

DOUGLAS MISSILE TEST FACILITY,  
BETA TEST COMPLEX  
North of Douglas Road  
Rancho Cordova  
Sacramento County  
California

HAER CA-2310-B

BLACK AND WHITE PHOTOGRAPHS

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, BETA TEST COMPLEX**

**HAER No. CA-2310-B**

**Location:** Sacramento County, California

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 Beta Test Complex is located west of the Alpha Test Complex, and north of Douglas Road.

Approximate center of Beta Test Complex: Latitude  
38°34'13.60"N; Longitude 121°14'04.63"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:** As a part of the Douglas Missile Test Facility in Rancho Cordova, the Beta Test Area was actively involved in the development and testing of liquid- and solid-propellant rocket booster engines, including NASA Saturn S-IV and S-IVB booster engines (1963-69). Existing facilities contain specialized buildings, structures, and a landscape that reflects the region's scientific heritage, advances in general engineering, and examples of important new technologies and innovation. The Beta Complex meets Criteria A and C of the National Register, but is best understood and interpreted as part of the larger Douglas Missile Test Facility.

**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 facility.<sup>1</sup> 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, 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, Alpha Test Complex, Test Stand No. 2,  
HAER CA-2310-A-3

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

---

<sup>1</sup> 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 43<sup>rd</sup> 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:** 1963-64

**2. Architect/Engineer:** Ralph M. Parsons

**3. Builder:** Douglas Aircraft Company

**4. Original Plans and Construction:** The Beta Test Complex was the final group of large-scale test stands constructed at the Douglas Missile Test Facility. Ralph M. Parsons designed the facilities within the Beta Test Complex in 1963, and construction immediately began. The complex occupied about 325 acres; much of this is a buffer zone in case of accidental explosions of liquid oxygen and hydrogen. The main components of the complex were the central blockhouse and two static test stands (original plans called for three test stands, but only two were constructed). Additional ancillary features were also constructed to support the function of the test stands. The facilities expanded NASA's test capabilities for the Saturn S-IVB booster. NASA operated test Stand No. 1 in the Beta Test Complex to run tests for the Saturn S-IVB booster during 1965-69. Beta Test Stand No. 3 test stand is where the Apollo 8 third stage exploded. This was the only flight stage in the Apollo-Saturn program that exploded.

**5. Alterations and Additions:** Static testing ended in 1969, but test stands were maintained in a state of readiness into late 1972. Douglas had removed the steel superstructure of the tower and the flame deflector in 1977.

### **B. Historical Context:**

On December 21, 1961, NASA awarded Douglas a contract to design, build, and test the upgraded S-IVB stage to be used in two configurations. The 200 model was used as the second stage of the Saturn IB launcher and the 500 model was used as the third stage of the Saturn V launcher. Both versions of the S-IVB stage had a diameter of 22 feet and utilized one J-2 engine. To support this new program Douglas initiated work on a new test complex that became known as the Beta complex.

The Beta Test Complex was the final group of large-scale test stands constructed at the Douglas Missile Test Facility. The Ralph M Parsons Company completed the design of the Beta test stands on 6 November 1963. Construction began in 1964. Because of the nature of the testing, a large buffer zone also comprised the Beta Test Complex; it is made up of about 325 acres.

Although originally designed to support three test stands only two were finally constructed. The Beta I stand was activated in September 1964 with the first cryogenic loading in the S-IVB Battleship stage. Static firings of this stage started on December 1, 1964 and continued until August 20, 1965. The second Beta test stand, Beta III, became operational and was used for the first flight stage firing of S-IVB-201 on August 8, 1965. From 1965-69, nine S-IVB-200 and eleven S-IVB-500 flight stages were static fired at the Beta Test complex.

