

ROCKET ENGINE TEST FACILITY – OBSERVATION BLOCKHOUSE HAER No. OH-124-E  
(Rocket Propulsion Test Facility – Observation Blockhouse)  
NASA Glenn Research Center  
Cleveland  
Cuyahoga County  
Ohio

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD

National Park Service  
Great Lakes Support Office  
1709 Jackson Street  
Omaha, Nebraska 68102

February 27, 2003

## HISTORIC AMERICAN ENGINEERING RECORD

### ROCKET ENGINE TEST FACILITY – GRC OBSERVATION BLOCKHOUSE (Rocket Propulsion Test Facility – Blockhouse)

HAER No. OH-124-E

Location: NASA – Glenn Research Center  
Cleveland  
Cuyahoga County  
Ohio  
UTM: 17.427510.4584080  
Quadrangle: Lakewood, Ohio 1:24,000

Date of Construction: 1955-57

Engineers: H. K. Ferguson Company

Present Owner: National Aeronautics and Space Administration – Glenn Research Center

Present Use: Vacant/Not in use.

Significance: The Rocket Engine Test Facility Complex is a National Historic Landmark, and the observation blockhouse is included in the description of the site on the National Historic Landmark nomination form. The blockhouse is located approximately 260' north of the Rocket Engine Test Cell in Building 202. The blockhouse was one of the original Rocket Engine Test Facility Buildings constructed from 1955-57. The significance of the blockhouse lies in its role of providing a safe place where observers could monitor rocket engine tests during the early period of testing at the facility, from 1957-72.

Project Information: This documentation was initiated on May 15, 2002, in accordance with a Memorandum of Agreement among the Federal Aviation Administration, National Aeronautics and Space Administration (NASA), The Ohio State Historic Preservation Officer, and the Advisory Council on Historic Preservation. The City of Cleveland plans to expand the Cleveland Hopkins International Airport. The NASA Glenn Research Center Rocket Engine Test Facility, located adjacent to the airport, must be removed before this expansion can be realized. To mitigate the removal of this registered National Historic Landmark, the National Park Service has stipulated that the Rocket Engine Test Facility be documented to Level I standards of the Historic American Engineering Record (HAER). This project was initiated to fulfill that requirement.

Historian: Robert C. Stewart      Historical Technologies, West Suffield, Connecticut

### **Description:**

The observation blockhouse covers a surface area of about 132 square feet. The concrete walls of this small one-story building are 6" thick, and a flat built-up roof covers the structure. Observers could enter the blockhouse through a steel door in the north elevation. A ladder next to the door led to the building's roof, where a closed-circuit television camera was installed in 1972. The south elevation has a deeply recessed thick glass window that measures approximately 4' wide and is divided into two sections by a vertical mullion. The window is about 18" high and allowed observers stationed inside the blockhouse to watch engine tests in Building 202.<sup>1</sup>

While photographic evidence suggests that a closed-circuit television system was installed in the test cell as early as 1957, observers in the blockhouse were needed to supplement electronic and video data.<sup>2</sup> The blockhouse was originally equipped with an intercom system, an emergency communications system, and a telephone system to allow two-way contact between observers and test engineers. The blockhouse also had a small instrument panel with several switches and a "panic button." This instrument panel was similar to that located in the Building 100 control room, and was positioned below the observation window. In case of emergency, the "panic button" could be activated to initiate automatic test shutdown through programmable logic control. The control panel and telephone system components are still in place in the observation blockhouse, but this equipment is no longer functional. Other than some moisture-related deterioration of equipment on the building's interior, the observation blockhouse appears to have changed very little since its active use was discontinued around 1972.

