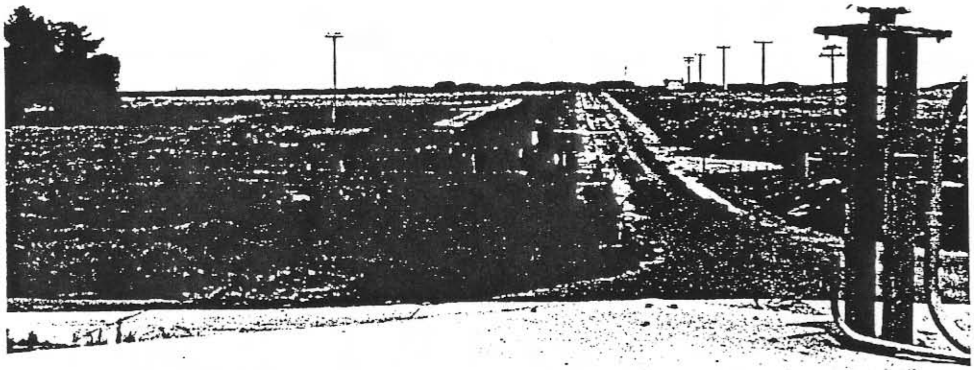
Pl 46: I.R.S.S. checkout facilities: antenna foundation and cable tray, at the south end of the tray. Looking down (Weitze: 1993)



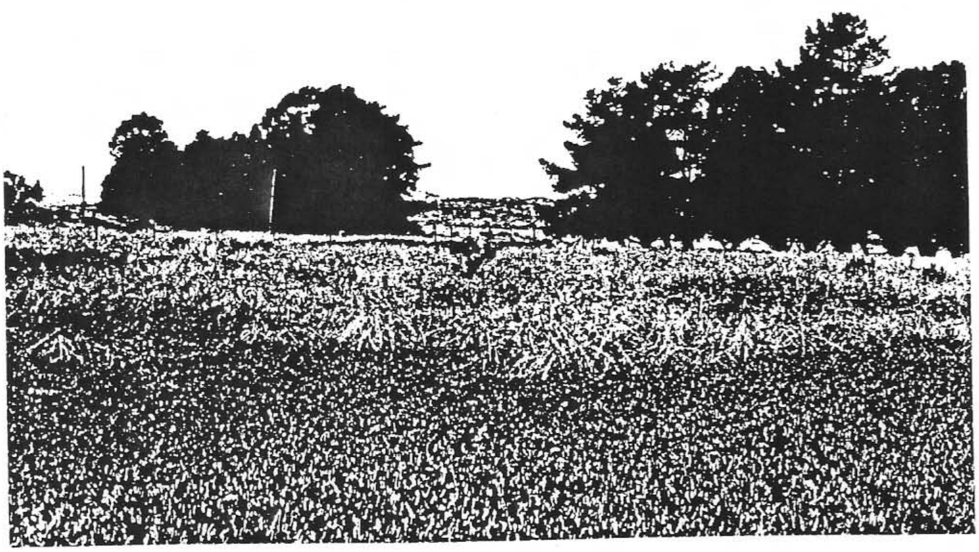
Pl 47: Security fence and swing gate; sentry booth site, middleground; windbreak, background. Looking north. (Weitze: 1993)



Pl 48: Building [unknown description] site, south side of OSTF Road, outside security fence; 576 D radome and windbreak, background. Looking southwest. (Weitze: 1993)

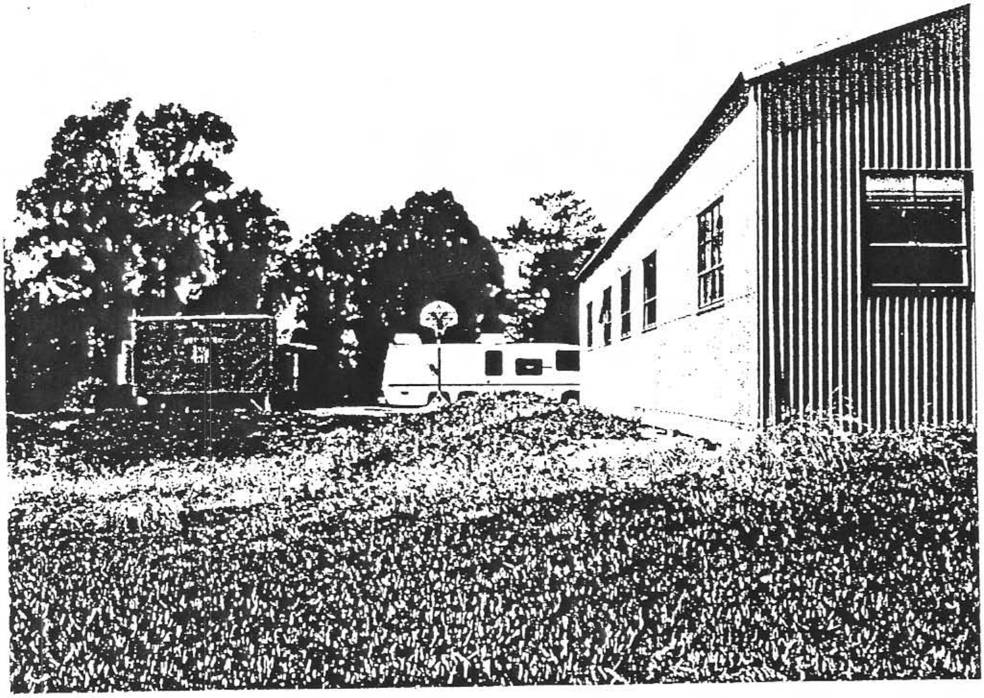


Pl 49: OSTF Road; camera stand atop launch control center stairwell, foreground; security fence and sentry booth site, middleground. Looking east. (Weitze: 1993)

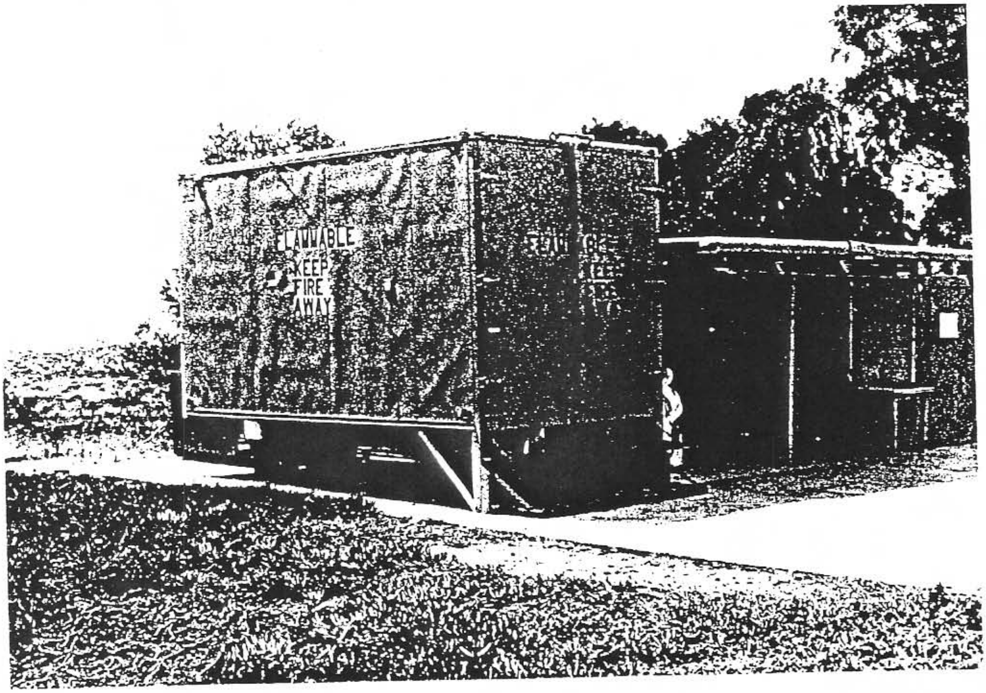


Pl 50: Windbreak. Looking west. (Weitze: 1993)

APPENDIX E

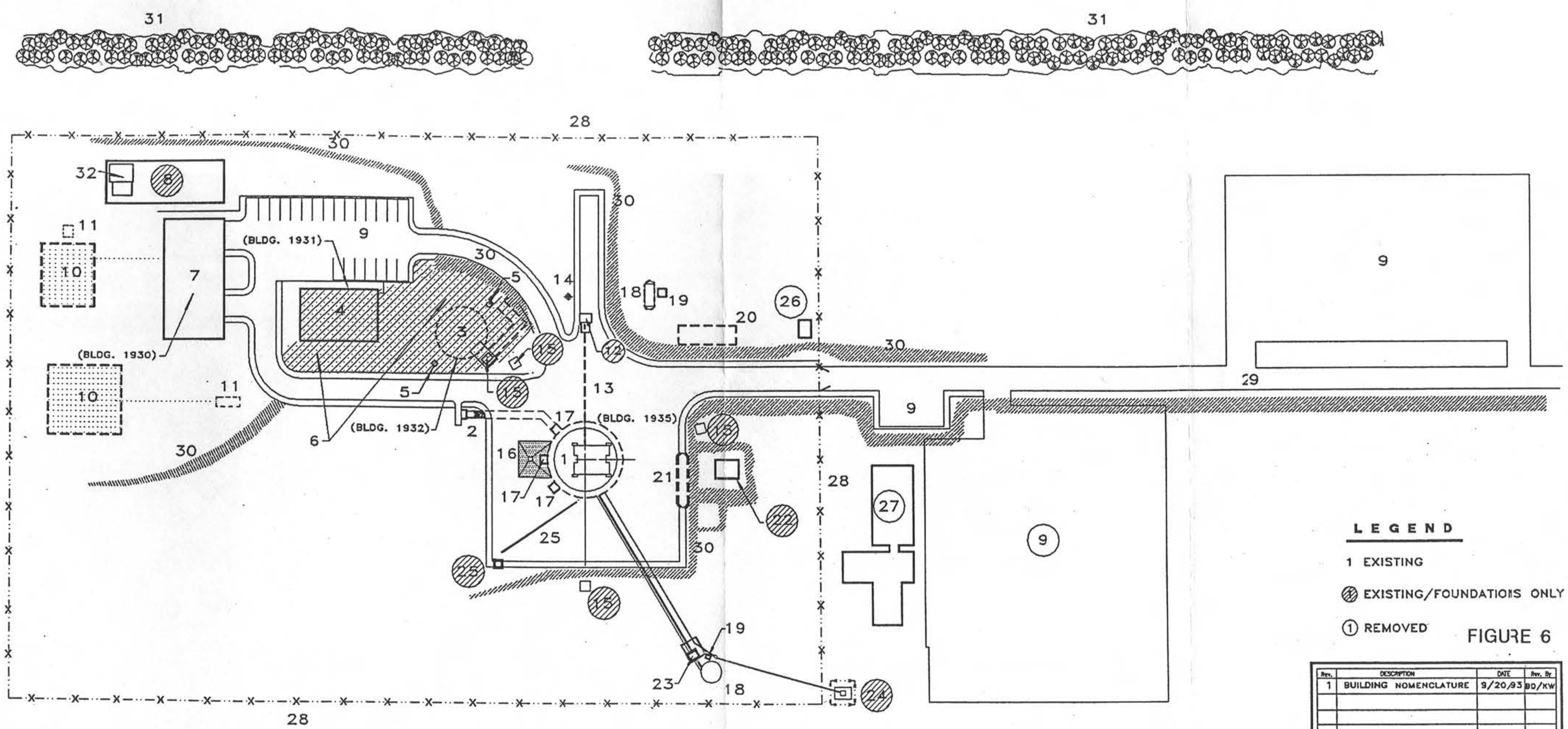


Pl 51:Semitrailer, left; utility building, right. Looking north.
(Weitze: 1993)



Pl 52: Semitrailer and storage structures. Looking west. (Weitze:
1993)

APPENDIX B



LEGEND

1 EXISTING

(hatched circle) EXISTING/FOUNDATIONS ONLY

(1) REMOVED

FIGURE 6

CONTRIBUTING COMPONENTS

1 SILO (BLDG. 1935)
2 PERSONNEL TUNNEL
3 LAUNCH CONTROL CENTER (LCC) (BLDG. 1932)
4 INSTRUMENTATION BUILDING (BLDG. 1931)
5 AIR INTAKE/EXHAUST
6 EARTHEN BERM AND SANDBAG REVETMENT
7 UTILITY BUILDING (BLDG. 1930)
8 PREFABRICATED STEEL BUILDING
9 PARKING AREA (4)
10 SAND FILTER (2)
11 SEPTIC TANK (2)
12 THEODOLITE STATION
13 COLLIMATOR SIGHT TUBE
14 ARMA GUIDANCE OPTICS PIER
15 TV CAMERA AND FLOODLIGHT (4)
16 CATCH BASIN
17 VENTILATION SHAFT (3)
18 WATER TANK (2)
19 VALVE BOX (2)
20 FUEL CATCHMENT TANK ENCLOSURE
21 DIESEL OIL STORAGE TANK
22 COOLING TOWER
23 FIREX PUMP STATION
24 ELECTRICAL SUBSTATION
25 I.R.S.S. CHECKOUT FACILITIES (CABLE TRAY AND TOWER ANTENNA)
26 SENTRY BOOTH
27 BUILDING (UNKNOWN DESIGNATION)
28 SECURITY FENCE (WITH SWING GATE)
29 O.S.T.F. ROAD
30 DRAINAGE DITCH
31 EUCALYPTUS AND MONTEREY PINE WINDBREAK

NON-CONTRIBUTING COMPONENTS

32 PAINT STORAGE BUILDINGS (TEMPORARY)

NORTH

0 40 80 120 160
SCALE IN FEET

Rev.	DESCRIPTION	DATE	Rev. By
1	BUILDING NOMENCLATURE	9/20/93	BD/KW

ATLAS 576G
O.S.T.F. 2
EVALUATION FOR NATIONAL REGSTER OF HISTORIC PLACES

VANDENBERG AIR FORCE BASE
LOMPOC, CALIFORNIA

DRAWN: BND
CHECKED: KJW
DATE: 9/7/93
CAD FILE: 576GSITE.DWG
DAMES & MOORE, INC.
SHEET 1 OF 1

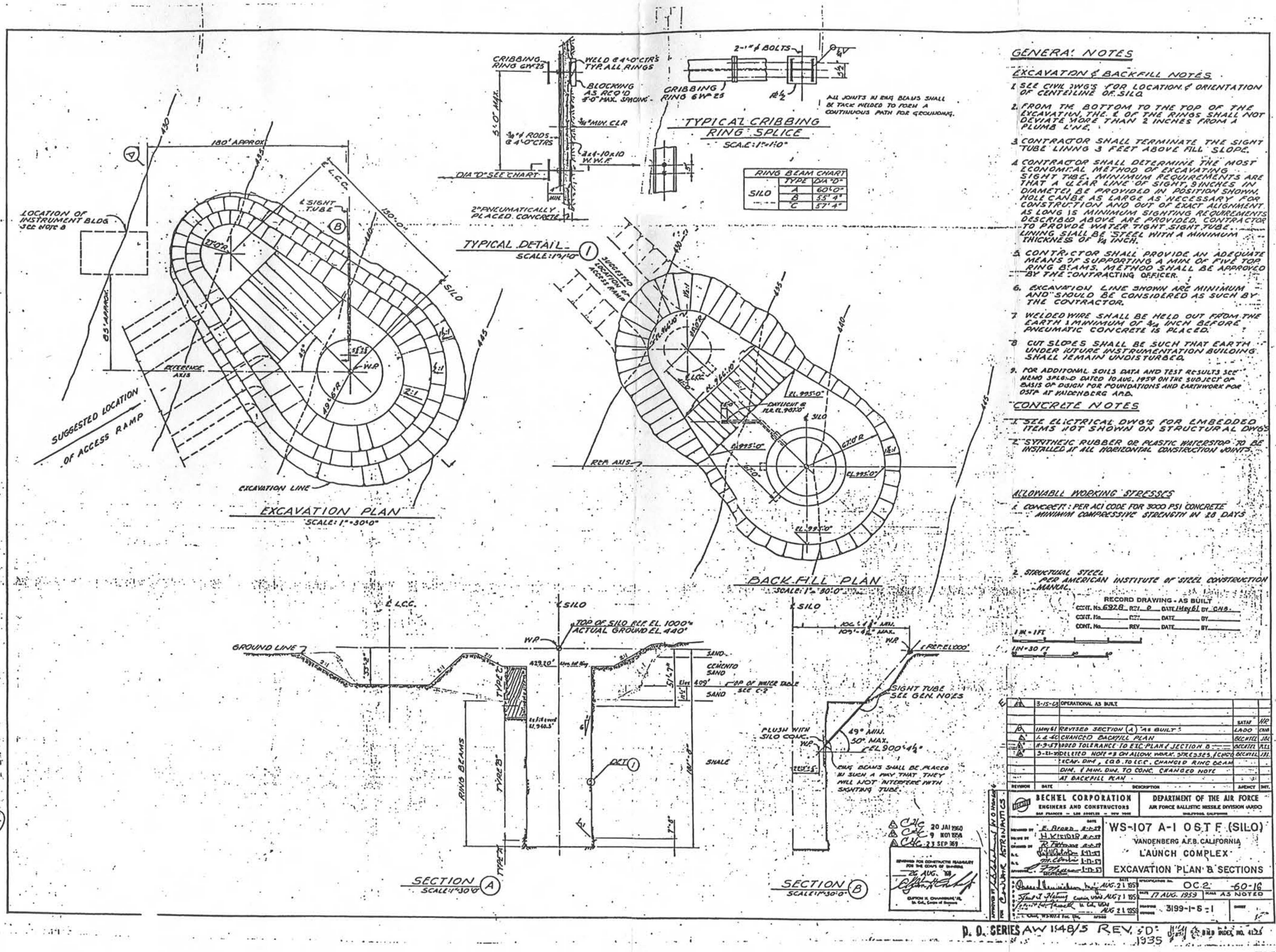
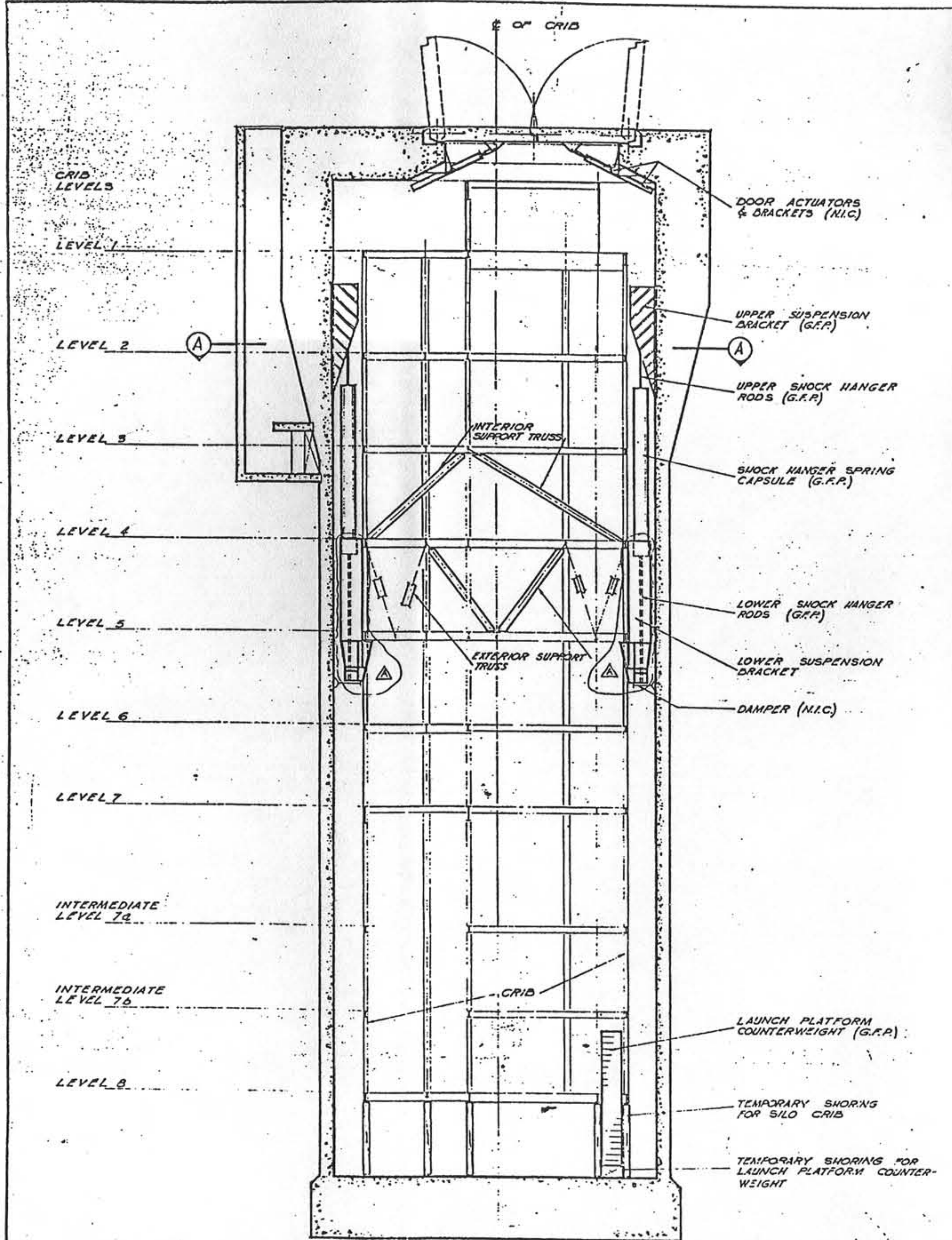
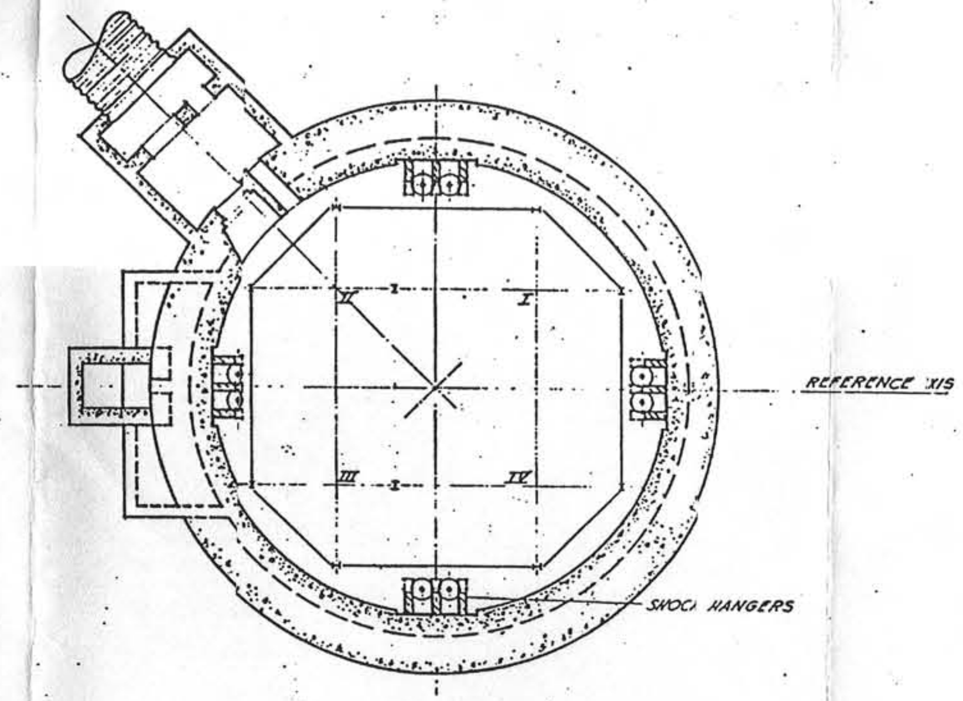

EXCAVATION PLAN
SCALE: 1"=30'0"
BACK-FILL PLAN
SCALE: 1"=30'0"
TYPICAL DETAIL (1)
SCALE: 1"=1'0"
TYPICAL CRIBBING RING SPLICE
SCALE: 1"=1'0"
SECTION (A)
SCALE: 1"=30'0"
SECTION (B)
SCALE: 1"=30'0"
RING BEAM CHART
SILO | TYPE | DIA "D"
A | 60'0"
B | 55'4"
C | 57'4"
SUGGESTED LOCATION OF ACCESS RAMP
LOCATION OF INSTRUMENT BLDG SEE NOTE 8
EXCAVATION LINE
GROUND LINE
TOP OF SILO REF. EL. 1000'
ACTUAL GROUND EL. 440'
SIGHT TUBE SEE GEN. NOTES
RING BEAMS SHALL BE PLACED IN SUCH A WAY THAT THEY WILL NOT INTERFERE WITH SIGHTING TUBE.
ALL JOINTS IN RING BEAMS SHALL BE TACK WELDED TO FORM A CONTINUOUS PATH FOR GROUNDING.
GENERAL NOTES
EXCAVATION & BACKFILL NOTES
1. SEE CIVIL DWG'S FOR LOCATION & ORIENTATION OF CENTERLINE OF SILO
2. FROM THE BOTTOM TO THE TOP OF THE EXCAVATION, THE ℄ OF THE RINGS SHALL NOT DEVIATE MORE THAN 2 INCHES FROM A PLUMB LINE.
3. CONTRACTOR SHALL TERMINATE THE SIGHT TUBE LINING 3 FEET ABOVE FILL SLOPE.
4. CONTRACTOR SHALL DETERMINE THE MOST ECONOMICAL METHOD OF EXCAVATING SIGHT TUBE. MINIMUM REQUIREMENTS ARE THAT A CLEAR LINE OF SIGHT, 9 INCHES IN DIAMETER, BE PROVIDED IN POSITION SHOWN. HOLE CAN BE AS LARGE AS NECESSARY FOR CONSTRUCTION AND OUT OF EXACT ALIGNMENT AS LONG AS MINIMUM SIGHTING REQUIREMENTS DESCRIBED ABOVE ARE PROVIDED. CONTRACTOR TO PROVIDE WATER TIGHT SIGHT TUBE. LINING SHALL BE STEEL WITH A MINIMUM THICKNESS OF 1/4 INCH.
5. CONTRACTOR SHALL PROVIDE AN ADEQUATE MEANS OF SUPPORTING A MIN. OF FIVE TOP RING BEAMS. METHOD SHALL BE APPROVED BY THE CONTRACTING OFFICER.
6. EXCAVATION LINE SHOWN ARE MINIMUM AND SHOULD BE CONSIDERED AS SUCH BY THE CONTRACTOR.
7. WELDED WIRE SHALL BE HELD OUT FROM THE EARTH A MINIMUM OF 3/4 INCH BEFORE PNEUMATIC CONCRETE IS PLACED.
8. CUT SLOPES SHALL BE SUCH THAT EARTH UNDER FUTURE INSTRUMENTATION BUILDING SHALL REMAIN UNDISTURBED.
9. FOR ADDITONAL SOILS DATA AND TEST RESULTS SEE MEMO SPLO-D DATED 10 AUG. 1959 ON THE SUBJECT OF BASIS OF DESIGN FOR FOUNDATIONS AND EARTHWORK FOR OSTF AT VANDENBERG AFB.
CONCRETE NOTES
1. SEE ELECTRICAL DWG'S FOR EMBEDDED ITEMS NOT SHOWN ON STRUCTURAL DWGS
2. SYNTHETIC RUBBER OR PLASTIC WATERSTOP TO BE INSTALLED AT ALL HORIZONTAL CONSTRUCTION JOINTS.
ALLOWABLE WORKING STRESSES
1. CONCRETE: PER ACI CODE FOR 3000 PSI CONCRETE MINIMUM COMPRESSIVE STRENGTH IN 28 DAYS
2. STRUCTURAL STEEL PER AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL.
RECORD DRAWING - AS BUILT
CONT. No. 6928 REV. D DATE 1 May 61 BY CNB.
1 IN = 1 FT
1 IN = 30 FT
3-15-63 OPERATIONAL AS BUILT
1 May 61 REVISED SECTION (A) AS BUILT — LADO — CNB
1-4-60 CHANGED BACKFILL PLAN — BECHTEL — JBL
11-9-59 ADDED TOLERANCE TO EXC. PLAN & SECTION B — BECHTEL — RTS
3-21-59 DELETED NOTE #3 ON ALLOW. WORK. STRESSES, (CHG'D EXCAV. DIM., LOB. TO LCC. CHANGED RING BEAM DIM. & MIN. DIM. TO CONC. CHANGED NOTE AT BACKFILL PLAN — BECHTEL — JBL
REVISION | DATE | DESCRIPTION | AGENCY | INIT.
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
WS-107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
EXCAVATION PLAN & SECTIONS
OC.2 -60-16
17 AUG. 1959
AS NOTED
3199-1-S-1
20 JAN 1960
9 NOV 1959
23 SEP 1959
26 AUG. 1959
D. O. SERIES AW 1548/5 REV. "D"
1935
INDEX NO. 4125

