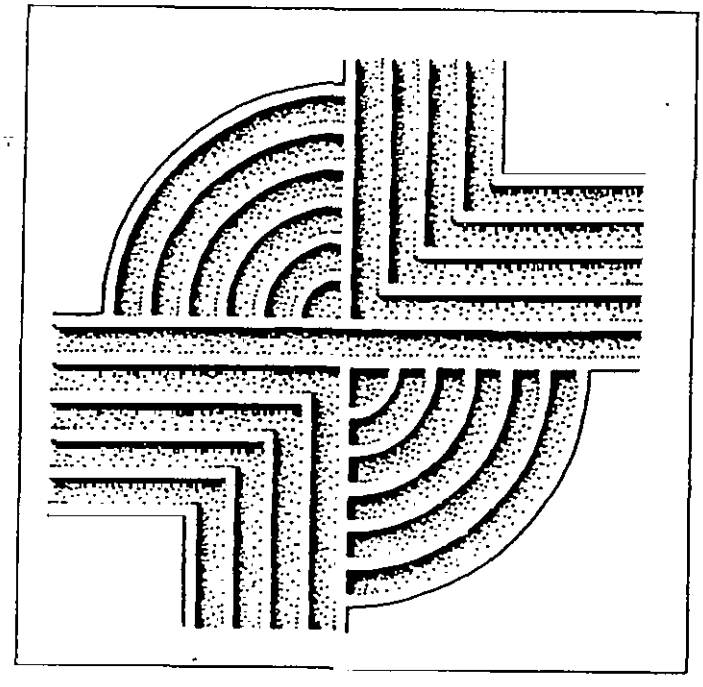
A CONSERVATION ASSESSMENT AND PRELIMARY PRESERVATION PLANFOR FORT HOWELL, HILTON HEAD ISLAND, BEAUFORT COUNTY, SOUTH CAROLINA



RESEARCH CONTRIBUTION 199

A CONSERVATION ASSESSMENT AND PRELIMINARY PRESERVATION PLAN FOR FORT HOWELL, HILTON HEAD ISLAND, BEAUFORT COUNTY, SOUTH CAROLINA

Research Series 50

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Prepared For:
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History has no last act, and men are not permitted their utter ruin.

-- R. Nicholas Olsberg

ABSTRACT

A site assessment of Fort Howell was undertaken with a video camera and still camera in late October and early November 1996 in order to document the current condition and conservation/preservation requirements of the existing earthworks. A copy of the video has been submitted with this report to the owner of the property, The Hilton Head Island Land Trust, and can be used as a partial baseline for future assessments. Another copy, along with a set of the color slides, has been submitted to the S.C. Department of Archives and History. A final set of the color slides, along with the black and white negatives, have been submitted to the S.C. Institute of Archaeology and Anthropology. Coupled with this documentation, the site's current condition has been carefully reviewed and individuals associated with the site have been interviewed for their input into the preservation plan.

The first section of this report briefly explains the nature of this project, while the second outlines the history and appearance of Fort Howell as it was originally constructed. Specific findings from the review are summarized in the third section of this report, "Existing Conditions Assessment." The assessment was made on the basis of specific areas of the Fort as identified during this initial study.

Where appropriate, recommendations have been made to address specifically identified problems. However, many of the erosion problems can be traced back to three major sources of disturbance: previous dirt bike use, visitor trampling, and absence of stabilizing vegetation. The solution to the problems ultimately lies in resolving these critical issues. These, and supplemental issues are discussed in the fourth section of the report, "Development of a Preservation Plan." Suggestions are made for appropriate response to a wide range of preservation and interpretation issues, with a view to the eventual development of a long-term Conservation Plan, including significant changes in visitor interpretation, canopy tree location and replacement, artificial support systems for vegetation cover of the slopes (i.e., watering, fertilizing, liming), as well as the development of an appropriate management regime that is implemented by the Land Trust.

If the recommendations offered in this study are incorporated into a Conservation Plan for the site, the long-term preservation of the earthworks at Fort Howell can be better guaranteed for the benefit of future generations.

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INTRODUCTION

Background

This project was originally conceived in 1994, three years after the Hilton Head Land Trust had acquired control of Fort Howell from Greenwood Development Corporation and only a few months after Chicora Foundation had been invited to make a presentation to the Land Trust at the behest of Greenwood's CEO, Mr. Charles Pigg. Several site visits were made with then Land Trust President, Mr. John Evans, during which time a variety of preservation issues unique to Fort Howell were discussed. Of particular concern were the on-going efforts to stop, and repair, damage to the site from dirt bikes or all-terrain vehicles. The Land Trust had been using a variety of obstacles, which in themselves presented a liability issue, to discourage access to the slopes. They had been using a backhoe to push slumped soil back onto the earthworks, a technique which had the potential to seriously jeopardize both the integrity of the earthworks as well as any archaeological evidence which might be present. Other issues which were discussed included techniques for interpreting the site, and also visitor access.

In order to help the Land Trust begin developing a workable preservation plan for the site, Chicora Foundation agreed to submit a proposal to the S.C. Department of Archives and History for a State Historic Preservation Grant for Planning Projects. This grant was supported by the Land Trust (Mr. John Evans), a local preservationist (Mr. Michael Taylor), the Hilton Head Museum (Ms. Barbara Lothrop), Ballantine Environmental Resources (Mr. Todd Ballantine), and the Town of Hilton Head Island (Mr. Stephen Riley). Unfortunately, this first grant request was not funded. The S.C. Department of Archives and History was concerned that the threat to the site was not great and the reviewers were confused over the use of terminology typical to historic structure reports.

After discussions with the Grants Manager for this program, Mr. John Tucker, it was decided to resubmit the grant request for the next round of reviews in 1995. The discussion of site threat was expanded to emphasize that ownership, even by the most sensitive organization did not guarantee site preservation, absent a clear understanding of preservation issues and a long-range conservation plan. The second grant also indicated that earthworks, as standing objects, were very similar to standing houses in that both needed base-line assessments before any work was contemplated. This second grant request was again supported by the Land Trust (Ms. Betty MacDonald), Mr. Michael Taylor, the Hilton Head Museum, Ballantine Environmental Resources, and the Town of Hilton Head Island. A letter of support was also provided by Mr. Tom Jenkins, with Palmetto Pictures, who had just completed filming a history of Hilton Head and who addressed the site's interpretative potential, especially for filming projects.

This second grant request was fully funded by the S.C. Department of Archives and History. It had two primary goals: (1) to develop a baseline assessment of the earthwork, suitable for future use in condition reports and (2) to develop recommendations and a conservation or preservation plan suitable for long-term preservation efforts. These goals were to be met through the production of three specific products by this project. The first would be an existing conditions report consisting of a video, photographs, and topographic map. The second would be a long range conservation plan for the site. The third would be a general proposal for the implementation of the highest priority needs as identified in the assessment.