### **History and Function:**

The observation blockhouse was built from 1955-57, during the original construction phase at the Rocket Engine Test Facility. A sheet of construction drawings for the building is dated June 29, 1955, and indicates that engineers of the H. K. Ferguson Company designed the structure.<sup>3</sup> During the early years of operation at the Rocket Engine Test Facility, technicians and engineers relied on the direct observation of engine firings to supplement instrument readings. One visual observation post was located in the observation room adjacent to the test cell. This post consisted of two mirrors arranged to form a periscope, through which the observer safely viewed the engine firing from a position that was not in direct line with the test engine. Another viewing point for rocket engine tests was the observation blockhouse, a plain, reinforced concrete bunker located approximately 260' north of Building 202. The actual line of sight distance from the test stand to the center of the blockhouse was 294'-7<sup>3</sup>/<sub>8</sub>".<sup>4</sup> The blockhouse protected observers from flying debris in case of catastrophic engine failure.

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<sup>1</sup> Drawing CE-101540.

<sup>2</sup> NASA Photograph Number C-45021 (1957). Photo on file at NASA Plumbrook Research Center.

<sup>3</sup> Drawing CE-101540.

<sup>4</sup> Drawing CF-101580 – 7/3/86.

In 1972 the Rocket Engine Test Facility staff installed a closed-circuit television camera on top of the blockhouse.<sup>5</sup> They also installed further lighting in the test cell and surrounding area. These improvements enabled technicians and engineers in the Building 100 control room to observe rocket engine tests on closed-circuit television from a safe distance. This development reduced the need for observers in the blockhouse.<sup>6</sup> Increasingly sophisticated sensors, instrumentation, and computerized data reduction technology further diminished the need for direct observers, and the blockhouse became obsolete.

The observation blockhouse is currently not in use. Based on the deteriorated condition of the interior, it is clear that the building has not been used for many years. The Rocket Engine Test Facility ceased operations in 1995 and has been vacant since that time. Along with the entire Rocket Engine Test Facility complex, the observation blockhouse is scheduled for demolition to make way for expansion of the Cleveland Hopkins International Airport.

**Conclusion:**

The observation blockhouse dates to an earlier period in the history of technology, when test monitoring by a human observer provided useful data. During active testing, a rocket engine often exhibited transient phenomena that human observers could not detect. These events were instead recorded by sound monitoring equipment and high-speed cine-cameras operating at 200 frames per second. As closed-circuit television systems improved and faster methods of recording and analyzing data became available, the contributions of human observers in a blockhouse became less important, and this method of observation was discontinued.

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<sup>5</sup> Interview with George Repas, 10/24/02.

<sup>6</sup> See HAER No. OH-124-D – GRC Building 100 – Rocket Operations Building.

Sources of Information/Bibliography

A. Engineering Drawings:

NASA Lewis Research Center – Cleveland, Ohio 44135  
Rocket Engine Test Facility  
Building No. 202  
Pilot Plan Equipment Location  
Drawing No. CF-101580 – 7/9/86

NASA Lewis Research Center – Cleveland, Ohio 44135  
Rocket Engine Test Facility  
Observation Post  
Drawing No. CF-101540 – 6/29/55

B. Interviews:

Repas, George, Hardware Design Engineer  
Interview by the author, 24 October 2002  
West Suffield, Connecticut, Telephone interview, Hardlines Design Company,  
Columbus, Ohio

C. Secondary Sources:

Butowsky, Harry. "Rocket Engine Test Facility, National Register of Historic Places Nomination." Washington, D.C.: United States Department of the Interior, National Park Service, 1984.

