

PRATT & WHITNEY PLANT, TEST CELLS
(Pratt & Whitney Plant, Building No. 87)
1500 & 2000 East Bannister Road
Kansas City
Jackson County
Missouri

HAER MO-118-AF
HAER MO-118-AF

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
MIDWEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
601 Riverfront Drive
Omaha, NE 68102

HISTORIC AMERICAN ENGINEERING RECORD

PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)

HAER No. MO-118-AF

- Location: 1500–2000 East Bannister Road, Kansas City, Jackson County, Missouri
- Present Owner: U. S. Department of Energy, National Nuclear Security Administration
- Present Use: While originally used to test engines, after the Pratt and Whitney years, they have been used for a multitude of purposes. Currently they function as laboratory spaces, fabrication operations, maintenance areas and storage/warehouse.
- Significance: Between the opening of the plant in February 1943 and V-J Day (September 2, 1945), the plant manufactured and tested in its 32 concrete production test cells 7,815 R-2800 Series C engines, each containing over 14,000 parts. Linked to the enormous Main Manufacturing Plant, an excellent example of the famous “Warspeed” construction system developed by Albert Kahn Associated Architects and Engineers, Detroit, during World War II. Furthermore, for the first time, it was with the Pratt & Whitney Plant that Kahn incorporated the firm’s newly conceived concrete arch, born out of necessity, as a design adaptation of his original Warspeed concept. Kahn developed this multiple arch roof system as a response to the War Production Board’s limitations on the use of structural steel during the war. The main Manufacturing Plant, the largest building within the complex, was constructed using load-bearing arches, each forty-foot wide, with movable forms. This nearly 3 million square foot building is representative of some of the largest integrated projects in the war construction program, being virtually under one roof. It remains a landmark of American industrial design. The plant was responsible for manufacturing and testing the novel 3,400 horsepower, R-2800-C engines.
- Report prepared by: Cydney Millstein, principal, architectural historian
Architectural & Historical Research, L.L.C., Kansas City, Missouri
- Mary Ann Warfield, cultural historian, Kansas City, Missouri
- Date: April 9, 2012

PART I. HISTORICAL INFORMATION

A. Physical History

1. Date of Construction: 1943
2. Architect/Engineer: Albert Kahn Associated Architects and Engineers, Detroit, Michigan
3. Builder/Contractor/Supplier: Long-Turner Construction Company, Kansas City
4. Original Plans: Yes
5. Alterations and Additions: No

B. Historical Context

These cells, which tested the Double-Wasp engines, were constructed by placing 1,200 to 2,700 cubic yards of concrete in units consisting of two test cells and one control room observation gallery per unit. Completed aircraft engines were transferred by a monorail system from the test cells; leaving the test cell building by a chain conveyor that circles around the sides of the tear-down and re-assembly building.

PART II. ARCHITECTURAL INFORMATION

A. General Statement

Extending north from the northeast corner of the Main Manufacturing Plant is a series of thirty-two production test cells, constructed of reinforced concrete. This area occupies 132,596 square feet and has a second floor in some sections of each cell with an approximate dimension of 480' x 200'. As originally designed, there is a 48' aisle between the two banks of cells. The intake and exhaust stacks are equipped with movable covers. These cells, which tested the Double-Wasp engines, were constructed by placing 1,200 to 2,700 cubic yards of concrete in units consisting of two test cells and one control room observation gallery per unit.

The test cells were designed as horizontal cylinders, 16' and 24' in diameter. Each concrete cell was built up in successive lifts from the bottom to the top with horizontal construction joints between the sections. Different methods were employed for the two varying sizes of cells. For the 16 foot cell, vertical reinforced concrete walls were built at the two sides of each cell, using slip forms to conserve lumber and obtain maximum progress with the least use of limited working space. Dry-mixed concrete was placed for the bottom lift and the invert was shaped to

the 16 foot diameter by use of a template. Sidewall sections were constructed by shooting pneumatically applied Gunitite against the previously completed vertical walls in the area between the invert and the top form. The 24 foot diameter cells did not include the construction of any vertical walls. Separate sets of forms were used for each of the three stages of construction.

At both ends of each type of cell stands a baffle tower, webbed with sections of concrete blocks containing openings stuffed with rock wool. These towers were designed to mute the roar of the engines for the benefit of factory workers and residents in the surrounding area.

A tank farm served the test cells with high octane gasoline oils and greases.

