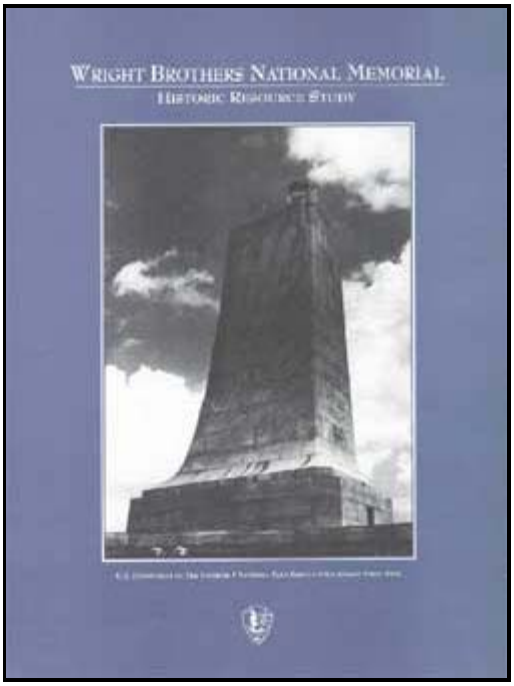
# Wright Brothers National Memorial

## Historic Resource Study




# *Wright Brothers National Memorial*
# Historic Resource Study

**William R. Chapman**
**Jill K. Hanson**

**January 1997**

Southeast Field Area
National Park Service
U.S. Department of the Interior
Atlanta, Georgia

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# Wright Brothers National Memorial

## Historic Resource Study

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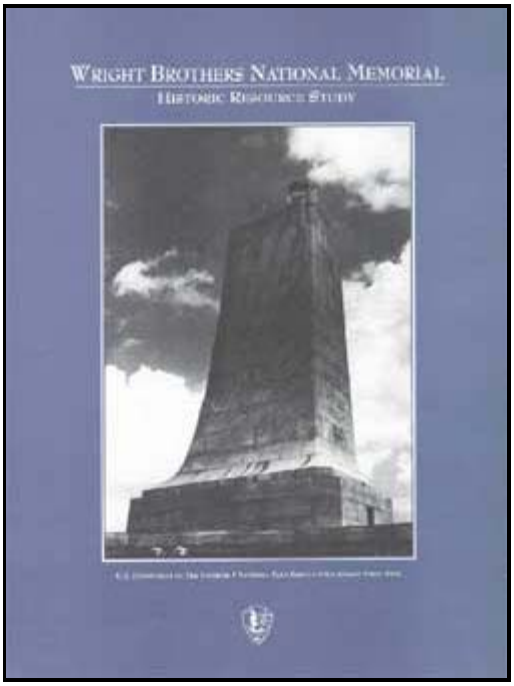


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## Historic Resource Study

## FOREWORD

We are pleased to make available this historic resource study, part of our ongoing effort to provide comprehensive documentation for the historic structures and landscapes of National Park Service units in the Southeast Field Area. Following a field survey of park resources and extensive research, the project team updated the park's List of Classified Structures, developed historic contexts, and prepared new National Register of Historic Places documentation. Many individuals and institutions contributed to the successful completion of this work. We would particularly like to thank Cape Hatteras Group Superintendent Russell W. Berry, Jr., Assistant Superintendent Mary Collier, Museum Curator Steve Harrison, and Wright Brothers National Memorial Historian Darrell Collins for their assistance. We hope that this study will prove valuable to park management and others in understanding and interpreting the historical significance of the park's cultural resources.

Kirk A. Cordell
Assistant Superintendent, Cultural Resources
Southeast Support Office
January 1997

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# INTRODUCTION

## SCOPE AND PURPOSE OF HRS

### Purpose

This study documents historic buildings, structures, and other resources within the Wright Brothers National Memorial, located in Kill Devil Hills, North Carolina. It has been conducted in compliance with Sections 106 and 110 of the National Historic Preservation Act of 1966, as amended, and as set out in 36 CFR Parts 63 and 800. It has been undertaken as part of a cooperative agreement between the University of Georgia Research .Foundation and the Southeast Region of the National Park Service (NPS), U.S. Department of the Interior (Cooperative Agreement Number 5000-8, Sub-Agreement Number 5). The study includes a detailed inventory of historic buildings, structures, and sites in accordance with recognized survey procedures as set out in the *Secretary of the Interior's Standards for Identification and Evaluation* (FR, No. 190, Sep. 29, 1983, pp. 44,720 - 44,726) and, most recently, in National Register *Bulletins* 15, 16, 18, and 21.

An immediate product of the survey is an updated set of List of Classified Structures (LCS) forms for the Park together with completed state inventory forms on each property. Completed LCS forms and photographs are submitted with the study. Additionally, the study includes physical descriptions, historical background information, and assessments of significance, as well as management recommendations. Information provided in this study will be used to update National Register documentation for the park district.

### Scope of Work

The Scope of Work described in NPS Cooperative Agreement No. 5000-8-8009, Sub-Agreement No. 5, entitled "Southeastern Park(s) Inventory" called for "a comprehensive inventory of all standing structures constructed before 1950" within a number of parks in the Southeast Region. It also called for updated LCS forms and state inventory information sheets, as well as National Register nominations for eligible properties. Additionally, the Scope called for an overview of historic cultural resources in each park, a discussion of relevant historic contexts and associated properties or property types, as well as management recommendations. Reference to landscape features is also specified in the Scope of Work.

This report meets the requirements set out in the Scope of Work, and in many ways extends beyond the original Scope. In the case of the Wright Brothers National Memorial, a number of structures and features postdating 1950 have been inventoried and assessed. Although the 1959-1960 Wright Brothers Memorial Visitor Center and the 1963 First Flight Airstrip are not presently considered eligible for listing in the National Register of Historic Places, both may be at a future date.

The study includes a historic base map for the Wright Brothers National Memorial in order to place each resource within an overall geographical context. U. S. Geological Survey maps are also provided. Resources have been documented with two to four photographs (with more extensive photographic coverage for many of the properties).

**Contexts**

This report relies on the context-based approach to assessment and evaluation as set out particularly in National Register *Bulletins* 15 and 16 (now published as *Bulletins* 16A and 16B). As described in National Register *Bulletin* 15, "to qualify for the National Register, a property must be significant; that is, it must represent a significant part of the history, architecture, archeology, engineering, and culture of an area, and it must have characteristics that make it a good representative of properties associated with that aspect of the past" (National Park Service [1991]a: 7). To assess significance, all properties must be judged against contexts either already recognized or new contexts developed for purposes of the reports. This report relies on the development of a substantial new context, "The Commemoration of the Wright Brothers, 1926-1941," as well as the long-recognized context for the site, "The Wright Brothers and Early Flight at Kitty Hawk, North Carolina, 1900-1903 ."

The context-based approach allows for the expansion of the periods of significance originally conceived for the park and enables the identification of seven resources as significant and therefore eligible for listing in the National Register. The context approach, especially as applied at the Wright Brothers Memorial, helps to underscore the overall significance of later, essentially commemorative contributions to a site originally valued for its association with the experimental air flight efforts of Orville and Wilbur Wright. Efforts of national and local organizations, federal programs, and even the NPS had important, now historic, impacts on the site, which this study identifies through the context approach.

**Project Personnel**

This report was undertaken by faculty and graduate students in the School of Environmental Design at the University of Georgia. The Principal Investigator and the author of the report is William Chapman a Ph.D. anthropologist and historic preservationist (as well as faculty member at the University of Hawaii) with considerable experience at the local, state, and national level in surveying and evaluating historic structures. He was assisted on-site by Ian Firth, another faculty member at the University of Georgia, who provided insights and advice on landscape

features in particular; Firth is a recognized authority on cultural landscapes and a frequent consultant to NPS.

The project also included up to seven graduate assistants, who participated in various levels of the survey and information-gathering for the project. They include Cathleen Turner, Scott Butler, Deborah Rushton, Kinney Clark Joanna Carter, and Jean Arnold, all graduate students in the Historic Preservation Program at the University of Georgia. Tamas Deak, a graduate student in the Landscape Architecture Program, completed the site plans and other illustrations. Graduate student Lisa Crowder was responsible for final production of the report, including many editorial suggestions. Anne Catherine Christian and Laurel Davis, also graduate students in historic preservation at the University of Georgia, proofread the document and made the final assembly of materials. Jill Hanson, historian in the NPS Southeast Field Area Office, substantially revised and edited the final draft submitted by the University of Georgia team.

NPS personnel, particularly Steve Harrison, Museum Curator, Bebe Woody, Cultural Resources Officer, and Mary Moran, Management Assistant, of the Cape Hatteras Group, as well as Len Brown and Kirk Cordell in the NPS Southeast Field Area Office in Atlanta assisted project staff Ruthanne Mitchell and Karen Rehm of NPS provided additional advice on LCS forms and inventory procedures.

## DESCRIPTION OF THE WRIGHT BROTHERS NATIONAL MEMORIAL

### Location and Boundaries

The Wright Brothers National Memorial park is located on the Outer Banks of North Carolina, about four miles south of the older community of Kitty Hawk, and about seven miles north of the historic coastal village of Nags Head, in Kill Devil Hills. The park is accessible from state route 158, and its entrance gate is located just 300 feet from the highway. Colington Road is located along the south periphery of the park bifurcating park lands in the southwest quadrant.

The Wright Brothers National Memorial comprises approximately 431.4 acres of federally owned land and 6.63 acres of nonfederal land. Expanded from its earlier 314-acre size on June 23, 1959, the park incorporates the historic Kill Devil Hill, the larger of three sand hills present on the site at the time of the Wright brothers experiments of 1900-1903 and now the site of the Wright Brothers Monument; the granite First Flight Marker, north of the monument; the modern visitor center, located in the northeast; a superintendent's quarters (residence) and maintenance area in the southwest; and the First Flight Airstrip, a small airstrip spanning the western boundary of the park. State Route 158 forms the eastern boundary of the park with the exception of a small buffer parcel of land on the east side of the highway; the historic West Hill and relatively arbitrary changes in the boundary due to land ownership defines the west boundary; and Colington Road effectively forms a south boundary. The area is surrounded by vegetated areas on the west and southwest, and by more built-up areas on the southeast, east, and north (see Figures 1 and 2).

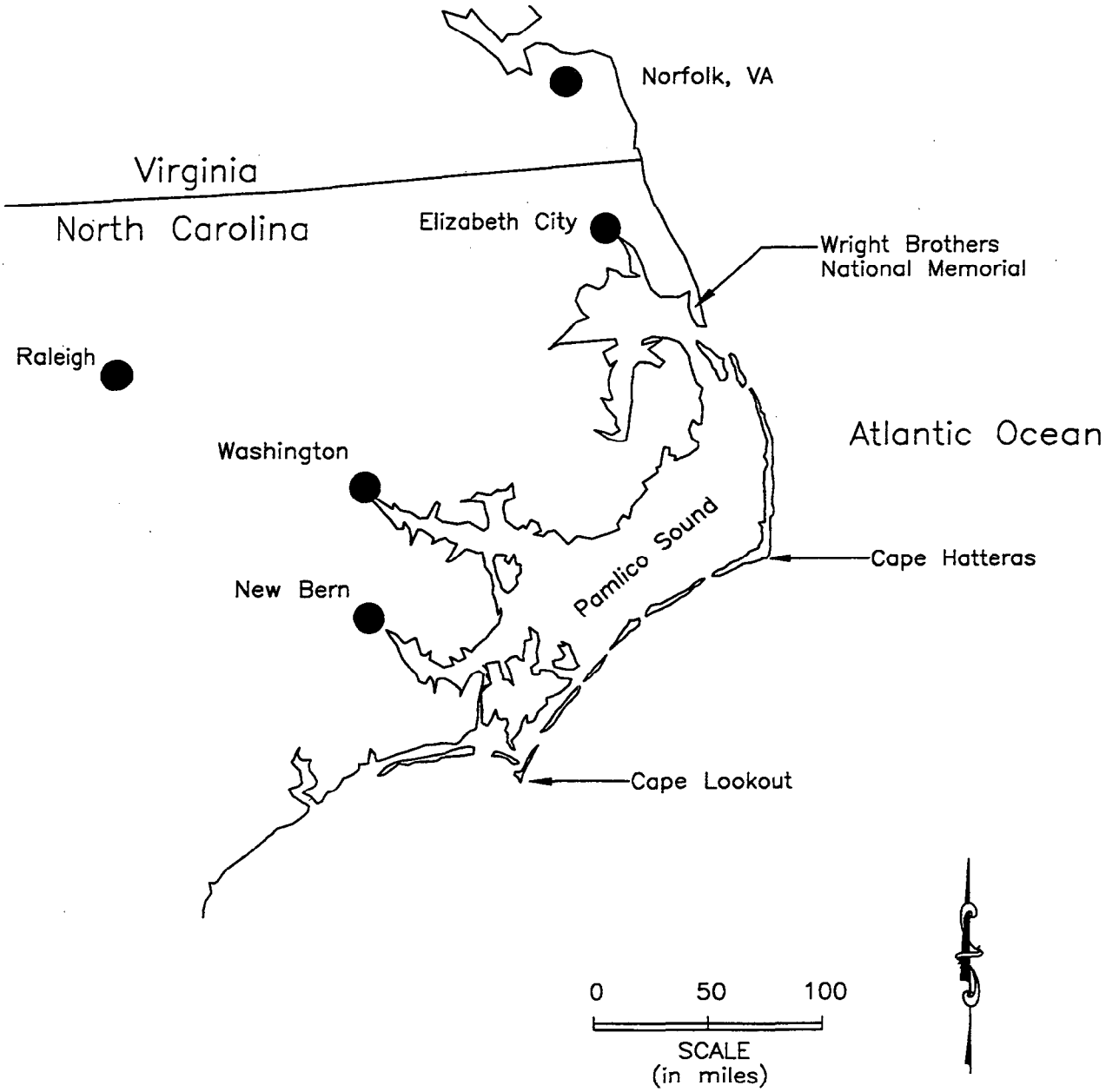



**Figure 1** Vicinity Map

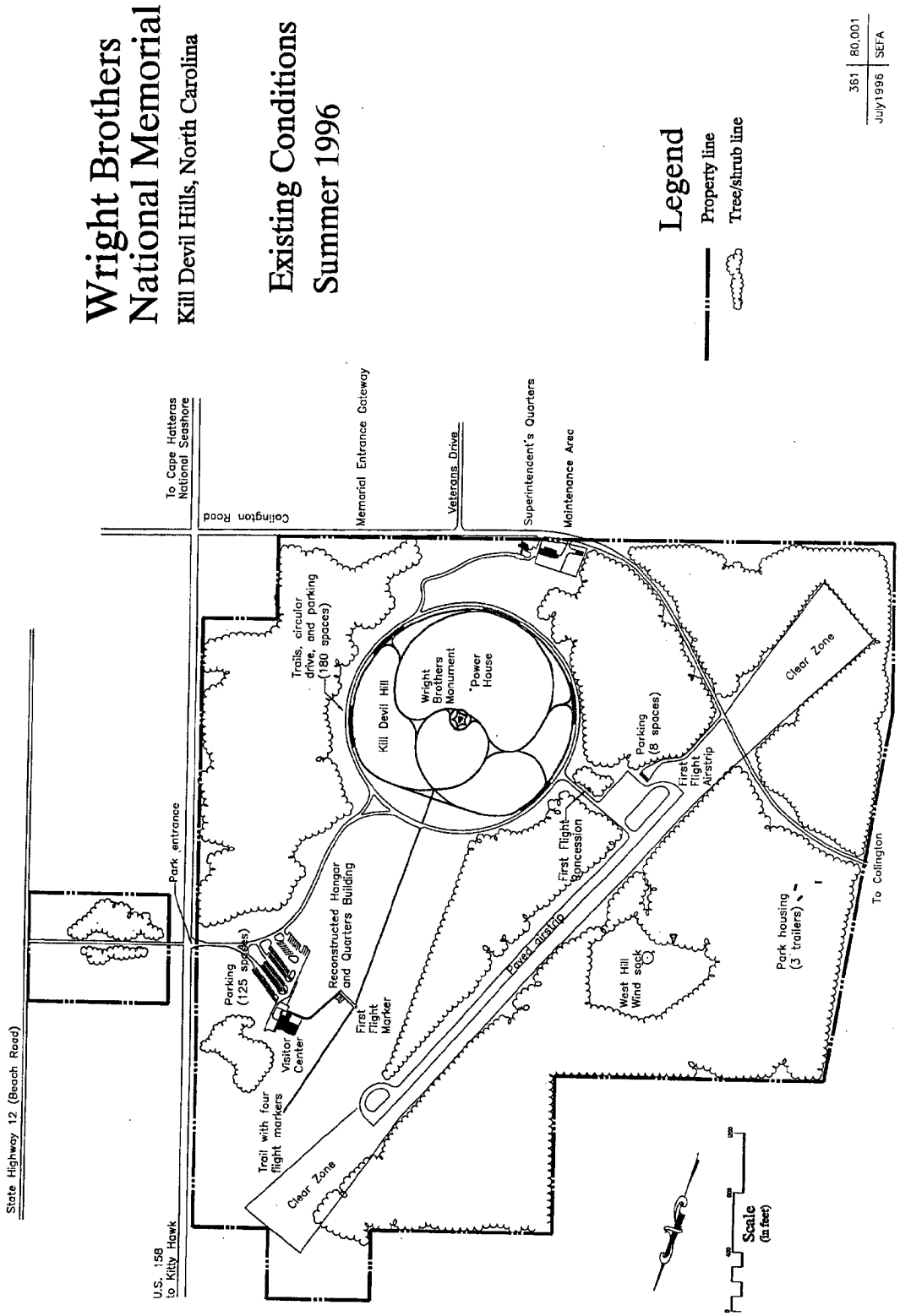



**Figure 2** Current Conditions Map

**History and Significance of the Wright Brothers National Memorial**

The Wright Brothers National Memorial incorporates the site of the first successful powered air flight in history-an accomplishment attained by Orville and Wilbur Wright, two ingenious mechanics from Dayton, Ohio, on December 17, 1903. The Wrights occupied the site, known historically as the Kill Devil Hills (Stick 1958: 267), on successive seasons beginning in 1900 (when they in fact spent only a day at the site) and ending in 1903, living and working in two temporary wood camp buildings. While Orville and Wilbur Wright returned to the area in 1908 for further powered-flight experiments and Orville returned again for tests in 1912, the greatest contributions to flight were glider experiments in which they learned to control flight during four seasons spent at Kill Devil Hills between 1900 and 1903 and a series of four powered flights in 1903.

Following the successful experiments of 1903, and subsequent reuse of the camp buildings in 1908 and 1911, the original camp deteriorated. The buildings had disappeared, either covered by sand or scavenged by local inhabitants for their wood, by the late 1920s when the first tangible efforts were made to commemorate and recognize what the Wrights had done at Kill Devil Hills. The topography changed as well; the largest of the four sand hills in the area, known as Kill Devil Hill and as Big Hill by the Wrights, drifted approximately 450 feet to the southwest.

Both local and national players sought to commemorate the Wrights' accomplishments in the Kill Devil Hills area in the 1920s. W.O. Saunders, the boosterish editor of the *Elizabeth City Independent,* spearheaded the local effort (Hewes 1967:16). Frank Stick of the Carolina Development Company, and Allen R Heuth and Charles M. Baker, New Jersey sportsmen, who donated land for the memorial, joined Saunders. At the national level help came from the National Aeronautics Association (NAA), with its many influential members, including Senator Hiram Bingham of .Connecticut, Charles Lindbergh, and others. Finally, North Carolina Congressman Lindsay Warren pushed a bill through Congress to create a memorial to the Wrights on land donated for the purpose in 1927.

The first commemoration of the site was the First Flight Marker, a 6-foot-high, rock-faced granite marker indicating the approximate site of the Wrights' first historic liftoff on December 17, 1903. This was erected in 1928 to mark the twenty-fifth anniversary of the Wrights' flight. A cornerstone for a proposed larger monument was also dedicated the same day. Finally built in 1931-1932, the completed monument stood as a striking memorial in the open landscape of the Outer Banks. By the time of its transfer from the War Department (which supervised the construction of the monument) to NPS on August 10, 1933, the site was already a well-established tourist destination.

At the time of its transfer from the War Department to NPS, the park (officially known as the Kill Devil Hill Monument) consisted of the granite First Flight Marker, mounted on a small earthen mound; the Wright Brothers Monument, an impressive Art Deco-inspired granite memorial placed at the top of the stabilized Kill Devil Hill; an entrance gate, contact station, and caretaker's office at the southeast comer; a powerhouse, situated southeast of the main monument; a road leading from the entrance, circling the east side of the monument hill, and

traveling north up to and around the granite marker; and a trail leading straight up the hill to the monument.

The availability of Public Works Funds from 1933 to 1939 enabled NPS to undertake extensive development at the site. The park's circulation system as altered and expanded between 1933 and 1936, included the main visitor entrance to the southeast, a road from the entrance up to and encircling the monument, a series of curving trails around the monument, and a single, axial road linking the monument to the marker some 2,000 feet to the north. By 1939, the park included a comfort station for visitors, located southeast of the monument; a superintendent's quarters south of the monument, added in 1935-1936; and a maintenance area, just west of the superintendent's quarters. The park supplemented the grass and shrubs planted in 1928 with additional landscaping, allowing trees and other vegetation to become established. Plans were also afoot for a museum or visitor center, and local and national organizations continued to push for an airstrip, a feature suggested since the Memorial's earliest years. Following the development of the 1930s, there were few major changes to the park until the early 1950s.

World War II interrupted the park's commemorative development. Development resumed after the war with the 1947 Master Plan calling for major changes to the site. These changes included the alteration of the circulation pattern and the development of more visitor-oriented facilities on the east side, near the First Flight Marker. The local and national promotional organization, the Kill Devil Hills Memorial Association (later the First Flight Society), pressed for more interpretive displays in anticipation of the fiftieth anniversary celebrations of 1953, including the reconstruction of the Wrights' 1903 camp. In 1958, the park closed the old road and built a new entrance on the east, from state route 158, just opposite the reconstructed camp buildings.

Acquisition of additional lands in 1959, resulting from a donation by the Avalon and Old Dominion Foundation and funding from the State of North Carolina, allowed for the construction of a new visitor center, one of NPS's Mission 66 projects. The visitor center, designed by the firm of Mitchell/Giurgola, echoes the modem airport designs of architects such as Eero Saarinen, and now serves as the museum, gift shop, interpretive center, and administrative offices for the unit. An essentially commemorative airstrip was added in 1963, also on the newly acquired land. Linked administratively to the Cape Hatteras National Seashore, established in 1953, the site is now an important tourist destination on the Outer Banks and an important landmark in the area.

## Geographical Character

The Wright Brothers National Memorial has a controlled entry point at the east, paved parking lots, a reception area (the visitor center), and park exhibits, including the reconstructed hangar and quarters. There are several asphalt roads, including the entrance road and a circular drive around the base of the monument hill. The airstrip is also paved, as are trails to the Wright Brothers Monument and various other access and maintenance roads.

Mature trees cover much of the periphery of the park, especially in the southeast and southwest comers, and along the west and north. Species include laurel oaks, other evergreen and deciduous trees, along with a wide variety of shrubs, including holly, wax myrtle, and wild olive. There are several strikingly open areas, including Kill Devil Hill and the area between its summit and the Visitor Center to the northeast and the equally open grassy area to the south.

In the 1900 to 1903 period when the Wright brothers completed their successful glider and powered-flight experiments, the area was a sandy expanse of open space with sand dunes or hills, of which the Kill Devil Hill, with its elevation of approximately 100 feet, was the most prominent. By the time of the earliest commemoration of the Wrights' achievements in 1928, this main hill had drifted approximately 450 feet from its site twenty-five years before *(New York Times* 12/18/28). As a result, the War Department decided as early as 1927 that the site needed stabilization. Following a procedure developed in part by local land developers and property donors Frank Stick Allen Heuth, and Charles Baker, Captain William H. Kindervater of the War Department began a program of sodding and stabilizing the site. Kindervater also introduced a number of shrubs and small trees, which grew to maturity by the 1960s. While the Master Plan of 1965 called for and resulted in the removal of some vegetation, NPS decided a full restoration of the 1903 landscape was a practical impossibility. If returned to sand, site features would continue to migrate as they had during the early part of the century. The present site, with open grassy areas and peripheral trees and shrubs, represents a compromise, meant to provide an appropriate background for appreciation of the Wrights' achievement, but not to reproduce 1900 to 1903 conditions.

**Recognized Historic Themes for Historic Resources**

The Wright Brothers National Memorial is a fairly complicated park in terms of its historic resources. Although the park is listed on the National Register as a district because of its significance as the site of the Wright brothers' successful flying experiments in 1900 to 1903, no structures and few landscape features remain from this period of significance. The first context presented-in this study establishes the significance of the Wright brothers work. The original 1978 National Register district boundary, identical with the park boundary, will not be changed; the district retains its national significance under National Register Criteria A and B for its association with the Wright brothers and their successful flight trials. The Kill Devil Hill and the West Hill are the only remaining features of the site present during the Wright brothers work. They are nationally significant under National Register Criteria A and B. As detailed below, the reconstructed hangar and quarters buildings are exhibits that fail to satisfy the National Register criteria for reconstructions.

The second context for the park encompasses the local and national efforts between 1926 and 1941 to commemorate the Wright brothers' achievements at Kill Devil Hills. National Register-eligible resources from this period include the First Flight Marker, erected in 1928; the Wright Brothers Monument and its associated powerhouse, built 1931 to 1932; the curving trail and circular road system around the monument, established 1933 to 1936; and the spatial

relationship between the marker and the monument, created in 1928. They are all significant under National Register Criterion A as examples of the recognition and commemoration of the Wright brothers' achievements and under National Register Criterion C for associated architectural and landscape design qualities. The First Flight Marker and the Wright Brothers Monument are nationally significant; the powerhouse, the curving trail and road system, and the spatial relationship between the marker and monument are significant at the state level.

**Overview of Resources Evaluated**

The landscape and structural features within the boundaries of the Wright Brothers National Memorial evaluated for this report include:

1. Wright Brothers Reconstructed Quarters
2. Wright Brothers Reconstructed Hangar
3. First Flight Marker
4. Wright Brothers Monument
5. Wright Brothers Monument Powerhouse
6. Memorial Entrance Gateway
7. Superintendent's Quarters and other staff housing
8. Wright Brothers Memorial Visitor Center
9. First Flight Airstrip
10. Circulation System including roads and paths
11. Landscape features including the spatial relationship between the Monument and the First Flight Marker
12. Maintenance Area
13. Kill Devil Hill
14. West Hill
15. Fee collection kiosk
16. Four stone landing markers
17. Metal information panel next to hangar
18. Metal information panel between Monument and Marker
19. Two Wright bust sculptures at Monument
20. Plaque next to Visitor Center.