The project was to begin with a public meeting where individuals concerned with the site would have an opportunity to voice their concerns. This would provide us with a more realistic idea of

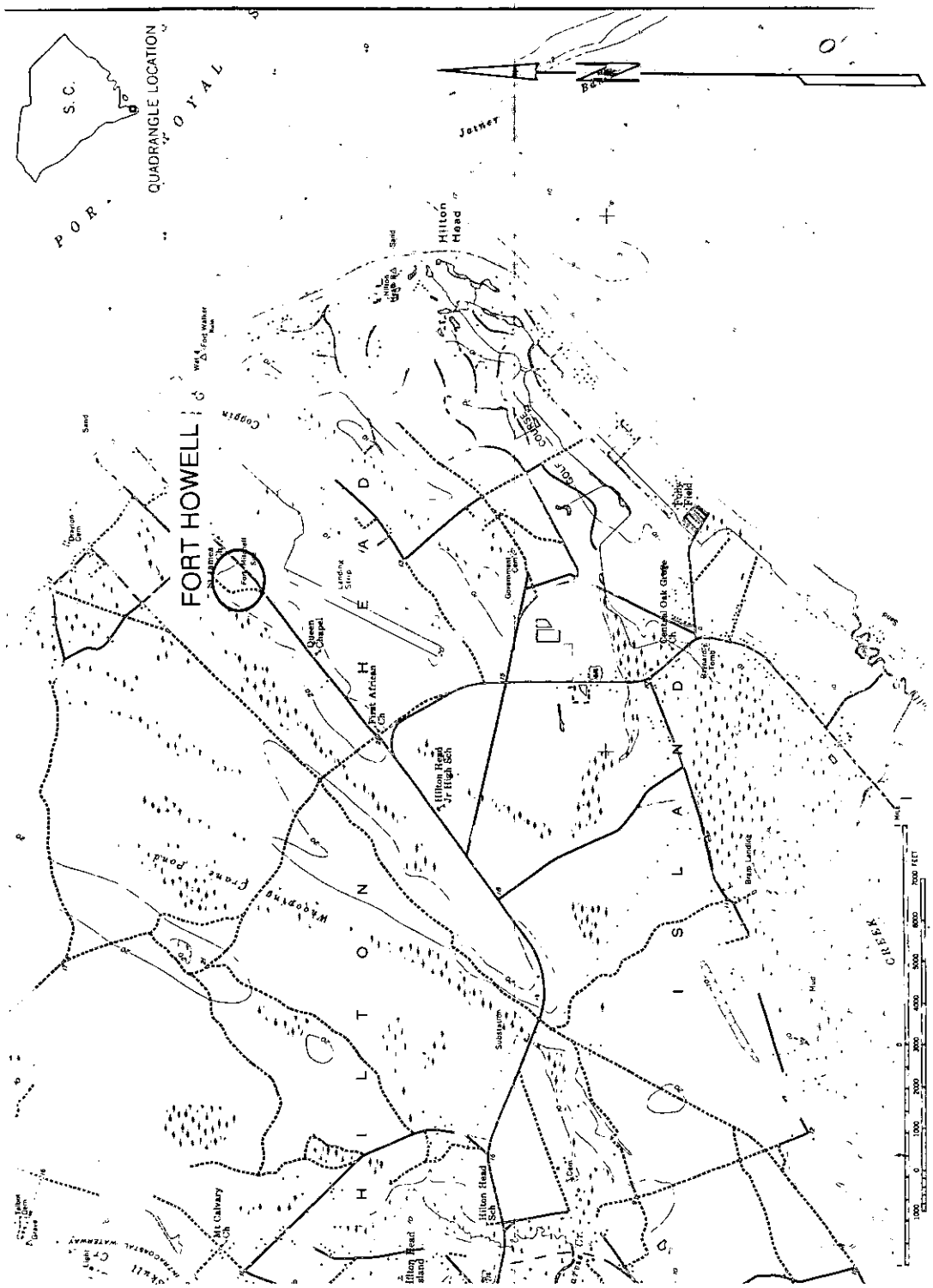

Figure 1. Location of Fort Howell on Hilton Head Island.

how the site was being used by the community and also would clarify essential issues. Following this would be a phase of field work, during which time the site video, photographic documentation, condition report, and topographic map would be prepared. Finally, these different data sources would be brought together to produce a final report.

As with most projects, some changes were necessary as the project advanced. The most significant change is that it became obvious that the Land Trust is not currently in a position to develop, or even support, a Long Range Conservation Plan. There are still a wide range of use and interpretation issues which must first be clarified. Consequently, rather than offer such a plan, this study reviews a range of options, hopefully providing some clarification that will be useful as the ensuing hard choices are made.

A public meeting was held at the Hilton Head Island Town Hall on October 22. Twelve individuals were in attendance, including representatives from the Hilton Head Island Land Trust, the Hilton Head Museum, and the Town of Hilton Head Island. A variety of issues were raised during this meeting.

Most prominent were concerns over access, with considerable concern expressed over the current lack of public access. Coupled with this was a concern over control of visitors when there was no on-site staff. Concern was also expressed over the impact on the site which might be created by increased use. Arising from the issue of access was a concern that the Town of Hilton Head was not doing enough to protect historic sites or enforce its site protection ordinance.

Another topic of considerable concern was the use of the site as a visual buffer, screening Beach City Road from the house lot sites at Palmetto Hall Plantation. Coupled with this is the Land Trust's major theme of ecological preservation, which seeks to maintain Fort Howell in a "rustic" condition with minimal intervention.

Both of these major issues will be discussed at greater length in the following discussions.

The video taping of the site was conducted on October 22, after the public meeting. The site assessment, topographic mapping, and photographic documentation, however, were not conducted until November 4.

The Site Locale

The Fort Howell site, which encompasses about 5 acres, is situated on the north end of Hilton Head Island, Beaufort County, South Carolina, and is bounded to the west, north, and east by Palmetto Hall Plantation development and to the south by Beach City Road (S.C. 333). The site is about 14 miles south of the City of Beaufort and 27 miles northeast of the City of Savannah (Figure 1).

Topography in the vicinity of Fort Howell tends to be level, with only a very slight slope northwestward toward a small slough or "gall," about 1,000 feet from the earthworks. Today the topography has been significantly altered by the development of Palmetto Hall. Adjacent to Fort Howell today is a golf course as well as single-family houses. The soils in the site area are the Wando Series, which consist of excessively drained, rapidly permeable soils formed in thick sandy coastal plain sediments. The soil is low in natural fertility and organic matter, and has a pH of 5.6 to 7.3 throughout. The Ap horizon may be up to 0.8 foot in depth and is a dark brown, friable, fine sand. It overlies the C horizon, which consists of a brown to pale yellow fine sand (Stuck 1980:42-43).

Mathews et al. (1980:155) note that the most significant ecosystem on Hilton Head Island is the maritime forest community. This maritime ecosystem is defined most simply as all upland areas located on barrier islands, limited on the ocean side by the extreme high spring tide mark and on the mainland side by tidal marshes. On the sea islands the distinction between the maritime forest community and an upland ecosystem (essentially found on the mainland) becomes blurred. In the vicinity of Fort Howell oaks are the dominant vegetation, with occasional specimens of sweet gum. Pines form a sparse supercanopy. In

general this provides dappled sunlight, so the forest floor is largely covered with either oak leaves or pine needles. In a few areas the sub-canopy includes blueberries, greenbriers, palmettoes, and muscadines, although small oaks and pines are more common. Where the canopy has been opened, there are very xeric conditions and the soil is either bare or is characterized by broomstraw, sandspurs, or other grasses.

Disclaimer

Chicora Foundation is not an architectural landscape, architectural, or engineering service. Our recommendations offered in this study are based only on our best professional knowledge of historic preservation and are not meant to represent architectural or engineering drawings, plans, or specifications. Although we have contacted various representatives of the Town of Hilton Head Island, we are not offering legal advice on complying with various town ordinances or codes.

HISTORICAL OVERVIEW

Historical Evidence

Hilton Head served as the headquarters for the Union's Department of the South and coordinated the Siege of Charleston. Although this effort officially lasted from the spring of 1863 until the Confederate evacuation in February 1865, the bulk of the efforts were confined to the summer of 1863. Afterwards no substantive gains were made and the Union efforts consisted largely of protracted shelling. As the siege efforts were reduced, the buildup of forces at Hilton Head were dramatically reduced, with troops shifted to other fronts. This left troop strength at Hilton Head so low by the spring of 1864 that there was fear that the post might no longer be secure.

In order to deal with the reduction in forces steps were taken to improve defensive positions on Hilton Head. One area of concern was the freedman's village of Mitchelville, outside the defense works protecting the major military and commercial facilities on the island. Two major earthworks were planned and constructed in late 1864 — a large earthwork enclosure on the existing southern line of defenses, called Fort Sherman, and an entirely new work located south of Mitchelville, called Fort Howell.