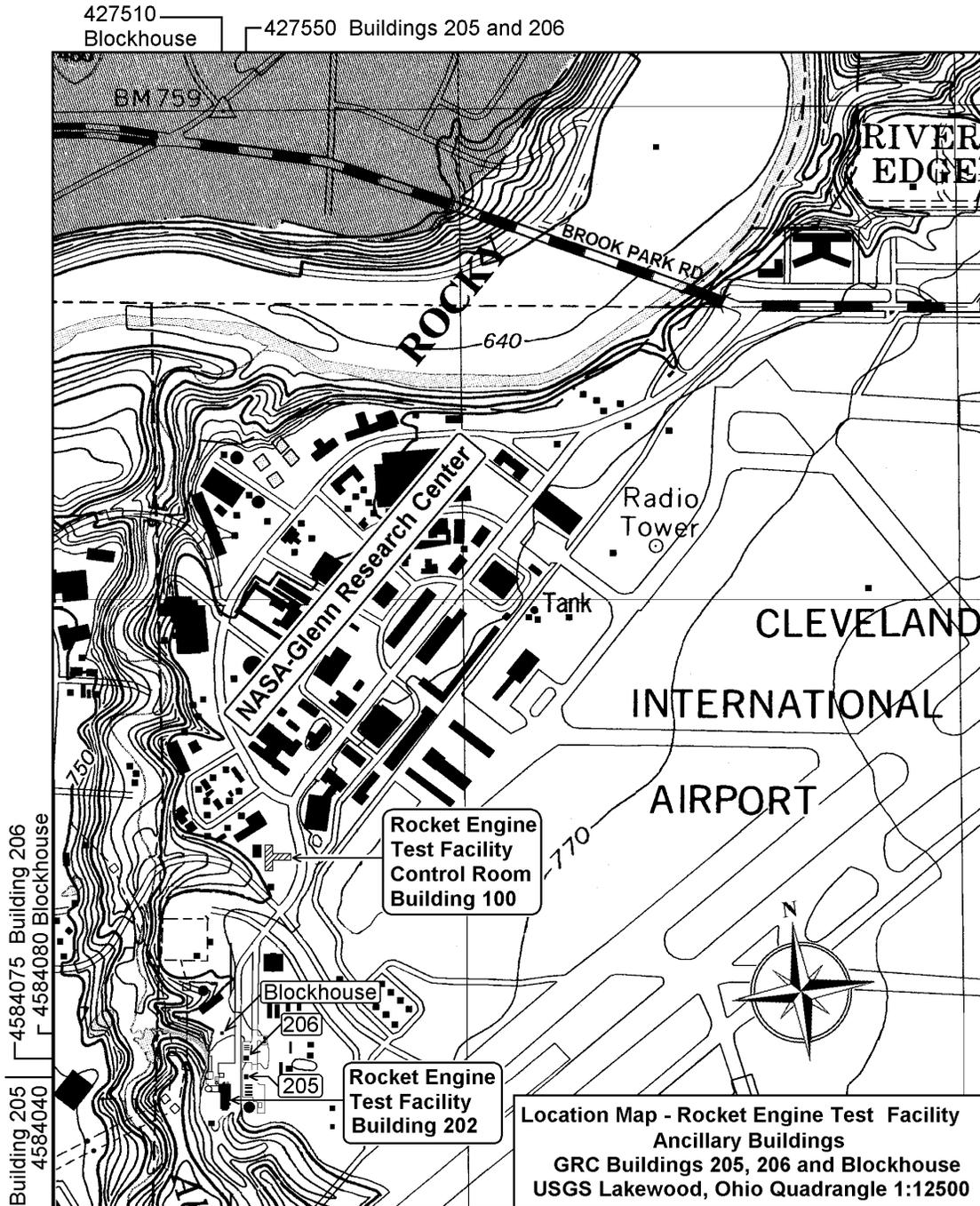
Dawson, Virginia P. "Rocket Propulsion Research at Lewis Research Center," 28<sup>th</sup> Joint Propulsion Conference AIAA/SAE/ASME/ASEE, July 6-8, 1992, AIAA-92-31230. NASA Contractor Report 189187.

National Aeronautics and Space Administration. "Historic Photographs of Rocket Engine Test Facility, 1955-1995." On file at NASA Plumbrook Research Center, Sandusky, Ohio.

Sloop, John. *Liquid Hydrogen as a Propulsion Fuel*. Washington, D.C.: NASA Special Publication No. 4404, 1978.

Thomas, Wayne. "Description of the Rocket Engine Test Facility." Cleveland: Lewis Research Center, 1984.

