BUILDING 100 - CONTROL BUILDING

Building 100 is located 1,600 feet north of the rocket engine test cells, which are housed in Building 202. Building 100 provided a safe place from which operators could remotely control engine tests that used hazardous or toxic fuels. From this protected control room, Rocket Engine Test Facility (RETF) personnel could collect data from tests of experimental engine designs.

Building 100 was designed by H. S. Kerline and built by the H. K. Ferguson Company of Cleveland, Ohio. The architect designed this facility using aesthetic principles commonly applied to industrial or laboratory buildings. NASA engineers designed the innovative control room systems.

The building stands on a flat, featureless area of the NASA-Glenn Research Center that is located at an elevation of 761 feet above sea level. The facility has a "T"- shaped footprint. The long leg of the "T" consists of a corridor. Seventeen offices line both sides of this corridor and wrap around its east end. The cross portion of the "T" consists of a high bay, observation area, and the RETF control room.

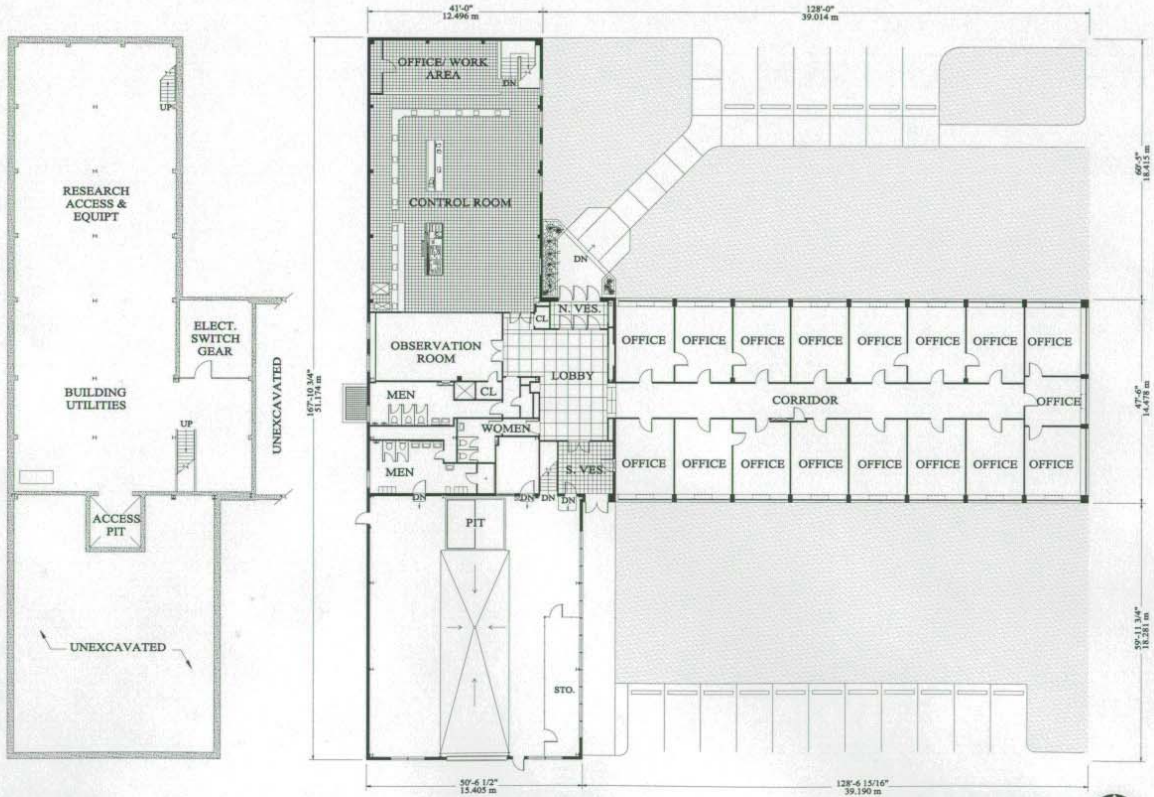
The northern arm of the plan's cross portion contains the control room, an office, and work area. The basement beneath the control room houses utilities, electrical switchgear, and an entry tunnel for steam pipes. This basement also allows access to the wiring chases, control consoles, and model board in the control room above. The southern arm of the crossbar contains a high-bay area that rises to twenty-one feet, six inches in height. A twelve-foot square pit in the floor of the high bay allows heavy equipment to be lowered into the basement beneath the control room.