On August 17, 1864, Captain Charles R. Suter, Chief Engineer of the Department of the South, received orders to construct a new fort at Mitchelville. Two days later the commander of the newly arrived 32nd United States Colored Troops received an order to begin working on the construction of a fort "just beyond Mitchelville." The 32nd had been on Morris and Folly islands, engaged in fatigue details and, once back on Hilton Head, had been initially assigned to labor at Spanish Wells on Fort Holbrook. Consequently, the 32nd did not actually locate their camp outside Mitchelville until September 6, although at least some details were probably at work by August 20.

There is good evidence that the fort was constructed in an area of cleared land — either a fallow cotton field or land recently logged. Figure 2 shows the location of this new fort, placed at the very edge of Mitchelville, in an area of cleared or partially cleared lands.

Construction of the fort appears to have taken place between August 20 and November 23 under the direction of supervising engineer Captain McGuire. The remaining records, however, indicate that the 32nd was less than enthusiastic about their fatigue duty, with the result that McGuire often complained about how few men were actually devoted to the work. Up to October 13, the details ranged from 250 to 300 men, afterwards the number declines dramatically.

One example, from September 16, helps us understand the allocation of labor and tasks. On that date the approximately 175 infantry troops and 24 engineers worked from 7:00 to 11:00 AM and 2:00 to 6:00 PM. The engineers, supervising the fatigue details, were engaged, "5 Digging Water Ditch, 6 loading Carts, 8 Covering Magazine, 2 Making pegs, 2 loading Manure, 2 Manuring Magazine, 1 in Tool house" (quoted in Legg et al. 1991:36). This entry reveals, for example, that at least one magazine was located in the fort and that the earthworks were originally covered in manure to retard erosion.

On September 26 the "New work at Mitchelville" was named Fort Howell in honor of General Joshua Howell, who was killed in Virginia. The work was not complete when the 32nd USCI left the area in mid-October and small parties from the 144th New York continued work until late November. An order dated October 3, 1864 directed surplus artillery from Bay Point be moved to other works, including Fort Howell. There are not, however, any records concerning the level of readiness or number of guns at Fort Howell. Nor does Legg et al. (1991) provide any detail

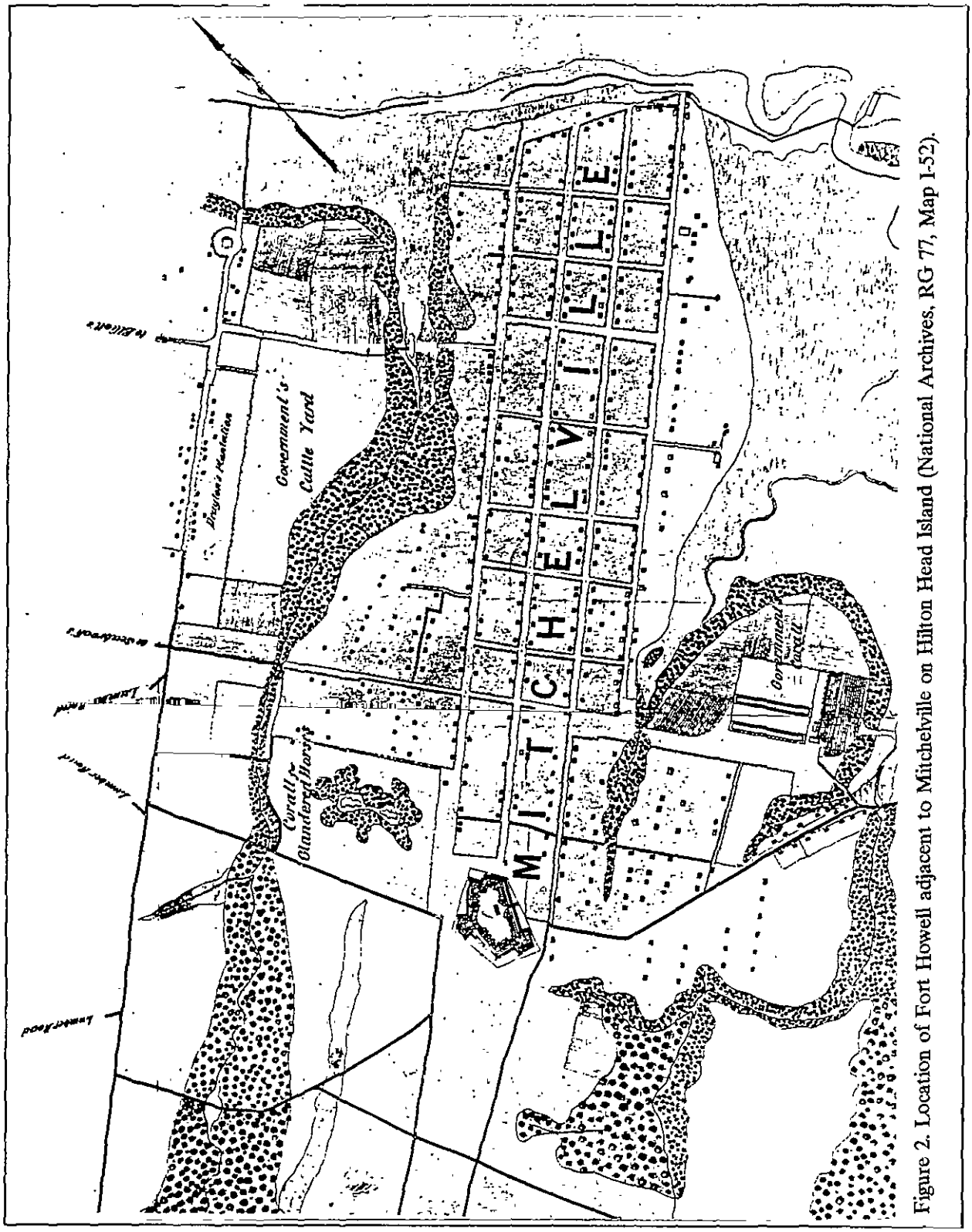

Figure 2. Location of Fort Howell adjacent to Mitchelville on Hilton Head Island (National Archives, RG 77, Map 1-52).

concerning the fort's decommissioning or disposal by the Federal military when Hilton Head was abandoned. Regardless, we know that the fort saw no action.

Fort Howell's Form

Perhaps the most common reference guide to military fortifications of the period is D.H. Mahan's *A Treatise on Field Fortifications* (for the purpose of these discussions, Mahan 1862 has been used). As Paddy Griffith notes, it is very significant that America's only official military academy, West Point, was built as a college of engineering. He notes that:

> Graduates of West Point might not have been particularly well versed in the art of commanding infantry or cavalry in battle, but whatever else one might say about them it is certain that they had a solid grounding in mathematics and military engineering. Their Professor of Engineering and the Art of War, Dennis Hart Mahan, was to all accounts a persuasive teacher — and his favourite theme was the preeminence of the spade in combat (Griffith 1989:124).

Recently, David R. Wright (1982) has expanded Mahan's work by exploring the theory and practice of Civil War fortifications. Although his work largely follows the definitions proposed by Mahan, there are some minor differences, usually associated with an effort to make Mahan somewhat more understandable.

A detailed map was made of Fort Howell, showing what we presume the fort looked like at its completion (Figure 3). Of course without archaeological investigations it is impossible to determine how accurate these plans actually are. It is interesting that when Figure 3 is compared to the fort shown on Figure 2, there is one immediate difference — the ditch work on Figure 2 is much more extensive than shown on Figure 3. These two figures are compared in Figure 4.

Curiously, the ditchwork on Figure 2 appears much closer to the reality of the site than that shown on Figure 3. Mahan (1862:14-15) discusses at length some of the problems associated with bastioned forts such as Howell, noting that if the counterscarp of the ditch is laid out parallel to the interior crest, there is formed a dead angle along each face near the shoulder. This appears to be the situation shown in Figure 3. Mahan proposed several solutions, one of which is widening the ditches such as is shown in Figure 2. Another solution is to dig a second ditch, at the foot of the slope across the main ditch and use palisades (Mahan 1862:15).

It appears that Figure 3 may be the original plan, which incorporated only the ditch within a ditch and palisade approach, while Figure 2 was drawn after the fort was completed and the wider outer ditches had been added. This suggests that we are seeing an effort to make Fort Howell as defensible as possible, with the engineers tackling problems in design. In itself this is a very interesting observation which reveals that while Fort Howell never saw action, it is still an important example of military engineering.

