

DOUGLAS MISSILE TEST FACILITY,
ALPHA TEST COMPLEX, TEST STAND NO. 2
West of Security Park Drive
Rancho Cordova
Sacramento County
California

HAER CA-2310-A-3

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

U.S. Department of the Interior
National Park Service
Pacific West Regional Office
San Francisco, California

HISTORIC AMERICAN ENGINEERING RECORD

DOUGLAS MISSILE TEST FACILITY, ALPHA TEST COMPLEX, TEST STAND NO. 2

HAER No. CA-2310-A-3

Location: The Douglas Missile Test Facility is in the City of Rancho Cordova, Sacramento County, California, about twelve miles east of the City of Sacramento. The testing facilities are contained within 1,700-acres located south of White Rock Road, north of Douglas Road, east of Sunrise Boulevard, and west of Grant Line Road in eastern Sacramento County. Test Stand No. 2 and related structures are part of the Alpha Test Complex, located west of Security Park Drive, in the southeastern quadrant of the testing facilities. Test Stand No. 2 is west of the Control Center in the northern part of the Alpha Test Complex.

Approximate center of Test Stand No. 2 complex: Latitude 38°34'18.42"N; Longitude 121° 13'05.91"W

USGS 7.5 minute quadrangles Carmichael and Buffalo Creek, California, Photorevised 1992

Present Owner: Elliott Homes and Easton Development Company, LLC

Present Use: Abandoned

Significance: The Douglas Missile Test Facility, including the Alpha Test Complex, has been determined eligible for listing in the National Register of Historic Places as a district under significance criterion A (Events) and criterion C (Design/Construction) for advances in science and technology. Test Stand No. 2 of the Alpha Test Area has been determined eligible for its involvement with the Thor Intermediate-Range Ballistic Missile (IRBM), liquid propellant testing and static acceptance firings of completed missiles (1957-60), and NASA Saturn S-IV and S-IVB booster engines, testing (1963-69). The test stand is best considered and understood as an integral component of the Alpha Test Complex, and the larger Douglas Missile Test Facility District.

Historians: Rebecca Allen, Ph.D., Katherine Anderson, M.A.
Architectural Historians
Environmental Science Associates
2600 Capitol Ave, Ste 200
Sacramento, CA 95816
January 2014

Project

Information: Elliot Homes currently plans to demolish all facilities associated with the Douglas Missile Test Facility. As part of the permitting process, the Army Corps of Engineers determined that buildings and structures associated with this facility are considered potentially eligible for listing in the National Register of Historic Places, and recommended HAER photo documentation and recordation of this facility. Environmental Science Associates conducted the background historical research, assisted by previous studies of the facility¹. Robert Hicks provided all HAER quality photographs. Alan Lawrie provided technical expertise.

For additional information, see:

Douglas Missile Test Facility, HAER-CA-2310

Douglas Missile Test Facility, Alpha Test Complex, HAER CA-2310-A

Douglas Missile Test Facility, Alpha Test Complex, Control Center,
HAER CA-2310-A-1

Douglas Missile Test Facility, Alpha Test Complex, Test Stand No. 1,
HAER CA-2310-A-2

Douglas Missile Test Facility, Beta Test Complex, HAER CA-2310-B

Douglas Missile Test Facility, Beta Test Complex, Terminal Control Room,
HAER CA-2310-B-1

Douglas Missile Test Facility, Beta Test Complex, Test Stand No. 3,
HAER-CA-2310-B-2

Douglas Missile Test Facility, Gamma Test Complex, HAER CA-2310-C

Douglas Missile Test Facility, Gamma Test Complex, Test Structure,
HAER CA-2310-C-1