The entrances into Building 100 are located in the angles where the two sections of the "T" intersect. A small terrace leads to the main entrance, which is located between the northern arm of the "T" and the office corridor. On the terrace outside this main entrance, granite planters flank the exterior doors. A secondary entrance is located between the southern arm of the "T" and the office corridor. Metal canopies protect both entryways. These entrances lead into a central lobby and vestibule that form a transition between the office corridor and the cross arm of the "T." This central area contains restrooms, closets, locker room, and showers.

The building exterior is clad in buff-colored brick laid in running bond. Limestone trim and the granite planters at the main entrance add visual interest to the exterior. The steel-framed high bay to the south is sheathed with metal panels, the exteriors of which are vertically corrugated and provide a pleasing contrast to the horizontal lines prevalent throughout the building.

Building 100 is a utilitarian facility where different parts of the structure house distinct functions. This design created an efficient work environment for early rocket engine testing.

Note: Plans depict building as configured ca. 1955.



BASEMENT FLOOR PLAN

FIRST FLOOR PLAN

DELINEATED BY: Hardlines Design Company, 2002

NASA ROCKET ENGINE TEST FACILITY
BUILDING 100
CLEVELAND

ROCKET ENGINE TEST FACILITY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, LEWIS RESEARCH CENTER
CUYAHOGA COUNTY
OHIO

SHEET 10 of 12

HISTORIC AMERICAN ENGINEERING RECORD
OH-124-D

BUILDING 100 - CONTROL BUILDING

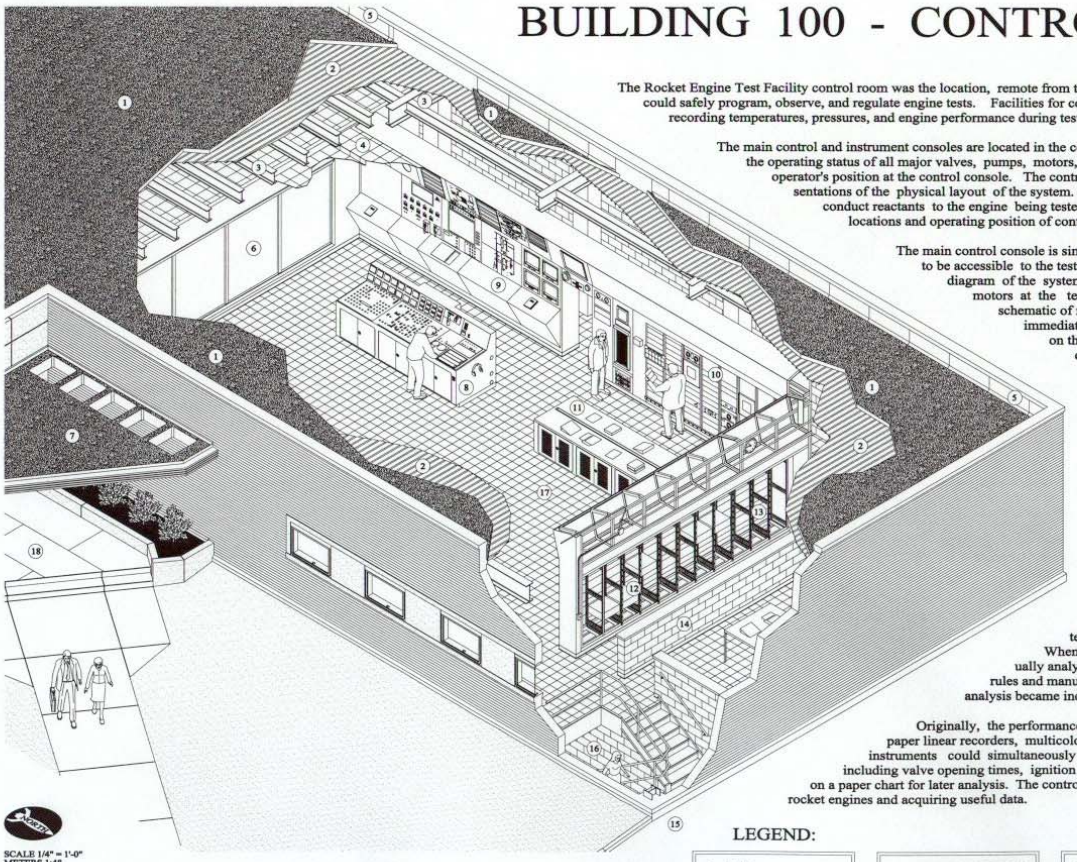
The Rocket Engine Test Facility control room was the location, remote from the Building 202 test cell, where engineers and operators could safely program, observe, and regulate engine tests. Facilities for controlling fuel and oxidizer flow, and for measuring and recording temperatures, pressures, and engine performance during tests, are also located in this facility.