FIGURE 7



ELEVATION THROUGH REFERENCE AXIS



PLAN AT A—A

LEGEND

1. (G.F.P.): GOVERNMENT FURNISHED PROPERTY (INSTALLED BY FACILITY CONTRACTOR)
2. (N.I.C.): NOT IN CONTRACT

GENERAL NOTES

1. ITEMS NOT OTHERWISE NOTED ARE FURNISHED AND INSTALLED BY THE FACILITY CONTRACTOR

REVISION	DATE	DESCRIPTION	AGENCY	APP.
[illegible]	6/17/60	CHANGED LOWER SUSPENSION BRACKETS	AFBMD	[illegible]
	[illegible]	[illegible]	[illegible]	

BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO – LOS ANGELES – NEW YORK

DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION ARDC
INGLEWOOD, CALIFORNIA

CONVAIR ASTRONAUTICS

Designed by GUTIERREZ
Drawn by GUTIERREZ 1/13/60
Checked by LIEBI 1/13/60

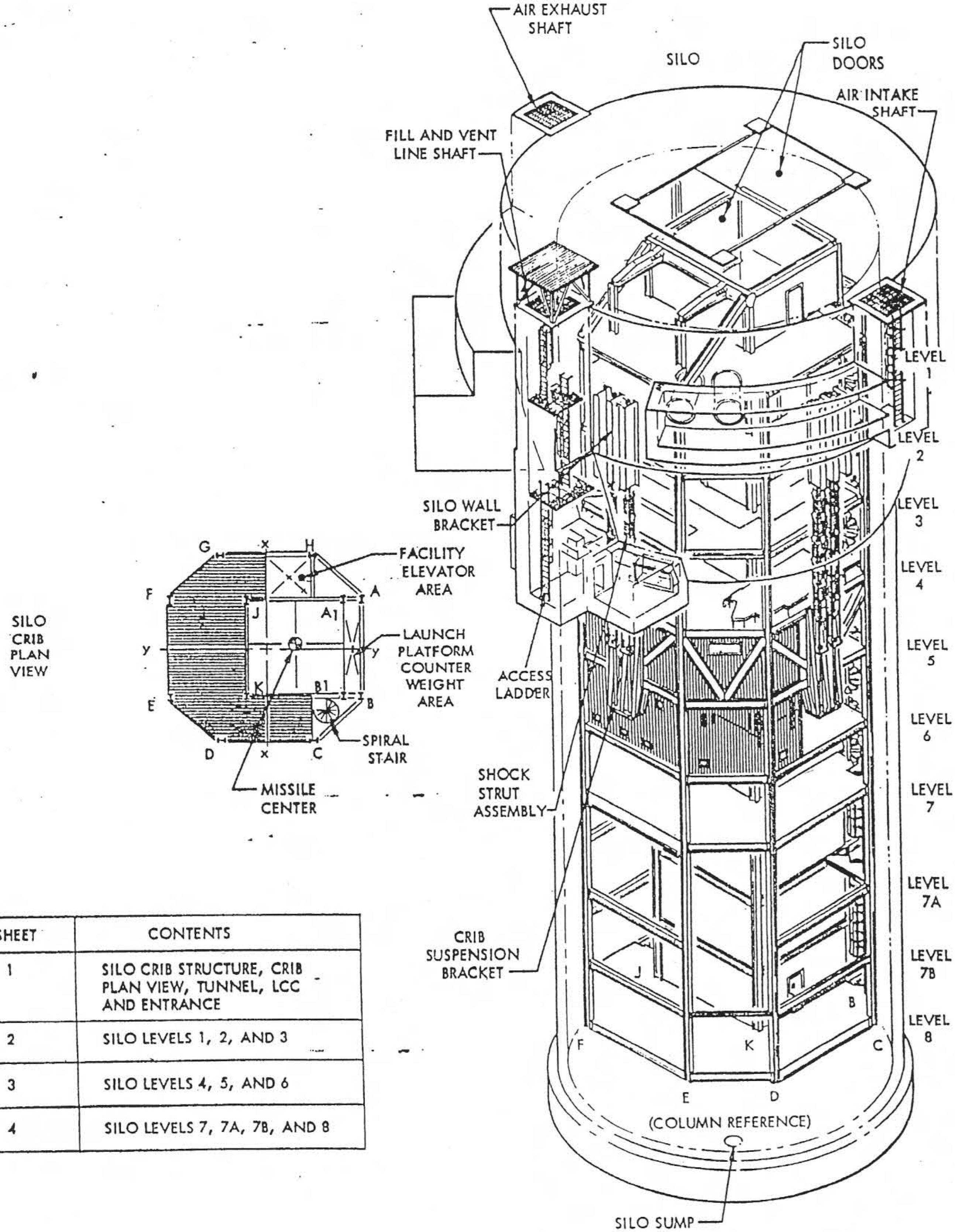
WS 107A-1 OPERATIONAL BASE
UNITARY SILO
LAUNCHING SILO
GENERAL ARRANGEMENT
PLAN AND SECTION

Specification No. OC-4-60-89
Date 1960
Scale 1/8" = 1'-0"
Drawing No. AFBMD-1-A-22.3

1920, 1935

Draw 63

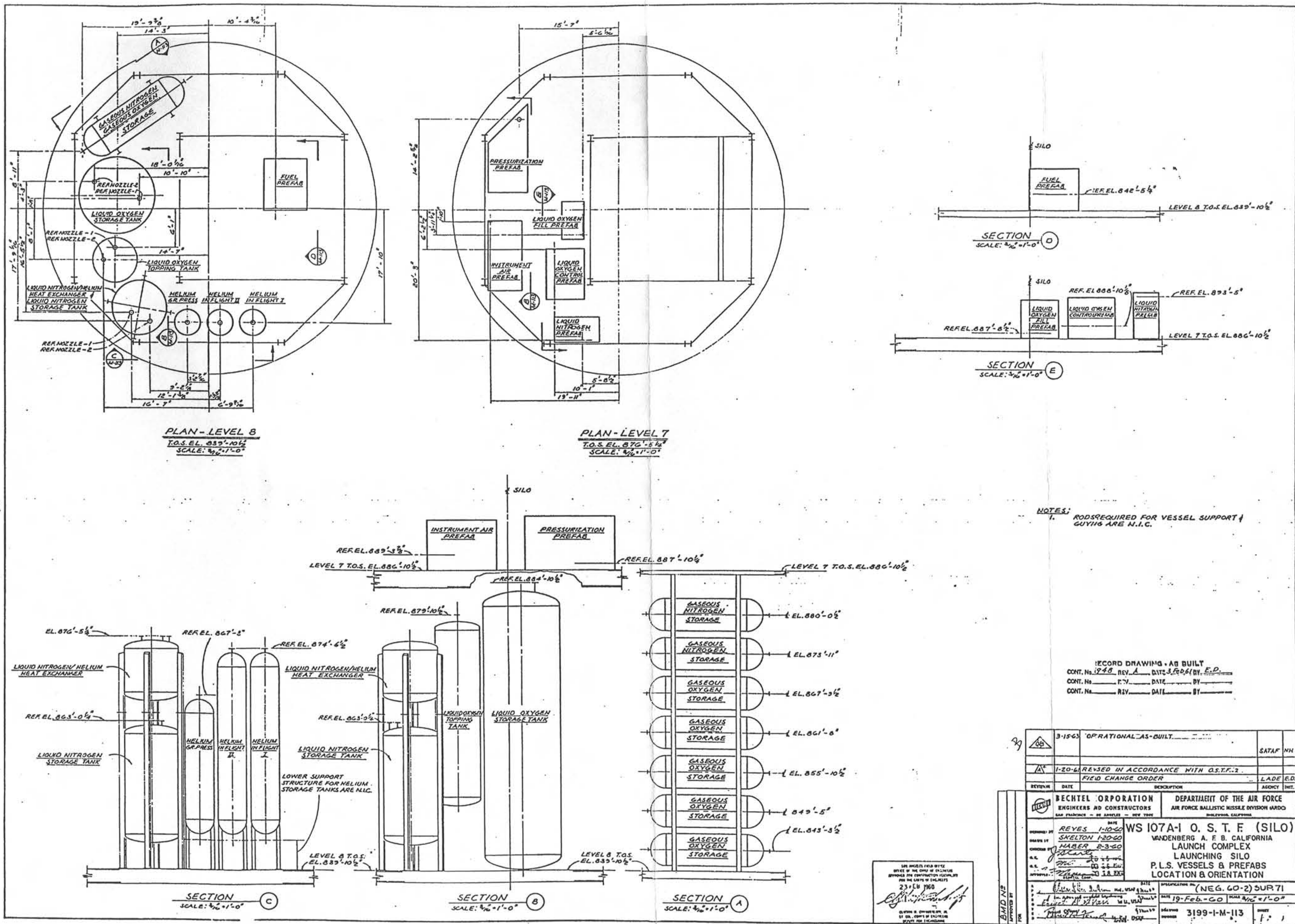
FIGURE 8



SHEET	CONTENTS
1	SILO CRIB STRUCTURE, CRIB PLAN VIEW, TUNNEL, LCC AND ENTRANCE
2	SILO LEVELS 1, 2, AND 3
3	SILO LEVELS 4, 5, AND 6
4	SILO LEVELS 7, 7A, 7B, AND 8

Silo and Launch Control Center

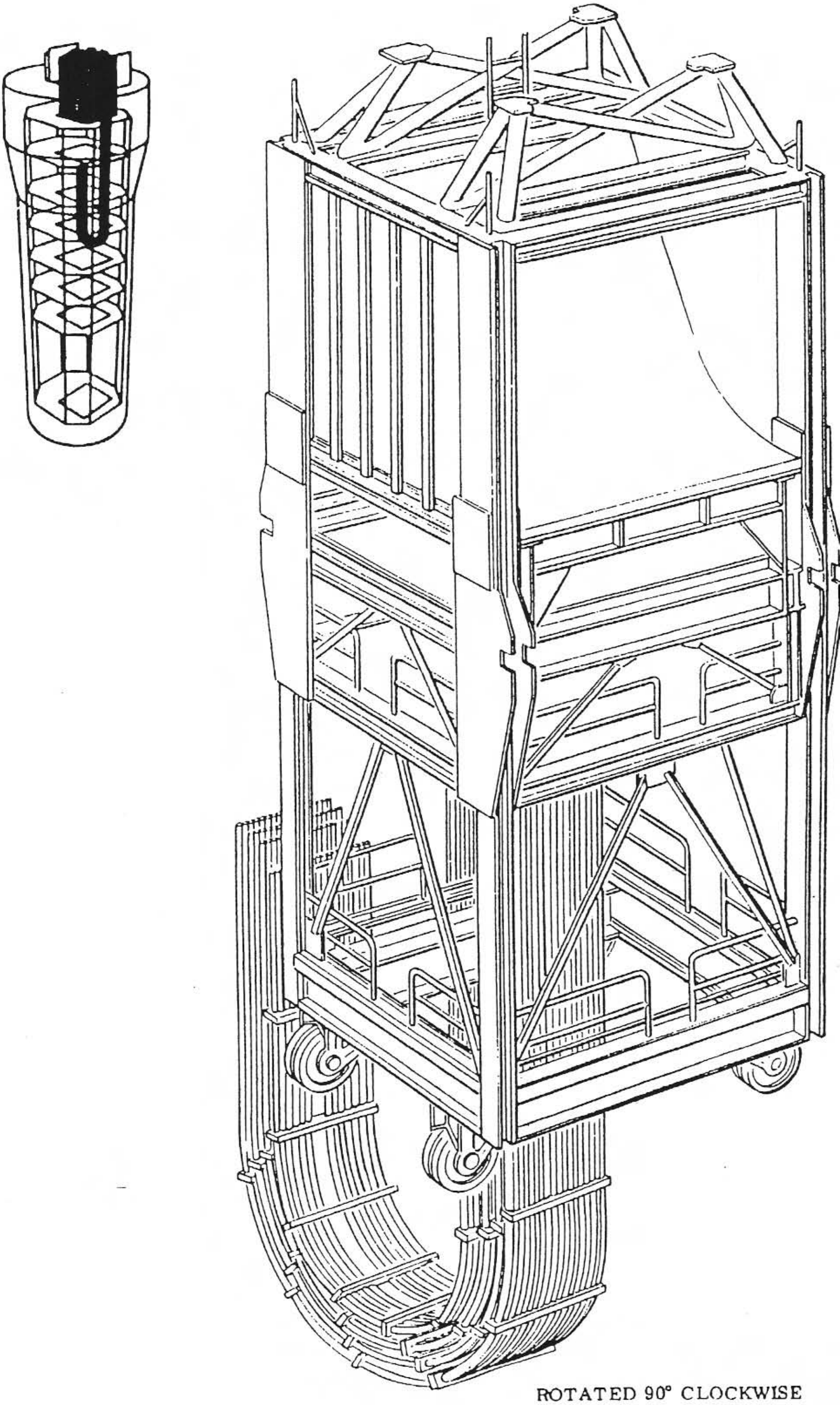
FIGURE 9



OCR F-21

1735 D.O. SERIES A.W. 1548/107 REV. BMD INDEX NO. 4125

FIGURE 10



ROTATED 90° CLOCKWISE

FIGURE 11 Launcher Platform

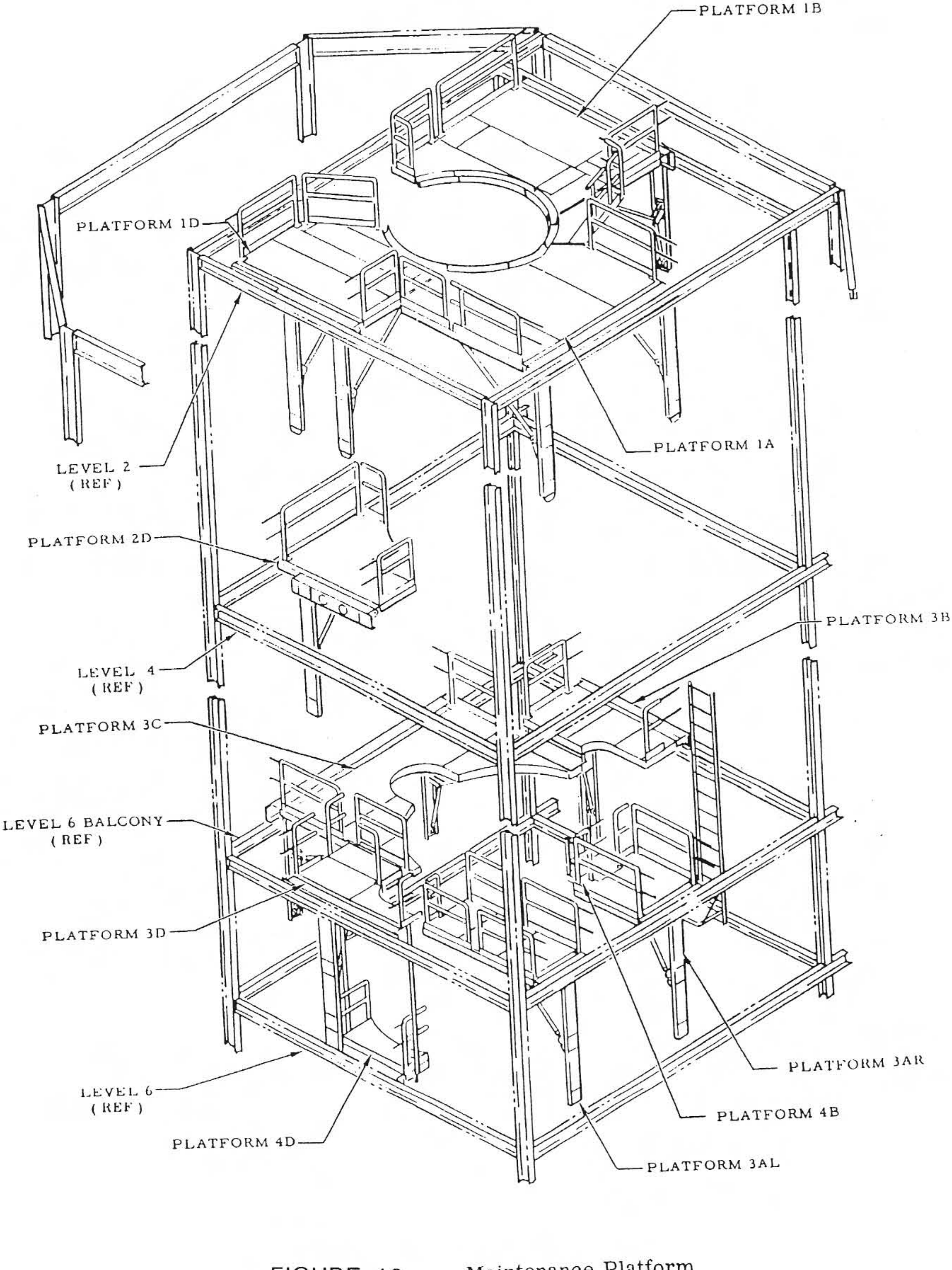


FIGURE 12 Maintenance Platform

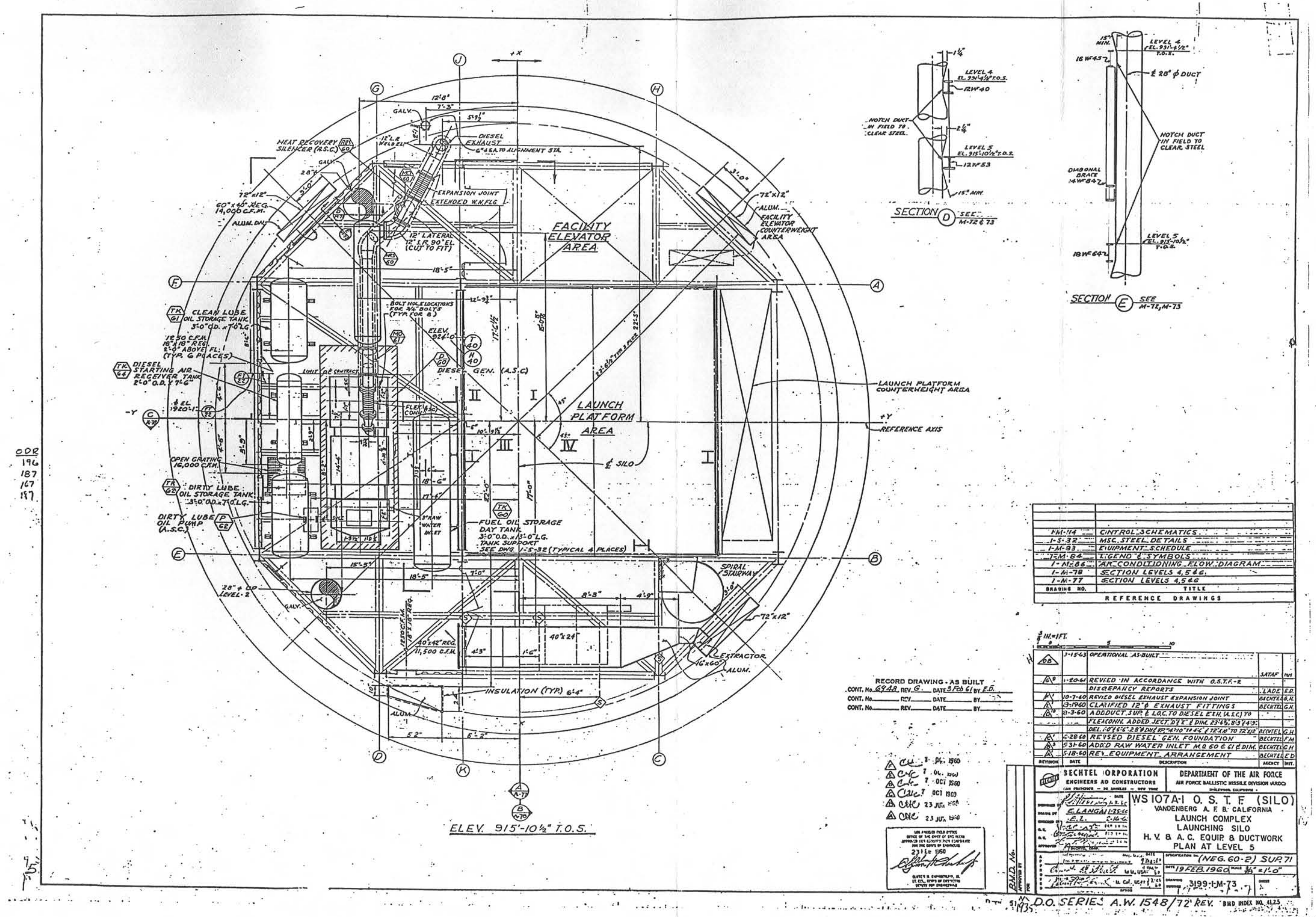
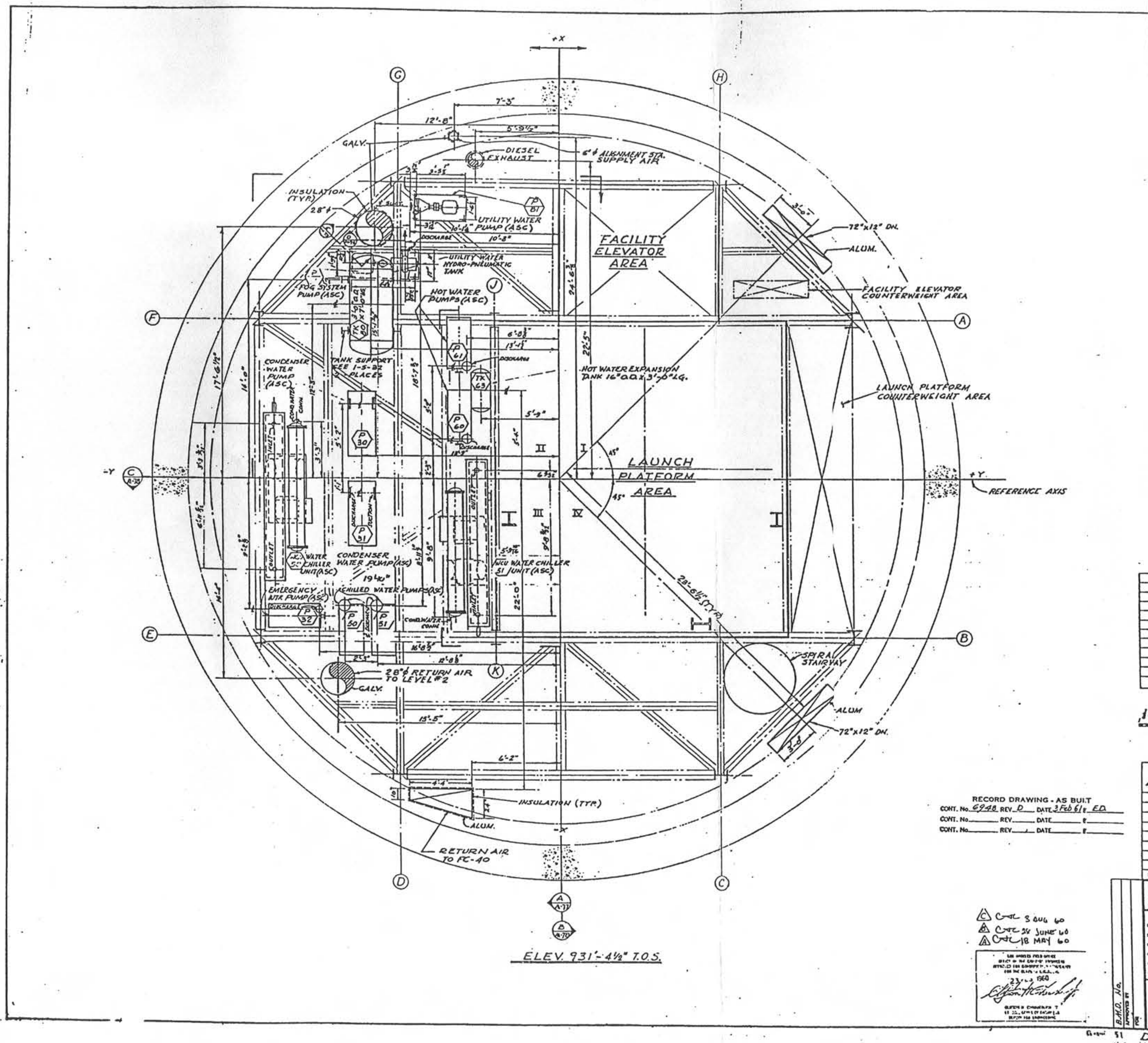