1. Architectural Character: Modern Industrial
2. Condition of Fabric: Excellent

B. Description of Exterior

1. Foundation: Concrete
2. Walls: Concrete
3. Structural System: Reinforced concrete
4. Openings:
 - a. Doorways: Unknown
 - b. Windows: N/A
5. Roof: Flat

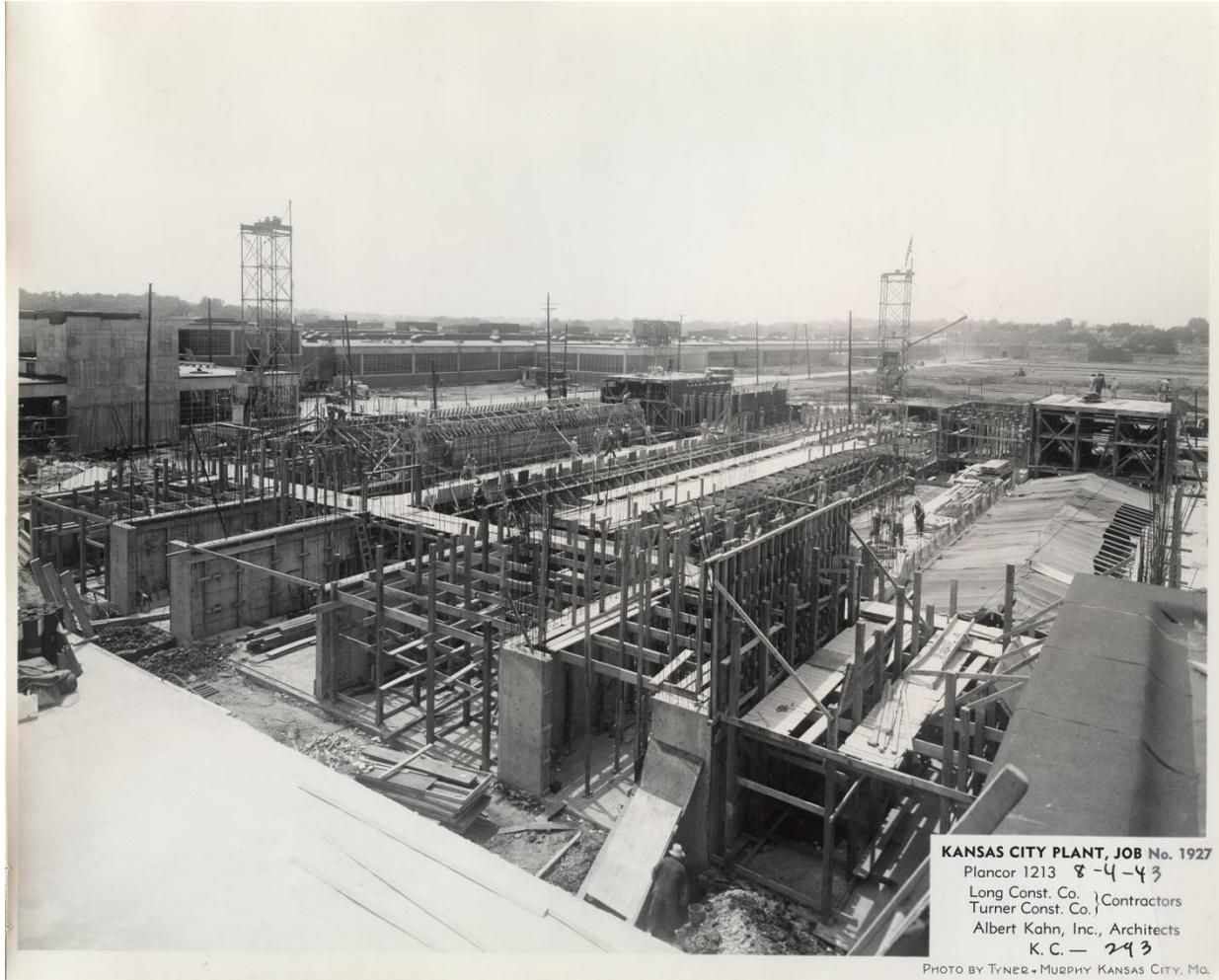
C. Description of Interior

Due to restricted access, it was impossible to examine the interior of the test cells.

D. Site

The Test Cells are part of the Main Manufacturing Plant and are located at the northeast portion of the facility.