Douglas Missile Test Facility, Kappa Test Complex, HAER CA-2310-D

Douglas Missile Test Facility, Sigma Test Complex, HAER CA-2310-E

Douglas Missile Test Facility, Solid Propellant Assembly Area, HAER CA-2310-F

¹ Karen Weitze, Draft Historic Buildings and Structures Inventory Douglas Missile Test Facility Rio del Oro Specific Project Plan. Report to City of Rancho Cordova and U.S. Army Corps of Engineers, Sacramento District, from EDAW, Sacramento, and Weitze Research. (2005); Alan Lawrie, Return to Sacramento: a Review of Saturn Rocket Firings and Explosion. Paper presented at 43rd AIAA/ASME/SE/ASEE Joint Propulsion Conference and Exhibit, July, Cincinnati, Ohio. Published by the American Institute of Aeronautics and Astronautics, manuscript number AIAA 2007-5343. (2007); Rebecca Allen, National Register of Historic Places Evaluation of Structures Associated with the Douglas Missile Test Facility (P-34-4317), Rio del Oro, Rancho Cordova, California. Report to ECORP Consulting, Rocklin, and Elliot Homes, Folsom, from Past Forward, Inc., Garden Valley, California. (2011).

Part I. Historical Information

A. Physical History

1. Date of Construction: 1956-57

2. Architect/Engineer: Aerojet General engineers

3. Builder: Douglas Aircraft Company, Aerojet General

4. Original Plans and Construction: In December 1955, the U.S. Air Force awarded the Douglas Aircraft Company to design, test, and deliver Thor IRBMs. The following year, Douglas Aircraft Company entered into a lease agreement with Aerojet General to develop 1700 acres on western edge of Aerojet to build the Douglas Missile Test Facility, also known as the Sacramento Test Operations (SACTO) site. Construction began at the Alpha Test Complex before October 1956, and continued through 1957. Aerojet General designed Test Stand No. 2 during 1956-57 as part of the Alpha Test Complex. Test Stand No. 2 was integral to the function of the Alpha Test Complex, which is associated with the Thor Missile.

5. Alterations and Additions: In April 1960, the U.S. government awarded Douglas the contract to design, build, and test S-IV second stage for the Saturn I booster. Testing occurred at Alpha Test Complex, including Test Stand No. 2.

From 1973-77, McDonnell Douglas dismantled the majority of steel superstructure on the four test stands in the Alpha Test Complex and Beta Test Complex, and then initiated sales of parcels and buildings in the Administration Area. In 1984, Aerojet bought back the original property from McDonnell Douglas. The complex was mostly derelict by then. The site is currently slated for demolition.

B. Historical Context:

The Alpha Test Complex featured the first large-scale test stands erected for the Douglas Missile Test Facility at Rancho Cordova, and occupied forty-five acres in the southeast quadrant of the facility. The engineers of Aerojet General designed the facilities within the Alpha Test Complex in 1956, with construction underway in 1957. Douglas initiated static firings at the Alpha Test Complex in January 1958. The first missile in test was the Thor IRBM. Both test stands in the Alpha Test Complex were captive firing stands, and both used deluge systems. Test Stand No.2 included two positions, Test Stand No. 2A and Test Stand No. 2B. Douglas fired battleship versions of Rocketdyne's Thor engines on Test Stand No. 2A.

Douglas completed its research-and-development tests of Thor at the Alpha Test Complex in December 1959, and in mid-1960 full-scale Initial Operational Capacity (IOC) testing of Thor moved to Vandenberg Air Force Base in southern California. Douglas next used Test Stand No. 2A for battleship tests of the Aerojet Titan ICBM second-stage engine.

During 1965-1968, Douglas conducted acceptance testing of Saturn S-IV boosters on Alpha Test Stand No. 2B for NASA. The company shipped S-IV boosters from its plant in Santa Monica for check-out, firing, and post-firing checks at the missile test facility in Rancho Cordova. After completion of the acceptance testing, Douglas shipped the Saturn S-IV boosters by air to NASA's facilities at Cape Kennedy in Florida.