FACILITY ELEVATOR AREA
LAUNCH PLATFORM AREA
LAUNCH PLATFORM COUNTERWEIGHT AREA
FACILITY ELEVATOR COUNTERWEIGHT AREA
REFERENCE AXIS
℄ SILO
HEAT RECOVERY SILENCER (A.S.C.)
DIESEL EXHAUST
EXPANSION JOINT EXTENDED W.N.FLG.
CLEAN LUBE OIL STORAGE TANK 3'-0" O.D. x 7'-0" LG.
DIESEL STARTING AIR RECEIVER TANK 2'-0" O.D. x 7'-6"
DIESEL GEN. (A.S.C.)
DIRTY LUBE OIL STORAGE TANK 3'-0" O.D. x 7'-0" LG.
DIRTY LUBE OIL PUMP (A.S.C.)
OPEN GRATING 16,000 C.F.M.
FUEL OIL STORAGE DAY TANK 3'-0" O.D. x 15'-0" LG.
SEE DWG 1-S-32 (TYPICAL 4 PLACES)
SPIRAL STAIRWAY
EXTRACTOR
INSULATION (TYP) 6'-4"
SECTION D SEE M-72 & 73
SECTION E SEE M-72, M-73
NOTCH DUCT IN FIELD TO CLEAR STEEL
LEVEL 4
LEVEL 5
℄ 28" ϕ DUCT
ELEV. 915'-10½" T.O.S.
REFERENCE DRAWINGS
DRAWING NO. | TITLE
1-M-114 CONTROL SCHEMATICS
1-S-32 MSC. STEEL DETAILS
1-M-83 EQUIPMENT SCHEDULE
1-M-84 LEGEND & SYMBOLS
1-M-86 AIR CONDITIONING FLOW DIAGRAM
1-M-78 SECTION LEVELS 4,5 & 6.
1-M-77 SECTION LEVELS 4,5 & 6
3/8 IN.=1FT.
REVISION | DATE | DESCRIPTION | AGENCY | INIT.
68 3-15-63 OPERATIONAL AS-BUILT SATAF
G 1-20-61 REVISED IN ACCORDANCE WITH O.S.T.F.-2 DISCREPANCY REPORTS LADE E.D.
F 10-7-60 REVISED DIESEL EXHAUST EXPANSION JOINT BECHTEL G.H.
E 8-1960 CLARIFIED 12" ϕ EXHAUST FITTINGS BECHTEL G.H.
D 8-3-60 ADD DUCT SUP. & LOC. TO DIESEL EXH. (A.S.C.) TO FLEX CONN. ADDED SECT. D & E & DIM. 23'-6½", 8'-3" & 4'-9"; DEL. 1'-0" & 6'-6" 28" ϕ DUCT & ... 72"x10" TO 72"x12" BECHTEL G.H
C 6-28-60 REVISED DIESEL GEN. FOUNDATION BECHTEL F.M
B 5-31-60 ADD'D RAW WATER INLET M.Q 60 & 61 & DIM. BECHTEL G.H
A 5-18-60 REV. EQUIPMENT ARRANGEMENT BECHTEL E.D
RECORD DRAWING - AS BUILT
CONT. No. 6948 REV. G. DATE 3 Feb 61 BY E.D.
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
WS 107A-1 O. S. T. F. (SILO)
VANDENBERG A. F. B. CALIFORNIA
LAUNCH COMPLEX
LAUNCHING SILO
H. V. & A. C. EQUIP. & DUCTWORK
PLAN AT LEVEL 5
(NEG. 60-2) SUP. 71
19 FEB. 1960
3199-1-M-73
D.O. SERIES A.W. 1548/72' REV.
BMD INDEX NO. 4125

FIGURE 13



1-M-114	CONTROL SCHEMATICS
1-M-83	EQUIPMENT SCHEDULE
1-M-84	LEGEND & SYMBOLS
1-M-86	FLOW DIAGRAM
1-S-32	MISC. STEEL DETAILS SHEET 4
1-M-78	SECTION LEVELS 4,5 & 6
1-M-77	SECTION LEVELS 4,5 & 6
DRAWING NO.	TITLE
REFERENCE DRAWINGS	

REVISION	DATE	DESCRIPTION	AGENCY	INIT.
08	3-15-63	OPERATIONAL "AS-BUILT"	SATAF	NH
07	1-20-61	REVISED IN ACCORDANCE WITH O.S.T.F.-2 DISCREPANCY REPORTS	LADE	ED
	8-3-60	RV. BEAMS. MADE RETURN AIR & DIESEL EXH. TO SCALE. C&D DIMS. 18'-7 WAS 19'-0"; 9'-8 WAS 10'-2"; 4'-6" WAS 4'-10". AD DIMS. 23'-6¼", 22'-5", 6'-11, 3'-3, 6. SHOWED INLET & OUTLET, SUCTION & DISCHARGE ON EQUIPMENT. ADD SEC. D/C	BECHTEL	G.H.
	6-28-60	REVISED PUMP LOCATIONS P-80, P-32, P-30, P-31, P-60, P-61	BECHTEL	F.M.
	5-18-60	REVISED EQUIPMENT ARRANGEMENT	BECHTEL	E.D.

BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS

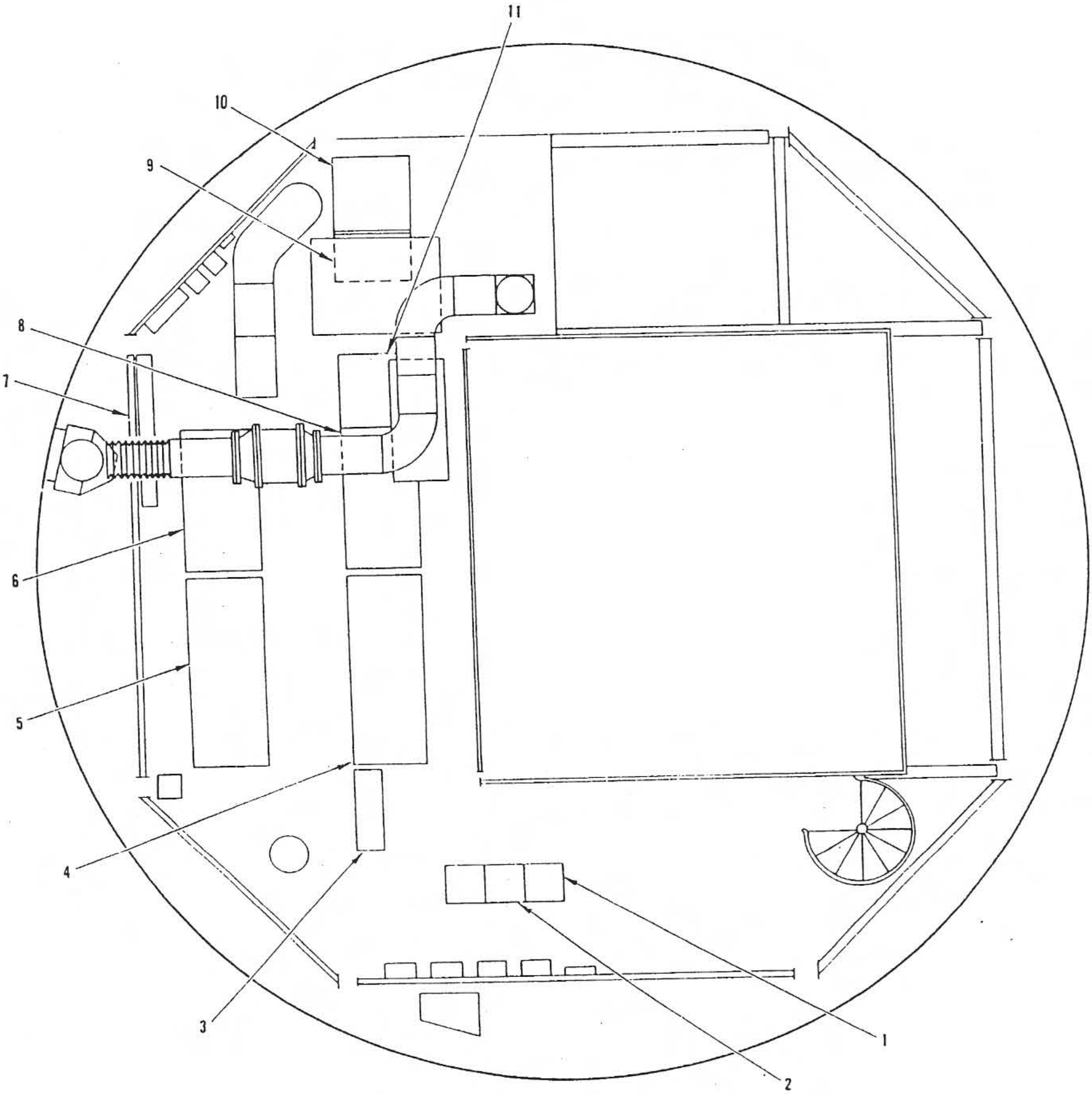
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)

WS 107A-1 O. S. T. F. (SILO)
VANDENBERG A. F. B. CALIFORNIA
LAUNCH COMPLEX
LAUNCHING SILO
H. V. & A. C. EQUIP. & DUCTWORK
PLAN AT LEVEL 4

SPECIFICATION (NEG. 60-2) SUP. 71
DATE 19 FEB. 1960 SCALE 3/8" = 1'-0"
DRAWING NUMBER 3199-1-M-72

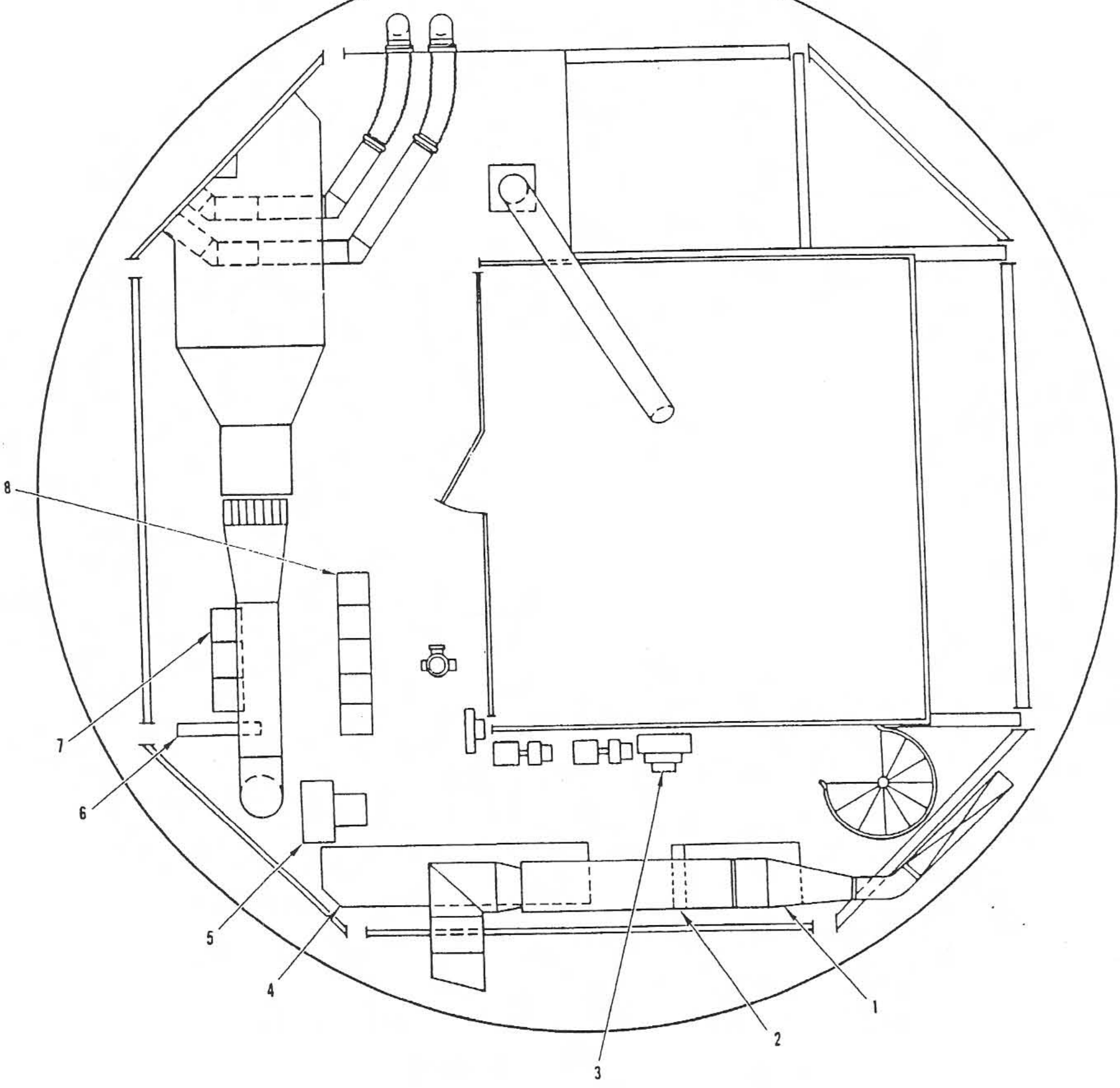
D.O. SERIES A.W. 1548/71 REV.
BMD INDEX NO. 4123

FIGURE 14



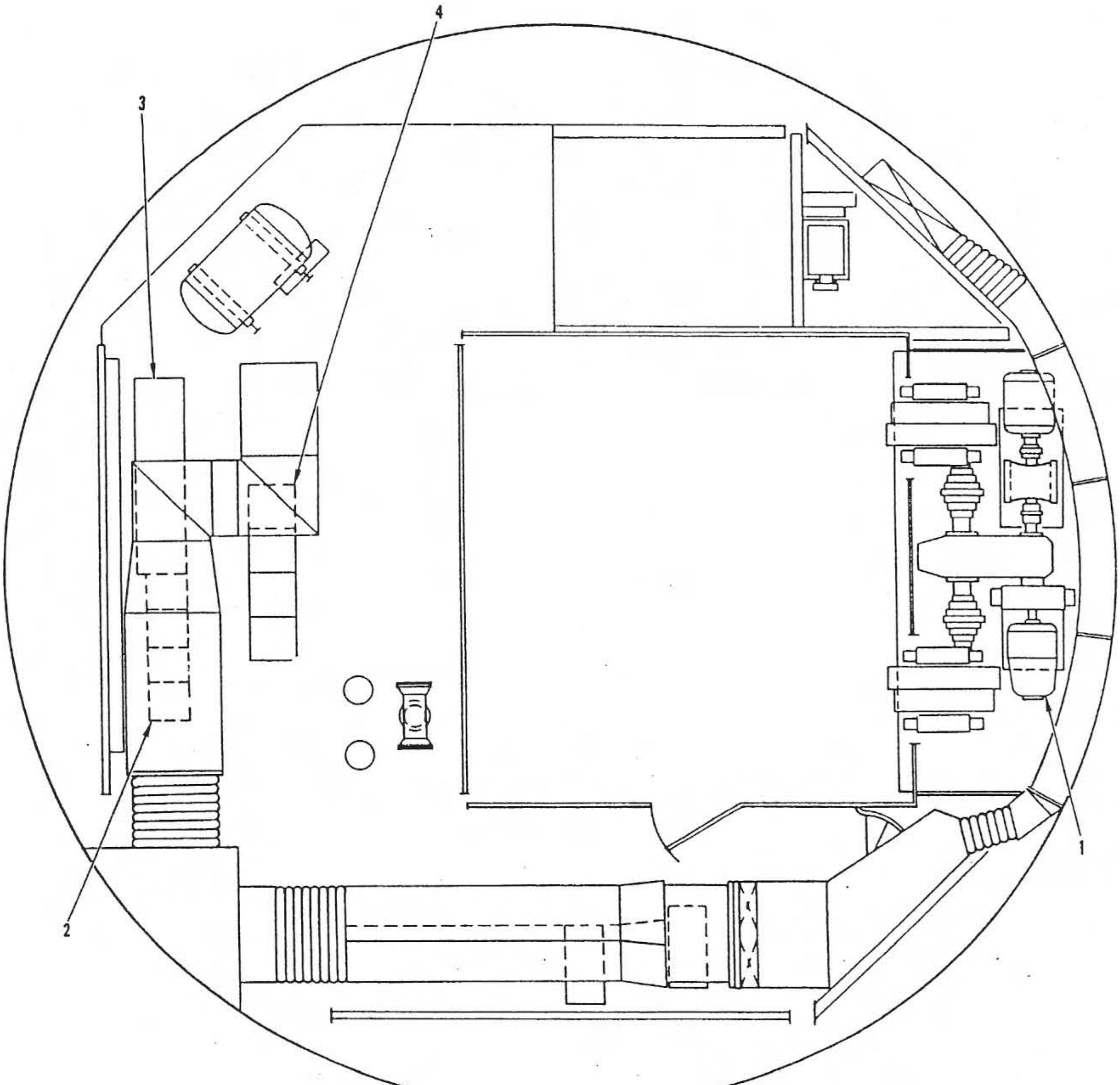
1 RE-ENTRY VEHICLE PRELAUNCH MONITOR
2 GUIDANCE SYSTEM MONITOR
3 FACILITIES INTERFACE CABINET
4 CONTROL MONITOR GROUP 1 OF 4
5 CONTROL MONITOR GROUP 3 OF 4
6 CONTROL MONITOR GROUP 4 OF 4
7 AIR BLAST CLOSURE SYSTEM PRESSURIZATION CONTROL RACK
8 CONTROL MONITOR GROUP 2 OF 4
9 EMERGENCY MISSILE POWER BATTERY
10 MOTOR-GENERATOR SET
11 POWER SUPPLY AND DISTRIBUTION UNIT

FIGURE 15 Level Three



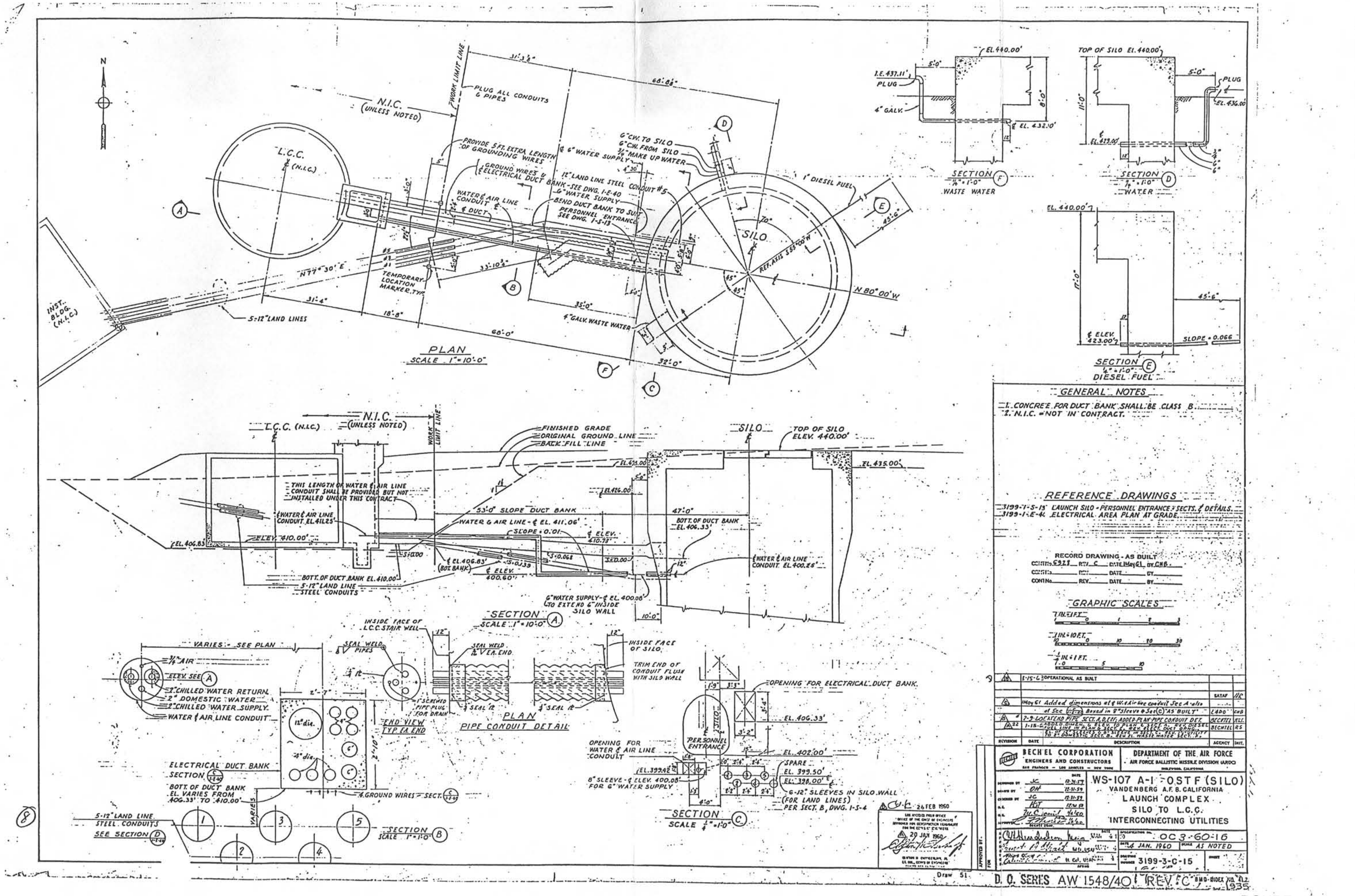
1 HYDRAULIC RESERVOIR
2 HYDRAULIC RESERVOIR CONTROL PANEL
3 HYDRAULIC MANIFOLDS
4 ACCUMULATOR RACK
5 HYDRAULIC CONTROL PANEL
6 EXHAUST PLENUM VENT CONTROL PANEL
7 ESSENTIAL MOTOR CONTROL CENTER
8 NONESSENTIAL MOTOR CONTROL CENTER

FIGURE 16 Level Two

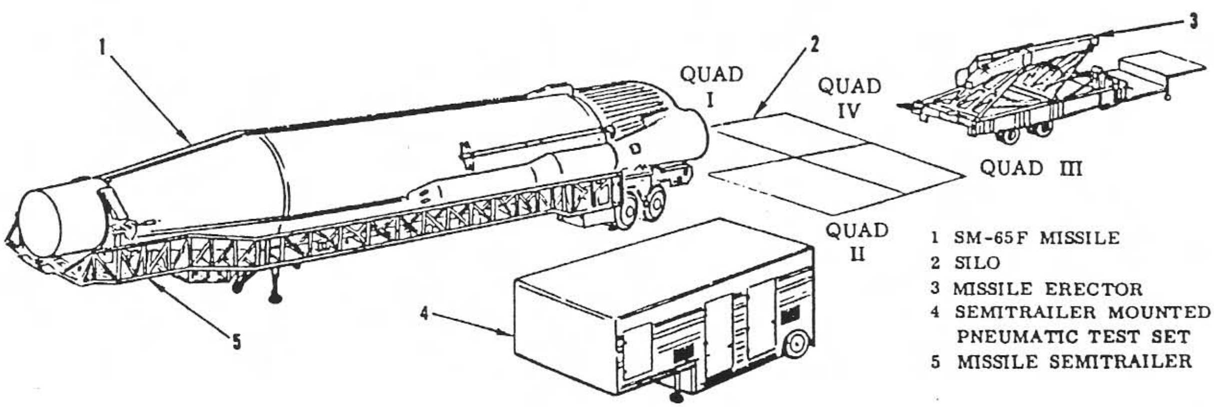


1 LAUNCHER PLATFORM DRIVE
2 LAUNCHER PLATFORM MOTOR CONTROL CENTER
3 LAUNCHER PLATFORM DRIVE CONTROL
4 LOGIC RACKS

FIGURE 17 Level One

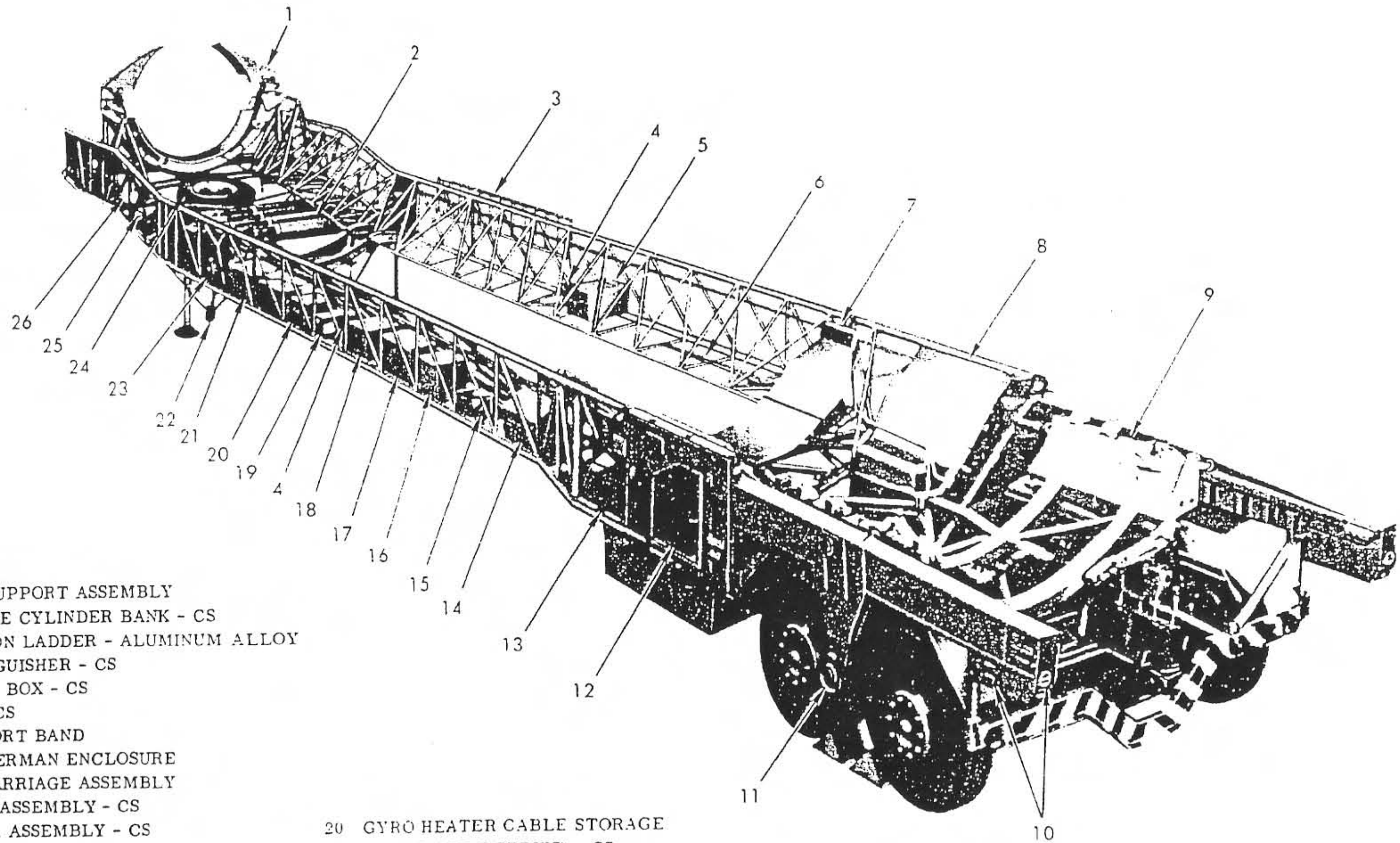

PLAN
SCALE 1" = 10'-0"
L.C.C. (N.I.C.)
SILO
N.I.C. (UNLESS NOTED)
WORK LIMIT LINE
PLUG ALL CONDUITS 6 PIPES
PROVIDE 5 FT. EXTRA LENGTH OF GROUNDING WIRES
GROUND WIRES & ELECTRICAL DUCT BANK
WATER & AIR LINE CONDUIT
6" CW. TO SILO
6" CW. FROM SILO
3/4" MAKE UP WATER
1" DIESEL FUEL
5-12" LAND LINES
INST. BLDG. (N.I.C.)
TEMPORARY LOCATION MARKER, TYP.
N 80° 00' W
4" GALV. WASTE WATER
SECTION (F)
WASTE WATER
SECTION (D)
WATER
SECTION (E)
DIESEL FUEL
TOP OF SILO EL. 440.00'
FINISHED GRADE
ORIGINAL GROUND LINE
BACK FILL LINE
TOP OF SILO ELEV. 440.00'
53'-0" SLOPE DUCT BANK
WATER & AIR LINE - ¢ EL. 411.06'
BOTT. OF DUCT BANK EL. 410.00'
5-12" LAND LINE STEEL CONDUITS
6" WATER SUPPLY - ¢ EL. 400.00' TO EXTEND 6" INSIDE SILO WALL
SECTION (A)
SCALE 1" = 10'-0"
GENERAL NOTES
1. CONCRETE FOR DUCT BANK SHALL BE CLASS B.
2. N.I.C. = NOT IN CONTRACT.
REFERENCE DRAWINGS
3199-1-S-13 LAUNCH SILO - PERSONNEL ENTRANCE - SECTS. & DETAILS.
3199-1-E-41 ELECTRICAL AREA PLAN AT GRADE.
RECORD DRAWING - AS BUILT
GRAPHIC SCALES
PLAN
PIPE CONDUIT DETAIL
END VIEW
TYP. EA. END
ELECTRICAL DUCT BANK
SECTION (C)
SECTION (B)
SCALE 1" = 1'-0"
OPENING FOR ELECTRICAL DUCT BANK
PERSONNEL ENTRANCE
6-12" SLEEVES IN SILO WALL (FOR LAND LINES) PER SECT. B, DWG. 1-S-4
SECTION (C)
SCALE 1/4" = 1'-0"
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
WS-107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
SILO TO L.C.C.
INTERCONNECTING UTILITIES
OC 3-60-16
4 JAN. 1960
AS NOTED
3199-3-C-15
D. O. SERIES AW 1548/40 REV. C