NASA conducted tests of the RL10 and the J-2 engines in battleship configurations of the S-IV and S-IVB boosters on captive-firing stands in the Alpha Test Complex (the RL10) and in the Beta Test Complex (the J-2) during 1962-1968. Tests of the J-2 at Rancho Cordova illustrate the important interactive relationships between corporate test facilities and those maintained by NASA to develop a new engine for a launch vehicle. Rocketdyne contracted to manufacture fifty-five J-2 engines for NASA by August 1965, and delivered the first production J-2 engine in April 1964. Rocketdyne ran an intensive test program for the J-2 engine at the Santa Susana test site. NASA followed with qualification tests of the J-2 engine at its Marshall Space Flight Center in Huntsville, Alabama, during 1965-66. NASA conducted acceptance tests of the J-2 engine in the battleship S-IVB at the Beta Test Complex in Rancho Cordova during 1965. In mid-1966, NASA increased its contract for J-2 to 155 engines. Douglas ran acceptance tests of the J-2 engine at the S-IVB Stage Test Facility in Rancho Cordova from mid-decade into about 1968. After acceptance tests, NASA transported the individual J-2 engines from California to Cape Canaveral for installation on second- or third-stage S-IVB boosters configured in the Saturn III and Saturn V.

Beta Test Stand No. 3 test stand is where the Apollo 8 third stage accidentally exploded during testing. This was the only flight stage in the Apollo-Saturn program that exploded, but allowed engineers to refine flight stages for future space missions. Static testing ended in 1969, but test stands were maintained in a state of readiness into late 1972.

Between 1973 and 1977, McDonnell Douglas dismantled the majority of the steel superstructure on the four test stands in the Alpha Test Complex (two stands) and in the Beta Test Complex (two stands). The company sold the steel as scrap. Douglas removed the steel superstructure of the tower and flame deflector in 1977.

## **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

Saturn boosters. They reflect the specialized uses and development that occurred at the Douglas Missile Test Facility. The Beta Complex was one of seven grouping of facilities within the larger complex.

**2. Condition of fabric:** Extant facilities at the Beta Test Complex are generally in good to fair condition. Many structures associated with Beta Test Complex were demolished prior to this recordation effort (see table below).

**B. Description of Facility:**

**1. Beta Test Complex:** The Beta Test Complex is a large fenced compound, originally comprising approximately 325 acres, laid out west of the Alpha Test Complex. The irregularly-shaped complex includes a central blockhouse and the remains of two static test stands. It was originally configured with thirty numbered structures and several unnumbered support units and concrete pads. In 2005, the Beta Test Complex existed as twenty-two buildings, structures, and structural remnants.<sup>2</sup> The dominant, character-defining features within the Beta Complex were its central terminal control room, and two test stands, connected by underground instrumentation tunnels. Ancillary structures were clustered near the Central Control Center and two test stands. Many buildings and structures were demolished in 2008, prior to their formal recordation. The table below lists all extant structures at the time of documentation, as well as demolished structures that are no longer present. Buildings associated with the Central Control Center are described below; Test Stand No. 3 and associated foundations are described in a separate report.

<b>Date of Construction</b>	<b>Common name</b>	<b>Description</b>	<b>Condition</b>
<i>Control Center and Entrance</i>			
1963-64	Test Control Center	Reinforced concrete blockhouse	demolished
1964	Between control center and test stands	underground tunnels	mostly demolished
1963-64	Beta support offices	Prefabricated metal	demolished
1964	Pump house	Reinforced concrete	good
1963-64	Water storage tank	Steel storage tank	good
1963-64	Facilities shop	Prefabricated metal	good
1963-64	Liquid hydrogen	Concrete perimeter	demolished

<sup>2</sup> As recorded by Weitze, 2005

<b>Date of Construction</b>	<b>Common name</b>	<b>Description</b>	<b>Condition</b>
	tank	wall and footings	
1963-64	Guard House No. 7	Wood framed small building	fair; windows now broken
<b><i>Test Stand No. 1</i></b>			
1963-64	Test Stand No. 1	Reinforced concrete base and pit	demolished
1963-64	Terminal equipment room	Reinforced concrete	demolished
1964	Shop building	Steel framed	demolished
1963-64	Observation Shelter No. 1	Reinforced concrete shelter	demolished
1963-64	Fan Room	Small underground structure	demolished
1963-64	Liquid Hydrogen Tank	Steel tank	demolished
<b><i>Test Stand No. 3</i></b>			
1963-64	Terminal Equipment Room	Reinforced concrete	good
1963-64	Test Stand No. 3	Reinforced concrete	good
1964	Shop building	Steel framed	demolished
	Liquid oxygen (LOX) Tank	Steel tank	demolished
1963-64	Observation Shelter No. 4	Reinforced concrete shelter	demolished
1963-64	Liquid hydrogen tank	Concrete perimeter wall and footings	tank no longer present; concrete perimeter foundation recently impacted; stairs removed
1963-64	Fan room	Small underground structure	demolished
1963-64	Observation Shelter No. 4	Reinforced concrete shelter	demolished
<b><i>Ancillary Structures no Longer Present on Site<sup>3</sup></i></b>			
	LOX tank	Immediately west of Test Stand No. 1	n/a
	Observation shelter	South of Test Stand No. 1	n/a
	Tool crib	South of Test	n/a