ROCKET ENGINE TEST FACILITY – GRC OBSERVATION BLOCKHOUSE  
 (Rocket Propulsion Test Facility – Blockhouse)  
 HAER NO. OH-124-E  
 Page 5



# HISTORIC AMERICAN ENGINEERING RECORD

## INDEX TO PHOTOGRAPHS

RETF OBSERVATION BLOCKHOUSE  
NASA Glenn Research Center  
Cleveland  
Cuyahoga County  
Ohio

HAER No. OH-124-E

Jeff Bates, Hardlines Design Company, Field Photographer, May 2002

NASA Information Technology Center (ITC), Copywork Photographer, November 2002

- OH-124-E-1      CONTEXT VIEW OF NORTHEAST CORNER OF OBSERVATION BLOCKHOUSE, WITH BUILDING 202 IN BACKGROUND. VIEW LOOKING SOUTH FROM HILL NORTH OF OBSERVATION BLOCKHOUSE.
- OH-124-E-2      SITE CONTEXT OF OBSERVATION BLOCKHOUSE, LOOKING NORTHWEST FROM ACCESS ROAD.
- OH-124-E-3      CONTEXT VIEW OF OBSERVATION BLOCKHOUSE, LOOKING NORTH AT SOUTH ELEVATION FROM HILLSIDE NORTH OF BUILDING 202.
- OH-124-E-4      VIEW OF NORTHEAST CORNER OF OBSERVATION BLOCKHOUSE, LOOKING SOUTHWEST.
- OH-124-E-5      VIEW OF SOUTHWEST CORNER OF OBSERVATION BLOCKHOUSE, LOOKING NORTHEAST.
- OH-124-E-6      VIEW OF NORTH ELEVATION OF OBSERVATION BLOCKHOUSE, LOOKING SOUTH.
- OH-124-E-7      INTERIOR VIEW OF OBSERVATION BLOCKHOUSE, LOOKING SOUTHEAST.
- OH-124-E-8      HISTORIC PLAN, SECTION, AND DETAIL DRAWING OF OBSERVATION BLOCKHOUSE. NASA GRC DRAWING NO. CE-101540, JUNE 29, 1955 (ON FILE AT NASA GLENN RESEARCH CENTER).

ROCKET ENGINE TEST FACILITY – GRC OBSERVATION BLOCKHOUSE  
(Rocket Propulsion Test Facility – Blockhouse)  
KEY TO PHOTOGRAPHS  
HAER NO. OH-124-E  
Page 2