The main control and instrument consoles are located in the center of the room. The vertical model board that shows the operating status of all major valves, pumps, motors, actuators, and exhaust scrubbers in the system faces the operator's position at the control console. The control console and the model board display schematic representations of the physical layout of the system. Color-coded lines and symbols represent the pipes that conduct reactants to the engine being tested. Pilot lights in the various schematic lines show the locations and operating position of control valves in the system.

The main control console is similar to the model board, but it is labeled and positioned to be accessible to the test operator. Color-coded lines depict a schematic piping diagram of the system. Switches that remotely control valves, actuators, and motors at the test stand are located at appropriate points along the schematic of reactant flow lines. In case of an emergency requiring immediate shut down, the operator could push a "panic button" on the console to end the run. Closed-circuit television and dedicated telephone lines allowed the control room personnel to observe tests and communicate with operating personnel at the test cell.

The operating time of the engineer working during the test was generally limited to a few minutes. Significant transient events causing longer performance could occur during a test, and slow human reaction time made manual sequencing of an engine test almost impossible. Additionally, real-time observation of a test by operators and engineers would yield limited data. Consequently, operation of engine tests was controlled by electro-mechanical timers, binary - coded thumbwheel switches, or subsequently by programmable logic controllers. Data acquisition was also automated. The records of a run, including input factors such as timing and reactant flow, was later analyzed and plotted against outputs such as engine thrust, temperatures, pressures, and other performance criteria When the test facility went on line in 1957, operators manually analyzed and reduced paper charts of run data using slide rules and manual computation. As the facility evolved over time, data analysis became increasingly automated.

Originally, the performance data of a run were recorded on magnetic tape, thermal paper linear recorders, multicolor pen recorders, or Honeywell "Visicorders." These instruments could simultaneously record the timeline of most events and conditions, including valve opening times, ignition point, engine thrust, temperature, or pressure transient, on a paper chart for later analysis. The control room performed a vital function in testing experimental rocket engines and acquiring useful data.



SCALE 1/4" = 1'-0"
METERS 1:48

FEET | METERS
5
FEET 5 — 1 — 5 FEET
METERS — METERS
30' 1 0 1 30'

ISOMETRIC OF CONTROL ROOM

LEGEND:

1. ROOF
2. METAL DECKING
3. ROOF BEAMS
4. ACOUSTICAL CEILING
5. PARAPET
6. OBSERVATION WINDOW
7. ENTRY CANOPY
8. A-STAND CONTROL PANEL
9. A-STAND MODEL BOARD
10. ELECTRICAL CONTROLS
11. INSTRUMENT CONSOLE
12. MODICON PROGRAMMABLE LOGIC CONTROLLERS
13. PROPORTIONING CONTROLS FOR VALVES
14. LOW DIVIDER WALL
15. PARKING LOT
16. BASEMENT STAIRWELL
17. ASBESTOS FLOOR TILE
18. STONE ENTRY STOOP