Fort Howell is an example of a relatively permanent fortification constructed of earth. It was designed as a quadrilateral redoubt with the re-entering angles all being 90° or less. Two lunette bastions[1] were created to provide good flanking fire to cover the surrounding ditches. One was situated on the northwest face, while the other was located on the south face. Combined these provided coverage of the most likely approaches to Mitchelville — the two roads leading to the village from the southwest (see Figure 2). Facing

[1] A bastion is a projection from the main work containing two faces and two flanks that provide flanking fire to the fronts of the curtains. The curtain is the section of the rampart or fort wall that exists between two bastions, connecting their flanks. In the case of Fort Howell these ramparts formed a salient or outward projecting angle of about 90°.

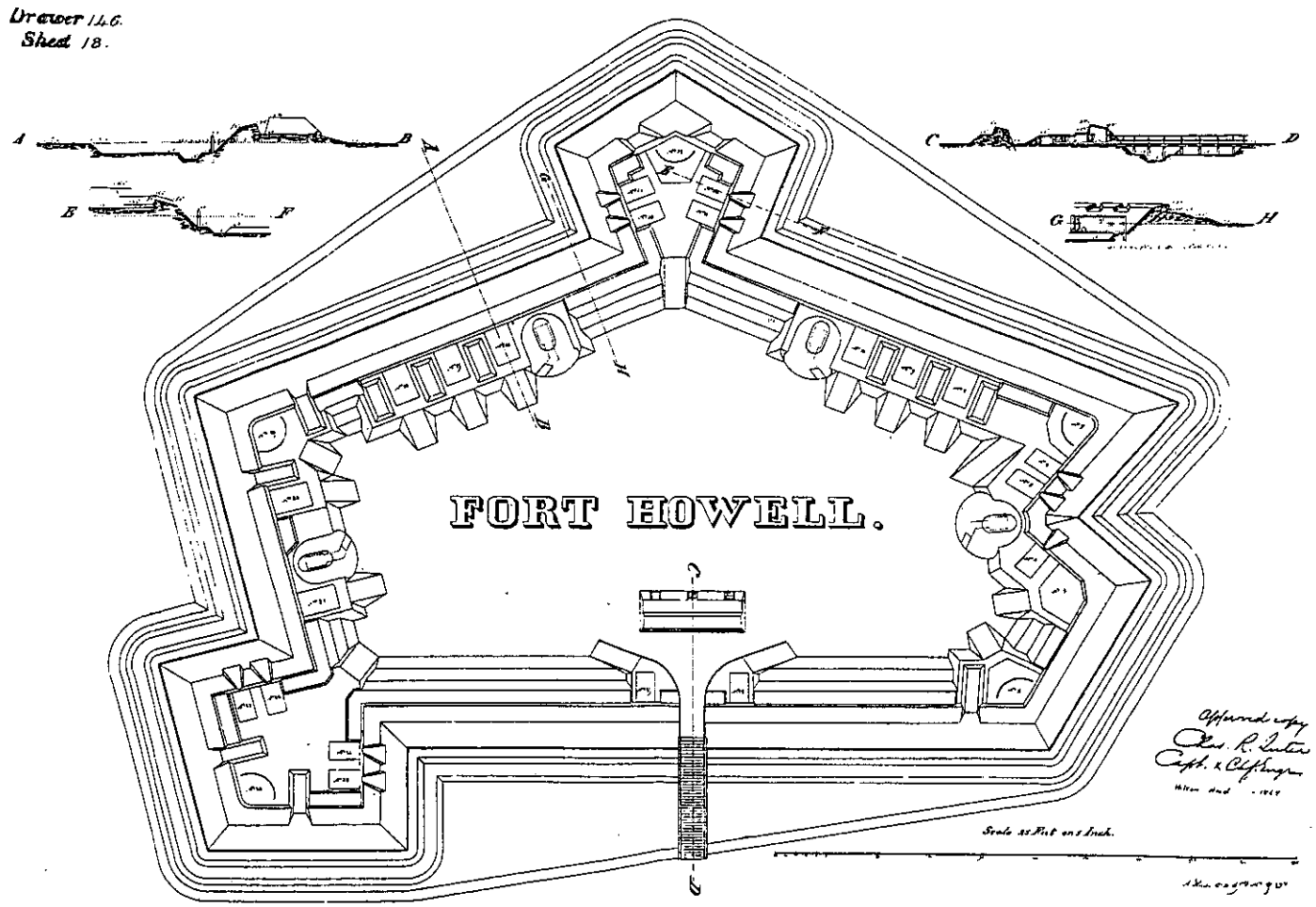

Figure 3. Plan of Fort Howell prepared by A. Riviere, Co. D, 47th New York Vols. and approved by Captain Charles R. Suter, Chief Engineer (National Archives, RG 77, Drawer 146, Sheet 18).

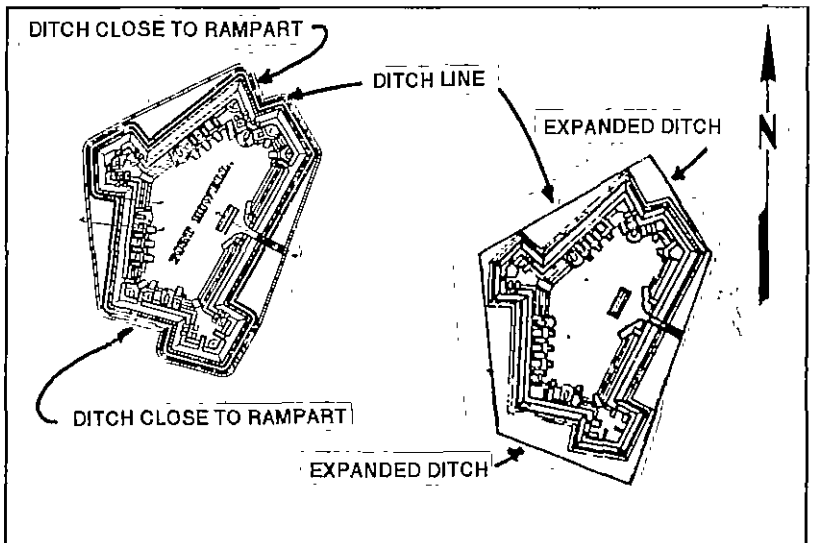

Figure 4. Comparison of the fort plan with that shown on the Mitchelville map. Note the difference in the ditch width.

Mitchelville to the east was a modified priest cap[2], designed to provide cross fire on the capital.

The entrance to the fort, also known as the sally port or outlet, was on its southeastern face, looking back toward Mitchelville. Clearly this was viewed as the least exposed area of the work. Passing over the ditches was a wooden bridge 14 feet in width, leading to an outlet 11 feet in width. Mahan notes that while 6½ feet are adequate for normal passageways, "when they serve as a common passage for wagons, &c. . . . they should be at least ten feet wide" (Mahan 1862:61). No gate or other barrier is shown in Figure 3, although the opening is protected by an earthen traverse about 50 feet in length. This was sufficient to prevent an enemy from directly oblique fire into the work through the outlet.

Cross section C-D on Figure 3 reveals that the traverse had a wood revetment on the steep exterior slope, while the parapet was about 7 feet deep. This was sufficient, according to Mahan (1862:19) to stop the projectile from an 18-pounder fired at 110 yards. The banquette was 6 feet in width, adequate for two or more ranks of soldiers.

The fort was built for 27 guns. Sixteen of these were barbette batteries, allowing the cannon to fire over the parapet.[3] The fort had 10 salients, six of which were protected by guns. All of these were barbette batteries. One had a trapezoidal platform, while the other five salients may have been protected by heavier guns with carriages running on metal track. This would have been typical of seacoast weapons, 32- and 42-pounders, used by the army to protect permanent positions.