FGURE 18



Position of Guided Missile Semitrailer, Missile Erector, and Semitrailer Mounted Pneumatic Test Set in Relation to Silo

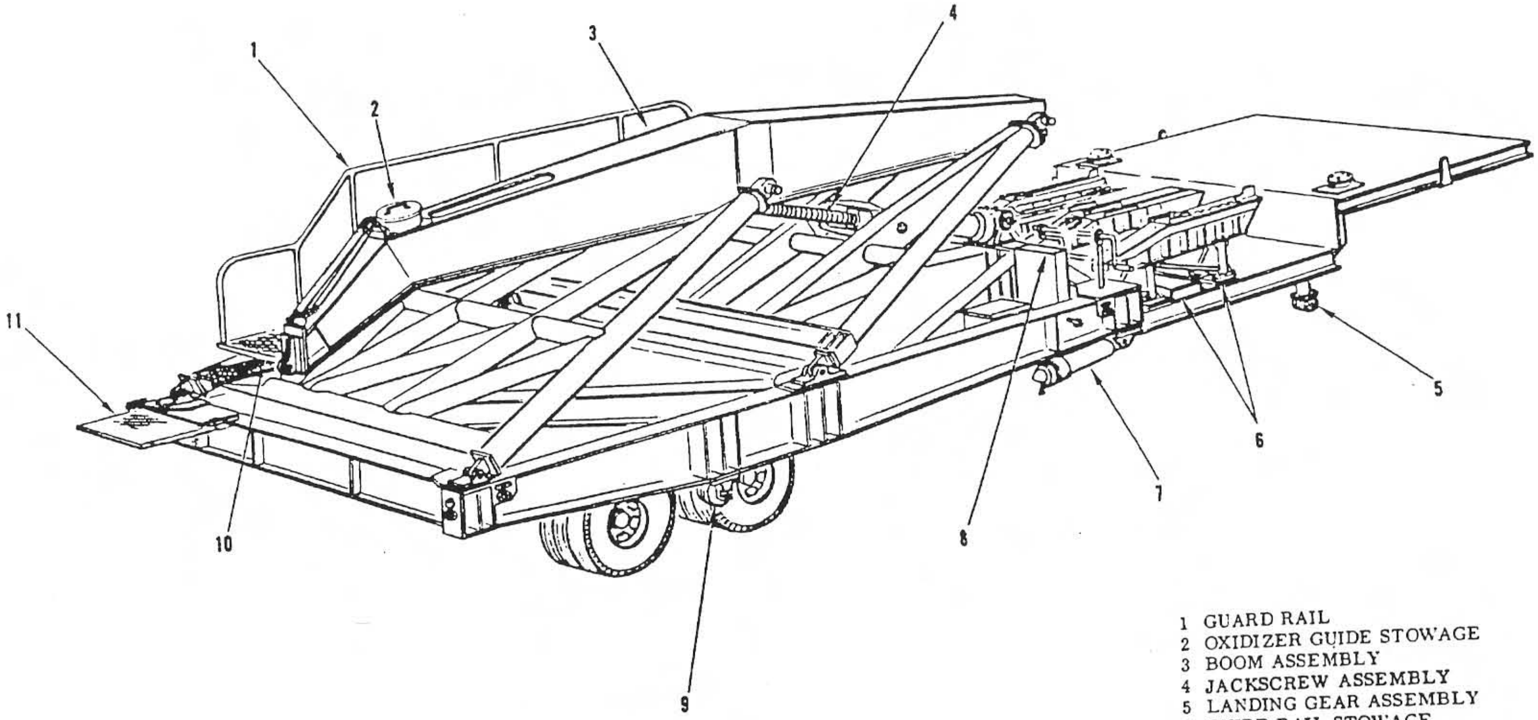
FIGURE 19



1 FORWARD SUPPORT ASSEMBLY
2 GAS STORAGE CYLINDER BANK - CS
3 OBSERVATION LADDER - ALUMINUM ALLOY
4 FIRE EXTINGUISHER - CS
5 RIGHT TOOL BOX - CS
6 TOW BAR - CS
7 REAR SUPPORT BAND
8 RIGHT TILLERMAN ENCLOSURE
9 BOOSTER CARRIAGE ASSEMBLY
10 TAIL LIGHT ASSEMBLY - CS
11 AFT CASTER ASSEMBLY - CS
12 LEFT TILLERMAN ENCLOSURE
13 AIG POD SUPPORT - CS
14 REAR SUPPORT BAND AND MATE - DEMATE CONTROL UNIT CABINET - CS
15 REAR JACK PAD STOWAGE BRACKET - CS
16 GASOLINE ENGINE ELECTRICAL CONTROL PANEL CABINET - CS
17 BATTERY BOX - CS
18 LEFT TOOL BOX - CS
19 VOLTAGE REGULATOR BOX - CS
20 GYRO HEATER CABLE STORAGE BOX (E AND F SERIES) - CS
21 STABILIZATION SYSTEM CONTROL UNIT CABINET - CS
22 FORWARD CASTER ASSEMBLY - CS
23 GASOLINE ENGINE - CS
24 SPARE TIRE INSTALLATION - CS
25 FORWARD JACK PAD STOWAGE BRACKET - CS
26 FORWARD SUPPORT CONTROL UNIT CABINET - CS

FIGURE 20

Guided Missile Semitrailer



1 GUARD RAIL
2 OXIDIZER GUIDE STOWAGE
3 BOOM ASSEMBLY
4 JACKSCREW ASSEMBLY
5 LANDING GEAR ASSEMBLY
6 GUIDE RAIL STOWAGE
7 SUPPORT ASSEMBLY
8 POWER CONTROL PANEL
9 AFT CASTER ASSEMBLY
10 MISSILE ERECTOR PLATFORM
11 RETRACTABLE WORK PLATFORM

FIGURE 21

Trailer Mounted Guided Missile Erector

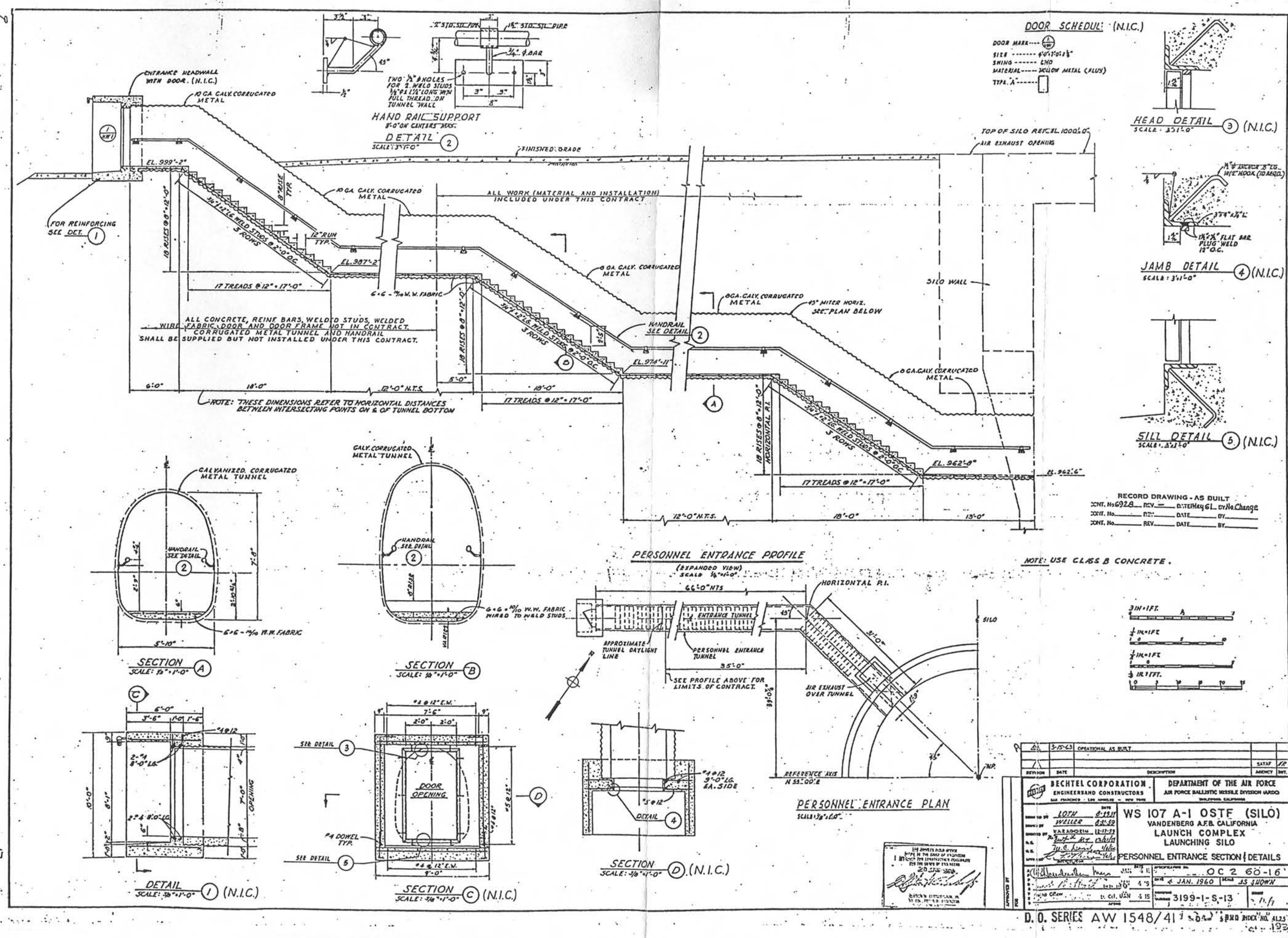
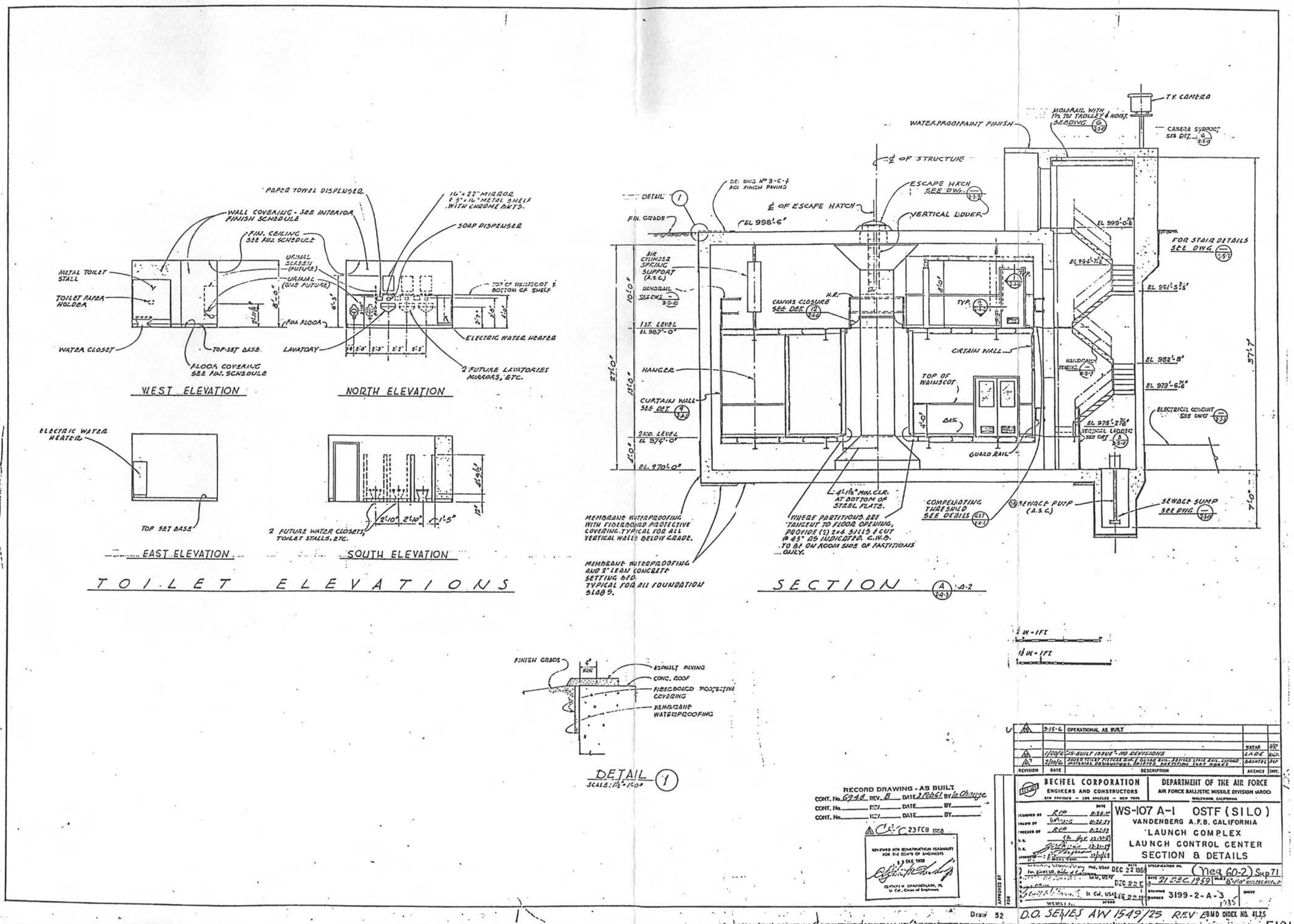

ENTRANCE HEADWALL WITH DOOR. (N.I.C.)
10 GA. GALV. CORRUGATED METAL
HAND RAIL SUPPORT
DETAIL 2
SCALE: 3"=1'-0"
FINISHED GRADE
TOP OF SILO REF. EL. 1000'-0"
AIR EXHAUST OPENING
EL. 999'-2"
EL. 987'-2"
EL. 974'-11"
EL. 962'-8"
FOR REINFORCING SEE DET. 1
18 RISES @ 8" = 12'-0"
17 TREADS @ 12" = 17'-0"
3 ROWS
ALL WORK (MATERIAL AND INSTALLATION) INCLUDED UNDER THIS CONTRACT
ALL CONCRETE, REINF BARS, WELD STUDS, WELDED WIRE FABRIC, DOOR AND DOOR FRAME NOT IN CONTRACT. CORRUGATED METAL TUNNEL AND HANDRAIL SHALL BE SUPPLIED BUT NOT INSTALLED UNDER THIS CONTRACT.
NOTE: THESE DIMENSIONS REFER TO HORIZONTAL DISTANCES BETWEEN INTERSECTING POINTS ON ℄ OF TUNNEL BOTTOM
HANDRAIL SEE DETAIL 2
45° MITER HORIZ. SEE PLAN BELOW
SILO WALL
HORIZONTAL P.I.
DOOR SCHEDULE (N.I.C.)
HEAD DETAIL 3 (N.I.C.)
JAMB DETAIL 4 (N.I.C.)
SILL DETAIL 5 (N.I.C.)
RECORD DRAWING - AS BUILT
NOTE: USE CLASS B CONCRETE.
PERSONNEL ENTRANCE PROFILE
(EXPANDED VIEW)
GALVANIZED CORRUGATED METAL TUNNEL
SECTION A
SECTION B
SECTION C (N.I.C.)
SECTION D (N.I.C.)
DETAIL 1 (N.I.C.)
DOOR OPENING
SEE DETAIL 3
SEE DETAIL 5
#4 DOWEL TYP.
ENTRANCE TUNNEL
PERSONNEL ENTRANCE TUNNEL
APPROXIMATE TUNNEL DAYLIGHT LINE
SEE PROFILE ABOVE FOR LIMITS OF CONTRACT.
AIR EXHAUST OVER TUNNEL
SILO
REFERENCE AXIS N 55°00' E
PERSONNEL ENTRANCE PLAN
3-15-63 OPERATIONAL AS BUILT
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
WS 107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
LAUNCHING SILO
PERSONNEL ENTRANCE SECTION & DETAILS
OC 2 60-16
4 JAN. 1960
AS SHOWN
3199-1-S-13
D. O. SERIES AW 1548/41

FIGURE 22


TOILET ELEVATIONS
WEST ELEVATION
NORTH ELEVATION
EAST ELEVATION
SOUTH ELEVATION
SECTION A 2-4-3 A-2
DETAIL 1
SCALE: 1½"=1'-0"
T.V. CAMERA
WATERPROOF PAINT FINISH
ESCAPE HATCH
VERTICAL LADDER
FOR STAIR DETAILS SEE DWG.
SEWAGE PUMP (A.S.C.)
SEWAGE SUMP SEE DWG
COMPENSATING THRESHOLD SEE DETAILS
GUARD RAIL
CURTAIN WALL
HANGER
1ST. LEVEL EL 987'-0"
2ND. LEVEL EL 974'-0"
EL. 970'-0"
EL 998'-6"
EL 999'-0"
EL 982'-8"
MEMBRANE WATERPROOFING AND 2" LEAN CONCRETE SETTING BED. TYPICAL FOR ALL FOUNDATION SLABS.
FINISH GRADE
ASPHALT PAVING
CONC. ROOF
FIBERBOARD PROTECTIVE COVERING
MEMBRANE WATERPROOFING
RECORD DRAWING - AS BUILT
CONT. No. 6948 REV. B DATE 2 Feb 61 BY la Change
23 FEB 1960
REVIEWED FOR CONSTRUCTION FEASIBILITY FOR THE CORPS OF ENGINEERS
3:15:6 OPERATIONAL AS BUILT
1/20/6 AS-BUILT ISSUE - NO REVISIONS
REVISION
DATE
DESCRIPTION
AGENCY
INIT.
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO - LOS ANGELES - NEW YORK
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
INGLEWOOD, CALIFORNIA
WS-107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
LAUNCH CONTROL CENTER
SECTION & DETAILS
DEC 22 1959
(Neg 60-2) Sup 71
21 DEC 1959
3199-2-A-3
Draw 52
D.O. SERIES AW 1549/25 REV E
BMD INDEX NO. 4L25

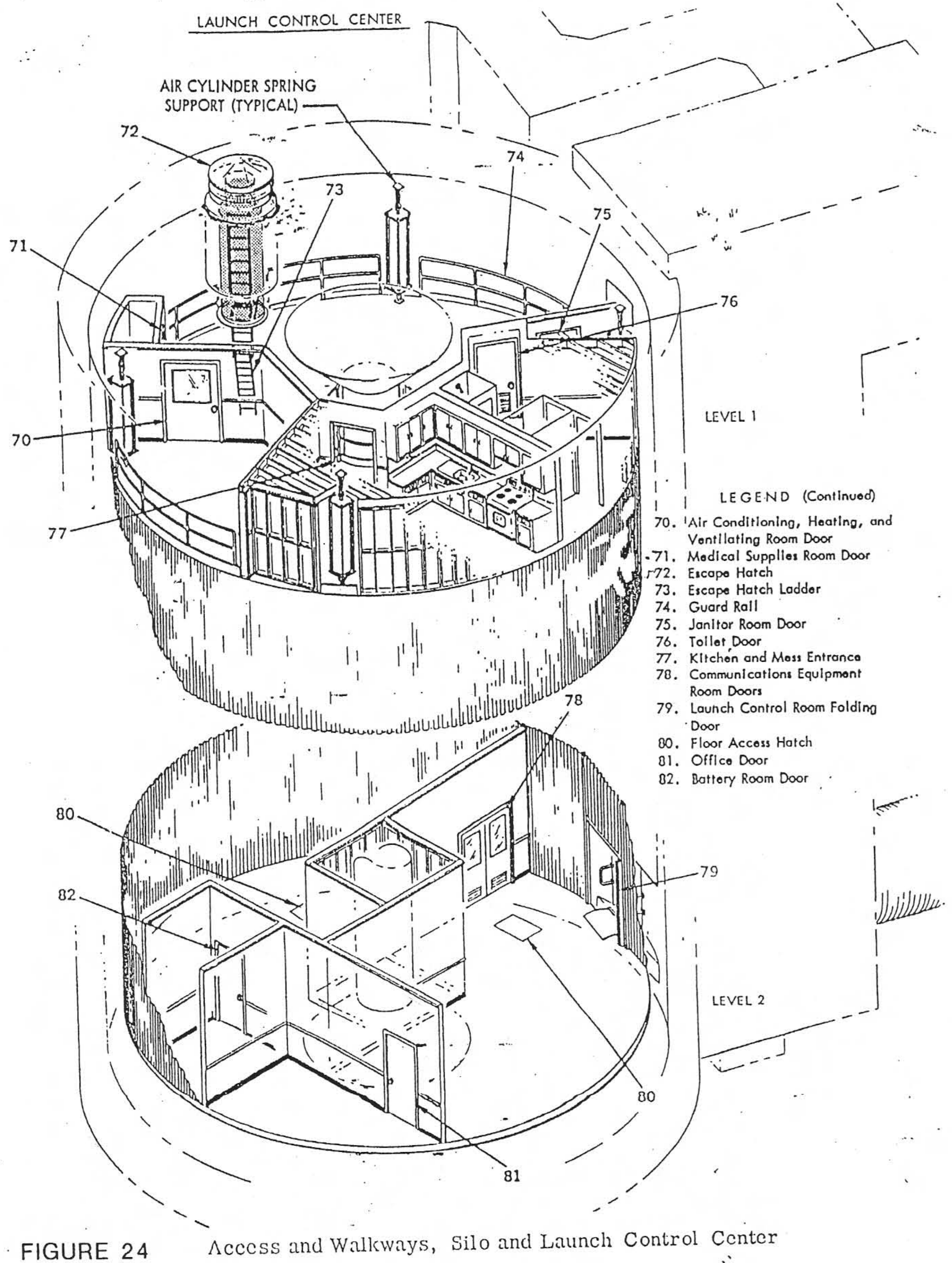
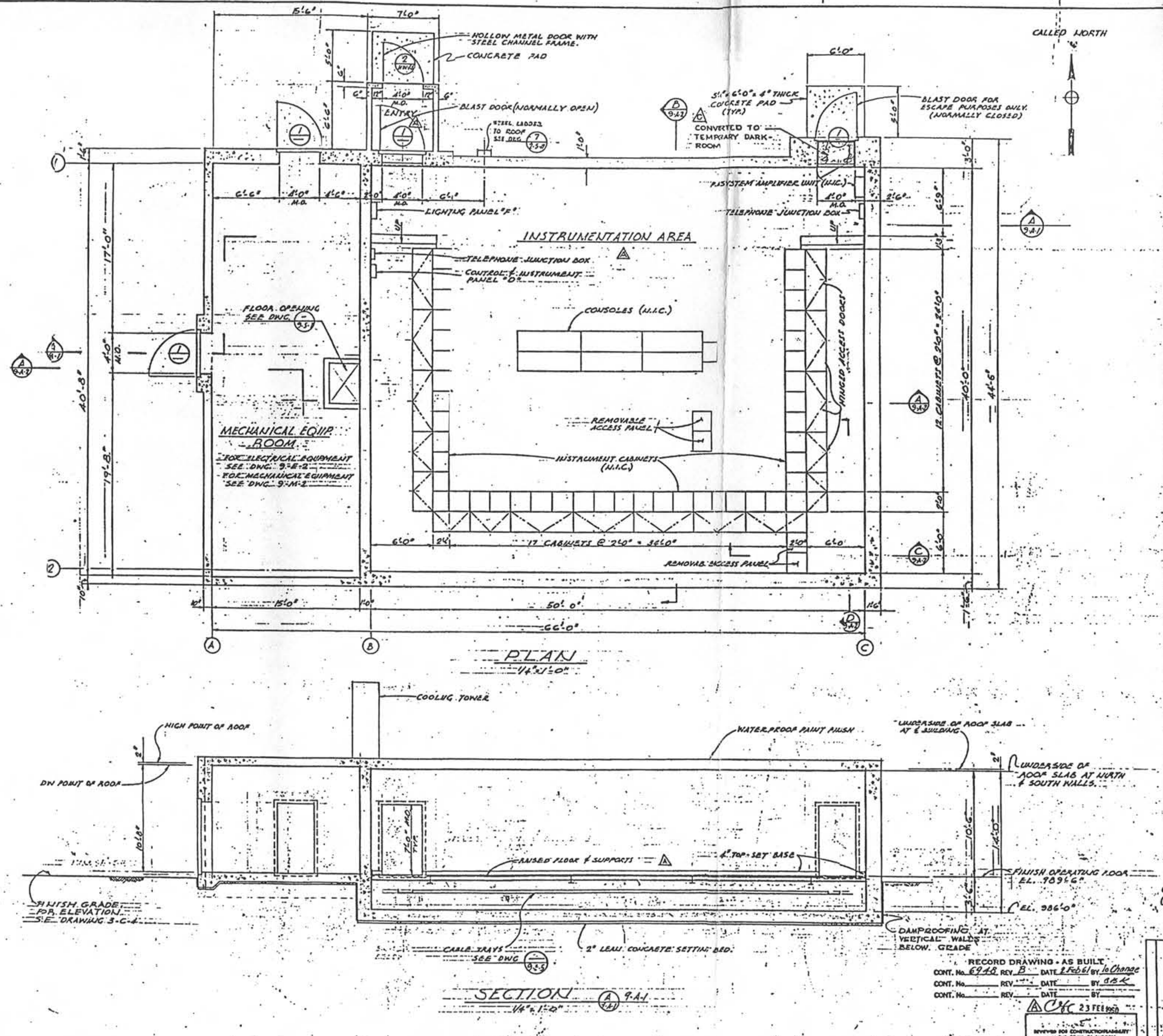


FIGURE 24 Access and Walkways, Silo and Launch Control Center



GENERAL NOTES

1. DOORS No 1 SHALL BE BLAST RESISTANT. NOMINAL SIZE 4'-0" x 7'-0". FOR EXACT SIZE AND DETAILS SEE DWG. 9-S-9.
   DOOR No 2 SHALL BE HOLLOW METAL DOOR. NOMINAL SIZE 4'-0" x 7'-0" x 1¾" THICK. FRAME SHALL BE GLB.2 DETAILED IN DWG. 9-S-7. UPPER PORTION OF DOOR GLAZED WITH ¼" THICK CLEAR POLISHED WIRE GLASS.
2. MECHANICAL EQUIPMENT ROOM AND ENTRY: FLOOR SHALL BE CONCRETE SLAB, STEEL TROWEL FINISH. WALLS AND CEILING SHALL BE EXPOSED CONCRETE.
3. INSTRUMENTATION AREA: SUBFLOOR SHALL BE CONCRETE SLAB, WOODFLOAT FINISH.
   RAISED FLOOR SHALL BE ¼" STEEL PLATE WITH LINOLEUM TILE FLOOR COVERING. WALLS & CEILING SHALL BE EXPOSED CONCRETE. WALLS SHALL HAVE A 4" HIGH TOP-SET BASE AT THE FLOOR.
4. PAINTING SHALL BE IN ACCORDANCE WITH GENERAL NOTE No. 4 ON DWG. 3199-2-A-1.
5. PAINTED SURFACES:
   a) METAL DOORS AND DOOR FRAMES, COLOR: No 14373.
   b) EXTERIOR OF ROOF SLAB.
   c) EXPOSED PORTION OF STEEL STAIRS, COLOR No 24373.
6. UNPAINTED SURFACES:
   a) ALL INTERIOR CONCRETE SURFACES
   b) EXTERIOR CONCRETE WALLS ABOVE GRADE.
   c) STEEL FLOOR FRAMING.
7. ELEVATIONS SHOWN ARE BASED ON A REFERENCE ELEVATION AT TOP OF FINISHED OPERATING FLOOR = 989'-6". FOR ACTUAL ELEVATION SEE DWG. 3199-3-C-4.