All static testing ended in 1969, although Douglas maintained the test stands in the complex in a state of readiness into late 1972. After deactivation of the Alpha Test Complex, Douglas dismantled the superstructure of the test stands. McDonnell Douglas used the facility for a short time to test aircraft fire suppression systems.

Part II. Structural/Design/Equipment Information

A. General Statement:

1. Character: The structures and landscape reflect architectural and engineering characteristics unique to this facility, as they were specifically designed to test the Thor and Titan missiles, and Saturn boosters. They reflect the specialized uses and development that occurred at the Douglas Missile Test Facility. The Alpha Complex was one of seven grouping of facilities within the larger complex. Test Stand No. 2 is particularly associated with the Thor IRBM, liquid propellant testing and static acceptance firings of completed missiles, 1957-60, and NASA Saturn S-IV and S-IVB booster engines, testing, 1963-69.

2. Condition of fabric: Varies, depending upon the specific structure or building. Further information is detailed below.

B. Description of Facility:

1. Test Stand No. 2 Complex. At Test Stand No. 2, the metal superstructure that rose above the concrete test stand has been removed, as at Test Stand No. 1. Approaching the area, the facility appears as a low structure. Upon closer inspection, the large size of Test Stand No. 2 becomes apparent. Other facilities that remain in the Test Stand No. 2 area include liquid oxygen (LOX) tank stands, raised pedestal foundations for steam accumulators, an observation shelter, and concrete stand.

2. Test Stand No. 2: Test Stand No. 2 once featured a steel-beam tower with two side captive-firing positions, a north-facing flame deflector, and a ground-level, reinforced concrete terminal room. The terminal room also functioned as the base of the test stand. The concrete structure, excluding the stairs, catchment area, and other features, is 60' x 95'. The south facade shows two bays, each with a large steel door. There is a viewing platform on the top of the remaining structure, and metal stairs are on the west and east sides of the structure. From below, the three-story structure is evident. The west side is windowless; a single steel door is evident in the bottom south corner. Metal stairs are mounted on the west side of the building. From the platform adjacent to the west side, the flame deflector catchment area to the north is evident. The concrete pad of the flame deflector catchment area is flat, and found directly behind (north of) the structure, and then slopes upwards on the east and west sides. The east side of the structure is similar to the west, with metal stairs (but no entry). From the viewing deck on top of the structure, the associated water containment basin is evident east of the north end of the flame catchment area. A TV camera stand at the northwest end of the flame catchment area is extant, as are test-in-progress lights to the west.

On the interior, there is a terminal room, with many of the original features are intact, although the area is in disarray, with the majority of the equipment removed. Much of the infrastructure remains, including light fixtures, overhead piping, metal stairs, and interior control panels. The entrance to the instrumentation tunnel is accessible and intact, as is the concrete top of the tunnel on the exterior. The interior is in fair condition.

2. LOX Tank Foundations: Two LOX tanks for Test Stand No. 2 sat within a protected area to the near southwest of the test stand. A reinforced, L-shaped barricade wall, surrounding earthen berm, and the raised pedestal foundations for the tanks remain at the site. The longest side of the concrete barrier wall is 92' long; the shorter side is 43' long. The barricade varies in height, from approximately 4' to 12' high. A concrete pad is inside the L-shape, with four concrete pedestal foundations. A metal stairwell is on the southwest corner of the area. Tall earthen berms surround the structure on the north and east sides. Placed at the location in 1956-57, the LOX tank are no longer present.

3. Steam Accumulator Foundations: Two steam accumulators for Test Stand No. 2 sat to the immediate southwest of the test stand. Placed at the site in 1956-57, the steam accumulator equipment is no longer present. The accumulators supported the altitude simulation system engineering for the test stand. The area has two concrete pads with raised concrete pedestal foundations. The smaller of the pads is 20' x 33', with four pedestal foundations. The adjacent larger concrete pad is 38' x 66' wide, with two rows of two large concrete pedestals with two smaller pedestals between; a single pedestal is to the west of the first row of two. There are seven pedestals altogether.

