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Kill Devil Hills, North Carolina

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Wright Brothers National Memorial
Cultural Landscape Report

Cultural Resources
Southeast Region



WRIGHT BROTHERS NATIONAL MEMORIAL

CULTURAL LANDSCAPE REPORT

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Foreword

We are pleased to add this volume to our growing library of Cultural Landscape Reports for park units in the Southeast Region. Many individuals and institutions contributed to the successful completion of this work. In particular, we would like to thank Cape Hatteras National Seashore Chief of Resource Management Steve Harrison, Cultural Resources Specialist Doug Stover, and former Wright Brothers National Memorial Superintendent Mary Doll. Finally, we would like to recognize the labor and dedication of Landscape Historian Susan Hitchcock, author of this report. We hope that the study will be a useful tool for park management and for others interested in the history and significance of the Park's many cultural resources.

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INTRODUCTION

Management Summary

This cultural landscape report (CLR) documents the landscape history and evaluates the significant features of the historic landscape in order to provide treatment recommendations for Wright Brothers National Memorial (the Park), located in Kill Devil Hills, North Carolina. The Park was established in 1927 to commemorate man's first successful attempt at heavier-than-air powered flight.

The Wright-era landscape has been irretrievably altered by the stabilization required for the site's commemoration, the 1930s construction of an artificial foredune along the entire length of the Outer Banks, and the commercial and residential development of the Outer Banks. These actions converted the historic scene, characterized by barren, shifting sandflats, to a vegetated, stable landscape surrounded by dense development. The preservation of the commemorative landscape has proven problematic because the Park's primary mission is to interpret the Wright era. The 1947 Master Plan initiated a shift from commemoration to comprehensive interpretation that culminated in the design of the Wright Brothers National Memorial Visitor Center, recently designated a National Historic Landmark (NHL). However, the commemorative resources hold historical significance in their own right. In view of such concerns, this report provides:

- treatment recommendations for features associated with the Wright era (1900-1911);
- treatment recommendations for features associated with the park development era (1927-1942);
- treatment recommendations for the Wright Brothers National Memorial Visitor Center landscape (1960);
- direction for interpreting the overlapping layers of the landscape;
- direction for future development at the site.

The Park is anticipating the centennial of the Wright brothers' achievement in December 2003. To that end, a General Management Plan (GMP) was approved in August 1997, although the controversial recommendation to remove the visitor center included in the plan has been settled with the NHL designation. The decision not to remove the visitor center will necessitate a new GMP.

Historical Summary

The Park incorporates the site of the first successful human attempt at heavier-than-air powered flight—an accomplishment attained by Orville and Wilbur Wright on 17 December 1903. The Wright brothers came to the Outer Banks of North Carolina in 1900 to conduct glider experiments. The area met their need for a wide, open space devoid of vegetation with steady winds of fifteen to sixteen miles per hour. They chose the area south of Kitty Hawk because of the presence of three large sand dunes, known locally as Kill Devil Hills. The Wrights spent the next three years, intermittently at Kill Devil Hills, conducting experiments and test flights before achieving success with four powered flights, the longest of which was 852 feet in fifty-nine seconds. Historians now view the Wright brothers' efforts as a seminal event in aeronautic development, paving the way for future advances in aviation.

The U.S. Congress created Wright Brothers National Memorial in 1927 to commemorate the Wright brothers' historic first flight. Beginning in

1928, the site was planted with grasses in order to stabilize the sand dunes and to create a memorial landscape that included the Wright Brothers Monument on top of Kill Devil Hill, the First Flight Marker, and a grassed mall. With the decision to build a museum/visitor center in the early 1950s, emphasis shifted from the monument and marker to an interpretive program that included the reconstruction of the Wright brothers' camp buildings.

In January 2001, the Wright Brothers National Memorial Visitor Center was designated a National Historic Landmark, in recognition of its being a nationally significant example of a Mission 66 visitor center and one of the most important examples nationally of the Philadelphia School of modern architecture. It had previously been included as a contributing feature of the existing National Register historic district as an outstanding example of modernist architecture in North Carolina.

STUDY BOUNDARY

The 421-acre park is located in Kill Devil Hills, Dare County, North Carolina, about four miles south of the community of Kitty Hawk and about seven miles north of the historic coastal village of Nags Head, in a highly developed corridor along the Outer Banks. Expanded from its earlier 314-acre size on 23 June 1959, the site is bounded to the south by Colington Road, to the east by U.S. 158 (with the exception of a small buffer parcel of land east of the highway), and to the west by areas of vegetation. Commercial and residential development adjoins the Park on its northern, eastern, and western sides.

SCOPE OF WORK AND METHODOLOGY

The overall goal of the historical research is to document significant landscape changes over time. The research findings are used to draw comparisons to the site's conditions in order to assess what resources remain from the Wright era and from later commemorative overlays. Based on this analysis, recommendations are proposed to suggest how the landscape resources can most effectively be treated and interpreted.

The Park's *Historic Resource Study* (1998) and *Administrative History* (1967), as well as the recently completed National Historic Landmark nomination for the visitor center (2000), served as essential starting points for understanding the changes that have occurred at the site. A number of secondary sources provided additional background information on the history of flight, regional geography, culture, and local history. Other park documents reviewed include the *General Management Plan* (1997), the *Statement for Management* (1993), the *Grounds Management Plan* (1981), historical maps and drawings, archival photographs, and various early park documents, including "Superintendent's Reports" for Wright Brothers National Memorial. Field research included site visits during September and October 1999. Historical investigation was limited primarily to the review of pre-existing park research and documentation, supplemented by conversations with persons having specific site history information.

SUMMARY OF FINDINGS

The landscape of Wright Brothers National Memorial has been in a state of development since its establishment in 1927. The initial direction of the commemorative landscape, although never fully realized, was to create a direct spatial relationship between the Wright Brothers Monument and the First Flight Marker. The original setting of the Wright era was compromised due to stabilization efforts begun in 1928. No Wright-era structures remain on site. Modifications to the commemorative layer occurred when the orientation of the site shifted to the visitor center in 1960. This new building type was designed to become an integral part of the site's interpretation. The landscape treatments proposed are thus devised with multiple purposes in mind:

- to preserve the Park's significant cultural landscape resources;
- to provide a fuller and richer interpretation of the site's landscape features, context, and multiple layers of significance;
- to address contemporary planning and management concerns such as visitor circulation, buffering, and vegetation management.

A program of rehabilitation is the most viable treatment approach for the site with the goal of preserving the elements that best interpret the Wright brothers era: the open character of the site with minimal intrusions. Treatment recommendations are proposed that would strengthen the spatial relationship between the Wright Brothers Monument and the First Flight Marker by reinforcing the primacy of the mall. Treatment recommendations also suggest how improving pedestrian circulation can enhance the visitor experience at the site. Treatment recommendations are proposed for preservation of the Wright Brothers National Memorial Visitor Center landscape. Additional recommendations suggest linking the primary and secondary periods of significance by explaining the evolution of the site. Direction is also given for appropriate areas for future development.

PART ONE: SITE HISTORY

The Wright Era, 1900-1911

The Wright Brothers National Memorial is recognized as the site of the first successful human attempt at heavier-than-air, controlled, powered flight carried out by Orville and Wilbur Wright on 17 December 1903. The first flight marked the end of many years of experimentation by the brothers from Dayton, Ohio. The three years immediately preceding were spent intermittently on site conducting experiments and test flights. The brothers' fascination with heavier-than-air flight has been traced back to 1892, when they began reading and analyzing previous writings and experiments on flight. Employed in their own bicycle manufacturing and repair business, the Wrights were able to devote the majority of September to January to their experiments. In 1899, the brothers conducted their first glider experiments using a double-foiled kite, and the following year they continued testing construction materials and techniques. Their goal was to create a glider capable of carrying the weight of a man.

It was during this first period of experimentation in Dayton that the brothers began to search for a more practical site to test their glider. They consulted the U.S. Weather Bureau and other individuals conducting flight experiments to identify locations that would meet certain criteria of topography, vegetation, and wind (a wide, open space; steady winds of fifteen to sixteen miles per hour; isolation; elevation change; and soft sand for landing). They chose the North Carolina Outer Banks because the landscape was characterized by broad, open expanses of shifting sand and steady northeasterly prevailing winds. The area was void of vegetation because of the high winds, salt spray, and periodic storm overwash. Following correspondence with residents of Kitty Hawk, North Carolina, Orville and Wilbur Wright were persuaded that this was the best location for their flight experiments, due to the presence of several large sand dunes, known in the area as Kill Devil Hills.[1]

The First Season, 1900

The brothers' first season of experiments at Kitty Hawk began when they arrived in September 1900. The last leg of the trip was by boat, as there were no bridges connecting the Outer Banks with the North Carolina mainland. At the time, Kitty Hawk was an isolated fishing village of several hundred inhabitants. A letter from Wilbur in 1900 described the area:

> In October my brother and myself spent a vacation of several weeks at Kitty hawk, North Carolina, experimenting with a soaring machine. We located on the bar which separates Albemarle sound from the ocean. South of Kitty hawk the bar is absolutely bare of vegetation and flat as a floor, from sound to ocean, for a distance of nearly five miles, except a sand hill [Kill Devil Hill] one hundred and five feet high which rises almost in its center. The main slope of the hill is to the northeast, which is facing the prevailing winds. The slope is one to six. To the north, northeast, and east, and southeast there is nothing but flat plain and ocean for a thousand miles nearly. It is the ideal place for gliding experiments except for its inaccessibility. [2]

The brothers originally stayed in the home of local Postmaster William J. Tate and his family in the village of Kitty Hawk. Soon thereafter they established a camp immediately outside the village, approximately four miles north of the current National Memorial (figure 1).



Figure 1. Wright brothers camp, 1900.

Orville and Wilbur began to experiment with their first glider in October 1900, focusing on flying the glider as a kite using guide ropes controlled from the ground. On 19 October, they moved their experiments about four miles south to the Kill Devil Hills area to begin their first manned glides from the slopes of three large sand dunes (referred to by the Wrights as Big Hill [Kill Devil Hill], West Hill, and Little Hill). Wilbur later described the Kill Devil Hills practice ground as a "group of detached hills or mounds formed by sand heaped up by the winds ... constantly changing in height and slope, according to the direction and force of the winds." [3]

Before the end of their first season, the brothers had completed about a dozen manned glides from the Kill Devil Hills. They returned to Dayton in late October, resuming their work in the bicycle shop and beginning the design and construction of a second glider that they completed early the following year.

The Second Season, 1901

Orville and Wilbur transported their second glider to the Outer Banks for testing in July 1901. At this time they established a more permanent camp, constructing a combined wood frame workshop and storage facility about four miles south of their old camp and just northeast of the main Kill Devil Hill.[4] The season's experiments consisted primarily of manned glides that were launched from the slopes of the main Kill Devil Hill. With the benefit of an increased wing span and surface area, the brothers broke the previous season's records of manned glider distance and time aloft. The brothers completed their experiments in August and returned to Dayton for further work. After a series of wing configuration tests, they had enough data to create a new design, which they incorporated into the 1902 glider and subsequent powered aircraft.

The Third Season, 1902

The Wright brothers began a third season at the Kill Devil Hills site in August 1902. They returned to the camp established the previous year to find it in disrepair as a result of winter storms and shifting sand. With the help of local labor, the brothers made basic repairs to their camp and added 10 feet to the storage and workshop building to be used as living quarters.[5] The brothers remained in camp until October while they tested their new glider, surpassing the previous year's records of distance and time aloft, completing more than 700 glides from the slopes of the three large sand dunes that dominated the topography of the site (figure 2). By the end of the 1902 season, the Wrights had made great progress on the way to successful flight. They returned to Dayton to develop an engine for their aircraft.

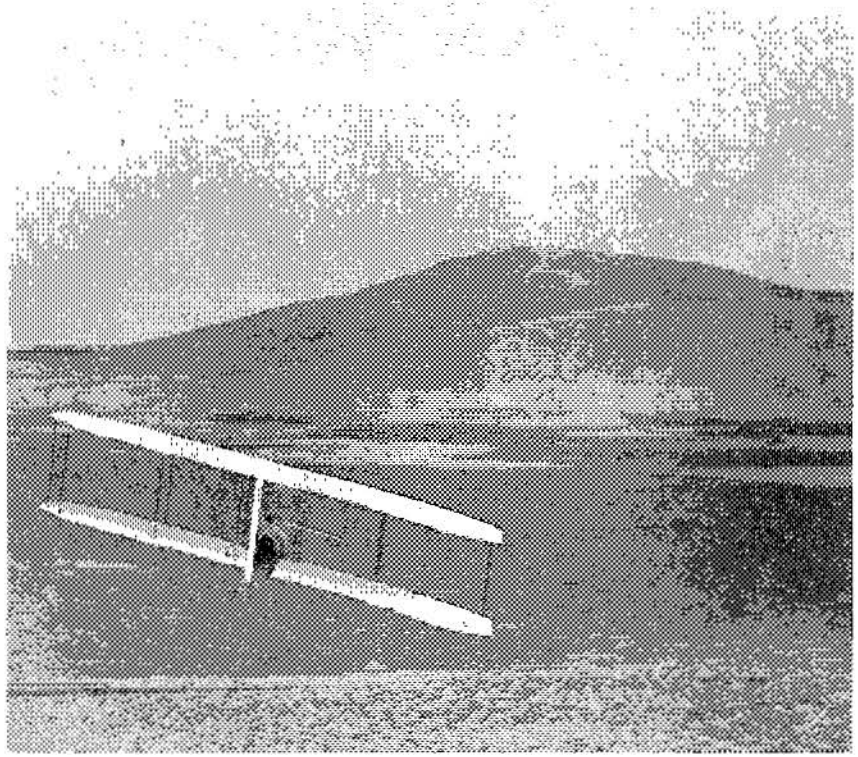


Figure 2. Glider flight from West Hill, 1902.

The Fourth Season, 1903

The Wrights spent the winter of 1902 and spring of 1903 in Dayton developing an engine for their glider with the goal of attaining powered flight. They returned to the Outer Banks for their fourth season at the Kill Devil Hills site in late September. Upon their arrival they began repairs on the storage facility/workshop, which had been blown off its foundation by storms. They found the 1902 glider intact, despite damage to the storage facility, and practiced with it until the 1903 aircraft was ready. They also constructed a second building, or hangar, for their powered aircraft. The new building, constructed just west of the old camp building, was a wood frame structure that was braced on two sides against the wind and measured approximately 44-by-16 feet (figure 3).[6] The powered glider, which they called the *Flyer,* arrived one month after Orville and Wilbur, and another month passed before the powered aircraft was assembled. To aid in the launching of the *Flyer*, the brothers constructed a 60-foot-long "monorail" that consisted of four, 15-foot-long two-by-fours covered with a metal strip. The Wrights immediately experienced engine difficulties, which in turn resulted in damage to one of the propeller shafts, which they sent to Dayton for repairs. In the interim, the brothers improved the construction of the monorail, which had to be relaid for each flight along the northeast side of Big Hill (figure 4). The repaired shafts arrived at the camp on 20 November, but extremely cold weather delayed test flights throughout the month. After finding a crack in one of the propeller shafts, they decided only solid steel shafts could withstand the vibrations of the engine. Orville traveled back to Dayton to get the necessary parts.[7]

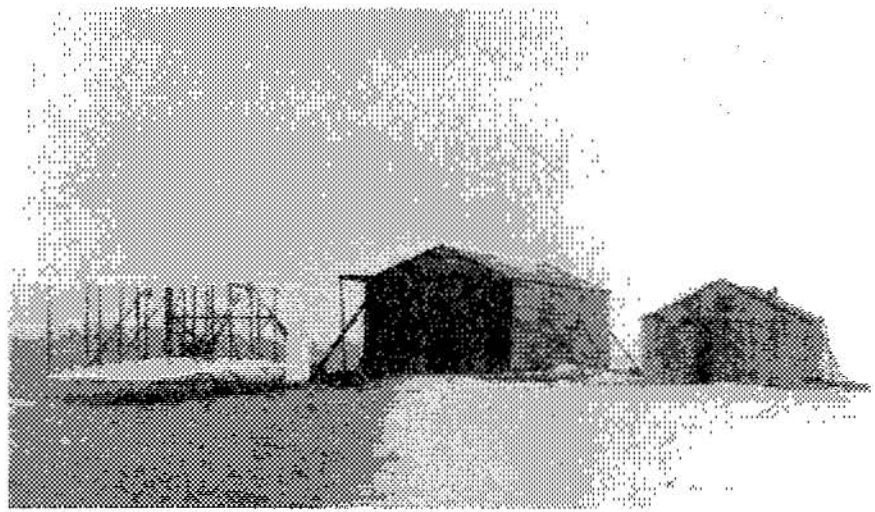


Figure 3. Camp buildings, 1903.

On 12 December, the brothers installed new propeller shafts on the *Flyer*. The following Monday, they decided to test the machine despite low wind velocities, but were only able to stay aloft for three and one-half seconds before the *Flyer* clipped the sand with its left wing. After repairs were completed, the next attempt was made on 17 December. They erected the monorail on the flat ground just west of their camp buildings. Orville Wright piloted the first flight, which covered a distance of 120 feet and lasted only twelve seconds. Following repairs to a damaged rudder, the brothers repeated the experiment. At 11:20 Wilbur made a second flight, totaling 175 feet. A half-hour later Orville made the third flight, covering a little more than 200 feet and lasting about fifteen seconds. At noon Wilbur piloted the fourth and longest flight of the day, covering 852 feet in fifty-nine seconds. A gust of wind toppled the *Flyer* after the fourth flight, cracking the engine and making any further attempts impossible. The incident ended the season's experiments.

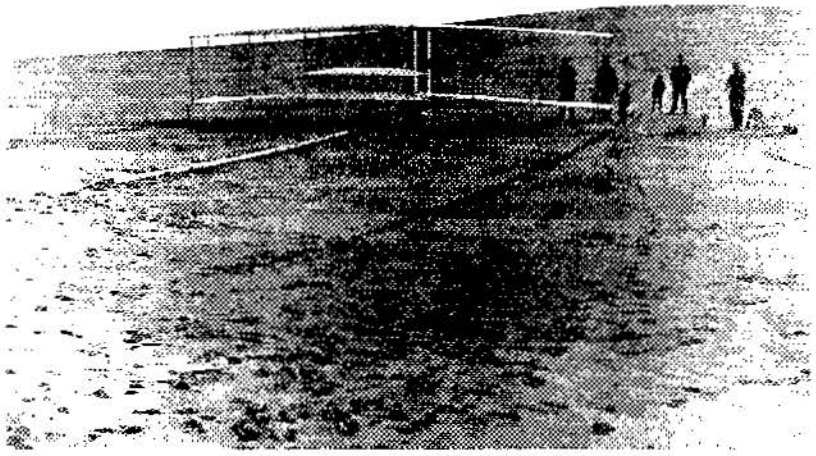


Figure 4. The *Flyer* prior to 14 December attempt from Kill Devil Hill, 1903.

The Aftermath

After successfully completing the first powered flights of 1903, Orville and Wilbur returned to Dayton to work on a sturdier flyer that would hold a more powerful engine. The brothers used a field located about eight miles from Dayton as a practice area for the two new planes that they designed and constructed in 1904 and 1905. Although they acknowledged that the practice area was not as favorable as the Kill Devil Hills site, they continued to set new records of time and distance aloft.

Between 1905 and 1908, the brothers devoted their time to making improvements to the flyer and in negotiating with potential clients. In 1908, the brothers secured two contracts with the U.S. Army Signal Corps and a French client. Because the contracts were dependent on successful demonstrations of the flyer, the brothers decided to return to Kill Devil Hills where they could count on better winds, more open space, and privacy to regain their skills and further test the aircraft.[8]

The Fifth Season, 1908

The fifth season began in April 1908 when Wilbur arrived to prepare the camp; Orville arrived a month later. In their absence storms had again destroyed the camp buildings used in previous seasons. They constructed a new building to serve as both living quarters and hangar for the 1908 experiments. By the end of May, the brothers were confident they could meet the required demonstrations the contracts called for. Wilbur left the Outer Banks on 17 May to go directly to Europe where he began assembling the glider for the demonstration in LeMans, France. Orville left camp a few days later for Dayton to begin building a new flyer for the U.S. Signal Corps tests at Fort Myer, Virginia.[9] In 1911, Orville returned for a short period for further glider experiments. Wilbur died in 1912 of typhoid fever.

EARLY RECOGNITION OF THE WRIGHTS' EFFORTS

The LeMans and Fort Myer tests received wide acknowledgement as resounding successes. By 1909, the Wrights led the world in the piloting and production of airplanes, but their standing was not universally accepted at the time. For many years they faced a number of contenders for priority in aeronautics, especially the American aviator Glenn Curtiss, whose independent development of ailerons, or flaps, eventually superseded the Wrights' wing-warping mechanism.

The onset of World War I (WWI) highlighted the Wrights' contributions to the development of flight. 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 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.[10]

The mid-to-late 1920s introduced a period of renewed interest in the capabilities of aircraft and the general potential for air flight, culminating in Charles A. Lindbergh's nonstop flight from New York to Paris in May 1927. The increased flight activity of the late 1920s encouraged a public recognition of the Wrights' place in the history of aviation. At the local level, North Carolinians, led by W.O. Saunders, sought to memorialize the site of the Wrights' experiments and to underscore the importance of the Outer Banks to their success. Saunders, the editor of the nearby Elizabeth City *Independent*, organized the Kill Devil Hill Memorial Association to ensure a proper commemoration of the Wrights' first flight effort.[11] A longstanding champion of Outer Banks causes, Saunders progressively pushed for economic development, with a memorial to the Wright brothers seen as only a part of that development. Other important players included Frank Stick, a real estate developer from New Jersey interested in promoting the Outer Banks, and North Carolina administrators and politicians such as Frank Page of the North Carolina Highway Commission and R. Bruce Etheridge, Director of the North Carolina Department of Conservation and Development.

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 17 December 1926, the twenty-third anniversary of the first flight of 1903. Senator Hiram Bingham of Connecticut, a former WWI 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. Warren enlisted the support of Orville Wright and the National Aeronautics Association. Frank Stick and other New Jersey investors donated the land at Kill Devil Hills where the Wrights conducted their experiments. The act passed both houses of Congress and was signed by President Coolidge on 2 March 1927, establishing the Kill Devil Hill Monument National Memorial.

ADMINISTRATION BY THE WAR DEPARTMENT, 1927-1933

The specifics of the Wright Brothers Memorial Act called for a monument to be erected in commemoration of the first successful human attempt at power-driven airplane flight. A commission made up of the Secretaries of War, Navy, and Commerce would select an appropriate location within the memorial for a monument. The Commission of Fine Arts, established by Congress and composed of various experts who were to decide on matters concerning aesthetics and the fine arts, and the Joint Committee on the Library would be responsible for approval of the design and other plans for the memorial.[12]

The Kill Devil Hills Memorial Association lobbied for construction of a bridge to the Outer Banks (completed in 1930) and a new road connecting Kitty Hawk and Nags Head. The memorial offered an

incentive for tourists to visit the area, and therefore provided a justification for new roads and bridges. The state of North Carolina took over the land for the proposed road in October 1927.[13]

The Office of the Quartermaster General prepared a report in October 1928 suggesting that the top of the largest hill (Kill Devil Hill) would be a suitable location for the monument. Previously, it had been thought that such an attempt would be impractical because of the shifting sands on the dune, but a committee appointed to investigate the site discovered that the hill consisted of moist and heavily compacted sand, which could be planted and secured (figure 5).[14] By this time nothing remained of the camp buildings constructed by the Wrights, and the prevailing winds had caused the southwestward migration of Kill Devil Hill by what has been estimated as 300 to 600 feet. In 1928, the Coast Guard and local citizens began the first stabilization efforts of Kill Devil Hill, planting shrubs and sand grass around its base and over its conical sides.[15]



Figure 5. Kill Devil Hill, 1928.

No War Department Master Plan has been located for the development that occurred at Wright Brothers National Memorial. Consequently, the work carried out by the War Department will be laid out chronologically.

First Commemoration

An important first step in the realization of the Wright Brothers National Memorial occurred on 17 December 1928, when 200 delegates from the International Civil Aeronautics Conference and more than 3,000 visitors dedicated a granite marker placed at the approximate location of the 1903 liftoff and laid the cornerstone of the monument to be placed on Kill Devil Hill. W.O. Saunders, Senator Hiram Bingham, and Secretary of War Dwight Davis addressed the crowd, including Orville Wright and Amelia Earhart. The National Aeronautics Association (NAA) provided the marker, carved to resemble a boulder.

Identifying the exact location of the takeoff was problematic because the topography of the site had shifted in the years following the Wrights' experiments. On 4 November 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 takeoff. Tate described their methods at the marker's dedication ceremony:

> 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 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 three men proceeded by them-



Figure 6. First Flight Marker, 1934.

> selves 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. . . . [16]

A copper pipe was driven into the ground to mark the spot, and a concrete foundation was poured over it. The granite marker, measuring approximately 6-by-4 feet, was set on the foundation, and a small mound of sand was spread over the foundation and covered with grass so that the boulder would give the appearance of having been set in the sand (figure 6).[17]

Selection of Monument Design

The cornerstone laid at the top of Kill Devil Hill on 17 December 1928 initiated the spatial relationship between the granite marker and the monument. The construction of a monument was set out in the 1927 Congressional Act, but its actual design was undecided. The Memorial Commission favored a utilitarian design, and the Commission of Fine Arts favored a purely commemorative structure. Much of this controversy took place before the 1928 anniversary celebration. By June 1928, the Office of the Quartermaster General, responsible for supervision of construction, realized the futility of a quick decision and announced a design competition. By 31 January 1929, a jury established by the Memorial Commission through the Quartermaster General had received thirty-six entries. The selection of the winning design was made in accordance with principles established by the American Institute of Architects. The jury chose the submission by the New York architectural firm of Rodgers and Poor, and the Commission of Fine Arts concurred. The objections of several parties delayed official notification until 14 February 1930.

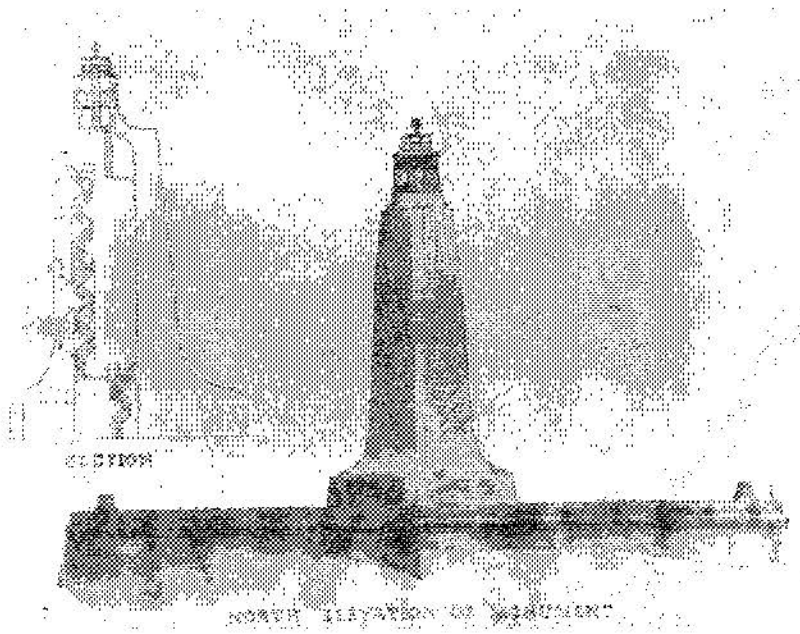


Figure 7. Wright Brothers Monument elevation, 1929.

The winning Art Deco-inspired design was a masonry shaft and base of approximately 60 feet set on a star-shaped foundation. The foundation formed a terrace around the monument base and shaft at a height of 5 to 10 feet above grade. The triangular shaft was embellished with relief carvings symbolizing stylized sculpted wings on the east and west sides (figure 7). The design implied ancient Egyptian motifs, an important source for Art Deco designs. The main entry to the monument was from the terrace at the center of the base on the south side.[18] Alfred Poor later remarked that the design and orientation of the monument were influenced by thoughts of placing an airstrip south of the monument. There were no provisions for pedestrian or auto circulation.