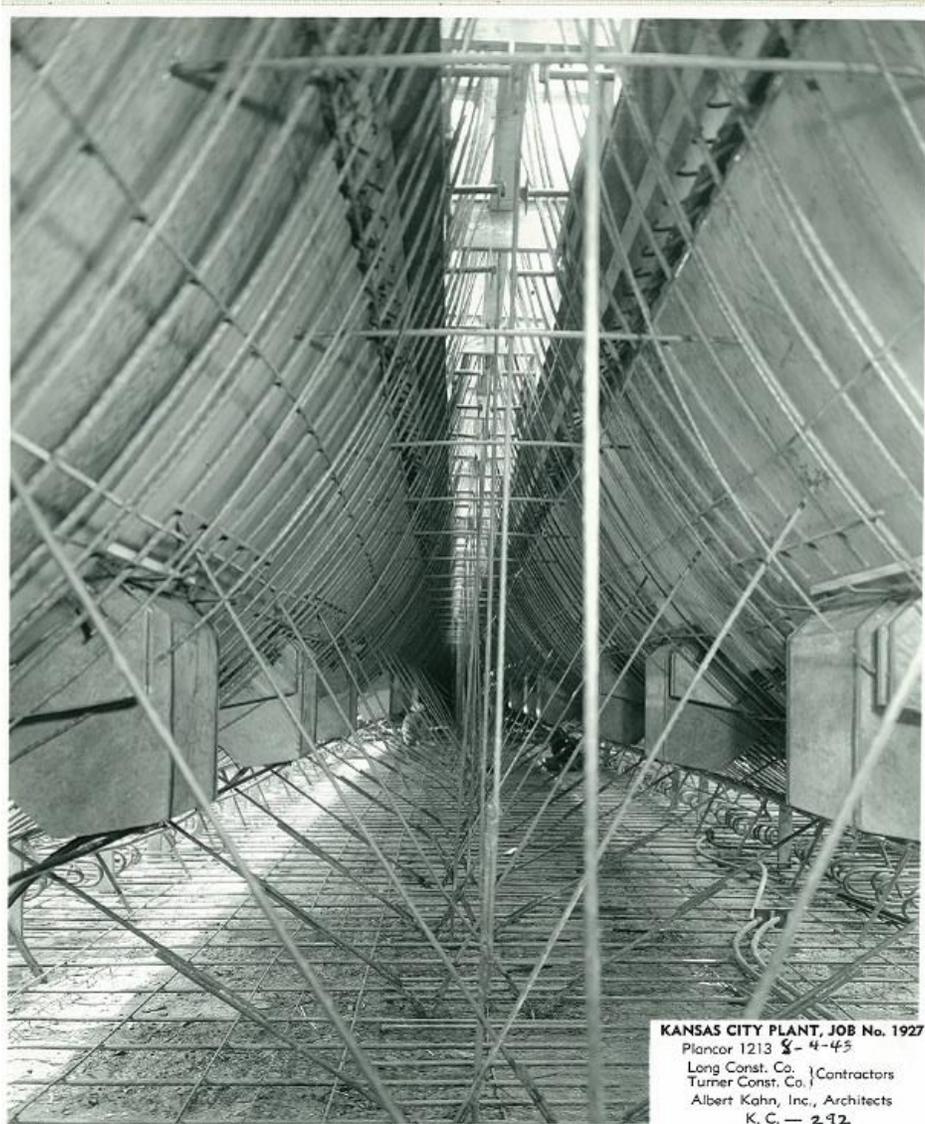
PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)
HAER No. MO-118-AF
(page 4)



Early-stage construction of the test cell building, view looking southwest
Date: August 4, 1943