LEGEND

DOOR NUMBER. SEE GENERAL NOTES ON THIS DRAWING.
HARDWARE SET NUMBER - SEE SPECIFICATION.
SECTION LETTER OR DETAIL NUMBER
DRAWING ON WHICH SECTION OR DETAIL APPEARS
COLUMN LINE NUMBER OR LETTER.

DENOTES REINFORCED CONCRETE WALLS

CONC. CONCRETE
MAX. MAXIMUM
M.O. MASONRY OPENING
N.I.C. NOT IN CONTRACT
O.C. ON CENTERS.

NOTE:
CHECK: 1935- FOR SOME ADDL DETAILS - DO AW 1549/1-73

REVISION	DATE	DESCRIPTION	AGENCY	INIT.
C	[illegible]	"AS - BUILT"		
B	3-15-63	OPERATIONAL AS BUILT	SATAS	
A	1/20/61	AS-BUILT ISSUE - NO REVISION.	LADE	
3	2/10/60	[illegible] EQUIPMENT & GENERAL NOTES TO SUIT.		

RECORD DRAWING - AS BUILT
CONT. No. 6948 REV. B DATE 2 Feb 61 BY lo Change
CONT. No. ____ REV. ____ DATE ____ BY BBK
CONT. No. ____ REV. ____ DATE ____ BY ____

CFC 23 FEB 1960

REVIEWED FOR CONSTRUCTION-FEASIBILITY BY THE CORPS OF ENGINEERS

BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO — LOS ANGELES — NEW YORK

DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)

DESIGNED BY RCP [illegible]
DRAWN BY CH/G, HG [illegible]
CHECKED BY RCP [illegible]

WS-107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
INSTRUMENTATION BUILDING
FLOOR PLAN

SPECIFICATION No. 9 (Neg 60-2) Sup 71
DATE 21 DEC. 1959 SCALE ¼" = 1'-0"
DRAWING NUMBER 3199-9-A-1

D.O. SERIES AW 1549/74 REV. B 1931-1-1

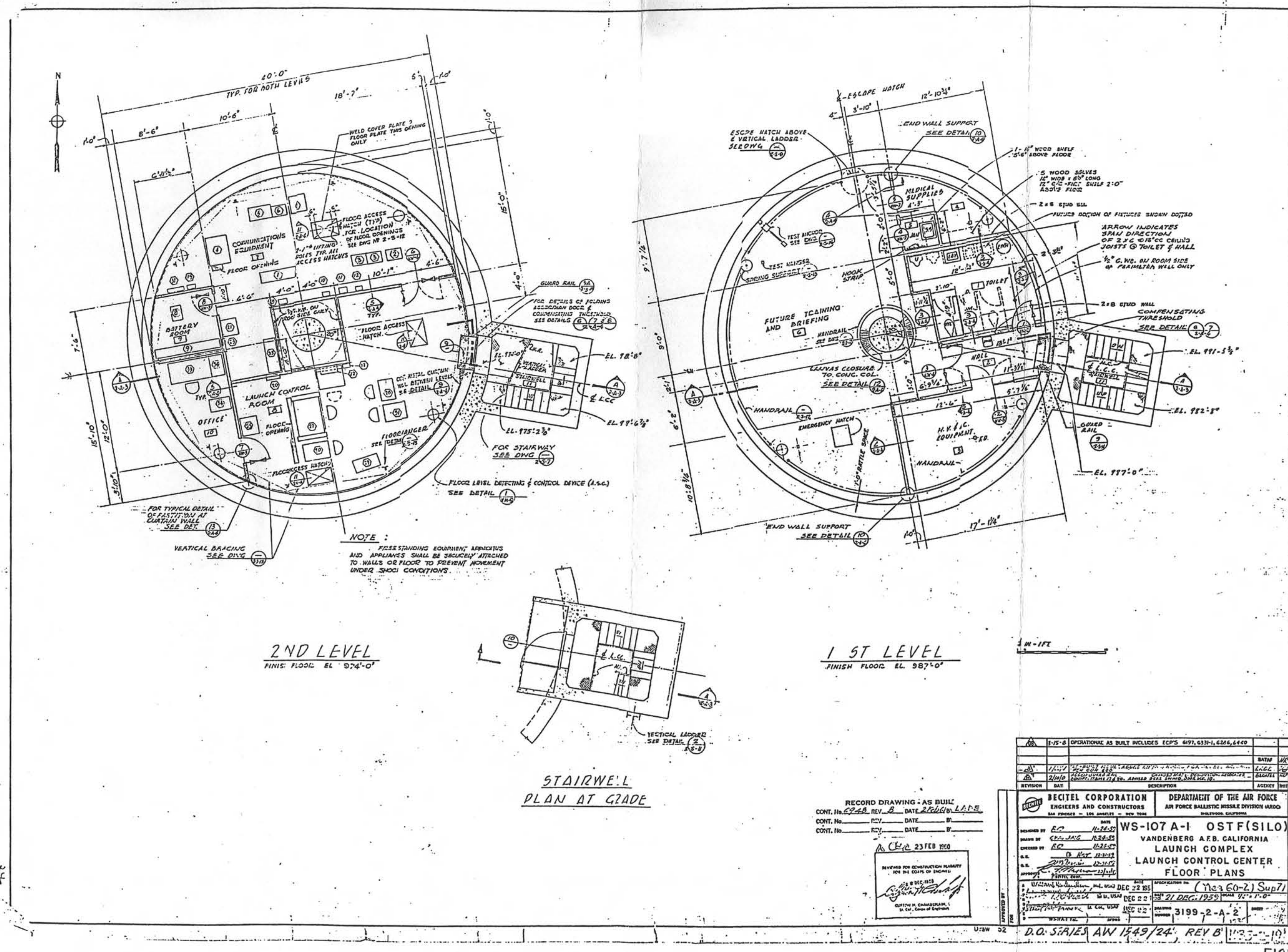
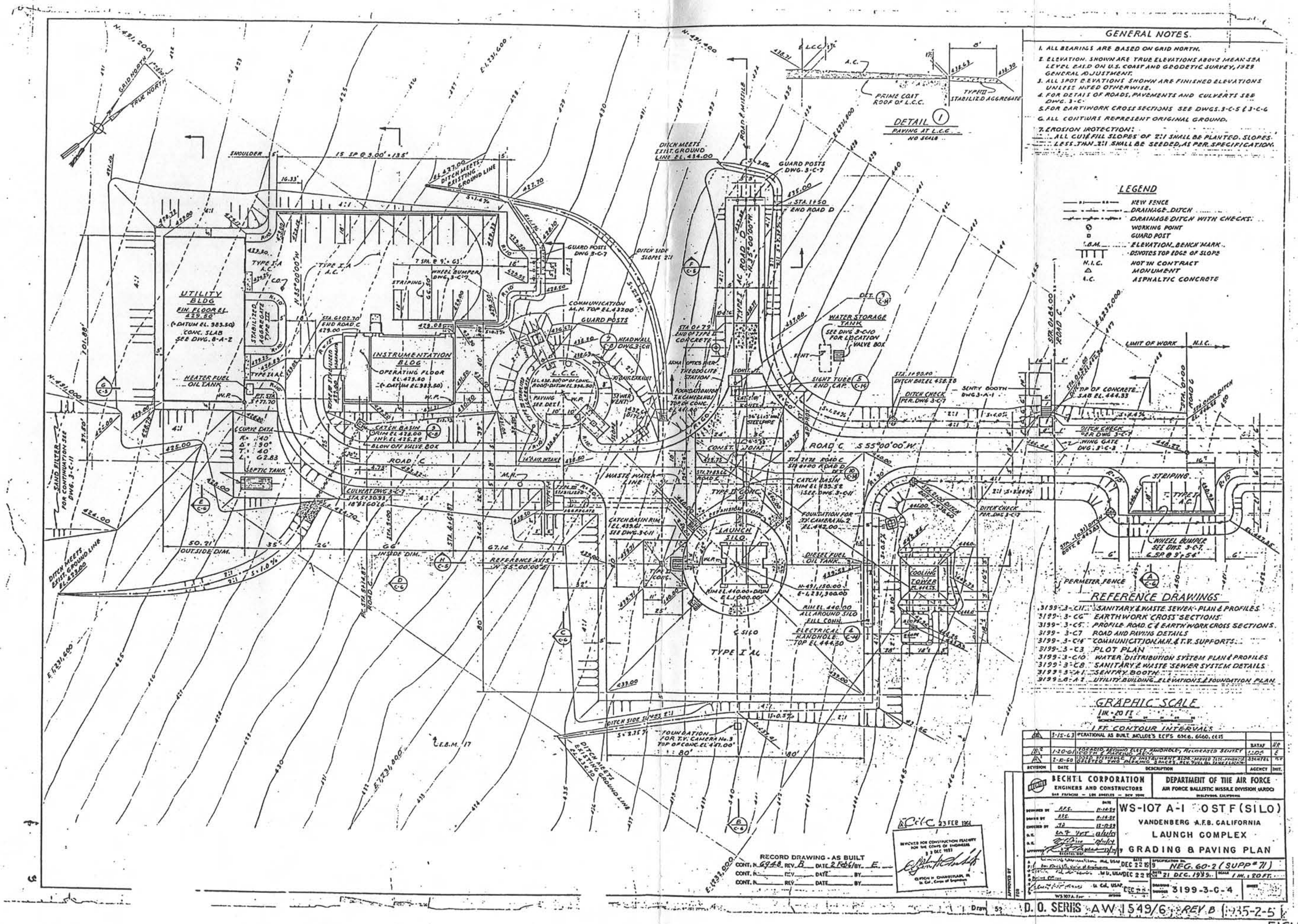
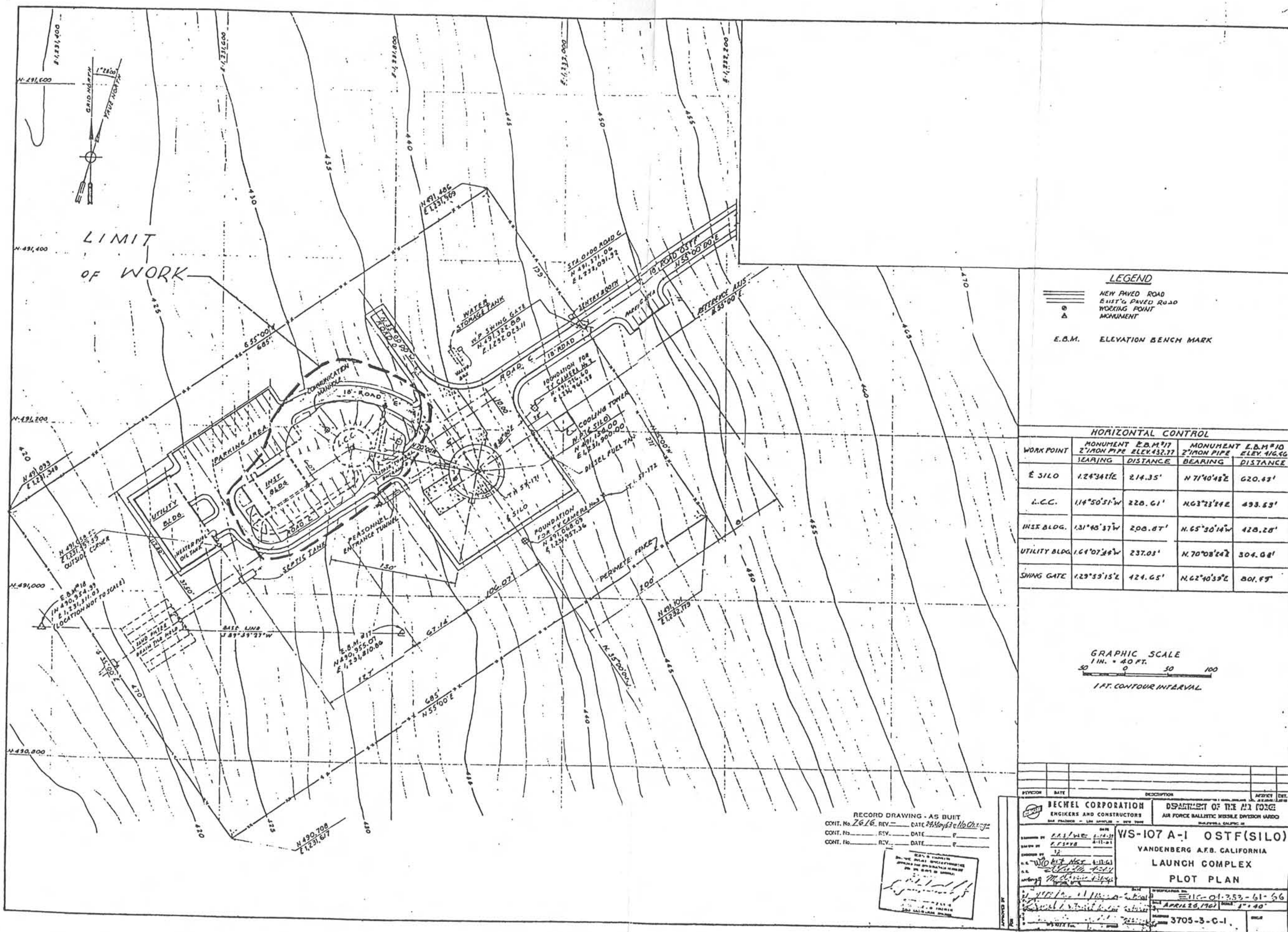

2ND LEVEL
FINISH FLOOR EL 974'-0"
1 ST LEVEL
FINISH FLOOR EL. 987'-0"
STAIRWELL
PLAN AT GRADE
NOTE :
FREESTANDING EQUIPMENT APPARATUS AND APPLIANCES SHALL BE SECURELY ATTACHED TO WALLS OR FLOOR TO PREVENT MOVEMENT UNDER SHOCK CONDITIONS.
LAUNCH CONTROL ROOM
OFFICE
BATTERY ROOM
COMMUNICATIONS EQUIPMENT
FUTURE TRAINING AND BRIEFING
MEDICAL SUPPLIES
TOILET
H.V. & A.C. EQUIPMENT
EMERGENCY HATCH
ESCAPE HATCH
END WALL SUPPORT SEE DETAIL
RECORD DRAWING - AS BUILT
3-15-6 OPERATIONAL AS BUILT INCLUDES ECP'S 6197, 6331-1, 6286, 6440
REVISION
DATE
DESCRIPTION
AGENCY
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO - LOS ANGELES - NEW YORK
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
INGLEWOOD, CALIFORNIA
WS-107 A-1 OSTF(SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
LAUNCH CONTROL CENTER
FLOOR PLANS
21 DEC. 1959
3199-2-A-2
D.O. SERIES AW 1549/24, REV B

FIGURE 25



GENERAL NOTES.
1. ALL BEARINGS ARE BASED ON GRID NORTH.
2. ELEVATION. SHOWN ARE TRUE ELEVATIONS ABOVE MEAN SEA LEVEL BASED ON U.S. COAST AND GEODETIC SURVEY, 1929 GENERAL ADJUSTMENT.
3. ALL SPOT ELEVATIONS SHOWN ARE FINISHED ELEVATIONS UNLESS NOTED OTHERWISE.
4. FOR DETAILS OF ROADS, PAVEMENTS AND CULVERTS SEE DWG. 3-C-
5. FOR EARTHWORK CROSS SECTIONS SEE DWGS. 3-C-5 & 3-C-6
6. ALL CONTOURS REPRESENT ORIGINAL GROUND.
7. EROSION PROTECTION:
ALL CUT & FILL SLOPES OF 2:1 SHALL BE PLANTED. SLOPES LESS THAN 2:1 SHALL BE SEEDED, AS PER SPECIFICATION.
DETAIL 1
PAVING AT L.C.C.
NO SCALE
PRIME COAT ROOF OF L.C.C.
TYPE III STABILIZED AGGREGATE
LEGEND
NEW FENCE
DRAINAGE DITCH
DRAINAGE DITCH WITH CHECKS
WORKING POINT
GUARD POST
ELEVATION BENCH MARK
DENOTES TOP EDGE OF SLOPE
N.I.C. NOT IN CONTRACT
MONUMENT
A.C. ASPHALTIC CONCRETE
GRID NORTH
TRUE NORTH
UTILITY BLDG
INSTRUMENTATION BLDG
L.C.C.
LAUNCH SILO
WATER STORAGE TANK
COOLING TOWER
HEATER FUEL OIL TANK
SEPTIC TANK
DIESEL FUEL OIL TANK
ROAD C S 55°00'00" W
ROAD D
LIMIT OF WORK
PERIMETER FENCE
REFERENCE DRAWINGS
3199-3-C11 SANITARY & WASTE SEWER PLAN & PROFILES
3199-3-C6 EARTHWORK CROSS SECTIONS
3199-3-C5 PROFILE ROAD C & EARTHWORK CROSS SECTIONS
3199-3-C7 ROAD AND PAVING DETAILS
3199-3-C14 COMMUNICATION M.H. & T.V. SUPPORTS
3199-3-C3 PLOT PLAN
3199-3-C10 WATER DISTRIBUTION SYSTEM PLAN & PROFILES
3199-3-C8 SANITARY & WASTE SEWER SYSTEM DETAILS
3199-3-A1 SENTRY BOOTH
3199-8-A2 UTILITY BUILDING ELEVATIONS & FOUNDATION PLAN
GRAPHIC SCALE
1 IN. = 20 FT
1 FT. CONTOUR INTERVALS
3-15-63 OPERATIONAL AS BUILT INCLUDES ECPS 6366, 6460, 6615
1-20-61
2-10-60
REVISION DATE DESCRIPTION AGENCY INIT.
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO - LOS ANGELES - NEW YORK
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
INGLEWOOD, CALIFORNIA
WS-107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
GRADING & PAVING PLAN
NEG. 60-2 (SUPP #71)
21 DEC. 1959
1 IN. = 20 FT.
3199-3-C-4
RECORD DRAWING - AS BUILT
D. O. SERIES AW 1549/6 REV B

FIGURE 27



HORIZONTAL CONTROL

WORK POINT	MONUMENT E.B.M.#17 2" IRON PIPE ELEV. 432.77		MONUMENT E.B.M.#10 2" IRON PIPE ELEV. 416.46	
	BEARING	DISTANCE	BEARING	DISTANCE
℄ SILO	1.24°34'21"E	214.35'	N 71°40'48"E	620.47'
L.C.C.	1.14°50'51"W	228.61'	N.63°23'24"E	493.53'
INST. BLDG.	1.31°48'37"W	208.87'	N.65°30'14"W	428.28'
UTILITY BLDG.	1.64°07'44"W	237.03'	N.70°08'24"E	304.08'
SWING GATE	1.29°59'15"E	424.65'	N.62°40'39"E	801.95'

FGURE 28

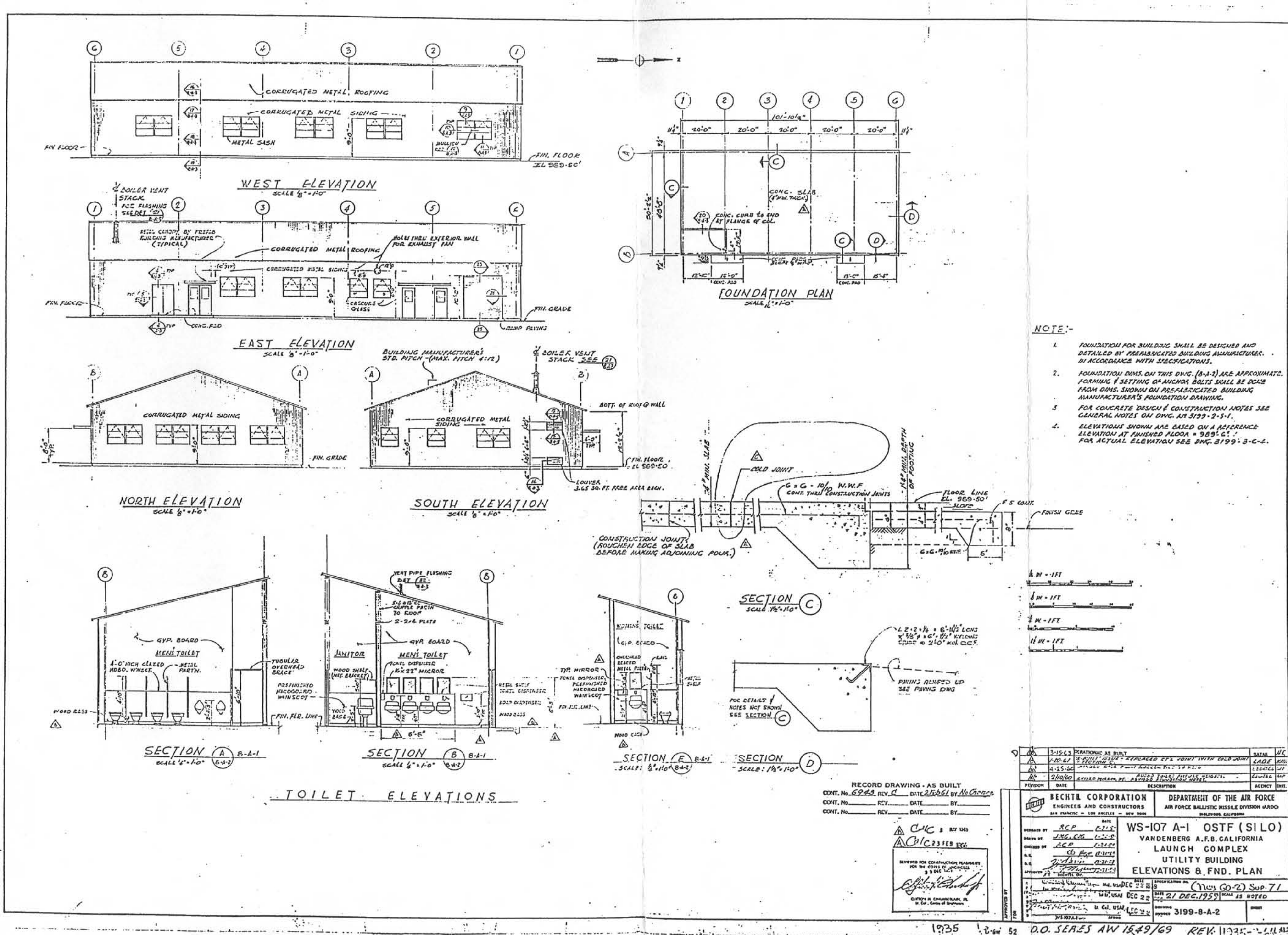

WEST ELEVATION
SCALE 1/8" = 1'-0"
CORRUGATED METAL ROOFING
CORRUGATED METAL SIDING
METAL SASH
FIN. FLOOR EL 989.50'
EAST ELEVATION
SCALE 1/8" = 1'-0"
CORRUGATED METAL ROOFING
HOLES THRU EXTERIOR WALL FOR EXHAUST FAN
FIN. GRADE
NORTH ELEVATION
SCALE 1/8" = 1'-0"
CORRUGATED METAL SIDING
SOUTH ELEVATION
SCALE 1/8" = 1'-0"
BUILDING MANUFACTURER'S STD. PITCH - (MAX. PITCH 4:12)
CORRUGATED METAL SIDING
FOUNDATION PLAN
SCALE 1/8" = 1'-0"
CONC. SLAB
SECTION C
SCALE 1 1/2" = 1'-0"
COLD JOINT
CONSTRUCTION JOINTS (ROUGHEN EDGE OF SLAB BEFORE MAKING ADJOINING POUR.)
FLOOR LINE EL. 989.50'
SECTION D
SCALE: 1 1/2" = 1'-0"
PAVING RAMPED UP SEE PAVING DWG
GYP. BOARD
MEN'S TOILET
JANITOR
WOMEN'S TOILET
SECTION A B-A-1
SECTION B B-A-1
SECTION E B-A-1
TOILET ELEVATIONS
NOTE:-
1. FOUNDATION FOR BUILDING SHALL BE DESIGNED AND DETAILED BY PREFABRICATED BUILDING MANUFACTURER. IN ACCORDANCE WITH SPECIFICATIONS.
2. FOUNDATION DIMS. ON THIS DWG. (8-A-2) ARE APPROXIMATE. FORMING & SETTING OF ANCHOR BOLTS SHALL BE DONE FROM DIMS. SHOWN ON PREFABRICATED BUILDING MANUFACTURER'S FOUNDATION DRAWING.
3 FOR CONCRETE DESIGN & CONSTRUCTION NOTES SEE GENERAL NOTES ON DWG. AN 3199-2-S-1.
4. ELEVATIONS SHOWN ARE BASED ON A REFERENCE ELEVATION AT FINISHED FLOOR = 989'-6". FOR ACTUAL ELEVATION SEE DWG. 3199-3-C-4.
RECORD DRAWING - AS BUILT
CONT. No. 6949 REV. C DATE 2 Feb 61 BY No Change
3-15-63 OPERATIONAL AS BUILT
1-20-61 AS-BUILT ISSUE - REPLACED CTL JOINT WITH COLD JOINT & SECTION C.
2/10/60
REVISION DATE DESCRIPTION AGENCY INIT.
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO - LOS ANGELES - NEW YORK
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
WS-107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
UTILITY BUILDING
ELEVATIONS & FND. PLAN
21 DEC. 1959
AS NOTED
3199-8-A-2
D.O. SERIES AW 1549/69