The remaining 10 barbette batteries each had a platform measuring about 12 feet in width by 18 feet in length (perpendicular to the parapet). This is slightly larger than proposed by Mahan (1862:57), but was clearly intended for siege or garrison, rather than field, guns. Mahan indicates that these platforms consist of:

> three sleepers of six inch scantling, either fifteen or seventeen feet long [18 feet in the case of those at Fort Howell], which are laid perpendicular to the direction of the epaulment, and are covered with two-inch plank, twelve inches wide, and cut into lengths of nine or ten feet [12 feet at Fort Howell]. Between the ends of the sleepers, and the foot of the genouillére, apiece of eight-inch scantling, nine feet

[2] A priest-cap is a work that resembles a capital letter "M" often formed by two joined redans. In the case of Fort Howell the southeastern and northern ramparts coming from the two redoubts form three salient angles and one re-entrant angle facing the east, toward Mitchelville.

[3] Although this created a very wide field of fire, it also exposed the guns and men to enemy fire, especially dangerous at close range.

> long, termed a heurter, is laid; it should project about six inches above the platform, and be bisected by the directrix. The object of the heurter is to prevent the wheels from being run against the revetment, and also to give the gun its proper direction, particularly in night firing (Mahan 1862:57; see also Anderson 1995:Figure 5).

Six of the barbette batteries were located north and south of the north bastion, with the guns separated by earthen walls to confine explosions or damage to a single position.

Eleven of the positions were embrasure batteries, which allowed the guns to fire through openings in the parapet wall.[4] These are found at the one re-entrant angle of the fort at the priest-cap and on the flanks of the two lunette bastions. All are what are termed oblique embrasures since the directrix or line bisecting the base of the opening makes an acute angle to the parapet. Examination of Figure 3 reveals that these oblige embrasures were oriented to direct fire power away from the walls of the fort. The platforms were 9 by 15 feet — the exact size specified by Mahan (1862:57) for field pieces.[5]

The fort contained four magazines, each measuring about 5 feet in width by 8 feet in depth. They were protected by mounds of earth and angled entrances. One was located at the re-entrant angle at the priest-cap, two were located on either side of the north lunette bastion, and another was located just west of the south lunette bastion. No profiles are provided by Figure 3, so additional details of construction must be interpolated from Mahan (1862:58-60).

Figure 3 provides a profile, labeled A-B, through one barbette battery. It reveals that the fort was constructed without a glacis, which is more often found in permanent fortifications where a siege was thought likely (Wright 1982:19). The first ditch was about 4 feet in depth, followed by a smaller inner ditch (previously discussed) an additional 2 feet in depth.

A relatively wide berm was likely needed to support the sandy soil, throwing the weight of the parapet back from the scarp. Between the berm and exterior slope of the parapet a wooden palisade is shown, providing additional protection to the parapet and slowing down the invading army. Curiously, however, this palisade was not placed at the foot of the counterscarp, where it was normally recommended. Such a position provided "no room to stand on the counterscarp and swing an axe downward while at the same instance being exposed to point-blank musketry" (Wright 1982:40). The placement of the palisade at Fort Howell would have allowed axe men to stand on berm while attacking the logs, relatively protected from musket fire.

Profile C-D provides a view of the banquette, designed for troops. The tread would have been adequate for two ranks of soldiers, while the terreplein allowed the massing of additional support troops.

Additional details concerning the fort's construction can be obtained from a careful review of Figure 3, although it is again appropriate to offer the caution that many details cannot be verified without archaeological investigations. Given the difference in the ditches seen in Figures 2 and 3 it seems likely that Figure 3 may either represent a plan of the *proposed* fort, or else additional work was done at the fortification *after* the plan was prepared.

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[4] Although this arrangement protected the gun and its crew, it weakened the wall and limited the field of fire for that gun.

[5] This reveals that Fort Howell was designed to have 11 field pieces and 16 siege or garrison guns. The field artillery included light weapons of high maneuverability, such as 6- and 12-pounders, while garrison weapons were heavier and slower to move, typically including 12-, 18-, and 24-pounders. Five of the garrison weapons may actually have been very heavy 32- or 42-pounders. Of course, it is impossible to know what was actually mounted at Fort Howell (see Ripley 1984 for an overview of these weapon types).

EXISTING CONDITIONS ASSESSMENT

Vehicle Access and Parking

Fort Howell is located immediately off Beach City Road (SC 333). There is no advance notice of the required turn and there are blind curves to the NNE and SSW. Figures 5 and 6 show the area as it currently exists.

The extant turning radius, while tight, is adequate for school bus traffic, but the holding area (between the road and the gate, measuring 37.5 feet) is insufficient to allow an average school bus (with a length of 39.5 feet) to safely pull entirely off the road if the gate is locked or closed. Once through the gate there is a crush-run apron ranging from 20 to 23 feet in width for about 155 feet. This provides adequate room for bus pull-in, but fails to provide adequate space for turning around (Figure 7). Consequently, buses using the parking facility currently have to back out onto Beach City Road — a dangerous undertaking under the best of circumstances.

Car parking is less difficult, but informal — there are no designated parking spaces. There are also no designated handicapped parking areas. This limits the number of vehicles which can safely use the parking area and will create considerable confusion as the site when more heavily used.

Of considerable concern during the public meeting was the current inability of the public to access the site. The Land Trust reports that unknown parties are locking the gate, although the Fort Howell sign indicates that the site is open during daylight hours. A daylight activated electric gate has been ordered by the Land Trust and is seen as a solution to the problem. Even an electric gate, however, can be locked shut, probably causing considerable damage to the gate motor. Daylight is also difficult to gauge and may cause inconvenience to individuals using the site. For example, there will need to be some mechanism to override the gate from the inside, allowing "trapped" cars to leave. There will also need to be a safety mechanism to prevent gate closures from damaging vehicles.

Associated with the issue of public access, we have been told (but have not independently verified) that employees of Palmetto Hall Plantation will allow visitors to use their access to the site, for a $5 charge. Apparently the Museum also has preferential access to the site. The inability to consistently access the site, coupled with the varying rights of access are of considerable concern since they detract from the site's educational potential and create an unnecessary feeling of preferential treatment.

Pathways to the Site

There is only one, relatively poorly defined, pathway to Fort Howell (Figure 8). Once parked, the visitor is confronted by a broad expanse of loose mulch, about 3 to 5 inches in depth. This covers an area about 45 feet by 120 feet and may serve as an excellent area for parking expansion. Currently the mulch is very difficult for ambulatory individuals to walk through and would be impassible for wheelchairs or walkers.

The path narrows to about 8 to 10 feet (Figure 9) and winds around trees, eventually leading to the Fort's outlet or sally port. The pathway is relatively firm in most areas, but consists of only pine straw or oak leaves. Branches and other obstacles are common on the path, making it hazardous for elderly visitors and difficult for wheelchairs or the disabled. The landscape in this area is unspectacular, being characterized by a variety of young oaks. There is at least one pile of concrete and iron pipe debris which detracts from the experience.