Stabilization of Kill Devil Hill

Before construction of the monument began, Kill Devil Hill required further stabilization (figure 8). In 1929, the War Department appointed William H. Kindervater of the Quartermaster Corps as caretaker and inspector of construction. Kindervater found that the most serviceable grasses and shrubs were Bermuda grass (*Cynodon dactylon*), secured from around dwellings locally and transplanted on the hill; bitter panic grass (*Panicum amarulum)* gathered at nearby Virginia Beach; and a range of local shrubs including yaupon (*Ilex vomitoria*), myrtle (*Myrica cerifera*), pine (*Pinus* sp.), live oak (*Quercus virginiana*), and sumac (*Rhus* sp.). Other grasses planted were crotalaria (*Crotalaria* sp.) and rye (*Lolium multiflorum*). The planting method is described below:

> Shallow furrows plowed about thirty inches apart. Fertilizer applied, wire grass roots placed in furrow, and different grass seeds sowed with the wire grass roots. All planting then covered with a thin layer of sand and the entire area covered with two to three inches of wood's mold. Wood mold helped to fertilize sand and prevented the movement of sand while the seeds were germinating.[19]



Figure 8. Stabilization of Kill Devil Hill, 1929.

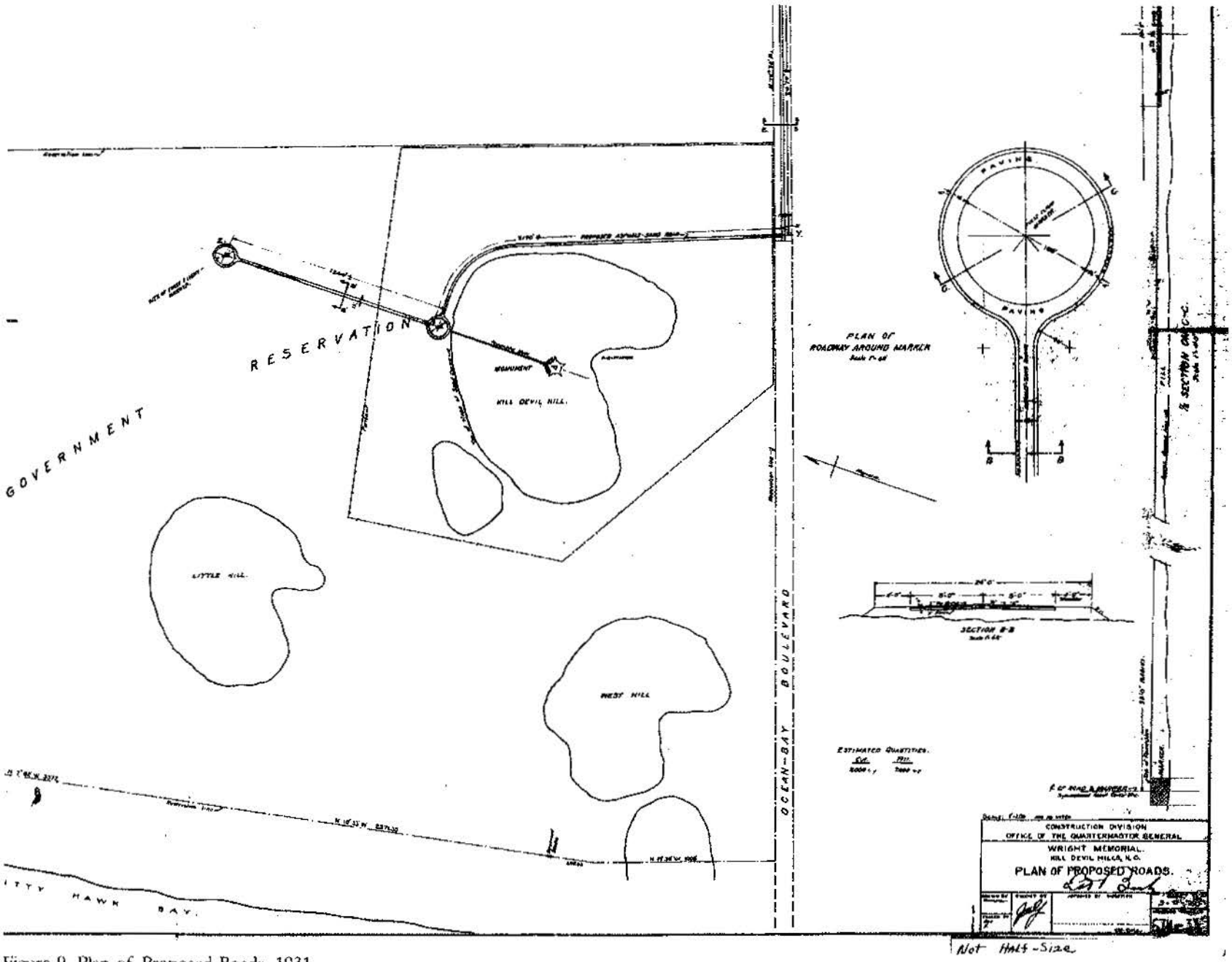


Figure 9. Plan of Proposed Roads, 1931.

Stabilization was completed in 1931. This planting method effectively halted the southwestward migration of Kill Devil Hill, which weathered several storms in 1929 and 1930 without damage. West Hill was not stabilized at this time (Little Hill, the third sand dune, was never acquired).

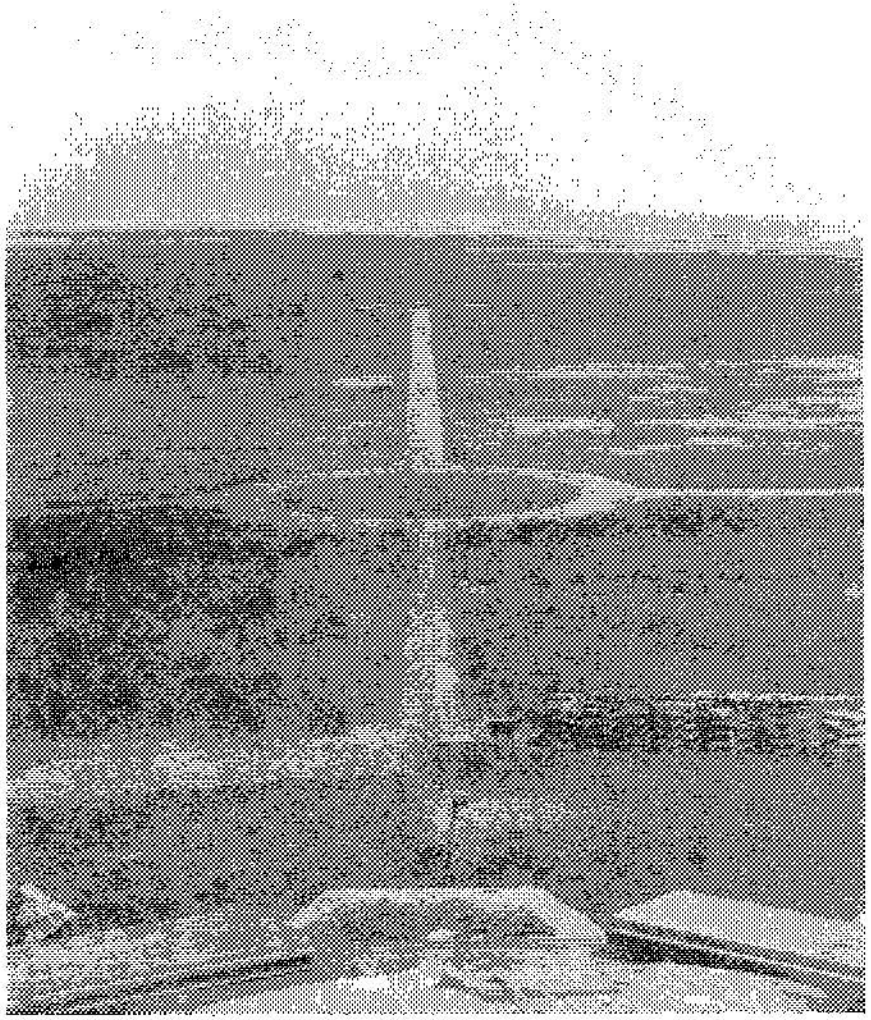


Figure 10. Construction of Boulder Road, 1931.

It was also necessary to protect the site from "the molestation of tourists and souvenir collectors, and the ravages of wild hogs." A wire fence enclosed the area around Kill Devil Hill to prevent animal grazing on the newly planted grass.[20]

Circulation System

The War Department constructed an access road (Ocean Bay Boulevard) into the Park from N.C. 158 (the new road from Kitty Hawk to Nags Head). Title to the strip of land connecting the Park and the highway was obtained from Dare County on 3 February 1931.[21] Bidding on the construction of an internal road network was opened in February 1931. The 1931 Plan of Proposed Roads called for a sand-asphalt entrance road that curved around the east side of Kill Devil Hill, turning due north on axis with the First Flight Marker and the Wright Brothers Monument (figure 9). Roundabouts were located at either end of an axial roadway (Boulder Road) connecting the First Flight Marker and the base of Kill Devil Hill. The plan specified that the centerline of the roadway (16 feet wide with a 4-foot shoulder on each side) was to be symmetrical about the granite marker, which was encircled by a concrete block walk. With roadwork completed by May 1931, the location of the entrance road provided a sight line to the First Flight Marker (figure 10).

Another component of the circulation system was a concrete block footpath, on axis with Boulder Road, starting at the base of Kill Devil Hill and ascending the hill to the monument (figure 11). Photographs dated December 1933 show that a concrete block plaza was also constructed on the monument's south side (figure 12).

Monument Construction

The Wills and Mafera Corporation of New York won the bid for general contractor of the monument. Construction specifications called for a 61-foot-high granite tower with a light beacon and a triangular base measuring 36-by-43-by-43 feet. Details specified stainless steel for

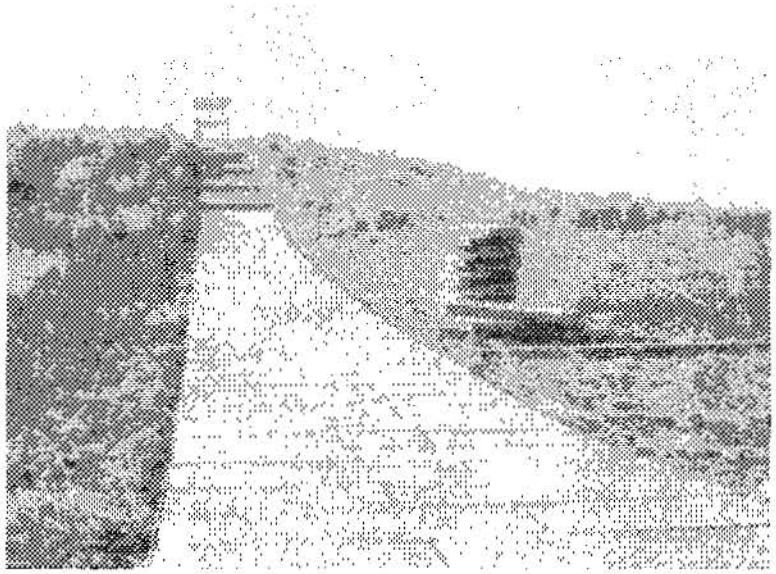


Figure 11. Footpath ascending Kill Devil Hill, 1934.

metal fittings, except for roofing, flashing, and thresholds, which were to be copper and bronze. The North Carolina Granite Corporation of Mount Airy, North Carolina, received the contract to supply the granite.

The stone was transported to the Park by railroad via Norfolk and Elizabeth City and then by barge and truck. The bridge at Kitty Hawk opened that spring, allowing smaller pieces to be delivered directly by truck. Moving larger pieces required on-site rails to be constructed.[22] Work on the star-shaped granite base began in December 1931. Granite blocks were lifted into place by a crane mounted on the hillside. Construction crews completed the monument and its associated powerhouse (designed by the War Department) in November 1932 (figure 13).

Entrance Feature

The War Department constructed an entrance feature that was sited to provide a visual link to the First Flight Marker, as well as a view to the Wright Brothers Monument. Roughly following the form of trun-



Figure 12. Wright Brothers Monument, 1933.

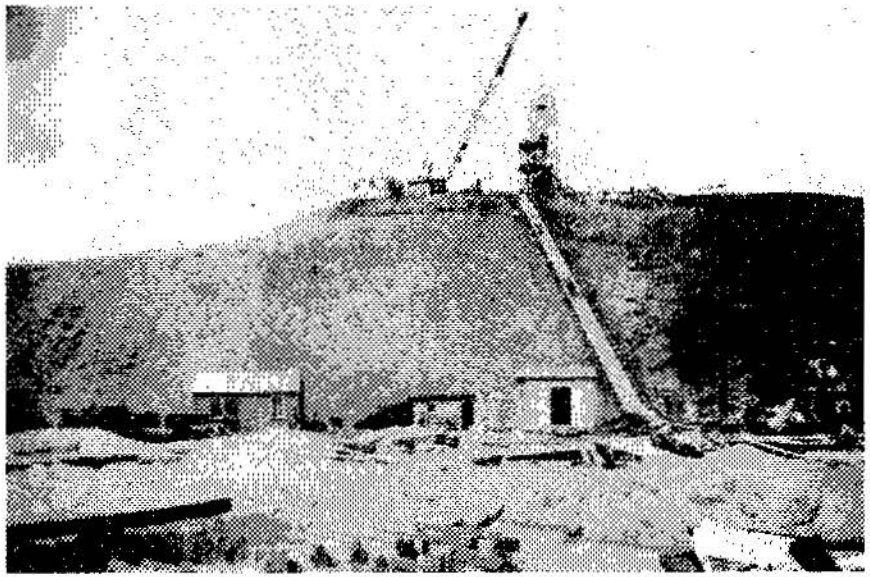


Figure 13. Monument and powerhouse construction, 1932.

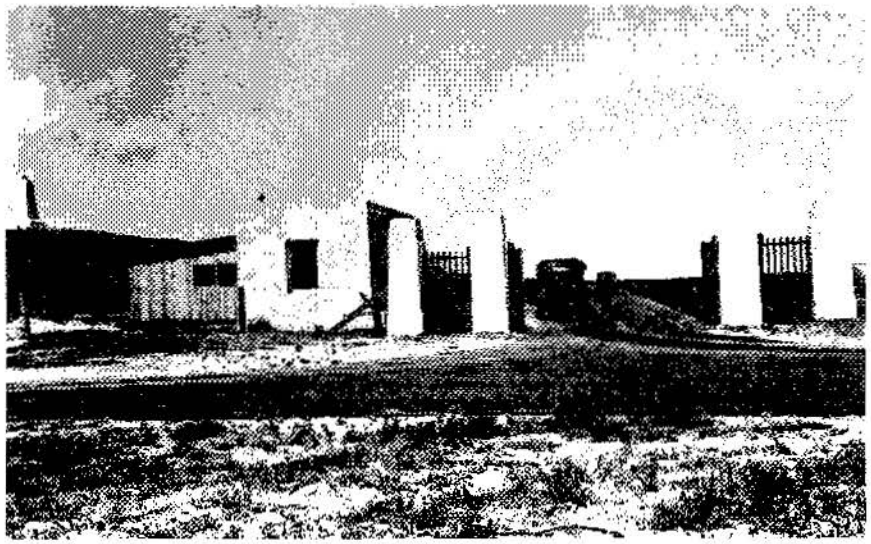


Figure 14. Entrance feature, c. 1935.

cated obelisks, the entrance gateposts used ancient Egyptian motifs like the monument. Extending about 9 feet above grade with approximately 30-inch-square, slightly projecting bases, the four obelisks tapered to less than 24 inches at the top, terminated with a recessed, pyramidal cap. The two outermost posts were fitted with bronze fence panels, and similarly designed moveable bronze gates, mounted on the two innermost posts, guarded the entrance. The Park built a small, concrete contact station just to the west of the entrance, which served as a caretaker's office (figure 14). It appears that the Quartermaster General Corps was responsible for the design and oversight of construction, completed before the transfer to the National Park Service (NPS) in 1933.[23]

ADMINISTRATION BY THE NATIONAL PARK SERVICE, 1933-PRESENT

In August 1933, two Executive Orders transferred administrative authority over forty-eight areas under the War Department to the NPS. Kill Devil Hills Monument National Memorial was one of the forty-eight. Horace Dough, local boat builder and fishing guide, was appointed caretaker just a few days before the transfer.

One of the issues immediately faced by the NPS was whether to construct an airstrip, which had been one of the original goals of the Kill Devil Hill Memorial Association. Soon after the transfer, the Association renewed lobbying for an airstrip. NPS was hesitant because of the expense required to buy needed additional lands, the cost of construction, and a concern that operation of an airport was not in keeping with the mission of the NPS.[24]

Park Development Era, 1933-1942

1938 Master Plan

As a result of President Franklin D. Roosevelt's New Deal programs, the Park received $90,500 through the Public Works Administration for "improvements." The final budget listed road and trail improvements

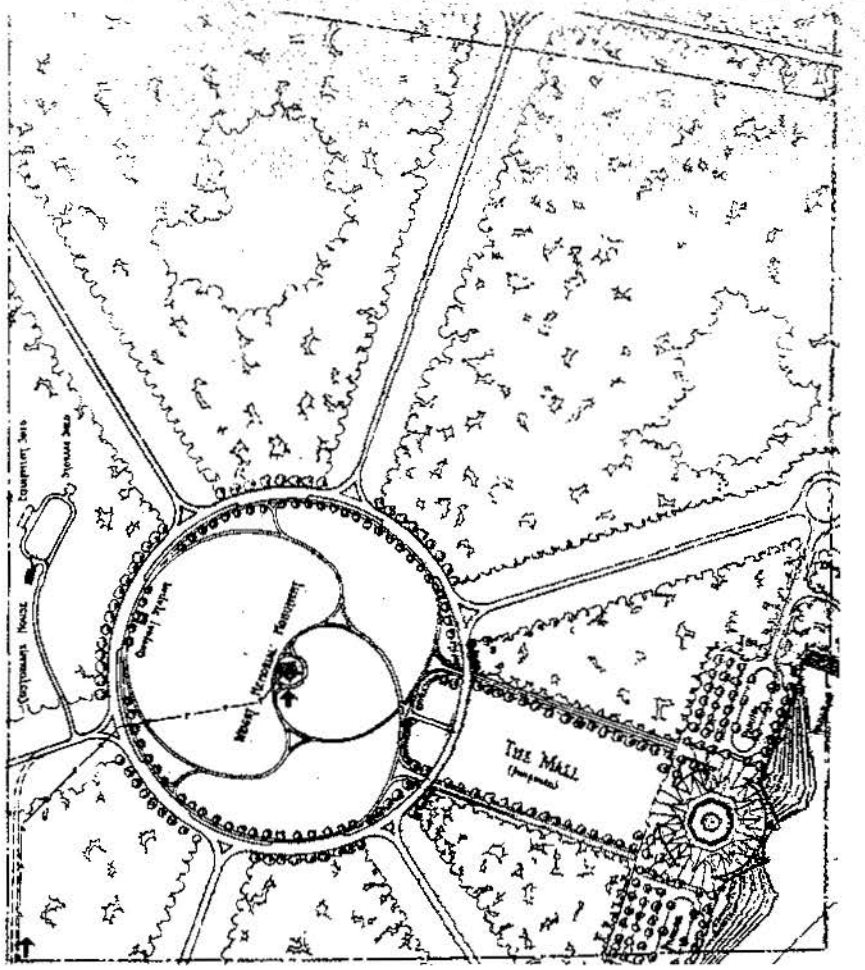


Figure 15. Master Development Plan, 1938.

($38,000), a superintendent's residence and office ($13,500), a comfort station and shelter for visitors ($10,000), additional fencing ($5,000), electrical service ($4,000), plants for the road, trails, and monument ($10,000), and plants for 290 acres of the Park ($10,000). The 1934 Preliminary General Plan, which was further articulated in the 1938 Master Plan, outlined these developments in a formal, Beaux Arts-style layout (figure 15).

In July 1934, the Park erected a fence constructed of concrete posts and eight strands of barbed wire around the entire 314-acre site. Previously, only a portion of the site was fenced to exclude free range grazing. Also in 1934, the Park stabilized West Hill with Bermuda grass, which was described as "growing fine and . . . [had] completely covered the hill except three small areas."[25]

Circulation System Alterations

Between 1935 and 1936, NPS removed the War Department road that arced around the east side of Kill Devil Hill and built a new monument road that encircled the base of the monument. The specified road mix was sand-asphalt. An exit spur led to the village of Colington.[26] The public utilized part of the monument road to reach Colington until a bypass road was built by the state of North Carolina in the 1950s.

In 1934, the preexisting footpath ascending the north slope of Kill Devil Hill was removed and portions used to lay out the walks at the superintendent's residence.[27] Also at this time, the concrete plaza leading up to the monument on the south side was replaced with asphalt. Between 1934 and 1936, four symmetrical, curvilinear paths (sand-bituminous foundation and sandrock asphalt surface) were constructed ascending Kill Devil Hill (figures 16-17). The shoulders were graded, planted with Bermuda grass, and covered with rushes.[28]

Structures

New additions to the site during the early NPS period included a superintendent's residence, with an associated access road, and a comfort station for visitors (figures 18-19). The residence and comfort station were sited to "provide minimum disruption of the natural and historic environment while still providing the best possible protection for the monument."[29] As a result, the new buildings were located on the south side of Kill Devil Hill, out of view of the First Flight Marker but on axis with the center line of the monument. Architect J.M. Thrower prepared the designs for both, sending his first versions of



Figure 16. Construction of curvilinear paths, 1935.

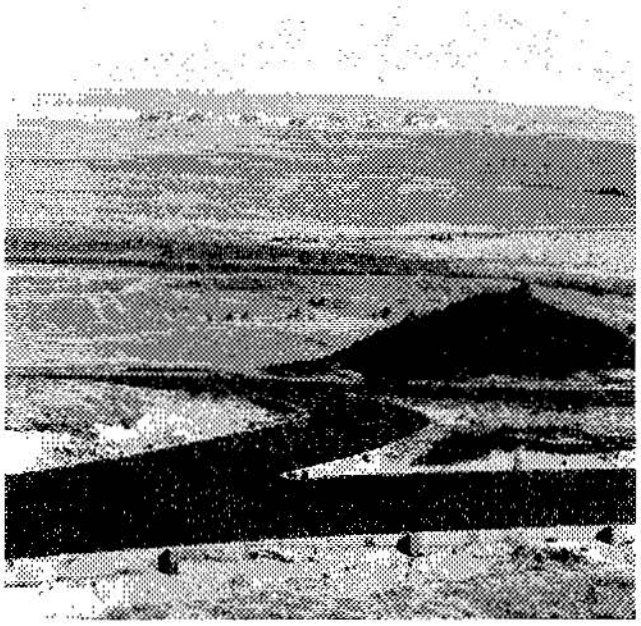


Figure 17. Paving of curvilinear paths, 1936.

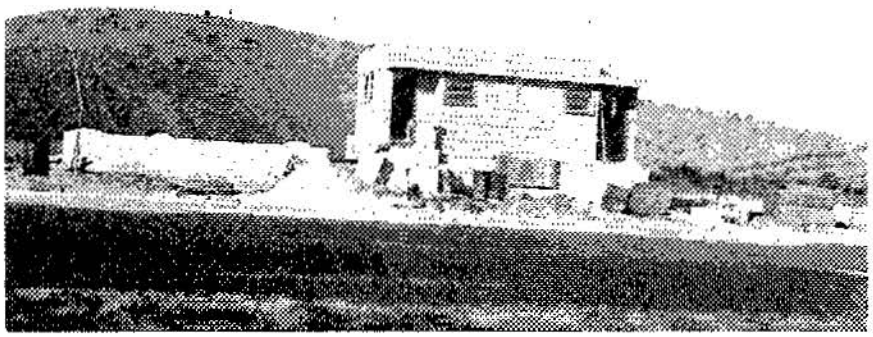


Figure 18. Comfort station, 1936.



Figure 19. Superintendent's residence, 1936.

the plans to Superintendent Horace Dough late in 1934. Construction of the comfort station and the residence began in October 1935 and ended in 1936.[30] Concrete pathways linked the comfort station to the circulation system on Kill Devil Hill.

Further implementation of the 1938 Master Plan occurred in 1939. The Park Service added a maintenance shop and storage building adjacent to the superintendent's residence. Another storage building and workshop were added in 1941.[31]

Articulation of the Mall and Ornamental Plantings

A 1935 letter from Thomas C. Vint, chief architect, states that another $7,500 was needed to make "such further improvement as a tree and bush-lined mall between the First Flight Marker and the Monument."[32] A 1936 proposal for projects for the years 1938 to 1943 (the Six-Year Plan) called for paths along the mall and plantings. The 1938 Master Development Plan articulated this concept, showing a long rectangular open space that linked the two focal points of the site—the monument and the granite marker.

In 1936, the Greenbriar Farms of Norfolk, Virginia, "completed the ornamental plantings projects . . . lining the circular drive with trees, planting flat, sandy areas with grass, and installing numerous shrubs."[33] The January 1936 Superintendent's Report states that 330 live oak trees were planted around the circular drive. The Circular Drive Planting Plan specified that the trees be aligned with the center line of the monument (figure 20). The Monument Planting Plan also called for a 3-foot-high yaupon hedge to be planted at the base of the monument. The Caretaker's Residence Planting Plan and the Comfort Station Planting Plan called for a palette of predominantly native plants, arranged in a naturalistic planting style. In January 1938, Greenbrier Farms had to replace the 330 oak trees planted in 1936 (figure 21).[34]

Aerial photographs from the 1950s show the mall defined by thin bands of vegetation along its longest sides, apparently planted as part of the 1936 ornamental planting project (figure 22). The mall is set apart from surrounding areas of the Park by differences in vegetation management. Outside the mall the vegetation was released to natural succession, resulting in scattered shrub growth (triggered by fertilizing, seeding, changes in drainage patterns, and the construction of an artificial foredune along the length of the Outer Banks). The aerial photographs suggest the Park arrested successional vegetation within the mall by regular mowing of grass and removal of trees and shrubs (see vegetation management below). Drainage ditches dug by the NPS in the 1930s prevented standing ponds of rainwater from destroying the grass.