Of these, the following are features that contribute to the significance of the National Register district :

1. First Flight Marker (placed 1928; reoriented 1966)
2. Wright Brothers Monument (cornerstone laid 1928; built 1931- 1932)
3. Wright Brothers Monument Powerhouse (constructed 1931- 1932)
4. Monument's curving trails and circular road with parking areas (completed 1936)
5. Spatial relationship between the First Flight Marker and Wright Brothers Monument (established 1928)

Kill Devil Hill (stabilized 1928)
West Hill.

The following resources are considered noncontributing because of an overall loss of integrity, particularly design material, and setting integrity; a lack of association with the Wright brothers context or commemoration context; or a construction date later than the 1900- 1941 period of significance for the park:

1. The Memorial Entrance Gateway (constructed 1932; entrance relocated and gates removed 1958)
2. Superintendent's Quarters (constructed 1935- 1936; roof replaced 1944; altered 1954; interior changes 1960s; altered, including windows replaced, 1974).
3. Maintenance Area (constructed 1939, numerous alterations and additions)
4. Visitor Center (constructed 1959-1960)
5. First Flight Airstrip (constructed 1962- 1963)
6. Fee collection kiosk (constructed 1987)
7. Four stone landing markers (erected 1963, replaced 1993)
8. Metal information. panel next to hangar (1966)
9. Metal information panel between Monument and Marker (1966)
10. Two Wright bust sculptures at Monument
11. Plaque next to Visitor Center (placed by Soaring Society of America, 1963).

The following two elements are classified as noncontributing features in the park's National Register district documentation:

1. Wright Brothers Reconstructed Quarters (reconstructed 1953, 1964-l965, 1976-1977, 1993)
2. Wright Brothers Reconstructed Hangar (reconstructed 1953, 1964-1965, 1976-1977, 1983, 1993).

The original 1978 documentation included the structures as elements of the district, but revised documentation will list them as noncontributing elements. They are relatively recent reconstructions of original buildings that do not conform to the special requirements of Criteria Consideration E, "Reconstructed Properties," and therefore are not eligible for listing. Neither of these properties is a fully accurate reproduction of the original; further, they are not in a fully suitable environment nor are they part of a restoration master plan, as set out in NPS guidelines (National Park Service [1991]a:30). As a result, they are considered interpretive exhibits only.

Finally, the museum collection at the park contains many original objects directly associated with the Wright brothers and their work. While most of the objects cannot be directly linked to Kill Devil Hills or the Wrights' gliders and planes, the collection does include the following objects from the 1903 *Flyer* that contribute to the significance of the National Register district:

1. Engine (crankcase), WRBR-345
2. Propeller, WRBR-346
3. Cloth from wing, WRBR-364

## SUMMARY OF IDENTIFICATION AND EVALUATION METHODS

### Survey Methodology

The survey team, including Principal Investigator William Chapman, faculty member Ian Firth, and three graduate students, photographed and measured each park site and structure in April 1990. At least three photographs were taken of each property; in the case of larger sites, such as the Monument, at least six to eight photographs were taken.

Field research was supplemented by extensive archival investigation, most of it conducted by Cathleen Turner, a graduate student assigned to the project. The survey effort benefitted from the fact that Cultural Resource Manager Bebe Woody and other NPS cultural resource managers and historians at Cape Hatteras Group Headquarters, located at Fort Raleigh National Historic Site, consolidated a large number of documents. The team made photocopies of maintenance records, historic photographs, manuscripts, and site plans and made blueprints of larger drawings and plans, including successive plans for the monument and the visitor center. The material proved useful in dating properties and in developing conceptual and historic frameworks for evaluation.

Finally, the author developed contexts on the basis of primary and secondary materials gathered at the park and additional published materials available in the University of Georgia Libraries.

### Survey Dates

The survey of Wright Brothers National Memorial occurred over three separate campaigns. The initial field work took place from April 4 through April 9, 1990. Personnel included Chapman (the Principal Investigator), Firth (faculty member), Turner, Rushton, and Butler. Chapman returned for a week-long follow-up from August 21 to August 27, 1990, in order to further consult NPS records. Turner returned in July 1991 to check on a few missing items of information and to reexamine some of the properties. Write-up of the project began in the spring of 1991 and was completed in July 1992. Following suggested changes by the staff of the Southeast Regional Office (SERO), a final,draft was submitted in November 1992, which has been further revised by NPS.

### Meetings with Park Personnel, Contacts with Local Historians

NPS staff have been extremely helpful throughout the project. Kirk Cordell and Len Brown of SEFA provided basic background information. Park personnel, including Museum Curator Steve Harrison, Management Assistant Mary Moran, Cultural Resources Manager Bebe Woody, Exhibits Specialist Bernie Weisgerber, Carpenter David Frum, and Ranger Hugo Desch, provided advice and supplied much useful information. Wright Brothers Interpreter Darrell

Collins provided last-minute information on several properties. Bebe Woody, in particular, has been indispensable to the success of this report. She provided both material and insights on the Park that added greatly to our understanding of its significance and the significance of its resources. Thomas L. Hartman, former Superintendent at Cape Hatteras and current Superintendent Russell W. Berry, Jr., have been most cooperative and helpful with time and information.

**Historical Research, Sources of Information**

Research for the project was based on archival materials housed in Cape Hatteras Group Headquarters at Fort Raleigh, materials in the climate-controlled storage facilities in the maintenance section at Fort Raleigh, and also some materials held at the Wright Brothers National Memorial. Specific records included historic photographs, construction drawings, manuscripts, earlier maintenance and management planning documents, and NPS maintenance records. Interviews with NPS maintenance staff, as well as the Cultural Resources Manager, helped fill in a number of gaps not covered in the written or printed record.

Much of the background information was obtained from secondary sources. Several publications by North Carolina historian David Stick were indispensable. These include his comprehensive work, *The Outer Banks of North Carolina* (1958), and his more recent work, *Dare County: A History* (1970). Gary S. Dunbar's *Historical Geography of the North Carolina Outer Banks* (1958) has been useful for geographical information on the area.

On the Wright brothers and their efforts at Kitty Hawk and the Kill Devil Hills, essential background has been provided in Fred Howard's *Wilbur and Orville: A Biography of the Wright Brothers* (1988) and Harry Combs's *Kill Devil Hill: Discovering the Secret of the Wright Brothers* (1979), as well as Fred Kelly's classic *The Wright Brothers* (1943). To put the Wrights' work into perspective several standard histories of flight have been employed. These include Roger Bilstein's *Flight Patterns* (1983) and *Flight in America* (1984); Walter Bonney's *The Heritage* of *Kitty Hawk* (1962); Walter Boyne's *The Smithsonian Book of Flight* (1987); and Tom Crouch's *A Dream of Wings* (1981). Most important have been the major works of Charles H. Gibbs-Smith (1954, 1962, 1963a, 1963b, 1966, 1970, 1974a, 1974b), upon which much of the comparative material presented in this report is based.

For the history of the park Andrew M. Hewes's *Wright Brothers National Memorial: An Ahministrative History* (1967) and Theodore A. Amundson's sequel *Wright Brothers National Memorial: An Administrative History 1968-1987* (1987) have been indispensable. Some perspective on the significance of the Monument was gained from Lois Craig's *The Federal Presence: Architecture, Politics,* and *National Design* (1984); from Alastair Duncan's *Art Deco* (1988); and from Richard Guy Wilson, et al, *The Machine Age in America, 1918-1941* (1986). Finally, on the new visitor center of 1959-1960, Mitchell and Giurgola's own monograph, *Mitchell/Giurgola Architects* (1983) has been useful.

**Criteria for Evaluation**

All properties surveyed have been evaluated in accordance with National Register criteria set out originally in the *Federal Register*, 41, No. 28, Section 60.6, p. 5907, and further described in the National Register *Bulletins* 1, 9, 15, 16, and 21. Specific National Register Criteria for Evaluation are:

a. Property is associated with events that have made a significant contribution to the broad patterns of our history;
b. Property is associated with the lives of persons significant in our past;
c. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction; or
d. Property has yielded, or is likely to yield, information important in prehistory or history.

In order to assess significance it has been necessary to reexamine the explicit and implicit historical contexts represented by the park unit and, in the case of the Wright Brothers National Memorial, to develop a new context for evaluation of later contributions and changes to the site. The primary theme or context at the Wright Brothers Memorial is "The Wright Brothers and Early Flight at Kitty Hawk, North Carolina, 1900-1903." A related secondary theme is "The Commemoration of the Wright Brothers, 1926-1941," a historical context that has, due to the passage of time, gained increasing significance in its own right. It is hoped that this historic resource study will help call attention to the later efforts to preserve the site of the Wright brothers' historic flights and to the NPS's ongoing mission at the Wright Brothers National Memorial.

**Historical Base Map**

All properties surveyed as part of this study are indicated on the accompanying base map. The properties are also indicated on the U.S. Geological Survey map included in the appendices.

**Overview of Historic Contexts**

As emphasized, this report relies on the historic context-based approach to assessment and evaluation, as described in National Register *Bulletins* 15 and 16. The context-based approach underscores the changing historic significance of the Wright Brothers National Memorial and gives greater emphasis to the more recent history of the site, including the significance of the site as a focus of preservation and commemoration efforts in the twentieth century.

The two contexts recognized and developed for this study are: "The Wright Brothers and Early Flight at Kitty Hawk, North Carolina, 1900-1903" and "The Commemoration of the Wright Brothers, 1926-1941."

Background information for other potential contexts was also collected and much of it incorporated within historical background discussions for the contexts in this study. Contexts developed and presented in this study are resource-driven and relate to the main historic significance of the site.

**Relationship of Contexts to State Historic Preservation Plans and National Park Service Thematic Framework**

The themes developed for this report closely correspond to historic themes and contexts developed by the State of North Carolina, Division of Archives and History, and by NPS (Revision of the National Park Service's Thematic Framework, June 28, 1994). The strongest link to a North Carolina Comprehensive Planning context is the "Transportation, Air Transportation" theme identified by the North Carolina State Historic Preservation Office. The primary park context falls under the NPS theme, "Expanding Science and Technology," and the secondary park context falls under the NPS theme, "Expressing Cultural Values."

# CHAPTER ONE: THE WRIGHT BROTHERS AND EARLY FLIGHT AT KITTY HAWK, NORTH CAROLINA, 1900-1903

## BACKGROUND ON CONTEXT

The period of significance for this context is based on the span of years that Orville and Wilbur Wright spent on the Outer Banks of North Carolina during their earliest period of experimentation, 1900 to 1903. It was during these years that they worked with gliders and with the first successfully flown, powered aircraft—efforts that culminated in what is now generally recognized as the first powered flight of December 17, 1903. The work of the Wrights' predecessors is important to an understanding of the Wright brothers' own successes; however, the primary period of significance is clearly that in which they lived and worked at their Kill Devil Hills camp.

The geographical area considered for this context and for the National Register historic district is the approximately 43l-acre site now known as the Wright Brothers National Memorial. The boundary of the park defines the district boundary. The Kill Devil Hills area is an expanse of sand hills located about four miles south of the village of Kitty Hawk, at the edge of Colington Creek and within view of the Atlantic Ocean to the east. Kill Devil Hill, where the Wright brothers' experiments with gliding occurred, was the highest of the hills, or dunes. Therefore, as Outer Banks historian David Stick emphasized, both appellations "Hill" and "Hills" are appropriate for the site (Stick 1958:267).

This study is confined to property owned or managed by NPS'as the Wright Brothers National Memorial and therefore limited to resources within the boundaries of the park. Reference is inevitably made to occurrences outside the park boundaries. The Wright brothers had close connections with people in the village of Kitty Hawk and at the U.S. Weather Station located there, as well as at the Lifesaving Station at Kill Devil Hills. Other parts of the country and world that have a direct bearing on the events at Kitty Hawk also receive attention in this study.

The grassy hill and surrounding land at Kill Devil Hills is significant as the site of Orville and Wilbur Wrights' glider and powered flight experiments of the early 1900s and especially as the site of the now generally recognized first powered flight of December 17, 1903. There are no structural remains associated with the Wright brothers' period of occupation and use of the area; the originally sandy hills and dunes that attracted the Wright brothers have been sodded and

otherwise planted and developed as part of a longstanding effort to stabilize the site and provide a setting for the recognition of the Wrights' achievements.

### THE WRIGHT BROTHERS IN PERSPECTIVE

The site of the first generally recognized successful powered air flight, conducted by Wilbur and Orville Wright on December 17, 1903, near Kitty Hawk, North Carolina, has been recognized and preserved in some way since at least 1928. The Wright brothers conducted experiments in flight intermittently for three years in the Kill Devil Hills area before achieving success with four powered flights, the longest of which was 852 feet in 59 seconds. Now viewed as a seminal event in the history of aeronautical development and the beginning of a near century of further advances in aeronautics, the Wright brothers' efforts at Kill Devil Hills stand as striking testimony to the ingenuity and fortitude of two individuals.

### THE WRIGHT BROTHERS' PREDECESSORS

The Wright brothers' experiments in both powered and unpowered flight were the culmination of many centuries of air flight experimentation. Historians of air flight have traced the beginnings of mankind's infatuation with the possibility of flight to speculations and fantasies of ancient philosophers and, more directly, to the theoretical ideas of the Renaissance (Gibbs-Smith 1954, 1970, 1974b; Joseph 1962; Howard and Gunston 1972; Boyne 1987).

In the late fifteenth century, Leonardo da Vinci offered a number of innovative possibilities for flight, suggesting in his notebooks devices for human-powered flying machines, with harnesses and movable bird-like wings. He also offered an early design for a helicopter as well as for parachutes—astutely predicting the future military applications of flight in the process (Josephy 1962: 12-13; Gibbs-Smith 1970:8-9; Hart 1961). Most early theoretical treatments, such as those of Leonardo, emphasized the character of the flight of birds as a model for human flight. However, it was really the acceptance of fixed-wing principles, which were adopted early in the Wright brothers' experiments, that opened up the possibility for successful, heavier-than-air human flight (Gibbs-Smith 1970: 8).

The fixed-wing idea originated in experiments of the late-eighteenth and nineteenth centuries. Fixed-wing experiments, in the form of primitive gliders, often occurred in conjunction with the development of balloons, or lighter-than-air flight, and parachutes. Among the earliest experimenters with fixed-wing devices was Sir George Cayley (1773-1857), identified by one flight historian "as the basic originator of the modern aeroplane" (Gibbs-Smith 1970:21). The success of balloon flights by Pilatre de Rozier and the Marquis d'Arlandes in a craft designed by the French Montgolfier brothers in 1783 initially inspired Cayley. In 1799, after years of research, Cayley designed a glider, featuring a fixed-wing for lift, a paddle-like mechanism for propulsion, and a tail, providing stability through both horizontal and vertical planes. Cayley's design was important in that for the first time, the process of lift was separated from that of propulsion—a striking readjustment from the ornithopter or movable wing concept (Anderson 1985:6). Cayley, who continued his experiments until his death in 1857, immortalized his design on a silver medal

and also built a series of successful model gliders, including one that carried a small boy for several yards. However, as Cayley himself emphasized, the problem with achieving sustained flight was in discovering a means of supplying sufficient power to decrease the air resistance offered to the crafl.

## PRECEDENTS OF THE LATE NINETEENTH CENTURY

Cayley's experiments and those of his contemporaries led to a number of other minor successes and advances during the nineteenth century. Much of the work, understandably, concentrated on providing the necessary power to propel heavier-than-air crafts. In 1857, Felix du Temple, a French naval officer, constructed a monoplane design fitted with a locomotive-like boiler and smokestack but was unable to get his craft airborne (Gibbs-Smith 1954, 1963a, 1966, 1970). He was followed in the 1870s by Thomas Moy, a British engineer, who managed to get his steam-powered craft a few inches off the ground, and in 1890, by the French engineer and mechanical genius Clement Ader, who actually succeeded in leaving the ground in his craft, though later historians have tended to interpret this as more of a "hop" than genuine sustained flight, as achieved by the Wright brothers (Gibbs-Smith 1954, 1966, 1974b).

Another contribution to early flight was the continuing work of model makers and kite designers, several of whom directly influenced the Wright brothers. The mid-nineteenth-century collaborative designs of the Englishmen Samuel Hensen and John Stringfellow prophetically anticipated later airplane designs (Josephy 1962; Stewart 1972; Boyne 1987). The invention of the box kite in 1893 by Lawrence Hargrave in Australia similarly impacted the configuration of early aircraft, including the Wrights' biplane gliders and flyers (Gibbs-Smith 1970:54). Miniature balsa models introduced by the Frenchman Alphonse Penaud (1850-l880), with twisted elastic band propulsion, suggested an immediate prototype for the Wright brothers, down to the fixed tapered wings shaped in the form of a positive dihedral, and was later incorporated in the Wright design (Gibbs-Smith 1970:43). Significantly, the young Wright brothers played with just such balsa toys in their childhood home at Cedar Rapids, Iowa (Howard 1988:4).

It was not simply the isolated work of individuals that was important for early experimenters such as the Wright brothers, but rather the collective momentum of the scientific establishment by the end of the nineteenth century that, in a sense, determined the cause of flight. Flight experimentation increasingly took place in the context of scientific societies, journals, publications, and correspondence among researchers. The Wright brothers' work built directly upon publications issued by scientific bodies, such as the Smithsonian Institution (with which, in fact, they corresponded at the beginning of their own research), as well as both popular and more scientific writings of air flight pioneers. The more important of these, especially for the Wrights, included Octave Chanute, whose *Progress in Flying Machines* was published in 1884; the Smithsonian's Secretary, Samuel P. Langley, whose *Experiments in Aerodynamics* followed in 1891; and James Means, whose popular journal the *Aeronautical Annual* was issued over three years between 1895 and 1897 (Combs 1979:51).

The Wright brothers, who appear to have become interested in the problems of flight around the mid-1890s, drew upon a great number of sources (Kelly 1943; Miller 1978; Howard 1988). They also made their own empirical observations, based on a kind of common-sense approach to problem solving. Despite later disclaimers that the knowledge and observation of bird flight made up only a part of their approach, it is clear that the brothers, led by the elder Wilbur, looked at Jules Marey's study *Animal Mechanism: A Treatise on Aerial Locomotion* of 1890 as well as making their own observations. In addition, the research of Louise-Pierre Mouillard (1834-1897) who wrote a significant treatise on the soaring and gliding characteristics of birds, published in 1881 as *L'Empire de l'Air* and excerpted and translated for popular consumption in the Smithsonian *Annual Reports,* also influenced the Wright brothers (Gibbs-Smith 1970:52; Howard 1988:28).

Even more directly, the work of German scientist and inventor Otto Lilienthal (l848-1896) influenced the two brothers. Lilienthal's successful experiments with gliders were widely publicized (Howard and Bunston 1972:38-39). His death in a glider accident in 1896 appears to have initially caught the Wright brothers' attention (Howard 1988:15); and in 1899, when they first wrote to the Smithsonian Institution for further information on flight, the organization recommended Lilienthal's experiments (Howard 1988:30-31).

One of the principal innovations of Lilienthal's gliders was his translation of the shape of birds' wings—based on his own years of study—into glider wings. Lilienthal believed the "gentle parabolic curve across [the wings'] upper surface" (Combs 1979:41) gave his gliders the necessary lift. The Wright brothers agreed that Lilienthal's curved wing contributed significantly to flight experimentation, and allowed him to make over 2000 successful glides-including one that took him sixty-five feet in the air. Lilienthal published meticulous accounts of his work, complete with diagrams and photographs, which the Wright brothers used (Combs 1979:79). While the Wright brothers improved continually on Lilienthal's work—they realized, for instance, that the movable wings of Lilienthal's gliders caused instability as did the wings' relatively short length and the pilot's or flyer's overall lack of control—it is clear that his legacy played a major role both in inspiring and guiding their experiments.

Of the aerial pioneers who influenced the Wright brothers, probably the most direct source was the work of Octave Chanute (1832-1910). The Smithsonian sent Chanute's book, *Progress in Flying Machines* of 1894, a compilation of popular magazine articles, to the Wrights in response to their 1899 request for information. The historian Charles Gibbs-Smith refers to it, together with Lilienthal's work, as one of "the two bibles of flying" (Gibbs-Smith 1970:83). Like the Wright brothers, Chanute at an early age became interested in the idea of human flight. However, he withdrew from research until he established a successful business career. Beginning around 1889, the French-born, Chicago-based amateur scientist resumed flight experimentation. His work resulted in a series of articles published in *The Railroad and Engineer Journal* between 1891 and 1893, which he in turn compiled in a book in 1894. In 1896, at the age of 64, he and a group of assistants began a series of gliding experiments in the sand dunes of Lake Michigan. From 1896 to 1897, his group built five different glider types and completed over 1,000

experimental flights, many 200 to 300 feet in length. The *Aeronautical Annual* published his carefully recorded results. After 1900, the Wright brothers began a correspondence with Chanute, who in time advised them on aspects of their experimentation. He eventually visited the Wright brothers at Kitty Hawk and witnessed some of their early glider experiments (Kelly 1951; Gibbs-Smith 1963b; Glines 1968; Hallion 1978).

The last truly pivotal figure in the development of the Wrights' own interests and their first successful experiments was Samuel P. Langley (1834-1906). Langley served as Secretary of the Smithsonian Institution (Crouch 1978) and originally corresponded with the Wrights in 1899, when they wrote to the organization stating their serious interest in flight (Kelly 1951; Combs 1979; Howard 1988). Langley was personally involved in flying experiments and, by the mid-1890s, worked on powered flying machines. Langley built at least six prototypes (which he called the *Aerodromes),* the last of which employed innovative gasoline-fueled engines. His 1890s aeronautical experiments largely failed (Oesher 1949: 157-60; Vaeth 1966). However, later versions of his *Aerodromes,* rebuilt roughly according to Langley's specifications by his champion Glenn Curtiss, made successful flights

Langley was generally considered the leading figure in heavier-than-air flight experimentation at the time of the Wrights' early experiments. The beginning of the Spanish-American War provided additional incentive for Langley, as grant funds were made available to him through the influence of Theodore Roosevelt, then President William McKinley's Assistant Secretary of the Navy (Bilstein 1984:9). Langley's efforts, however, were fraught with problems, and he never accepted the curved-wing theories of previous experimenters such as Lilienthal (Combs 1979:5). Throughout the first years of the twentieth century Langley continued his efforts, with a first attempt in October 1903, and a final attempt December 9, 1903, nine days before the brothers' successful flights. Following Langley's death in 1906, the Wright brothers argued with the Smithsonian Institution over conflicting claims to priority (Abbot 1928; Crouch 1978). Though now considered one of the treasures of the Smithsonian the original Wright *Flyer* was not donated to the museum until 1948, largely due to the Smithsonian's reluctant admission of the Wright brothers' contribution to aeronautics (Kelly 1943 :300-27; Oehser 1970: 100; Crouch 1978:46).

## THE WRIGHT BROTHERS' EARLY WORK

When Wilbur wrote a letter of inquiry to the Smithsonian in May 1899, the Wright brothers were relative newcomers to the science of aeronautics (Crouch 1978:41). Employed in their own bicycle manufacturing and repair business, these two sons of a non-conformist bishop developed a fascination with the notion of heavier-than-air powered flight during the mid- 1890s. Working together in the evenings after work, they applied their mathematical and mechanical skills to the analysis of earlier writers. Particularly influenced by Lilienthal, they referred to him as having provided "the best data available" (Combs 1979:42), but they also found errors in Lilienthal's research, particularly with wing-surface-to-weight ratios and his search for a satisfactory steering method.

The brothers' first experiments occurred in the early part of 1899. Employing a five-foot, double-foiled kite, they tested their own theories on lift and their "wing-warping" method for the control of altitude and direction method requiring the differential twisting of the curved wings in order to shift the kite's direction, which the Wright brothers eventually called "helical twisting" (Gibbs-Smith 1970:95). Combined with a rudder, this principle of warping or twisting eventually became the key to the Wright brothers' success, allowing the pilot to lean into turns while maintaining aerial stability (Crouch 1978:41).

Throughout 1899 and 1900 the Wright brothers applied their experimental efforts toward creating a glider capable of carrying the weight of a man. They tested different materials, further analyzed the flight of birds and the shape of birds' wings, and further developed the notion of wing-warping (Combs 1979:51; Ritchie 1976). A final kite test in the summer of 1899 achieved only limited results. However, the Wright brothers advanced their designs and the understanding of the processes at work. The immediately significant wing-warping technique allowed them to develop gliders with greater wing spans and therefore greater carrying capacity (Anderson 1985:24-28).

### THE MOVE TO KITTY HAWK, 1900

During the period of their initial Dayton experiments the Wright brothers realized the need for a more practical site to conduct their research. They needed a wide, open space with steady winds of up to fifteen to sixteen miles per hour. The seasonal nature of their business gave them time between September and January to conduct experiments. Writing to the U.S. Weather Bureau as well as to experimenters such as Octave Chanute, the brothers considered sites near San Diego, California, and along the coasts of Georgia and South Carolina-both recommended by Chanute before finally settling on the Kitty Hawk, North Carolina, area (Howard 1988:39-40; Bonney 1962). Kitty Hawk had the requisite open space and, according to the *Monthly Weather Review* reports, steady winds. Additionally, it was the closest of the proposed sites to their Dayton, Ohio, home base (Howard 1988:39).

Correspondence with Kitty Hawk residents also attracted the Wright brothers to North Carolina. Joseph J. Dosher of the Kitty Hawk U.S. Weather Bureau Station replied enthusiastically to Wilbur's site inquiry. He described the area as a treeless strip of land, a mile wide, without hills or other obstructions (Howard 1988:40; Wescott and Degan 1988:24-26). He also emphasized the prevailing winds from the north and northeast during the months of September and October, when the Wrights wished to begin their work. As to housing, Dosher suggested the two brothers bring a tent. The Wrights also received a letter from native Kitty Hawker Captain William Tate, a former postmaster and county commissioner (Stick 1958: 198-99). He emphasized, to the brothers' relief, the existence of hills in the area known as Kill Devil Hills, which aided ultimately in their experiments, but also cautioned them about more inclement weather in November (Howard 1988:40).