FIGURE 29

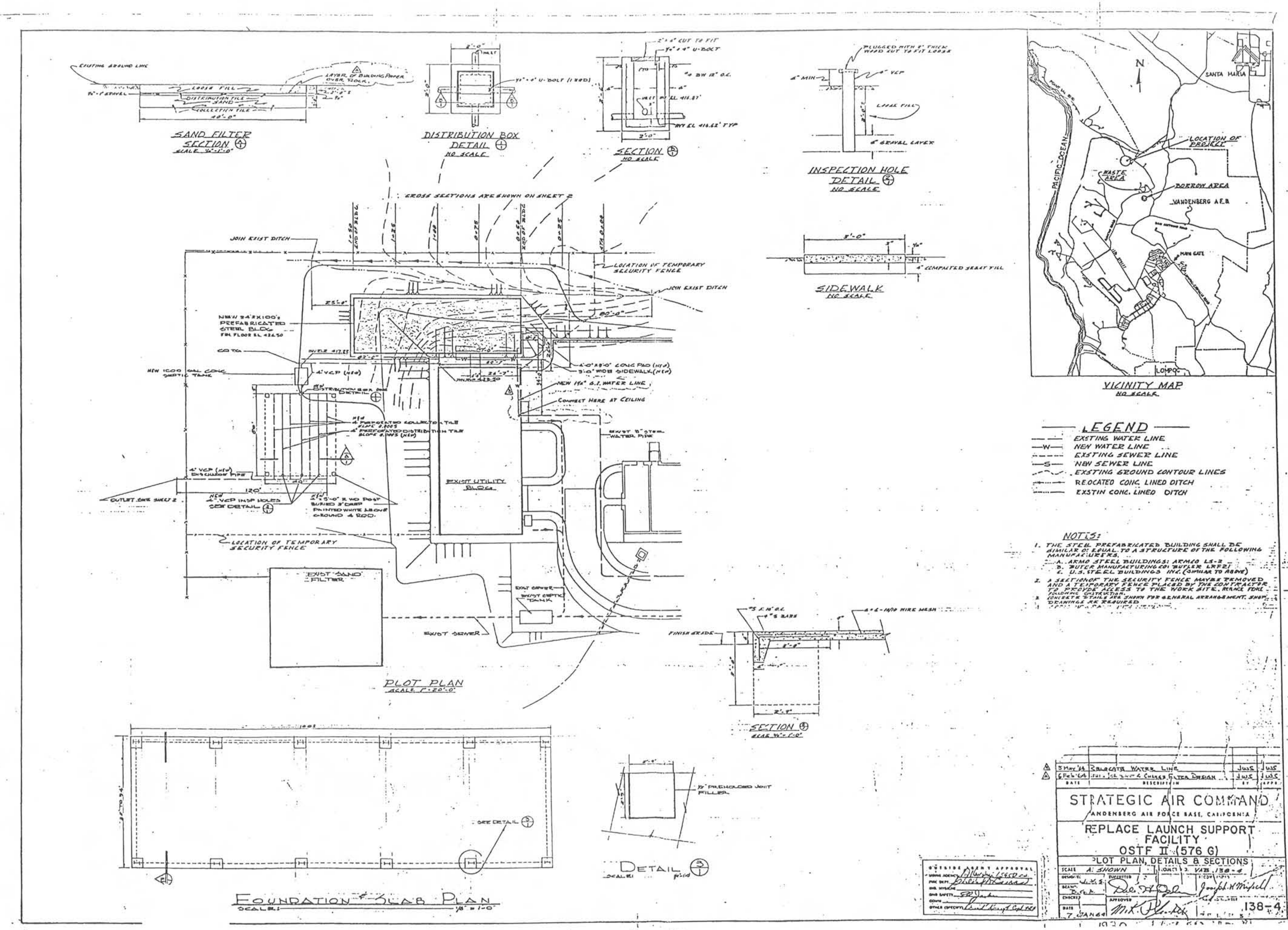
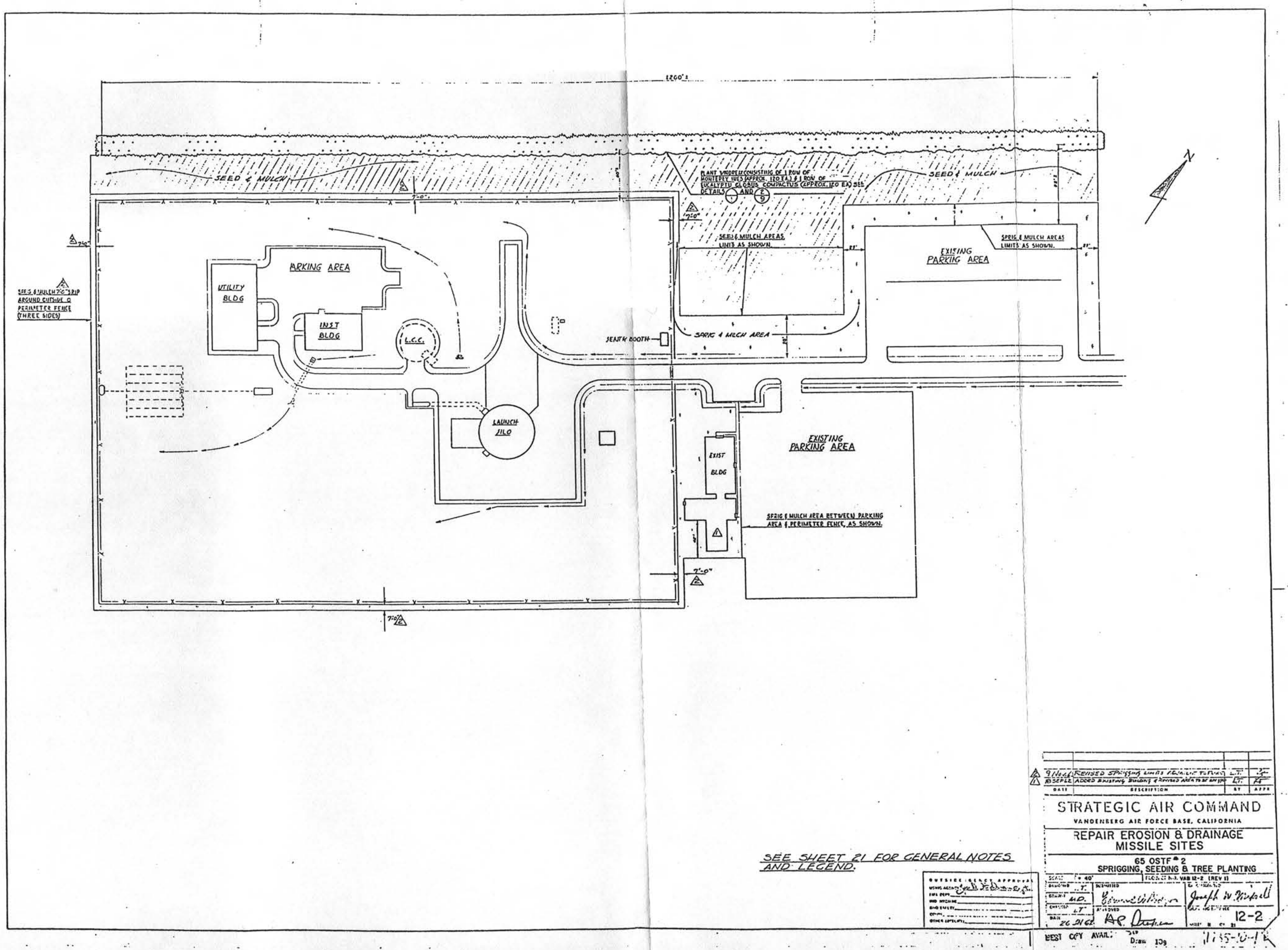
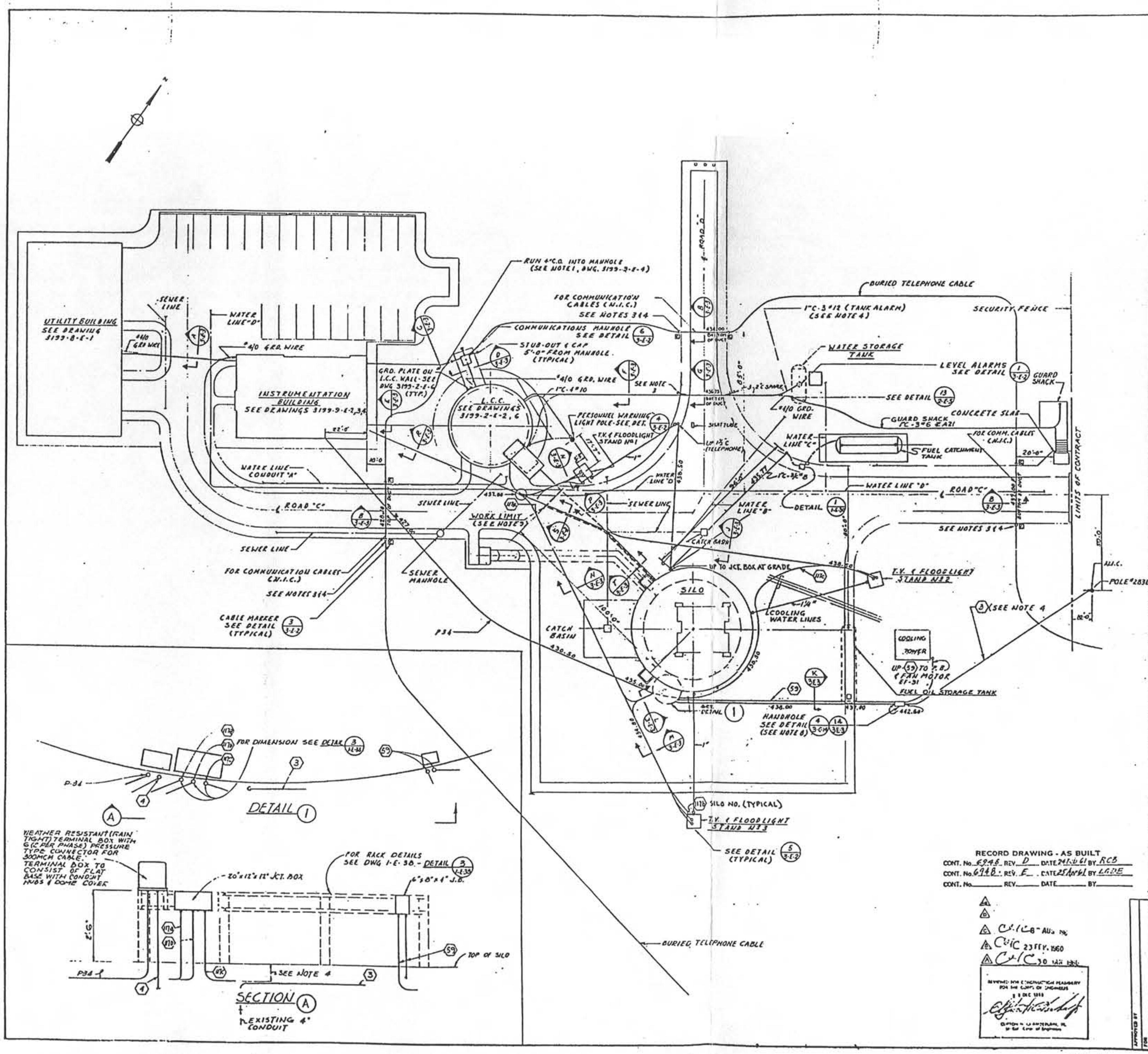

SAND FILTER SECTION
DISTRIBUTION BOX DETAIL
NO SCALE
SECTION
NO SCALE
INSPECTION HOLE DETAIL
NO SCALE
CROSS SECTIONS ARE SHOWN ON SHEET 2
JOIN EXIST DITCH
LOCATION OF TEMPORARY SECURITY FENCE
NEW 34'X100' PREFABRICATED STEEL BLDG
NEW 1000 GAL CONC SEPTIC TANK
4" VCP (NEW)
NEW 1½" G.I. WATER LINE
CONNECT HERE AT CEILING
EXIST UTILITY BLDG.
EXIST 8" STEEL WATER PIPE
EXIST SAND FILTER
EXIST SEPTIC TANK
EXIST SEWER
PLOT PLAN
SIDEWALK
NO SCALE
VICINITY MAP
NO SCALE
SANTA MARIA
LOCATION OF PROJECT
WASTE AREA
BORROW AREA
VANDENBERG A.F.B.
PACIFIC OCEAN
LOMPOC
LEGEND
EXSTING WATER LINE
NEW WATER LINE
EXSTING SEWER LINE
NEW SEWER LINE
EXSTING GROUND CONTOUR LINES
REOCATED CONC. LINED DITCH
EXSTIN CONC. LINED DITCH
NOTES:
SECTION
FOUNDATION & SLAB PLAN
DETAIL
STRATEGIC AIR COMMAND
VANDENBERG AIR FORCE BASE, CALIFORNIA
REPLACE LAUNCH SUPPORT FACILITY
OSTF II (576 G)
PLOT PLAN, DETAILS & SECTIONS
138-4

FIGURE 30



1200'±
SEED & MULCH
SEED & MULCH
SEED & MULCH AREAS LIMITS AS SHOWN.
SPRIG & MULCH AREAS LIMITS AS SHOWN.
EXISTING PARKING AREA
PARKING AREA
UTILITY BLDG
INST BLDG
L.C.C.
LAUNCH SILO
SENTRY BOOTH
SPRIG & MLCH AREA
EXISTING PARKING AREA
EXIST BLDG
SPRIG & MULCH AREA BETWEEN PARKING AREA & PERIMETER FENCE, AS SHOWN.
SEE SHEET 21 FOR GENERAL NOTES AND LEGEND.
DATE
DESCRIPTION
BY
APPR
STRATEGIC AIR COMMAND
VANDENBERG AIR FORCE BASE, CALIFORNIA
REPAIR EROSION & DRAINAGE MISSILE SITES
65 OSTF # 2
SPRIGGING, SEEDING & TREE PLANTING
VAB 12-2 (REV 1)
12-2
BEST COPY AVAIL.

FIGURE 31



NOTES

1. FOR ELECTRICAL SYMBOLS AND ABBREVIATIONS, SEE DRAWING 3199-2-E-12.
2. ENCASE CONDUIT IN CLASS "B" CONCRETE.
3. TERMINATE SPARE CONDUIT SLEEVES 1'-0" BEYOND SHOULDER OF ROADWAY AND CAP.
4. ALL METALLIC CONDUIT DUCT BANKS AND CONCRETE ENCASED DUCT BANKS TO BE A MINIMUM OF 1'-6" & ALL DIRECT BURIAL CABLES TO BE A MINIMUM OF 2'-0" BELOW FINISHED GRADE.
5. FOR L.C.C. CONDUIT SCHEDULE, SEE DRAWING 3199-2-E-4.
6. FOR SEWER SYSTEM PLAN, SEE DRAWING 3199-3-C-11 & FOR WATER SYSTEM PLAN, SEE DRAWING 3199-3-C-10.
8. HANDHOLE FOR PULLING CABLE ONLY. NO SPLICES TO BE MADE.
9. STEEL PIPES, CONDUITS, & GROUND WIRES ONLY OF SECTION "P", DRAWING 3199-3-E-3 AND (6) 12" DIA. STEEL PIPES ONLY OF SECTION "T" DRAWING 3199-3-E-3 FROM SILO TO WORK LIMIT INSTALLED UNDER PREVIOUS CONTRACT. WIRES AND CABLES WITH THE EXCEPTION OF GROUND WIRES PREVIOUSLY INSTALLED TO BE INSTALLED UNDER THIS CONTRACT.
10. ELEVATIONS INDICATE CENTER LINE OF DUCT UNLESS OTHERWISE SPECIFIED.

REFERENCE DRAWINGS

L.C.C.-ELECT. POWER PLAN	3199-2-E-2
GROUNDING PLAN	-2-E-6
GROUNDING DETAILS	-2-E-5
MISC. ELECT. SECT'S AND DET'S - SH.1	-3-E-2
- SH.2	-3-E-3
PROFILE PLAN	-3-E-4
ELECTRICAL AREA PLAN - AT GRADE	-1-E-30
UTILITY BUILDING - ELECT. LTG., PWR., & COMM.	-8-E-1
INSTRUMENTATION BUILDING - ELECT. POWER PLAN	-9-E-2
- ELECT. GRDING. PLAN	-9-E-3
SILO TO L.C.C. INTERCONNECTING UTILITIES	-3-C-13
COMM. MANHOLE & T.V. SUPPORTS	-3-C-14
ELECT. SECT'S & DET'S. - SHT. 2	-2-E-15
INSTRUMENTATION BUILDING - P.A. & TEL. PLAN	-9-E-4

1 IN. = 20 FT

REVISION	DATE	DESCRIPTION	AGENCY	INIT.
6	3-15-63	OPERATIONAL AS-BUILT DWG.	SATAF	
5	3-31-61	AS BUILT CHANGES; ADDED COMMUNICATION CONDUITS TO T.V. & FLOODLIGHT STANDS	LADE	
4	2/14/61	AS BUILT CHANGES	LADE	RCB
3	8/8/60	CHANGED CONDUITS FROM INSTR. BLDG. TO M.H.; ADDED REFERENCE NOTE & DRAWING	AFBMD	WJG
2	2/10/60	RELOCATED HANDHOLE & CONDUIT RUN. RELOCATED CONDUIT FROM COMM. M.H. TO INSTR. BLDG.	BECHTEL	WE
1	1/15/60	ADDED NOTES 9 & 10; ADDED WORK LIMIT TO DWG.; ADDED REF DWG. 3199-2-E-15; RELOCATED DUCT BANKS. REV. DET. NO 1	BECHTEL	WJG

RECORD DRAWING - AS BUILT
CONT. No. 6946 REV. D DATE 24 FEB 61 BY RCB
CONT. No. 6948 REV. E DATE 25 Apr 61 BY LADE
CONT. No. ____ REV. ____ DATE ____ BY ____

C/C 8 AUG 60
C/C 23 FEB. 1960
C/C 30 JAN 1960

BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO - LOS ANGELES - NEW YORK

DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)

WS-107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
U.G. LAND LINES & CONDUIT PLAN

DRAWN BY WAYNE GILL
DEC 22 1959
SPECIFICATION No. (Neg 60-2) Sup 7/0
DATE 21 DEC 1959 SCALE 1" = 20'-0"
DRAWING NUMBER 3199-3-E-1

Draw 52

D. D. SERIES AW 1549/18 REV 08 1935-2-1

FIGURE 32

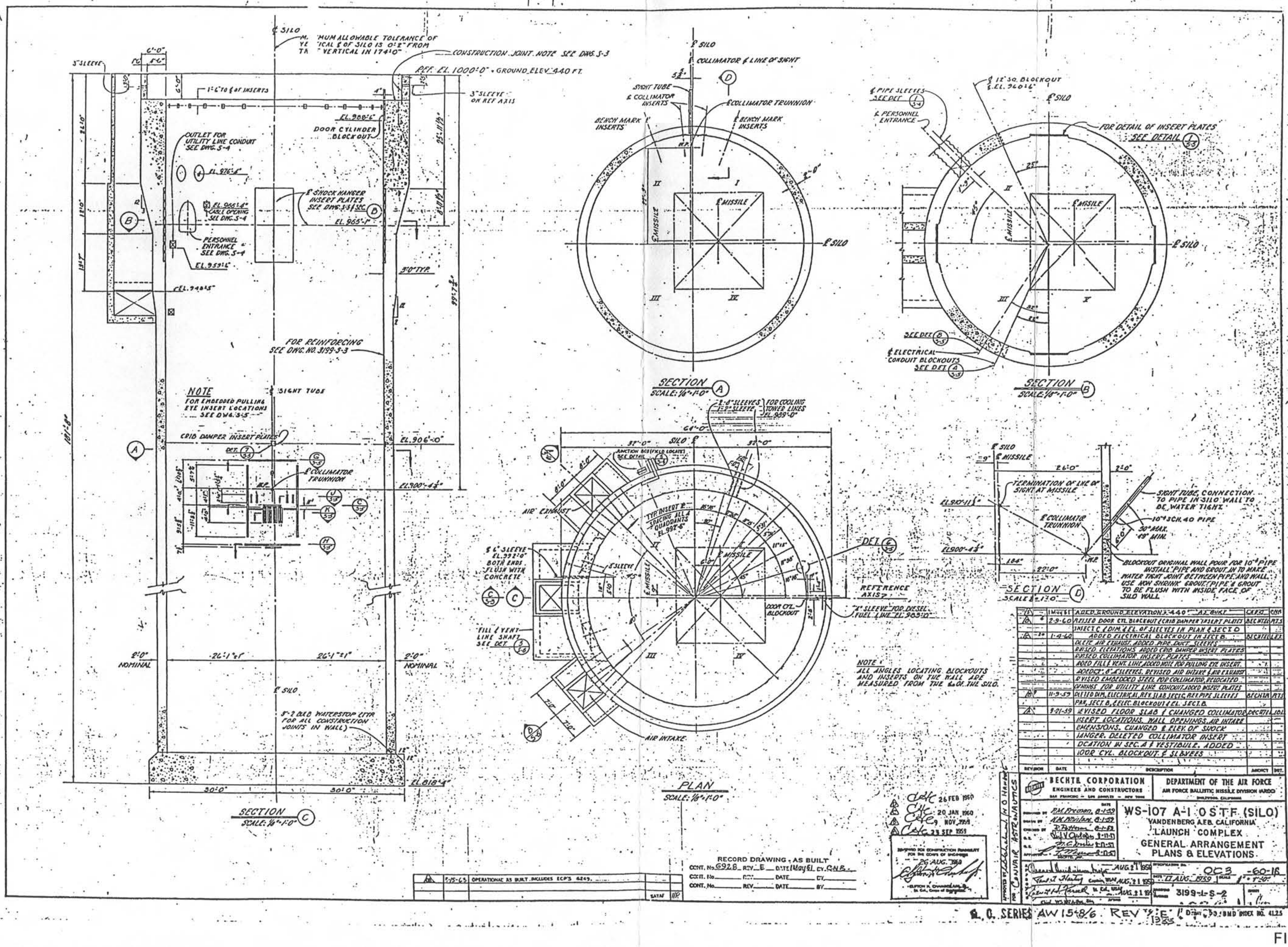

SECTION A
SCALE: 1/8"=1'-0"
SECTION B
SCALE: 1/8"=1'-0"
SECTION C
SCALE: 1/8"=1'-0"
PLAN
SCALE: 1/8"=1'-0"
SECTION C
SCALE: 1"=20"
℄ SILO
℄ MISSILE
℄ COLLIMATOR TRUNNION
BENCH MARK INSERTS
FOR REINFORCING SEE DWG. NO. 3199-S-3
SIGHT TUBE
AIR EXHAUST
AIR INTAKE
REFERENCE AXIS
DOOR CYL. BLOCKOUT
NOTE
ALL ANGLES LOCATING BLOCKOUTS AND INSERTS ON THE WALL ARE MEASURED FROM THE ℄ OF THE SILO.
SIGHT TUBE, CONNECTION TO PIPE IN SILO WALL TO BE WATER TIGHT.
10" SCH. 40 PIPE
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
DEPARTMENT OF THE AIR FORCE
WS-107 A-1 O.S.T.F. (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
GENERAL ARRANGEMENT
PLANS & ELEVATIONS
RECORD DRAWING - AS BUILT
3199-L-S-2
OC3 -60-18
SERIES AW 15-8/6