An Airport

Support for an airport continued a scheme that was included in the 1938 Master Plan. 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. The Park determined that a minimum of 523 acres would be needed in order for the airstrip to be useful as more than just an exhibit. Alfred Poor, the architect for the monument, offered to design the airstrip, stating that the original program for the memorial included an airfield south of Kill Devil Hill, which influenced the design and orientation of the monument. In July 1939, however, the Park produced schematic layouts both north and south of the monument without Poor's assistance. The scheme south of the monument was selected, but Roy Knabenshue, charged with working out acquisition costs and other problems, concluded that building costs at the south end would be too high due to the necessary removal of a large sand dune.[35]

World War II, 1942-1945

World War II (WWII) brought development at the Wright Brothers National Memorial to a complete halt. A lack of funding forced NPS to reduce staff. Money was unavailable for basic needs, such as fertilizer. Appropriation cuts brought by WWII (from a 1940 level of $21 million to $5 million in 1943) dealt a final blow to any further additions to the mall, such as formalized plantings around the granite marker. Plans for an airport were also shelved. The Park Service continued to plan for the

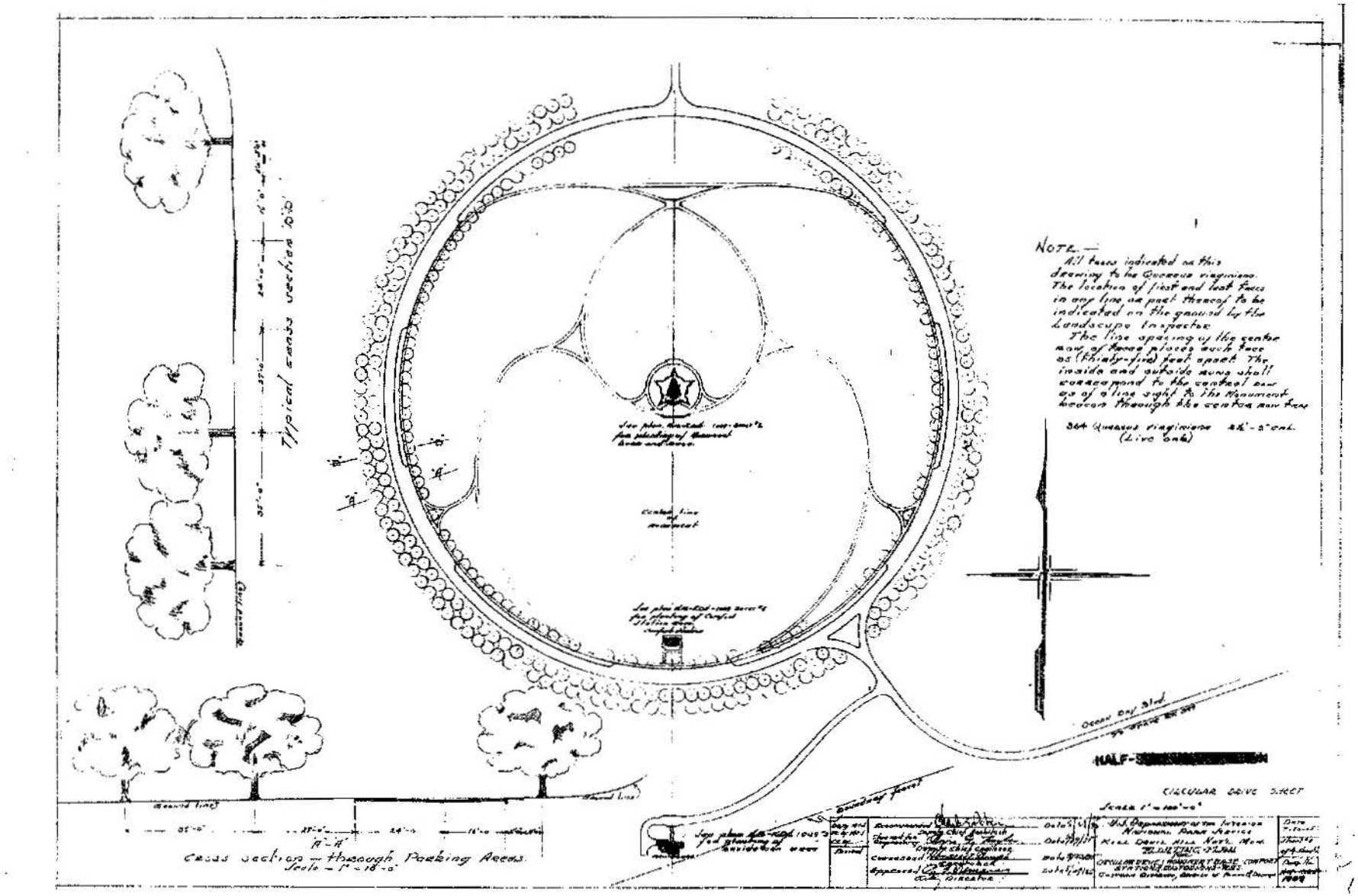


Figure 20. Monument Planting Plan, 1935.



Figure 21. Monument tour road showing tree planting, 1936.

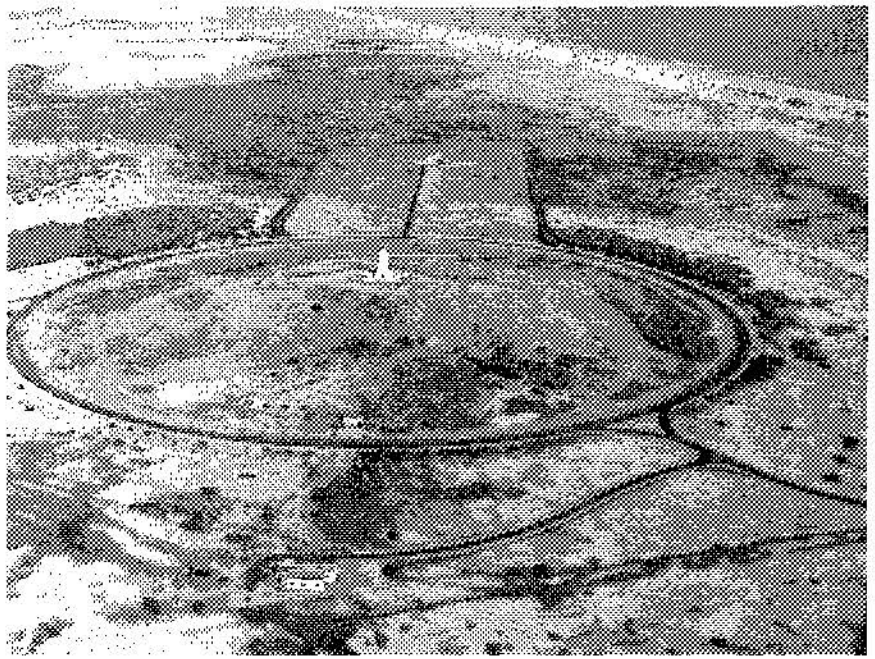


Figure 22. Aerial photograph showing mall, c.1953.

future, completing a new master plan in 1942. With the end of WWII in 1945, basic maintenance funds were returned to the Park, but the 1942 Master Plan was never implemented. An unplanned maintenance cost occurred in 1944 when the copper-sheathed roof of the superintendent's quarters was replaced with an asphalt roof following a damaging storm.[36]

The focus of park maintenance during this time was vegetation management. In 1943, park staff had to remove bushes and small trees from the 40-acre mall area extending from Kill Devil Hill. The June 1944 Superintendent's Report stated that "it has been determined by the Service Landscape Architect and everyone else concerned that the growth of trees and shrubs on Kill Devil Hill and around the base of the hill within the circular drive should be kept at the lowest possible elevation." The reasons given were to preserve the open character of the site and to prevent overgrown trees and shrubs from competing with the Wright Brothers Monument.[37] In November 1949, the yaupon shrubs planted around the base of the monument were "dug up with as much turf as possible and were reset in trenches."[38] Remnants of the hedge can be seen in photographs taken in the 1960s (figure 23).

1947 Master Plan and Mission 66, 1947-1966

Superintendent Horace Dough wrote the Director in 1946 asking for exhibits and other improvements "in order that the visiting public might be better informed."[39] In 1947, the Park drew up another master plan that emphasized interpretation and advocated thinning out brush and other vegetation in order to return to a more accurate historic scene.[40]

The 1947 General Development Plan prompted the acquisition of an 800-by-2,000-foot strip of land between the monument and N.C. 158 to the east, so that a new east-west entrance road could be built. The state of North Carolina promised to build a bypass road to Colington,

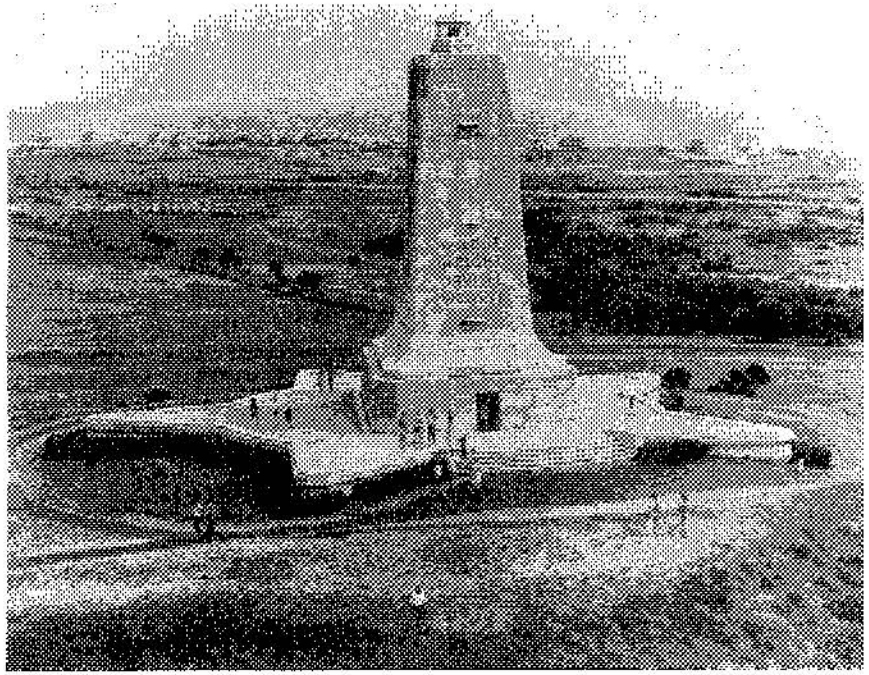


Figure 23. Wright Brothers Monument with yaupon hedges, 1963.

so that the public would no longer utilize internal park roads. The north-south entrance road would be obliterated. Alterations to the orientation of the site initiated the groundwork required before a larger interpretive program could be implemented. Funds could not be found for the required land purchase at this time, postponing related developments until the 1950s.

Refinements to the 1947 Master Plan in the 1950s included a museum/visitor center that ultimately changed the Park's orientation and focus. The Park proposed an "ultra-modern aviation museum" in 1942, hoping to convince Orville Wright that the 1903 *Flyer*, then on loan to the British Museum, should be housed at Wright Brothers National Memorial.[41] Such an ambitious construction project began to seem possible in 1951, when the Kill Devil Hills Memorial Association reorganized as a national "Society" hoping to raise awareness about the fiftieth anniversary of the first flight to be celebrated in 1953. The Kill Devil Hills Memorial Society hoped to raise funds for land acquisition, a museum, reconstruction of the camp buildings, and eventually an airstrip. In February 1952, the Park prepared preliminary plans for a museum facility to be located near the eastern park boundary (figure 24). The Wright Brothers Memorial Museum included a "court of honor," "Wright Brothers exhibit area," "library and reception center," and funnel-shaped "first flight memorial hall" with outdoor terraces facing the view of the First Flight Marker to the north and the Wright Brothers Monument to the west.[42]

These plans marked a shift from commemoration to comprehensive interpretation in the landscape. The monument was no longer the focal point of the site, as the new entrance road directed visitors to the museum and then out to the camp buildings, markers, and monument. All subsequent revisions to the 1947 Master Plan were based on this concept. The plans proposed that the Park boundaries be extended to

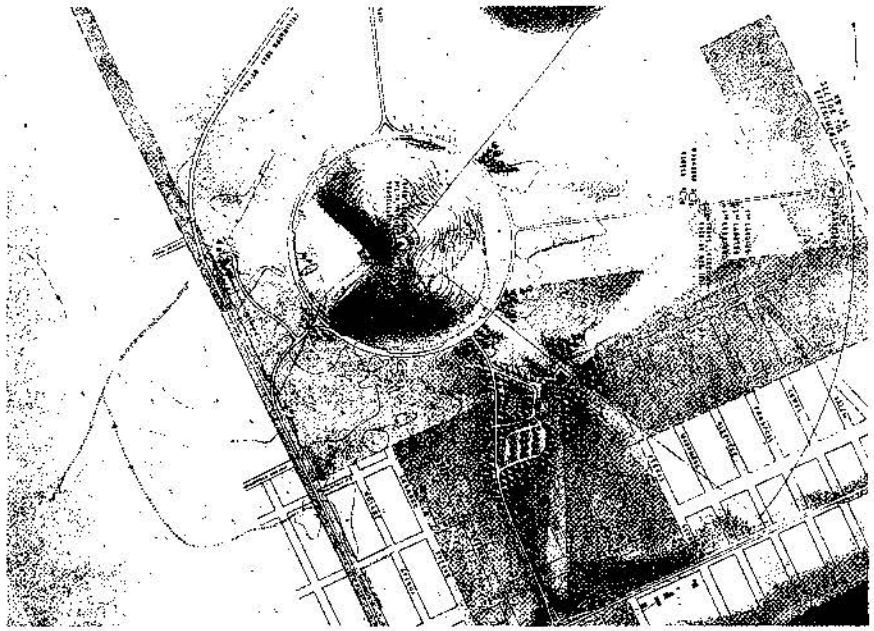


Figure 24. Wright Brothers Memorial Museum, 1952.

accommodate the museum and also to include the site of the fourth landing on 17 December 1903. The proposed east entrance was laid out in a curvilinear manner in its approach to the circular monument drive. This particular scheme sited the museum/visitor center southeast of its present location.

As early as the spring of 1952, it became obvious that enough money could not be raised to cover all the projects proposed, and plans for the $1.2 million museum were postponed. Instead of a museum, the Society decided to prioritize the reconstruction of the two camp buildings and the monorail from which the 1903 flyer had taken off; to erect cast aluminum information markers at the four landing points of the 17 December flights; and to construct walkways connecting these interpretive elements.[43] In November 1953, the archeologist from the Regional Office arrived to locate the site of the Wright brothers' camp buildings (figure 25). The camp buildings and monorail were completed by the fiftieth anniversary celebration in December.[44] The installation of these features initiated a change in the way visitors experienced the site, culminating in the construction of the Wright Brothers National Memorial Visitor Center.



Figure 25. Archeological investigations, 1953.

Wright Brothers National Memorial Visitor Center

In November 1953, the Avalon and Old Dominion Foundations of New York gave $82,000 for land acquisition at Wright Brothers. With the money finally in hand for the needed land purchase, building the museum and new entrance road became the next priority. The 1954 General Development Plan, which included an airstrip east of West Hill, further articulated the implementation of a larger interpretive program for Wright Brothers. The plan proposed changes to the commemorative landscape not seen in earlier plans. Boulder Road would be taken out and the new east entrance located farther north. The plan sited a museum and associated parking area north of the Wright Brothers Monument, slightly east of the location ultimately chosen for the visitor center. This 1954 revision to the 1947 Master Plan outlined all the subsequent changes that occurred to the site.

In 1957, the NPS offered to sponsor a scaled-down version of the museum facility. In an October meeting, Director Conrad Wirth outlined Mission 66, a ten-year program to transform the American national park system to meet the conditions and demands of the postwar era. The program included a new building type that centralized basic visitor services. The "visitor center" became the most significant architectural expression of national park development in this period and subsequently became the centerpiece of park planning all over the country. The use of the word "center" indicated the planners desire to centralize park interpretive and museum displays with new types of interpretive presentations, park administrative offices, restrooms, and various other services.[45] For its Mission 66 visitor center at Wright Brothers, the Park Service sought a smaller, less expensive, more compact structure with distinct components: restrooms (preferably entered from the outside), a lobby, exhibit space, offices, and a room for airplane

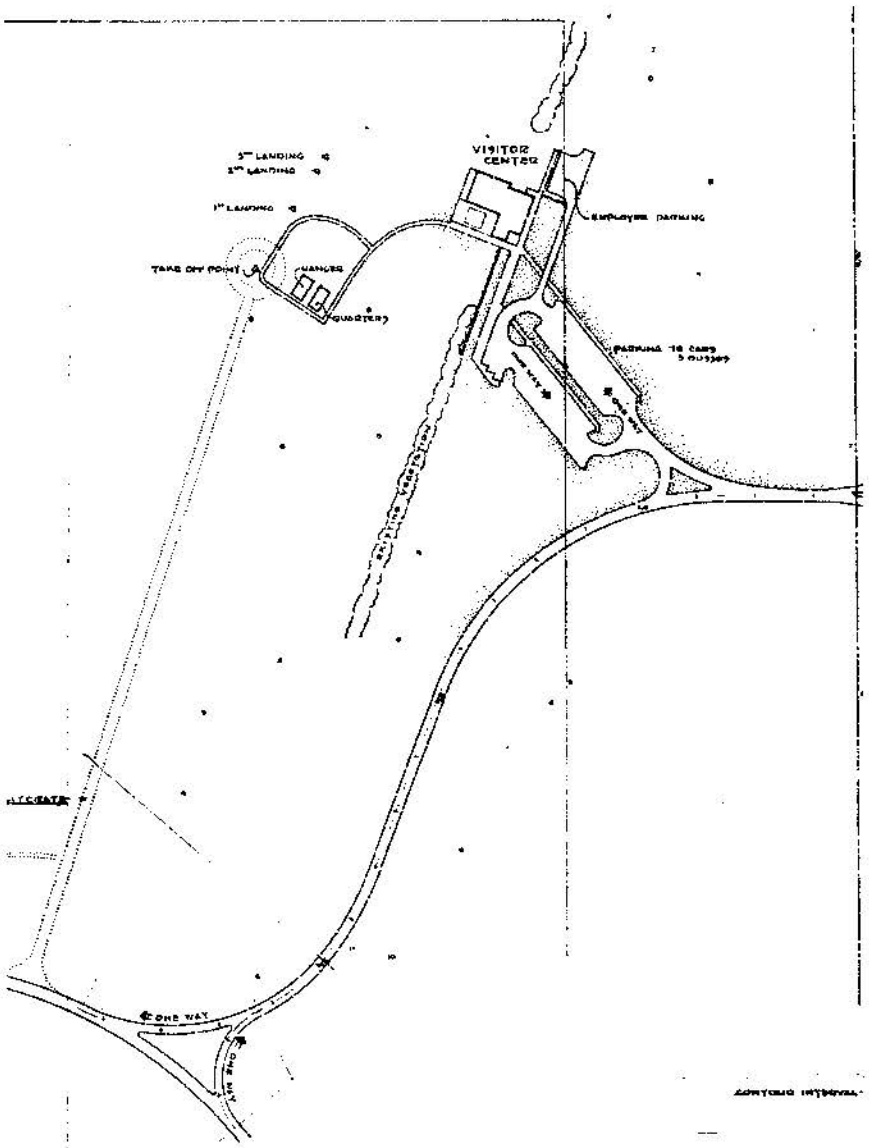


Figure 26. Visitor Center Development Plan, 1958.

displays and ranger programs.[46] Wirth approved the 1957 General Development Plan, a variation on the 1954 plan that sited the visitor center on the eastern edge of the mall. NPS chose the architectural firm of Mitchell, Cunningham, Giurgola, Associates of Philadelphia to design the building.

A collaborative effort took shape between the NPS and Mitchell/Giurgola for the design of the visitor center and surrounding site. Between April and June 1958, John Cabot, Regional Director Elbert Cox, Thomas Vint, and Conrad Wirth approved the location of the entrance road to the monument, the parking lot design, the visitor center footprint, and the paths to the quarters and hangar.[47] The 1958 Visitor Center Development Plan placed the building and parking area along the eastern edge of the mall (figure 26). It appears that NPS determined this location. The Mission 66 Prospectus for the Park stated that the visitor center was to be "near the camp buildings" and a pedestrian path would connect the new building and the first flight line.[48] According to architect Mitchell, the siting of the building was entirely a NPS decision. It was "exactly what they dictated. The location was specified as being close to the first flight line."[49] Park Service historians and planners felt that some encroachment on the historical and natural environment could be justified in light of the more effective public education that resulted.[50]

Throughout the design process, Mitchell and Giurgola were considering the location of the building in relation to the Wright Brothers Monument and the first flight line. Preliminary site plan sketches include arrows indicating vistas from the building to these points of interest (figure 27). Giurgola stated that "the low profile of the building is in keeping with the expanse of land and the gentle undulation of the dunes, and the distribution of the spaces is in relation with the view of the existing monument and of the Wright Brothers' shelters and take-off area. . . . the design reflected the particular period of American architecture of the early 60s in which the rigidity of modernism evolved into more articulated solutions integrating internal and external spaces."[51]

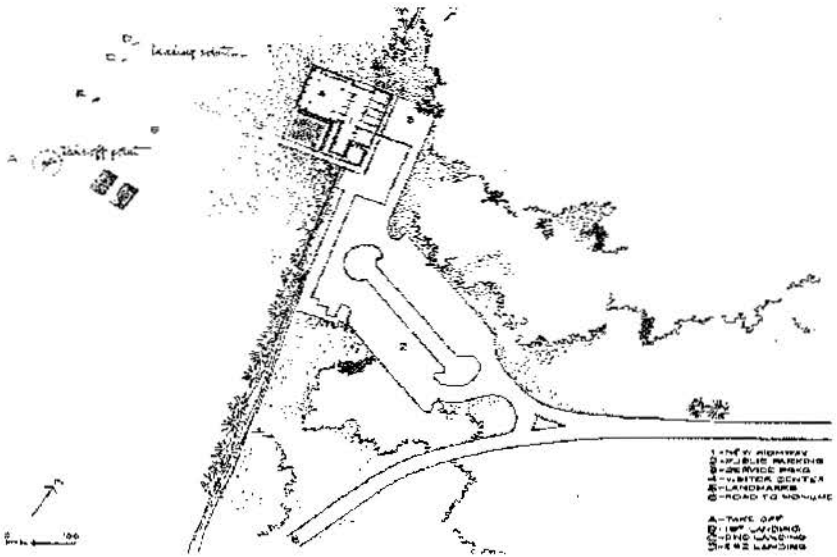


Figure 27. Site plan sketch, 1959.

While the architects worked with possible design schemes, the Park turned its attention to construction of the entrance road and parking facilities. In June 1958, they awarded a contract for the construction of the east entrance road and parking lot to Dickerson, Inc., of Monroe, North Carolina. In August, a group from the Eastern Office of Design and Construction (EODC) visited "to discuss plans for the Visitor Center and Parking Area."[52] The half-mile road and parking area were completed by December, and the following February the contract for the construction of the visitor center was awarded to Hunt Construction Company of Norfolk, Virginia. In June 1959, Congress authorized the formal acquisition of the additional property to the north and east needed for the visitor center and parking lot, including the fourth landing site of 17 December 1903. A second 16-acre tract was added between Lowell and Woodmere Avenues to provide a buffer from encroaching development. A total of 111 acres were added to the Park making the Park's total acreage 421.

Beginning in 1957, the circulation system, and ultimately the way visitors experienced the Park, was significantly altered. The state of North Carolina was proceeding with the relocation of the main highway paralleling the eastern boundary of the Park. The new highway (U.S. 158) would be located directly on the proposed eastern boundary, and the new entrance into the Park would be adjacent to this highway. Another change was the construction of a bypass road to Colington, completed in July 1958. Public traffic no longer had access to internal park roads, although the right-of-way for the bypass road was located in the southwestern corner of the Park. The old entrance road and the internal Colington Road extension were obliterated in May 1959.[53] Apparently Boulder Road was taken out sometime prior to 1959.[54]

Mitchell/Giurgola's final plan for the visitor center was a single-story concrete and glass building, slightly elevated on a 128-foot-square concrete platform (figure 28). Two parallel, rectangular blocks with flat roofs occupied the east half of the platform. The easternmost block consisted of restrooms and offices, and the other served as entry lobby and display area. The display area joined directly to a large, domed "assembly room," square in plan, that occupied the northwest quarter of the platform. The southwest quarter of the platform was an open "ceremonial terrace," and the southeast corner was open as well, functioning as a smaller "entry terrace." By alternating interior spaces with open exterior terraces, the architects avoided the potential monotony of such geometry. The roof structure design formed "a strong focal point on the exterior of the structure, which stands above the low-lying landscape, in concert with the higher rising dunes and pylon."[55]

The attention lavished on aesthetics and symbolic purpose did not detract from the visitor center's practical function. The visitor center served as a control point for what planners called "visitor flow," as well as a more efficient means of serving far larger numbers of visitors and cars in a more concentrated area.[56] Visitors arrived on the new entry road "located so as to give access, in proper sequence, to the

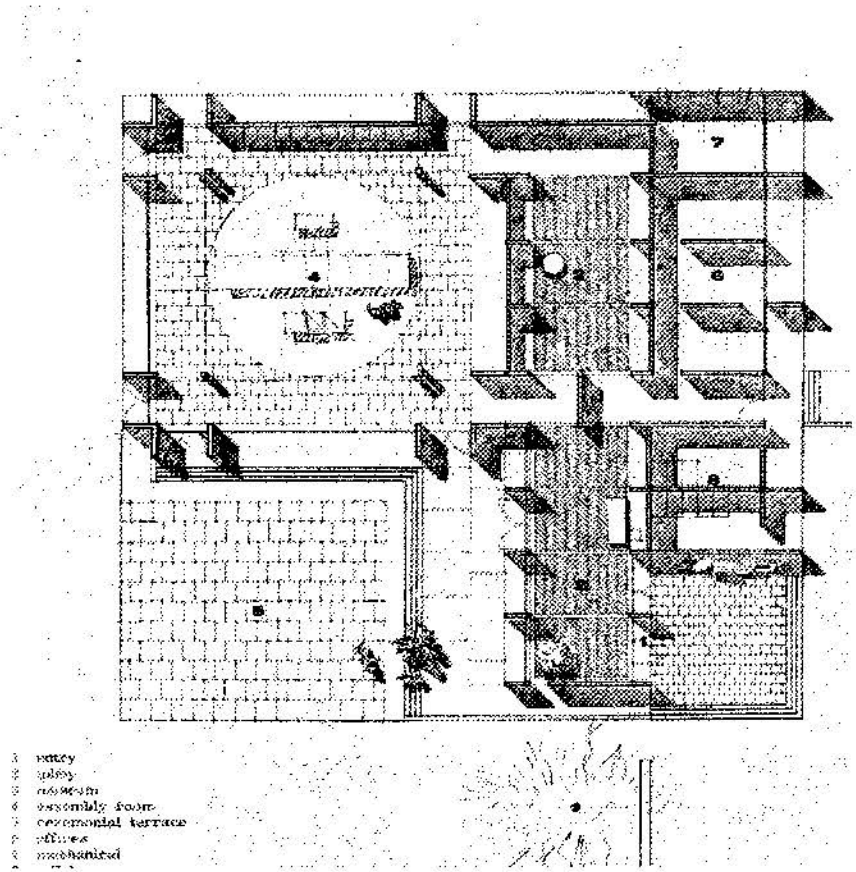


Figure 28. Presentation drawing, 1959.

historic sites and buildings."[57] The parking lot oriented visitors at a forty-five degree angle to the entry terrace at the southeast corner of the building (figure 29). Both the entry road and the siting of the parking lot directed the visitor away from the Wright Brothers Monument, which had previously been the focus of the site. The Park Service sited the building to become the new center for visitor arrival and orientation, with both monuments and the first flight line easily viewed from the visitor center itself. During an August 1958 meeting of the "Wright Memorial Committee," members agreed that "special consideration be given to directing people to the first flight line area rather than to the memorial feature."[58]



Figure 29. Aerial view of Wright Brothers National Memorial Visitor Center, 1963.

Cypress fences were part of the original plan, flanking the building on the south and east sides. The southern fence extended approximately 95 feet from the south side of the building along the west side of the parking lot. By blocking the view from the parking lot to the first flight line, the fence and associated vegetation funneled the visitor to an open entry court and controlled the visitor's initial view of the camp buildings, First Flight Marker, and Wright Brothers Monument. The intent was to guide the visitor into the building, through the museum exhibits, and into the assembly room housing the replica airplane, where a wall of glass allowed the visitor to look out onto the first flight line. This scheme also blocked views back to the parking lot from the ceremonial terrace. The fence on the south side was damaged by Hurricane Donna in September 1960 but was immediately rebuilt. The fence extending approximately 46 feet from the east side of the building screened staff

parking from view of arriving visitors. An entry feature with a fence and gate were designed as part of the site plan.

The approach from the parking lot was a crucial part of the design concept of controlling pedestrian flow up to the building, as well as blocking clear views out onto the mall. Walkways oriented visitors to the raised entry terrace, reached by three steps running the full width of both its south and east sides (figure 30). A formed-concrete water fountain was designed for the east side of the entry terrace near the restrooms. A walkway extended past the restrooms north of the entry terrace. Another walkway extended to a flagpole south of the entry terrace (figure 31).

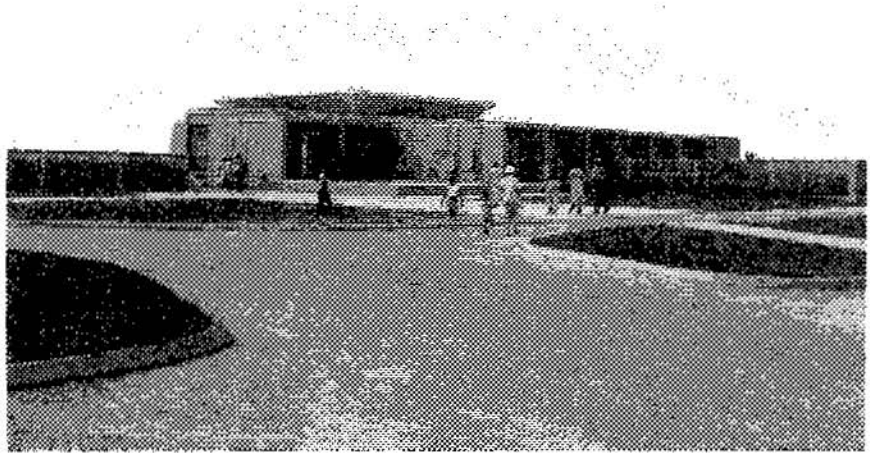


Figure 30. Pedestrian approach to visitor center, 1960.

