

DOUGLAS MISSILE TEST FACILITY,
ALPHA TEST COMPLEX, TEST STAND NO. 1
West of Security Park Drive
Rancho Cordova
Sacramento County
California

HAER CA-2310-A-2

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. 1 HAER No. CA-2310-A-2

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. The Alpha Test Complex, west of Security Park Drive, is in the southeastern quadrant of the testing facilities. Test Stand No. 1 and related structures are east of the Control Center in the northern part of the Alpha Test Complex.

Approximate center of Test Stand No. 1: Latitude 38°34'20.83"N;
Longitude 121°12'52.49"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 and its Test Stand No. 1, 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. 1 of the Alpha Test Complex has been determined eligible under criterion A 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). Test Stand No. 1 is best considered and understood as an integral component of the Alpha Test Complex, and the larger Douglas Missile Test Facility District.

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

Douglas Missile Test Facility, Alpha Test Complex, Test Stand No. 2,
HAER CA-2310-A-3

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 EDAA, 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).

California. In 1960, Douglas initiated activities for NASA at its Rancho Cordova location, beginning with tests for a developmental Saturn booster, the DSV-IV, on Alpha Test Stand No. 1. By 1962, activities conducted on Test Stand No.1 were also focused on the Saturn DSV-IV, and included static firings of the A-I and A-3 versions of the RL-10 liquid hydrogen engine placed in a battleship version of the booster.

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.

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. As part of the Douglas Missile Test Facility, Aerojet constructed the first large-scale test stands in what was labeled the Alpha Test Complex. Aerojet General engineers designed the facilities in 1956, and construction began the same year, with additional structures built in 1957. Test Stand No. 1 once featured a steel-beam tower with a single captive-firing position, 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.

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

B. Description of Facility:

1. Test Stand 1 Complex. As they exist today, several buildings comprise the facilities associated with Test Stand No. 1, including Test Stand No. 1 itself, liquid oxygen (LOX) Test Stands, a test cell, an observation shelter, and concrete pads of unknown purpose. The primary elements of Test Stand No. 1 that are no longer extant are a shop building to the south of the structure, and several associated tanks that once housed liquid hydrogen, nitrogen, and oxygen.

2. Test Stand No. 1: The footprint of the three-story Test Stand Unit No. 1 occupies an area of approximately 46' x 82' excluding the stairs on the east and west side of the building, and the buttresses and catchment basin that extend from the north facade. A single door opening on the west side of the structure is the primary feature of the single-story south facade. Metal stairs are visible on the west and east sides of the building, as is a view platform with metal railing on the

top of the structure. The steel superstructure that once towered over the Test Stand is no longer extant. Only the reinforced concrete terminal room at the base of the test stand remains at the site. The reinforced concrete catchment basin at the base of the flame deflector is also present, as is the test stand's large, circular deflector water-holding tank. The deflector water-holding tank is a surface pond facility. Miscellaneous camera and light stands site at the periphery of the test stand. Paved areas that comprise the roadway system extend from the east side of the structure. On the north facade, two large buttresses extend towards the north and into the area of the paved flame deflector catchment area. The stairway on the east side of the building and the viewing platform on top of the structure is also visible. A large tree obscures the west side of the building. The flame deflector catchment area extending north from Test Stand No. 1 is a flat concrete pad the width of the structure. Puddles now collect there. The sides of the catchment area are sloped up from the flat area. A water containment tank at the northeast end of the catchment area is extant.

The interior of the structure is in disarray, although many of the original elements remain. Stairways are still in place, as is much of the overhead infrastructure (pipes, etc.). The entrance to the instrumentation tunnel is extant and accessible.

Modern water facilities (primarily pipes) are in and around Test Stand No. 1, and visible in many of the photographs. These facilities are laid on top of existing features and do not compromise the physical structures.

3. LOX Tanks: two LOX tanks for Test Stand No. 1 sat within a protected area to the near southeast of the test stand. A reinforced L-shaped barricade wall remains at the site, and a surrounding earthen berm. Placed at the location in 1956-57, the LOX tanks are no longer present. The longest side of the ell-shaped concrete barrier is 88' long. From both end and the middle, the barrier turns at 90°, and extends for 24'. It ends in concrete pad that is 31' long and 17' long. Four concrete pedestals are placed on this concrete pad. A large sloping earthen berm extends outward from the longest wall of the concrete barricade wall.

4. Test Cell: The one-story (15' x 15') test cell located to the near southeast of Test Stand No. 1 is a three-sided, flat-roofed, steel-frame structure placed on site in 1957. The inside face of the test cell is paneled, possibly with asbestos. A stairwell with metal railings is adjacent to the test cell. The stairs lead from the level of the catchment basin associated with Test Stand No. 1 to a roadway in front of the Test Cell. The structure is rusted, as it is open to the elements; the interior paneling is in poor condition. The structure is in poor to moderate condition, while the adjacent stair well is in good condition. Historic use of the test cell is undetermined.

5. Observation Shelter: The observation shelter for captive firings at Test Stand No. 1 is northwest of the test stand at the midpoint of its 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. The fenestration is typical of that found in blockhouses and observation posts at missile facilities and launch sites. On its south-facing facade, an earthen berm is built up adjacent to the structure, making it appear approximately 6' tall from this vantage point. On the north side, concrete pillars on the north side roughly divide the structure into three bays, each with two long narrow observation windows. Inside the shelter, the roof is approximately 9' high. The windows are now broken out, showing the edge of the 2" thick glass. Electrical boxes are placed on a small concrete pad that is on the west side of the shelter. Constructed in 1956-57, the observation shelter is one of the two shelters on the access road. The observation shelter is in good condition, despite the broken windows.

6. Additional Foundations: Looking towards the southeast from the area above Test Cell, a series of concrete footings are visible. These footings do not seem to correspond with missing ancillary features noted by Weitze.² Their function is not currently understood.

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 Intermediate Range Ballistic Missile (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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² Weitze, 2005, p. 65.

Olin Teague, Chairman, Manned Space Flight Subcommittee, U.S. House of Representatives, Washington, D.C., February 11, 1966. Manuscript, in possession of D.R. Brincka, copy held by Alan Lawrie.

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B. Secondary Sources

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Lawrie, Alan, and Robert Godwin, *Saturn V: the Complete Manufacturing and Test Records plus Supplemental Material*. Apogee Books, Burlington, Ontario, Canada, 2005.

Weitze, Karen, 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.

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.