The Wright brothers first traveled to the village of Kitty Hawk, North Carolina, in September 1900, traveling by train to Elizabeth City and taking a small boat to the Outer Banks. The two

traveled separately; Wilbur arrived first, on September 13, following a two-day, storm-ridden trip on Israel Perry's schooner. He enjoyed a hospitable stay at the Tates' home in Kitty Hawk, while waiting for the arrival of the glider from Elizabeth City, where he left it temporarily. The brothers eventually employed Mrs. Tate's sewing machine to make wing covers (Stick 1958: 199; Howard 1988:46).

Orville arrived at Kitty Hawk two days later, following a less eventful trip. After a brief stay with the Tates, the brothers set up a tent just outside the village of Kitty Hawk, in the dunes immediately to the south. In a letter to their sister, Orville wrote enthusiastically of the site, calling attention especially to the impressive expanse of sand.

> The site of our tent was formerly a fertile valley, cultivated by some ancient Kitty Hawker. Now only a few rotten limbs, the topmost branches of trees that then grew in this valley, protrude from the sand. The sea has washed and the wind blown millions and millions of loads of sand up in heaps along the coast, completely covering houses and forest (Combs 1977: 105).

By October the Wrights' completed their preparations and began experiments with their first large glider. This first craft featured a 17-foot wingspan and a horizontal rudder, which functioned essentially as a front elevator. They designed the original craft with an 18-foot wingspan, but Wilbur was forced to substitute shorter pine strips for the intended spruce. Because the longest pine strips available at their Norfolk, Virginia, suppliers were only 16 feet, they augmented them with 6-inch sections, bringing the total length of the wings to 17 feet (Howard 1988:41). The pilot flew in a prone position, which departed from the method employed by other experimenters. The Wrights selected the prone position in order to make the operator "more comfortable, make landing safer, and to reduce head resistance" (Gibbs-Smith 1970:97). During that first short season the brothers succeeded in flying their craft as a kite, controlled from the ground using guide ropes. They were assisted by Kitty Hawk locals, including William (Bill) Tate and Tom Tate, the son of Bill's half brother. The wing warping and the front elevator proved successful. However, the dihedral, or curved, wings limited aerial stability. For a short time the brothers switched to flat wings by adjusting the struts, but this similarly proved ineffective (Gibbs-Smith 1970:97).

On October 18, the brothers shifted their experiments to a small hill about a mile south of their camp. There they met with only limited success, and their decision to man their glider came with too little time left in the day. The following morning, they moved farther south to the Kill Devil Hills area to begin their first manned glides. The first day, due to strong winds, they returned without a single attempt. However, on October 20, they made their first successful manned glides. Bill Tate again assisted the brothers. Wilbur apparently completed most if not all of the flying. The prone position proved successful, and they found that it was just as easy for the rider to remain in a recumbent position, rather than dropping down within the provided gap, when landing (Howard 1988:52).

In late October, the Wright brothers returned to Dayton reasonably encouraged. They asked Bill Tate to dispose of the glider, the cloth wings of which were made into dresses for his daughters (Howard 1988:53). Orville and Wilbur began work on a second glider, which they completed early the following year. The most significant change in the new model was an increased wing span of 22 feet, resulting in a new wing surface of 290 square feet. The new wing-warping mechanism, controlled by a "hip cradle," allowed the pilot to alter the warping by a shift of his torso. The wings also received a four-inch anhedral droop to help promote lift (Gibbs-Smith 1970:97). Wilbur wrote of the summer's successes and his theories to Octave Chanute. He also wrote two articles for publication in leading French and German aeronautical journals (Combs 1979:130).

### THE SECOND SEASON, 1901

The Wrights took their second glider to the Outer Banks in July 1901 for initial testing. The Wrights also built a more permanent camp during the summer visit, constructing a combined workshop and storage building out of locally procured materials about four miles south of their old tent camp, just northeast of the main Kill Devil Hill (Stick 1958:204). Octave Chanute arrived on the scene in August to witness the work and provide advice. Other participants had arrived earlier that season. These included Edward C. Huffaker and George Spratt, both recommended to the Wrights by Octave Chanute (Howard 1988:61-77). The flights, launched from around the midpoint of the largest of the three hills, took place mainly during July and August. They tested both manned and unmanned flights, though increasingly they were piloted.

The experimental flights of early August largely succeeded, resulting in glides of up to 389 feet (Gibbs-Smith 1970:98). Still, difficulties existed and clearly frustrated both brothers. The Wrights gave up their final experiments toward the end of August to return to Dayton for further work.

Between September 1901, when they left Kitty Hawk, and August 1902, the Wrights remained in Dayton. While their tests of the previous summer showed some success, the accuracy of Lilienthal's calculations, upon which they based much of their own work, continued to cause concern. This realization led the Wrights to put aside other scientists' data and conduct their own experiments. Building a series of models of wing sections, they began a systematic wind-tunnel study of the aerofoil sections. They tested every wing configuration possible and, after only three months, used the new data to create a design which they incorporated into their 1902 glider and later powered aircraft (Baals 1981:6; Combs 1977: 146-47). They built the third Wright glider over the winter and spring with a further increased wing span and consequent wing surface area. They also installed a double-planed, rear rudder. This provided their aircraft, for the first time, with both the longitudinal and lateral stability necessary for successful sustained flight (Gibbs-Smith 1970:98).

### THE THIRD SEASON, 1902

In August 1902, the Wright brothers returned to their old camp at Kill Devil Hills to begin their experiments again. The camp was largely in disrepair due to harsh winter winds and shifting sands. The brothers, with help from Bill Tate's half brother, Dan, carried out basic repairs to their camp, and added ten feet in length to the storage and workshop building (Combs 1979: 158) to provide for better living quarters. They also added battens to the exterior and properly tarpapered the roof (Wescott and Degan 1988:62-65, 71, 77-79). This substantially improved camp became the Wright brothers' home for the remainder of the summer and served as their base of operations the following year. The quarters included a makeshift dining room table, suspended burlap beds, and an operable kitchen. A photograph of the interior captured an enduring picture of life in the quarters, and eventually served as the basis for the present reconstructed exhibit at the site. (The camp also possibly included a chicken coop, though the evidence of this is less clear; the privy, if there was one, has similarly eluded researchers; Howard 1988:83.)

The tests that summer concentrated on improvements to the new glider. They engineered the aircraft to be unstable in order for the pilot to practice the control systems more thoroughly (Combs 1979:73). As a result, both brothers gained experience as pilots, an important prerequisite to the later longer flights (Gibbs-Smith 1970:99). Orville and Wilbur remained at their Kill Devil Hills camp until October. Octave Chanute visited for a period, and also their brother Lorin Wright, who assisted in some of their early flights. Augustus Herring, another of Chanute's proteges, and George Spratt also visited the site that year; Herring helped with tests of Chanute's own glider, all of which proved unsuccessful (Howard 1988: 66-67).

The Wrights set a number of new gliding records that season. Three glides traveled more than 600 feet, and five lasted between twenty and twenty-six seconds. To improve lateral stability, the Wrights added a vertical tail. This at first introduced new problems, most significantly a tendency for uncontrolled twisting, which they referred to as "well-digging." Orville apparently solved the problem, suggesting a moveable, rudder-like tail, which adjusted for the twisting. Wilbur, in turn tied its operating mechanism into the wing warping mechanism, overcoming the need for separate controls. As Fred Howard records:

> What the Wrights had stumbled on in the course of this gliding experiment at Kill Devil Hills in 1902 was to document that the principal function of the vertical rudder in an aircraft is not to steer but to supplement and refine the action of the lateral control mechanism. This was not an insignificant discovery, for it completed and brought to a patentable stage the Wrights' three-dimensional system of airplane control, which is the basic system used today in all winged vehicles that depend on the atmosphere for their support (Howard 1988:89).

The Wrights finally broke camp on October 28, returning to Dayton via Elizabeth City. With George Spratt and Dan Tate's help, during their stay they completed over 700 separate glides,

more than 375 in the final six days. One glide reached a distance of 622.5 feet and lasted more than twenty-six seconds. They gained increased control over their craft and logged a considerable number of hours of actual flight time, contributing to their later success as pilots (Combs 1979: 148-75). By the end of the 1902 season the Wrights had made great progress on the way to successful flight.

**POWERED FLIGHT, 1903**

Word of the Wrights' successes during the summer of 1902 began to leak out that autumn. They obviously impressed Chanute, and soon the scientific world began to hear of the brothers' work and their glider designs (Howard 1988:96-99). The military of several countries took an interest in their gliders (Combs 1979: 173); and in the spring of 1903, following their annual return to Dayton, the Wright brothers applied for their first patent on the wing-warping mechanism and rudder design. While the patent was not granted until 1906, the Wrights understood the greater significance of their efforts and the need to protect their enterprise (Gibbs-Smith 1970:99).

During the winter of 1902 and spring of 1903 the Wrights devoted time to developing an engine for their flying machine in order to finally attain powered flight—clearly their intention from the earliest period, but further reinforced by Octave Chanute's encouragement after 1902 (Howard 1988: 104). In order to carry the greater weight required for the engine, the brothers expanded the frame and wing span of the new *Flyer*, as they dubbed the craft (Howard 1988: 104), utilizing a biplane design. They also added wire stays to provide greater strength and stability. Unable to find a suitable engine, the Wrights decided to build their own calling upon Charles Taylor, the inventive and talented employee of the Wright Cycle Company, to complete the design and machine-work (Combs 1979: 176; Hobbs 1971).

Taylor's and the Wright brothers' work resulted in a 4-cylinder, 12-horsepower engine capable of translating 9.5 horsepower to propulsion, with the remaining 2.5 horsepower absorbed or lost in the system of drive shaft, sprockets, and chains (Combs 1979: 176). As work proceeded on the engine, Orville and Wilbur concentrated on the design of the propellers needed to provide the thrust required for flight. As with other aspects of this effort, no prototypes existed for experimentation, and again the Wright brothers developed their own equipment. Using their wind tunnel for testing, the Wrights settled on the now typical, two-bladed propeller design rejecting cork-screw designs and the examples offered by ship propellers (Combs 1979; Howard 1988:108-109). The final propellers, manufactured in the Dayton shop, measured a little over eight feet, and mounted on the rear of the plane.

By the summer of 1903, the machine-powered aircraft was ready for testing. The Wrights again shipped the aircraft, equipment, and provisions to Elizabeth City by rail, to be transported by schooner and wagon to the site. The Wrights' baggage arrived in September; the new *Flyer* arrived later. The amount of equipment and material had increased enormously since their first visit. It included the *Flyer*, now weighing close to 605 pounds with all its accessories, a large array of tools and equipment, including gauges, muslin, etc., and a more lavish supply of household goods (Howard 1988:111). Upon arrival they undertook repairs on their quarters and,

with the help of several local carpenters, added a second, adjacent frame shed to serve as a garage or hangar for the *Flyer* (Stick 1958:208). The new building, located a few feet west of the old camp building, consisted of an approximately 44-by-16-foot structure, braced on two sides against the wind. They fitted the ends with top-hinged doors for easy access. The brothers found the 1902 glider still intact, despite damage to its old storage quarters. For several weeks the brothers practiced on the glider, with Orville on October 26, 1903, soaring for one minute and eleven seconds. This record held until 1911, when Orville bettered his own mark (Howard 1988:115).

The *Flyer*, which finally arrived on site October 8, was fully assembled by early November, as was a 60-foot wood monorail used to launch the aircraft. The Wrights immediately experienced engine difficulties, which in turn resulted in damage to one of the propeller shafts. As a result, they sent the shaft to Dayton with Spratt for repairs. In the meantime, the Wrights improved the construction of the monorail, relaid for each flight along the northeast side of the Kill Devil Hill. Referred to by the brothers as a junction railroad, it consisted of four, 15-foot two-by-fours covered with a thin metal strip. Wooden crosspieces held the whole upright in the sand. A small wooden truck moved along the rail on two metal rollers made from modified bicycle hubs. Across the truck they placed a 60-foot plank, on which the skids of the *Flyer* rested during takeoff. A third bicycle hub, attached to a crosspiece under the horizontal front window, kept the machine from nosing over on the track (Howard 1988:118).

The repaired shafts arrived at the camp on November 20. They installed the shafts and tightened the sprockets, thought to be too loose. Extremely cold weather, however, delayed test flights throughout the month. Tests on the engine proved more successful. A crack discovered in one of the propeller shafts nearly ended the season; the brothers, eager to test the plane before the end of the year, decided to press on, and Orville traveled back to Dayton to retrieve the necessary replacements.

They decided only solid steel shafts could withstand the vibrations of the engine (Howard 1988: 122), so the brothers installed new propeller shafts on the *Flyer* on December 12, 1903, the day after Orville's return. The wind that day was too light to risk a flight, and the next day was Sunday, which was the brothers' traditional day of rest. On Monday, December 14, they decided to test the machine despite continuing low wind velocities. Following a pre-arranged agreement,, they placed a white sheet on one end of the hangar shed to invite men from the nearby Kill Devil lifesaving station, or inhabitants from Kitty Hawk, to be witnesses to the flight experiments. Shortly thereafter five men from the station arrived who helped move the *Flyer* up the Kill Devil Hill to make up for the lack of steady winds. The track was then adjusted on the hillside, and the *Flyer* placed at the high end (Howard 1988: 134).

Wilbur and Orville tossed a coin to see who would take the first turn. Wilbur won (Combs 1979:203). There was some difficulty in releasing the plane, but once released the *Flyer* proceeded down the rail, balanced by Orville, racing beside it. Wilbur adjusted the front rudder, causing the machine to jump into the air, before it clipped the sand with its left wing, sending it into the ground after only 3.5 seconds. Although this effort carried the *Flyer* over 100 feet, it

was not considered a successful first flight. Still, the accomplishment encouraged both brothers (Howard 1988:134).

The next day, December 15, the brothers spent making repairs, which they finally completed by midday the 16th. However, light winds delayed further flight attempts until December 17. At 10:00 A.M., despite threateningly high winds, they decided to chance another flight, and they notified the men from the lifesaving station. They laid the rail on level ground west of the hangar building and waited for the men from the station to arrive—three of whom finally appeared on the scene with two local men (Howard 1988:135-136).

Orville piloted this round of trials. At 10:35 A.M., he released the rope restraining the *Flyer,* which in turn moved slowly down the track, with Wilbur holding the right wing tip for balance. Although it lifted off at an air speed of 30 MPH, the wind, at over 20 MPH that day, represented fully 20 MPH of this speed. John Daniels, one of the lifesavers, took a photograph at the moment of lift off (Combs 1979:213).

The *Flyer* reached an elevation of about 10 feet before the shift in the rudder caused it to go downward. The total distance covered was about 100 feet. The stopwatch stopped due to the sudden impact, but the Wrights estimated a flight time of 12 seconds. Orville expressed it as:

> the first time in the history of the world in which a machine carrying a man had raised itself by its own power into the air in full flight, had sailed forward without reduction of speed, and had finally landed at a point as high as that from which it started (Howard 1988).

Following repairs to a damaged rudder, the brothers repeated the experiment. At 11:20 Wilbur made a second flight, totalling 175 feet. A half-hour later Orville made the third flight. By now, following earlier difficulties with the rudder, Orville was in a better position to make the necessary in-flight adjustments (Combs 1979:215-16). The third flight was steadier and longer, totalling a little over 200 feet and lasting about 15 seconds. At noon Wilbur made the fourth and longest flight of the day, covering a full 852 feet, though ending with a crushed front rudder frame. While the brothers recorded the distance, a sudden gust of wind toppled the craft, causing even more severe damage. This was the last of the flights with the 1903 *Flyer,* but the Wrights accomplished the main task of manned flight.

### THE AFTERMATH

This epochal day and the success of the Wright brothers created an immediate world impact. Notice appeared in several journals and newspapers; and though universal recognition was not immediate, within a few days the public accepted the fact, if not the magnitude, of the Wright brothers' achievements (Combs 1979:228-31; Howard 1988:141-45; Harrison 1953; Bonney 1962:60). By December 19, the brothers broke camp and packed up the damaged *Flyer* for shipment to Dayton. They arrived home in time for Christmas. Wilbur and Orville Wright returned to the Kill Devil Hills camp in the spring of 1908 to test their modified *Flyer;* and

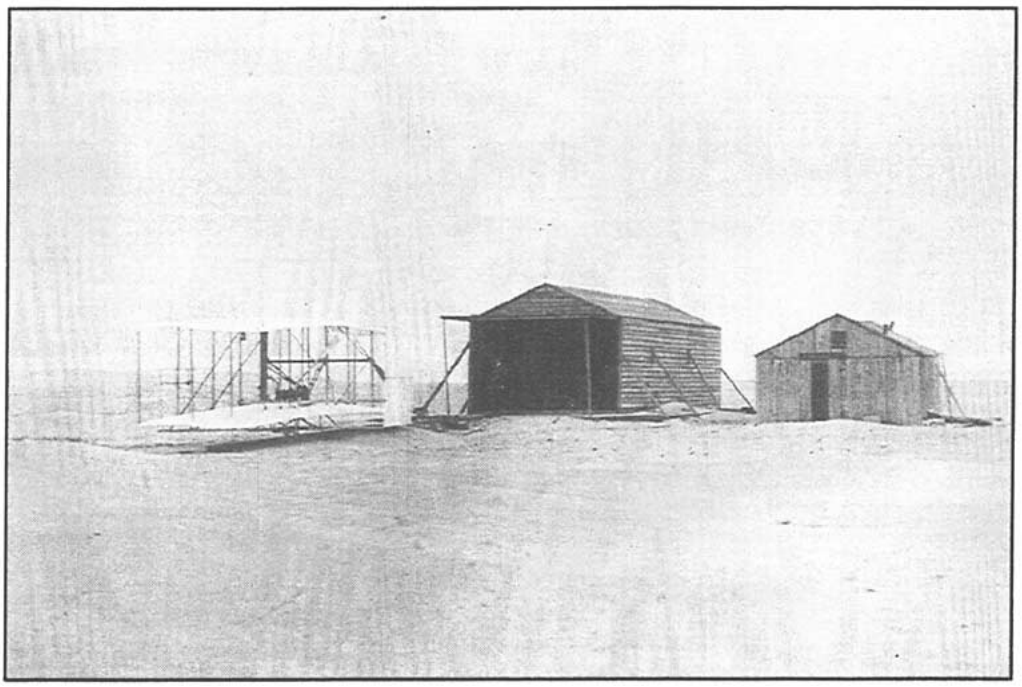


**Figure 3** 1903 Wright Brothers Hangar, Quarters, and *Flyer*

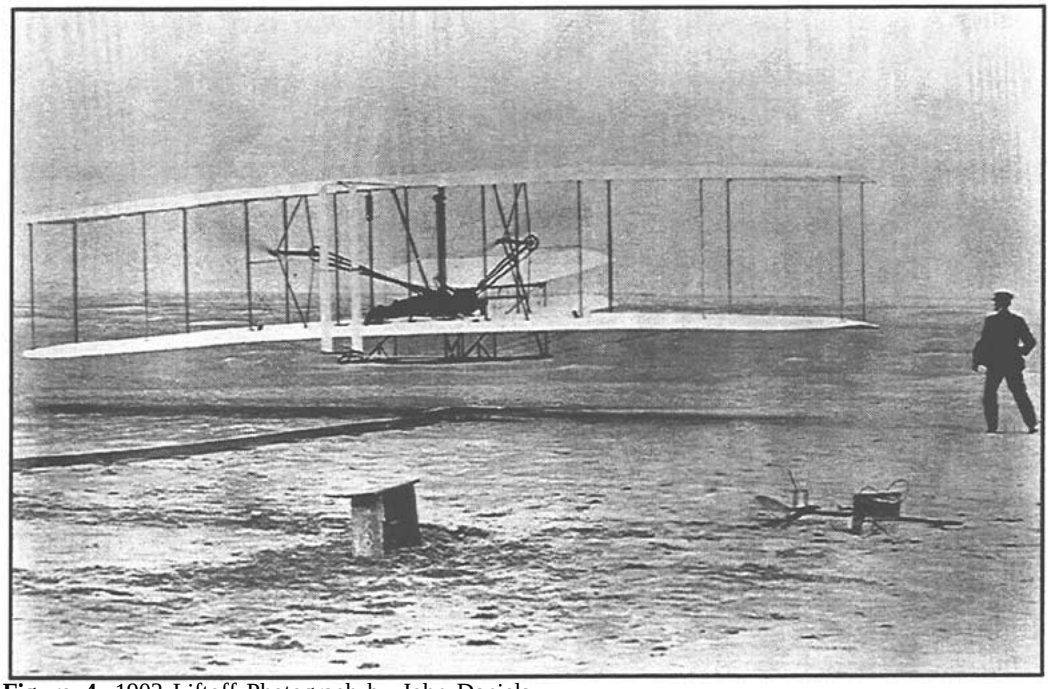


**Figure 4** 1903 Liftoff Photograph by John Daniels

Orville returned for a short period in 1911 for further glider experiments. After that date, however, the periodically repaired quarters and hangar buildings deteriorated, and the site, in a sense, returned to nature. Official commemoration of the first flight occurred twenty-five years after the success of 1903.

The Wrights achieved further success in the immediately succeeding years. The *Flyers* of 1904 and 1905 attained truly sustained flight in a series of tests conducted in a field outside of Dayton (Gibbs-Smith 1970: 101-102). In 1908, after further relatively secretive experiments, Orville and Wilbur signed a contract with the U.S. Army and with a French manufacturer for partial rights to their design. Although Wilbur died in 1912 as a result of typhoid fever, Orville enjoyed the fruits of their efforts and eventual recognition of the full value of their combined accomplishments.

## ASSOCIATED RESOURCES

### The Setting

The Wright Brothers National Memorial encompasses the site of the first powered air flight, undertaken by Orville Wright on December 17, 1903, and subsequent test flights of the same day piloted by both Orville and Wilbur Wright. The Wright brothers' earlier experiments with gliders also occurred here, particularly after 1901 when they moved their camp and operation from the south side of Kitty Hawk village to the area known as the Kill Devil Hills. The brothers continued their work at the site in 1908 and 1911.

At the time of the Wrights' experimental work, the Kill Devil Hills area consisted of sandy rolling dunes, rising to three more prominent sandy hillocks, known collectively as the Kill Devil Hills. The largest of these was called both Kill Devil Hill and—by the Wright brothers—Big Hill (Howard 1988:59). When the brothers began their operations at the site in 1901 it had an elevation of about 100 feet. Two smaller hills, known as Little Hill and West Hill, also occupied the site. The larger of these was about 60 feet high, the smaller and closer hill reached a height of about 30 feet (Howard 1988:59).

The site of the Kill Devil Hills changed substantially after the Wright brothers' experimental glides and flights. Subject to driving winds and the harsh weather typical of the Outer Banks, the three hills changed considerably in elevation, configuration, and location, with the largest drifting as much as 200 to 300 yards toward the southwest (Howard 1988:428-429; *New York Times* 12/18/28).

The War Department stabilized Kill Devil Hill beginning in 1927 following recommendations of an advisory committee to the Quartermaster General, the federal agency given the job of constructing a larger monument (Hewes 1967:24). An amount of $25,000 appropriated for stabilization enabled the planting of a variety of grasses over the sandy surface, supplemented by erosion-retarding barriers and a covering of woods mold or loam and fertilizer. The stabilized Kill Devil Hill served in turn as the base of the 1931-1932 Monument shaft, designed by the New York architectural firm of Rodgers and Poor.

The Wrights used the Kill Devil Hills site toward the end of their first season on the Outer Banks in the autumn of 1900, following earlier experiments on Lookout Hill just south of the Banker village of Kitty Hawk (Stick 1958:200). The first season consisted of only two days of work at the Kill Devil Hills site: October 19, when they decided not to fly because of high winds, and October 20, when they made several encouraging glider flights. They returned to the Kill Devil Hills site in 1901, this time pitching a tent about 1,000 feet east of the higher hill and building a rough shed to use as a workshop. They returned to the workshop for the 1902 season, and, together with Kitty Hawk resident Dan Tate, rebuilt the dilapidated shed, adding an additional 10 feet to use as a quarters. In 1903, when they began their powered experiments, the Wrights made further improvements to the quarters and also built a second frame shed, measuring about 44 by 16 feet, to hold the *Flyer* and serve as a sheltered work area. Located a few feet west of the camp building, it is clearly indicated in the Wrights' photographs of that year.

The quarters building and the hangar rapidly deteriorated after the departure of the Wright brothers in December 1903. In the spring of 1908 when the Wrights returned to the site to test their modified *Flyer,* both buildings needed significant repairs. John Daniels, one of the Kitty Hawk lifesavers who witnessed their earlier flight efforts, warned Wilbur when he arrived at Elizabeth City about the ruined camp buildings, and Wilbur purchased new materials for repairs. The sides of both buildings remained, but the roof of the old quarters was missing entirely and the interior was covered with sand. Wilbur hired two "semi-carpenters" to help make repairs and essentially to rebuild the structures (Howard 1988:239-241). Largely similar to those in place in 1903, the new buildings still differed in minor ways and constituted new structures overall. Orville reused the buildings in 1911, though again with changes. Following the 1911 season, the brothers abandoned the site, and the effects of wind, sand, and weather completely destroyed the buildings. In 1928, when the NAA placed the first commemorative marker at the site of the first flight, little remained of the structures on which to base the location of takeoff.

In 1953, NPS reconstructed the two Wright brothers' structures in recognition of the fiftieth anniversary of the first flight. The park based the approximate location on the point of take-off (William Harris, personal communication, 4/3/90). The Kill Devil Hills Memorial Society, a local promotional organization, supported the reconstruction. NPS, as well as the U.S. Air Force and private donors, provided funding and design guidance, reconstructing the buildings using photographs taken by the Wrights in 1903.

Neither of the reconstructed buildings survived storm and termite damage and the park removed both structures in 1963. Using treated materials, the park completed sturdier versions of the Hangar Building in early 1963 and the Quarters Building in 1965. However, the Hangar was replaced again in 1976 to 1977, due to continuing deterioration. The Quarters received substantial repairs the same year. Both the Hangar and the Quarters subsequently required occasional replacement materials and repairs.