The main entry brought visitors into the lobby area, where they had an immediate view directly across to the ceremonial terrace, with the first flight line in the distance. Visitors then proceeded into the interpretive display area, and finally to the large domed assembly room. The assembly room featured views out to the first flight line and the Wright

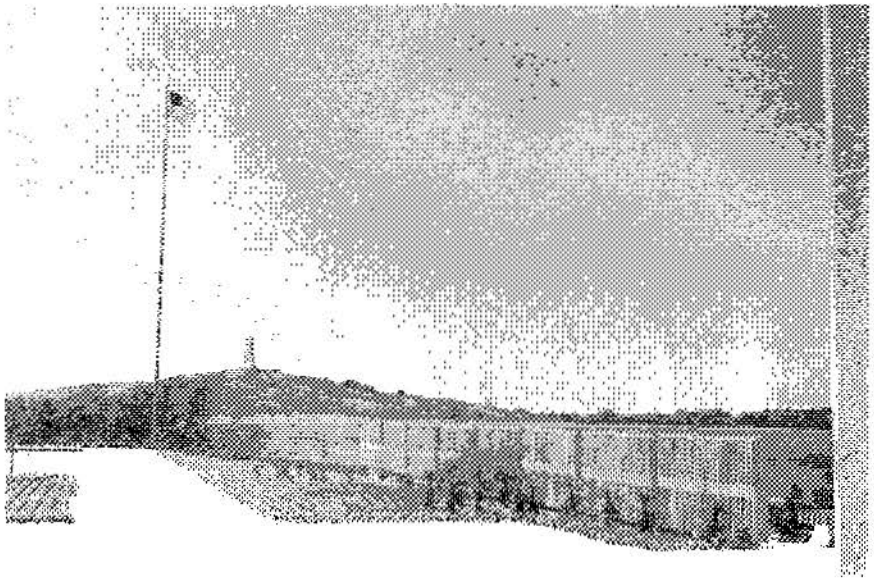


Figure 31. View out to flagpole, 1960.

Brothers Monument through large window walls on three sides of the room. The steel window frames and mullions were painted bright red-orange, drawing attention to the glass areas of the walls.[59] Double doors at either end of the south facade led out to the ceremonial terrace, designed to be the focal point for the Park's more formal events. A concrete walkway wrapping the east and north sides of the ceremonial terrace along the south side of the building connected the ceremonial and entry terraces.

A wooden bench was an original feature along the south side of the platform between the entry and ceremonial terraces; four cast-concrete planters were designed for the east and north sides of the ceremonial terrace (figure 32). A walkway on the south side of the ceremonial terrace led visitors out to the camp buildings and the first flight line (figure 33). According to the completion report for the visitor center, portions of the encircling exposed-aggregate concrete block walk around the First Flight Marker were taken up and used to complete the walk from the marker to the camp buildings.[60]

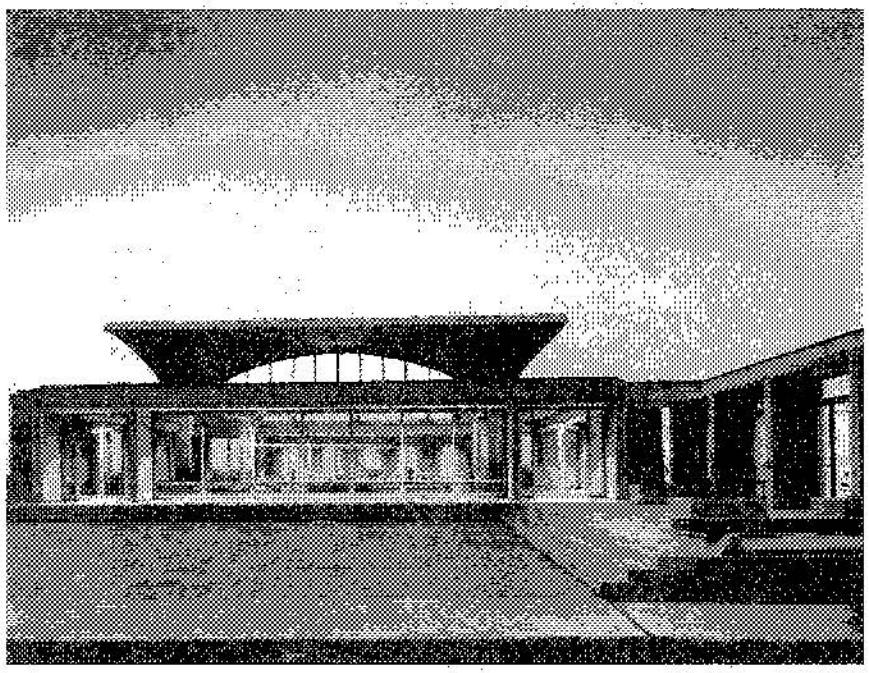


Figure 32. View of ceremonial terrace showing bench and planters, c. 1963.

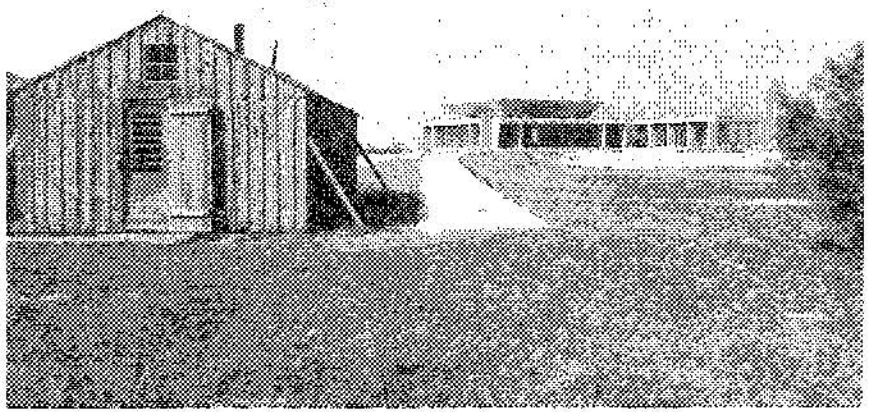


Figure 33. Camp buildings and visitor center, 1960.

The original planting plans for the visitor center specified bearberry (*Arctostaphylos uva-ursi*), a native groundcover that could not be supplied by the contractor. The completion report states that "considerable experimentation and effort" were used with native groundcovers in trying to replace the bearberry. The subcontractor was able to secure a prostrate, spreading form of yaupon, to be used with a non-native creeping liriope (*Liriope spicata*). The "as built" planting plan, however, indicates that creeping liriope was the only groundcover used. The open areas were stabilized with Bermuda grass and rye grass (figure 34).

The visitor center (9,900 square feet) was dedicated in December 1960. At this time, the visitor center and camp buildings became the center of comprehensive interpretation, with the suggestion from Washington that the Wright Brothers Monument be closed to visitors. Staffing was not adequate to man the monument, and there was also a concern about visitor safety.[61]

Definite plans for a 3,000-foot airstrip, to be located east of West Hill, were announced at the December 1962 anniversary ceremonies. The airfield was sited so that landing planes would have the correct wind conditions the majority of the time (figure 35). The dedication of the airstrip occurred at the sixtieth anniversary celebration in 1963 (figure 36).

Vegetation Management

Vegetation management during this time (other than routine mowing) entailed planting various grass seeds on the road shoulders and removing brush and trees. In June 1950, an area of one-half acre was planted in oats as an experiment and was to be expanded to include all the areas along the roadways that were not adequately grassed (this experiment was not mentioned again in the Monthly Reports). In October 1950, rye grass was sown on the bare portions of the road shoulders to prevent erosion by strong winter winds.[62] Superintendent Dough reported in May 1951 that the topsoil and Bermuda grass roots had started "growing a good cover" on the road shoulders around the hill. He noted

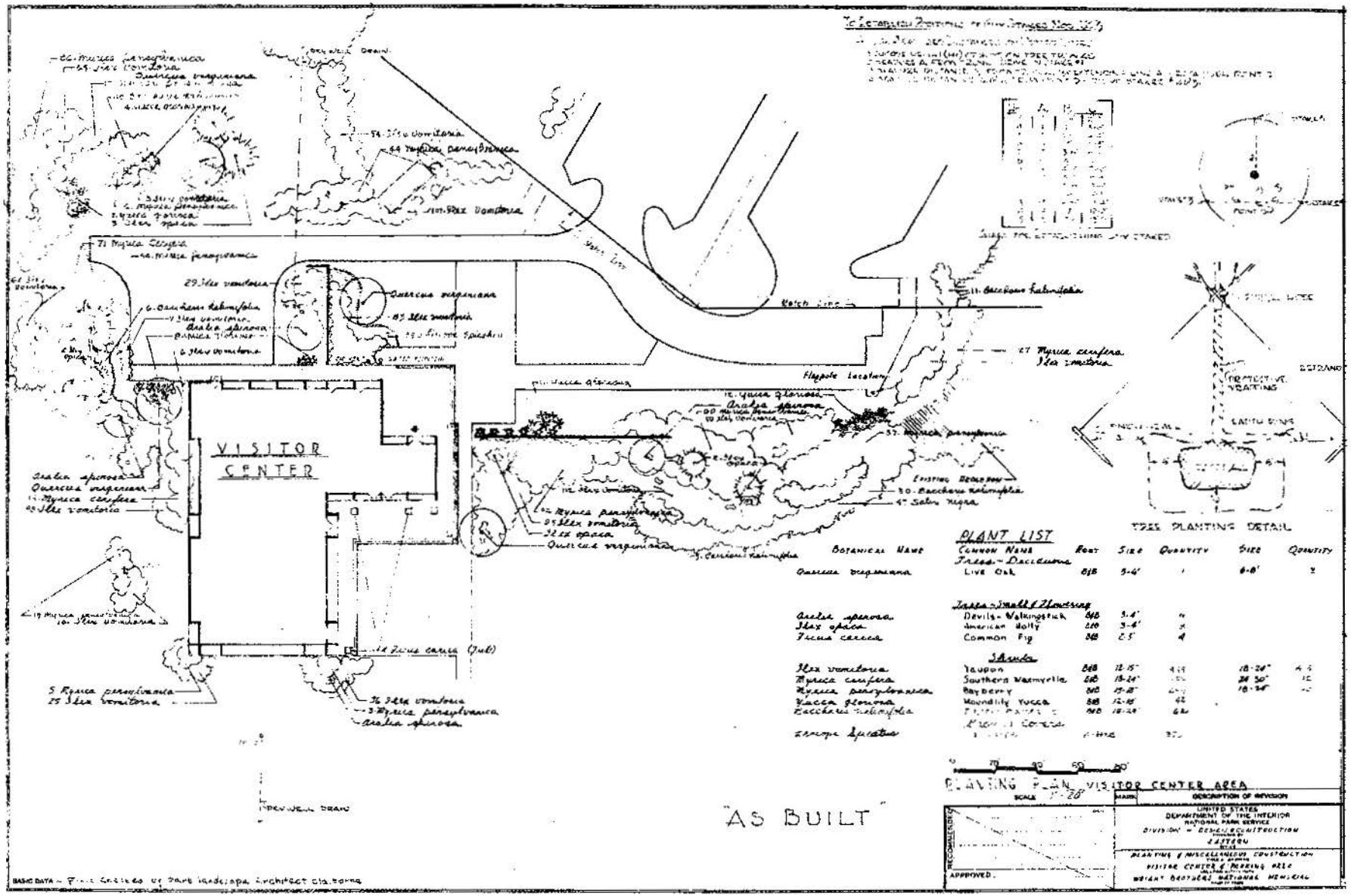


Figure 34. Planting and Miscellaneous Construction, 1960.

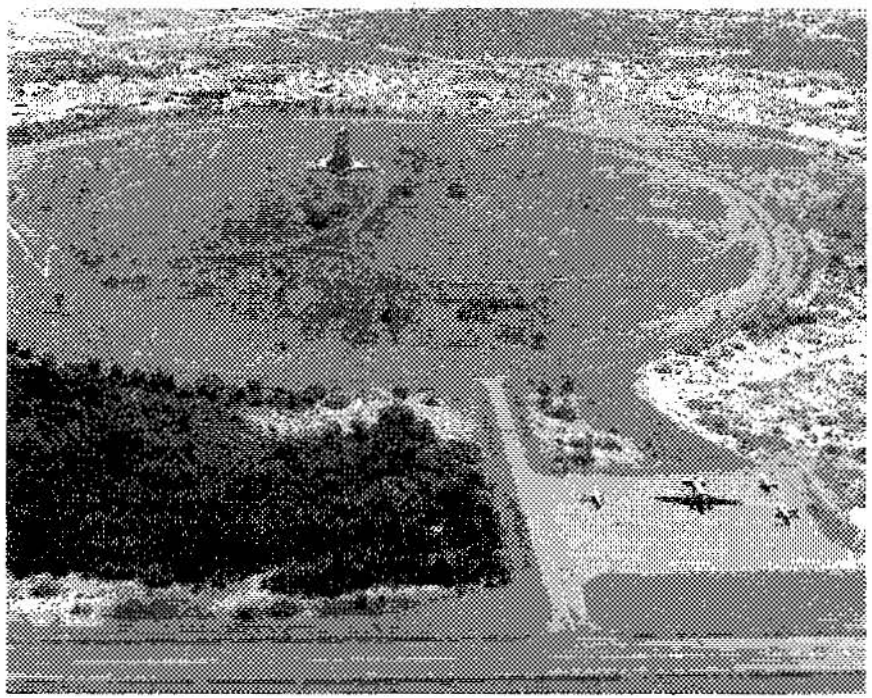


Figure 35. Aerial view of airstrip, 1969.

that in February 1951, the Park removed brush and trees flanking both sides of Boulder Road from the fifty acres between Kill Devil Hill and the First Flight Marker.[63] A similar notation was made for July 1960.

Miscellaneous Projects

In 1948, the Park graded and reshaped the shoulders on the inside of the circular monument road to correct drainage problems. In 1954, the Park repointed the exterior walls and enclosed the terrace on the north side of the superintendent's quarters. In 1957, the circular monument road and curvilinear walks were resurfaced with sand-asphalt and the shoulders regraded and covered with topsoil and Bermuda grass. In 1959, maintenance crews repainted the comfort station and garage and replaced the wooden walkways alongside the hangar.

In November 1963, the Park took down the camp buildings and rebuilt

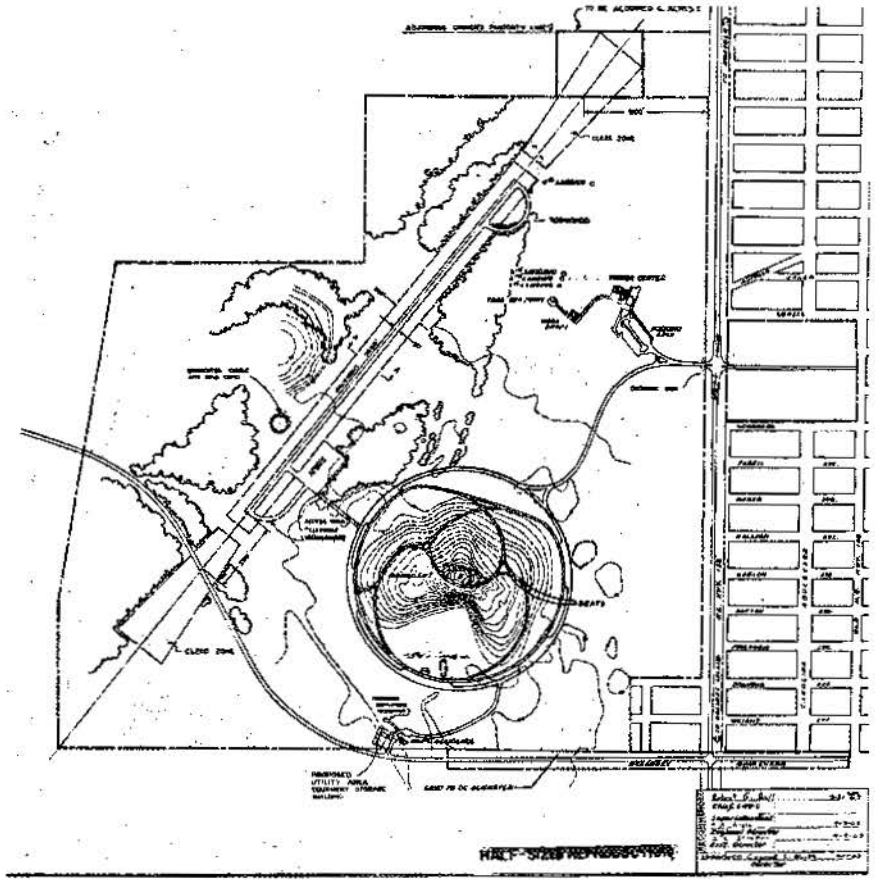


Figure 36. General Development Plan, 1963.

them in 1964 to 1965. In June 1963, the Park erected triangular pedestal markers at the landing points of the 17 December 1903 flights.[64] The pedestals were painted orange-red to match the color of the original steel window frames and mullions of the visitor center, creating a striking link between the building and the landscape.

Another important change to the commemorative landscape occurred in 1966. With Boulder Road taken out and interpretation shifted to the visitor center, the Park rotated the First Flight Marker so that it faced the camp buildings, and leveled the small mound supporting the



Figure 37. Reorientation of First Flight Marker, c. 1966.



Figure 38. Abandoned entrance station, 1977.

marker in an effort to return the topography to a more accurate Wright-era appearance. A new concrete walkway (brush-finish surface) connected the marker and the camp buildings with the visitor center (figure 37).

1965 Master Plan

The 1965 Master Plan called for "recreating the historic scene" by removing all trees and shrubs from Kill Devil Hill, West Hill, and the area between Kill Devil Hill and the first flight line; selective cutting to maintain a view of West Hill from the first flight line and visitor center, and screening of the airstrip turnaround as viewed from the visitor center. The plan also recommended removing the comfort station, powerhouse, and old entrance station (figure 38). The comfort station was removed sometime before 1969. In 1977, the Park submitted Section 106 compliance documentation for removal of the old entrance station and powerhouse. The Park received clearance to remove the old entrance station with the suggestion from the North Carolina State Historic Preservation Office (SHPO) that the entrance posts be retained. Park maintenance carried out the demolition of the entrance station in December 1979. The Park also received clearance to remove the powerhouse but chose to keep it.

In October 1966, Wright Brothers National Memorial was entered in the National Register of Historic Places, subsequent to passage of the National Historic Preservation Act, and documented as a historic district in August 1978. A Historic Resource Study and National Register amendment completed in 1997 added the Wright Brothers Monument, the First Flight Marker, the monument powerhouse, the curving trails and circular road, the spatial relationship between the monument and the marker, Kill Devil Hill, West Hill, and the Wright Brothers National Memorial Visitor Center as contributing resources to the historic district.

Vegetation Management

A 1980 Grounds Management Plan restated that a low profile vegetative cover evocative of the openness of the 1900 to 1903 period should be maintained. It called for the removal of 170 acres of trees and shrubs in and near Kill Devil Hill, West Hill, and the first flight line. These areas would be maintained as grass. All trees and shrubs were to be removed from West Hill. In 1987, the Superintendent reported that "a major landscaping project on the main hill at Wright Brothers was accomplished with the participation of personnel from all divisions." No further description of the work was included.[65]

Miscellaneous Projects

In 1974, the terrace of the superintendent's quarters was enclosed with screening and wood lattice, and the original steel sash windows were replaced with double-hung metal windows. In 1976, the Park also replaced the original steel frame windows and doors of the visitor center with an aluminum window-and-door system.[66]

In 1980, Denver Service Center oversaw a contract to approximately double the size of the visitor center parking area. Handicapped access ramps alongside the restrooms were added at this time.[67]

In 1980, the First Flight Airstrip and parking area, as well as the walks from the airstrip to the Wright Brothers Monument, were repaved. Also during the 1980s, the Park partially enclosed the employee parking lot on the northeast side of the building with a wood fence similar in appearance to the fencing along the visitor parking lot. In 1984, metal stair railings on both the entry and ceremonial terraces were installed, and a new entrance sign was designed and constructed. In addition, the hangar was rebuilt for a third time to more exact specifications after being destroyed by a storm.[68]

In 1985, a road and walkway rehabilitation project was contracted out through the Federal Highway Administration. It included leveling and

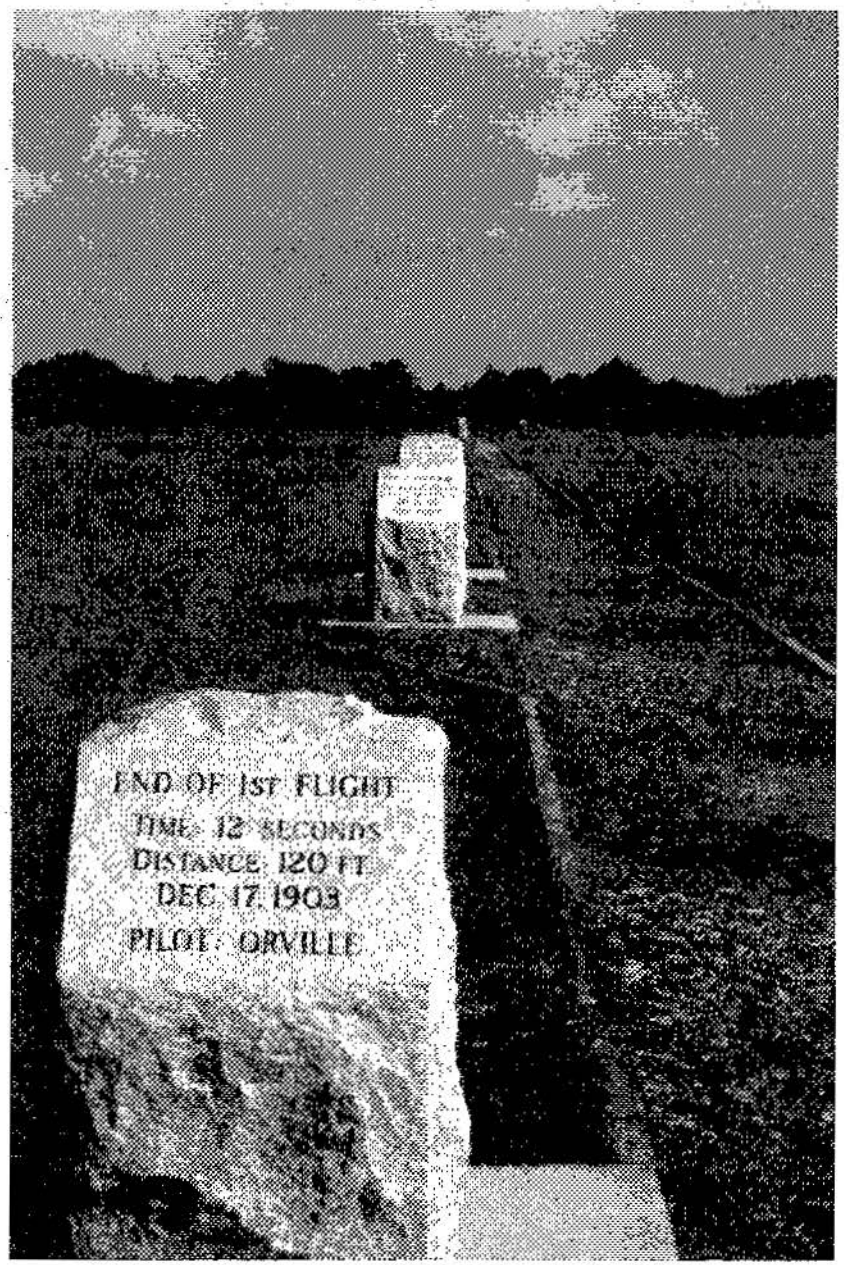


Figure 39. Granite markers, 1999.

overlaying the entrance road, maintenance road, and airstrip access roads; reconditioning and overlaying the circular monument road and parking areas; and reconstructing the entrance road intersection and the airstrip parking area and turnaround. The Williamsport Preservation Training Center completed preservation work on the Wright Brothers Monument in 1987. The first phase included replacement of ferrous metal with stainless steel and cleaning and painting the stairwell.[69] Also in 1987, the entrance gates to the Park were replaced, and a fee collection kiosk was placed near the Park's exit (modified in 1989).

In 1991, a new asphalt walkway was constructed on the west side of Kill Devil Hill where visitors had carved out a path between one of the parking pulloffs and the original curvilinear path. The installation of new fencing, handicapped access ramps, and gates at the airstrip also occurred in 1991.[70]

In 1992, the Park replaced the small concrete pedestals previously used to locate the 1903 landing sites with granite markers (figure 39). In 1993, the Cape Hatteras National Seashore (CAHA) preservation team rebuilt the camp buildings (for a fourth time). The installation of a new fiberglass flagpole also occurred in 1993. In 1997, the Wright Brothers Monument was rehabilitated. The replacement of the windows on the north side of the assembly room in the visitor center with solid walls also occurred at this time when a new HVAC system was installed. In 1998, the cypress fence that separated the parking lot from the mall was removed, along with the vegetation in front of it. The installation of the handicapped ramp at the ceremonial terrace also occurred in 1998. The stabilization of the monument powerhouse occurred in 2000.

Land Transfer

In 1984, the United States conveyed to the state of North Carolina a right-of-way along a portion of Ocean Bay Boulevard and a portion of Colington Road, which the state was already maintaining under terms of a special use permit. The basis for the transfer was a reduction in administrative workload. Rights of ingress and egress were retained.[71]

1997 General Management Plan

In 1997, a General Management Plan (GMP) was approved for Wright Brothers National Memorial. It proposed the following:

- removal of the 1960 Wright Brothers National Memorial Visitor Center;
- construction of a new visitor center, entrance road, and parking for 225 vehicles;
- 16,250 feet of stabilized trails;
- addition of a fee collection plaza;
- removal of camp buildings; footprints of the buildings interpreted instead;
- removal of a portion of the road system linking the existing entrance with the circular drive;
- restriction of access to full circular drive;
- thinning of the vegetation adjacent to the First Flight Airstrip to provide a view of aircraft taking off and landing;
- selective planting of vegetation at the Park's entrance to screen U.S. 158;
- removal of superintendent's residence;
- relocation of maintenance facilities;
- removal and relocation of First Flight Airstrip concession structure;
- culverts to replace sections of the drainage ditch on the east side of the monument;
- stabilization and repointing of the monument.

The NPS prepared an Environmental Assessment (EA) on the GMP for Wright Brothers National Memorial, which resulted in a Finding of No Significant Impact (FONSI) pursuant to the Council of Environmental Quality's regulations for implementing the National Environmental Protection Act. The GMP/EA addressed the issues of visitor use and circulation, interpretation, protection of cultural and natural resources, facility development, the use and disposition of extant structures, and how to prepare for the centennial of powered flight.

On 30 May 1996, staff of the North Carolina SHPO met with NPS staff concerning the draft GMP. The office raised questions concerning the visitor center's National Register eligibility and its future because all but one of the alternatives called for its removal. NPS staff explained that issues of eligibility would be addressed in the forthcoming Historic Resource Study. In September 1996, the SHPO received the draft GMP and commented on 23 September that the visitor center appeared to be eligible for listing in the National Register and requested that documentation be prepared to determine its eligibility. The SHPO also expressed concern about the alternatives in the GMP recommending removal of the visitor center. On 9 October, NPS informed the SHPO that NPS had sent to the SHPO on 12 July 1996 additional documentation for the park's National Register district that identified the visitor center as non-contributing. (Meanwhile, NPS had received no comment from the SHPO on the additional documentation, and on 13 September the Keeper of the National Register approved the additional documentation including the recommendation of non-contributing status for the visitor center.) Upon receipt of the October 9 letter the SHPO realized that the additional documentation material had been lost in interoffice mail after receipt. The SHPO requested and promptly received an additional copy from NPS.