About halfway to the fort the path incorporates what appears to be an old road bed (Figure 10) which is about a half foot below the

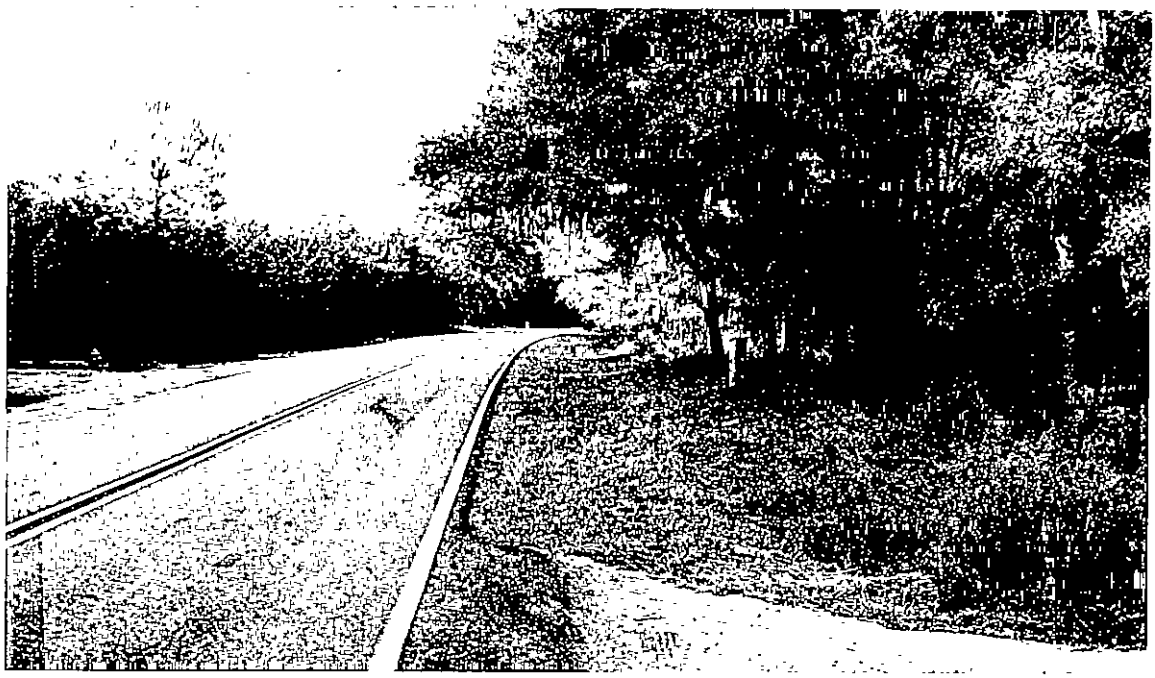

Figure 5. Beach City Road from Fort Howell gate, looking southwest.

Figure 6. Beach City Road from Fort Howell gate, looking northeast, toward Mitchelville.

Figure 7. Current parking area at Fort Howell, from Beach City Road, looking northwest.

Figure 8. Unmarked path to Fort Howell from parking area, view to the southwest. Note the tire tracks in the soft mulch.

Figure 9. Area where the path narrows and becomes less distinct. View to the south.

Figure 10. Portion of old road bed integrated into path leading to Fort Howell. View to the west with the ditch and rampart in the background.

surrounding ground in some areas. This creates an uneven walking surface. In this same area there is a pedestrian gate to Fort Howell, which apparently is always kept locked. The canopy is open in this area and sand is exposed, creating a very loose, consolidated walkway.

Although the path is poorly-defined, the vegetation has tended to channel visitors and discourages creating alternative paths.

At Fort Howell there is a broad roadway surface through the ditches and the ramparts, leading to the fort's terreplein. Inside the fort one immediately notices that the traverse is not present. This gives rise to the possibility that at some past time the traverse was pushed out of the fort and used for fill across the ditch.

Ditches

One of the best ditch views occurs as the visitor is walking into Fort Howell. This view, however, is compromised by both the infilled soil roadbed and also by the large number of very young pines growing up in the ditch to both the right and left of the access point (Figure 11).

The ditches are consistently eroded and it is impossible to see any distinction between the outer, more shallow ditch, and the inner, deeper, ditch. The scarps and counterscarps have eroded down to a natural slope. There is also no clear evidence of the berm anywhere around the earthwork. Certainly there is no evidence of the palisade.

Some ditch areas are known to have very poor drainage and to collect water during rainy periods. One such area is immediately to the right before entering the fort and another is between the two bastions, in an area of very loose sand which is characterized by ferns and brambles (Figure 12).

The ditch is entirely walkable, although it is being filled in with small trees. At least one pine, characteristic of the supercanopy, situated in the vicinity of the priest-cap, has been recently struck by lightening and may die in the near term. This tree, situated on the exterior slope of the rampart, is a threat to the integrity of the earthwork. Once dead it will be susceptible to wind throw.

In several areas, most particularly on the southern side of the fort, from the southern bastion toward the entrance, the ditch has been compromised by either the adjacent Palmetto Hall development or by Beach City Road (Figure 13).

The ditch area exhibits relatively little stabilizing vegetation. Leaf litter has collected in most areas and, assuming no pedestrian traffic, appears adequate to hold the existing slopes. In some areas, however, the canopy has been opened and bare sand is exposed, with only occasional grass. These areas exhibit increased potential for erosion.

Southeast Rampart

This section of the fort is situated between the southern bastion and the priest-cap to the northeast. It is also the location of the fort entrance. It originally consisted of two garrison gun positions on either side of the entrance, while the bulk of the wall consisted of a banquette.

Like all of the walls, this section has eroded to a natural slope and it is no longer possible to distinguish the outer slope, superior slope, or interior slope (Figure 14). Nor is it possible to distinguish the banquette from the associated terreplein. The gun positions and associated ramps are likewise no longer clearly defined.

There are two major erosional areas. One is situated to the south of the entrance where the damage has been caused by dirt bikes in an area measuring about 15 by 10 feet, to a depth of about 1 foot. A similar area is found north of the entrance along this same wall.

Previous efforts to stop use of these erosional areas consisted of creating 1x4 barricades, some of which are still extant, or partially so (Figure 15). While they appear to have been effective in stopping traffic in these areas, they are now serious trip hazards and do nothing

Figure 11. Ditch north of fort entrance. Note the large number of small pines clogging the ditch and detracting from the view.

Figure 12. Ferns and brambles in ditch west of the north bastion. View to the south.

Figure 13. Counterscarp of ditch outside of the Land Trust fence. View to the south-southwest.

Figure 14. Exterior slope of the rampart, showing the loss of definition. View to the west-northwest.

Figure 15. Erosion at the east corner of the priest-cap, showing the use of 1 by 4 barricades.

Figure 16. Depression in magazine or bombproof which may be the collapsed chamber or looting. View to the northeast.

to help stabilize the soil. Consequently, erosion is active, more so in the southern area than in the northern because of the difference in canopy between the two areas.

There are a number of trees on the walls, as well as at least one very large stump. Trees will be discussed in a following section.

Priest-Cap Walls

The modified priest-cap is situated at the northeastern corner of the fort, facing Mitchelville. Six gun positions are present in this area, as well as a short area of banquette. Also present is one of the magazines or bombproofs (at the re-entrant angle of the priest-cap).

The magazine is still visible as a discrete mound of earth with a slight depression in the center (reflecting either the collapsed chamber or previous looting efforts) (Figure 16). The gun positions, however, are indistinct and the associated rampart walls have eroded and taken a natural slope. Individual ramps are likewise no longer visible. Three of the guns were mounted en embrasure — this detail is also no longer clear.

There are two major areas of erosion. The first is just south of the first (or southern) salient. This area is rather small, measuring about 6 by 10 feet and perhaps a foot deep. A second area, situated on the northern salient, is larger. It measures about 10 by 15 feet in extent and is at least 2 feet in depth. This second area is also still actively eroding (Figure 17).

The view from the priest-cap is compromised by the location of a green cargo container just beyond the Land Trust fence, on Palmetto Hall property. This appears to be used for the storage of landscape equipment and supplies. It is frequently used and distracting to visitors of Fort Howell.

Wall Northeast of North Bastion

This wall included three gun positions, each separated by an earthen wall, as well as a magazine. A short section of banquette was originally built west of the guns, before the lunette bastion. Like other areas, these are heavily eroded and the rampart has taken a natural slope. The magazine is still recognizable, but is considerably more eroded that the one associated wit the priest-cap.

There are three areas of extensive outer wall erosion. The first measures about 10 by 15 feet and is 1 foot in depth. The second measures 15 by 20 feet and is 2 feet in depth. The third, and most serious, is about 15 feet square and is nearly 3 feet in depth (Figure 18). Several of these appears to have been "repaired" by trying to push the eroded soil back into position. Absent stabilizing vegetation, of course, this has partially failed. Each of these three areas is currently eroding and much open ground is present.