Due to the evolution of the setting or site and the fact that the existing structures are relatively recent reconstructions of original features, there is little real physical match between

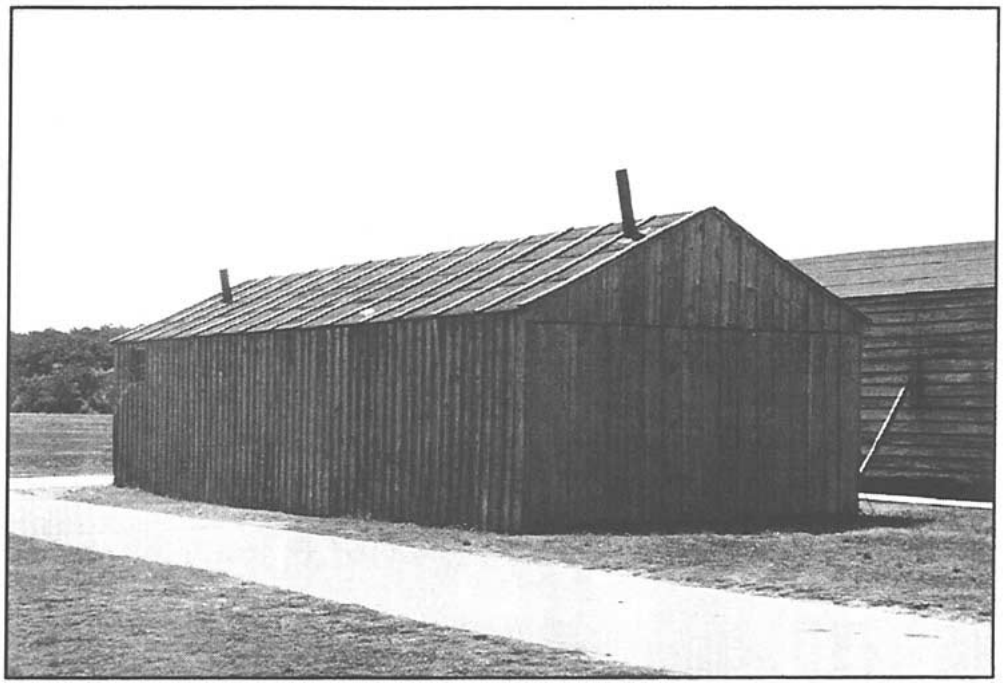


**Figure 5** Reconstructed Wright Brothers Quarters, 1990

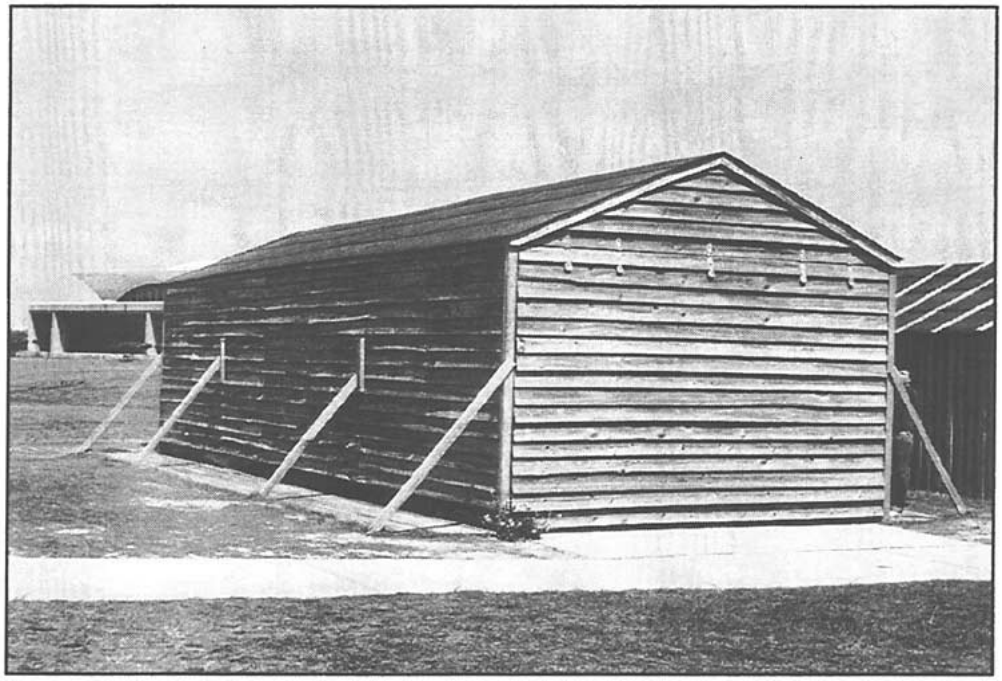


**Figure 6** Reconstructed Wright Brothers Hangar, 1990

the event that occurred on the site and existing structures. The primary structural evidence of the event is tied to the later significance of the site as a subject of commemoration.

The Wright Brothers National Memorial and the coterminous National Register district are significant under National Register Criteria A and B as the site of the Wrights' successful flight experiments. Kill Devil Hill and West Hill are contributing natural features that were the sites of glider trials. The reconstructed Wright brothers' quarters (built 1953, rebuilt 1964-1965, 1976-1977, and 1993) and reconstructed Wright brothers' hangar (built 1953, rebuilt 1964-1965, 1976-1977, 1983, and 1993) are the only manmade structures evaluated under the first flight context. Both resources are included in the original National Register documentation of the Wright Brothers National Memorial district as elements of the district property. This report recommends the reclassification of the buildings as noncontributing features because they do not meet the requirements of Criteria Consideration E. They are not accurate reconstructions, and the location of the structures was based on limited evidence.

**Physical Characteristics**

The two buildings are simple frame structures typical of utilitarian architecture of the early twentieth century. Both structures have gable roofs, covered with rolled roofing. The construction material is pine plank with larger, mainly two-by-four-inch supporting pieces. The Quarters is sheathed in board-and-batten siding. The Hangar has conventional lapped weatherboards. Floors, where present, are also pine plank. The Hangar features wood buttresses, connecting with plank bases, which originally provided added support against harsh winds. Overall dimensions are approximately 16 by 42.5 feet for the quarters and 16 by 48 feet for the hangar. Height to wall plates is about 7.5 feet.

**Associative Characteristics**

The two reconstructed buildings are meant to evoke the period of the Wright brothers' residency on the Outer Banks in the summer and autumn of 1902 and the autumn of 1903. Specifically, the exhibit intends to convey a sense of the appearance of the camp in 1903, when the first powered flight occurred. The repaired, and in part replaced, buildings of 1908 are not represented by these two buildings. In 1900 there was no camp on the site and in 1901 a tent served as the Wrights' quarters with a wood building for a hangar. In the south section of the quarters building the park created an exhibit with beds, furniture, appliances, shelves, and food closely resembling the original configuration of Orville and Wilbur Wrights' sleeping and living areas. These interior arrangements have the greatest interpretive value and could be recreated in the visitor center.

Although the park hoped to convey a sense of the Wrights' living conditions at Kill Devil Hills when they reconstructed the hangar and quarters buildings, reconstructions provide no original historical evidence. These buildings should be managed as interpretive exhibits only and listed as noncontributing elements of the Wright Brothers National Memorial National Register district.

**Significance**

The two structures are recent, inaccurate reconstructions of historic features. The intended association is with the history of early flight and Orville and Wilbur Wright's unique accomplishments in the sand dunes of the Kill Devil Hills area between 1900 and 1903 The two structures do not relate to the second context developed for this study, "The Commemoration of the Wright Brothers, 1926-1941," because they fall outside the period of significance.

Criteria Consideration E stipulates that a reconstructed property is considered eligible "when it is accurately executed in a suitable environment and presented as part of a restoration master plan and when no other building or structure with the same associations has survived' (National Park Service [1991]a:37). The quarters and hangar do not meet these requirements.

The actual site of the Wright brothers' efforts changed considerably following the 1903 flight. The configuration of landscape features, the introduction of trails, new roads, and vegetation altered the site as part of a mostly 1930s effort by NPS to create a new setting for recognition of the Wright brothers' accomplishments. NPS further altered the site after 1947 as part of a new Master Plan for the park. The park reconstructed the hangar and quarters buildings during the post-1947 development of the park. The changes occurred during an effort to increase interpretation at the park and, as such, function principally as an exhibit on the site. Because of the loss of an appropriate physical context and the fact that the site is not being interpreted as a restored landscape, neither structure is eligible for listing in the National Register of Historic Places.

**Requirements for Listing**

Neither the Reconstructed Hangar nor the Reconstructed Quarters are eligible for listing in the National Register. They are not part of an overall restoration plan for the site and the site has suffered substantial loss of integrity. There is also a limit to the degree of accuracy of the reconstructions, given the available documentation for the structures.

**Criteria Considerations**

Criteria Consideration E has been considered, but the two properties do not meet all of the requirements set out: 1) a suitable environment; 2) part of the restoration master plan; 3) no other building or structure(s) with the same associations surviving. The Hangar and Quarters are best considered as exhibits within the context of the Wright Brothers National Memorial.

**Integrity**

Both structures are reconstructions completed in 1993. They have no integrity of location, design, setting, materials, workmanship, feeling, or association.

**Contributing Resources**

The site itself, defined by the National Register district boundary, is the significant resource under this context. It is nationally significant under National Register criteria A and B for its

association with the Wright Brothers and their work with glides and powered flight. Specific contributing features of the site are:

1. Kill Devil Hill or Big Hill (stabilized 1928) and
2. West Hill.

**Surveyed Non-contributing Resources**

1. Reconstructed Wright Brothers Quarters (reconstructed 1953, 1964-1965, 1976-1977, 1993).
2. Reconstructed Wright Brothers Hangar (reconstructed 1953, 1964-1965, 1976-1977, 1983, 1993).

# CHAPTER TWO: THE COMMEMORATION OF THE WRIGHT BROTHERS, 1926-1941

## BACKGROUND ON CONTEXT

This context embodies a site-specific theme tied to the recognition of the Wright brothers as pioneers in the development of powered flight and to their unique achievements in the Kill Devil Hills area of the Outer Banks of North Carolina. Links to contexts set out in North Carolina's Comprehensive Planning document are largely indirect. There are some ties to the area of "Public Works; Federal Programs," specifically "Conservation." There is an oblique connection with "Transportation; Air Transportation" and "Engineering; Aeronautical Engineering." The main monument at the site, the Wright Brothers Monument dating to 1931-1933, has further significance for its architecture as an outstanding example of Art Deco style (Division of Archives and History n.d.). The context falls under the National Park Service Thematic Framework theme of "Expressing Cultural Values."

It is important to realize that the Wright Brothers National Memorial is an essentially commemorative site, marking the location and recognizing the achievements of the Wright brothers' work. Contributing historic resources at the site are related to the recognition and interpretation of the Wright brothers' achievements and the preservation of the site at which the experiments of the 1900-1903 period occurred.

The period of significance for the commemoration context begins with the efforts to erect a monument at the site in the late 1920s. It ends in 1941 when the end of public works funding used to develop the park and the start of World War II effectively stopped commemorative development of the site. Following the war, in 1947, NPS developed a new Master Plan for the park that added a layer of interpretation to the site. In addition to commemorating the Wrights' achievements, the new Master Plan called for broadening the unit's focus to include interpreting the brothers' work. Orville Wright's death in 1948 ended an intermittent period of family involvement in the site. The new 1947 Master Plan resulted in a significant shift in the way in which the site was interpreted. The park acquired additional land, dropped many unfulfilled aspects of the earlier plan, and introduced a new circulation system, including a new entrance, trails, and roads for visitors, significantly changing the relationships among features within the site. Beginning with work in the early 1950s, the NPS placed further emphasis on the interpretation of the site through exhibits in reconstructed buildings and a museum, rather than

the commemoration offered by earlier monuments, a direction reinforced by yet another Master Plan in 1965 (Amundson 1987). As a result, during the most recent phase of development, the park continued to emphasize interpretation of the original event over memorialization of the Wrights' achievements.

The area surveyed for this study includes an approximately 431-acre site located north of the resort community of Nags Head, North Carolina, and just four miles south of the community of Kitty Hawk. The history of the site is closely tied to these two communities. The Kill Devil Hill, referred to in the original title of the memorial, is the highest of three one-time sand hills or dunes located just east of Colington Creek and west of the Atlantic Ocean front. The originally sandy site of the Wright brothers' experiments is now sodded and partially covered at the periphery by a variety of shrubs and larger trees, all of which are products of efforts to stabilize the area and to prevent continued erosion, beginning in the late 1920s. The Wright Brothers National Memorial, previously the Kill Devil Hill Monument National Memorial, is located on the west side of state route 158, in the middle of commercial and residential development.

Because of the overall significance of the site, the geographical area discussed in this context extends well beyond the limits of the site itself Reference obviously is made to the growing acceptance in the 1920s, especially, of the significance of the Wright brothers' achievements as well as to parallel interpretive and commemorative efforts of the same period. There is also reference to other federal projects of the era and to expressions of Art Deco style elsewhere in the United States during the same period (as well as to the art movement's partially European origins).

In addition to its significance as the site of the Wright brothers' successful aeronautical experiments, the park is significant for the subsequent commemoration of these events. These commemorative efforts, dating from the late 1920s when local and national groups made the first tangible moves to protect and mark the site, have a significance in many ways distinct from the original event. In 1926 the first bill was introduced in Congress to establish a memorial on the site. A group of New jersey land owners in the area donated a portion of the site to the federal government in 1927. In 1928, the National Aeronautics Association placed the first commemorative marker at the estimated point of liftoff. Between 1930 and 1933 the War Department further developed the site for visitation and supervised the erection of an impressive granite monument at the top of the sodded and stabilized main hill. The NPS assumed responsibility for the monument in 1933. NPS reassessed the purpose and orientation of the site's program, introducing a new Master Plan in 1947, later augmented by a revised Master Plan in 1965 (Amundson 1987). The new Master Plans instituted significant changes at the park, reflecting a change of emphasis from commemoration to interpretation.

Earliest development of the Kill Devil Hills site, beginning in the late 1920s and extending through the 1930s to 1941, provides insights into the growing recognition of the enormous significance of the Wright brothers' achievements. The site of the first flight achieved national and international significance. Efforts to preserve, commemorate, and interpret the Wrights'

experiments represented national acceptance of the brothers' unique contributions to aeronautics and invention.

### EARLY RECOGNITION OF THE WRIGHTS' EFFORTS

While the Wrights' success in achieving powered flight on December 17, 1903, received immediate notice, recognition of the full importance of their work arrived more slowly. Following the success of their first flight and three subsequent flights on the same day, the Wright brothers returned to Dayton, Ohio, to spend the Christmas holidays with their family. The brothers telegraphed news of their successful first efforts to their family from the Outer Banks on the first day (Combs 1979:228-31; Howard 1988: 141-45). Their sister Katherine and older brother Lorin acted as defacto press agents, contacting the Dayton *Journal,* whose reporter served as a representative for the Associated Press. Reports contained factual inaccuracies with misattributions of distances, times, and even misspellings of the Wrights' names. Although the Wrights attempted to correct the mistakes, the general public misunderstood the full significance of their efforts for several years (Combs 1979:225-28; Howard 1988: 140-43; Bonney 1962:60).

The Wrights' efforts received a more positive reception from the scientific community. Octave Chanute, another early aerial experimenter and in some ways the Wrights' scientific mentor, understood the full impact of the two Dayton bicycle shop owners' accomplishments. In the spring of 1903, he reported on their flight experiments to the Aero Club of Paris (Bonney 1962:60) and to other interested scientists and enthusiasts. Chanute invited Wilbur Wright to give a preliminary lecture before the June 1903 Chicago meeting of the Western Society of Engineers (Howard 1988:339; Bonney 1962:61). The earliest scientific recognition of the precedent set by their first powered flight occurred in January 1906, when the French journal *L'Aerophile* printed an accurate account of their tests and a description of their 1903 *Flyer.*

Unfortunately, the Wright brothers' need for secrecy over the details of the *Flyer* prevented a more aggressive publicity campaign. In 1902, in order to protect their invention, they applied for a patent on their combined wing-warping and rudder mechanism. The patent was not granted until 1906, the year of the *L'Aerophile* article. In the intervening years they felt forced to keep their original machine and subsequent models out of sight (Wright 1953; Anderson 1985:30; Worrel 1979). They shielded their increasingly successful experiments, conducted near Dayton using a succession of machines and engines, from public scrutiny. During the intervening years they first developed a truly practical aircraft, in the form of the *Wright Flyer III,* a plane that completed a 38-minute flight in 1905 (Anderson 1985:30; Bilstein 1984:63). When they began demonstration flights for the French and U.S. armies in 1908, they brought their work back into public view.

The two brothers immediately realized the military potential of their invention (Bonney 1962: 172). They contacted the U.S. War Department as early as 1905 (Joseph 1962: 119) and made further efforts to interest the U.S. Army the next year (Bonney 1962:63). In frustration they began discussions with representatives of a French syndicate late in 1905 and finally entered into a contract to supply a prototype—the option for which the French group eventually dropped

(Howard 1988: 197-99). Similar dealings with the British War Office also fell through. In 1907, more serious discussions began with the U.S. War Department, and the Wrights embarked upon an effort to meet the prototype specifications of the Signal Corps. Shortly afterward, further negotiations began with the French War Ministry (Howard 1988:225). Testing their final model at Kitty Hawk, North Carolina, in the spring of 1908, the Wrights divided forces for the remainder of the year, with Wilbur traveling to France for trials held at LeMans in August 1908 and Orville undertaking the trials for the U.S. Signal Corps at Fort Myer, Virginia (Kelly 1943; Combs 1979; Howard 1988).

The LeMans and Fort Myer tests received wide acknowledgement as resounding successes. Wilbur continued the trials in France throughout the fall of 1908, taking dignitaries as passengers on demonstration flights and setting new endurance and distance records at Camp d'Auvours and Les Hungedieres (Gibbs-Smith 1970: 133-34; 1963b; 1974a). In December of that year he won the prestigious Coupe Michelin, a 20,000-franc prize for the longest flight to-date in France (Howard 1988:271). Orville gave equally dramatic performances at Fort Myer in early September 1908, with the new *Flyer* setting new records for both single-piloted and passengered flight. Delayed temporarily by an accident of September 17, 1908, injuring Orville and killing his passenger, the Wright *Flyer's* successful demonstrations continued into the following year, when the plane exceeded the Signal Corps specifications and finally made air machines a part of military operations for the U.S. government, with other nations following shortly behind (Bonney 1962:68).

### THE WRIGHT BROTHERS' CONTENDERS

By 1909 the Wrights clearly led the world in the piloting and production of airplanes. However, their standing was not universally accepted at the time; indeed, for many years they faced a number of contenders for priority in aeronautics. In the United States, the main competition came from Glenn Curtiss, whose own experiments, including efforts to vindicate the work of the Smithsonian's Secretary Langley, for many years helped obscure the Wrights' own significance (Crouch 1978:37; Gibbs-Smith 1963b; Blines 1968). Curtiss, who began as a mechanic and a motorcycle racer, attracted the attention of Thomas Baldwin and Alexander Graham Bell, both of whom threw support behind him. In association with a group of avid aeronautical enthusiasts known as the Aerial Experiment Association (AEA), Curtiss initiated a series of prototype trials, including the 1908 flight of Baldwin's *White Wing* craft. In the summer of 1908, or before the Wrights' success at Fort Myer and LeMans, Curtiss's own *June Bug* covered a distance of over 2,000 yards in one minute forty-three seconds to win a prize set by *Scientific American* magazine (Hatch 1942; Roseberry 1972; Casey 1981).

In subsequent years, as the Wrights turned to military training and patent litigation over their early inventions, Curtiss became the leading figure in American aviation. His improved machine, the *Gold Bug,* made impressive public flights in New York, winning a second *Scientific American* prize with a flight of 24.7 miles in 1909, around the time the Wrights finally met the Signal Corps specifications in Virginia. Although the Wrights eventually won the rights to their

wing-warping mechanism in court, Curtiss's independent development of the opposite acting ailerons, or flaps, eventually superseded the Wrights' method and pointed to the future of aeronautical control. Finally, Curtiss's development of successful hydro-airplanes or "flying boats" assured his success with the Navy, as that arm of the service moved into air flight after 1910.

Curtiss was not alone as an aeronautical experimenter during this period. In 1911, Calbraith P. Rodgers completed the first transcontinental flight from New York to Pasadena, California, in forty-nine days (Gibbs-Smith 1970: 159). The same year a plane flown by Eugene Ely made news by taking off and landing from the U.S. *Pennsylvania* (Josephy 1962: 134, 150). In Canada, J.A.D. McCurdy, a member of the AEA, made his contribution in 1909 when his plane, the *Silver Dart,* took off from the frozen surface of a lake near Alexander Graham Bell's Nova Scotia estate—the first heavier-than-air flight in Canada (Dwiggins 1969; Bilstein 1984).

The successes of Curtiss and others clouded the Wrights' accomplishments during this period. Curtiss added to the confusion by resurrecting Langley's *Aerodrome* and reconditioning it for new test flights. Langley, a leading figure in aeronautical research in the 1880s and 1890s, corresponded with the Wright brothers during his tenure as Secretary of the Smithsonian Institution. He played a part in the development of the Wrights' interests, if not in the specific design of their own machine (Howard 1988:335-36). Langley developed a series of experimental airplanes in the 1890s, and in 1896 flew a model plane in a circular path for some 3,200 feet over the Potomac River; a second flight reached a distance of 4,200 feet. With a grant of $50,000 from the War Department, Langley also designed a larger aircraft, fitted with an internal combustion engine, which, in model form, managed to make a 1,000-foot flight on August 8, 1903, several months before the Wrights' own successful flight. He attempted a manned flight of the full scale *Aerodrome* on October 7, but it resulted in failure; a second effort December 8 also failed (Oehser 1949: 157-60; Crouch 1978:37; Vaeth 1966; Crouch 1981).

Despite the unsuccessful flights of the *Aerodrome,* many contended that Langley made the main contribution to powered flight up to that point. Even when the Wrights received the Langley Medal in 1910 for their "achievements in aerodynamic investigation and its application to aviation" (Howard 1988:335), some suggested they had only tested Langley's own theories, not developed anything independently (Howard 1988:335). The resurrection of Langley's experimental craft by Curtiss added to the controversy. Curtiss's reconstructed *Aerodrome* of 1914 achieved two brief over-the-water flights and a later sustained flight over Lake Keuka in New York. After the plane was returned to the Smithsonian, the museum labelled Curtiss's reconstructed Langley *Aerodrome* in an exhibit as "the first airplane capable of sustained free flight with a man" a point of great annoyance to the Wright brothers (Oehser 1970: 100). Following Wilbur's death in 1912 of typhoid fever, Orville continued to bear a grudge. It was not until 1948 that the original Wright *Flyer* finally occupied its rightful place in the Smithsonian's collections (Combs 1979:346).

Europeans as well as Americans contested the Wrights' precedence in powered flight (Gibbs-Smith 1974a). While Wilbur's successful demonstrations of 1908 and recognition of the

brothers' accomplishments through the award of the prestigious Legion of Honor medal in 1909 partially cemented their worldwide reputation, there remained serious contenders to the Wrights' claims of priority throughout Europe during the early years of powered flight. In France, Alberto Santos-Dumont coaxed his awkward canard (tail first) biplane into the air for some six flights, one covering 720 feet, as early as 1906 (Wykeham 1962; Da Costa 1973; Gibbs-Smith 1974a). Gabriel and Charles Voisin, flying for their sponsor Henri Farman, remained airborne for more than a minute in 1907; and the development late the same year of Leon Lavavasseur's eight-cylinder, fifty-horsepower Antoinette engine made long duration flight a real possibility for the first time (Gibbs-Smith 1970: 135-40). With Louis Bleriot's and Leon Delagrange's achievements of 1908 and early 1909, European inventors and pilots came closer to matching the heroic efforts of Wilbur and Orville Wright. On July 25, 1909, Louis Bleriot flew across the English Channel for the first time (Gibbs-Smith 1963b, 1970, 1974a). This was merely the first of many milestones and records set by Europeans, and eventually other American pilots, as the Wright brothers settled down to the more mundane tasks of revising and improving designs mainly for military use.

### ADVANCES OF THE 1910S AND 1920S

The importance of air flight—and of the Wright brothers' contributions to its development—became dramatically obvious during World War I. As a result of the clear significance of air power, both for covering ground troops and for reconnaissance, the days of independent researchers and friendly prize contests ended. Governments willingly invested huge amounts for aircraft development and production. In 1914, France mobilized some 150 military planes, along with lighter-than-air ships; Germany about 260 aircraft, and 14 zeppelins; Britain fewer than 100 craft (Bruce 1957; Haddow 1962). By the end of the war each of these countries maintained literally thousands of planes. As of 1918, more than 180,000 people in France alone held positions in some aspect of the aircraft manufacturing industry (Gibbs-Smith 1970).

The impetus of World War I resulted in an outpouring of improved aircraft designs. France entered the war with a number of biplanes and monoplanes, most of them developed for racing during the heyday of air competitions during the 1910-1912 period. Early "bird cage" Voisin and Caudron bombers and observation planes gave way to efficient long-range Brequet and Letord day bombers. Single-seat fighters, such as Nieuport and Spad, became the favorites of French, British, and American pilots, proving themselves over the German Fokkers, Pfalz, and Albotros squadrons (Thetford 1954, 1957). By the war's end, the British Royal Flying Corps, originally made up of 150 aircraft and 1,800 men and officers, expanded to 300,000 officers and men and 22,000 aircraft. The U.S. air division, which started with Wright-supplied Signal Corps aircraft in 1917, grew to a force'of 13,000 planes, with orders pending for 52,000 more (Shrader 1953).

The war and its aftermath proved the value of aircraft. During a short-term hiatus as military needs diminished, public interest continued to grow. In 1918, the U.S. Post Office experimented with air-delivered mail. In 1920, the agency inaugurated transcontinental mail service (Josephy 1962; Bilstein 1984). Research during the same period also received official blessing. In 1915

the Smithsonian Institution recommended to Congress the establishment of a National Advisory Committee on Aeronautics (NACA), suggesting further that the committee be authorized to build its own laboratories and test areas. During the next decade, aeronautical research conducted by the NACA at Langley Field in Virginia introduced a significant number of advances. Further support from the Guggenheim Fund and other organizations put the U.S. at the forefront of aeronautical research by the end of the 1920s (Shrader 1953).

The 1920s brought the Wrights some level of recognition for their overall contribution to the development of heavier-than-air flight. By that period, bad feelings resulting from the Wrights' seemingly self-serving patent litigation had subsided, and Americans placed the Wrights' and the country's contributions in perspective. Air flight developed more systematically by the mid-1920s as centralized research operations introduced innovations and encouraged development through interest-grabbing demonstrations and flight records. In 1925, President Coolidge appointed a board to create a national air flight policy (Shrader 1953).