Because of the SHPO judgment that the visitor center was of exceptional architectural significance sufficient to warrant contributing status, staff conducted additional research to prepare a report evaluating its significance and requesting reconsideration by the Keeper. SHPO staff consulted various members of the historic preservation, architecture, and architectural history professions in the state and nationally on the question of significance and the importance of preserving the visitor center. As a result, widespread concerns were raised by the professional community who believed the visitor center was of great architectural significance. These included local, state, and national chapters of the American Institute of Architects, the Society of Architectural Historians, and other professional observers who vigorously challenged the decision by the Keeper regarding the visitor center. In the meantime, the SHPO completed a report demonstrating the statewide and exceptional significance of the visitor center, which was submitted to the Keeper on 3 February 1997.

In 1997, as a result of the concerns raised by the professional community, NPS amended the National Register documentation to include the visitor center as a contributing feature of the existing 421-acre historic district.[72] In January 2001, the visitor center was designated a National Historic Landmark as a nationally significant example of a Mission 66 visitor center and as one of the most important examples nationally of the Philadelphia School of modernist architecture. A Historic Structures Report (HSR) is being prepared concurrent with the Cultural Landscape Report. Details concerning the visitor center will be addressed in the HSR.

First Flight Centennial Plan

Over the past five years the National Park Service has undertaken various planning projects to prepare the Park for the 100th anniversary of flight in 2003. Designation of the Wright Brothers National Memorial Visitor Center as a NHL will necessitate a new GMP. In the meantime, planning for the centennial celebration is underway. The Park has written an Action Plan for the First Flight Centennial Anniversary. The celebration is expected to draw a minimum of 30,000 visitors per day over a two-day period and will include multiple local, state, and federal agencies, extensive civilian and military aircraft participation, and possibly a presidential visit.

Notes

1. Over the years, there have been many theories as to the origin of this place name. Regardless, the name appears on maps as early as 1809. A lifesaving station established here in 1870 bore the name, and when the town incorporated in 1954 it adopted the name as well.
2. Lynanne Westcott and Paula Degen, *Wind and Sand: The Story of the Wright Brothers at Kitty Hawk* (New York: Harry Abrams, 1983), 30.

3. Ibid., 76.
4. David Stick, *The Outer Banks of North Carolina, 1584-1958* (Chapel Hill: University of North Carolina Press, 1958), 204.
5. Harry Combs, *Kill Devil Hills: Discovering the Secret of the Wright Brothers* (Englewood, Colorado: Turn Style Press, 1979), 158.
6. Stick, 208.
7. Fred Howard, *Wilbur and Orville: A Biography of the Wright Brothers* (New York: Knopf, 1988), 122.
8. William R. Chapman and Jill K. Hanson, *Wright Brothers National Memorial Historic Resource Study* (Atlanta: National Park Service, 1997), 28.
9. Ibid., 38.
10. Ibid., 40.
11. Andrew Hewes, *Wright Brothers National Memorial: An Administrative History* (Washington, D.C.: National Park Service, 1967), 15.
12. Ibid., 11.
13. Ibid., 18.
14. Ibid., 24.
15. *New York Times*, 18 December 1928, p. 18.
16. House, *Twenty-fifth Anniversary of the First Airplane Flight: Proceedings at the Exercises held at Kitty Hawk, N.C. on December 17, 1928, in Commemoration of the Twenty-fifth Anniversary of the First Flight of an Airplane Made by Wilbur and Orville Wright*, 70th Cong., 2d sess., S. Doc. 520.
17. Omega East, "Wright Brothers National Memorial: It's Origin, Development, and Administration" (National Park Service, 1961, typescript), 36.
18. Chapman and Hanson, 47.
19. Over the years Bermuda grass was referred to as wire grass (*Aristida stricta*) in park reports. See Method of Planting, 1930, Landscaping File, Cape Hatteras National Seashore Headquarters (CAHA).
20. Hewes, 30.
21. Ibid., 38.
22. Chapman and Hanson, 52.
23. No drawings of the entrance station have been located.
24. Hewes, 50-51.
25. *Superintendent's Monthly Report*, July 1934, CAHA.
26. See Road Diagram 361/1011.
27. *Superintendent's Monthly Report*, March 1936, CAHA.
28. *Superintendent's Monthly Report*, June 1935-January 1936, CAHA; Circulatory and Monument Approach Paths 361/1008.
29. Hewes, 59.
30. Chapman and Hanson, 58.
31. Horace Dough to the Director NPS, 8 February 1928, CAHA; *Superintendent's Monthly Report*, August 1941, CAHA.
32. Landscape architect Thomas C. Vint studied at the University of California, Berkeley. He joined the Park Service in 1922 and became the chief landscape architect for the Division of Plans and Design in San Francisco. In 1933, Vint relocated to Park Service headquarters in Washington, D.C., to head the Branch of Plans and Design. At this time his title was changed to chief architect. Hewes, 60.
33. Ibid., 59.
34. *Superintendent's Monthly Report*, January 1938, CAHA.
35. Hewes, 64.
36. Ibid., 74.
37. *Superintendent's Monthly Report*, June 1944, May 1945, June 1945, CAHA.
38. *Superintendent's Monthly Report*, November 1949, CAHA.
39. Hewes, 76.
40. Cathleen Turner, *The Wright Brothers National Memorial: A Study in the Application of the Context-Based Approach to Evaluating Significance* (Athens:
The University of Georgia, 1993), 97.
41. At his death in 1948, Orville Wright left the 1903 *Flyer* to the Smithsonian Institution after many years of controversy. For a more indepth discussion of these events see Tom D. Crouch, *The Bishop's Boys* (New York: W. W. Norton & Company, 1989), 491-529. Hewes, 73.
42. Sarah Allaback, *Mission 66 Visitor Centers: The History of a Building Type* (Washington, D.C.: U.S. Department of the Interior, National Park Service, 2000), 69. In conjunction with plans for the museum, the Park consulted with engineers and landscape architects to discuss the prob-

lems involved with choosing a site for the proposed airstrip. In July 1952, several schemes were proposed west of West Hill. See NPS 361/2015, 361/2016, and 361/9010.
43. Hewes, 83.
44. *Superintendent's Monthly Report*, November–December 1953, CAHA.
45. Allaback, 24.
46. Ibid., 70.
47. Ibid., 74.
48. "Mission 66 Prospectus Brief, Wright Brothers National Memorial" (National Park Service, Wright Brothers National Memorial, July 1957, photocopy), 7.
49. Allaback, 75.
50. Ibid., 27.
51. Romaldo Giurgola to Carol Shull, 4 March 1997, copy in Southeast Regional Office (SERO).
52. Allaback, 76.
53. Hewes, 91; *Superintendent's Monthly Report*, May 1959, CAHA.
54. The 1959 Obliteration and Access to Residence Map (361/ 3007) shows Boulder Road gone and the other two roads still to be obliterated.
55. Allaback, 80.
56. Ibid., 24.
57. "Mission 66 Prospectus Brief," 8.
58. Ronald Lee to David Stick, 14 August 1958, CAHA.
59. Allaback, 81.
60. "Completion Report, Visitor Center and Utilities" (Wright Brothers National Memorial, 1961, photocopy). CAHA.
61. Acting Regional Director to Superintendent, December 1960, CAHA.
62. *Superintendent's Monthly Report,* October 1950, CAHA.
63. *Superintendent's Monthly Report,* February 1951, CAHA.
64. *Superintendent's Monthly Report,* June 1963, CAHA.
65. *Superintendent's Annual Report,* 1987, CAHA.
66. Chapman and Hanson, 67-68.
67. A 200-seat auditorium addition and expansion to the parking lot were planned for the visitor center in the late 1970s. In 1978, all contractor bids exceeded the available funding of $312,000. In 1979, the project was re-advertised and again all bids for the construction of the auditorium alone were in excess of the appropriated amount and additional funds were not available. In 1980, the parking lot expansion alone was funded. See *Superintendent's Annual Report*, 1980, CAHA; see NPS 361/ 41007-B.
68. *Superintendent's Annual Report,* 1984, CAHA.
69. *Superintendent's Annual Report,* 1987, CAHA.
70. *Superintendent's Annual Report,* 1991, CAHA.
71. Theodore Amundson, *Wright Brothers National Memorial: Administrative History, 1968-1987* (Raleigh, North Carolina: St. Augustine's College, 1987), 24.
72. Wright Brothers National Memorial listed 1966; documentation for historic district submitted 1978.

PART ONE: EXISTING CONDITIONS

Location

Kill Devil Hill Monument was established by the Act of 2 March 1927 to commemorate the first successful human attempt at heavier-than-air, controlled, powered flight. The Secretarial Order of 1 December 1953 redesignated the area and monument as Wright Brothers National Memorial. The 421-acre site is located in Kill Devil Hills, Dare County, 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. The Park is accessible from U.S. 158, and its entrance gate is located 300 feet from the highway. Colington Road is located along the south periphery of the Park, bifurcating park lands in the southwest quadrant (figure 40).

Boundary and Buffering

The Park incorporates the historic Kill Devil Hill, the largest of three sand dunes present on the site at the time of the Wright brothers' experiments of 1900 to 1903 and now the site of the Wright Brothers Monument and associated curvilinear, pedestrian paths; the granite First Flight Marker, north of the monument; the circular monument drive; the grassed mall between the Wright Brothers Monument and the First Flight Marker; the visitor center, located in the northeast portion of the site; a superintendent's quarters and maintenance area in the southwest portion of the site; and the First Flight Airstrip, a small airstrip paralleling the western boundary of the Park. Generally speaking, U.S. 158 forms the eastern boundary of the Park, and Colington Road forms the south boundary. To the west and southwest, a wooded area of pine/hardwood forest buffers the Park. More built-up areas surround the Park on the southeast, east, and north, although areas of woody vegetation on the southeast and east screen the site from increasing development (figures 41-42 and 44).

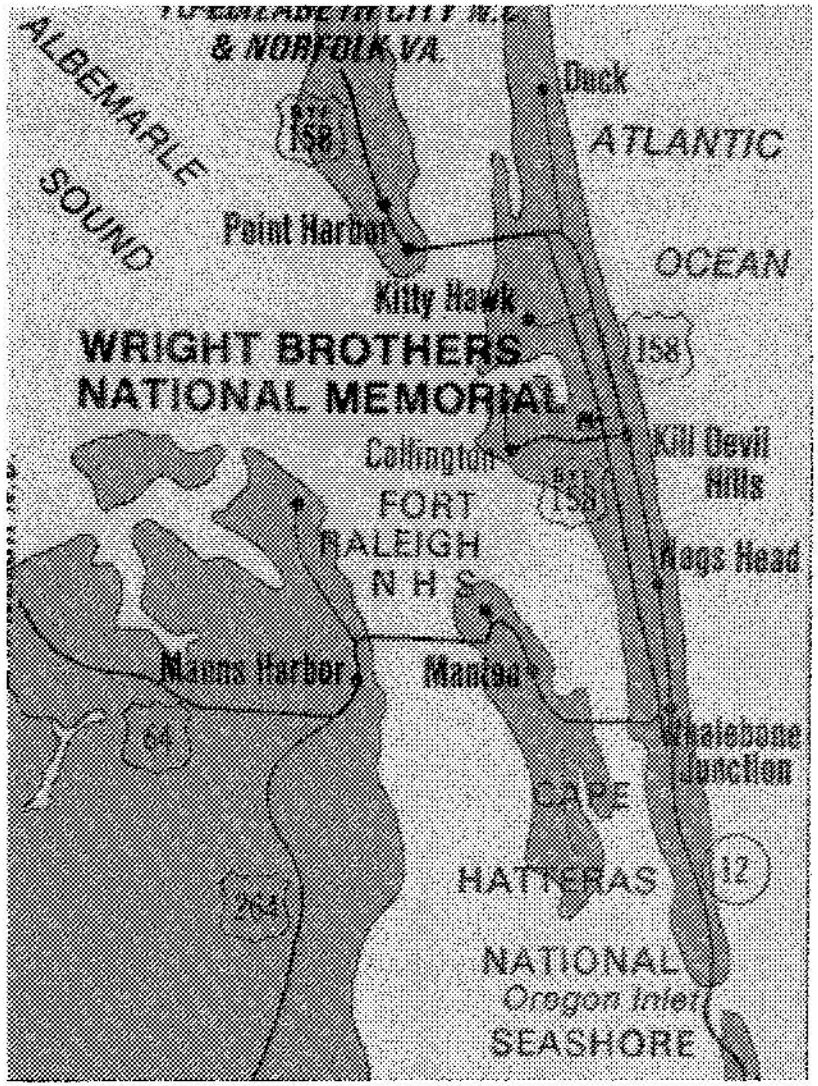


Figure 40. Location map, 1981.



Figure 41. Aerial view of site, 1999.



Figure 42. Surrounding development, 1999.

TOPOGRAPHY

A flat, predominantly open terrain punctuated by the two vegetated sand dunes, Kill Devil Hill and West Hill, characterizes the topography at Wright Brothers National Memorial. Kill Devil Hill, which rises 90 feet above the surrounding landscape, is located in the middle of the site (figure 43). West Hill reaches 60 feet and is located near the west boundary. Little Hill, the third sand dune, was never acquired and stabilized. It lies slightly outside the Park's northwest boundary and is almost completely eroded.[1] The mall is an open 2,852-foot-long and approximately 750-foot-wide zone running north to south from the Wright Brothers Monument to the fourth landing site marker and bounded on the east and the west by drainage ditches dug by NPS in the 1930s. Another flat area of pine forest is located to the west and southwest of Kill Devil Hill.

The dynamic topography of the site was dramatically changed by the stabilization of Kill Devil Hill and West Hill, which were planted with

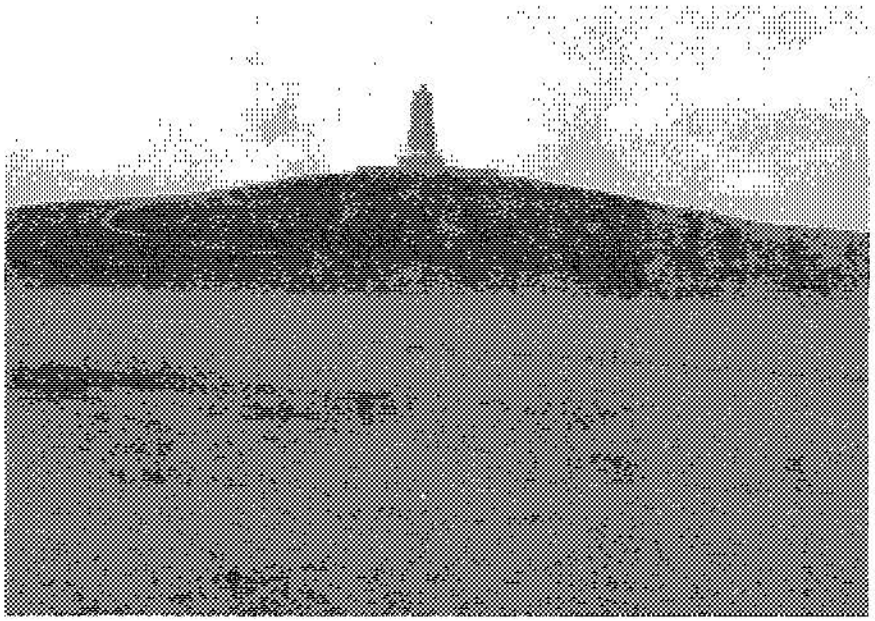


Figure 43. Topography of the site, 1999.

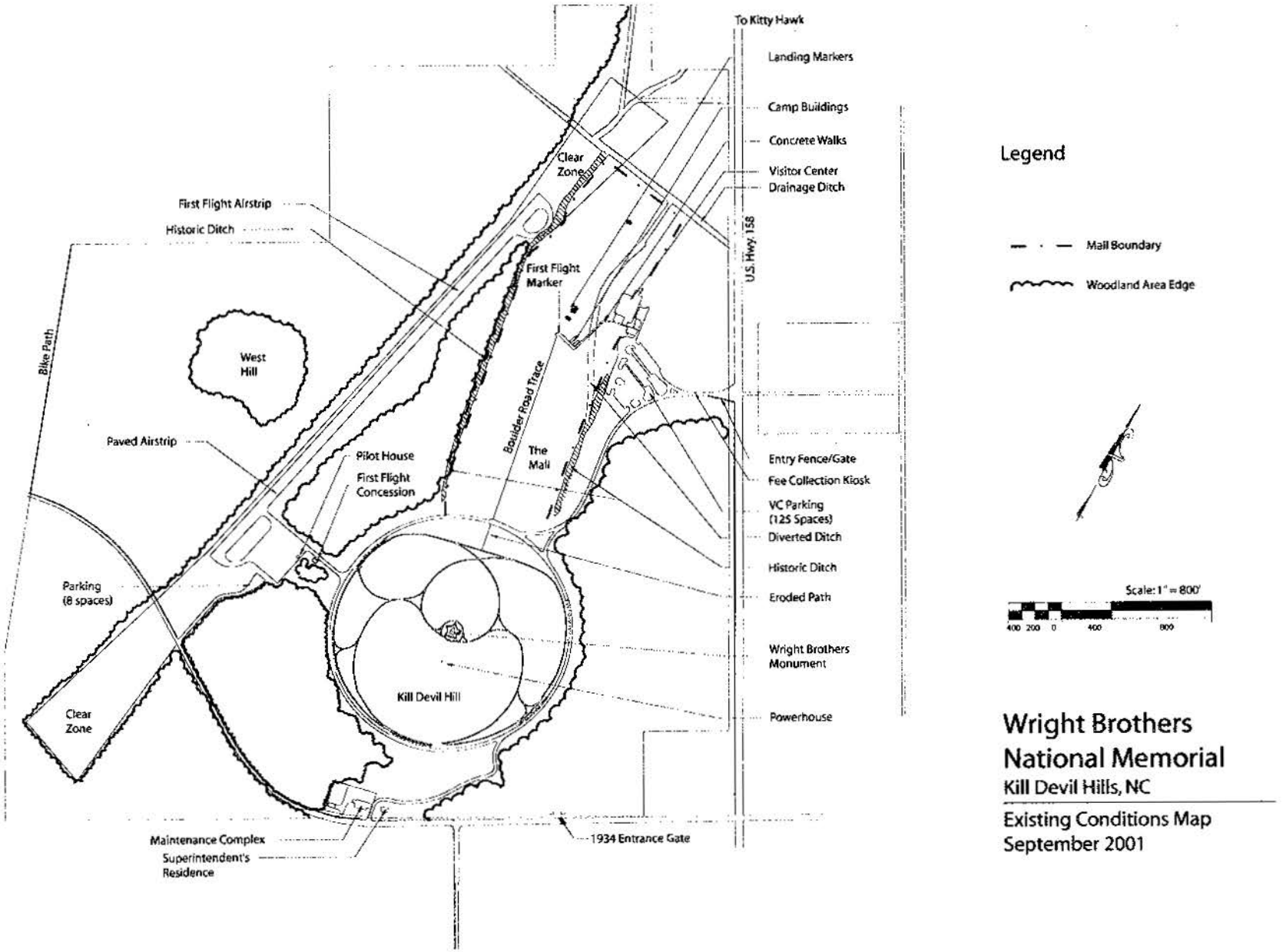


Figure 44. Existing Conditions Map.

grasses and shrubs to stop their southwestward migration and diminish wind erosion. These stabilization measures altered the barren, continually changing terrain of the site, diminishing the influence of the natural forces that affect landscape change. The natural drainage patterns of the site were altered by the War Department to prevent water from pooling on Boulder Road, and later by NPS when the drainage ditches historically delineating the mall were dug (figure 45). In the areas where the drainage ditches cross the sidewalk leading from the visitor center to the camp buildings, the water is piped through drainage culverts (figure 46). These changes protected the commemorative landscape layer but altered the Wright-era landscape.

During one of three hurricanes affecting the site in 1999, one culvert collapsed. Standing water is still a problem in some portions of the Park after heavy rains, particularly during hurricane season (figure 47).

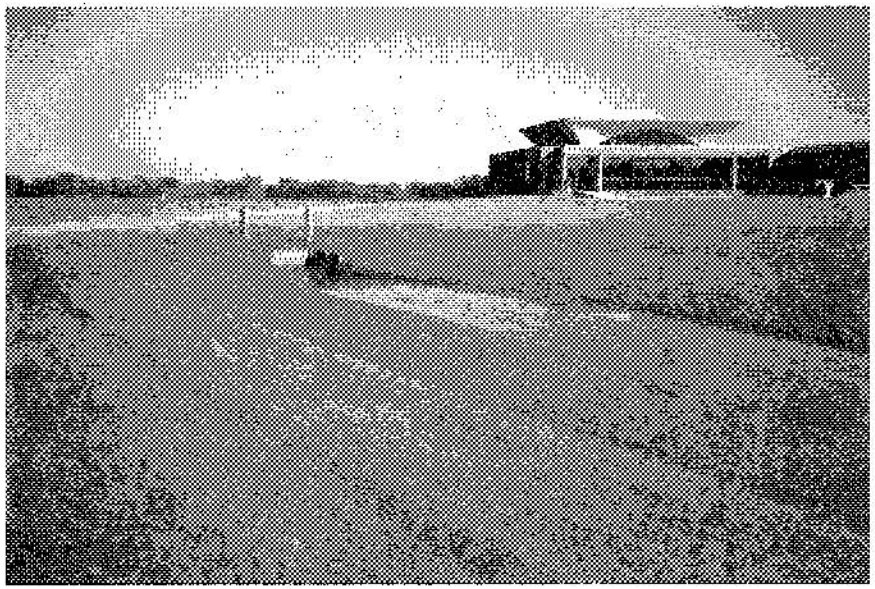


Figure 46. Water piped under sidewalk, 1999.

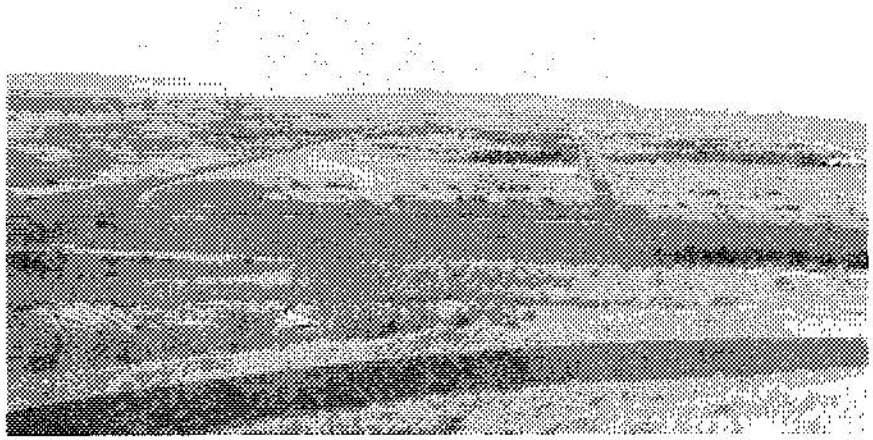


Figure 45. Drainage ditches, 1936.



Figure 47. Standing water after heavy rain, 1999.

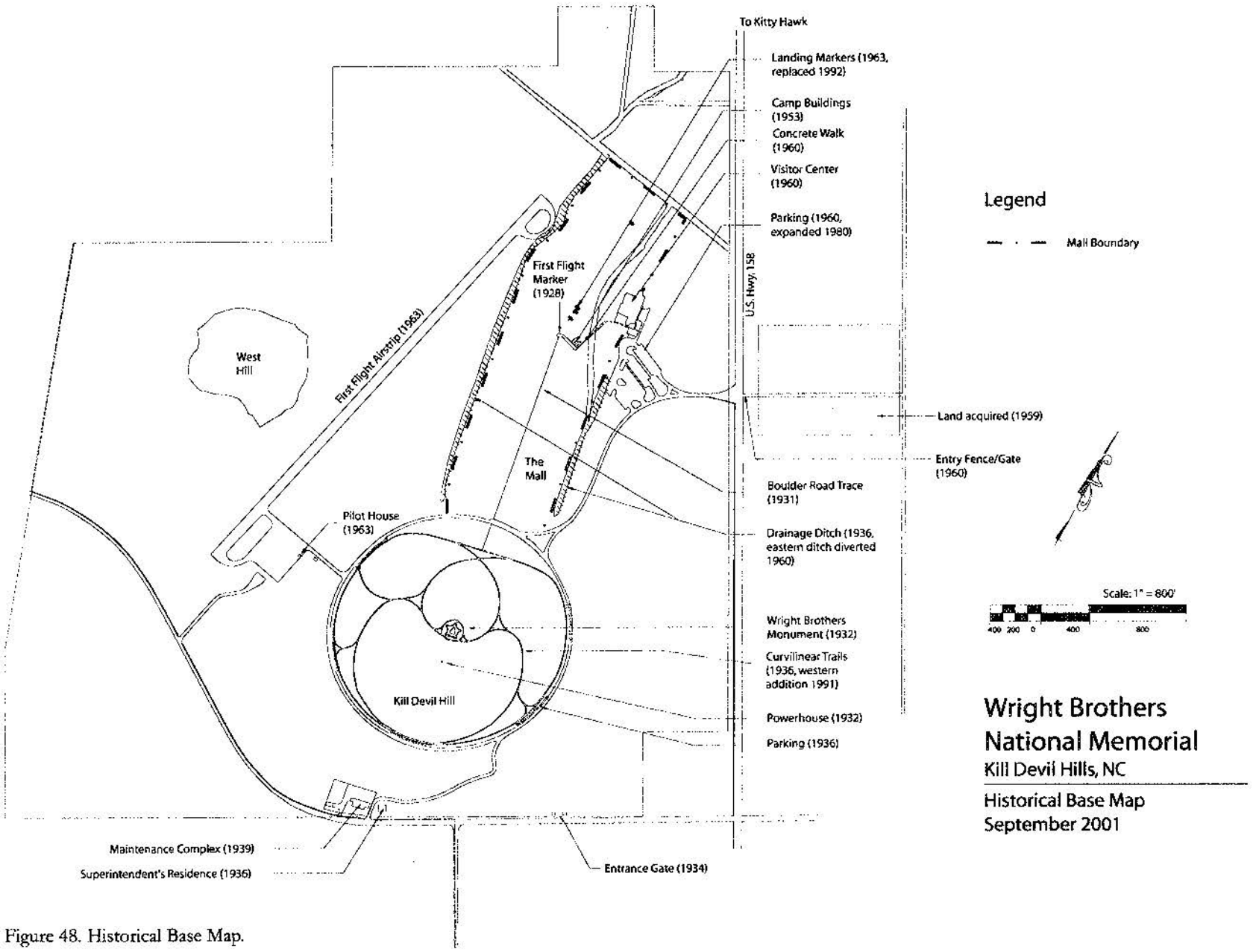


Figure 48. Historical Base Map.

SPATIAL ORGANIZATION

The symmetry of placement between the Wright Brothers Monument and the First Flight Marker was a focal point of the commemorative landscape, and is still apparent in plan and from the air. The historic mall defines the spatial relationship between the two structures (figures 48-49). The spatial relationship between the First Flight Marker and the four landing site markers expanded the dimensions of the historic mall to encompass the fourth landing site.

A carefully planned visitor entry experience controls the spatial organization of the Wright Brothers National Memorial Visitor Center. Upon entry into the site from U.S. 158, the visitor is directed to the parking area. Originally, cypress fencing blocked the view out to the first flight area and funneled visitors to the entry terrace and from there into the building. Today these views are open, with the fence and the screening vegetation around the fence removed (figure 50).

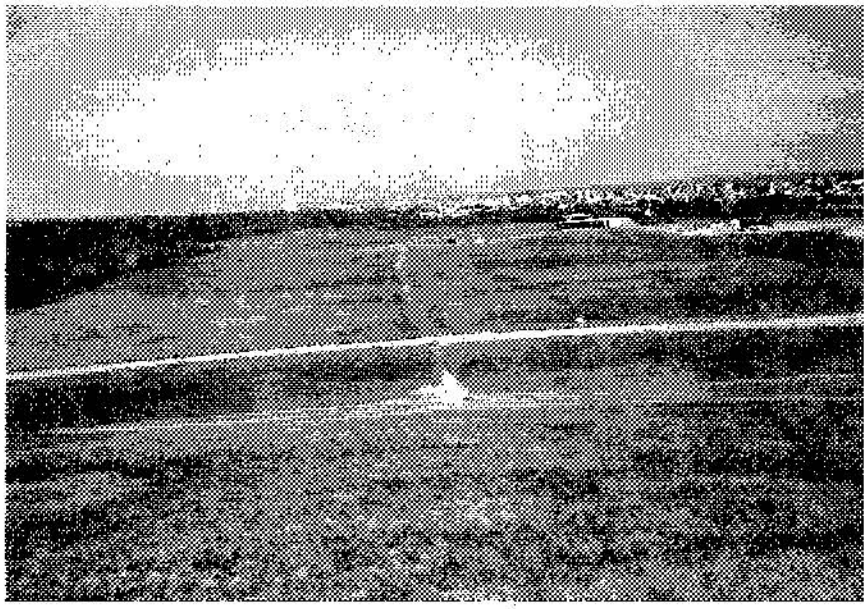


Figure 49. Spatial organization of the mall, 1999.