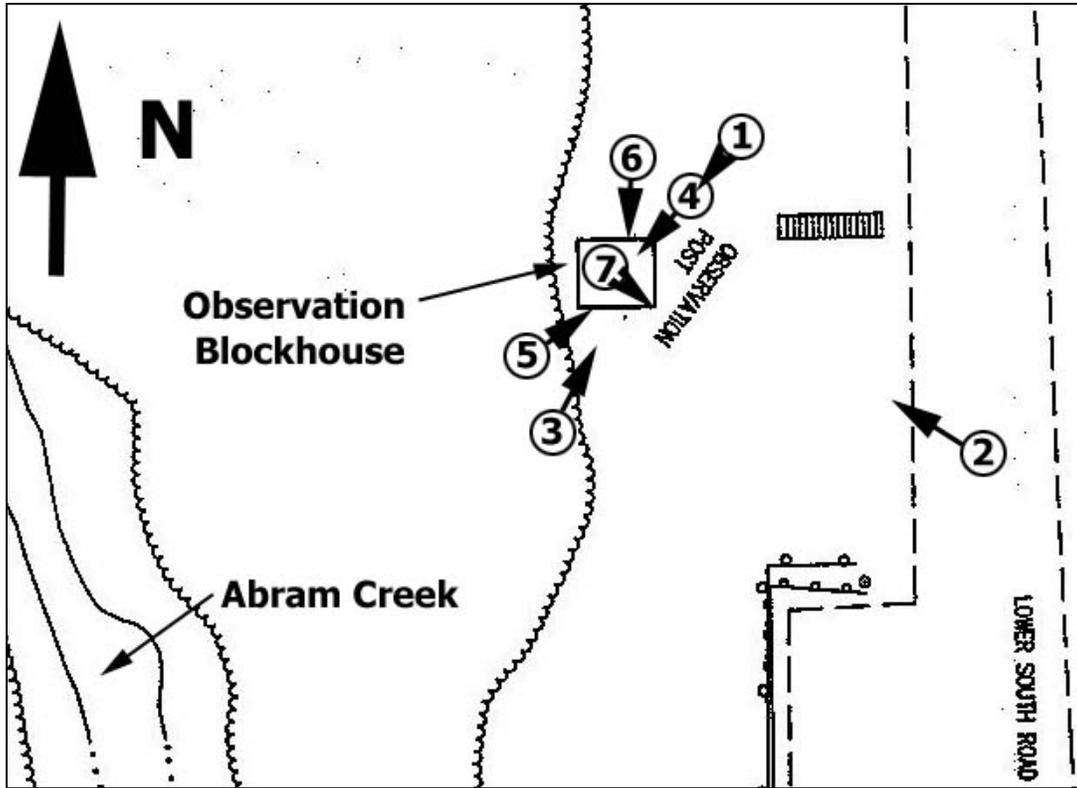


Photo Key for Observation Blockhouse



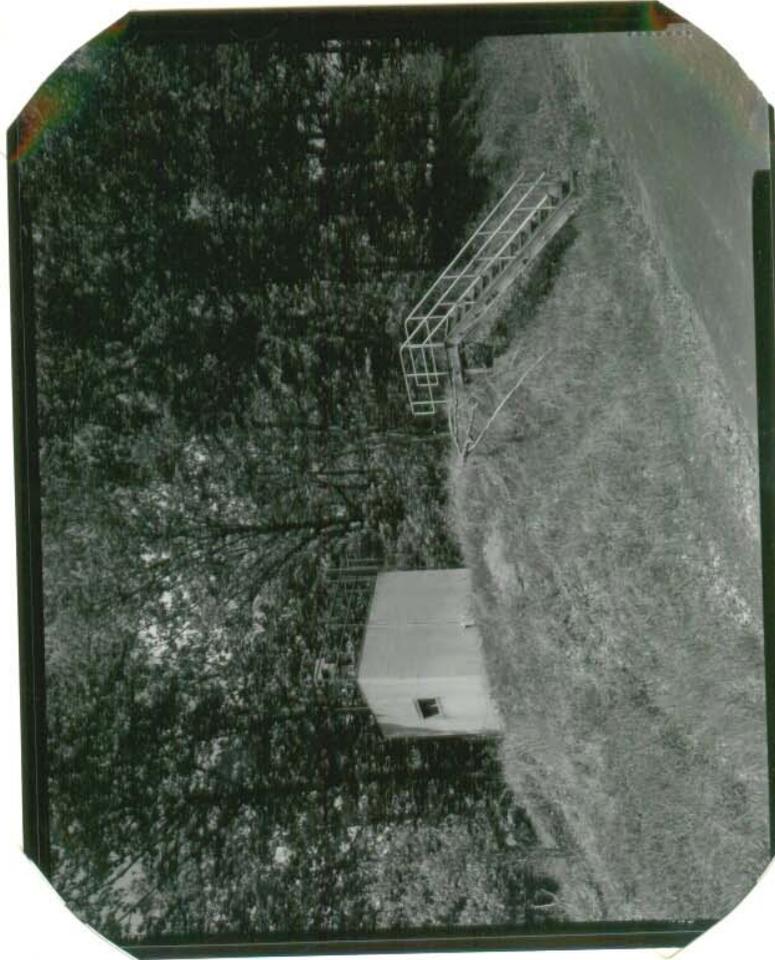
HISTORIC AMERICAN ENGINEERING RECORD  
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HAER No. OH-124-E-1