In 1926, the Air Commerce Act, anticipating the development of commercial travel, the Navy's Five-Year Aircraft Program, and the Army's parallel program, contributed further to American aviation development. Other countries made comparable moves, establishing a series of civil and military regulations and controls. In short, governments regularized air flight and development, making the achievements of aerial pioneers ripe for rediscovery and recognition (Shrader 1953; Josephy 1962; Bilstein 1984).

The mid-to-late 1920s also introduced a period of renewed public interest in the capabilities of aircraft and the general potential for air flight. In 1926, Colonel Billy Mitchell, who in 1921 demonstrated the military effectiveness of aircraft through demonstrations off the Outer Banks of North Carolina, gained notoriety when he received a court-martial for insubordination over his insistence that aircraft outmoded many conventional naval operations (Howard and Gunston 1972: 178-79; Bilstein 1983:43). Record-breaking flights, such as Lieutenant A.J. Williams's 266.6 MPH world speed record in 1923 and Lieutenant. J.A. Macready's altitude record of 35,239 feet in 1924, captured the public's imagination, as new craft were developed and old records broken. Long distance flights especially became subjects of interest. In 1925, Italian Commander de Pinedo and his mechanic traveled from Italy to Australia in their single-engine Savoia flying boat, returning via Japan for a record distance of over 30,000 miles. In November of the same year, the British pilot Alan Cobham flew from London to Cape Town via Cairo in a then-astounding time of ninety-four hours. And in May 1926, Commander Richard E. Byrd and his co-pilot Floyd Bennett flew from Spitsbergen over the North Pole and back in their three-engined monoplane the *Josephine Ford* (Josephy 1962; Bilstein 1984).

However, the biggest aviation event of the 1920s, and one that synchronized with the initial development of the Wright brothers' memorial near Kitty Hawk, was Charles A. Lindbergh's nonstop flight from New York to Paris in May 1927, winning Lindbergh the coveted $25,000 Orteig prize and catapulting the young, former airmail pilot into international prominence (Ross 1968). Lindbergh's flight encouraged further long-distance efforts (Ward 1958). In June 1927, Clarence Chamberlain and Charles Levine flew in their Bellanca monoplane from New York to

Eisleben, Germany. The same month, Lieutenants Maitland and Hegenberger (of the U.S. Army flew 2,400 miles from Oakland, California, to Honolulu. In October, the pilots Costs and Le Brix flew the Brequet biplane from Senegal on the west coast of Africa to Rio de Janeiro, establishing yet another first (Bonney 1962; Josephy 1962; Dwiggin 1969; Bilstein 1984).

### RECOGNITION OF THE WRIGHT BROTHERS' ACHIEVEMENTS

The increased flight activity of the late 1920s and the burgeoning public and governmental interest in all things connected with air flight led to a new attention to the history of flight experimentation and to recognition of the Wrights' special place in that history. Efforts to recognize the Wright brothers' achievements had both a national and local dimension. The national aspect included the continuing controversy over priority and patents represented by the Wright brothers (and after 1912 by Orville Wright) and their champions on one side, and by Curtiss's and Langley's advocates on the other (Wright 1953; Worrel 1979; Reynolds 1950). At the local level, North Carolinians sought to recognize and protect the site of the Wrights' experiments and to underscore the significance of North Carolina and the Outer Banks to the Wright brothers' seminal accomplishments. Both the national interest, tinged by increasing patriotism as the U.S. reassessed its own contribution to the development of air flight, and the local interest, in part fueled by both pride and regional boosterism, converged at the Kill Devil Hills site to create a monument to both the Wright brothers and to America's important place in aviation history (Bilstein 1983:143).

W.O. Saunders, the outspoken editor of the nearby Elizabeth City *Independent*, originated the movement to recognize the Wrights and to give special attention to the Kill Devil Hills site (Hewes 1967:16). A longstanding champion of Outer Banks causes, Saunders progressively pushed for economic development, pressing for and supporting governmental programs, and otherwise promoted the potential of the Outer Banks. Local landowners and investors, as well as prominent long-time residents, heeded Saunders's call for development of the Banks, with a memorial to the Wright brothers seen as only a part of that development. Important players in these efforts included Frank Stick, a native of New Jersey but a strong advocate of the developmental potential of the Outer Banks (Stick 1970:53), and North Carolina administrators and politicians such as Frank Page of the North Carolina Highway Commission and Dare County native R. Bruce Etheridge, Director of the North Carolina Department of Conservation and Development (Stick 1958:248).

National figures joined local efforts to promote the idea of a Wright brothers memorial. U.S. Representative Lindsay Warren of North Carolina first introduced a bill for a Wright memorial to Congress on December 17, 1926, the twenty-third anniversary of the Wrights' historic flight *(Congressional Record* Dec. 17, 1926). Senator Hiram Bingham of Connecticut, a former World War I aviator, as well as the renowned discoverer of Machu Pichu, the "Lost City of the Incas" in Peru, introduced a similar bill in the U.S. Senate the same day; Bingham was closely tied to the Wrights' cause and played an effective role in establishing the memorial both through his political office and as president of the National Aeronautics Association (Hewes 1967:8;

Bingham 1963). Warren sought the support of Orville Wright, presenting Wright's positive response in a speech to the U.S. House of Representatives. He also separately enlisted the support of the National Aeronautics Association (Hewes 1967:5). As a last dramatic gesture in his presentation to the House, Warren pointed to Frank Stick, Allen Heuth, and Charles Baker's donation of the plot of land at Kill Devil Hills where the Wrights conducted their experiments as reason for creating a memorial *(Congressional Record* Feb. 8, 1927, p. 3282). The act finally passed both houses of Congress and was signed by President Coolidge on March 2, 1927, rewarding the efforts of Warren and Bingham.

The specifics of the Wright Brothers Memorial Act called for the Secretaries of War, Navy, and Commerce to appoint a memorial committee to establish an appropriate site for a commemorative monument and to appoint a second committee to oversee the construction of the monument and plan for its dedication. The standing Commission of Fine Arts and the Joint Committee on the Library received responsibility for approval of the final design and for other plans for the memorial *(Congressional Record* Feb. 8, 1927, p. 3281). Other individuals involved, both formally and informally, in decisions concerning the monument included future President Herbert Hoover, Charles Lindbergh, Cecil B. DeMille, Joseph Pulitzer, Fiorella La Guardia, Commander Richard E. Byrd, General John P. Pershing, and Harry Guggenheim, all of whom joined the Kill Devil Hills Memorial Association, a national and local support group for the project founded August 27, 1927 (Elizabeth City *Independent* 8/19/27).

The supporting organizations played a central role in the realization of a Wright brothers memorial, and their members worked assiduously to both prepare the way for and determine many of the details of the final monument. W.O. Saunders held a key role, organizing the Kill Devil Hills Memorial Association in August 1927 and then pressing for the road and bridge construction required for access to the memorial (Hewes 1967:15-16). Up to the time of the Wright memorial, little real development had occurred on the isolated and economically stagnant Outer Banks (Dunbar 1958; Stick 1958; Bishir 1987). Warren obviously recognized the problem and hoped to draw the Outer Banks into a more sustainable economy (Hewes 1967:3). The proposed Wright brothers memorial, as well as concurrent efforts to develop the commemorative and interpretive site of Fort Raleigh on Roanoke Island near Manteo, played a central role in Saunders's and other local boosters' plans for state expenditures on bridges and highways for the Outer Banks (Stick 1970:53). The Kill Devil Hill Monument National Memorial offered an incentive for tourists to visit the area, and therefore provided a justification for new roads and bridges, including the Wright Brothers Memorial Bridge, planned by a group of Elizabeth City investors, led by local businessman Carl Blades. Completed in 1930, this three-mile-long toll bridge assured the construction and paving of a new road past the memorial (Stick 1958).

## BEGINNINGS OF THE WRIGHT BROTHERS MEMORIAL

An important first step in the realization of the Wright brothers memorial occurred on December 17, 1928, when 200 delegates from the International Civil Aeronautics Conference, as well as friends and family of the Wrights and more than 3,000 other visitors, dedicated a granite marker

placed at the approximate site of the 1903 liftoff and laid the cornerstone of the monument to be placed on the largest of the Kill Devil Hills. The National Aeronautics Association (NAA) provided the six-foot-high marker, carved to resemble a boulder and carrying the following inscription on a bronze tablet:

> THE FIRST SUCCESSFUL FLIGHT OF AN AIRPLANE WAS MADE FROM THIS SPOT BY ORVILLE WRIGHT DECEMBER 17,1903 IN A MACHINE DESIGNED AND BUILT BY WILBUR AND ORVILLE WRIGHT.

Identifying the exact location of the flight was problematic because the dunes and hills had shifted considerably over the years following the Wrights' experiments. On November 4, 1928, under the direction of the NAA, Captain William Tate organized a meeting of three of the four surviving witnesses to the first flight to determine the point of takeoff. Using Orville Wright's accounts of the flight, Will Dough, Adam Etheridge, and Johnny Moore identified the approximate location of the first flight takeoff. Tate presented the method of determination at the marker's dedication ceremonies:

> Dough, Etheridge, Moore, and I assembled here and I explained to them the importance of arriving at a definite conclusion with respect to the spot where the Wright brothers' airplane, in making its first successful flight, first began to move along the ground. We

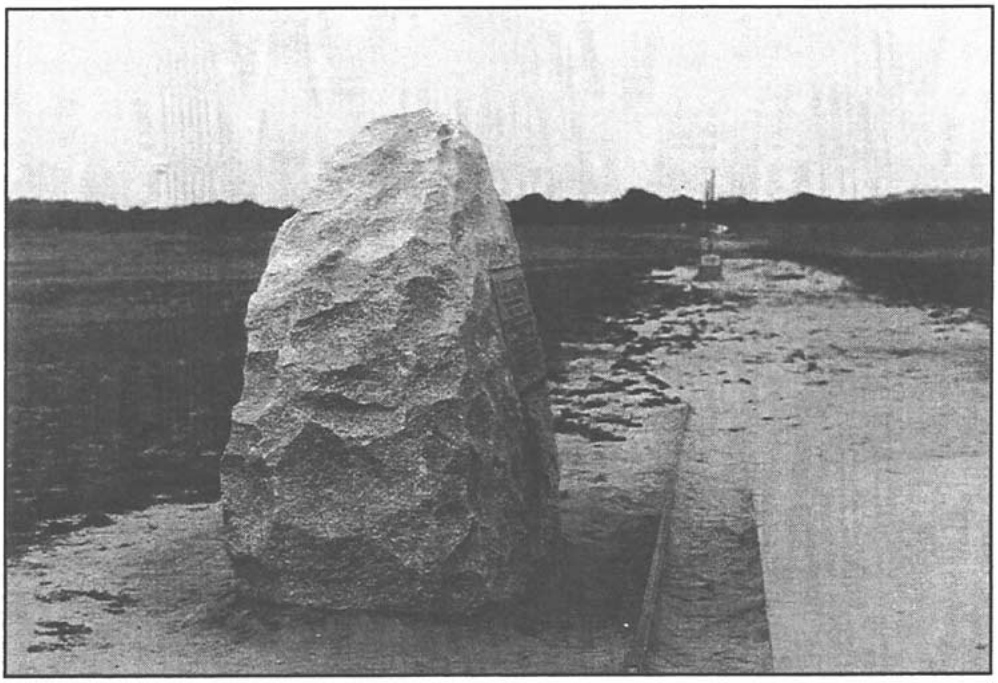


**Figure 7** First Flight Marker, 1991

> located the four corners of the building in which the machine was housed . . . . We took into consideration what Mr. Orville Wright said about it in his article How We Made Our First Flight. We had a compass with us and we were sure of our compass course. After considering all these things and talking it over these other three men proceeded by themselves to come out here on this point and select the spot on which this magnificent boulder stands and said that this was the spot where the Wright airplane started its first successful flight. . . .After agreeing upon this exact spot we signed a paper to that effect. . . . (U.S. House, 70th Congress, 2d Session, House Document 520, 1929:23)

The granite marker, obtained at a price of $2,500 and measuring approximately 6 by 4 feet, was placed at the top of a small mound on the spot the witnesses identified with the inscription facing the Kill Devil Hill. By general agreement it has remained the best available indicator of the Wrights' historic takeoff point.

A second memorial, a modest stone shaft, placed around the same time in William Tate's yard about four miles north of the Kill Devil Hills location, indicated the location of the first assembly of the Wrights' first glider (Howard 1988:429; *New York Times* 12/16/28).

While the NAA completed background research on the site and provided the first two memorials, other efforts were made for the main monument. Beginning in the summer of 1928, prior to the unveiling of the granite marker, a joint effort of the Coast Guard and local citizens partially stabilized the large hill at Kill Devil Hills through an encircling band of shrubs and stub grass in order to help prepare the hill for the planned larger monument *(New York Times* 12/18/28; Howard 1988:429-30). This became the first major alteration of the site; the War Department eventually stabilized, planted with shrubs and trees, and sodded the ground, thus altering the once barren scene of the flight forever.

The day before the granite marker's unveiling, the delegates from the International Civil Aeronautics Conference traveled to the site on a steamer. Due to heavy fog, the travelers, including Orville Wright and other family members, spent the night in Norfolk, Virginia, transferring to buses for the final seventy-five-mile trip to the Outer Banks. Reaching the end of the improved roads, the passengers transferred to a fleet of seventy automobiles, which in turn carried them over a system of temporary corduroy and mud roads to the ferry at Point Harbor. At Kitty Hawk they changed to a second fleet of cars, which took them over a new road to a barbecue and turkey lunch near the site. After lunch they made the final trip to the Kill Devil Hills for the unveiling and dedication of the marker. More than 3,000 other spectators, arriving by boat, private car, mule, and pony cart, joined the group at the site *(New York Times* 12/18/28).

W.O. Saunders, Senator Bingham, and Secretary of War Dwight Davis addressed the gathering. After the laying of the cornerstone, the Norfolk Naval Station band played "The Star-Spangled Banner." The crowd then moved down the hill to be near the marker designating the point of take-off in 1903. Orville stood by the well-known aviator Amelia Earhart, barely recognizable in her cloche hat (Howard 1988:430). The boulder was sheathed in a parachute of white silk, which Mary Byrd Saunders and Florence Ballard, both of Elizabeth City,

ceremoniously removed. Simultaneously, a sailor from the Norfolk Naval Station released a flight of fifteen carrier pigeons "which put on a formation of spirals and turns before turning northward toward their home" *(New York Times* 12/18/28). Following another rendition of the national anthem, the crowd dispersed, returning over the next few days in an operation compared by the press to Napoleon's retreat from Moscow, to their *various* homes *(New York Times* 12/18/29).

### SELECTION OF THE MONUMENT DESIGN

The placement of the rock-faced marker with inscription initiated the commemorative development of the Wright brothers memorial site. The cornerstone laid at the top of Kill Devil Hill on December 17, 1928, initiated the construction of the principal monument as set out in the 1927 Congressional Act, but the selection of the actual design for the monument remained. All the interested parties immediately disagreed over the monument design and function. The Memorial Commission, established by the act, dealt with all concerns. Congressman Warren expressed hopes "that the plans will call for something grand and artistic which will worthily mark the public recognition of what the achievement signified" *(Congressional Record* Feb. 10, 1927, p. 3281). Another suggestion called for the monument to be combined with a new structure for the lifesaving station at Kitty Hawk, then in disrepair. William P. MacCracken, Jr., the Assistant Secretary of Commerce for Aeronautics, as well as Secretary of Commerce Herbert Hoover, supported this proposal. As Hoover expressed it, he was reluctant to dump "a quarter of a million dollars of public money on a sand dune where only a few neighborhood natives would see it" (Elizabeth City *Independent* 11/18/32). Hoover also suggested a marine light to further the monument's utility (Hewes 1967:29).

The Commission of Fine Arts, retaining the right of final design approval, rejected the utilitarian proposals put forward by the Memorial Commission and Hoover, favoring a purely commemorative structure. Senator Bingham especially expressed his disagreement with the plan that attempted "to combine memory with utility" (Hewes 1967:28). He promoted a Greek temple design, constructed from granite quarried in his home state (Howard 1988:428). Nonetheless, utility ultimately won out. Charles Moore, Chairman of the Commission of Fine Arts, indicated to the Memorial Commission that the final design included "a memorial tower which should carry a powerful light to air flyers... [and] a landing place for planes" (Hewes 1967: 19). While the commemorative airstrip took many years to be realized, the final design included a beacon, though as one of the architects recorded, it was more a memorial with a beacon than a beacon glorified as a memorial (Hewes 1967:34).

Much of this controversy over the design took place in the early part of 1928, before the official unveiling ceremony for the smaller marker and dedication of the cornerstone. By June 1928, the Office of the Quartermaster General, charged with supervising actual construction, realized the impossibility of a quick decision and announced a design competition (Hewes 1967:21). The Memorial Commission appointed members of a jury to select the winning design in accordance with principles established by the American Institute of Architects (Hewes 1967: 27-28). While the jury awaited submitted designs, the Quartermaster General prepared a report

on the site, which suggested that the top of the largest hill at Kill Devil Hills would indeed be a suitable location for the monument. At first thought to be subject to further shifts and erosion, the hill consisted of moist and heavily compacted sand, which could be stabilized as a suitable base. Although selection of the final design was delayed until the early part of the following year, by October 1928 the site was finally agreed upon.

By January 31, 1929, the jury had received a total of thirty-six entries. The jury selected the submission of the New York architectural firm of Rodgers and Poor; and on February 18, 1929, the Commission of Fine Arts concurred, over the objections of Senator Bingham. The Joint Committee on the Library, of which Bingham was a member, held up the decision for nearly another year. On February 14, 1930, the firm of Rodgers and Poor finally received formal notification that their design won the $10,000 prize and that they were to proceed as architects for the construction of the monument (Hewes 1967:34).

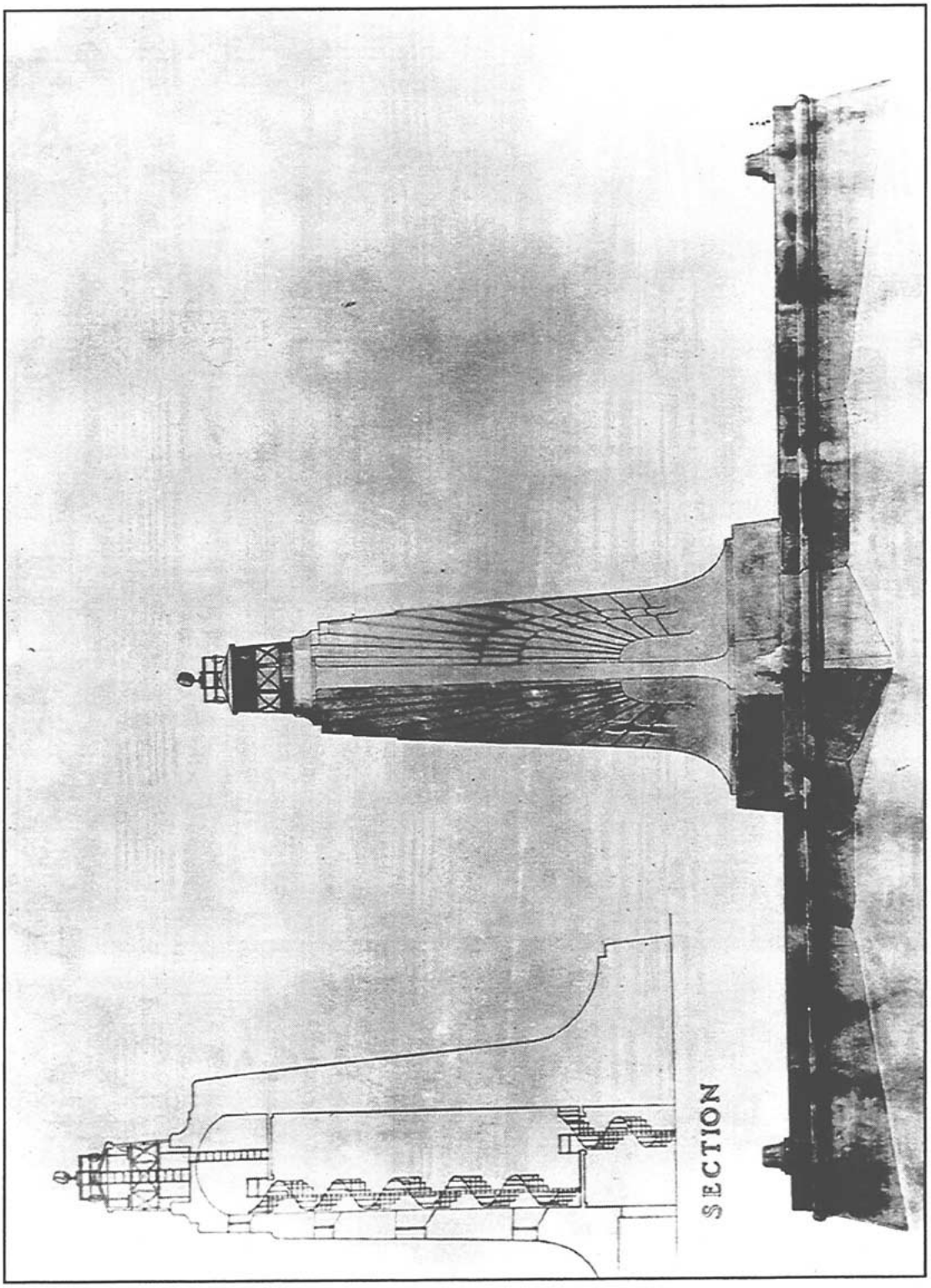
Respected Beaux-Arts-trained architects, Rodgers and Poor were well-suited to the task. Robert Perry Rodgers (1895-1934) graduated from Harvard University in 1917 and served in the Navy during World War I in an Atlantic transport unit. He studied at the famous Ecole des Beaux Arts in Paris, receiving a diploma in 1920. His early training began as a draftsman in Bertram Goodhue's office in New York (Rodgers, Robert Perry 1939).

Rodgers began his collaboration with Alfred Easton Poor (1899-1988) in the late 1920s, working on an office building for Little and Brown Publishers and a private studio on East 78th Street. Poor also attended Harvard, as well as the University of Pennsylvania, receiving degrees in architecture from both. His interests included historic American architecture, and in 1932 he published *Colonial Architecture of Cape Cod Martha's Vineyard, and Nantucket,* still considered a standard work on the topic (Poor, Alfred Easton, Obituary, *New York Times* 1/8/88).

Interestingly, the Rodgers and Poor design was anything but traditional and, in fact, revealed strong ties to the then-popular Art Deco movement—a movement traced to the 1925 *Exposition Internationale des Arts Decoratifs et Industriels* in Paris (Duncan 1988). Few designs of this style existed among federally sponsored buildings; most tended to be more fully in the classical and Beaux Arts tradition (Craig 1984:286). Rodgers and Poor's design gave expression to the "aesthetics of the machine" (Craig 1984:306). Essentially a masonry shaft, about 60 feet high, the monument was embellished with highly stylized sculpted wings on each side to symbolize the ideas of flight and motion. The design implied ancient Egyptian motifs, an important source for Art Deco designs, which also drew upon Native-American and Asian precedents (Duncan 1988:7-8).

The Wright Brothers Monument was a design unequaled by other federal projects of the era, most of which focused on utilitarian functions and character. Among the other more noteworthy projects of the same period were the Arlington Memorial Bridge, the Deadwood Dam, and the Hoover Dam (Craig 1984:32; Wilson, Pilgrim and Tashjian 1986:111). In part to placate Senator Bingham, the commission authorized the architect to give even further embellishment to the building, emphasizing the design features of the memorial more than the functional qualities of

**Figure 8** Rodgers and Poor Monument Design Entry, 1929


SECTION

the beacon. Simultaneously, the Quartermaster Corps agreed to construct the monument from North Carolina granite, rather than the concrete proposed by Rodgers and Poor, in deference to Congressman Warren *(American Architect* 37 [1930] 55). Most of the parties involved felt the resulting unique memorial, suffused with the appropriate symbolism and majesty, properly marked the site.

### BUILDING THE MONUMENT

Before construction of the monument began, the site required further stabilization and construction of access roads. The Quartermaster General sought an appropriation for the necessary funds to carry out the work with support given by the Secretary and Assistant Secretary of War. In addition to the original $25,000 in preparation and planning money authorized by the 1927 act, the budget now reached a tremendous $277,688, well over the $100,000 originally considered. The War Department allotted some $25,000 of this amount to stabilization work, with leadership assigned to Captain William H. Kindervater of the Quartermaster Corps, appointed inspector of construction on January 16, 1929 (Hewes 1967:26). Kindervater began work immediately. Most of the work involved the planting of grasses and shrubs, an effort presaged by Captain Gould, the caretaker of the nearby Bodie Island Gun Club, who first experimented with the use of dune grasses in the early-to-mid 1920s (Stick n.d. I:16; Copeland 1940:15). Kindervater found that the most serviceable grasses and shrubs were the locally available wire (bermuda) grass; Bitter Tanic, gathered at nearby Virginia Beach; and a range of local shrubs, including yaupon, myrtle, pine, live oak, and sumac, among others. As early as January 1929 he worked out a formula for fertilizer to encourage the growth of vegetation on the shifting sand hills. In April he wrote the Senior Agronomist at the Department of Agriculture for suggestions on "any seed that has a pretty flower ... [in order to] spell out the words Kill Devil Hill in flowers" (Hewes 1967: 30), an idea never acted upon. He also sought to protect the site from "the molestation of tourists and souvenir collectors, and the ravages of wild hogs," and to this end he constructed a wire fence around a portion of the site to prevent animal grazing on the newly planted grass. In August, apparently in recognition of his success, Kindervater received a promotion from inspector to superintendent of construction (Hewes 1967:31).

Kindervater chose a relatively straightforward method for stabilizing the hill and surrounding area. He harrowed the site, loosening sand and soil; spread a two-inch layer of pine straw, rotted leaves, and wood mold; sowed grass seed; and then covered the whole with brush to protect new growth. The area also received heavy fertilization (Hewes 1967:31). The dune withstood storms in 1929 and 1930, justifying the operation. The successful work at the Kill Devil Hills site helped lay the groundwork for the massive dune stabilization project along the proposed national seashore at Cape Hatteras during the mid- to late-1930s (Stick n.d.; Stick 1958; Stick 1970:59).