Source: Albert Kahn Associates, Inc., Detroit, Michigan

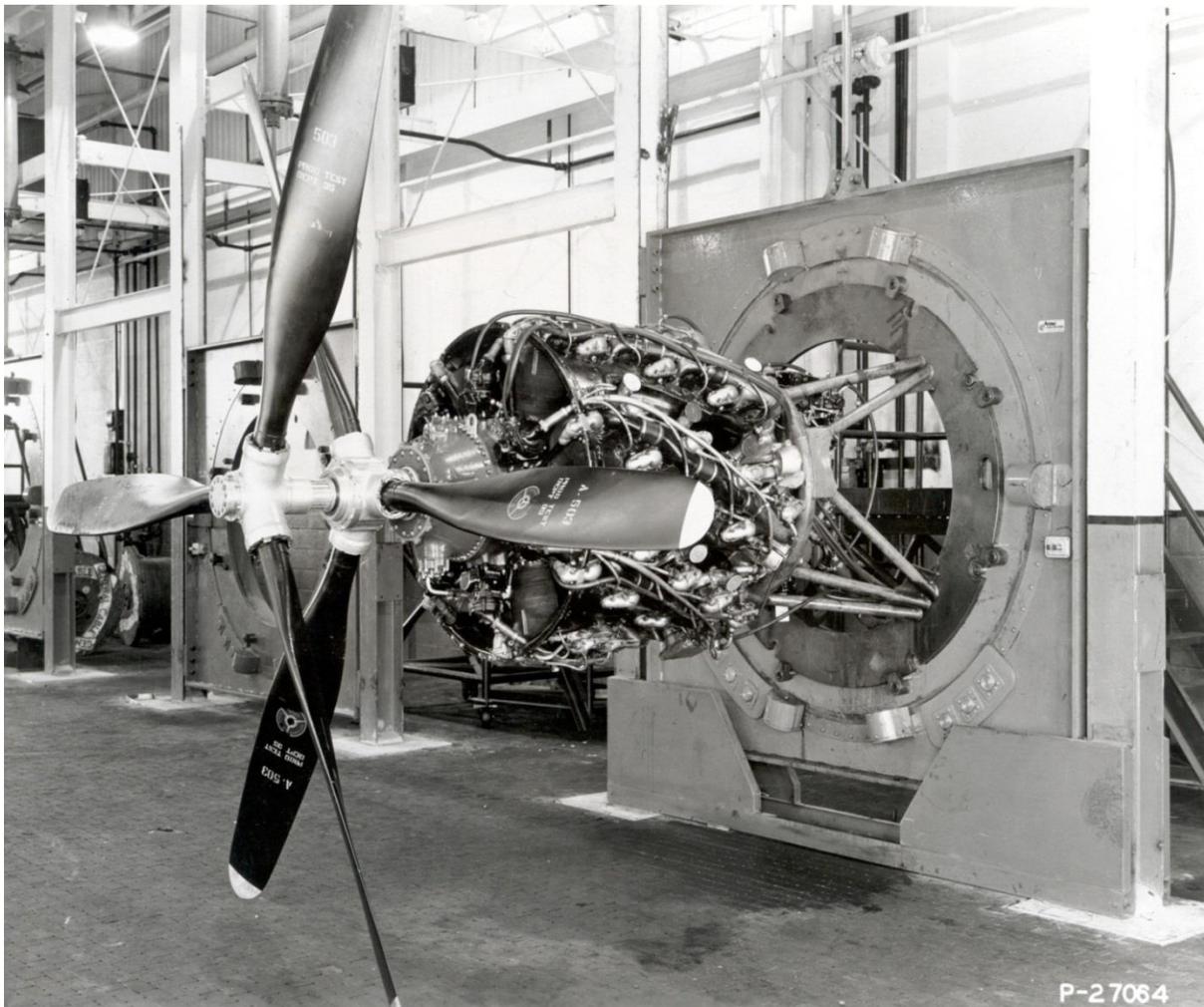
PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)
HAER No. MO-118-AF
(page 5)



Reinforcing for the 24-foot test cells
Date: August 4, 1943

Source: Albert Kahn Associates, Inc., Detroit, Michigan

PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)
HAER No. MO-118-AF
(page 6)



Test cell interior
Date: Unknown

Source: Albert Kahn Associates, Inc., Detroit, Michigan

PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)
HAER No. MO-118-AF
(page 7)



Test Cell No. 7
Date: August 4, 1943

Source: Albert Kahn Associates, Inc., Detroit, Michigan

PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)
HAER No. MO-118-AF
(page 8)



Passage No. 1 Test Cell, view facing south
Date: August 4, 1943

Source: Albert Kahn Associates, Inc., Detroit, Michigan

PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)
HAER No. MO-118-AF
(page 9)