HISTORIC AMERICAN ENGINEERING RECORD  
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HAER No. OH-124-E-2



HISTORIC AMERICAN ENGINEERING RECORD  
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HAER No. OH-124-E-3



HISTORIC AMERICAN ENGINEERING RECORD  
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HAER No. OH-124-E-4



HISTORIC AMERICAN ENGINEERING RECORD  
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HAER No. OH-124-E-5



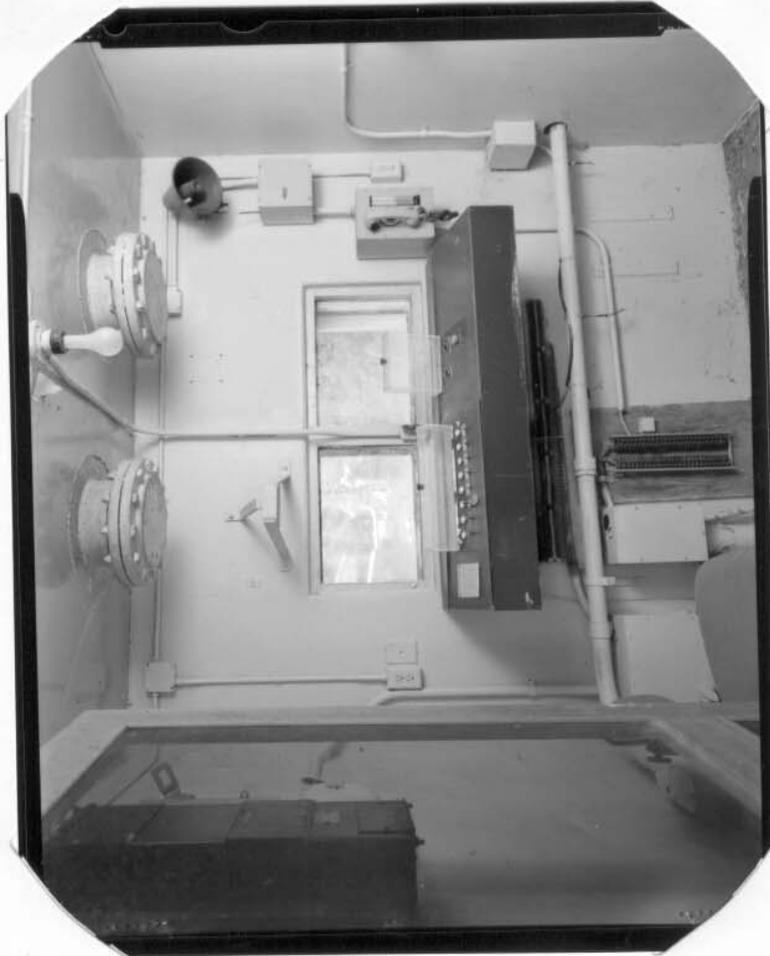
HISTORIC AMERICAN ENGINEERING RECORD  
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