Figure 50. Open view to mall from parking lot, 2000.

VEGETATION/VEGETATION MANAGEMENT

Between 1936 and 1940, the Civilian Conservation Corps constructed an artificial foredune along the Outer Banks, reducing salt-spray exposure, sand movement, and ocean overspray. The artificial dune system altered the distribution and composition of the island vegetation, allowing salt-intolerant species previously excluded from the island to thrive. These changes have directed and accelerated successional trends of vegetation, encouraging large increases in prairie and woody vegetation and a corresponding decrease in bare sand and cordgrass communities.

Four different plant community/cover types exist at Wright Brothers National Memorial: 1) non-forested open dunes, disturbed ground, and grasslands; 2) live oak scrub; 3) pine-mixed hardwood forest; and 4) wetlands. The Park is approximately 50 percent forested and 50 percent non-forested. Cover type 1 is dominated by exotic species. Naturally dwarfed live oak (*Quercus virginiana*), black cherry (*Prunus serotina*), and

hollies (*Ilex opaca* and *Ilex vomitoria*) dominate cover type 2. Type 3 is true forest and is dominated by middle-aged to mature loblolly pine (*Pinus taeda*), American holly (*Ilex opaca*), red maple (*Acer rubrum*), sweet gum (*Liquidamber styraciflua*), and red (*Persea palustris*) and sweet bay (*Magnolia virginiana*). Cover type 4 is a catchall wetland type. Drainage ditches, which may have at one time been natural wetlands, marshes, and wet forested areas, are included in this type. The dominant vegetation in and around the ditches is generally herbaceous, although wax myrtle (*Myrica cerifera*) and small sweet gums are abundant. In the marshes, giant cordgrass (*Spartina cynosuroides*), needlerushes (*Juncus* spp.), black willow (*Salix nigra*), and cattails (*Typha* sp.) dominate. Loblolly pine, sweet gum, and red maple, with scattered woolgrass bulrushes (*Scirpus cyperinus*), dominate the one large forested wetland area.

One state-listed plant, wooly beach heather (*Hudsonia tomentosa*), was found at Wright Brothers National Memorial during a field survey of the state and federally listed threatened, endangered, and other noteworthy plants and animals conducted by the contractor *terra incognito* in 1998 and 1999. A state-listed butterfly, the giant swallowtail (*Papilio cresphontes*), was seen on the property, as well as its food plant, toothache tree (*Zanthoxylum clava-herculis*). Another noteworthy plant found was sandy woods sedge (*Carex arenaria*), which is uncommon in North Carolina.[2]

The open dunes, disturbed grounds, and grasslands are populated with a native cactus that is a nuisance to visitors and probably restricts the numbers of ground-nesting and ground-feeding birds at the Park.

All of Wright Brothers National Memorial is designated as historic zone. It is further divided into historic, special use, development, and natural sub-zones, which determine vegetation management at the site. Kill Devil Hill, West Hill, and the first flight area comprise the historic sub-zone. The grasses on the west, north, and east faces of Kill Devil Hill, the



Figure 51. Entry road, monument tour road, and curvilinear paths, 1999.

mall, and the grounds surrounding the visitor center are intensely maintained. Grasses are allowed to grow to seeding height before being mown to promote wildflower displays and reduce maintenance costs. The south face of Kill Devil Hill is too steep to maintain with mechanical equipment, so grass and brush removal has consisted of periodic cutting by hand. After each cutting, however, the regrowth of briars, shrubs, and small trees soon takes over that portion of Kill Devil Hill again. The summit of West Hill is kept clear around the windsock, but the remainder of the dune is covered with woody shrubs and trees.[3]

The special use sub-zone is limited to the area around the First Flight Airstrip. Vegetation management is governed by Federal Aviation Administration (FAA) regulations, which require a cleared zone of 250 feet in width or 125 feet from the centerline of the runway. Development sub-zones are located around the visitor center/parking area, the property along the access road east of U.S. 158, and the maintenance compound.

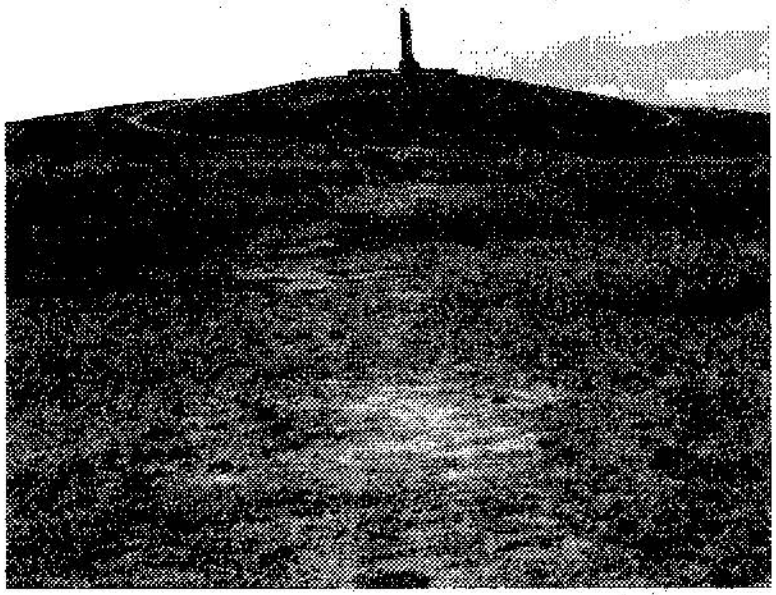


Figure 52. Volunteer path over Boulder Road trace, 1999.



Figure 53. Circulation between
First Flight Marker and camp buildings, 1999.

CIRCULATION

A two-way asphalt entry road brings visitors into the site from U.S. 158 and directs them to the visitor center parking area. The entry road connects with the one-way monument tour road that encircles Kill Devil Hill (figure 51). The circular monument tour road was constructed by NPS in 1935 as part of the commemorative landscape. There are five symmetrically placed parking areas that accommodate more than 100 vehicles around the monument road. A series of paved, curvilinear pedestrian paths ascending Kill Devil Hill are laid out in a symmetrical design on either side of a straight-line axis from the Wright Brothers Monument to the First Flight Marker. All but two of the trail segments are part of the 1930s commemorative design. The other segments were added over informal paths created by frequent visitor use.

A volunteer path along the trace of the old Boulder Road connects the circular monument road with the First Flight Marker (figure 52). An unpaved path stabilized with landscape matting in 1999 connects the First Flight Marker and the four landing sites of December 1903. Concrete walkways connect the First Flight Marker, the reconstructed camp buildings, and the visitor center (figure 53). The walkways installed in 1966 to connect the marker and camp buildings are quite different in color and texture from the exposed-aggregate concrete walk that extends to the camp buildings from the ceremonial terrace of the visitor center.

A paved service road accesses the Park's maintenance complex and superintendent's quarters. The First Flight Airstrip can be reached either by foot or by car. An asphalt walkway connects the airstrip with the circular monument road. Vehicular access to the airstrip parking area is via an asphalt entrance road located just west of Colington Road.

The 1933 concrete entrance gateposts, now lacking their bronze gates, are still standing on the southeastern boundary of the Park (figure 54). They flanked the original north-south entrance road which was obliterated in 1959 with the construction of the new east-west entrance from U.S. 158.

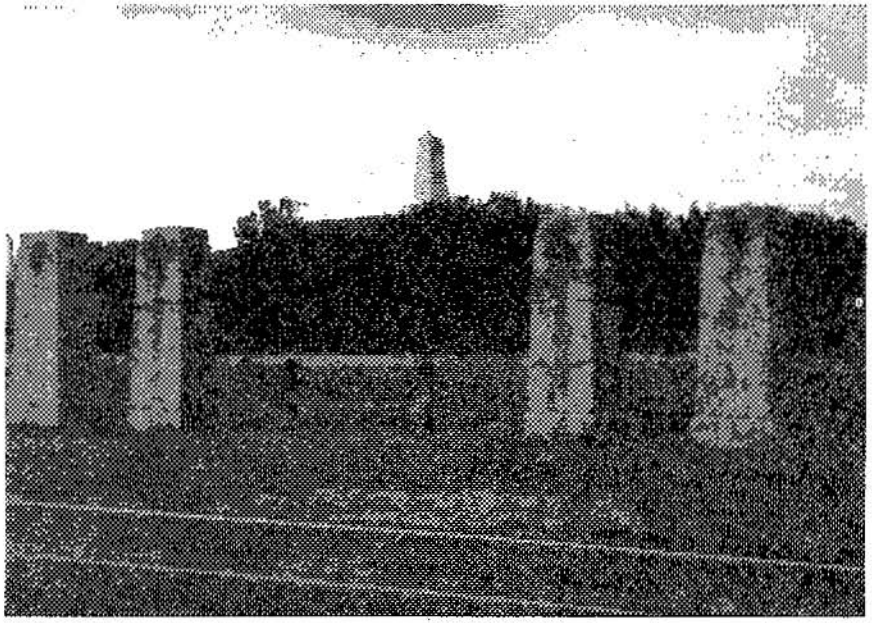


Figure 54. Original entrance gateposts, 1994.

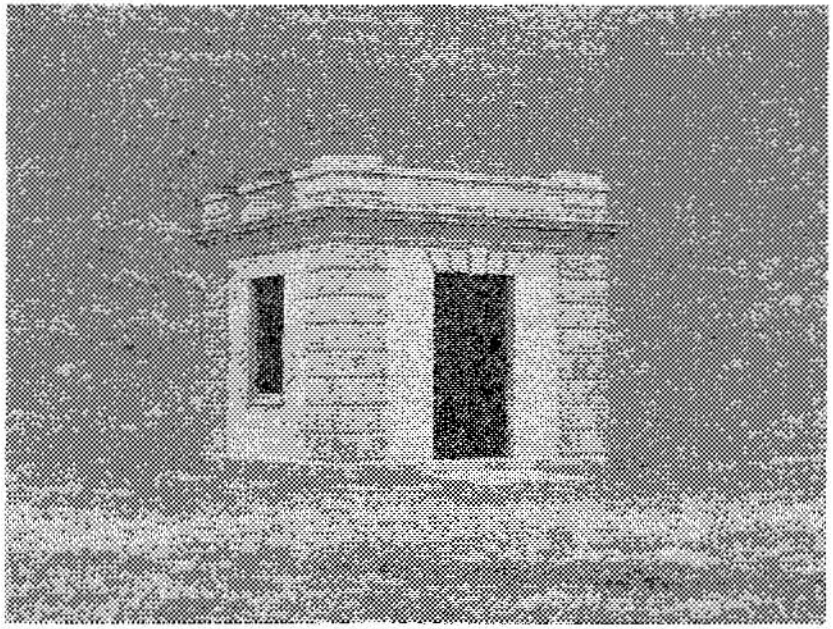


Figure 55. Stabilized powerhouse, 2001.

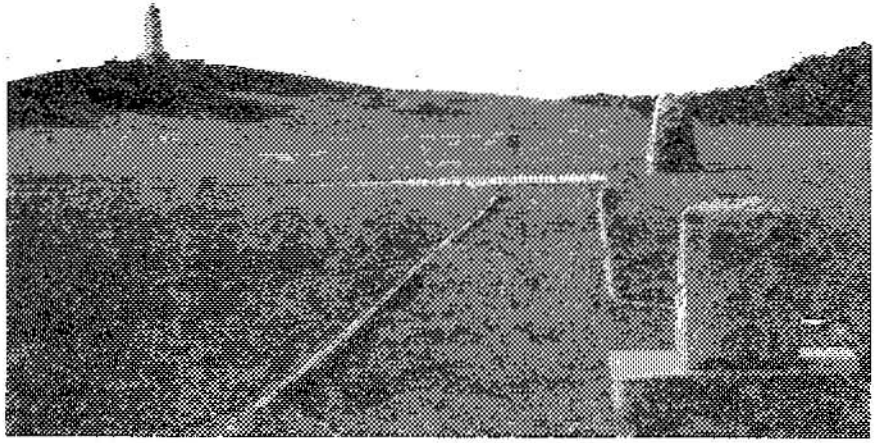


Figure 56. Wright Brothers Monument, First Flight Marker, and flight path, 1999.

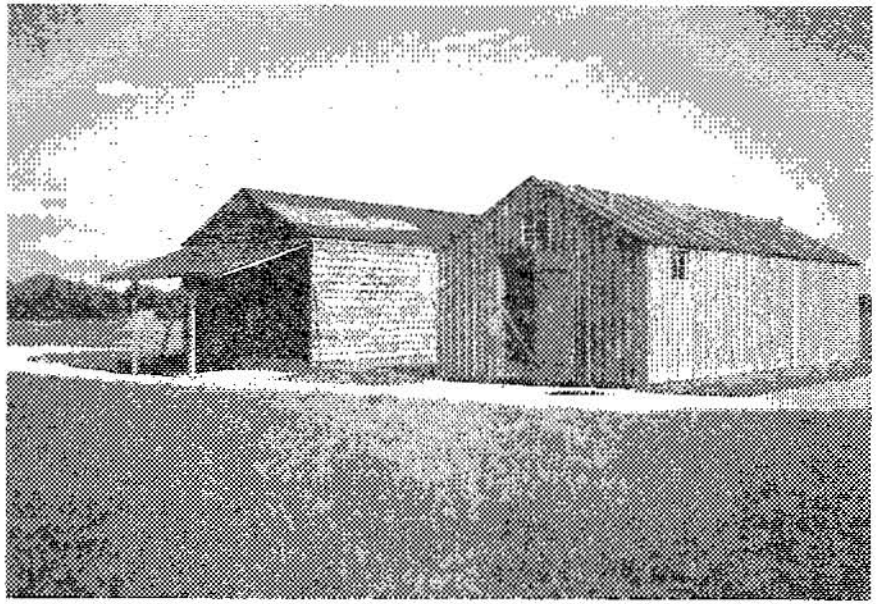


Figure 57. Camp buildings, 1999.

WRIGHT BROTHERS MONUMENT AND FIRST FLIGHT MARKER

The 1932 Wright Brothers Monument designed by Rodgers and Poor dominates the site. The approximately 60-foot-high Art Deco-inspired granite shaft rests on a star-shaped granite base that emerges from the top of Kill Devil Hill on axis with the First Flight Marker. The monument's associated Beaux Arts powerhouse (recently stabilized) is located at the base of Kill Devil Hill's south face (figure 55). The 1928 First Flight Marker, the first effort to commemorate the site, was realigned in 1966 to face the reconstructed camp buildings. The hangar and workshop were first rebuilt in 1953, then again in 1965, 1976, and 1993. Granite markers, installed in 1992, are located at the four landing sites of December 1903 (figures 56-57).

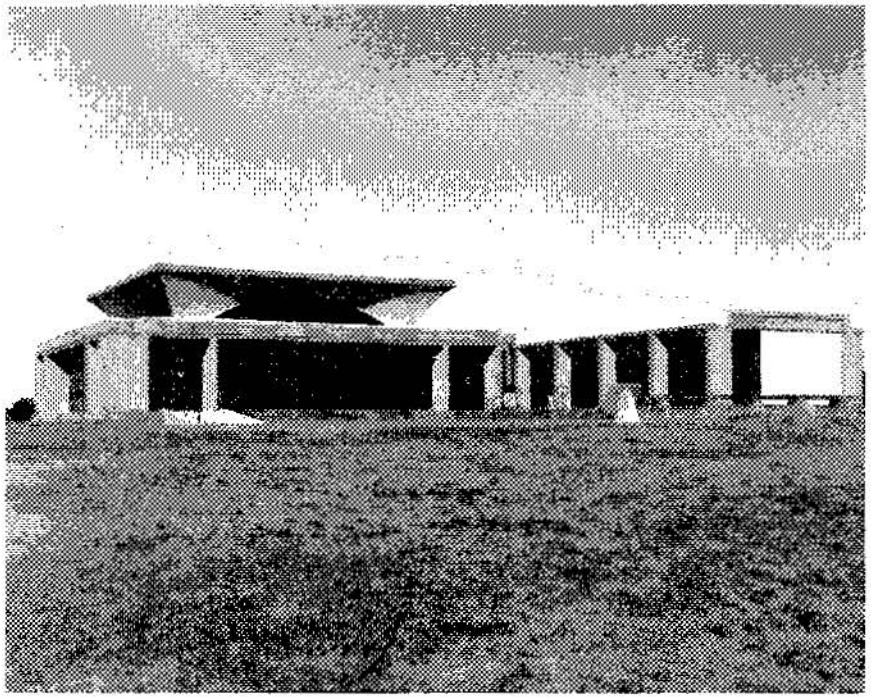


Figure 58. Wright Brothers National Memorial Visitor Center, 2000.

WRIGHT BROTHERS NATIONAL MEMORIAL VISITOR CENTER LANDSCAPE

The visitor center rests on the eastern edge of the mall (figure 58). The horizontal roof punctuated by a shallow concrete dome reflects the surrounding landscape of beach and dunes, while the curved overhang of the dome provides partial shade for the interior and represents the soaring possibilities of flight. The museum area of the visitor center has displays depicting the systematic study of flight that led to the Wright brothers' first powered flights of 17 December 1903. The section known as the assembly room houses accurate reproductions of the Wright brothers' 1902 glider and the 1903 *Flyer*. Interpretive presentations are conducted here, giving visitors a view out to the first flight line. Changes to the fenestration in the assembly room reduced natural light levels on the interior and altered the building's exterior appearance.

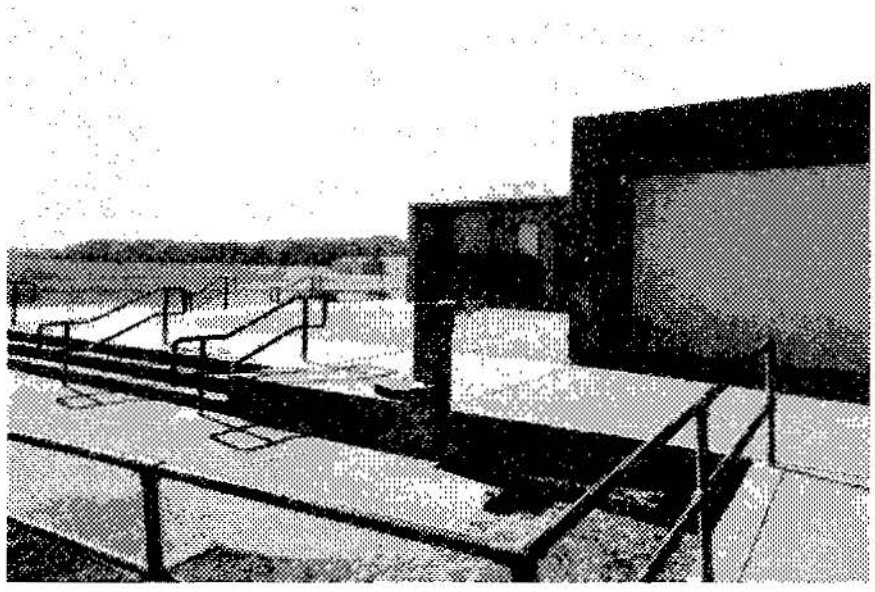


Figure 59. Handicapped access rails, 2000.

In January 2001, the Wright Brothers National Memorial Visitor Center was designated a National Historic Landmark in recognition of its being a nationally significant example of Mission 66 architecture and as one of the most important examples nationally of the Philadelphia School of modern architecture. It was previously determined contributing to the existing National Register historic district (the entire 421 acres of the Wright Brothers National Memorial are listed in the National Register as a historic district).

Only one tree (live oak) and a grouping of shrubs (yaupon) survive from the original planting plan, both located in front of the fence flanking the building on the east side. Paving on the entrance and ceremonial plazas shows wear from visitor use and weather. Some of the 4-foot-square concrete modules have been replaced with poor quality replicas of the original modules or with modules that do not match. Handicapped access ramps and other repairs elsewhere on the platform use a standard, brush-finished surface without exposed aggregate (figure 59). The original parking area was expanded in 1980, nearly doubling its size to accommodate recreational vehicles. Although the cypress fence that flanked the building on the south has been removed, the flagpole has retained its location at the west end of the original parking lot.

The wooden bench that was an original feature along the south side of the platform between the entry terrace and the ceremonial terrace has been modified through total redesign and replacement of its wooden components, with only the concrete support piers remaining from the original installation (figure 60). Early photographs show that the original design was constructed, but also show that by the 1970s red-painted metal covered the horizontal top of the bench. The metal was eventually replaced with wood of a modified design. Another original feature that still survives intact is the poured-concrete water fountain designed for the east side of the entry terrace near the restrooms. No longer operative and beginning to deteriorate, the fountain features two concave, squarish bowls.

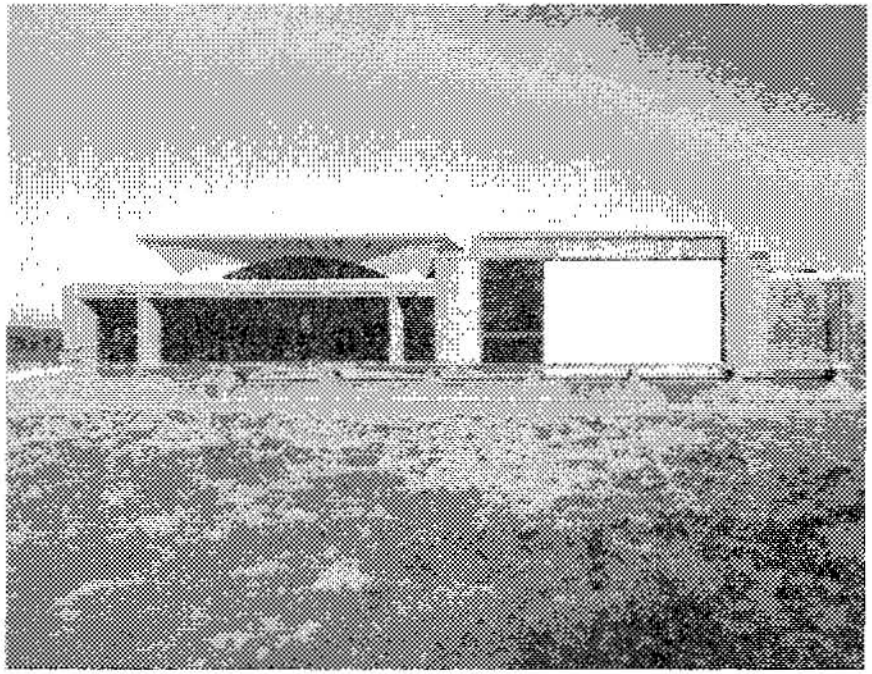


Figure 60. Close-up of bench, 2000.



Figure 61. First Flight Airstrip, 2002.

The 1959 entrance fence and gates, designed as part of the collaborative plans for the visitor center, mark the entry into the site from U.S. 158. The gate and entrance sign have been altered, but the fence is original. The fee collection kiosk is located along the south side of the entry road to allow visitors to pay their entrance fees as they exit the Park onto U.S. 158.

FIRST FLIGHT AIRSTRIP

The First Flight Airstrip is located west of the Wright Brothers Monument, immediately north of Colington Road. The airstrip consists of a 50-foot-wide, asphalt-paved taxiway, a tie-down apron, and a turnaround (figure 61). The Park also owns two 800-foot-long clear zones on the north and south ends of the runway. The area includes a concession building, pilot house, and parking for eight cars (figure 62).



Figure 63. Superintendent's residence, 1994.



Figure 62. Airstrip concession, 1994.

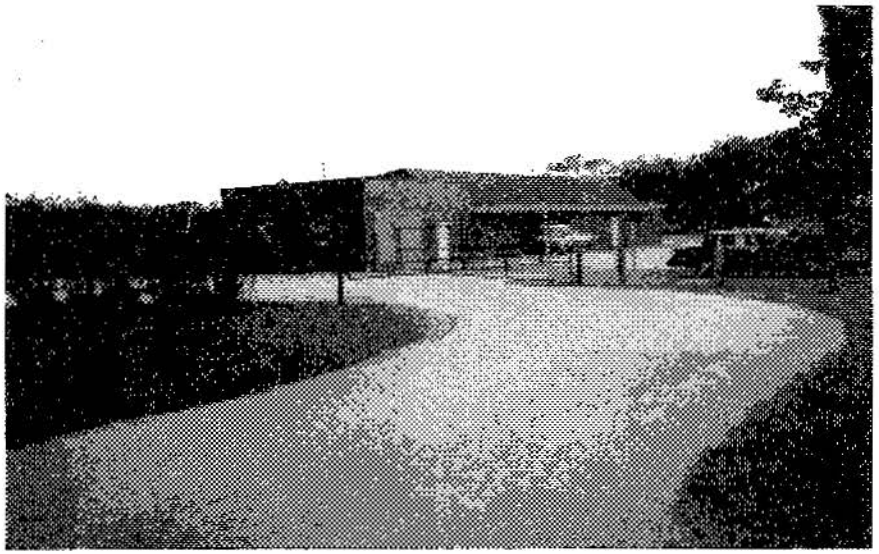


Figure 64. Maintenance complex, 1994.

Views to the airstrip from the first flight area are blocked by vegetation that marks the western edge of the mall.

SUPERINTENDENT'S RESIDENCE/MAINTENANCE COMPLEX

The 1935 superintendent's residence is located near the south boundary of the Park (figure 63). A number of changes to the building, which is currently used for office space, have occurred over the years, including replacing the original copper-sheathed roof with asphalt, enclosing the terrace, and replacing the original windows. Only a few ligustrum from the 1935 plantings remain. The maintenance shop/storage building next door has been significantly altered since its construction in 1939 (figure 64). A second, smaller maintenance building was constructed in 1941.

Notes

1. Amundson, 1.
2. Gaddy, L. L., W.D. Chamberlain, and Jeffrey C. Beane, "Threatened and Endangered Species of Wright Brothers National Memorial" (Columbia, South Carolina: *terra incognito*, 1999), 1-3.
3. "Statement for Management: Wright Brothers National Memorial" (National Park Service, May 1993, photocopy), 7.

PART ONE: ANALYSIS AND EVALUATION

This section compares the findings of the site history with the existing conditions in order to identify which extant landscape characteristics and associated features have historical significance. The integrity of each characteristic is evaluated within the context of the landscape as a whole. This process is the groundwork for establishing the period of significance, and for identifying a framework against which all changes in the landscape can be compared. It is an important step for developing appropriate and relevant treatment strategies.

Period of Significance

The analysis of the landscape development at Wright Brothers National Memorial suggests that the appropriate period of significance is 1900 to 1960. As the location of the Wright brothers' early experiments from 1900-1903, culminating in the 17 December 1903 successful heavier-than-air powered flight, Wright Brothers National Memorial achieves its primary significance for its association with that historic event (figure 65). However, radical changes that occurred to the site, beginning with the stabilization of Kill Devil Hill with grass and shrubs, as part of the Park Development era (1928 to 1942), altered the historic setting. Subsequent changes in the way the visitor is oriented to the site (1947 to 1960) altered the commemorative landscape. The 1947 Master Plan and later refinements in 1952 and 1954 that included a visitor center overlay reflect the culmination of design and development at Wright Brothers National Memorial, ending in 1960 with the construction of the Wright Brothers National Memorial Visitor Center. Landscape characteristics and features will be evaluated based upon work completed from the 1947 Master Plan.