FIGURE 33

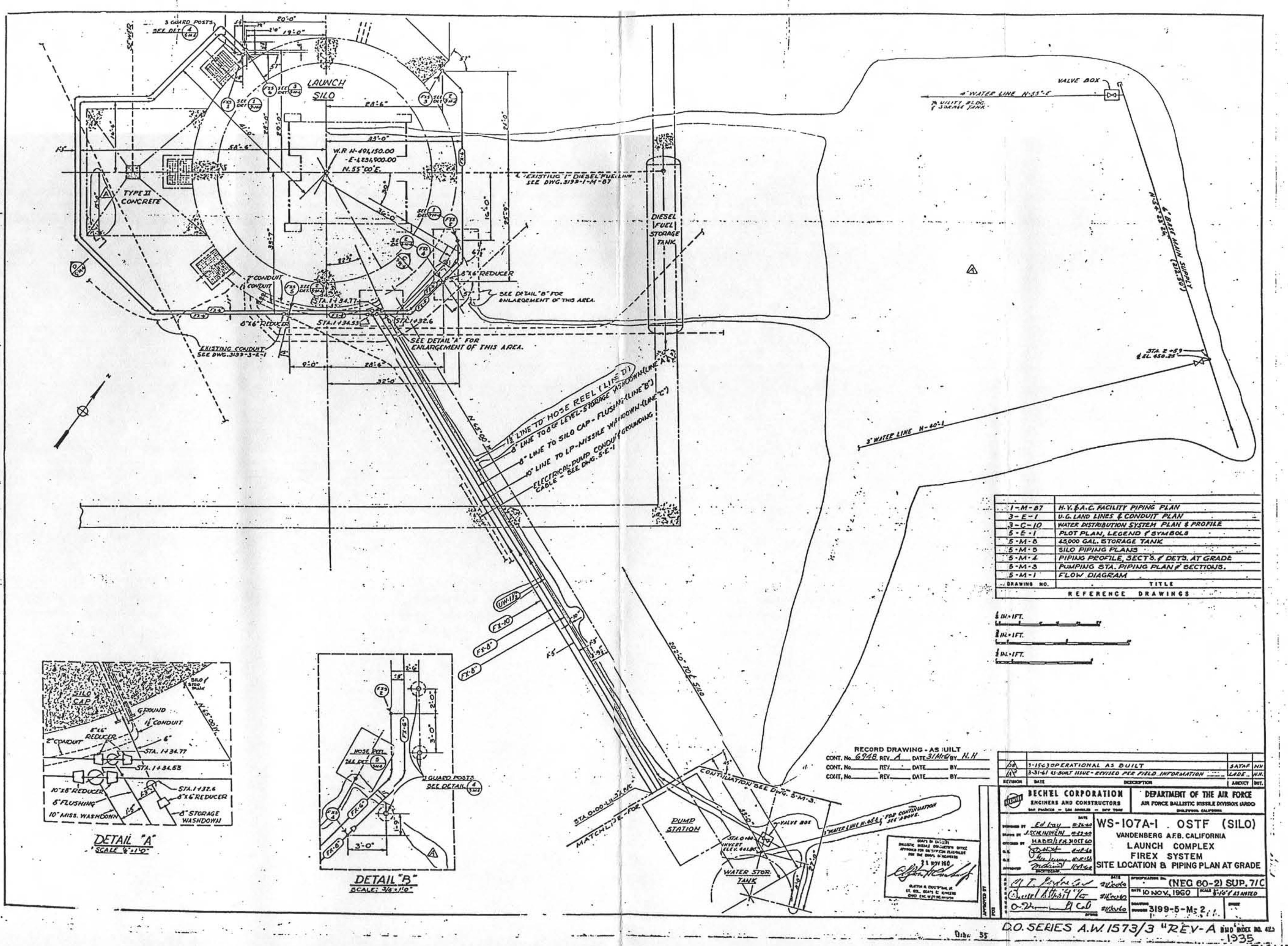
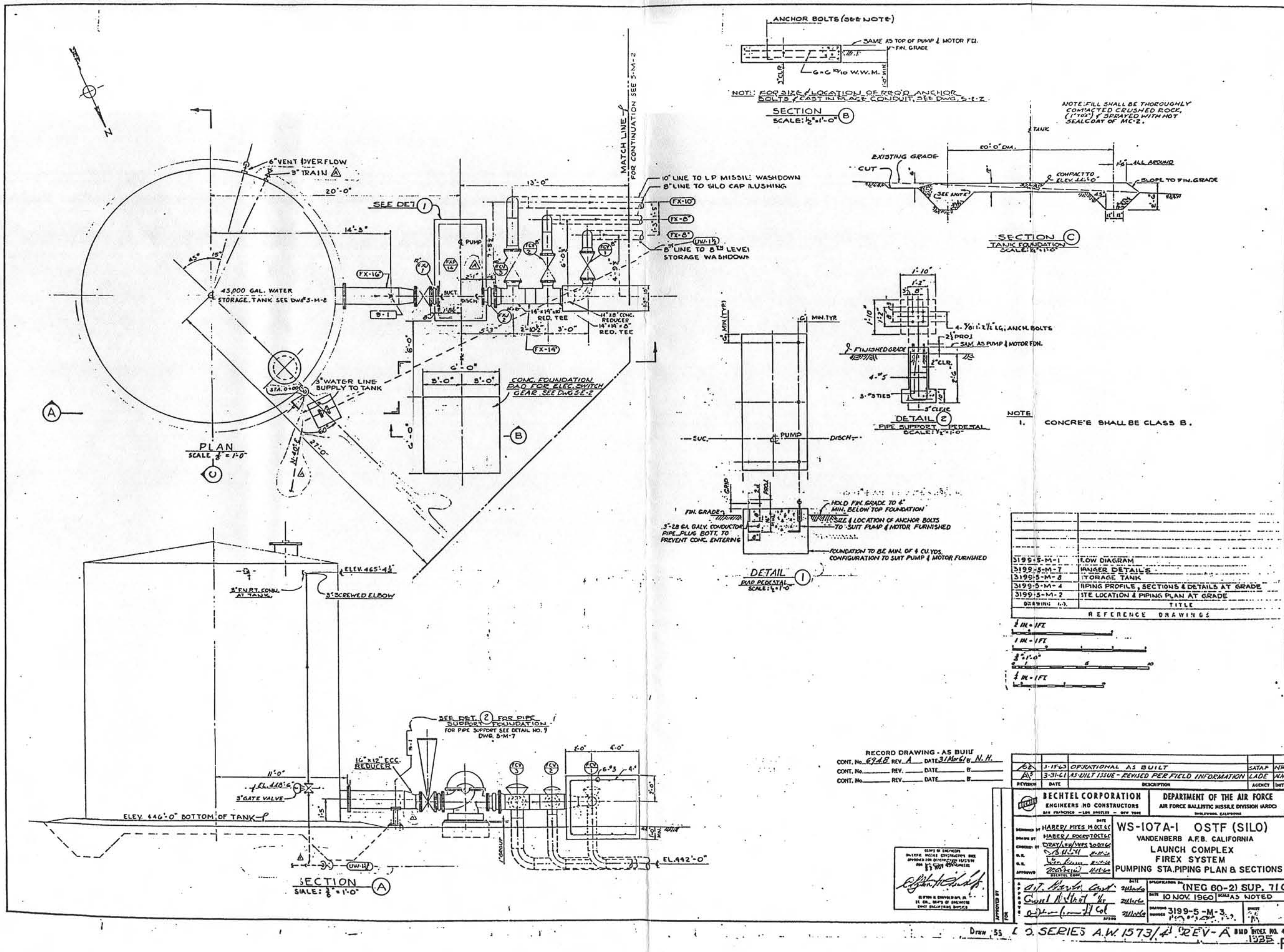
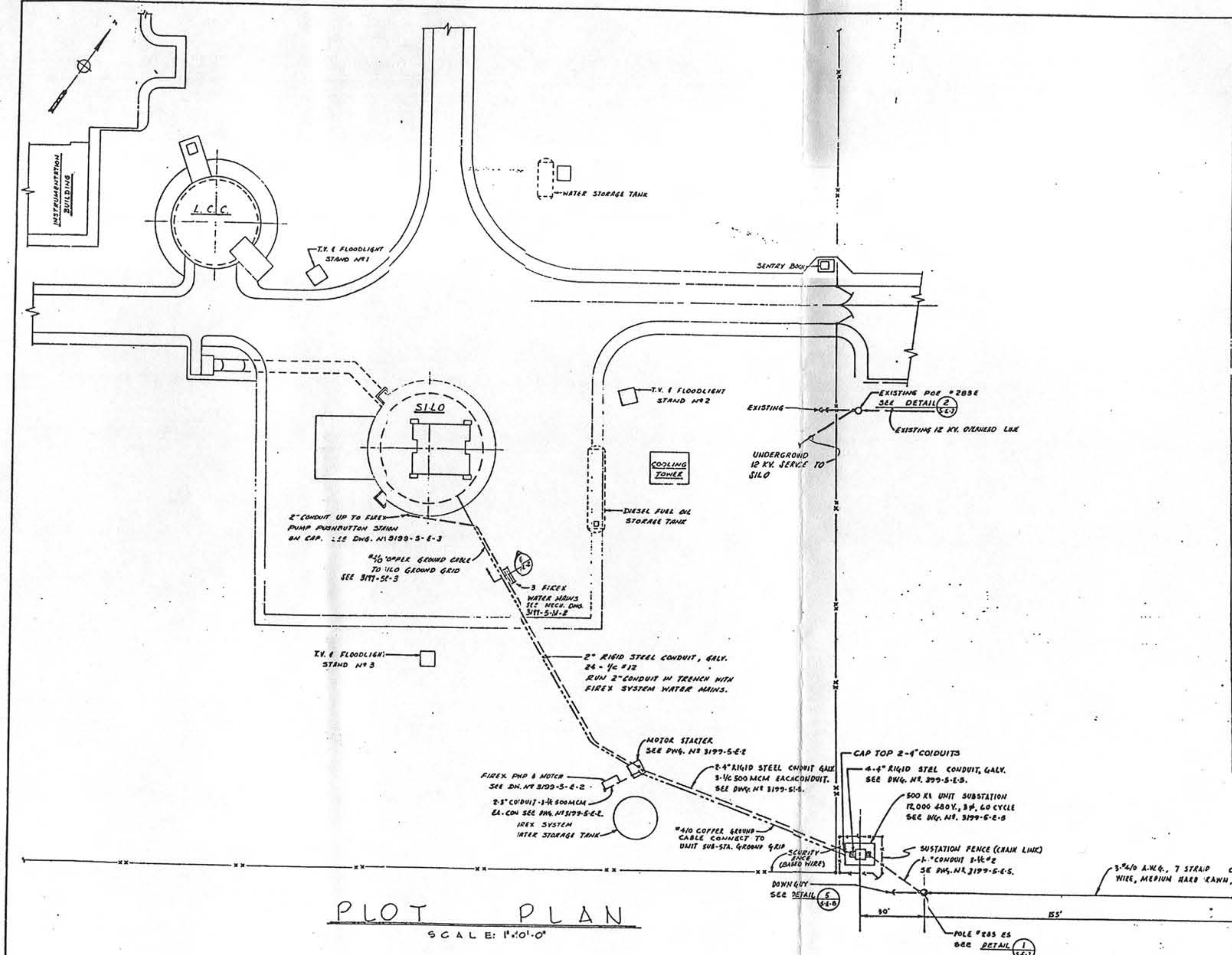

LAUNCH SILO
TYPE II CONCRETE
W.R N-491,150.00 -E-1,231,900.00 N.55°00'E.
EXISTING 1" DIESEL FUEL LINE SEE DWG. 3199-1-M-87
DIESEL FUEL STORAGE TANK
VALVE BOX
4" WATER LINE
3" WATER LINE
8"x6" REDUCER
SEE DETAIL "B" FOR ENLARGEMENT OF THIS AREA.
SEE DETAIL "A" FOR ENLARGEMENT OF THIS AREA.
EXISTING CONDUIT SEE DWG. 3199-3-E-1
1½" LINE TO HOSE REEL (LINE D)
8" LINE TO 6" LEVEL STORAGE WASHDOWN (LINE A)
8" LINE TO SILO CAP - FLUSHING (LINE B)
10" LINE TO LP-MISSILE WASHDOWN (LINE C)
ELECTRICAL PUMP CONDUIT & GROUNDING CABLE - SEE DWG. 5-E-1
PUMP STATION
WATER STOR. TANK
MATCHLINE-FOR
DETAIL "A"
DETAIL "B"
1-M-87 H.V. & A.C. FACILITY PIPING PLAN
3-E-1 U.G. LAND LINES & CONDUIT PLAN
3-C-10 WATER DISTRIBUTION SYSTEM PLAN & PROFILE
5-E-1 PLOT PLAN, LEGEND & SYMBOLS
5-M-6 45,000 GAL. STORAGE TANK
5-M-5 SILO PIPING PLANS
5-M-4 PIPING PROFILE, SECTS. & DETS. AT GRADE
5-M-3 PUMPING STA. PIPING PLAN & SECTIONS.
5-M-1 FLOW DIAGRAM
DRAWING NO.
TITLE
REFERENCE DRAWINGS
RECORD DRAWING - AS BUILT
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
WS-107A-1 . OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
FIREX SYSTEM
SITE LOCATION & PIPING PLAN AT GRADE
(NEG 60-2) SUP. 7/C
10 NOV. 1960
3199-5-Ms 2
D.O. SERIES A.W. 1573/3 "REV-A
1935

FIGURE 34



PLAN
SCALE 3/8" = 1'-0"
43,000 GAL. WATER STORAGE TANK SEE DWG 5-M-8
6" VENT OVERFLOW
3" DRAIN
3" WATER LINE SUPPLY TO TANK
SEE DET. 1
MATCH LINE FOR CONTINUATION SEE 5-M-2
10" LINE TO L P MISSILE WASHDOWN
8" LINE TO SILO CAP FLUSHING
8" LINE TO B LEVEL STORAGE WASHDOWN
FX-10"
FX-8"
FX-16"
FX-14"
PUMP
SUCT.
DISCH.
14"x14"x10" RED. TEE
14"x8" CONC. REDUCER
14"x14"x8" RED. TEE
CONC. FOUNDATION PAD FOR ELEC. SWITCH GEAR SEE DWG 5-E-2
ANCHOR BOLTS (SEE NOTE)
SAME AS TOP OF PUMP & MOTOR FDN.
FIN. GRADE
6-6 10/10 W.W.M.
NOTE: FOR SIZE & LOCATION OF REQ'D ANCHOR BOLTS & CAST IN PLACE CONDUIT, SEE DWG. 5-E-2.
SECTION B
SCALE: 1/2" = 1'-0"
NOTE: FILL SHALL BE THOROUGHLY COMPACTED CRUSHED ROCK, (1" MAX.) & SPRAYED WITH HOT SEALCOAT OF MC-2.
EXISTING GRADE
CUT
20'-0" DIA.
TANK
1'-6" ALL AROUND
SLOPE TO FIN. GRADE
SEE NOTE
SECTION C
TANK FOUNDATION
DETAIL 2
PIPE SUPPORT PEDESTAL
SCALE: 1 1/2" = 1'-0"
4 - 3/4" x 2 1/2" LG. ANCH. BOLTS
FINISHED GRADE
SAME AS PUMP & MOTOR FDN.
NOTE
1. CONCRETE SHALL BE CLASS B.
DETAIL 1
PUMP PEDESTAL
SCALE: 1/4" = 1'-0"
HOLD FIN. GRADE TO 6" MIN. BELOW TOP FOUNDATION
SIZE & LOCATION OF ANCHOR BOLTS TO SUIT PUMP & MOTOR FURNISHED
FOUNDATION TO BE MIN. OF 4 CU. YDS. CONFIGURATION TO SUIT PUMP & MOTOR FURNISHED
3199-5-M-1 FLOW DIAGRAM
3199-5-M-7 HANGER DETAILS
3199-5-M-8 STORAGE TANK
3199-5-M-4 PIPING PROFILE, SECTIONS & DETAILS AT GRADE
3199-5-M-2 SITE LOCATION & PIPING PLAN AT GRADE
DRAWING NO. TITLE
REFERENCE DRAWINGS
ELEV. 465'-4 1/2"
3" F.V.P.T. CONN. AT TANK
3" SCREWED ELBOW
3" GATE VALVE
ELEV. 446'-0" BOTTOM OF TANK
SEE DET. 2 FOR PIPE SUPPORT FOUNDATION
FOR PIPE SUPPORT SEE DETAIL NO. 9 DWG. 5-M-7
16" x 12" ECC. REDUCER
EL. 442'-0"
SECTION A
SCALE: 3/8" = 1'-0"
RECORD DRAWING - AS BUILT
B 1-15-63 OPERATIONAL AS BUILT
A 3-31-61 AS-BUILT ISSUE - REVISED PER FIELD INFORMATION
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)
WS-107A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
FIREX SYSTEM
PUMPING STA. PIPING PLAN & SECTIONS
(NEG 60-2) SUP. 71C
10 NOV. 1960
AS NOTED
3199-5-M-3
D SERIES A.W. 1573/4 REV-A

FIGURE 35



SYMBOL LIST

●	NEW POLE
○	EXISTING POLE
	DOWN GUY
	DOUBLE ANCHOR
	OVERHEAD TRANSMISSION LINE. ARROW DENOTES DEAD END OF LINE
	UNDERGROUND CONDUIT OR DUCT BANK RUN
	BURIED GROUND CABLE
	POLE MOUNTED, LOAD BREAK FUSED DISCONNECT
	LIGHTNING ARRESTER
800A.	CIRCUIT BREAKER, MOLDED CASE. TRIP RATING AS INDICATED
(M)	3 PHASE SQUIRREL CAGE INDUCTION MOTOR
15A.	FUSE, RATING AS INDICATED
STOP	PUSHBUTTON, UNIVERSAL CONTACTS. LEGEND PLATE AS INDICATED
	RELAY, CONTACTOR OR SOLENOID VALVE OPERATING COIL
	NORMALLY OPEN CONTACT
	NORMALLY CLOSED CONTACT
RUN (R)	INDICATING LIGHT, RED COLOR, LEGEND PLATE AS INDICATED.
	TYPE "T" CONDULET
J	JUNCTION BOX, SIZE AS SHOWN ON DWGS.
	INDICATES EXISTING WIRE TO BE RELOCATED AS SHOWN
⊙	GROUND ROD, 3/4" x 10'-0", COPPERWELD

ABBREVIATIONS

L.O.	LOCK-OUT
T.O.	TIME DELAY OPENING
T.C.	TIME DELAY CLOSING
C.R.	CONTROL RELAY
S.V.	SOLENOID OPERATED VALVE
B.O.S.	BOTTOM OF STEEL (NOMINAL)

GENERAL NOTES

1. ALL CONDUIT PENETRATING CONCRETE PADS SHALL BE INSTALLED WITH CONDUIT COUPLING FLUSH WITH TOP OF PAD.

DRAWING NO.	TITLE
3199-5-E-9	WIRING DIAGRAMS & DETAILS - CO_2 DETECTOR SYSTEM
3199-5-M-6	SILO PIPING SECTIONS
3199-5-M-3	PUMPING STA. PIPING PLAN & SECTIONS
3199-5-M-2	SITE LOCATION & PIPING PLAN AT GRADE
3199-5-E-8	POLE LINE DETAILS
3199-5-E-7	TERMINAL POLE DETAILS
3199-5-E-6	SINGLE LINE, SCHEMATIC & WIRING DIAGRAMS
3199-5-E-5	PLAN, ELEVATIONS & SECTIONS - 500 KVA. SUBSTATION
3199-5-E-4	PARTIAL FLOOR PLANS - SILO LEVELS 1, 2 & 7.
3199-5-E-3	PLANS, SECTIONS & DETAILS - L.C.C. & SILO
3199-5-E-2	CONDUIT LAYOUT & DETAILS - FIREX PUMP STATION

REFERENCE DRAWINGS

REVISION	DATE	DESCRIPTION	AGENCY	INIT.
B	3-16-62	OPERATIONAL AS-BUILT DWG.	SATAF	
A	3-31-61	AS BUILT CHANGES; RE-LOCATED SUBSTATION & RE-ROUTED AERIAL FEED & FEED TO MOTOR STARTER FOR FIREX PUMP & MOTOR	LADE	

RECORD DRAWING - AS BUILT
CONT. No. 6948 REV. A DATE 31Mar61 BY R.C.B.
CONT. No. ____ REV. ____ DATE ____ BY ____
CONT. No. ____ REV. ____ DATE ____ BY ____

BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO – LOS ANGELES – NEW YORK

DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)

DRAWN BY COCHRAN

WS 107 A-1 OSTF (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
FIREX SYSTEM
PLOT PLAN, LEGEND & SYMBOLS

SPECIFICATION No. (NEG 60-2) SUP. 71C
DATE 10 NOV. 1960 SCALE 1" = 20'-0"
DRAWING NUMBER 3199-5-E-1

Draw 55 DO SERIES AW 1573/2 BMB INDEX NO. 4125 REV 08

FIGURE 36

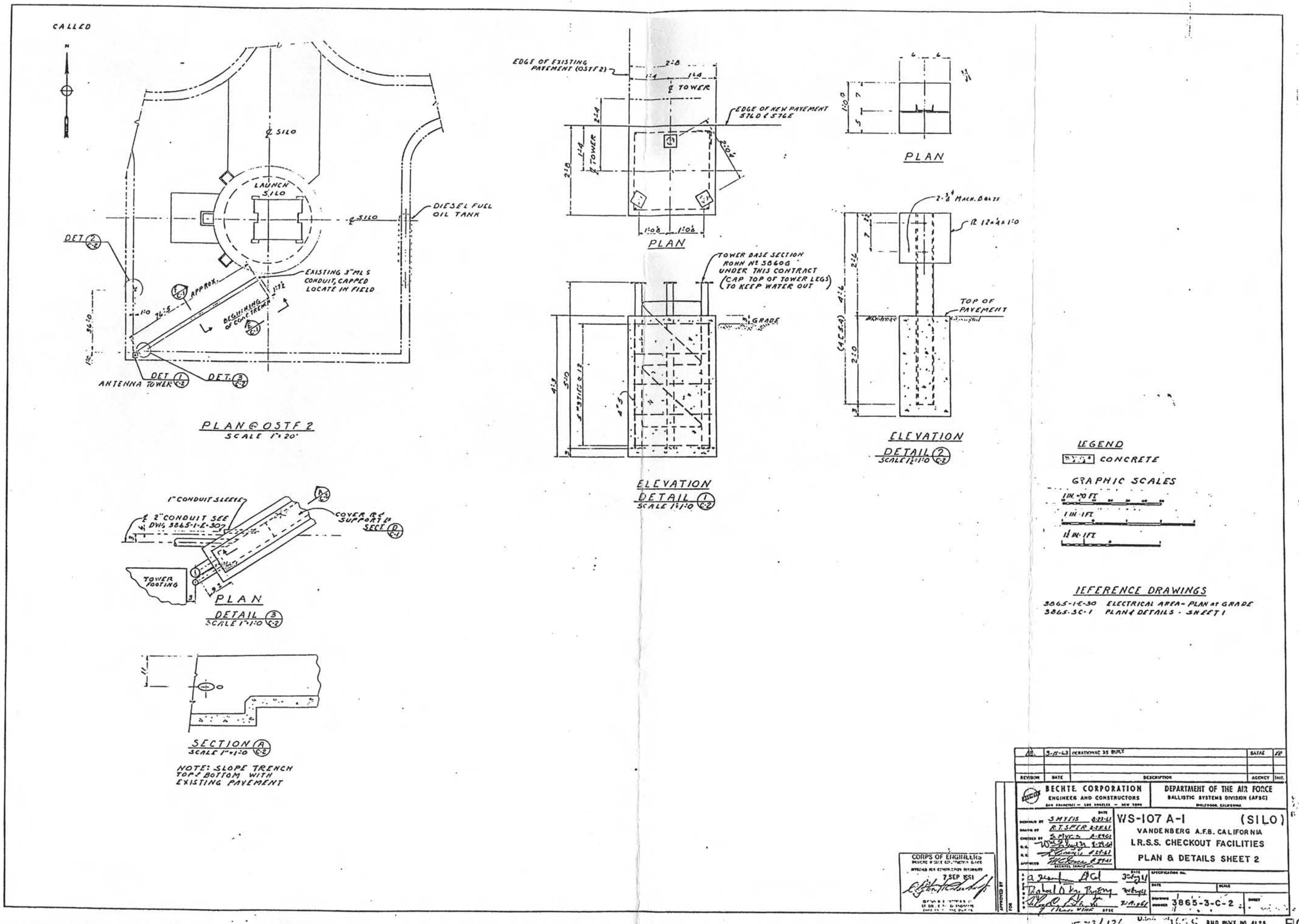
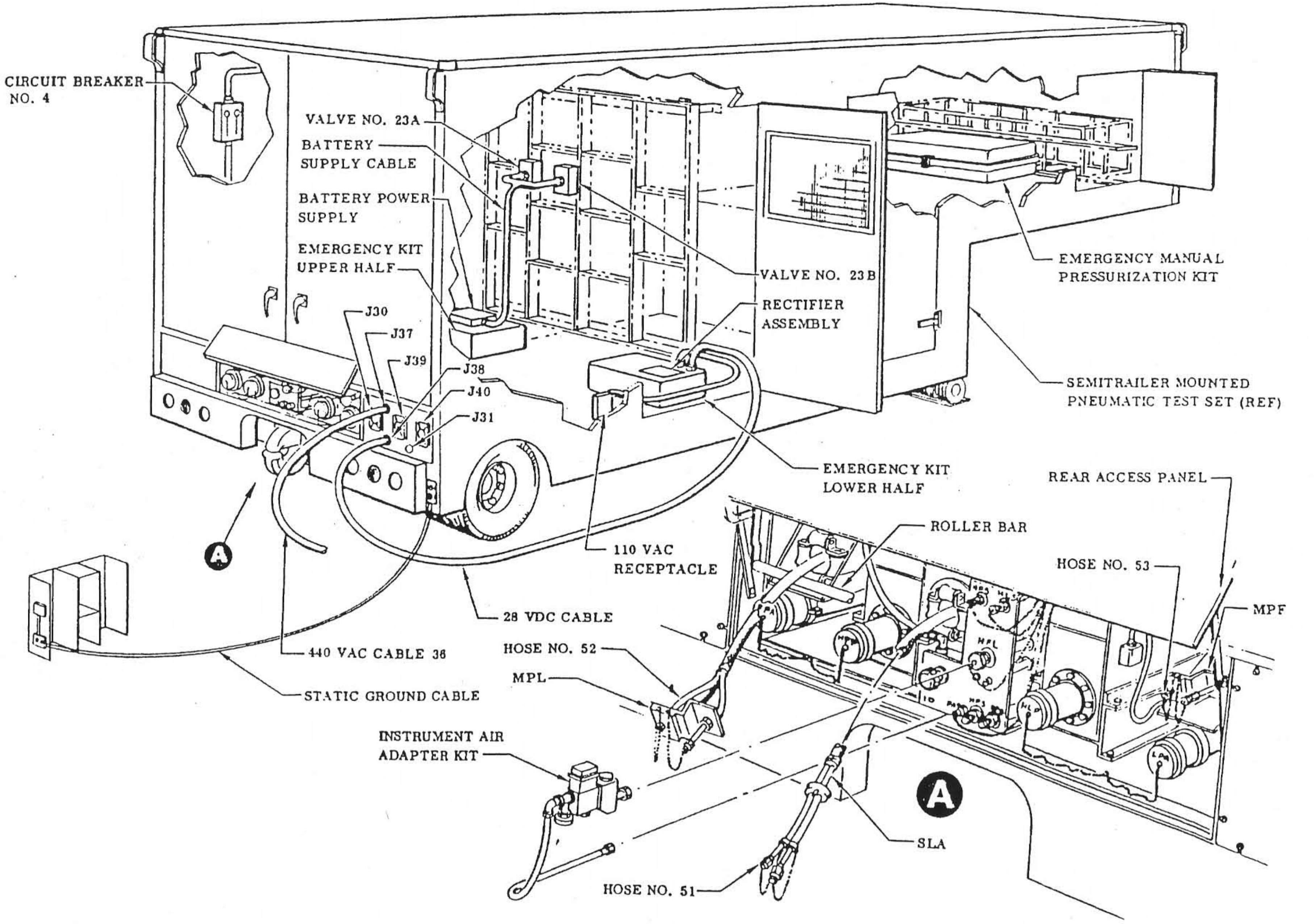
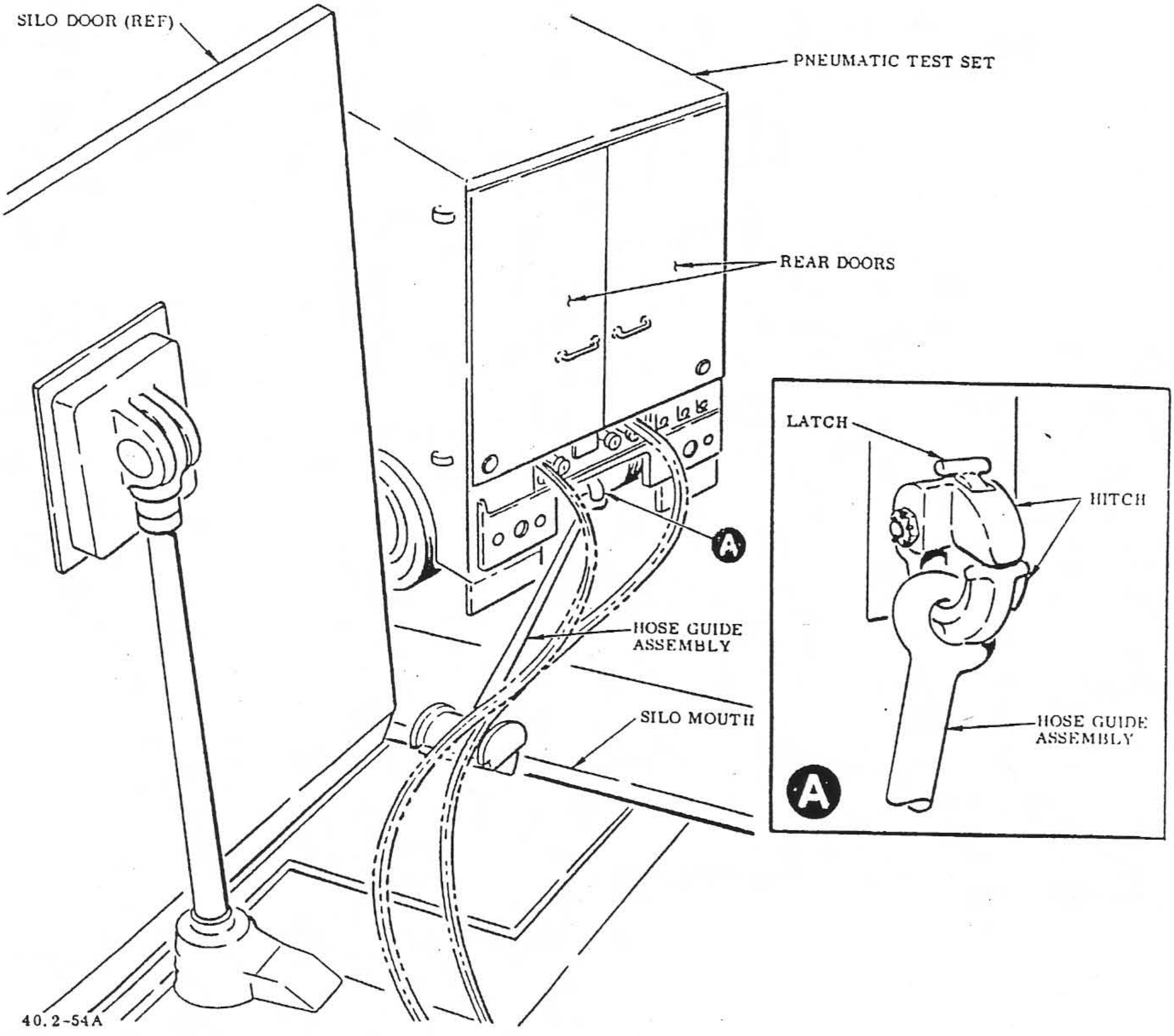

