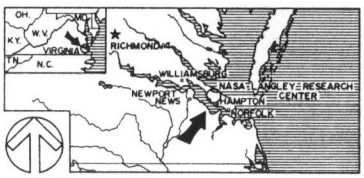
EIGHT FOOT HIGH SPEED WIND TUNNEL
1933-1936

By the late 1920s aeronautical engineers were exploring transonic and supersonic flight. In 1933 the National Advisory Committee for Aeronautics (NACA) authorized construction of a high-speed wind tunnel (HST) to test large models under extended steady-state conditions. Eastman N. Jacobs formulated the concept for the HST while Manly J. Hood and Russell G. Robinson headed the design team. The designers developed a plan for a single return, atmospheric tunnel incorporating a closed throat, circular test section eight feet in diameter. Its maximum speed would be Mach 0.75 (575 miles per hour).

The engineers faced two problems unique to high speed tunnels. First they had to counteract the Bernoulli effect. As the airstream was forced through the tunnel's narrowing nozzle, it would speed up and its pressure would drop. This created a partial vacuum in the vicinity of the nozzle. Thus the test chamber had to withstand inwardly directed atmospheric pressure.

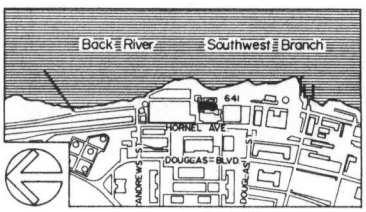
The engineers designed a beehive-shaped test chamber to resist external air pressure. The facility was formed of reinforced concrete walls twelve inches thick. Actual construction was carried out by the Works Projects Administration (WPA).

BASED ON HARDLINES' DESIGN AND DELINEATION'S INTERPRETATION OF FEILD WORK, HISTORIC PHOTOGRAPHS, AND NATIONAL ADVISORY COMMITTEE FOR AS BUILT DRAWINGS D-2504-05, 2510, 2726-45, 2752-53, 2809, 2964, 2981-82, 3051 3120-21, 3489-95, 3810, 3820, and LD-5467.



STATE MAP

MAPS BASED ON "1994 ROAD ATLAS" PUBLISHED BY RAND McNALLY. NO SCALE.



SITE PLAN

1"=600'-0" 0 500 1000 1500 2000 FT

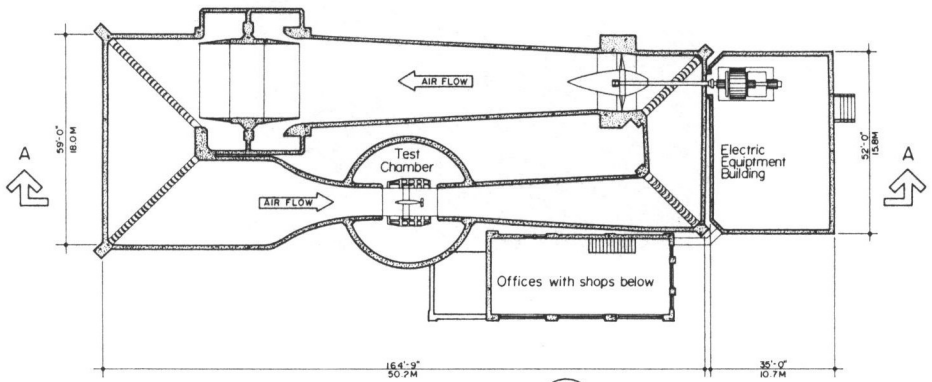
1:7200 0 100 200 300 400 500 M

SOURCE: DRAWING No. LD-740138, NASA-LANGLEY RESEARCH CENTER, VA

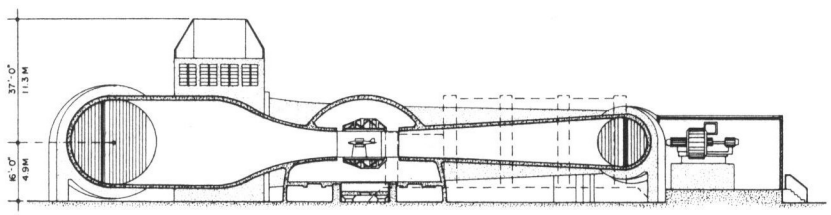
The second problem faced by the designers was heat build-up. The fan was driven by an 8000 HP motor. The mechanical energy of the spinning fan was added as heat to the airstream. Unless it was removed, temperatures theoretically could reach over 2000°F. To reject this heat, about 1% of the airstream was continuously bled off, vented and replaced with cool outside air.

Pressure within the chamber was comparable to that encountered at an altitude of 12000 feet. Personnel entered through air locks and wore oxygen masks while tests were underway. The HST was instrumental in investigating the causes and cures for stability and control problems encountered in high speed dives. The HST produced data for designing high-speed propellers, cowlings and inlets used in jet aircraft. It played a vital part in designing superior combat aircraft during World War II.

After increasing power to 16000 HP in 1945, the tunnel was used to obtain data at speeds up to Mach 0.92. Other modifications in 1947 increased capability to Mach 1.2. The tunnel was used to develop and design the first transonic, slotted-throat test section in 1950. The transonic area rule which enabled designers to develop optimum shapes for transonic aircraft was defined at this facility. The tunnel was finally deactivated in 1956.



PLAN



SECTION AA

SCALE: 1/16"=1'-0" 0 5 10 20 30 50 FT 1:192 0 5 10 15 M

DELINEATED BY Hardlines: Design & Delineation, 1995-1996

NASA-LANGLEY RESEARCH CENTER RECORDING PROJECT NATIONAL PARK SERVICE UNITED STATES DEPARTMENT OF THE INTERIOR	NASA-LANGLEY RESEARCH CENTER EIGHT FOOT HIGH SPEED WIND TUNNEL BUILDING NUMBER 641 HAMPTON HAMPTON VIRGINIA	SHEET 1 OF 1	HISTORIC AMERICAN ENGINEERING RECORD VA-118-B	