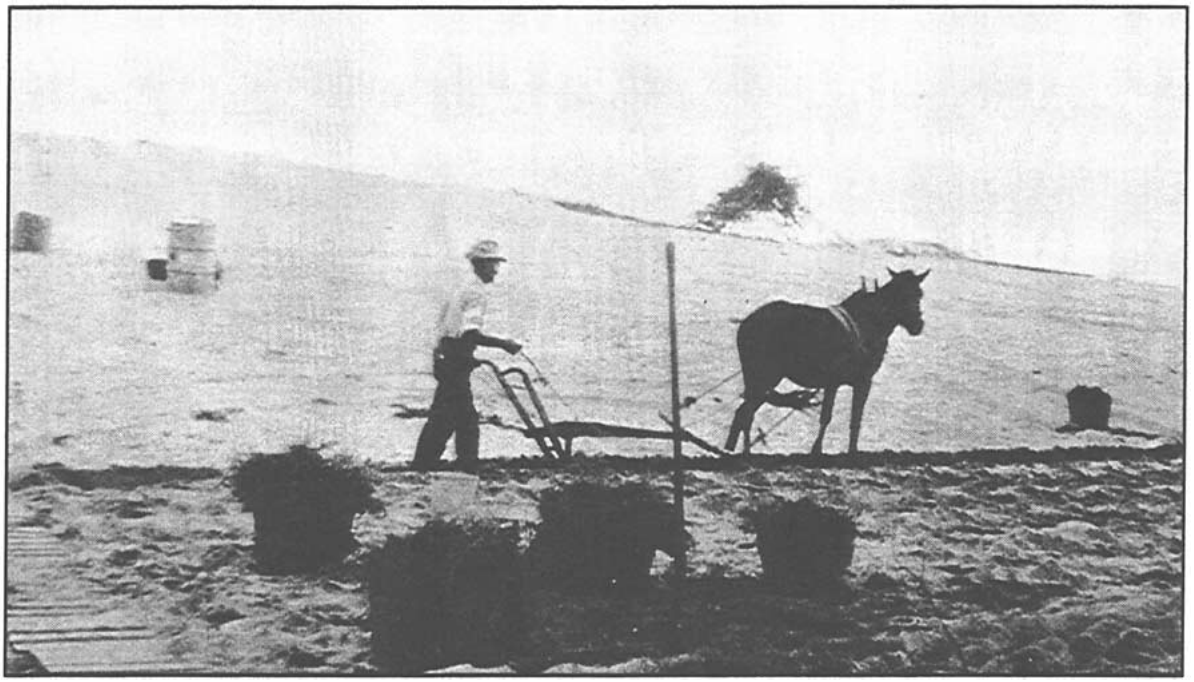


**Figure 10** Planting Method, Kill Devil Hill Stabilization, 1930

**Figure 11** Wood Mold Application, South Slope of Kill Devil Hill, 1930

Before construction began on the monument, workers improved access by creating a drive from the newly constructed North Carolina Highway Route 158, south of the site. Further roadways planned within the 314-acre reservation included a road forming a semicircle on the east side of the big hill. Other construction was required for part of the old Kitty Hawk/Nags Head road which passed by the site. In the early part of 1931, Congress authorized the Secretary of War to allocate $25,000 for road construction, with the stipulation that Dare County provide maintenance costs. Bidding for the combined sand and asphalt roads opened in February, with construction beginning in April and completed in May (Hewes 1967:38).

Congress confirmed appropriations for the building of the Rodgers and Poor-designed monument in December 1930. The contract documents were released shortly afterward (Specifications for Construction of Wright Brothers Memorial 1930). The Office of the Quartermaster General appointed Marine Captain John A. Gilman as the Constructing Quartermaster of the site. The Wills and Mafera Corporation of New York won the bid for general contractor around the same time, quoting a low bid of $213,000 for the monument and a powerhouse at the foot of the main Kill Devil Hill (Hewes 1967:37, 41). Construction specifications, dated November 1, 1930, called for a granite tower, 61 feet high, with a base measuring 36 by 43 feet (Specifications for Construction of Wright Brothers Memorial 1930). Plans called for the use of stainless steel for the metal fittings, except for roofing, flashing, and thresholds, which were copper and bronze. The tower included a light beacon, but the contract described only the mounting, not the installation of the light. The War Department designed the more utilitarian powerhouse that supplied electricity to the monument's beacon.

The contractors scheduled construction beginning February 1931 following the completion of Captain Kindervater's work on stabilization and road construction. Materials arrived late, delaying the project start to October of that year.

Wills and Mafera received bids for granite from a number of companies in New England and North Carolina. The Sargent Granite Company of Mount Airy, North Carolina, received the contract award. The same company provided the material for the Arlington Memorial Bridge in Washington, D.C., and for the Gettysburg Memorial in Pennsylvania, two other important federal projects of this period, securing their reputation (Elizabeth City *Independent* 11/18/32). The stone traveled to the site by railroad via Norfolk and Elizabeth City and then by barge and truck to the Kill Devil Hills reservation. The bridge at Kitty Hawk opened that spring (Stick 1958), and allowed smaller pieces to be delivered directly by truck. Larger stones required on-site rails for moving *(The Baltimore Sun* 8/28/32).

Work on the star-shaped granite base began in December 1931. Granite blocks were lifted into place by a crane mounted on the hillside. In all, the project required nearly 1,200 tons of granite, more than 2,000 tons of gravel, more than 800 tons of sand, and nearly 400 tons of cement (Elizabeth City *Independent* 9/23/32). Each construction crew averaged more than fifty men. Many local residents participated in the construction, giving them their first experience with government-sponsored projects on the Banks (Hewes 1967:41-42).

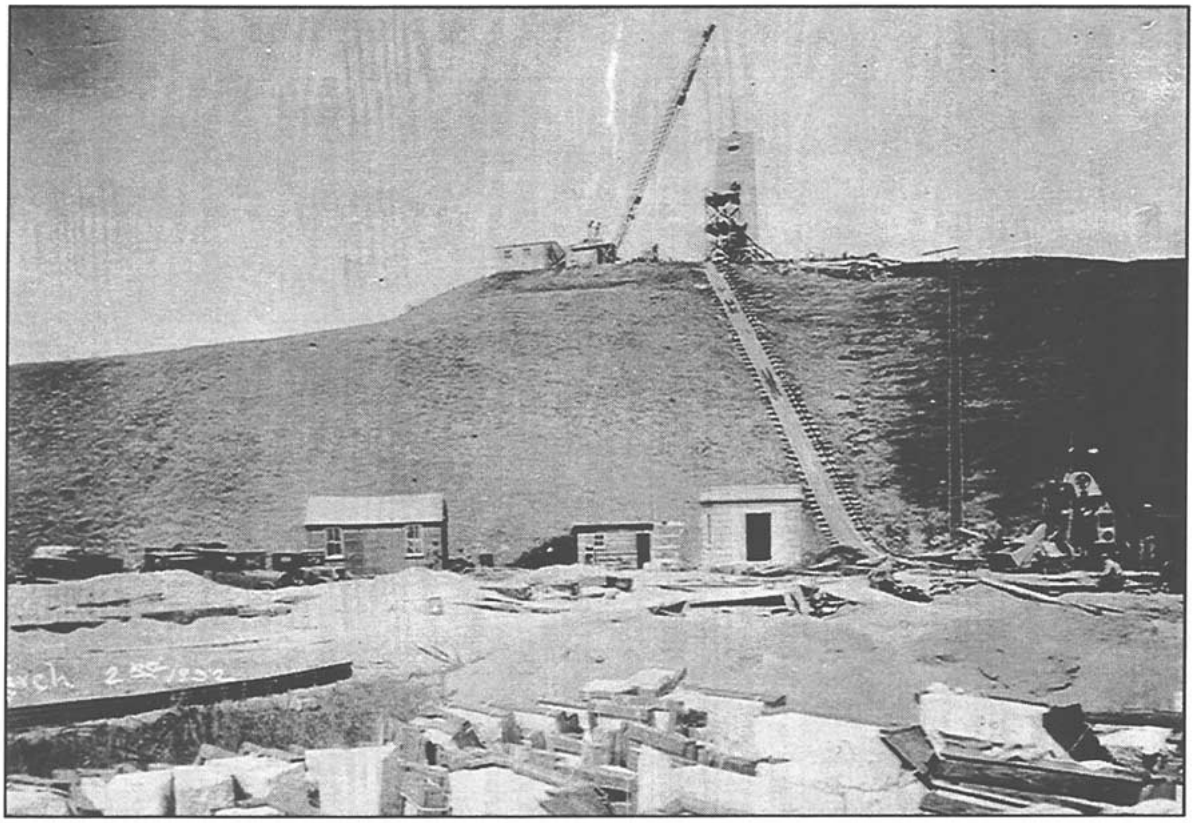
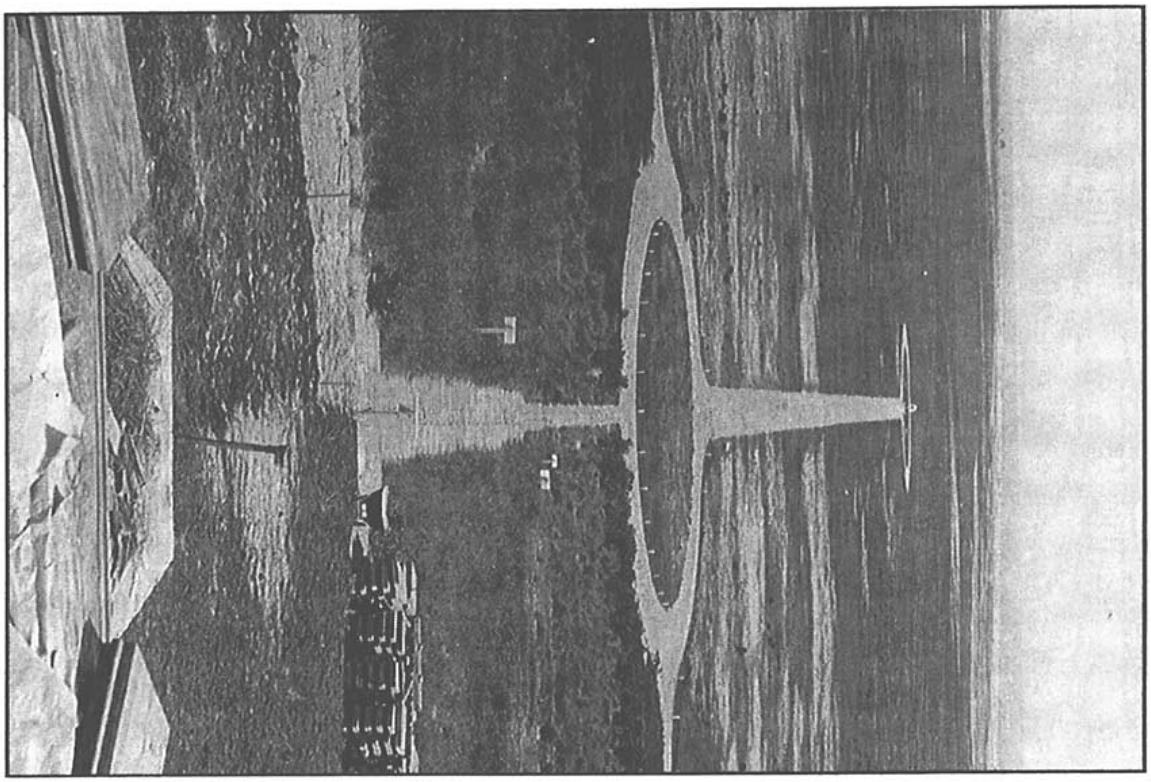
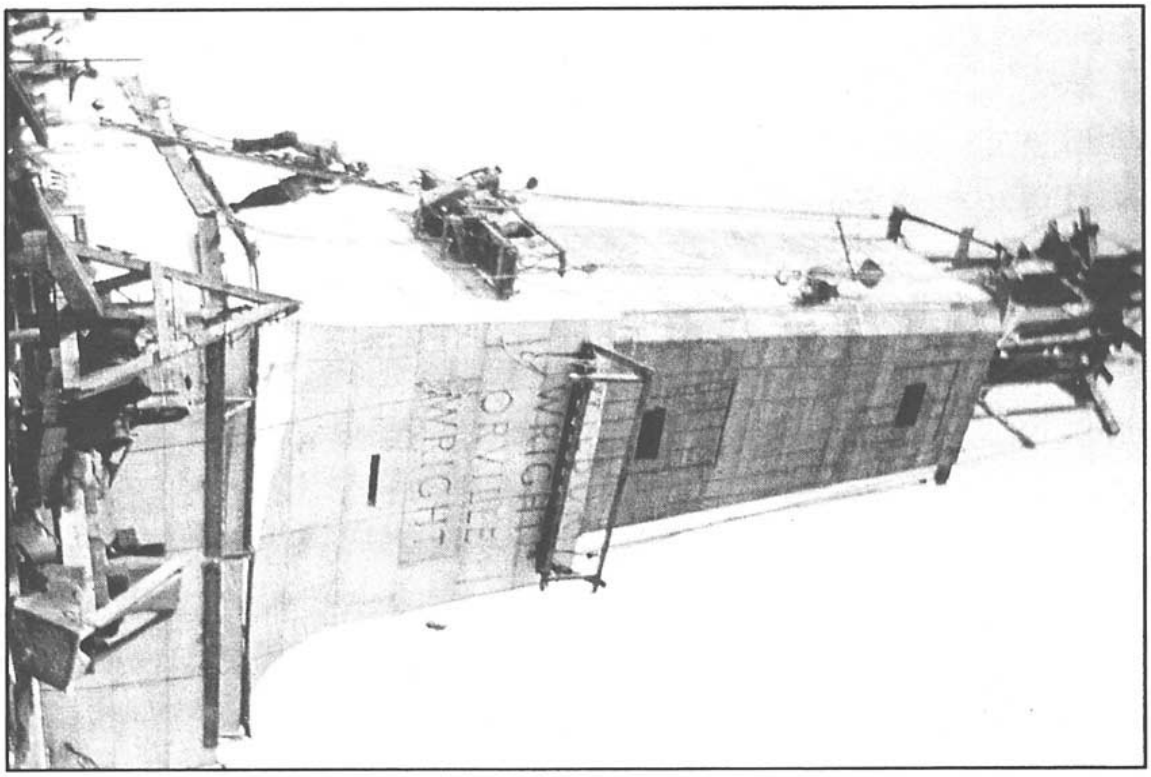


**Figure 12** Monument Construction Using Crane; Powerhouse at Base of Hill, 193l-32

The crews completed the monument construction in November 1932. By this time the site included the new monument on top of the big hill and its associated powerhouse, the original granite marker north of the new monument, a road from state route 158 leading to the park boundary, a park road circling the east side of monument hill and turning due north to circle the granite marker, and a straight pedestrian trail leading from the road at the base of Kill Devil Hill to the monument. The War Department placed the memorial under the jurisdiction of the Commanding General of the Fourth Corps Area and appointed a caretaker to maintain and protect the monument. The Quartermaster General recommended Joseph Partridge, a local resident who worked as a foreman on the project, for the job of caretaker. Orville Wright and "25 outstanding citizens" including President Hoover, favored Captain William (Bill) Tate, the former Kitty Hawk postmaster who played such a central role in attracting the Wrights to the site in the first place. Surprisingly, the Quartermaster General selected Partridge. When Partridge died early the following year, Kindervater served as a temporary replacement, receiving help from an unskilled laborer (Hewes 1967:42).

Plans for the dedication of the monument began the summer before the scheduled completion date of October 1, 1932 (Elizabeth City *Independent* 12/26/32). Despite a pending presidential election, General Louis H. Bash, the Acting Quartermaster General, chose November 19, the Saturday after elections, as the dedication date. Soldiers from Fort Monroe, Virginia,




WRIGHT
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WRIGHT

volunteered to participate in the ceremony (Elizabeth City *Independent* 12/18/32). The U.S. Navy planned to send a dirigible, and the Army a bomber and fighter squadron for an aerial display. Members of Congress, local dignitaries, military officers connected with the project, well-known aviators, and aircraft manufacturers, as well as the President of the United States, received invitations to the event. Orville Wright headed the list as the guest of honor. Boats chartered from Washington provided a round-trip excursion fare of $7.50. Organizers provided bleachers for 2,000 people and parking for 1,000 cars. In all, they anticipated as many as 20,000 spectators *(The Washington Post* 11/20/32).

Dedication day arrived with heavy rains and high winds. Neither the dirigible nor the airplanes received permission to leave their bases, and estimated attendance reached no more than 1,000 *(The Washington Post* 11/20/32). General Bash acting as master of ceremonies, read a letter from President Hoover expressing his regret at not being able to attend. Refraining from any general address to the audience, Orville later confided that he felt the monument was "distinctive, without being freakish" *(The New York Herald Tribune* 11/20/32). At the end of the ceremony, aviator Ruth Nichols pulled a cord to officially mark the dedication of the monument. The cord released a well-drenched American flag concealing the word GENIUS in the inscription along the base of the monument:

IN COMMEMORATION OF THE CONQUEST OF THE AIR
BY THE BROTHERS WILBUR AND ORVILLE WRIGHT CONCEIVED BY
GENIUS
ACHIEVED BY DAUNTLESS RESOLUTION AND UNCONQUERABLE FAITH

While a few details still remained to be finished, including the beacon grill, the ventilator covers, and the entrance gates (these were under separate contract), the monument was complete.

**THE NATIONAL PARK SERVICE AND ADDITIONS TO THE SITE**

With the monument completed, the Quartermaster General planned further development of the site and the management of daily activities. To replace Partridge and his temporary replacement Kindervater, the Quartermaster General appointed local Outer Banks resident Horace Dough, beginning a long-time association between Dough and the site. Dough previously made his living as a boat builder, fisherman and for a short time, laborer on the monument. The new appointment made him acting caretaker beginning August 8, 1933 (Hewes 1967:47).

On August 10, 1933, jurisdiction over the Kill Devil Hills Monument National Memorial was officially transferred to the National Park Service (NPS), an agency seen by several officials, including former President Hoover, as the most appropriate to manage the site *(The National Parks Index* 1987). Dough's temporary appointment as caretaker became permanent early the following year. As a result of President Franklin D. Roosevelt's New Deal, the site received a windfall of Public Works Funds for operation and development work during the earliest period of Dough's caretakership. The Kill Devil Hills Memorial Association, responsible in many ways

for initiating the monument, pressed for completion of the proposed airstrip (see Elizabeth City *Independent* 8/26/32, 9/8/33). This required additional lands, which local advocate Frank Stick agreed to help secure. Although Park Service officials considered the costs prohibitive, they agreed in principle and moved toward taking options for additional purchases. In the meantime, park officials agreed that the windfall appropriation of $90,500 from Public Works be spent on improving the roads and trails; building a superintendent's residence; building a shelter and comfort station for visitors; providing additional fencing; supplying electrical service; and improving the landscape (Hewes 1967:50).

Roads and trails received a high priority in order to prevent future erosion of the site caused by visitors and to act as fire lanes, then considered of great importance for the newly planted hill (Hewes 1967:57). In all, the park built 2.04 miles of new roads and 1.99 miles of trails between 1934 and 1935. A major improvement included the construction of a curvilinear trail system around the monument, consisting of four circuitous trails of sandrock asphalt laid out in a symmetrical design on either side of a straight line axis from the monument to the First Flight Marker. Completed in July 1936, the curving trails replaced the War Department's straight path climbing up the hill and continue to serve as the main access to the monument. A new road was built from the park boundary at state route 158 circling the Kill Devil Hill for a distance of .9 miles and surfaced with a bituminous sand road mix. The circular road also included five symmetrically placed parking areas. The park retained the road from the hill to the granite marker and agreed to cooperate with the state of North Carolina for the construction of a road from state route 158 to the city of Colington. The completed Colington Road utilized a portion of the park road circling the Wright brothers monument (Hewes 1967:58).

Another feature of the site was the entrance gates, built before the park's transfer to NPS by the L.R. Broyhill Company of Hampton, Virginia, and then linked through the revised NPS plan to the new circular road. Roughly following the form of truncated obelisks, they suggested ancient Egyptian precedent. Extending about 9 feet above grade with approximately 30-inch-square, slightly projecting bases, they tapered to less than 24-inch-square at the top, where a recessed, pyramidal cap provided definition. Bronze combination panel and picket fence sections, fitted between the outer posts, and similarly designed moveable bronze gates, mounted on the two inner-most posts, guarded the entrance. The park built a small, concrete contact station, measuring about 18 by 22 feet, just to the west of the entrance. With a total floor area of 376 feet, the contact station served as the superintendent's or caretaker's office and the first point of contact with visitors. The contractors completed the entrance gates on June 24, 1933 (Hewes 1967:48). The Quartermaster General Corps supervised this construction and completed the complementary contact station the following year, just before transfer of the property to NPS (USDI, NPS Fixed Property Record). The gate posts, now abandoned and lacking their bronze gates, remain within the monument site. The contact station, outmoded by 1960 and first scheduled for demolition in 1963, was finally removed in 1978 (USDI, NPS Fixed Property Records).

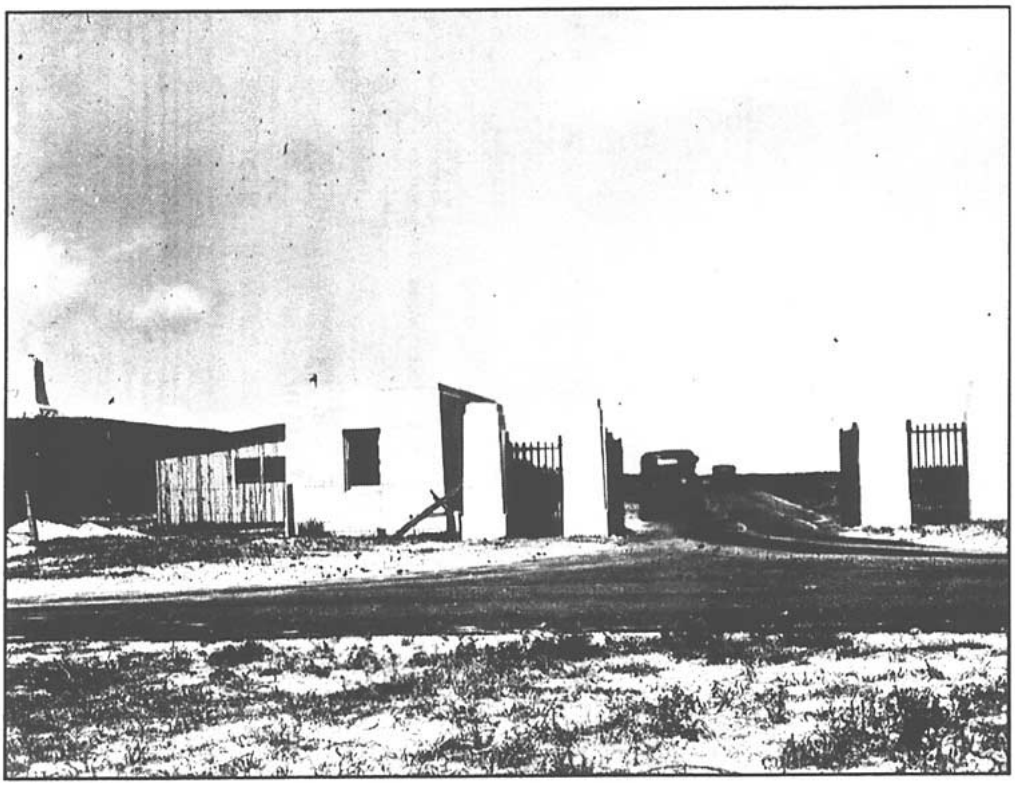

**Figure 15** Contact Station, Entrance Gate, and Garage, c. 1935

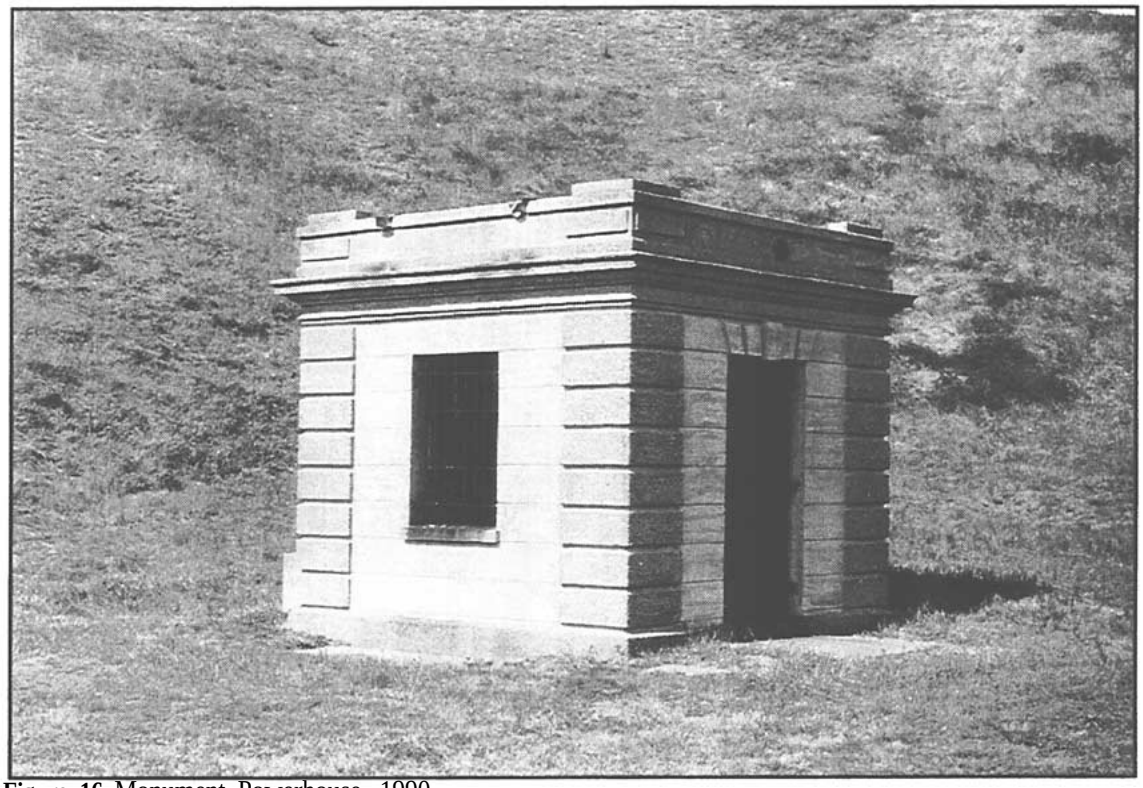

**Figure 16** Monument Powerhouse, 1990

The powerhouse served as a utilitarian feature of the site during its earliest development period. Built in 1932, this small concrete structure housed the generator necessary for lighting the monument's beacon. Designed and built by Quartermaster Corps engineers, it followed the conventional Beaux Arts styling typical of many government projects in that period. Fitted with standard metal sash windows and metal doors, the building employed scored concrete resembling ashlar stone work and included decorative quoins and keystones. Overall dimensions were 12 by 12 feet. By the late 1930s the introduction of conventional power sources outmoded the building's function. Its equipment served, however, as a source of auxiliary power until 1954, though even in 1940, during a power outage, it failed to perform that function (Wright Brothers National Memorial, 106 Statement n.d.). The building remains as a reminder of the monument's original dual function as a memorial and aviation beacon.