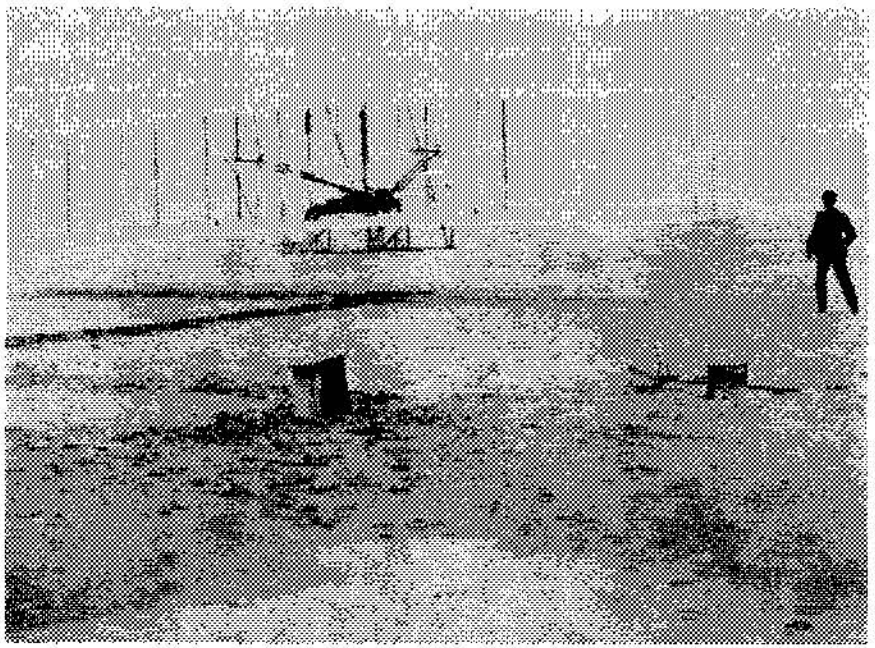


Figure 65. First flight, 17 December 1903.

The Wright Brothers National Memorial Visitor Center was designated an NHL in January 2001. The building and the landscape features immediately associated with the building will be evaluated. The other Mission 66 landscape features (the camp buildings, the monorail, the walks, and the associated plantings) are significant to the Park, but for the purposes of this report they will not be evaluated as contributing or noncontributing until the comprehensive context for Mission 66 landscape development is completed.[1]

The following analysis of the character-defining features of the developed landscape at Wright Brothers National Memorial will compare current site conditions to the 1947 Master Plan and 1952 to 1954 refinements that outlined all future development at the site.[2]

Spatial Organization

The first effort to create a direct relationship between the Wright Brothers Monument and the First Flight Marker began with the placement of the monument cornerstone on Kill Devil Hill in 1928. This spatial relationship was reinforced by a grassed mall that set off the area from the surrounding landscape that was growing up in woody vegetation. Its roughly symmetrical layout—rectilinear, bisected by a central drive—clearly marked it as a designed landscape (figure 66). Boulder Road reinforced, but did not determine, the spatial relationship between the two memorial markers. Thus, the spatial organization of the site has retained integrity. The rotation of the First Flight Marker in 1966 reflects the shift to a comprehensive interpretation of the site that evolved from the 1947 Master Plan.

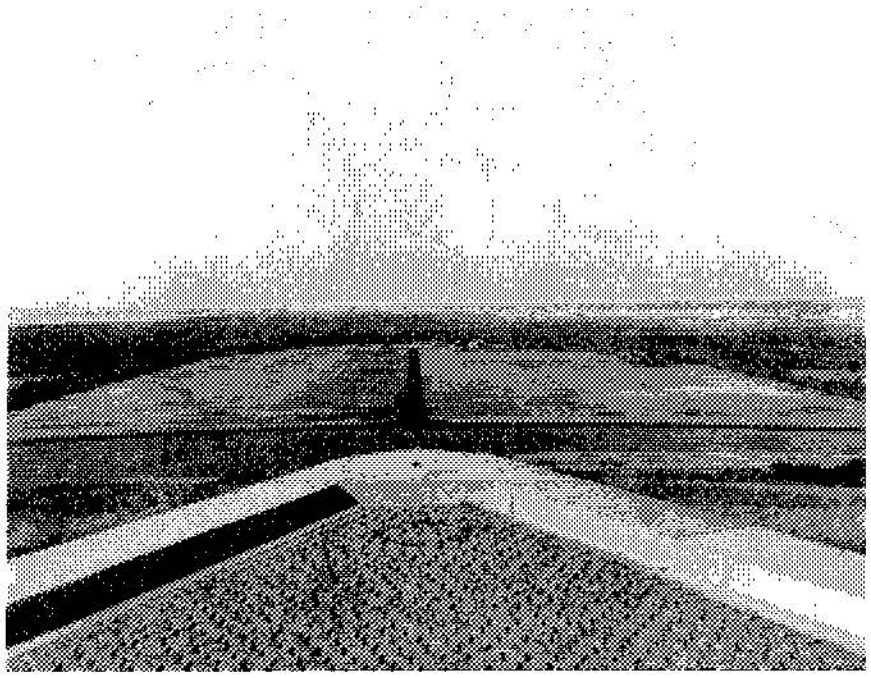


Figure 66. Spatial relationship of the site, 1956.

This shift in spatial organization was further articulated in the 1954 General Development Plan, which oriented visitors away from the monument. The subsequent visitor center site plan controlled pedestrian flow up to the building from the parking lot, with a cypress fence shielding visitors as they approached the visitor center from a clear view of the first flight line and monument. Removing the fence and the associated vegetation changed the experience of visitors approaching the building. The spatial organization between the visitor center and the first flight line has been hampered by the lack of a coherent design effort reinforcing the commemorative landscape and the visitor center landscape.

Circulation

Between 1934 and 1936, NPS altered the circulation system designed by the War Department. The entrance road that arced around the east side of Kill Devil Hill was removed and a new circular monument road was built. The concrete block pedestrian path that led straight up the hill was removed and four symmetrical, curvilinear paths were constructed as part of the commemorative landscape.

Between 1947 and 1960, as part of the 1947 Master Plan and subsequent plans for the visitor center, the Park removed Boulder Road, closed the original entrance, and built a new entrance road along the eastern boundary. The state of North Carolina constructed a bypass road to Colington. These changes significantly altered the Park Development-era circulation system, which had previously been processional in nature and culminated in the view from the top of the Wright Brothers Monument out to the First Flight Marker. By constructing a new entrance road and abandoning the War Department entrance gateway, NPS changed the orientation of the site from the monument to the visitor

center. Boulder Road was no longer needed for vehicular traffic as visitors parked at the visitor center and walked out to the first flight area and monument. It is the circulation initiated by the 1947 Master Plan that has retained integrity.

Vegetation

The stabilization of the site with grasses and shrubs began in 1928. The vegetation planted at the site has adhered to a predominantly native palette. By 1936, Greenbriar Farms had completed an ornamental planting project that included lining the circular drive with live oak trees, planting flat, sandy areas with grass, and installing numerous shrubs (native). This project apparently included the mall, which is defined in 1950s aerial photographs by thin bands of vegetation on the east and west, growing along drainage ditches (figure 22). Beginning in the 1940s, the Park began removing shrubs and small trees from the 40-acre area extending from Kill Devil Hill in order to maintain the historic open pattern of the mall, a character-defining feature (figure 67). Vegetation outside the mall was released to natural succession.

The planting plan for the visitor center specified native plants (figure 34). All of the plantings except the live oak and yaupon located in an area in front of the entry plaza have been removed over the years. The most significant loss occurred to the plantings placed in front of the cypress fence to help screen the first flight line from view of the parking lot. Although outside of the 100-foot-square NHL boundary, these plantings were an original part of the collaborative design and extended the barrier between the parking lot and the mall.

Views

An unobstructed view between Kill Devil Hill and the first flight line has remained a character-defining feature of the site. During the War Department and Park Development eras, sight lines from the Wright Brothers Monument to the First Flight Marker were an important design element. The collaborative plans for the visitor center resulted in its placement on top of the existing vegetation that marked the eastern edge of the mall, but with open vistas to the first flight line. Proposed planting plans were modified so that no vertical plantings obstructed the view to the Wright Brothers Monument.[3]



Figure 67. Encroaching vegetation on Kill Devil Hill, 1941.

Screened views, both from the parking lot out to the mall and from within the mall, were also an important feature of the design effort for the visitor center (figure 68). These filtered views were provided by the cypress fence along the building's south side and the vegetation around it; the Park later removed both the fence and the vegetation.

Structures

The superintendent's residence and maintenance area have all undergone substantial alterations. The Park replaced the original roof of the superintendent's residence in 1944 (following storm damage), altered the front terrace in 1954 and 1974, and replaced the original



Figure 68. Cypress fence and associated vegetation, 1962.

windows in 1974, significantly altering the few original Art Moderne design elements. The maintenance area has had numerous additions and alterations, with no attempt made to retain the original features of the 1930s-era design.

The Wright Brothers Monument and associated powerhouse retain integrity of design. Along with the First Flight Marker, these structures represent the core of the earliest commemorative development at the Park.

The camp buildings and the monorail are reconstructions whose location was never more than a close approximation. However, their placement in 1953 marked the shift from commemoration to comprehensive interpretation in the landscape.

In January 2001, the 1960 Wright Brothers National Memorial Visitor Center's nomination as a National Historic Landmark was approved. In 1998, it was included as a contributing feature of the Park's 421-acre National Register historic district. As one of the original examples of a visitor center, a new building type that concentrated visitor services and supplemented old-fashioned museum exhibits with modern methods of interpretation, it is a nationally significant example of Mission 66 architecture. It is also one of the most important examples nationally of the Philadelphia School of modern architecture, reflecting a period when modernist architects were moving away from the limitations of the rectangular glass box. For the Wright Brothers site, Mitchell/Giurgola sought a design that would respond to its sun-and-wind-swept site and symbolically portray the concept of flight in static form.

Alterations to the building in 1976 compromised aspects of design integrity. As part of a contract for the refenestration of the building, the original glass was replaced with tinted double-pane, insulated glass, and the steel window frames and doors were replaced with an anodized aluminum window-and-door system. This system did not replicate the composition, profile, or color of the original, whose hopper-type, ventilating windows and prominent reddish-orange color were among the building's more distinctive features. These changes also disrupted the unity of color between the windows and the pedestal markers (replaced in 1992).

The installation of concrete handicapped access ramps and metal hand railings has compromised the design integrity of the entry and ceremonial terraces. These installations and other repairs elsewhere on the platform use a standard, brush-finished surface without exposed aggregate, making them quite different from the original in both color and texture. As much as these changes alter the aesthetic of the building, they do not compromise its overall form or affect visitor circulation.

Small-scale Features

The rotation of the First Flight Marker in 1966 was part of the program of comprehensive interpretation in the landscape. The small

mound supporting the marker was leveled to better convey a sense of the flat terrain at the time of the Wright brothers' experiments. The side of the marker holding the bronze plaque was turned towards the visitor center—it originally faced the monument—in order to be more visible to visitors approaching the first flight area from the visitor center (figure 69).

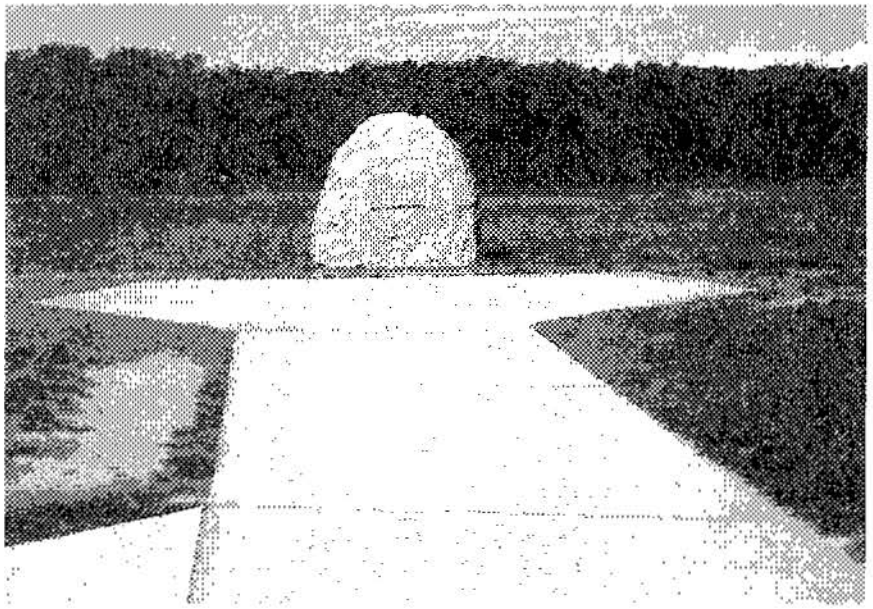


Figure 69. First Flight Marker, 1999.

The War Department entrance-feature gateposts lost a significant amount of design integrity when the Park removed the bronze gates from their posts in the 1960s after abandoning the original entrance in 1958. The gateposts are the only surviving elements of the original entrance feature. The Park received clearance and demolished the contact station in 1978.

The 1959 entrance fence and gate along U.S. 158 retain overall integrity of design, although the original gates were replaced in 1987 and 1999.



Figure 70. Entrance fence and gate, 2001.

Due to substantial changes to the bench located along the south side of the visitor center platform, it has retained little design integrity. In 1998, the cypress fence that separated the parking lot from the first flight line was removed, along with the associated vegetation. Its removal disrupted the intended entry experience and also exposed the parking lot and the more-distant highway to view from the mall.

EVALUATION OF INTEGRITY

A landscape that possesses integrity will be able to convey its historical significance. The National Register recognizes seven qualities that, combined, define the integrity of a given site. Those seven criteria are location, design, setting, materials, workmanship, feeling, and association. Several or all of these aspects must be present for a site to retain its historic integrity.[4]

The following is a preliminary description of the overall condition of the Wright Brothers National Memorial cultural landscape in regards to the seven aspects of integrity.

Location

The historic location of the Wright Brothers Monument and associated powerhouse, First Flight Marker, curvilinear paths and circular road, visitor center, and the spatial relationship between the monument and marker retain overall integrity of location. The rotation of the First Flight Marker in 1966 reduced the resource's integrity of location, but because it was originally placed at a location determined by the best estimates of surviving witnesses, it has never marked more than an approximate location. The boundary of the Park was expanded in 1959 to include the location of the fourth landing site of 17 December 1903.

Design

The Wright Brothers Monument and associated powerhouse, First Flight Marker, curvilinear paths and circular monument road, and the spatial relationship between the monument and marker retain high design integrity. Changes to the fenestration of the visitor center reduced its design integrity, but did not compromise the building's overall form. Changes to the visitor center landscape (removal of the fence and associated vegetation and changes to the bench) resulted in a loss of design integrity. The original entrance feature, superintendent's residence, and maintenance area have all undergone substantial alterations and lack sufficient integrity.

Setting

A major characteristic of the Wright-era landscape was its dynamic nature in response to natural forces and features. The Wrights chose the Outer Banks for their experiments because the landscape met certain criteria: broad, open expanses of soft sand, prevailing winds, and sparse vegetation. The Kill Devil Hills area was the focus of their experiments because of the presence of three large sand dunes. The natural forces and features that made the site ideal contributed to creating a landscape characterized by continual and dynamic change due to the low profile, narrowness, sand deposition, and adjacent high wave energy. The high winds, storm overwash, and salt spray precluded the establishment of dense vegetation.

Beginning in 1928, the topography and vegetation of the site were dramatically changed by the stabilization of Kill Devil Hill and West Hill, which were planted with grasses and shrubs to stop their southwestwardly migration. Construction of artificial barrier dunes along the Outer Banks between 1936 and 1940 reduced salt spray, sand movement, and storm overwash, altering the distribution and composition of the vegetation at Wright Brothers National Memorial.

These changes have compromised the original setting of the Wright brothers' first flight of 17 December 1903. The World Heritage Committee denied the Park's nomination in 1980 as a World Heritage site for this reason.

The setting of Wright Brothers National Memorial has achieved significance as an example of a designed commemorative landscape that has evolved over time. Early efforts to memorialize the site focused on the Wright Brothers Monument, the First Flight Marker, and the spatial relationship between the two. With the decision to build a museum/visitor center and landing strip in the early 1950s, emphasis shifted from the monument and marker to a larger interpretive program that included the reconstruction of the Wright brothers' camp buildings. Markers placed at the landing sites of the first powered flights (the first flight path) have gained importance as later additions to the commemorative landscape.

Materials

Replacement of the original glass and steel window frames and doors in the visitor center compromised materials integrity. The entrance-

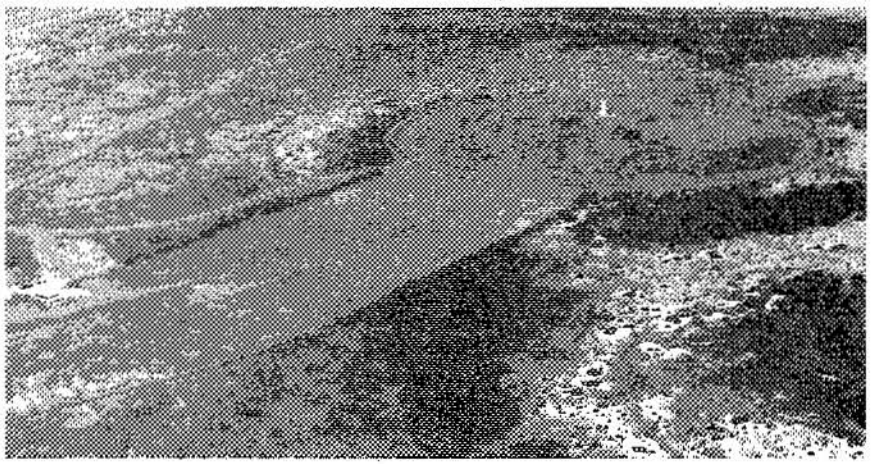


Figure 71. Aerial view, 1960.

feature gateposts lost materials integrity when the bronze gates were removed in the 1960s. The removal of the generating equipment from the monument powerhouse resulted in a small loss of materials integrity.

Granite, asphalt, and concrete are historically significant materials repeated throughout the memorial. Failure to match the finishes of the terraces and walkways when installing handicapped access ramps and railings has compromised the materials integrity of the visitor center platform.[5] The platform bench also lost integrity due to replacement of all materials from the original installation, with the exception of the concrete support piers.

Waxleaf privet (*Ligustrum lucidum*) and eastern red cedar (*Juniperus virginiana*) survive from the 1935 Custodian's Residence Planting Plan. One group of yaupon and one live oak survive from the 1959 Visitor Center Planting Plan. Although the yaupon has outgrown its intended use as a low-growing foundation plant, the live oak tree remains in scale with the building and helps define the entry terrace. Planting plans for the memorial have specified predominantly native plant materials.

Workmanship

Most of the features associated with the Wright Brothers National Memorial retain integrity of workmanship. The most prominent example of loss of integrity of workmanship occurred during the many alterations and additions to the maintenance buildings, with no attempt made to retain the original features of the 1930s-era design.

Feeling/Association

The Wright Brothers Monument lost some integrity of feeling and association following the relocation of the park entrance and the construction of the visitor center in the late 1950s, which marked a shift in the way visitors experienced the Park. Up until this time, the monument had been the focal point of the commemorative landscape. After the visitor center opened in 1960, however, the monument was closed to visitors—it became something to be viewed at a distance. The monument's powerhouse lost a measure of integrity of feeling and association after the discontinuation of the substation function of the building. The association of the powerhouse and the monument remains strong and offers an opportunity to interpret the monument's original beacon feature. The First Flight Marker retains integrity of feeling and association; the spatial relationship between the marker and the monument remains intact, as well as the spatial relationship of the marker and the first flight line. Development outside the park boundary has changed the feel of the location somewhat, although vegetation partially screens the site along all sides.

Summary

The evolution of the historic landscape of Wright Brothers National Memorial is a complex one, beginning with stabilization efforts in 1928 that altered the historic setting. The initial direction of the commemorative landscape (1927 to 1942), although never fully realized, was to create a direct relationship between the Wright Brothers Monument and the First Flight Marker, reinforced with a grassed mall



Figure 72. Spatial relationship between the monument and marker, 1999.

that set off the area from the surrounding landscape that was growing up in woody vegetation (figures 71-72). With the decision to include a larger interpretive program in the 1947 Master Plan, emphasis shifted from the monument and marker to plans for a museum/visitor center, reconstruction of the Wright brothers' camp buildings, and markers placed at the landing sites of the first powered flights. The developments associated with this shift to a comprehensive interpretation approach altered much of the Park Development-era landscape. However, the landscape as proposed in 1947, with refinements in 1952 and 1954, remains essentially intact and is in the range of being fifty years old.

The Wright Brothers National Memorial Visitor Center was the centerpiece of the shift from commemoration to comprehensive interpretation in the landscape. Throughout the Mission 66 period, the Park Service's overriding goal for its visitor centers was to improve interpretation and stimulate public interest in the park.[6] Recently designated an NHL, this early Mission 66 visitor center controlled the



Figure 73. Flight path, 1970.

approach and entry from the parking lot into the building, with clear views out to the mall blocked by the cypress fence. Visitors were directed to the visitor center first, where they learned the Wright brothers' story, and then were released out to the camp buildings, the first flight line, and the monument (figure 73).

Notes

1. The Mission 66 context is currently being written by Ethan Carr, author of the Park Development context and the NHL nomination for the visitor center.
2. 361/2010-D, 1954 General Development Plan.
3. 361/3006, sheet 3, 1959 Planting and Miscellaneous Construction.
4. National Park Service, *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (Washington, D.C.: U.S. Department of the Interior, 1991), 44.
5. The Park completed Section 106 compliance and received approval for this work.
6. Allaback, 26.

PART TWO: TREATMENT RECOMMENDATIONS

The treatment section of a Cultural Landscape Report articulates a preservation strategy for long-term management of a cultural landscape based on its significance, existing conditions, and use. Part Two considers management goals, such as public access, preservation of natural resources, contemporary use, and interpretation.

Treatment of a cultural resource must be guided by the policies, guidelines, and standards contained within NPS *Management Policies*, the *Cultural Resource Management Guidelines*, and the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. These documents identify four types of treatment: preservation, rehabilitation, restoration, and reconstruction.

Specific policies, guidelines, and standards exist for each of the four types of treatments. Collectively, the four treatments form the philosophical basis for responsible preservation practice and enable long-term preservation of a landscape's historic features, qualities, and materials. The four treatments allow for both traditional and contemporary treatment techniques while supporting continued use.

Proposed Preservation Strategy

As defined by *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*, rehabilitation is

> the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.[1]

Because of striking changes to the topography and vegetation of the site, restoration of an accurate Wright-era landscape is not possible. Modifications to the barren, unstabilized terrain were necessary to establish a commemorative landscape. Changes to the spatial orientation of the site initiated by the 1947 Master Plan and visitor center overlay altered the commemorative landscape. Therefore, a program of rehabilitation that addresses contemporary management, planning, and interpretive concerns, while preserving significant cultural resources, is the most viable overarching landscape treatment approach for the site.

General Recommendations

The following recommendations reflect not only historically based cultural landscape concerns, but also contemporary interpretive and planning issues.

- Emphasize the primary interpretive theme, the first flight of 17 December 1903, by landscape management treatments that preserve the open quality of the mall, a significant character-defining feature. The mall is defined as the 2,852-foot-long by 750-foot-wide zone running north to south between the Wright Brothers Monument and the fourth landing site marker and bounded on the east and the west by drainage ditches dug in the 1930s. Given the significant alterations to the topography and vegetation subsequent to the stabilization of the site, maintaining

the open character of the mall is of primary importance to the historic setting.

- Preserve the distinctive commemorative features of the mall—the Wright Brothers Monument, the First Flight Marker, and the unimpeded spatial relationship between the monument and marker. Although a later addition, the commemoration of the first flight line has gained importance in telling the Wright brothers' story.
- Preserve the Wright Brothers National Memorial Visitor Center and those landscape features immediately around the building, as defined by the NHL boundaries.
- Improve the pedestrian circulation between the Wright Brothers Monument, the First Flight Marker, and the four landing site markers. Although the area was seeded with grass after the removal of Boulder Road, visitors continue to access the monument over this road trace, wearing a volunteer path. Visitor foot traffic in the first flight area needs to be formalized in a way that supports the overall spatial orientation of the site.
- Continue a native plant palette for any new vegetation at the site (see appendix for plant list).
- Continue to manage vegetation at the airstrip in compliance with FAA regulations. The Park may remove or thin vegetation to open a view to the first flight line.
- Improve interpretation of the landscape's evolution. Many visitors do not understand the complex changes that have occurred to the landscape since the Wright era. Interpretation of the stabilization efforts, the commemorative design elements, and the visitor center landscape would add to the visitor experience at the site.

SPECIFIC TREATMENT RECOMMENDATIONS

Preserve the open character of the mall

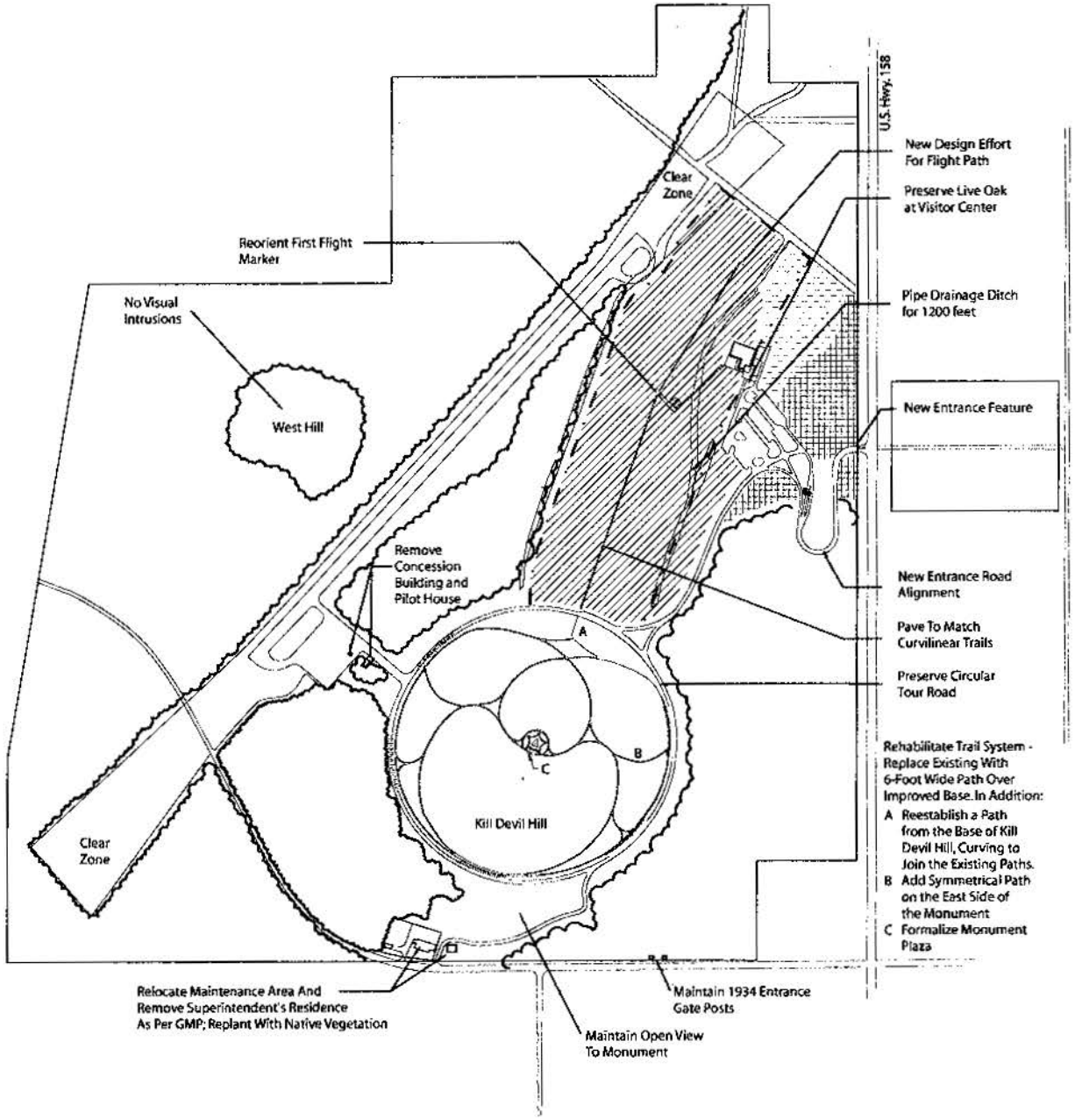
- Continue the present mowing regime to prevent encroachment by woody vegetation onto Kill Devil Hill and the mall. Nothing should be planted in the 2,852-foot-long by 750-foot-wide zone running north to south between the Wright Brothers Monument and the fourth landing site marker (the mall). This area is delineated on the east and west by drainage ditches dug by the NPS in the 1930s.
- Continue to mow the area between the eastern boundary of the historic mall and the entry road. The Park can discontinue mowing on the western side of the entry road, leaving a mown edge as a buffer.
- Vertical elements in the first flight area should be discouraged in order to assure the primacy of the open landscape.
- No development should occur in the mall (figures 74-75).