North Bastion

The north lunette bastion included five gun positions — four en embrasure and one en barbette. The bastion is still present, although like other earthwork areas, the definition is largely gone. Individual gun positions are no longer recognizable, the parapet walls and especially the embrasures, are no longer present, and the ramp leading to the bastion terreplein is not well defined. In general, only the vague impression of the bastion is conveyed.

On the bastion the view is largely compromised by a single-family house immediately to the north, just beyond the Land Trust fence. It is unfortunate that the development was not planned to provide some buffer for the site. As it is, the view from the bastion fails to convey much of an impression.

There are four areas of significant erosion on the superior and exterior slopes of the parapet. One measures about 10 feet square and is about 1.5 feet in depth. Another is about 15 feet square, to a depth of 3 feet. The third is about 20 feet square, to a depth of 1.5 feet. The final erosional area is 10 by 15 feet in extent and is 2.5 feet in depth (Figure 19). Each of these represents a remnant dirt bike pathway. Several have been blocked with log sections. Although these are less

Figure 17. Close-up of erosion on the priest-cap walls. View to the southwest.

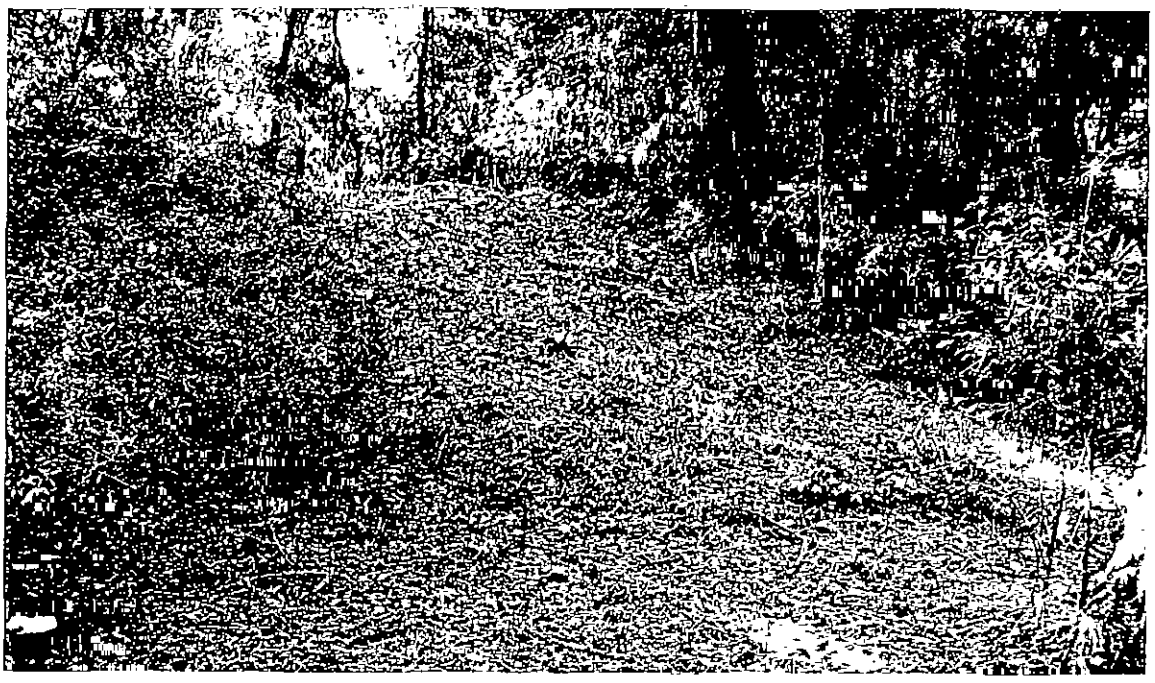

Figure 18. Heavy erosion on wall northeast of north bastion. View to the south-southeast.

FIGURE NOT AVAILABLE

Figure 19. Heavy erosion at capital of north bastion which has resculpted the bastion face. View to the south-southeast.

Figure 20. Heavily worn path up to the north bastion on the fort interior. View to the northwest.

hazardous than the use of 1x4 boards, they are nevertheless detracting from the overall view of the fort. In addition, while they deter movement up and down the slope they do nothing to help hold the soil.

There is a clear pedestrian pathway from the terreplein of the fort up to the north bastion and thence to the south along the top of the parapet wall. In several areas this path has caused, or encouraged, erosion of the sandy soil (Figure 20).

Salient Southwest of North Bastion

These walls include six gun positions, all en barbette, and two magazines. The three gun platforms between the north bastion and the salient are the best preserved at Fort Howell (Figure 21). Some remnant evidence of the actual platform areas is present. In addition, there are slight rises which correspond to the earthen walls between the positions. The three ramps leading to the barbette batteries are also clearly present. The two magazines, one at each end of the salient, are in relatively good condition.

This is not to say that the parapet has not seen considerable erosion, with the walls taking on natural slopes. It is no longer possible to distinguish the superior and interior slopes, nor is it possible to distinguish the banquette area just south of the north bastion.

This salient is the most intact of all the walls, evidencing no dirt bike erosion. What is seen, however, is "slippage" (Figure 22). The walls are still relatively steep and there are areas of bare ground where roots are exposed. These represent areas of potential erosion if steps are not taken to stabilize the soil.

This side of the earthwork also exhibits somewhat greater diversity in the vegetation, with small clusters of pine and sweet gum interspersed among the oak. There is also more muscadine and some blueberry in this area.

South Bastion

The south bastion also included five guns, four en embrasure and one en barbette. Like the north bastion, it has suffered considerable erosion and none of the surface details are visible. In addition, there are four areas of extensive erosion. On the western flank of the bastion is an area of erosion measuring about 10 feet square, to a depth of about 1.0 foot. On the southwest face is an area measuring about 10 feet by 20 feet, eroded to a depth of nearly 2.0 feet. At the intersection of the southeast face and eastern flank is an erosional area measuring about 15 feet by 30 feet, with damage to a depth of nearly 2.5 feet. On the eastern flank is another area of heavy erosion damage, measuring about 25 by 30 feet, to a depth of about 1.0 foot. Several of these areas have remnant 1x4 board barricades, but there has been no effort to stabilize the loose, unconsolidated sands (Figure 23).

Southwest Rampart

This section of wall, situated between the southern bastion and the central entrance to the fort, is in similar condition to its mate, described as the southeast rampart. The entire length was designed as a banquette, although erosion has reduced the walls to a natural slope and no details are obvious.

There is one area of heavy erosion, measuring about 10 by 15 feet to a depth of about 1.0 foot.

Traverse

There is no evidence of the traverse shown on Figure 3. As previously discussed, it seems likely that it was used to create the ditch fill allowing access to the fort. Careful inspection of this area fails to reveal any residual mounding or topographic anomaly (Figure 24).

Fort Interior or Terreplein

The interior of the fort is covered in scrub vegetation, primarily very small (<½ inch in diameter) oaks with some muscadine vines (Figure

Figure 21. Salient southwest of the north bastion, view to the north.

Figure 22. Soil creep or slippage on the salient walls southwest of the north bastion. View to the east-northeast.

Figure 23. Erosion at south bastion. View to the west.

Figure 24. Fort Howell terreplein looking toward entrance. View to the east-southeast.

Figure 25. Scrub vegetation on the fort terreplein. View to the north-northeast.

25). There are also a number of small (≤ 3 inches in diameter) oaks. The canopy, however, is primarily provided by the larger oaks.

Careful inspection of the area reveals some indication of uneven topography. This is likely the result of both looting and use of the fort as a dirt bike track. There is still clear evidence of a roadway of sorts which came through the entrance, turned sharply to the west and then northward again. This bike path is deeply worn, with a build-up of soil to the south and west.

The pedestrian route through the fort is not as clear, but appears to generally follow a path from the entrance through the middle of the fort, up the north bastion and then to the salient. From this point on the path is less distinct and no clear exit pathway could be discerned.

Trees and Other Vegetation

Relatively few of the trees at Fort Howell are protected by Hilton Head's tree ordinance. Most are fairly young small trees and many are little more than scrub. Nevertheless, there are other factors which must be considered. For example, there is a strong interest on the part of Palmetto Hall Plantation to have Fort Howell provide a buffer against Beach City Road. In addition, the Land Trust itself is interested in maintaining the site much as it exists today.