Major new additions to the site during the early NPS period included the superintendent's quarters, with an associated access road, and a comfort station for visitors. Architect J.R. Thrower prepared the designs for both, sending first versions of the plans to Horace Dough late in 1934 (Hewes 1967:58). Charles Peterson, the founder of the Historic American Buildings Survey program, signed the drawings as Supervisory Park Architect (Construction Drawings Fort Raleigh 9/20/34; signed 10/2/34). Construction of the comfort station and the superintendent's quarters began in October 1935 (Horace Dough to Thomas C. Vint 8/16/37) and ended in 1936.

The simple, two-bedroom 1,141-square-foot superintendent's quarters featured Art Moderne elements designed to create a streamlined effect, including a flat roof with parapet walls, common bond yellow brickwork banded by header rows, stone coping, and partial stringcourses. Grouped windows originally featured metal sashes and frames. The design included a living room kitchen, two bedrooms, separate office at the northeast comer, and recessed terrace along the north side. At a later date, NPS replaced the original copper-sheathed roof with slag and pitch (asphalt). NPS required Superintendent Horace Dough to move from his longtime home in Manteo to live at the site. As a result, he commuted nearly every evening to visit family and friends (Hewes 1967:59).

The comfort station, located north of the superintendent's quarters near the base of the monument hill and directly on axis with the powerhouse, featured a more streamlined character than Dough's residence. (Superintendent's Monthly Report 8/36). NPS constructed this small, brick, flat-roofed, rectangular building with strongly emphasized brick banding and a sharply cantilevered roof, protecting the two south-facing entrances. Concrete pathways linked the building to the park's circulation system. NPS completed construction in April 1936 and removed the building around 1977, at about the same time as the contact station (USDI, NPS Fixed Property Record).

In addition to the superintendent's quarters and the comfort station, NPS added a number of other essentially utilitarian structures to the site during the late 1930s and early 1940s. The park erected an 85-foot steel flagstaff in a triangular open space southeast of the hill, just northwest of the entrance in 1936 (USDI, NPS Fixed Property Record). In 1939, the park added a

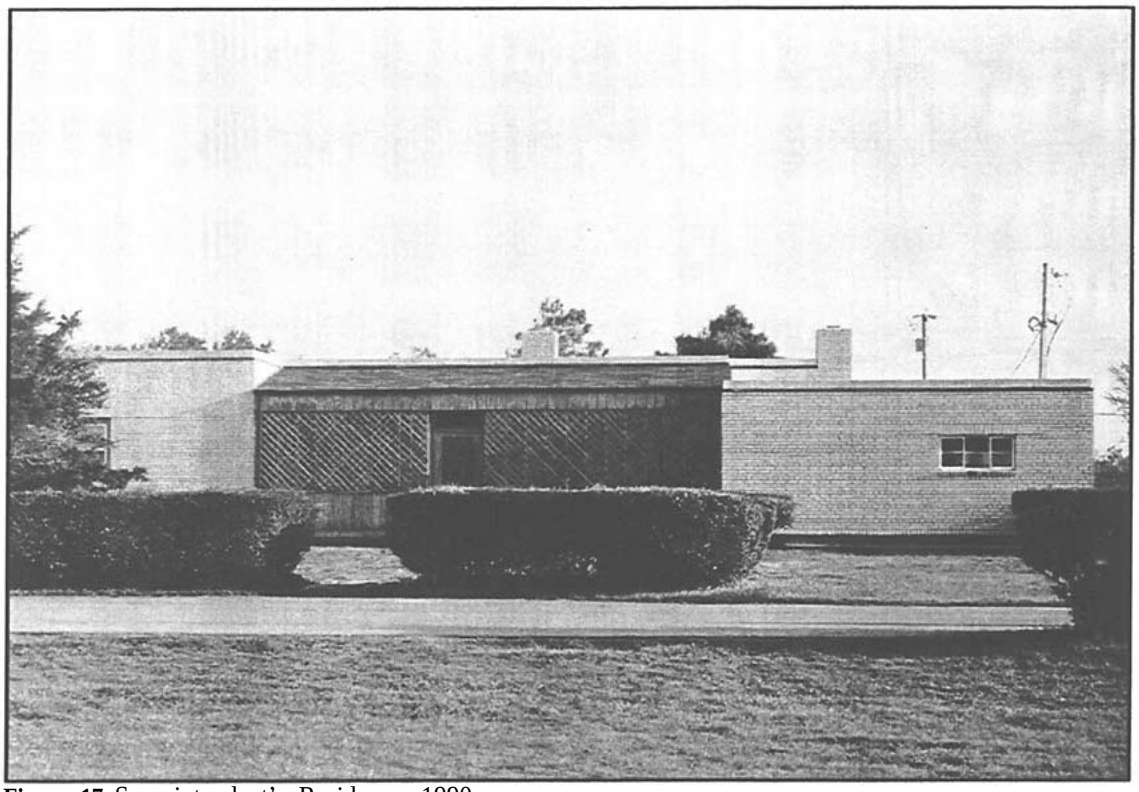

**Figure 17** Superintendent's Residence, 1990

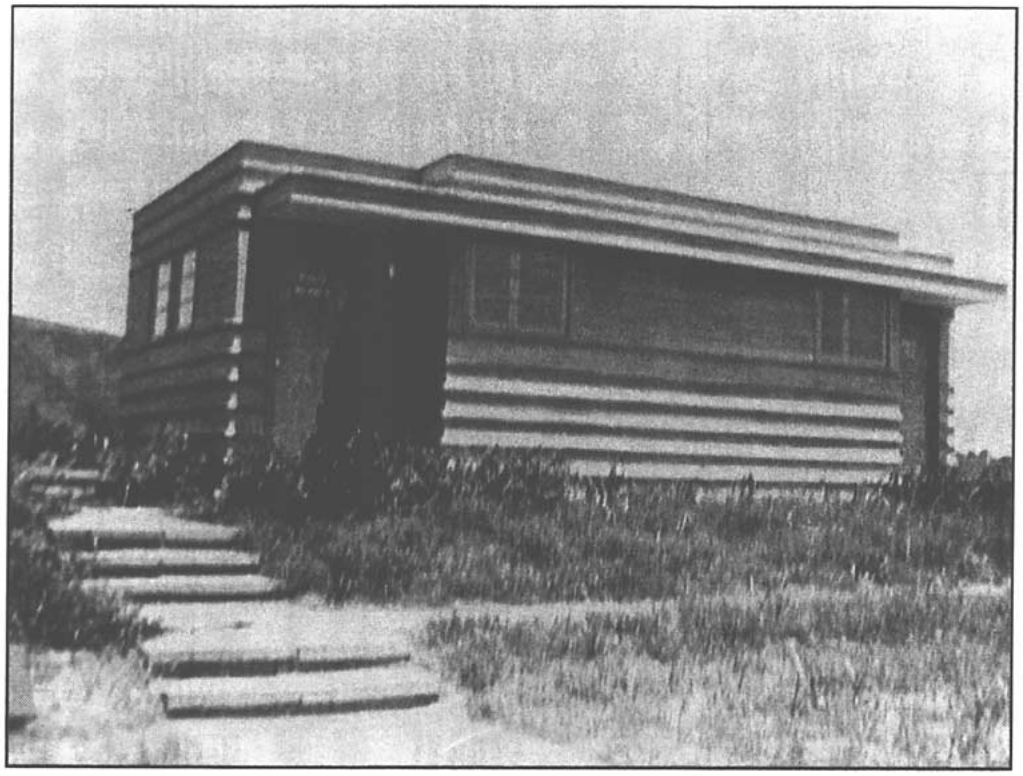

**Figure 18** Comfort Station, c. 1936

wood-frame maintenance shop and storage building (Horace Dough to the Director NPS, 2/8/38), located in the maintenance area adjacent to the superintendent's quarters, and in 1941, a second, smaller workshop and storage building located next to the west boundary of the park (Superintendent's Monthly Report 8/41). The park significantly altered these structures over the years and removed the flagstaff after 1963.

Landscape improvements began in 1934 when the park stabilized the remaining grounds through grass planting and protected the site by constructing a wire fence along the entire park boundary. In 1936, Greenbriar Farms of Norfolk, Virginia, lined the circular road with trees and planted grass and shrubs. By the late 1930s a "mall" defined the space between the monument and the granite marker with vegetation lining a mown lawn. Vegetation outside the mall was released to natural succession. Fertilizing, seeding, and the construction of an artificial foredune along the coast of the Outer Banks encouraged the scattered growth of shrubs and other vegetation on the previously barren landscape.

Visitors arrived in greater numbers during the late 1930s following the opening of bridges and highways and general development of the area. NPS floodlit the monument beginning in 1936, creating an enthusiastic public reaction. Increased visitation encouraged a number of concessionaires to sell postcards and pamphlets at the site. W.O. Saunders of the Elizabeth City *Independent* and longtime supporter of the Memorial, wrote a *Handbook of the Wright Memorial.* Through a casual arrangement with the superintendent he sold the book privately at the monument base (Hewes 1967:60).

Proper policing of the site was difficult, and Dough reported numerous instances of petty vandalism including damage to the monument by souvenir hunters. Dough pressed for additional money to hire a night guard, a post finally funded in 1937. There were numerous other logistical and public relations problems for Dough. The Junior Birdmen of America received permission to produce a model of the monument as a trophy. Dough often had to entertain visiting dignitaries, taking them on fishing expeditions as part of his unofficial duties.

The idea of constructing an airstrip continued to receive attention from park supporters. In 1936, projected improvement costs for the period 1938-1943 totaled $143,500. Proposed changes included adding another utility building (built in 1941); a second employee's residence (never realized); lightning protection for the monument; sewage, water, and power lines; additional road construction; further path construction; and more parking. Cost of the proposed airstrip added $1,000,000 to this figure, without deterring supporters (Hewes 1967:64).

In addition to its projected cost, the location for the airstrip remained a major issue. The area south of the monument seemed most probable, due to the high costs of land to the north and the lack of space to the west. In order for the airstrip to be useful as more than an exhibit (one projected use included Coast Guard operations), the park needed a minimum of 523 acres. Alfred Poor, the architect for the monument, offered to design the airstrip. He emphasized that the original plan for the memorial included an airfield south of Kill Devil Hill, which influenced the design and orientation of the monument. In July 1939, the park laid out a schematic airstrip design south of the monument. At this time, however, Roy Knabenshue, charged with working

out acquisition costs and other problems, concluded that building costs at the south end would be prohibitively high due to the necessary removal of a large sand dune (Hewes 1967:64). NPS shelved the whole project, and World War II postponed all further development.

## WORLD WAR II AND POST-WAR CHANGES AND PROPOSALS

World War II brought development at the Wright Brothers Memorial to a complete halt. A lack of funding forced NPS to reduce staff at the park and cut money for basic needs, such as fertilizer, and the federal government utilized its land for wartime purposes—the U.S. Navy added a submarine monitoring station to the monument for a short time (Hewes 1967:72). Both NPS and the supporting Kill Devil Hills Memorial Association continued to plan for the future and completed a new Master Plan by 1942. In 1941, Orville Wright announced the return from England of the Wright *Flyer,* displayed at the Science Museum in South Kensington since 1928 (Crouch 1978). The Kill Devil Hills Memorial Association began a campaign to secure the plane in a museum at the site, a continuation of earlier museum plans, and proposed "an appropriate ultra-modem aviation museum" in 1942. While the Smithsonian Institution remained a likely recipient of the plane, Orville Wright's long-standing feud with Langley's supporters fueled the Association's hopes of receiving the *Flyer.* Following Orville Wright's death in 1948, speculation continued that the *Flyer* might be placed at the Kill Devil Hill Monument (Elbert Cox to the Director, NPS 6/3/48), but the Smithsonian eventually received the plane, as stipulated in Orville Wright's will (Oehser 1970: 100; Hewes 1967:94).

The war's end returned basic maintenance funds to the park, but the 1942 Master Plan never became reality. In 1947, the park drew up another Master Plan, broadening the purpose of the park to include an overlapping layer of interpretation. Floodlighting of the monument resumed in 1947, and the park undertook several basic repairs on the main structure. The 1947 plan prompted the acquisition of an 800-by-2,000-foot strip of land to the west of the park and the state rerouted the road south of the monument, no longer utilizing the Memorial's road system (Superintendent's Monthly Report 5/47).

Work at the park in the 1950s and 1960s included implementation of the 1947 Master Plan's overall physical program for the site. These changes altered the park's orientation and focus. In 1957, the park added an entrance road on the east at state route 158, outmoding the old entrance gateway on the south. In 1963, the park removed the metal gates and fencing from the old entrance and in 1977 demolished the contact station (USDI, NPS Fixed Property Records; Joseph Brown, Regional Director to North Carolina Department of Natural Resources 11/10/78). The comfort station was also demolished and a new circulation system introduced (Amundson 1987). In 1960, the park added a new visitor center and parking area east of the granite marker and northeast of the stabilized hill and Wright Brothers Monument, one of the most significant changes to the site in this period of development. Designed by the Philadelphia firm of Mitchell/Giurgola, later designers of the Liberty Bell Pavilion near Independence Hall, the new concrete visitor center suggested the form of an airport terminal, reminiscent of Eero Saarinen's Dulles International Airport outside Washington. It also conveyed a sense of

connection between the achievements of the Wright brothers and the world of modern air transportation. The building was one of several Mission 66 projects sponsored by NPS to upgrade National Park buildings and facilities in anticipation of the fiftieth anniversary of the Service, serving as museum, lecture hall, gift shop, and administrative offices for the park. The 1960 closure of the Wright Brothers Monument's interior to visitors shifted the focus to the new visitor center.

**Figure 19** Visitor Center, c. 1960

The physical alterations of the 1950s and 1960s represented not only changes in the overall character of the monument, but also an expansion of the aims of the Memorial. Both the granite marker and the larger monument served as traditional commemorative structures. They emphasized veneration of the innovations and singular achievements of the Wright brothers. Changes of the mid-twentieth century sought to provide interpretation and education about the international significance of the Wright brothers' work in addition to commemoration. In 1951, encouraged by the interest of the Kill Devil Hills Memorial Association (renamed the First Flight Society in 1966), NPS embarked on a campaign to introduce a new series of educational exhibits. In 1953, the park reconstructed the Wright brothers' hangar and quarters buildings on their approximate original sites-relying on the placement of the granite marker as a point of reference. Exhibits proposed for the new museum were installed after its completion. The most

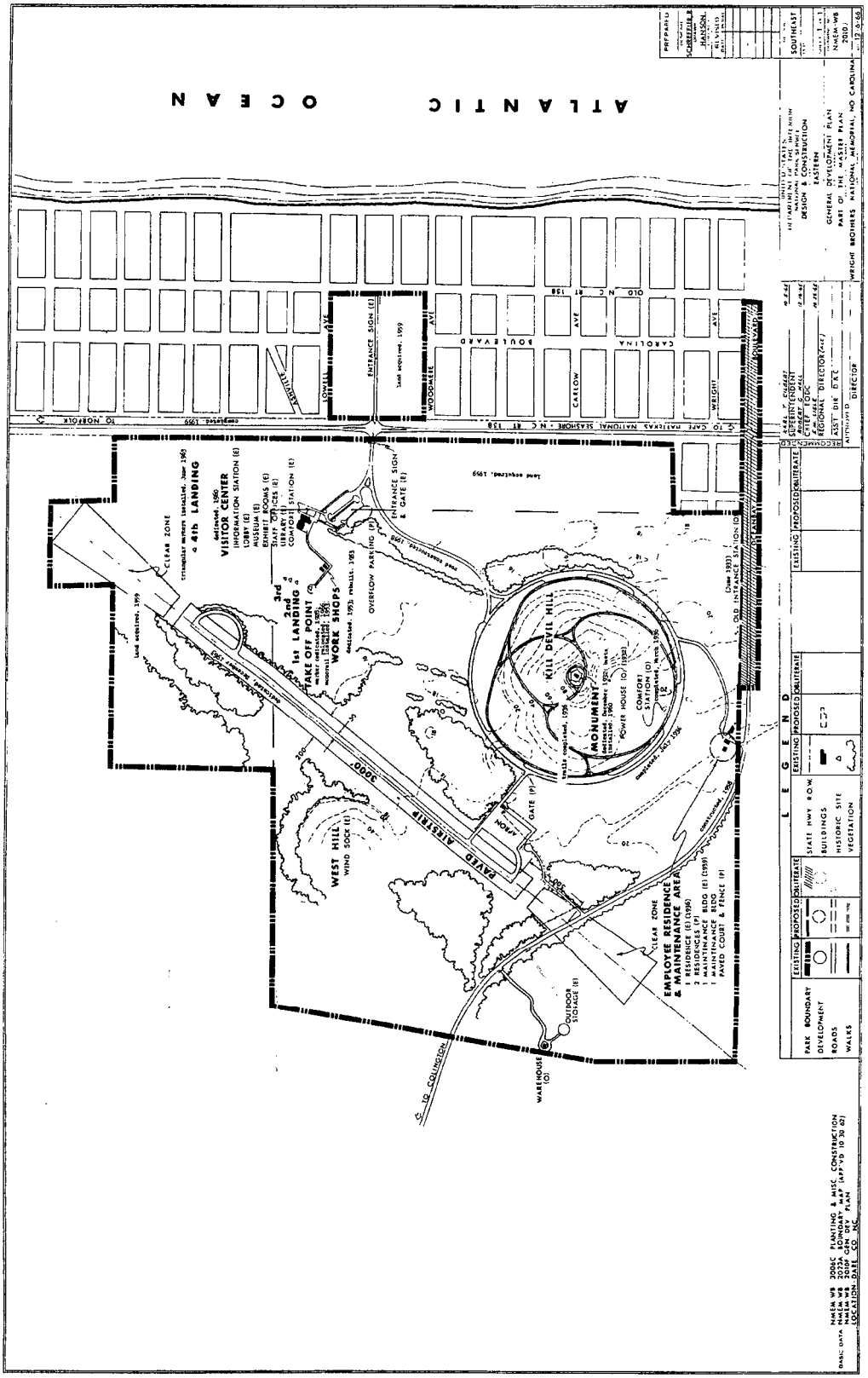


**Figure 20** Wright Brothers National Memorial, 1965-66 General Development Plan

dramatic exhibit featured the reconstructed 1903 *Flyer* built by the Washington Section of the Institute of Aeronautical Sciences and donated to the museum in 1963 (Hewes 1967:94).

The last major addition to the site was the long dreamed-of airstrip. In November 1959, the Avalon and Old Dominion Foundations of New York gave $82,000 to NPS to acquire the additional land necessary for the airstrip. Constructed in 1963 to the north and west of the visitor center, the airstrip was functional in design, allowing small planes to land at the site, but it did not represent a formal addition to the commemorative landscape. Another major change to the site (other than the periodic reconstruction of the hangar and quarters) included the realignment in 1966 of the 1928 granite marker so that it faced visitors approaching from the reconstructed camp buildings. The park also leveled the small mound supporting the marker so the topography appeared more as it did during the Wrights' efforts.

Reconsideration of the Memorial's name continued to plague the park in the post-war years. Dough suggested the name be changed from the original "Kill Devil Hill Monument," also officially designated in 1942 as the "Kill Devil Hill Monument National Memorial," to the "Wright Brothers First Flight Memorial." Regional historian Roy E. Appleton agreed. However, as late as 1948, the park considered alternative titles. NPS chose the present name, the "Wright Brothers National Memorial," in 1953 (USDI Order 18FR7877, *Federal Register* 12/1/53).

## CONCLUSIONS

The Wright Brothers National Memorial is a unique monument to the achievements of Orville and Wilbur Wright and their experiments with gliders and powered flight, conducted at the site between 1900 and 1903. While no historic structures associated with the seminal event remain, the commemorative additions to the site, including the granite First Flight Marker, the monument's curving trails and circular road, the unequaled Art Deco-inspired Wright Brothers Monument and associated powerhouse, and the spatial relationship between the marker and the monument, have achieved their own significance. These features represent local and national efforts to recognize the Wrights' achievements. In addition, the monument is an outstanding example of commemorative architecture of the period. Several much-altered ancillary structures from the commemorative period, including the gate posts, maintenance buildings, and the superintendent's quarters, also remain though changes in the overall plan of the site and individual losses of integrity diminish their relative significance.

## ASSOCIATED RESOURCES

### The Setting

The Wright Brothers National Memorial is a complex site, representing many years of additions, subtractions, and layering. The most important elements are those associated with early commemoration of the site including the granite First Flight Marker, placed in 1928 to mark the point of liftoff of the first powered flight; the Wright Brothers Monument, added in 1931-1932 and an outstanding, nationally significant example of commemorative architecture; the monument's associated powerhouse, completed 1932; the monument's curving trails and circular

road, completed 1936; and the spatial relationship between the marker and monument, established in 1928. Other structures and features lost integrity through additions or alterations, represent the shift from commemoration to interpretation initiated with the 1947 Master Plan or postdate the period of significance for this context. These include the remnants of the original War Department-era entrance gates, the superintendent's quarters and other staff housing, the maintenance area, the post-1947 circulation system, the reconstructed hangar and quarters, the visitor center, and the airstrip.

**Physical Characteristics**

The significant features for the 1926-1941 commemoration context include: the granite, boulder-shaped First Flight Marker, placed in 1928 at the approximate liftoff point for the first flight; the Rodgers and Poor-designed Wright Brothers Monument of 1931-1932, a granite Art Deco-inspired monument in the form of stylized wings on a star-plan stone terrace; the monument powerhouse, a War Department-designed, concrete structure typical of federal Beaux Arts designs of the period; the monument's curving trails and circular road, completed in 1936, that encouraged visitors to visit the commemorative monument; and the spatial relationship between the monument and the marker established in 1928 by the earliest commemorative efforts for the site. The area between the marker and monument is a 2,000-foot-long zone running north to south and bounded on the east and west by drainage ditches dug by the National Park Service.

**Associative Characteristics**

The commemorative structures, circulation around the monument, and the important axial relationship between the marker and monument were all established before 1941. They represent the realization of the intended commemorative purpose of the park through a formal design under War Department and NPS management. Subsequent development focused on the interpretation of the Wrights' innovations and visitor access through the construction of a new visitor center, circulation system, airstrip, and reconstructed hangar and quarters buildings in the 1950s and 1960s.

**Significance**

The resources are significant under National Register Criterion A for their association with efforts to recognize, commemorate, and preserve the site of the Wright brothers' experiments and successes in flight in the dunes at Kill Devil Hills between 1900 and 1903. They are also significant under National Register Criterion C as representative of the commemorative architecture and landscape design of the site. The First Flight Marker and the Wright Brothers Monument are nationally significant; the powerhouse, the curving trails and circular road around the monument, and the spatial relationship between the marker and monument are significant at the state level.

**Requirements for Listing**

The Wright Brothers National Memorial was listed in the National Register of Historic Places on October 15, 1966. NPS personnel submitted documentation for the district in 1978. The submitted documentation references the monument, reconstructed hangar and quarters, residential area including the superintendent's quarters, airstrip, visitor center, maintenance area, and paved walks. No mention is made, however, of the 1928 granite marker, the powerhouse, or the abandoned memorial entrance gates, and the text does not include a list of contributing and noncontributing elements. Many of the resources mentioned in the original documentation are not contributing elements of the district. Information provided in this study will be used to complete additional documentation for the district that will clearly define contributing and noncontributing resources and establish a 1900-1941 period of significance for the district.

The Wright Brothers National Memorial district is nationally significant under National Register Criteria A and B. Specific features are also eligible for listing in the National Register under Criteria A and C. These include the nationally significant Wright Brothers Monument and First Flight Marker as well as the powerhouse, the monument's curving trails and circular road, and the spatial relationship between the monument and marker, which possess significance at the state level. Other associated properties, including the superintendent's quarters and the remnants of the gates, which are connected to the developmental history of the site, are not eligible due to a substantial loss of integrity. The visitor center and airstrip are not eligible because they are less than fifty years old and do not meet the requirements of National Register Criteria Consideration G. In addition, they postdate the period of significance and do not further the commemorative program established prior to 1941.

**Criteria Considerations**

Criteria Consideration F, "Commemorative Properties," has been considered in the evaluation of properties associated with this context. Commemorative properties are those:

> designed or constructed after the occurrence of an important event or after the life of an important person. They are not directly associated with the event or with the person's productive life, but serve as evidence of a later generation's assessment of the past. Their significance comes from their value as cultural expressions at the date of their creation. Therefore, a commemorative property generally must be over fifty years old and must possess significance based on its own value, not on the value of the event or person being memorialized (National Park Service 1991:39).

The granite First Flight Marker, the Wright Brothers Monument and its associated powerhouse, the monument's curving trails and circular road, and the spatial relationship between the monument and marker remain as elements of the commemorative development of the site and meet these requirements.

**Integrity**

The marker, monument, powerhouse, monument's curving trails and circular road, and spatial relationship between the marker and monument generally retain overall integrity of location, design, setting, materials, workmanship, feeling, and association. As a group, these elements represent the core of the earliest commemorative development period at the park. Individually, they illustrate the specific commemorative and utilitarian needs of the site prior to 1941. However, changes at the park since 1941 have affected the integrity of these resources. The Wright Brothers Monument lost some integrity of feeling and association following the move of the park entrance and the construction of the new visitor center in the late 1950s. The powerhouse lost a measure of feeling and association integrity after the discontinuation of the substation function of the building. The removal of the generating equipment from the powerhouse resulted in a small loss of materials integrity. The association of the powerhouse with the monument remains strong and offers an opportunity to interpret the original beacon feature of the monument. The reorientation of the 1928 First Flight Marker in 1966 reduced the resource's integrity of location, setting, feeling, and association. However, because the marker originally was placed at a location determined by the best estimates of surviving witnesses, it has never marked more than an approximate location. The small mound supporting the object was leveled to better convey a sense of the character of the terrain at the time of the original event and not mislead visitors. The side of the marker holding the bronze plaque was also turned to the east —it originally faced south—in order to be more visible to visitors approaching from that direction. The 1947 Master Plan and subsequent changes to the site significantly altered the circulation system and the spatial relationship between the monument and marker. The new roads, trails, and visitor center changed the visitor experience at the site, shifting the focus to interpretive exhibits at the museum and reconstructed hangar and quarters buildings and away from the commemorative monument and marker.