<sup>3</sup> Weitze, 2005, p. 92.

Date of Construction	Common name	Description	Condition
		control center	
	Warehouse	West of Test Stand No. 3	n/a
	Liquid nitrogen tank	South of Test Control Center	n/a
	Two wells		n/a
	Power substation	Outside securing fencing, south of complex	n/a

**2. Test Control Center and Entrance Area:** The majority of these structures were demolished prior to formal recordation. The one-story steel-reinforced windowless concrete Control Center had an interior space of 26,240 square feet. Center opening double blast doors were on the building's east, west, and south walls. A large control room dominated the north part of the building, along with an observation room. Smaller work areas were in the southern part of the building.

(Demolished 2008-2009). Two steel-framed structures covered in corrugated metal siding constructed in 1963-64 served as support offices. The westernmost of the pair was two stories, and functioned as a calibration complex. Ralph Parsons also designed these two structures.

(Demolished 2008-2009). Pedestal footings, vent pipes, a concrete perimeter wall, and access stairs associated with a liquid hydrogen tank that was northwest of the pump house. The liquid hydrogen tank serviced Test Stand No. 3.

A Guard House that was extant in 2009 was subsequently demolished. Built in 1963-64, the small (9' x 12') flat-roofed, one-story wood-frame structure had large plate glass windows on all sides. Central doors with flanking windows were on the west and east facades. A chain link fence (also removed) once surrounded the guard house.

The extant Pump House was constructed in 1964; it measures 50' long, and is 42' wide. It is a one-story reinforced concrete structure with fixed ventilation panels on its north and south facades, but is otherwise windowless. A single entrance is on the west side of the building. The interior is a single room.

The extant water tank (fabricated in 1964) is approximately 91' in diameter. Ladders are found on two sides of the structure; a railing is at

the top of the tank above one of the ladders. Pipes running from top to bottom are also found on the side of the tank.

An extant Facilities Shop was also constructed in 1964. Corrugated siding covers the one-story gable-roof prefabricated metal building that measures 30' x 60'. Openings include a centered, track-mounted door on the north façade, and windows on the east and west sides of the building.

### **3. Test Stand 1, Terminal Equipment Room, and Ancillary**

**Structures:** (Demolished prior to formal recordation, 2008-2009). These structures were similar in configuration and appearance to the facilities in Test Stand Unit No. 3. Weitze notes that NASA operated test Stand No. 1 and the Terminal Equipment Room to run tests for the Saturn S-IVB booster during 1965-69.<sup>4</sup> The terminal equipment room for Test Stand No. 1 was a one-story, reinforced concrete structure that abuts the western face of the base of Test Stand No. 1. The instrumentation tunnel from Test Stand No. 1 to the Beta Test Complex test control center exited from the lower level of the terminal equipment room. Douglas had removed the steel superstructure of the tower and the flame deflector in 1977. Concrete elements of the buildings were still standing when Weitze recorded them in 2005, and Lawrie in 2006.

Weitze recorded a shop building in 2005; it was demolished prior to formal recordation. It was a one-story, steel-frame structure, built in 1964. It had steel I-beam construction with a light truss roof frame, covered in corrugated siding, a center-opening, track-mounted door on the east façade, and a steel blast door on the west facade, and a simply entry on the north side of the building.