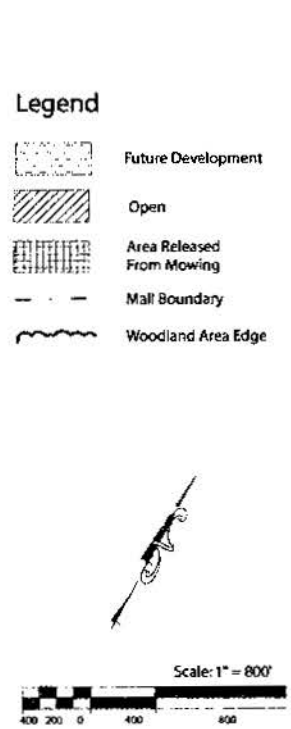
Rehabilitate the commemorative landscape

- Rehabilitate the curvilinear paths encircling Kill Devil Hill. Erosion over the years has made maintenance difficult (figure 76). The walks will be replaced with a 6-foot-wide path over an



Figure 74. Open character of the mall, 2001.





Wright Brothers National Memorial

Kill Devil Hills, NC

Treatment Recommendations
January 2002

Figure 75. Treatment Recommendations Map.

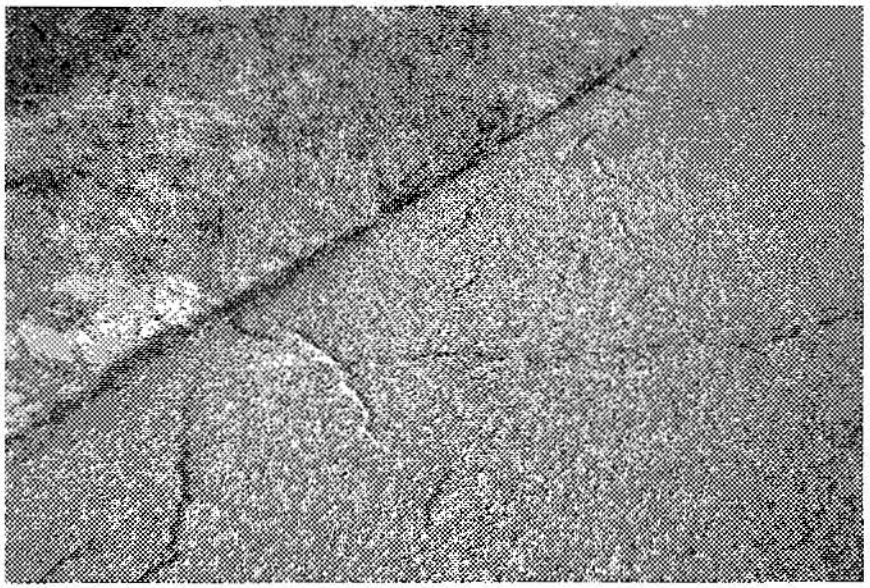


Figure 76. Alligatoring of asphalt, 1999.

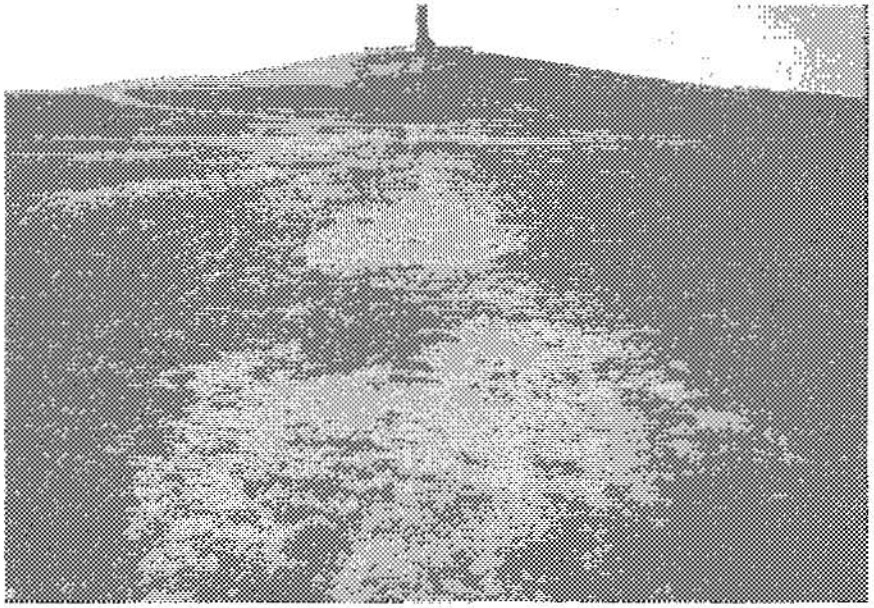


Figure 77. Volunteer path over Boulder Road trace, 1999.

improved base. A hardened continuous surface should be used, for example concrete or asphalt, and its installation should match the curve of the existing path. Specifications for the job will be coordinated with Mike Stanley, regional landscape architect.

- Preserve the circular monument tour road constructed by the War Department in 1931 and as altered by NPS in 1935. The road was part of the original commemorative landscape.
- Establish a straight path from the First Flight Marker to the base of the circular monument drive, utilizing the alignment of Boulder Road (figures 77 and 78). This path should meet Americans with Disabilities Act (ADA) standards for accessibility using the same paving materials that are to be used to rehabilitate the curvilinear paths encircling Kill Devil Hill. After crossing the circular monument drive, the path should continue up Kill Devil Hill, splitting at some point approximately 12 feet from the road edge and curving to join the existing curvilinear paths (figure 75). The final design for the area will be coordinated

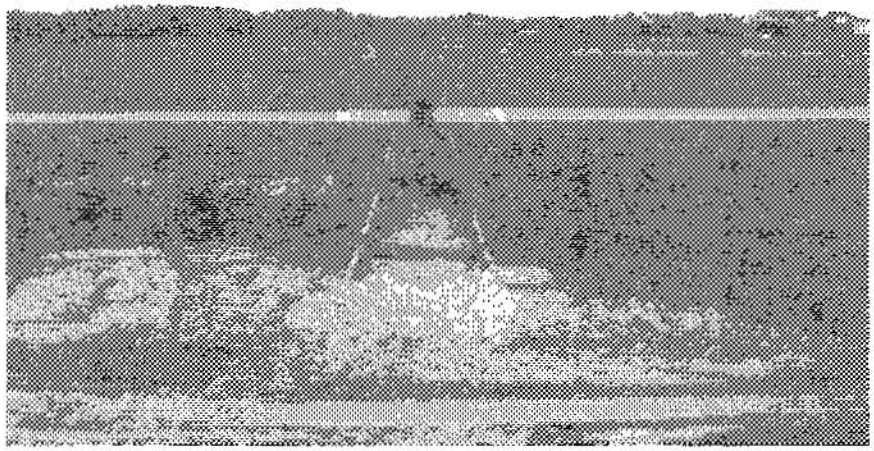


Figure 78. Unimproved pedestrian circulation, 1999.

with Mike Stanley, regional landscape architect, who will produce the drawings for the path.

- Establish a path on the east side of the monument to match the path added on the west side, keeping the design symmetrical.
- Improve the monument plaza, which is currently a wide asphalt landing at the base of the monument steps. The new work would begin at a place on the existing path near the monument floodlights. The plaza will incorporate materials used on the monument terrace, including granite pavers, stone, and/or concrete. An 18-inch seat wall may define the outside edge of the plaza in order to provide seating and definition to an area with a steep topographic change. Design will be coordinated with Mike Stanley, regional landscape architect, who will produce the drawings for the plaza.
- A new design effort is needed to improve pedestrian circulation from the visitor center out to the First Flight Marker, along the route of the first flights of December 1903, and to the camp buildings. This design effort will be coordinated with Mike Stanley, regional landscape architect.
- As long as the camp buildings and the monorail continue to function as part of the Park's interpretive program, they may remain in their present locations.
- The eastern drainage ditch near the visitor center and First Flight Marker is an intrusion into the historic mall and makes access to the flight path more difficult (figure 79). The Park may eliminate this section of the drainage ditch. Piping or filling this created wetland will require National Environmental Protection Act (NEPA) compliance. The Park should contact Jami Hammond in the Southeast Regional Office (SERO) if they have questions about this process.
- Maintain the original entrance gateposts.

The visitor center, as described in the NHL nomination, is a nationally significant example of a Mission 66 visitor center, as well as one of the most important examples nationally of the Philadelphia School of

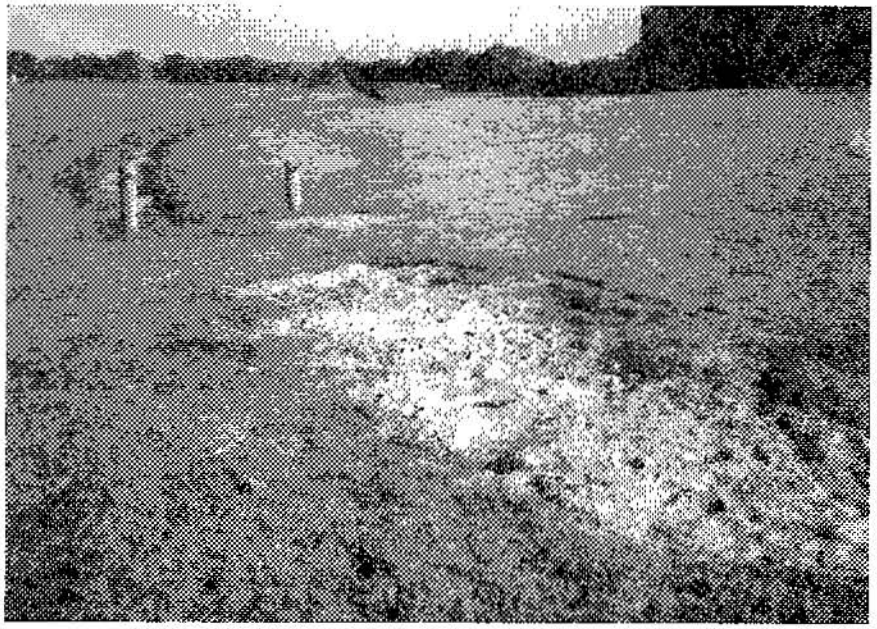


Figure 79. Exposed culvert, 1999.

modern architecture. The Mission 66 visitor center remains the most complete expression of the planning and design practices developed by the Park Service during Mission 66. Cecil Doty, a leading Park Service architect at the Western Office of Design and Construction (WODC) in San Francisco, noted at a visitor center planning conference that "the parking area, walks, terraces, and everything in and around the building are part of the Visitor Center ensemble, and are one exhibit as something constructed by the National Park Service. They can be more important than the exhibits themselves."[2]

- All treatment work for the building, platform, and screening fences is outlined in the Historic Structures Report (HSR).
- Place any future additions north and northeast of the existing building (figure 75).
- Additional parking should mimic the control of pedestrian flow up to the building, blocking clear views out onto the mall until the visitor enters the visitor center.

- Buffer new parking with low-growing, native vegetation and release an area from mowing along U.S. 158 (on both sides of the entry road) to soften the impact of a large expanse of pavement (figure 75).
- Restoration of the concrete planters that were located on the ceremonial terrace is covered in the HSR. Common fig as originally specified should not be used for the planters, as it did not survive. A list of drought-tolerant plants is provided in the appendix.
- The remaining live oak is a character-defining element of the visitor center entry terrace and should be preserved (figure 80). The yaupons planted around it are now out of scale and do not function as intended. They should be replaced with five-gallon container specimens. If any future additions necessitate a new entrance to the visitor center, yaupon and live oak would be appropriate native plant materials.

Wright Brothers National Memorial entrance

- Design a new entrance feature that accommodates the width of the new entry drive but does not extend into the memorial past the present entrance feature.
- The design should complement the style and materials of the visitor center.
- The entrance road will be realigned to accommodate the collection of fees as cars enter the Park. A value analysis (VA) held in December 2001 determined a preferred alternative.
- Vegetation should be brought across and in front of the entrance feature to complete the screen that effectively blocks the view of traffic and adjacent development from the core of the Park.

Link the primary and secondary periods of significance through interpretation

- Consider developing a pamphlet that explains the significance of the visitor center and memorial landscape.
- Consider opening the Wright Brothers Monument for special occasions.

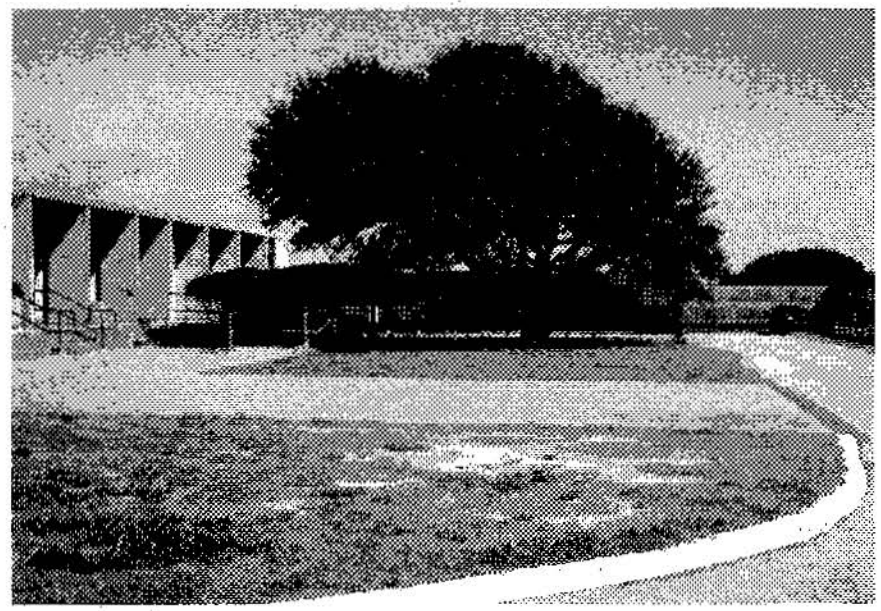


Figure 80. Plantings around visitor center, 1999.

First Flight Airstrip and West Hill

- The present concession building and pilot house may be removed so that a new pilot house with a sanitary facility can be constructed.
- As long as this area is screened from the mall and circular monument drive, a new concession station, pilot house, sanitary facility, and expanded parking may be added that does not compete visually with the Wright Brothers Monument.
- A clear zone should be maintained around the airstrip runway according to FAA regulations.
- West Hill is an important link to the Wright Brothers era. No visual intrusion should be added that could be seen from the Wright Brothers Monument or the mall.

Superintendent's residence/maintenance area

- The Superintendent's residence may be removed.

- The maintenance buildings may be removed and relocated to an undeveloped area outside of and not visible from the commemorative landscape (figure 81).
- After removal of these structures, the area should be grubbed and stabilized with low-growing, native vegetation (see appendix for plant list).
- An open view to the Wright Brothers Monument should be maintained.



Figure 81. Superintendent's residence/maintenance complex, 1999.

Notes

1. National Park Service, *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (Washington, D.C.: U. S. Department of the Interior, 1996), 48.
2. Allaback, 34.

PART THREE: PREPARING A RECORD OF TREATMENT

Purpose

As both a follow-up to the CLR's recommendations and as a reference for future historic research, the Park should maintain an accurate record of treatment to document the intent, extent, time, and cost of all implemented treatments. This record should describe the as-built physical work, including any modifications between the proposed and actual treatments. Systematic documentation is important whether treatment is implemented over an extended period of time or in short discrete phases. The record should document specific treatment actions, not routine preservation maintenance, unless maintenance is altered specifically as a result of the treatment recommendations.

Contents and Format

The record of treatment should include copies of field reports, condition assessments, and any contract summaries. Documentation may follow a variety of formats, including as-built construction drawings, plans, details, narrative descriptions, "before" and "after" photographs, and even videos. The Section 106 compliance documentation developed to review and approve recommended treatment actions may, in some cases, be sufficient as the record of treatment.

When treatment recommendations are not implemented immediately following the preparation of the CLR, the record of treatment should also describe any changes that have occurred to the existing condition of the landscape prior to treatment. The record of treatment may be produced as an appendix or addendum to the CLR and designated as "Part Three: Record of Treatment."

Reference Materials

The "Landscape Lines" section of *A Guide to Cultural Landscape Reports* (1999) explains and provides technical guidance on various landscape survey, research, and treatment techniques that may be employed in preparing a record of treatment. All parks should have received a copy of the guide during the spring of 1999; Wright Brothers National Memorial's (WRBR) copy is housed in the Park library at CAHA headquarters in Manteo. Additional copies of the guide are available for purchase from the Superintendent of Documents, Government Printing Office, Washington, DC 20402-9325, Stock No. 0245-005-01187-1.

Another useful reference is the Olmsted Center for Landscape Preservation's *Guide to Developing a Preservation Maintenance Plan for a Historic Landscape* (1998), especially the summary, inspection, and inventory forms provided in Appendix F (p. 62), which could easily be adapted for use in compiling a record of treatment. This publication is included as an appendix to the *Guide to Cultural Landscape Reports* sent to each park. (For additional information regarding this publication, visit the Olmsted Center's web site at http://www.nps.gov/frla/oclp.htm.)

Guidelines and standardized forms for preparing a record of treatment will eventually be accessible for park use on the SERO-CRS intranet site, located at http://crs.sero.nps.gov.

REFERENCES

Documentary Materials

Cape Hatteras National Seashore map and archival collection, Cape Hatteras National Seashore Headquarters (CAHA), Manteo, North Carolina.

Wright Brothers National Memorial photographic archives, historic negatives and prints, Wright Brothers Headquarters (WRBR), Kill Devil Hills, North Carolina.

Drawings and Plans

Plans located in NPS archives at Denver Service Center, Technical Information Center (DSC/TIC); Denver, Colorado. Some duplicated in CAHA map collection:

361/1000	Proposed Custodian's Residence, 1935
361/1001	Proposed Comfort Station, 1935
361/1002	Preliminary General Plan, 1934
361/1008	Circulatory and Monuments Approach Paths, 1934
361/1009	Circular Dr, Monument, Caretaker's Residence Planting Plans, 1935
361/1011	Road Diagram Kill Devil Hill National Monument, 1935
361/2000	Garage and Utility Building, 1938
361/2001-A	Proposed Airport, 1939
361/2010-C	General Development, Part of the Master Plan, 1947
361/2010-D	General Development Plan, Part of the Master Plan, 1954
361/2010-F	General Development Plan, Part of the Master Plan, 1957
361/2010-H	General Development Plan, Part of the Master Plan, 1963
361/2011	Kill Devil Hill National Memorial Utilities Plan, 1941
361/2012-A	Road and Trail System Plan, 1950
361/2013	Topographic Base Map, 1950
361/2014	Wright Brothers Memorial Museum, Part of the Master Plan, 1952
361/2015	Air Strip Wright Brothers Memorial, Part of the Master Plan, 1952
361/2016	Proposed Air Strip, Part of the Master Plan
361/2018	Hangar Building
361/2019	Quarters Building
361/2023	Boundary Map, 1962
361/3000	Resurfacing Circle Drive and Approach Walks, 1956
361/3003-A	Visitor Center Development, Part of the Master Plan, 1958
361/3005-A	Visitor Center Entrance Road and Parking Area, 1958
361/3006-C	As-Built Planting and Miscellaneous Construction, 1960
361/3007	Obliteration and Access to Residence, 1959
361/3010	Road and Trail System Plan, Part of the Master Plan, 1965
361/6003	Kill Devil Hill National Memorial Topography, 1934
361/9010	Wright Memorial Airport, 1952
361/20001	Master Development Plan, 1938
361/25001	Elevations, 1930
361/41007	Visitor Center Parking Area Expansion, 1978
361/41900	Caretaker's Lodge, 1933
361/41905	Plan of Proposed Roads, 1931
361/41906	Substation Building, 1930
361/41908	Plan Showing Planting at Kill Devil Hill, 1930
361/41913	Plan Showing Wright Memorial on Kill Devil Hill, 1930
361/41914	Pavement Rehab and Bituminous Overlay, 1985
361/80009	Development Plan, 1997

UNPUBLISHED REPORTS

The following reports are located in the Cape Hatteras National Seashore Headquarters library, Manteo, North Carolina. Some may also be available in other NPS libraries.

Cape Hatteras National Seashore. *Superintendent's Annual Reports.*

"Completion Report of Construction Project, Visitor Center and Utilities." Wright Brothers National Memorial, 1960. Photocopy.

"Completion Report, Visitor Center and Utilities." Wright Brothers National Memorial, 1961. Photocopy.

East, Omega. "Wright Brothers National Memorial: It's Origin, Development, and Administration." Wright Brothers National Memorial, 1961. Typescript.

"Evaluation of the Visitor Center (Mitchell/Giurgola, 1959-1960), Wright Brothers National Memorial, Kill Devil Hill, Kitty Hawk, North Carolina." North Carolina State Historic Preservation Office, 1997. Photocopy.

Gaddy, L. L., W.D. Chamberlain, and Jeffrey C. Beane. "Threatened and Endangered Species of Wright Brothers National Memorial." *terra incognito*, 1999. Photocopy.

"Mission 66 Prospectus Brief, Wright Brothers National Memorial." National Park Service, Wright Brothers National Memorial, 1957. Photocopy.

"Specification: Grading Shoulders and Resurfacing Circle Road and Trails Around Monument." Wright Brothers National Memorial, 1957. Photocopy.

"Specifications: Planting and Miscellaneous Construction." Wright Brothers National Memorial, n.d. Photocopy.

Wright Brothers National Memorial. *Superintendent's Monthly Reports.*

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Allaback, Sarah. *Mission 66 Visitor Centers: The History of a Building Type.* Washington, D.C.: U.S. Department of the Interior, National Park Service, 2000.

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Birkemeier, William, et al. "The Evolution of a Barrier Island." *Shore and Beach* 54 (April 1984): 3-12.

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AERIAL PHOTOGRAPHS

The following photographs are located in the Cape Hatteras National Seashore Headquarters library, Manteo, North Carolina.

1928 black and white aerial. Scale 1:500.
1929 black and white aerial. Scale 1:500 and 1:2000.
1930 black and white aerial. Scale 1:600.
1932 black and white aerial. Scale 1:1000 and 1:5000.

APPENDIX

Primary grasses planted

Bermuda grass (*Cynodon dactylon*)
Bitter panic grass (*Panicum amarulum*)
Italian ryegrass (*Lolium multiflorum*)

1935 Monument, Superintendent's Residence, and Comfort Station Planting Plans

Loblolly pine (*Pinus taeda*)
Live oak (*Quercus virginiana*)
American holly (*Ilex opaca*)
Flowering dogwood (*Cornus florida*)
Eastern red cedar (*Juniperus virginiana*)
Crape myrtle (*Lagerstroemia indica*)
Pecan (*Carya illinoensis*)
Redbud (*Cercis canadensis*)
Yaupon (*Ilex vomitoria*)
Groundselbush (*Baccharis halimifolia*)
Southern waxmyrtle (*Myrica cerifera*)
Red tartarian honeysuckle (*Lonicera tatarica*)
Shiny leaf privet (*Ligustrum lucidum*)
Blue-fig (*Ficus utilis*)
Palmetto palm (*Sabal major*)
American Beauty Rose (white climber)
Emily Gray Rose (yellow climber)

1959 Visitor Center Planting Plan

Live oak (*Quercus virginiana*)
Devils walking stick (*Aralia spinosa*)
Common fig (*Ficus carica*) – used in planters
Yaupon (*Ilex vomitoria*)
Southern waxmyrtle (*Myrica cerifera*)
Bayberry (*Myrica pensylvanica*)
Moundlily yucca (*Yucca gloriosa*)
Eastern baccharis (*Baccharis halimifolia*)
Creeping Liriope (*Liriope spicata*)

List of drought-tolerant plants for concrete planters

Mexican feather grass (*Stipa tenuissima*)
Hairy awn muhly (*Muhlenbergia capillaris*)
Blue love grass (*Eragrotis elliottii*)
Purple foliage switchgrass (*Panicum virgatum 'Shenandoah'*)
Dwarf eulalia grass (*Miscanthus sinensis 'Adagio'*)
Fountain grass (*Pennisetum alopecuroides*)

Sources

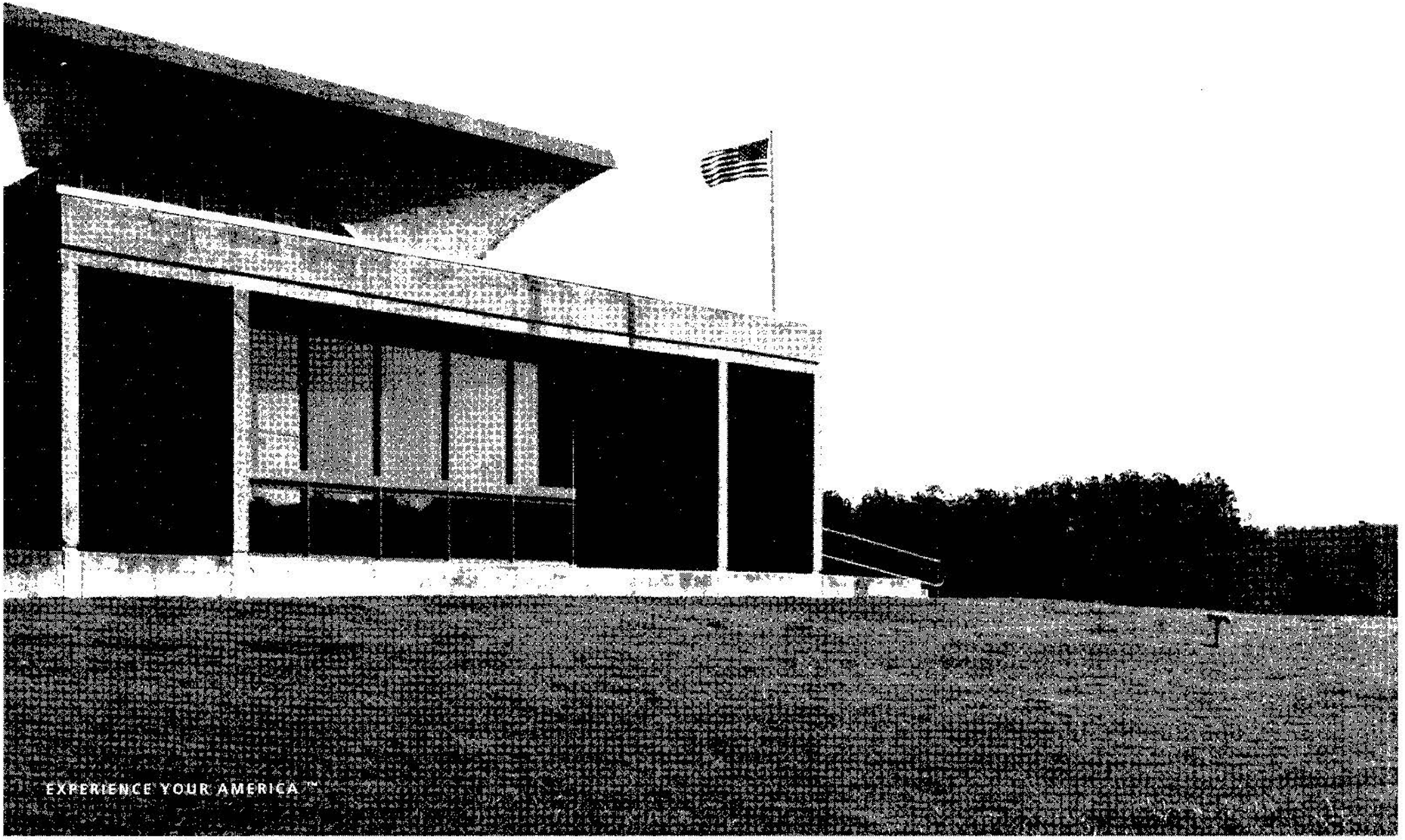
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