The original entrance gateway, superintendent's quarters, and maintenance area have all undergone substantial alterations and therefore lack sufficient integrity. They are also utilitarian structures and were never part of the core commemorative landscape at the park. The park closed the original entrance gate to the memorial in 1958 when they built a new entrance road at state route 158. The park abandoned the road, removed the bronze gates from their posts in the 1960s, and destroyed the contact station in 1978. The gate posts are the only surviving elements of the entrance. As a result, the gates lost a significant amount of design, setting, materials, feeling, and association integrity. Alterations to the superintendent's quarters throughout the building's history affected its integrity of design, materials, and feeling. The park replaced the original roof in 1944, enclosed the front terrace in 1974, and replaced the original windows in 1974, significantly altering the few original Art Moderne design elements. These alterations also introduced new materials to the resource. The maintenance area has had numerous additions and alterations, with no attempt made to retain the original features of the 1930s-era design.

The visitor center, constructed in 1959-1960, does not meet the requirements of National Register Criteria Consideration G, which states that a property less than fifty years old must be "of exceptional importance" to be eligible. Because the visitor center was not part of the original commemorative development of the park, centering on the monument and First Flight Marker, its significance must be evaluated under Criterion C for its design. The visitor center was an early commission of the Philadelphia firm of Mitchell/Giurgola, which subsequently designed a number of more prominent buildings. The firm was formed only in 1958 and is still practicing, although both original partners have now retired. It is extremely doubtful that sufficient historical perspective exists to accurately evaluate the firm's importance. Most of the firm's important commissions date to the 1970s and 1980s, a period of intense controversy in the architectural profession that has yet to be viewed within anything approaching consensus by architectural historians.

Only a handful of the exceptionally important architectural works from the post-World War II period, such as Eero Saarinen's Gateway Arch (St. Louis), Skidmore, Owings and Merrill's Lever House (New York), and Ludwig Mies van der Rohe's Illinois Institute of Technology campus (Chicago) are listed on the National Register. Even considered within the body of Mitchell/Giurgola's work, the visitor center is a minor commission, both in scale and in the attention it has received from the architectural press and architectural historians. More distinguished works of the firm, such as the United Fund Headquarters (Philadelphia, 1971), the College Center, State University of New York (Plattsburgh, New York, 1974), and the IBM Westlake Park Office Complex (Dallas, 1984-1990) are not on the National Register. The visitor center is not the firm's only North Carolina commission. The Davis Library at the University of North Carolina, Chapel Hill (1984) and the Weatherspoon Art Gallery at the University of North Carolina, Greensboro (1990) both are more representative of the firm's mature design philosophy.

Further militating against a finding of exceptional importance for the visitor center is the fact that several major alterations made in 1976 compromise the integrity of the design. At that time, a Florida firm was awarded a contract for the refenestration of the building. Resulting changes included replacements of all steel window frames with aluminum frames; new window glass; the removal of steel casement-type ventilation windows and replacement with larger, fixed-sash aluminum windows in the assembly room; and changes in the dimensions of doors and associated transom and side lights. Considering all these factors, the visitor center, although representative of its period of construction, does not rise to the level of exceptional importance required by Criteria Consideration G (Cape Hatteras Group Headquarters Contract files, 1975-1976).

**Contributing Resources**

1. First Flight Marker (constructed 1928; reoriented 1966)
2. Wright Brothers Monument (constructed 1931-1932)
3. Wright Brothers Monument Powerhouse (constructed 1931-1932)

4. Monument's curving trails and circular road with parking areas (constructed 1936)
5. Spatial relationship between monument and marker (established 1928)

**Surveyed Non-contributing Resources**

1. Maintenance Area (first building constructed 1939)
2. Memorial Entrance Gateway (constructed 1932)
3. Superintendent's Quarters (constructed 1936)
4. Wright Brothers Memorial Visitor Center (constructed 1959-1960)
5. First Flight Airstrip (constructed 1963)
6. Fee collection kiosk (constructed 1987)
7. Four stone landing markers (erected 1963, replaced 1993)
8. Metal information panel next to hangar (1966)
9. Metal information panel between marker and monument (1966)
10. Two Wright bust sculptures at monument
11. Plaque next to Visitor Center (placed by Soaring Society of America, 1963)

## CHAPTER THREE: MANAGEMENT RECOMMENDATIONS

The following management recommendations are provided to help the park apply the research provided through this study, the List of Classified Structures survey (LCS), and the Cultural Landscape Inventory (CLI). No structures from the 1900 to 1903 Wright brothers site remain. Most of the resources from the commemorative period, 1926 to 1941, including the Wright Brothers Monument and the First Flight Marker, have been protected and should be included in the visitor experience at the park.

The area defined by the location of Kill Devil Hill, the monument, the marker, the powerhouse, the monument's curving trails and circular road and the spatial relationship between the monument and marker represents the historic commemorative zone of the park. Every effort should be made to protect and interpret these resources as the remaining elements of the first commemoration of the Wright brothers' work. No alterations or additions should be made in this area that detract from the commemorative core. Especially significant is the vista along the axis from the Wright Brothers Monument to the First Flight Marker. The existing vegetation adjacent to the commemorative zone is not historically significant and can be manipulated in order to reinforce the memorial space or to screen out undesirable views to adjacent development. Refocusing the visitor experience on the monument and marker should include reopening the monument to visitor access and utilizing the series of curving trails on the monument hill. Traffic on the circular drive may be restricted, but removable bollards or chains are preferable to the construction of more permanent gates. Every effort should be made to use the historic material for resurfacing the road and trails. The First Flight Marker should be returned to its original orientation with the inscription facing the monument on the south.

The maintenance area and superintendent's residence are not significant to the historic commemorative zone. Limited development or removal of these areas will not compromise the park district's historic value.

The reconstructed hangar and quarters buildings should be removed from their current location. If rebuilt, the exhibits should be placed in the Visitor Center or in an area where they do not intrude on the historic commemorative zone. The site and history of the buildings may be identified with a small wayside.

The National Register documentation for the park will be updated to include the new periods of significance and lists of contributing and noncontributing resources as discussed in this study.

Any future changes to structures or landscape features at the park should be recorded because some resources, such as the visitor center and the airstrip, may achieve significance at a later date.

# Wright Brothers National Memorial

**Historic Resource Study**

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**Newspapers and journals:**

*Washington Post*
*New York Times*
*Elizabeth City Independent*
*The New York Herald Tribune*
*The Baltimore Sun*
*Congressional Record*
*American Architect*
*Progressive Architecture*

The report has also required reference to unpublished materials held at the Cape Hatteras Group Headquarters located at Fort Raleigh National Historic Site and at the Wright Brothers National Memorial. These include the Superintendent's Monthly Reports, various clipping, drawing, and photography files, as well as correspondence and maps. Citations to these, where possible, are included in the text.

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http://www.nps.gov/wrbr/hrs/hrsb.htm
Last Updated: 01-Jun-2002

## APPENDIX A
## CONTRIBUTING AND NON-CONTRIBUTING RESOURCE DESCRIPTIONS

### Contributing Resources

***Wright Brothers Monument, HS-01, LCS 07396, constructed 1931-1932.*** Designed by the firm of Rodgers and Poor, the monument is a 61-foot-high, Art Deco-inspired shaft and base constructed of concrete with granite veneer set on a star-shaped concrete and granite foundation. The foundation is a circle with five star points projecting from the circle on the north, west, southeast, southwest, and east. The foundation forms a terrace around the monument base and shaft at a height of 5 to 10 feet above grade; the walls are topped with coping. Five steps climb the foundation from a pedestrian trail on the south to the terrace around the monument. The steps are flanked by granite rails with busts of Orville and Wilbur Wright sculpted by Oskar Hansen set on granite pedestals. The present busts are reproductions; the originals were moved to museum storage after being stolen on two separate occasions. The monument base and shaft have a roughly triangular plan with the sides of the projecting base measuring 36 by 43 by 43 feet. An inscription around the top of the base reads: "IN COMMEMORATION OF THE CONQUEST OF THE AIR BY THE BROTHERS WILBUR AND ORVILLE WRIGHT CONCEIVED BY GENIUS AND ACHIEVED BY DAUNTLESS RESOLUTION AND UNCONQUERABLE FAITH." The main entry to the monument is from the terrace at the center of the base on the south side. Three steps descending from the terrace lead to a double-door entry with doors made of nickel and stainless steel with four square bronze panels each; the panels feature relief sculptures depicting historical and mythical representations of flight. The triangular shaft rises from the base with relief carvings symbolizing wings on the east and west sides. The names of the Wright brothers are carved on the bottom half of the shaft's south face. The top of the shaft holds an electric beacon within a glazed, cylindrical housing; part of the original design the beacon represents the functional purpose of the monument, although it is no longer used as a navigational aid.

***First Flight Marker, HS-04, LCS 90066, placed 1928.*** An approximately 4-by-3-by-6-foot rough-cut granite marker, resembling a boulder in its natural form. The marker is located 2,000 feet north of the Wright Brothers Monument. A bronze plaque placed on the east side of the marker bears the following inscription: "THE FIRST SUCCESSFUL FLIGHT OF AN AIRPLANE WAS MADE FROM THIS SPOT BY ORVILLE WRIGHT DECEMBER 17, 1903 IN A MACHINE DESIGNED AND BUILT BY WILBUR AND ORVILLE WRIGHT. THIS TABLET WAS ERECTED BY THE NATIONAL AERONAUTIC ASSOCIATION OF THE USA DECEMBER 17, 1928 TO COMMEMORATE THE 25TH ANNIVERSARY OF THIS EVENT."

***Wright Brothers Monument Powerhouse, HS-05, LCS 90077, constructed 1931-1932.*** An approximately 12-foot-square, 13-foot-high one-story building located at the base of the monument hill, south of the Wright Brothers Monument. The building is constructed of

reinforced concrete with concrete walls scored to resemble ashlar stone work and includes a flat parapeted roof and decorative quoins. The entrance on the south features a flat arch with a projecting keystone and a pair of four-paneled sheet metal doors. Industrial sash windows are on the east and west sides of the building. The door and windows are faced with iron bar grilles.

***Monument's Curving Trails and Circular Road with parking areas, LCS 91553, constructed 1936.*** Four symmetrical, curving trails radiating from the Wright Brothers Monument to the base of Kill Devil Hill. The approximately 2 miles of trails are interconnected, with two paths converging at a loop around the foundation of the monument. The trails originate at the southern vehicle parking area on the circular road at the base of the hill and provide access to the monument. NPS added another curving path on the west side of the hill leading from the parking area to the existing trail in the 1980s. The road includes five parking areas symmetrically placed along the drive. The trails and road are surfaced with asphalt.

***Spatial Relationship between Wright Brothers Monument and First Flight Marker, established 1928.*** An approximately 2,000-foot-long rectangular space between the monument and marker established with the placement of the marker and monument cornerstone by the National Aeronautics Association in 1928. Since then, the War Department and NPS have consistently kept this mall-like space mown and clear, reinforcing its role as a core element of the commemorative landscape. The curving paths surrounding the monument are symmetrically organized on either side of the axial line running between the monument and the first flight marker.

***Kill Devil Hill, stabilized 1928.*** The largest of three sandhills in the Kill Devil Hills area, the Kill Devil Hill or Big Hill originally reached an elevation of approximately 100 feet. The War Department initiated stabilization of the hill in 1928 after it had drifted from 200 to 300 yards to the southwest of the location it held during the Wright Brothers' experiments. The sand dune is located approximately 2,000 feet south of the First Flight Marker and is currently covered with stabilizing grass/vegetation. Structural features of the hill include a series of curving trails and the Wright Brothers Monument.

***West Hill.*** West Hill is an approximately 60-foot-high sand dune located west of the airstrip and north of Colington Road. The hill is stabilized with grass.

**Noncontributing Resources**

***Memorial Entrance Gateway, HS-06, LCS 90078 SHADOW constructed 1932.*** The remaining elements of the entrance gateway are four concrete posts measuring approximately 30 inches square at the base and tapering to 18-inch-square pyramidal tops. The posts are about 9 feet high. The posts are symmetrically arranged approximately 30 feet north of the original entrance to the park at the Colington Road. Two posts placed 4 feet apart flank the site of the original 17-

foot-wide park entrance drive. The park removed the original bronze entrance gates and fence panels in the 1960s. The gate mounting hardware remains on the inside of the posts. The entrance also .included a contact station that the park removed in the 1970s.

***Superintendent's Quarters, constructed 1935-1936.*** An approximately 70-by-37-foot, heavily altered, one-story building with a lack of ornamentation, a flat roof, and an asymmetrical floor plan. The house is constructed of yellow brick laid in American common bond on a concrete foundation. The flat, parapeted roof with concrete coping was originally sheathed with copper, which was replaced with asphalt over plywood in 1944. Two interior brick chimneys break the flat line of the roof The original plan divided the structure into five intersecting blocks including a central living room, dining room, and bedroom block; an office block; a kitchen, bath, and utility block; a fue1 room and pantry block; and a two-car garage block. The north-facing front of the house features a terrace that was enclosed with a shed-roof, lattice and screen porch in 1974. The same year, the park replaced the house's original industrial steel sash windows with double-hung metal windows. The windows retain their original soldier arches and brick sills. In the 1970s, the park also covered the fuel room and pantry block on the southwest comer with lapped weatherboard siding and replaced the side-hinged garage doors with suspended overhead doors.

***Maintenance Area, constructed 1936-1959.*** The maintenance area consists of three buildings adjacent to the superintendent's quarters with the original building constructed between 1936 and 1939. The original structure is a one-story, wood frame building set on a concrete foundation. The exterior walls are sided with wood weatherboard. The park made additions to the area in 1941 and 1959.

***Visitor Center, constructed 1959-1960.*** Located 2,000 feet northeast of the Wright Brothers Monument, the visitor center is the centerpiece of the park's main entrance and interpretation area. The one-story, reinforced concrete structure has an asymmetrical plan set on a 128-foot-square platform. The main building rests on the northern half of the platform and features a domed assembly hall and museum. The exterior has vertical concrete slab columns and walls of recessed, full-height glass windows with fixed aluminum frames or wood panels covered with silica bond shadowform. The dome projection has 40-by-6-foot arched clerestory windows and cove-shaped, overhanging eaves made of poured concrete. The main entry is from a terrace at the southeast comer of the building where visitors enter a wing housing the gift shop and reception area. A second, larger terrace on the southwest comer provides access from the museum to a path to the First Flight Marker.

***First Flight Airstrip, constructed 1963.*** The 3,000-foot-long airstrip is located west of the Wright Brothers Monument, immediately north of the Old Colington Road. The airstrip consists of a 50-foot-wide, asphalt-paved taxiway, a tie- down apron, and a turnaround. The north end

of the runway includes a maintenance yard and. fueling area. The park also owns two 800-foot-long clear zones on the north and south ends of the runway (not structural).

***Wright Brothers Reconstructed Quarters, HS-02, LCS 07397 SHAD0W.*** A 16-by-42-by-10-foot, one-story, front-gable roof structure located 300 feet southwest of the visitor center. The board-and-batten walls are constructed of rough-sawn pine, and the roof is covered with rolled asphalt held in place by narrow wood battens. Interior stove pipe chimneys are on the east slope of the roof at the south and north ends of the building. A board-and-batten awning door stretches the till width of the building's north end. A single-entry batten door secured by two horizontal ledge boards is in the center of the south end of the building. Above the door on the south end is a six-light, fixed-sash window.

***Wright Brothers Reconstructed Hangar, HS-03, LCS 07398, SHAD0W.*** A 16-by-48-by- 12-foot, one-story, front-gable roof structure located 320 feet southwest of the visitor center. The wood-frame walls are covered with lapped weatherboard siding, and the roof is covered with rolled asphalt. The east and west sides of the building are supported by 2-by-4-inch board braces. The north and south ends of the building have full-width awning doors.

***Fee collection kiosk, constructed 1987***

***Four stone landing markers, erected 1963, replaced 1993***

***Metal information panel next to hangar, erected 1966***

***Metal information panel between Monument and Marker, erected 1966***

***Two Wright bust sculptures at Monument, reproductions; originals in museum storage***

***Plaque next to Visitor Center, placed by Soaring Society of America, 1963***

# APPENDIX B
# NATIONAL REGISTER FORM

NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

RECEIVED 2280
JUL . 1996
NAT. REGISTER OF HISTORIC PLACES
NATIONAL PARK SERVICE

66000071

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

## 1. Name of Property

*historic name* Wright Brothers National Memorial (Additional Documentation)

*other names/site number* _____

## 2. Location

*street & number* U.S. Highway 158

*not for publication* ___
*vicinity* ___

*city or town* Kill Devil Hills
*state* North Carolina *code* NC *county* Dare *code* 055
*zip code* 27954

## 3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____ meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ___ nationally ___ statewide ___ locally. ( ___ See continuation sheet for additional comments.)

*See cover letter*

*Signature of certifying official* *Date*

*State or Federal agency and bureau*

In my opinion, the property ____ meets ____ does not meet the National Register criteria. ( ___ See continuation sheet for additional comments.)

*Signature of commenting or other official* *Date*

*State or Federal agency and bureau*

**4. National Park Service Certification**

I, hereby certify that this property is:

____ entered in the National Register _____ _____
___ See continuation sheet.
____ determined eligible for the National Register _____ _____
___ See continuation sheet.
____ determined not eligible for the National Register _____ _____
____ removed from the National Register _____ _____
__✓__ other (explain): Additional Documentation Accepted

for Edson A. Beall 9.13.96
Signature of Keeper Date of Action

**5. Classification**

*Ownership of Property*
*(Check as many boxes as apply)*

___ private
___ public-local
___ public-State
_x_ public-Federal

*Category of Property*
*(Check only one box)*

___ building(s)
_x_ district
___ site
___ structure
___ object

*Number of Resources within Property*
*(Do not include previously listed properties in the count)*

| Contributing | Noncontributing | |
|---|---|---|
| 1 | 6 | buildings |
| 1 | 0 | sites |
| 2 | 2 | structures |
| 1 | 8 | objects |
| 5 | 16 | Total |

*Number of contributing resources previously listed in the National Register* 3

*Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.)* N/A

## 6. Function or Use

*Historic Functions*
*(Enter categories from instructions)*
LANDSCAPE/national park
RECREATION AND CULTURE/
monument/marker
TRANSPORTATION/road-related/
pedestrian-related
OTHER/electric powerhouse

*Current Functions*
*(Enter categories from instructions)*
LANDSCAPE/national park
RECREATION AND CULTURE/
monument/marker
TRANSPORTATION/road-related/
pedestrian-related

## 7. Description

*Architectural Classification*
*(Enter categories from instructions)*
MODERN MOVEMENT/Art Deco

*Materials*
*(Enter categories from instructions)*
*foundation*: concrete, granite
*walls*: concrete, granite
*roof*: concrete, copper
*other*: nickel, stainless steel, iron, asphalt, earth

*Narrative Description (Describe the historic and current condition of the property on one or more continuation sheets.)*

## 8. Statement of Significance

*Applicable National Register Criteria (Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)*

_x_ A Property is associated with events that have made a significant contribution to the broad patterns of our history.

_x_ B Property is associated with the lives of persons significant in our past.

_x_ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

___ D Property has yielded, or is likely to yield information important in prehistory or history.

*Criteria Considerations (Mark "X" in all the boxes that apply.)*

___ A owned by a religious institution or used for religious purposes.

___ B removed from its original location.

___ C a birthplace or a grave.

___ D a cemetery.

___ E a reconstructed building, object, or structure.

_X_ F a commemorative property.

___ G less than 50 years of age or achieved significance within the past 50 years.

*Areas of Significance*
*(Enter categories from instructions)*
INVENTION
ARCHITECTURE
LANDSCAPE ARCHITECTURE
CONSERVATION

*Period of Significance*
1900-1941

*Significant Dates*
1900-1903, 1928, 1931-1932, 1933, 1936

*Significant Person*
*(Complete if Criterion B is marked above)*
Wright, Orville
Wright, Wilbur

*Cultural Affiliation*
N/A

*Architect/Builder*
Robert Perry Rodgers and
Alfred Easton Poor
War Department
National Park Service

*Narrative Statement of Significance (Explain the significance of the property on one or more continuation sheets.)*

## 9. Major Bibliographical References

*(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)*

*Previous documentation on file (NPS)*

___ preliminary determination of individual listing (36 CFR 67) has been requested.
_x_ previously listed in the National Register
previously determined eligible by the National Register
___ designated a National Historic Landmark
___ recorded by Historic American Buildings Survey # _____

___ recorded by Historic American Engineering Record # _____

*Primary Location of Additional Data*

___ State Historic Preservation Office
___ Other State agency
_x_ Federal agency
___ Local government
___ University
___ Other

*Name of repository*: Wright Brothers National Memorial, Kill Devil Hills, NC
Cape Hatteras Group Headquarters, Manteo, NC

## 10. Geographical Data

*Acreage of Property* 431

*UTM References (Place additional UTM references on a continuation sheet)*

| | Zone | Easting | Northing | | Zone | Easting | Northing |
|---|---|---|---|---|---|---|---|
| A | 18 | 440075 | 3986350 | D | 18 | 438650 | 3986350 |
| B | 18 | 440725 | 3985425 | F | | | |
| C | 18 | 439175 | 3984950 | F | | | |

___ See continuation sheet.

*Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet.)*

There is no change in the existing district boundary.

*Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)*

**11. Form Prepared By**

*name/title* Bill Chapman, University of Hawaii, and Jill Hanson, Historian, NPS

*organization* National Park Service, Southeast Field Area

*date* _____

*street & number* 75 Spring Street, S.W. *telephone* (404) 331-5840

*city or town* Atlanta *state* GA *zip code* 30303

**Additional Documentation**

*Submit the following items with the completed form:*

Continuation Sheets

Maps
A USGS map (7.5 or 15 minute series) indicating the property's location.
A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs
Representative black and white photographs of the property.

Additional items (Check with the SHPO or FPO for any additional items)

**Property Owner** *(Complete this item at the request of the SHPO or FPO.)*

*name* National Park Service

*street & number* P.O. Box 37127 *telephone* _____

*city or town* Washington *state* DC *zip code* 20013-7127

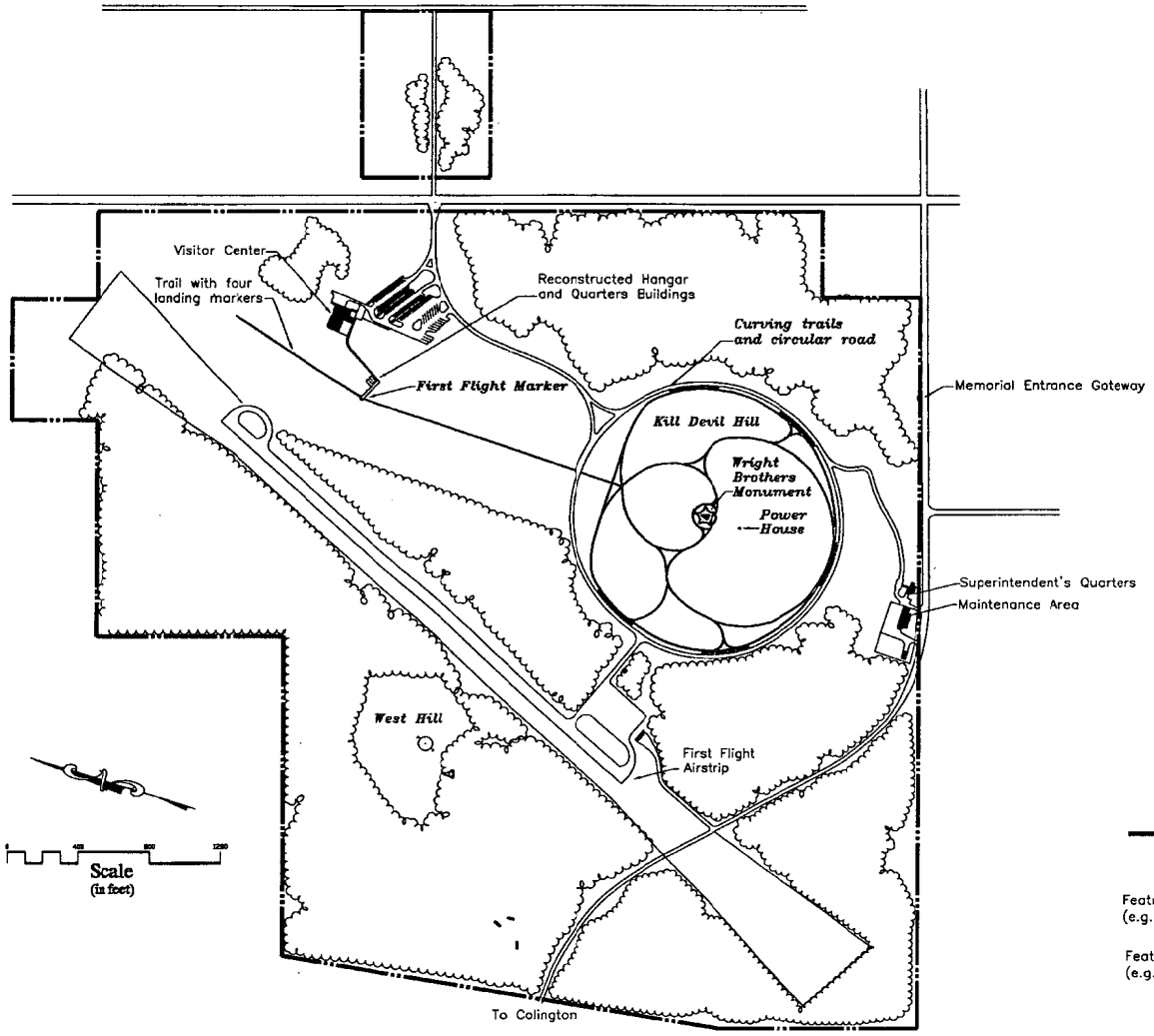
# APPENDIX C
# HISTORICAL BASE MAP

# Wright Brothers National Memorial

Kill Devil Hills, North Carolina

## Historical Base Map

## 1996




## Legend

| | |
|---|---|
| | Property line |
| | Tree/shrub line |
| Features in italicized text (e.g. *Power House*) | Contributing historic resources |
| Features in standard text (e.g. Visitor Center) | Non-contributing features |

| | |
|---|---|
| 361 | 80,002 |
| July1996 | SEFA |