4. Observation Shelter: Designed by Aerojet General and constructed in 1956-57, the observation shelter is one of two shelters on the access road; the shelter associated with Test Stand No. 2 is at the end of the access road. The shelter is a small (23' long x 10' wide), flat-roofed, reinforced concrete structure, open on its rear face. The shelter features a bank of six viewing windows, each with thick, inset glass panes. It is nearly identical to Unit 79 (Observation Shelter No. 1), with two concrete pillars forming three bays, each with two long rectangular vertical windows. A cement chimney-shaped feature on the top of the shelter has a plate with four threaded holes. The feature is labeled "Target Reference" and may have provided a stable surface during captive firing events. Electrical boxes are placed east of the structure on a small concrete pad. Despite broken glass windows, the shelter is in good condition.

5. Concrete Stand: A square concrete stand with a metal plate bolted on the top is in the middle of a grass field approximately 3,000 feet east of the Alpha complex, and is closest to Test Stand No. 2. This feature closely resembles the Target Reference noted atop the Observation Shelter. This stand measures 51" on the bottom, 26" on the top, and is 6' tall.

C. Mechanicals/Operation: Tests conducted in The Douglas Missile Test Facility developed propellant and missile launchers during the Cold War era. When it operated as the Sacramento Test Operations (SACTO), the facility played a critical role in the conversion of missile technology. The Thor missile was the first IRBM in the arsenal of the United States Air Force. The Douglas Missile Test Facility supported captive test firings of early Thor missiles and engines. Firing stages for Saturn rockets, developed as part of the 1960s era space quest to explore the moon, were also developed and tested at this facility.

D. Site Information: The Douglas Missile Test Facility was constructed on the outskirts of Sacramento, in what was a suburban area known as Rancho Cordova. The Facility was situated south of the main highway (today known as Highway 50), amongst the remains of large numbers of dredge tailings, which in part provided existing earthen berms integral to the testing and captive firings. Although additional suburban shopping areas and commercial development now exist in the area south of Highway 50, this development has not encroached upon the main Douglas Missile Test Facility.

Part III. Sources of Information

A. Primary Sources

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B. Secondary Sources

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C. Likely Sources Not Yet Investigated

According to Alan Lawrie, he originally wrote the AIAA (2007) paper as part of his research on the Saturn rockets because the Douglas Missile Test Facility, Sacramento Test Operations, as well as events that took place at the Facility, that had not been previously documented. He noted that Don Brincka, retired Director of Technical Operations at the SACTO facility, had managed to retain some documentation, but more importantly was able to answer some of Lawrie's more obscure questions. Mr. Brincka passed all of his papers over to Mr. Lawrie. Mr. Lawrie also stated that he had researched primary source material at the National Archives and Record Administration in Atlanta, Georgia.

Rebecca Allen contacted Ralph H. Allen, Historic Preservation Officer, Marshall Space Flight Center, Huntsville, Alabama. Mr. Allen noted that sources of information on the SACTO facility held by Marshall were limited. After further conversation, and a visit to the Sacramento area, Mr. Allen mailed Rebecca Allen two CD discs of information that he knew were available at the Marshall facility, including "Facility Inventory Sheets, Liquid Chemical Propulsion Test Facility Inventory," September 1986, completed by Aerojet (96 pages). This paper also details future plans for a facility that was never built.

Mr. Allen also provided a CD of historic (unlabelled) photographs. Additional information may be at Marshall Space Flight Center.

The California History Room, California State Library, recently found a box of photographs concerning the Douglas Missile Test Facility that seem to have originated from Douglas archives. The 50+ photographs were indexed, but did not contain additional views critical to the current interpretation and documentation of the facility.

Several buildings associated with the Administrative Area were not recorded as part of this current project. These buildings remain standing, and are being actively used for other purposes.