PLAN @ OSTF 2
SCALE 1"=20'
ELEVATION DETAIL 1
PLAN
ELEVATION DETAIL 2
LEGEND
CONCRETE
GRAPHIC SCALES
REFERENCE DRAWINGS
3865-1-E-30 ELECTRICAL AREA - PLAN AT GRADE
3865-3C-1 PLAN & DETAILS - SHEET 1
PLAN DETAIL 3
SECTION A
NOTE: SLOPE TRENCH TOP & BOTTOM WITH EXISTING PAVEMENT
BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
DEPARTMENT OF THE AIR FORCE
BALLISTIC SYSTEMS DIVISION (AFSC)
WS-107 A-1 (SILO)
VANDENBERG A.F.B. CALIFORNIA
I.R.S.S. CHECKOUT FACILITIES
PLAN & DETAILS SHEET 2
3865-3-C-2
CORPS OF ENGINEERS

FIGURE 37



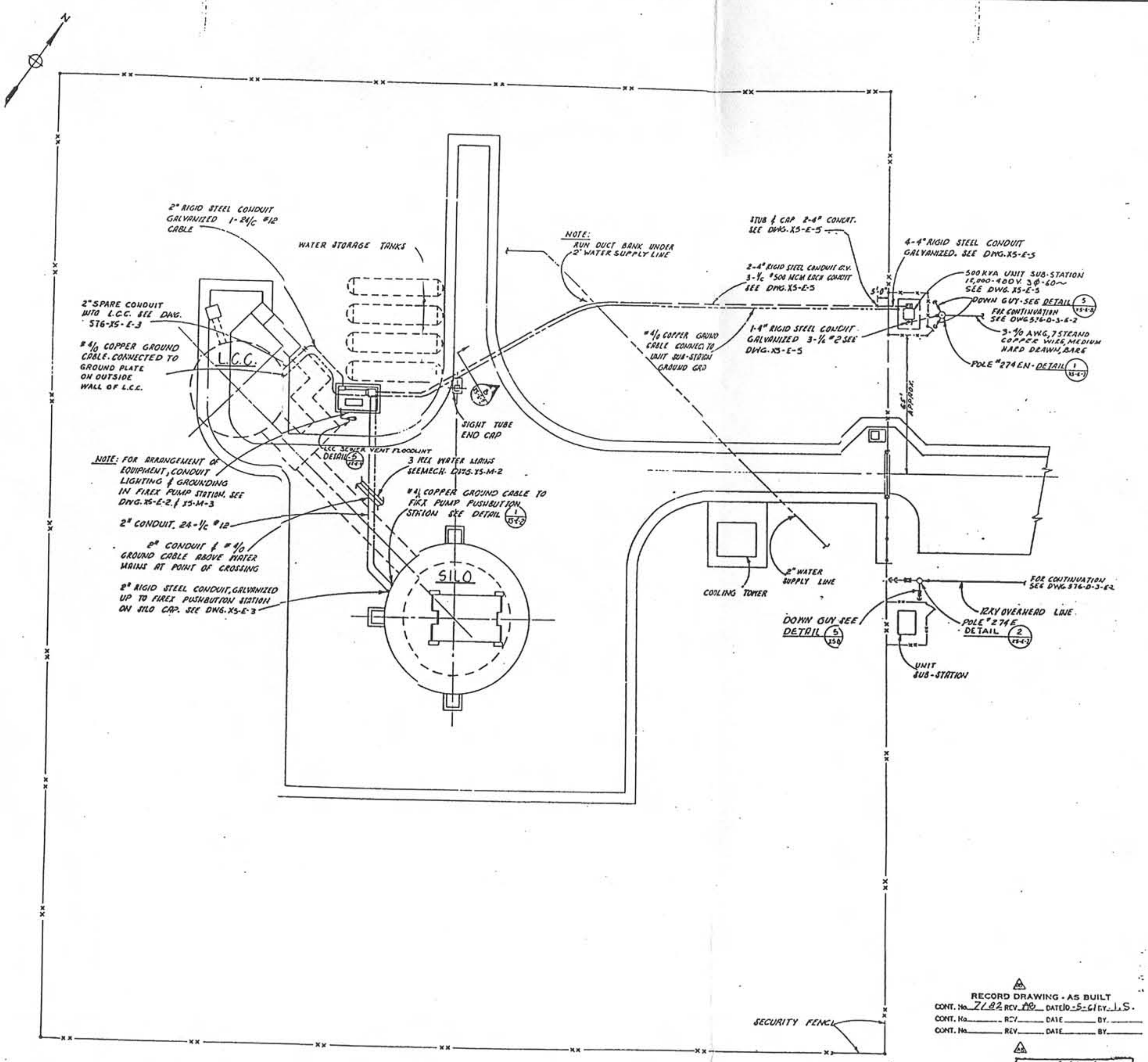
Pneumatic Test Set Disconnects and Emergency Manual Pressurization Kit Installation Details

FIGURE 38



Semitrailer Pneumatic Test Set Positioned at Silo Mouth

FIGURE 39



PLOT PLAN

SCALE: 1"=20'-0"

SYMBOL LIST

●	NEW POLE
○	EXISTING POLE
o—▪—	DOWN GUY
●o—▪—	DOUBLE ANCHOR
←—→	OVERHEAD TRANSMISSION LINE. ARROW DENOTES DEAD END OF LINE
———	UNDERGROUND CONDUIT OR DUCT BANK RUN.
——···	BURIED GROUND CABLE.
—⌐—	POLE MOUNTED, LOAD BREAK FUSED DISCONNECT
	LIGHTNING ARRESTER.
800A)	CIRCUIT BREAKER, MOLDED CASE. TRIP RATING AS INDICATED.
(M)	3 PHASE SQUIRREL CAGE INDUCTION MOTOR.
15A [ ]	FUSE, RATING AS INDICATED
STOP	PUSHBUTTON, UNIVERSAL CONTACTS, LEGEND PLATE AS INDICATED
—∧—	RELAY, CONTACTOR OR SOLENOID VALVE OPERATING COIL
—‖—	NORMALLY OPEN CONTACT
—‡—	NORMALLY CLOSED CONTACT
RUN (R)	INDICATING LIGHT RED COLOR, LEGEND PLATE AS INDICATED
—T—	TYPE "T" CONDULET
[J]	JUNCTION BOX, SIZE AS SHOWN ON DWG.
/////////	INDICATES EXISTING WIRE TO BE RELOCATED AS SHOWN
(•)	GROUND ROD, 3/4" x 10'-0", COPPERWELD

ABBREVIATIONS

G.F.E.	GOVERMEN FURNISHED EQUIPMENT
L.O.	LOCK-OUT
T.O.	TIME DELY OPENING
T.C.	TIME DELY CLOSING
C.R.	CONTROL RELAY
S.V.	SOLENOID OPERATED VALVE
B.O.S.	BOTTOM OF STEEL (NOMINAL)

GENERAL NOTES

1. ALL CONDUIT PENETRATING CONCRETE PADS SHALL BE INSTALLED WITH CONDUIT COUPLING FLUSH WITH TOP OF PAD

REFERENCE DRAWINGS

DRAWING NO.	TITLE
576-XS-M-3	PUMPING STATION PIPING PLAN & SECTIONS
XS-M-2	SITE LOCATION & PIPING PLAN AT GRADE
XS-E-10	WIRING DIAGRAM & DETAILS-CO2 DETECTOR SYSTEM
576-E-5-E-9	PLOT PLAN, LEGEND & SYMBOLS
576-XS-E-8	POLE LINE DETAILS
XS-E-7	TERMINAL POLE DETAILS
XS-E-6	SINGLE LINE, SCHEMATIC & WIRING DIAGRAMS
XS-E-5	PLANS, ELEVATIONS & SECTIONS-500 KVA SUB-STATION
XS-E-4	PARTIAL FLOOR PLANS-SILO LEVELS 2 & 7
XS-E-3	PLANS SECTIONS & DETAILS-L.C.C. & SILO
XS-E-2	CONDUIT LAYOUT & DETAILS-FIREX PUMP STATION

GRAPHIC SCALE:

1 IN. = 20 FT

FOR SITE: D

REVISION	DATE	DESCRIPTION	AGENCY	INIT.
00	8-15-62	OPERATIONAL AS BUILT DRAWING	SATAF	G.L.
	10-5-61	REVISED TO SHOW CONSTRUCTION AS-BUILT CONDITION; RELOCATED POLE #274EN-REMOVED EXTENDED POLE LINE, REMOVED NOTE, REVISED DWG. NO'S.	CEOMCO	

RECORD DRAWING - AS BUILT
CONT. No. 7182 REV. NO. DATE 10-5-61 BY L.S.
CONT. No. ____ REV. ____ DATE ____ BY ____
CONT. No. ____ REV. ____ DATE ____ BY ____

VANDENBERG AIR FORCE BASE
ATLAS TRAINING FACILITIES
65-T-2

BECHTEL CORPORATION
ENGINEERS AND CONSTRUCTORS
SAN FRANCISCO – LOS ANGELES – NEW YORK

DEPARTMENT OF THE AIR FORCE
AIR FORCE BALLISTIC MISSILE DIVISION (ARDC)

DESIGNED BY ______ 11-18-60
DRAWN BY W. COCHRAN 11-8-60
CHECKED BY ______ 11-9-60
APPROVED ______ 11-18-60

WS 107 A-1 65-T2 (SILO)
VANDENBERG A.F.B. CALIFORNIA
LAUNCH COMPLEX
FIREX SYSTEM
SITE D
PLOT PLAN, LEGEND & SYMBOLS

DATE 5 DEC. - 1960
SCALE AS NOTED
DRAWING 576-D-5-E-1

BSD INDEX NO. 41.6.21

D.O. SERIES AW 1573/61 REV 00

FIGJRE 40

APPENDIX C

Atlas 576 G: Historic Photographs
Vandenberg AFB, Lompoc, California

Plate 53: Artist's rendering, Atlas F Unitary Concept, 1959. *Aviation Week*, May 25,1959.

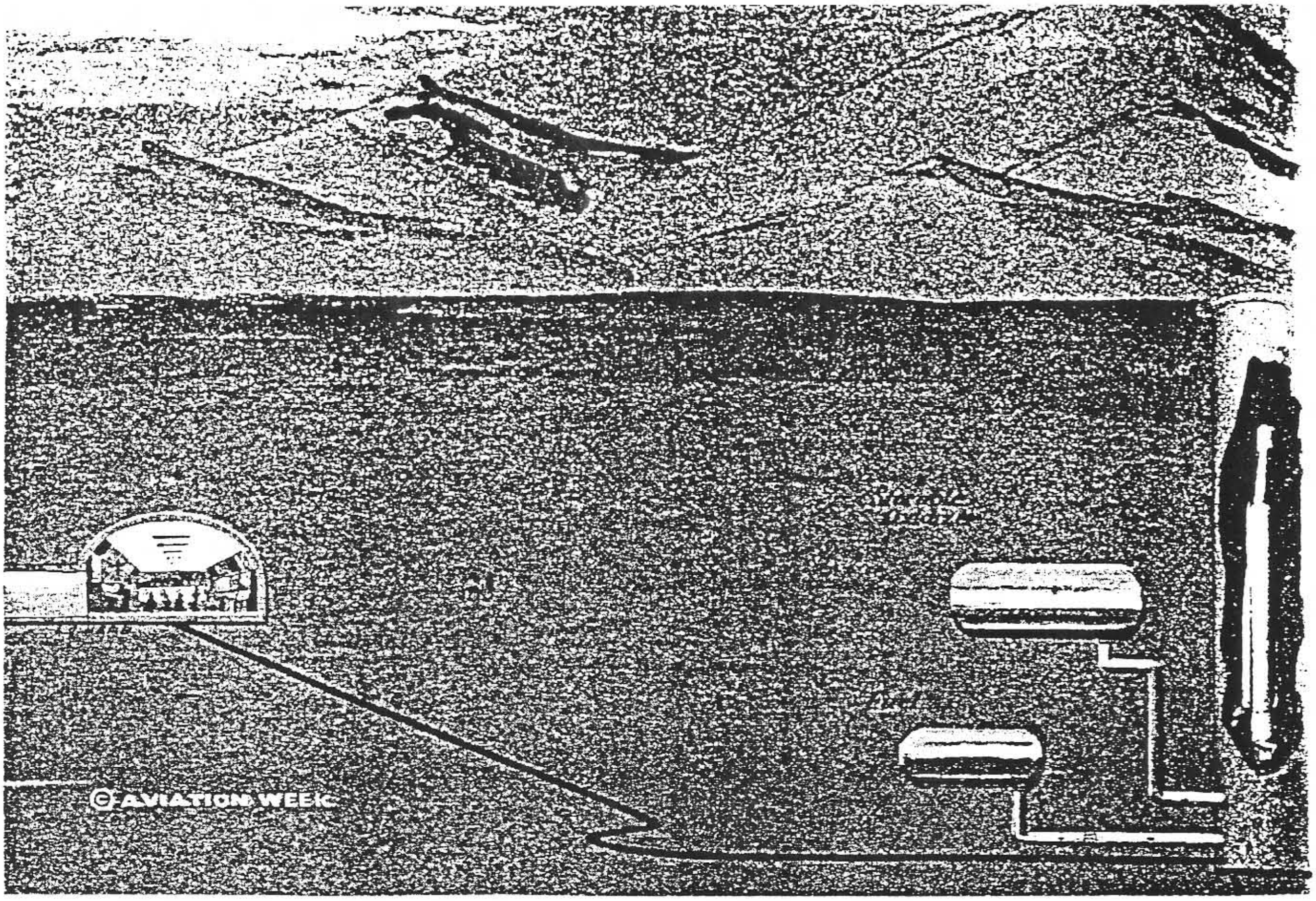
Plate 54: Artist's rendering, Atlas F Hardened Site, 1960.*Aviation Week*, February 22, 1960, and, June 20, 1960.

Plate 55: Artist's rendering, Atlas F Unitary Silo and Launch Center, 1961. *Aviation Week*, September 25, 1961.

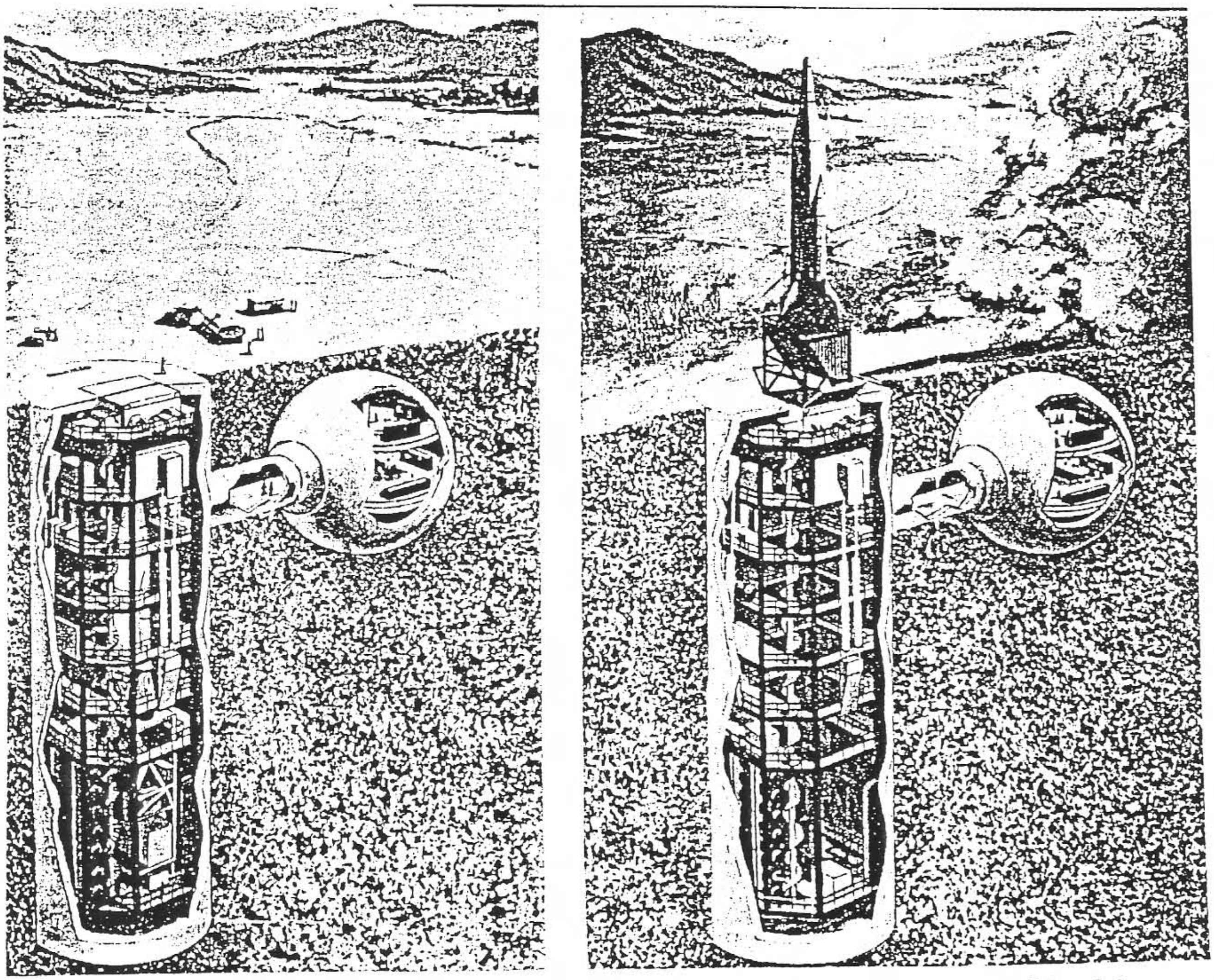
Plate 56: Water Bird: mockup for the Atlas F missile. Photograph published in *Missiles Volume*, 1962.

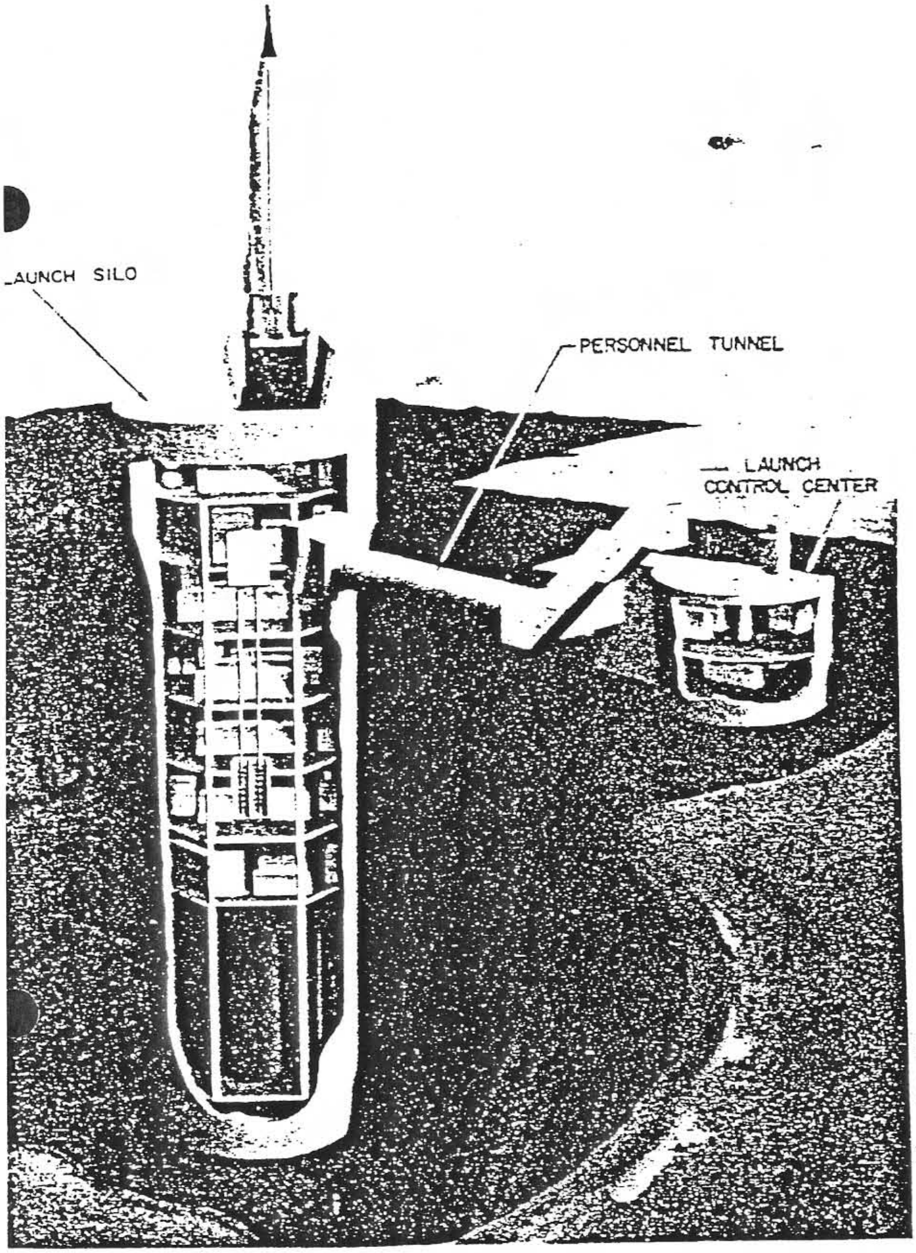
Plate 57: Atlas F, unidentified silo location. Photograph courtesy of Sergeant Jay Pritchard, Vandenberg Air Force Base.

Plate 58: Atlas F, unidentified silo location. Photograph courtesy of Sergeant Jay Pritchard, Vandenberg Air Force Base.



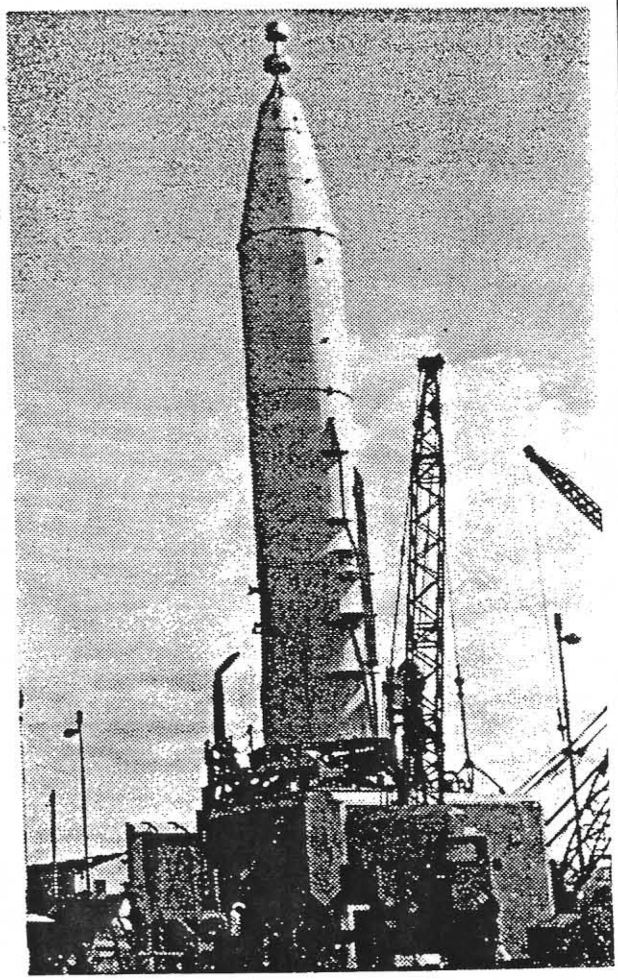
PL: 53





PL: 55

PL: 56



PL: 57