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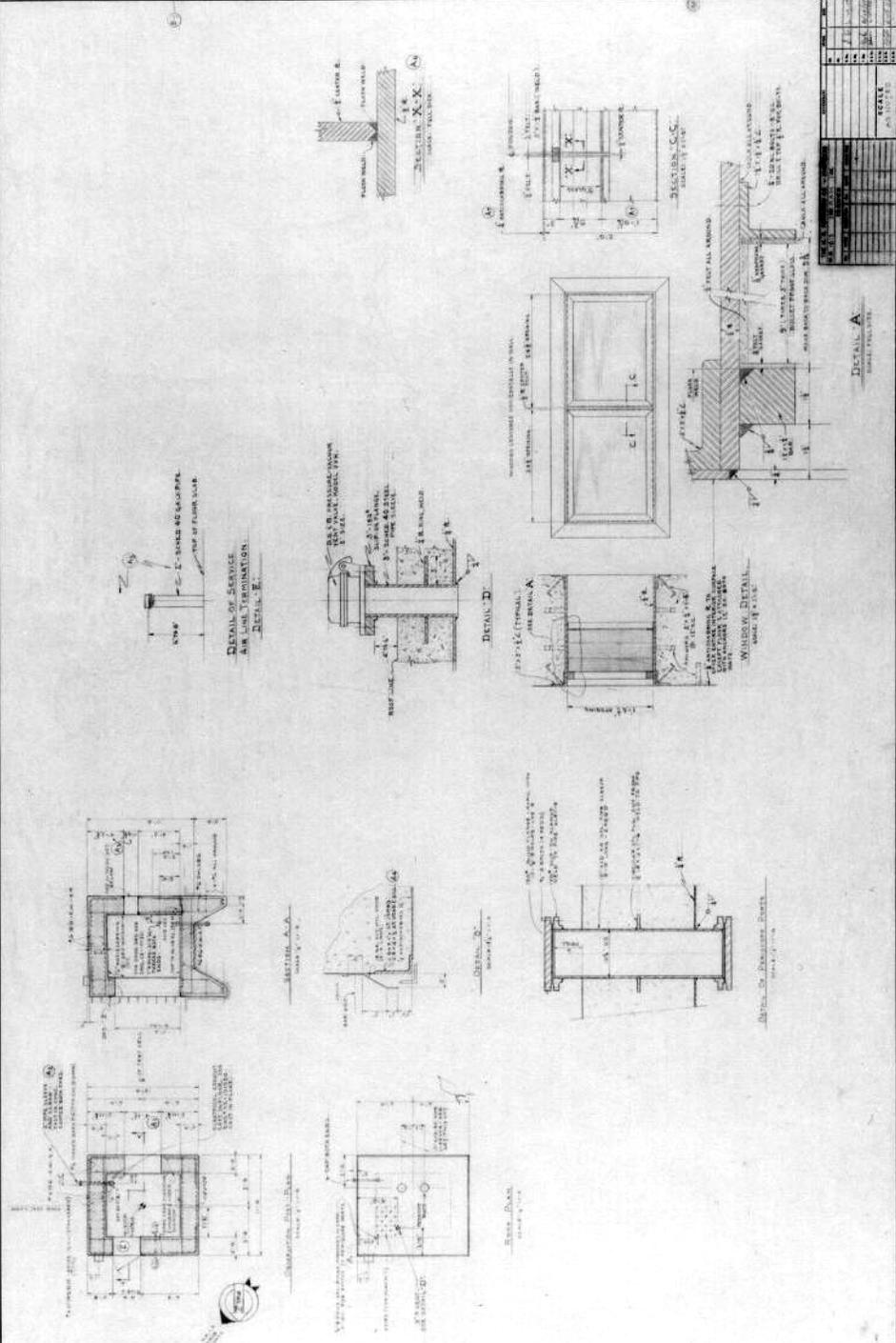
HISTORIC AMERICAN ENGINEERING RECORD  
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HAER No. OH-124-E-7



**SPECIAL NOTES**

1. ALL DIMENSIONS ARE IN UNITS OF FEET AND INCHES UNLESS OTHERWISE SPECIFIED.  
 2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.  
 3. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE SPECIFIED.  
 4. ALL DIMENSIONS ARE TO SURFACE UNLESS OTHERWISE SPECIFIED.  
 5. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE SPECIFIED.  
 6. ALL DIMENSIONS ARE TO SURFACE UNLESS OTHERWISE SPECIFIED.  
 7. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE SPECIFIED.  
 8. ALL DIMENSIONS ARE TO SURFACE UNLESS OTHERWISE SPECIFIED.  
 9. ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE SPECIFIED.  
 10. ALL DIMENSIONS ARE TO SURFACE UNLESS OTHERWISE SPECIFIED.



1	PROJECT NO.	OH-124-E-8
2	DATE	1948
3	SCALE	AS SHOWN
4	DESIGNER	W. H. HARRIS
5	CHECKER	W. H. HARRIS
6	APPROVED	W. H. HARRIS
7	PROJECT NAME	REAR PORCH, 124 E. 12TH ST., CLEVELAND, OHIO
8	CLIENT	W. H. HARRIS
9	LOCATION	CLEVELAND, OHIO
10	DATE OF CONSTRUCTION	1948
11	DATE OF PHOTOGRAPHY	1948
12	PHOTOGRAPHER	W. H. HARRIS
13	REMARKS	
14	REVISIONS	
15	DATE	
16	BY	
17	DATE	
18	BY	
19	DATE	
20	BY	

**DETAIL A**  
WALL SECTION