Control Room for Test Cells 5 and 7
Date: August 4, 1943

Source: Albert Kahn Associates, Inc., Detroit, Michigan

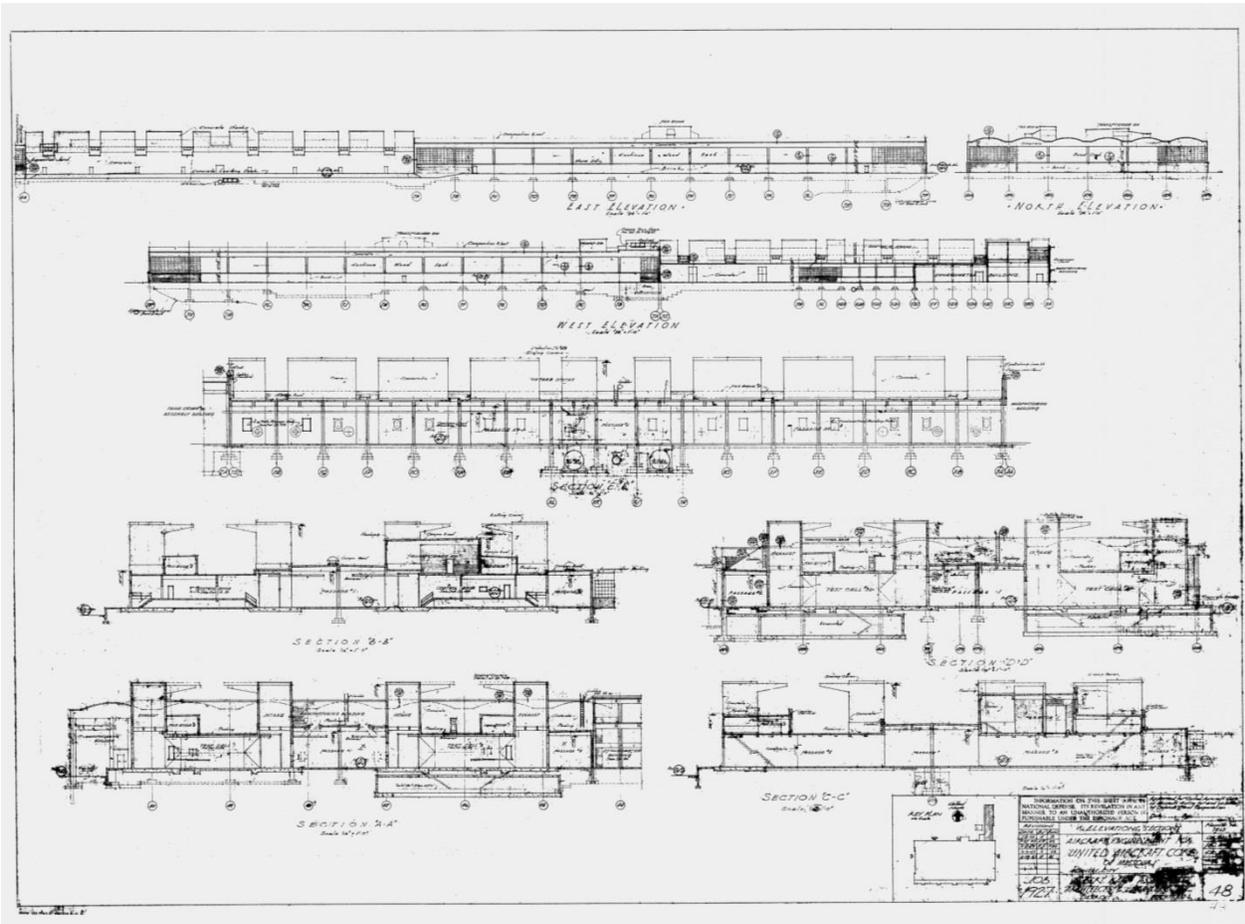
PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)
HAER No. MO-118-AF
(page 10)



Interior of a 24-foot test cell, view facing east
Date: September 10, 1943

Source: Albert Kahn Associates, Inc., Detroit, Michigan

PRATT & WHITNEY PLANT
Test Cells
(Pratt & Whitney Plant, Building No. 87)
HAER No. MO-118-AF
(page 11)



Elevations and Sections
[Test Cells]
Aircraft Engine Plant for United Aircraft Corporation of Missouri

Albert Kahn Associated Architects & Engineers, Inc. Detroit, Michigan
Sheet 48
Job 1927
Date: January 1943 (Corrected)

Source: Archives, National Nuclear Security Administration, Kansas City, Missouri

PART III. BIBLIOGRAPHY

Primary Sources

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Kahn, Albert and Associates. "Factory Construction." *Architectural Forum*. October 1942.

Kahn, Albert Associated Architects & Engineers, Inc. Aircraft Engine Plant for United Air Corporation of Missouri. Various dates. Job No. 1927. Archives at Albert Kahn Associates, Detroit, Michigan.

"Large Diameter Test Cells," *Construction Methods* 26 (October 1944): 79, 154, 156, 158.

Plans and Photos. NNSA Archives. Bannister Federal Complex, 1500-2000 East Bannister Road, Kansas City, Missouri.

The Kansas City Star, 4 July 1943.