DELINEATED BY: Hardlines Design Company, 2002

NASA ROCKET ENGINE TEST FACILITY
HISTORIC AMERICAN ENGINEERING RECORD
CLEVELAND

ROCKET ENGINE TEST FACILITY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, LEWIS RESEARCH CENTER
CUYAHOGA COUNTY
OHIO

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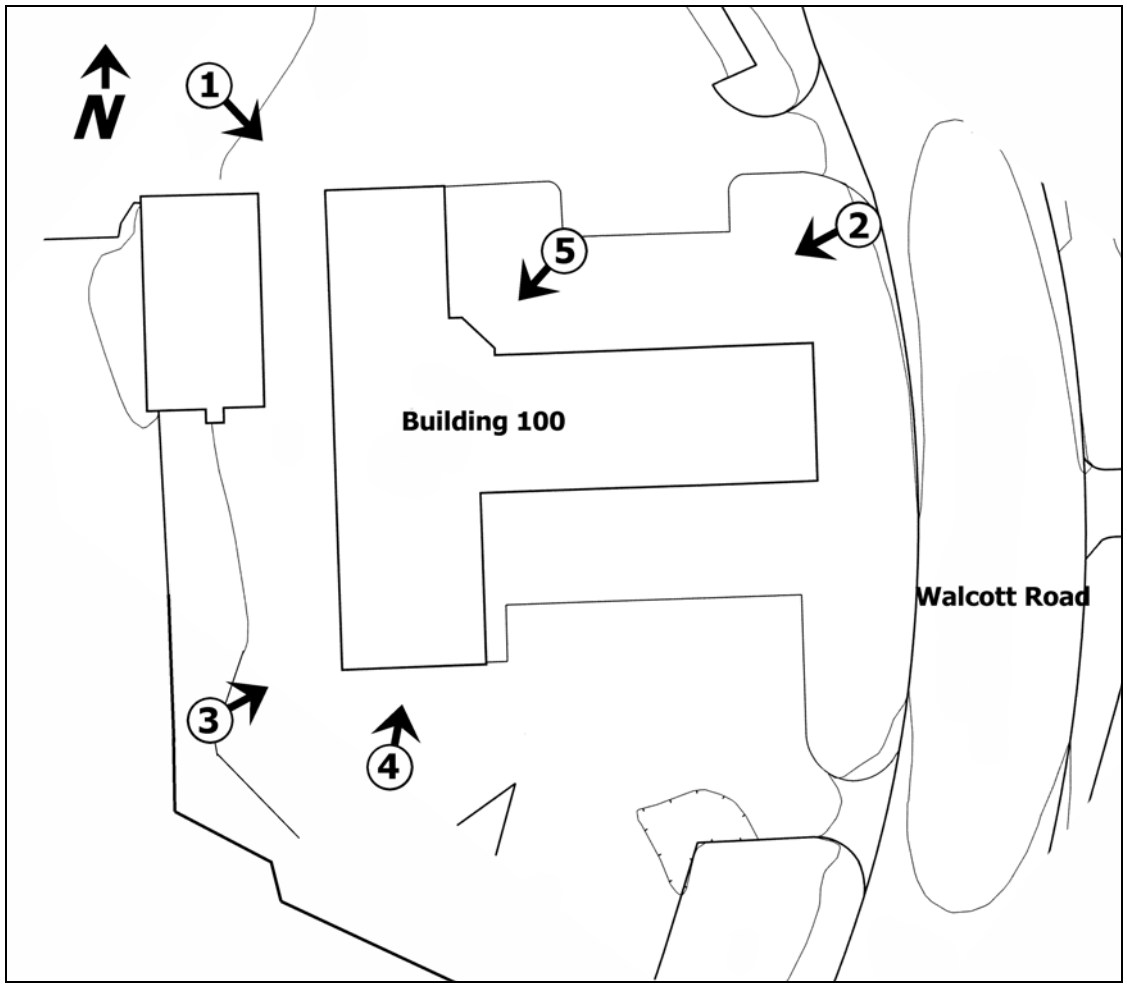
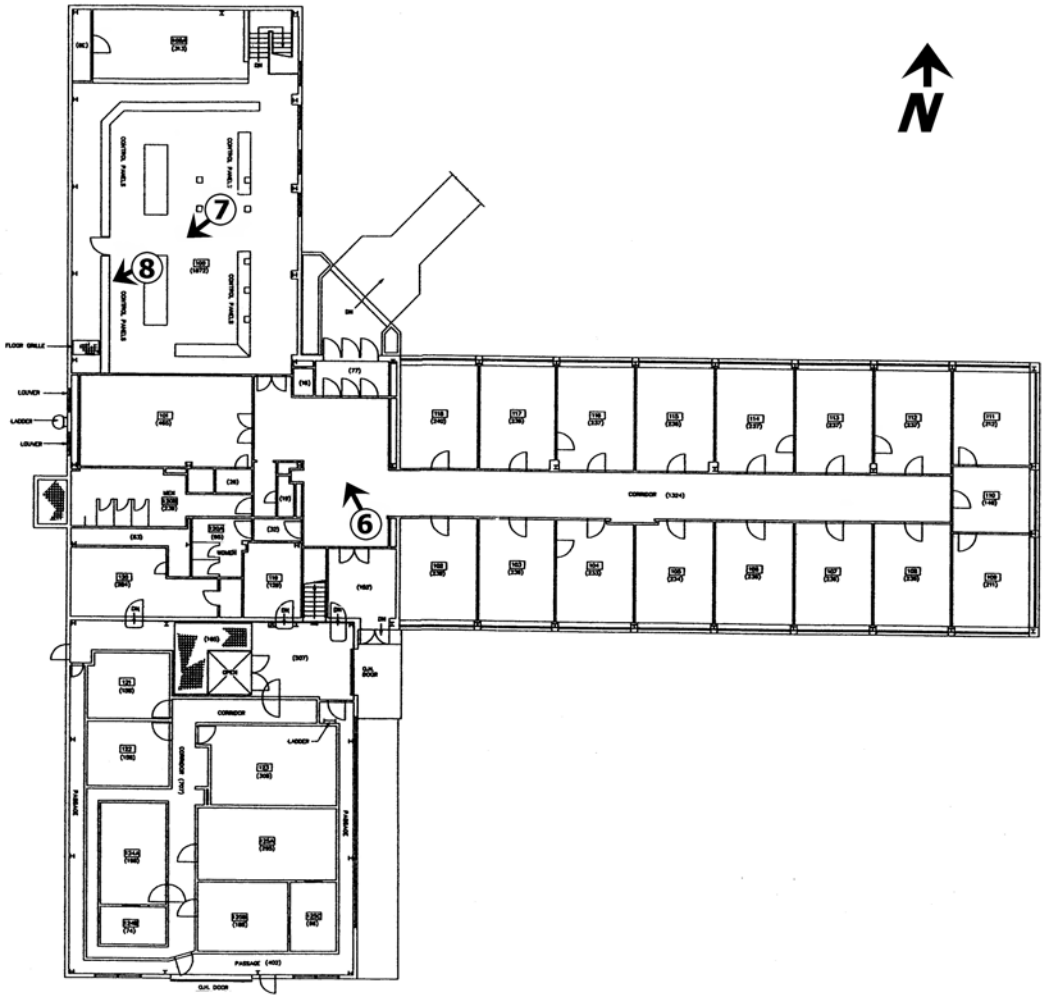
OH-1243



Exterior Photo Key for Building 100



Interior Photo Key for Building 100