(Demolished 2008-2009). Constructed in 1963-64, Observation Shelter No. 1 was north of the test stand, at the bend in access road to the fan room. It was a small, flat-roofed reinforced concrete structure, with a bank of three viewing windows with thick, inset glass pane. It had a steel blast entry door on the rear façade.

(Demolished 2008-2009). The Fan Room for Test Stand No. 1 was a small underground structure accessed through a heavy steel, circular hatch cover. The historic use of the room was not determined, other than for ventilation.

(Demolished 2008-2009). The associated liquid hydrogen tank for Test Stand No. 1 was a large sphere on raised footings, constructed in 1964.

---

<sup>4</sup> Weitze 2005, p. 116.

**4. Terminal Room and Test Stand No. 3:** These adjacent structures are discussed in two separate reports.

**C. Mechanicals/Operation:** NASA operated test Stand No. 1 to run tests for the Saturn S-IVB booster during 1965-69. Ralph Parsons also designed these buildings. Douglas had removed the steel superstructure of the tower and flame deflector in 1977. Concrete elements of the buildings were still standing when Weitze recorded them in 2005, and Lawrie in 2006.

The Control Center was constructed 1000' from each test stand. It was a steel-reinforced single-story air-conditioned concrete structure that contained parallel services for Test Stands No. 1 and No. 3, including closed-circuit television receivers, control systems, and data acquisition systems.

**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**

Aerojet Builds New Missile Rocket Plant. *Aviation Week*, 19 March 1956.

Douglas Missile & Space System Division, Saturn/Apollo and Manned Orbital Research Laboratory Congressional Record Presentation. Presentation to the Honorable 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.

Douglas Missile & Space System Division, Sacramento Test Center Resources Handbook, Douglas Report No. SM 37538 R1, Approved by D.R. Brincka, Director, Technical Operations, December 1966. Manuscript, in possession of D.R. Brincka, copy held by Alan Lawrie.

Douglas Missile & Space System Division, Sacramento Test Center MSSD Beta Complex Facts, prepared by Logistics Support Services, Sacramento Test Center, approved by W.L. Duval, Director, Sacramento Test Center, no date given. Brochure in possession of D.R. Brincka, copy held by Alan Lawrie.

Douglas Missile and Space Systems Division, Saturn Operations Engineering Testing Summary. Sacramento Field Station, 1958-1962. McDonnell Douglas Corporate Records (accessed by Karen Weitze, 2005).

Douglas Missile and Space Systems Division, Sacramento Test Center Resources Handbook. Douglas Report No. SM 37538. Sacramento Test Center, August 1966. McDonnell Douglas Corporate Records (accessed by Karen Weitze, 2005).

*FLIGHT International*, Missiles and Spaceflight. 5 July 1962, pgs. 25-27, 1962.

The Saturn V Apollo Moon Rocket, Statement issued by NASA. Available at <<http://www.apollosaturn.com/svfacts.htm>>, 1963.

Saturn Systems Office, Saturn Illustrated Chronology (April 1957 – April 1962). Report prepared by National Aeronautics and Space Administration, George C. Marshall Space Flight Center, Huntsville, Alabama.

Schriever, Major General Bernard A., ICBM – A Step Towards Space Conquest. Speech given at Astronautics Symposium, San Diego, California, in February 1957. Available at <<http://astronauticsnow.com/history/schriever/index.html>>, 1957.

## **B. Secondary Sources**

Allen, Rebecca, 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.

Bilstein, Roger, *Stages to Saturn: A Technological History of the Apollo/Saturn Launch Vehicle*. NASA History Series, National Aeronautics and Space Administration, Washington DC, 1996.

Green, Paul, Interim Guidance, Treatment of Cold War Historic Properties for U.S. Air Force Installations. U.S. Air Force, Washington, D.C. Available at <<http://www.afcee.af.mil/shared>>, 1993.

Lawrie, Alan, Return to Sacramento: a Review of Saturn Rocket Firings and Explosion. Published by the American Institute of Aeronautics and Astronautics, manuscript number AIAA 2007-5343, 2007.

Lawrie, Alan, *Saturn 1/1B: The Complete Manufacturing and Test Records*. Apogee Books, Burlington, Ontario, Canada, 2008.

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.