Some of the trees do serve useful functions. Those outside the fort are very effective in limiting access and helping to control the creation of multiple paths. Those on the walls do help to hold the earthwork's form, as long as they are healthy. Once diseased or dead, however, trees growing on the slopes pose hazards to both site visitors and to the site itself. Once dead, these trees could pose a significant blow-down threat if not professionally felled beforehand.

The healthy trees, by providing dappled shade, also help reduce heat and water stress on the understory vegetation. This will be particularly important as ground cover plants are selected to help restore erosional areas.

Many of the trees, such as those in the ditch and those on the fort's terreplein, serve no function and, in fact, may detract from the site's interpretation. The pines are especially problematic since they attract lightening strikes, are more prone to disease, and their needles tend to produce very acidic soils.

Other vegetation, for example the greenbrier and muscadine, may pose a significant tripping hazard to site visitors. The low scrub vegetation may also harbor ticks, which are significant vectors for an increasing number of diseases.[1]

Current Interpretation

At the present time little effort has been made to interpret the site to visitors. There is no signage, nor is there any form of brochure to accompany the visit. There is no convenient site map to help locate the visitor. In essence, the visitor must already understand the site, something about Civil War fortification, and Fort Howell's history, for the visit to be rewarding.

We understand from the public meeting that the majority of individuals visiting the site do so with some form of organized tour, either from the Hilton Head Museum or from Low Country Tours. In spite of this, there is an interest in making the site more hospitable to self-guided tours.

[1] The American dog tick, a common pest of both dogs and humans, may carry Rocky Mountain spotted fever, tularemia, and other diseases from animals to people. This tick may also cause paralysis when it attaches at the base of the skull or along the spinal column. While the primary vector of Lyme disease is the deer tick, there are species that are close relatives which are also capable of transmitting this very serious disease here in South Carolina.

Vehicle Access and Parking

Current vehicle access and parking is appropriate only for the very short term. Steps should be taken to make the existing turn safer, more clearly mark the site (which will not only help with safety concerns, but will also help publicize the fort's existence), and develop more appropriate parking facilities.

The turn to Fort Howell should be posted in both directions on Beach City Road by using standard SCDOT -signage for a historic site (typically brown). Such signage would likely indicate the name of the site (Fort Howell) and have an arrow. This would be adequate to ensure that motorists unfamiliar with the area have an opportunity to slow down in order to make the turn.

It might also be appropriate to request that the SCDOT investigate reducing the speed on this curve in order to help protect school bus traffic.

The Land Trust may also wish to explore the possibility of erecting a state historical marker at the road side.[1] This would provide some advance information concerning the site and might encourage more individuals to visit the site.

The current parking facilities are inadequate and should be expanded as soon as possible. In particular, the parking should provide space for at least one bus, coupled with one handicapped parking space (van accessible), and at least three automobile spaces.[2] Figure 26 provides a general layout which might be appropriate for such a parking area, although the Land Trust should have this designed by an architect with experience in parking facilities. The Land Trust should also consider incorporating at least one bike rack to encourage more environmentally sensitive transportation.[3]

While an asphalt parking area has a better appearance and wears better, it is possible to achieve adequate results using compacted crush run, realizing that higher long-term maintenance costs are associated with this technique.

The space for this parking enlargement is readily available in the area which today is covered in loose mulch. Removal of this material and use of this area for parking will cause no significant environmental consequences and will require that no trees or understory vegetation be removed. This area is also screened from both Palmetto Dunes and Beach City Road, so it should present no appreciable visible intrusion. Since the site is closed at night, we are not recommending any security lighting.

The Land Trust should consider

[1] The S.C. Department of Archives and History administers the Historical Marker program. It approves the documentation and wording for all historical markers and monuments located on public property, and it coordinates their erection with the S.C. Department of Transportation. There are no state-appropriated funds for erecting markers. The Land Trust would need to fund the completion of the marker form and the manufacture of the marker. A contact person at the S.C. Department of Archives and History is Dr. Tracy Power (803/734-8613).

[2] The ADA Accessibility Guidelines (4.1.2.5) specify one accessible space in lots with 25 or fewer spaces. The Land Trust, however, should check for any overriding local ordinances.

[3] Bike racks are typically rated for high or medium protection. Fort Howell would likely require only medium protection devices, such as a ribbon rack, M-rack, or U-rack. One source for bike racks is Kay Park Recreation Corporation, 2000 Waverly Road, Janesville, IA 50647, 800/959-0647.

establishing several picnic tables in the open woods between this proposed parking area and Beach City Road. Coupled with the tables should be several trash receptacles.[4] This area should be left rustic and no effort should be made to create paths or otherwise alter the terrain.[5]

It is essential that the party or parties responsible for locking the gate are identified and this practice be stopped. While the electric gate may help, it will be very important to insure that the gate has a manual over-ride on the interior to prevent visitors from being locked in. It will be equally important to insure that the gate mechanism has a safety device to prevent it from closing on vehicles or individuals.

One last issue of some concern is how access is obtained to the site. We suggest that the Land Trust should investigate whether our reports are correct and Palmetto Hall Plantation is charging individuals to visit the site through their gates, rather than the Land Trust gate. If so, this practice undermines the public nature of the site and may create an unfavorable impression in the public's mind. In addition, with access allowed through two gates it will be very difficult to control security and provide a reasonable account of site use. We recommend that access be limited to the Land Trust gate.

Pathway to the Site

The pathway to Fort Howell should be dramatically upgraded, making it clearly defined and ADA compliant.

This path should follow the one already established (Figure 26). This will minimize environmental disruption, since it follows a corridor which has already been disturbed. The low vegetation on either side will discourage visitors from leaving this path. Although it winds its way to the site, increasing construction cost, this is far more aesthetically attractive than creating a straight path through the low oak woods. Again, since the site is closed at night, there is little need for security lighting.

The current pathway is from 8 to 10 feet in width. A two-way walk requires only 4 feet, while a two-way wheelchair walk requires only 5 feet. We recommend a design width of 6 feet.[6] This seems to be more than adequate for the traffic anticipated at Fort Howell.

A variety of walkway materials were examined. Asphalt was dismissed because of both

[4] Picnic tables are available in a variety of materials, including wood, aluminum, fiberglass, plastic-coated metal (vinylast plastisol), and plastic made from recycled consumer products. Each has beneficial features, but we are inclined to recommend the use of plastic. These are insect and rot free, maintenance free, graffiti-proof, and splinter-free. Moreover, they represent environmental sensitivity. Suppliers include American Playtime Systems, 230-T Rte. 109, Farmingdale, NY 11735, 800/557-2598; American Recreational Products, 30-2 Raynor Avenue, Ronkonkoma, NY 11779, 800/663-4096; and Kay Park Recreation Corp., 2000 Waverly Road, Janesville, IA 50647, 800/959-0647. Whatever source is used, the Land Trust should ensure that the selected items meet or exceeds ASTM and CPSC guidelines. We also recommend that the picnic tables be specifically designed for handicapped use, which simply means that the frames are designed to provide a ground clearance of 30½ inches and that the table top extend 2 feet beyond the seats on at least one end to create ample wheelchair access.

One of the most common trash receptacles uses vertical slats to camouflage a 20 or 32 gallon trash can on a pedestal. Most have wood slats and these are frequently broken out or eventually rot out. We suggest the use of recycled plastic to provide a very similar look, but a receptacle that is virtually maintenance free.

[5] Absent the creation of paths this area will not be fully accessible. We have chosen to focus on accessibility of the site, which is the main feature of this property. If the Land Trust believes that the picnic area should also be accessible then it will be necessary to create pathways in this area as well.

[6] The ADA Accessibility Guide specifies (absent the integration of passing passes) that walkways have a minimum of 5 feet in clear width (ADAAG 4.3.2, 4.3.3, and 4.3.4). The Land Trust, however, should check for any overriding local ordinances.

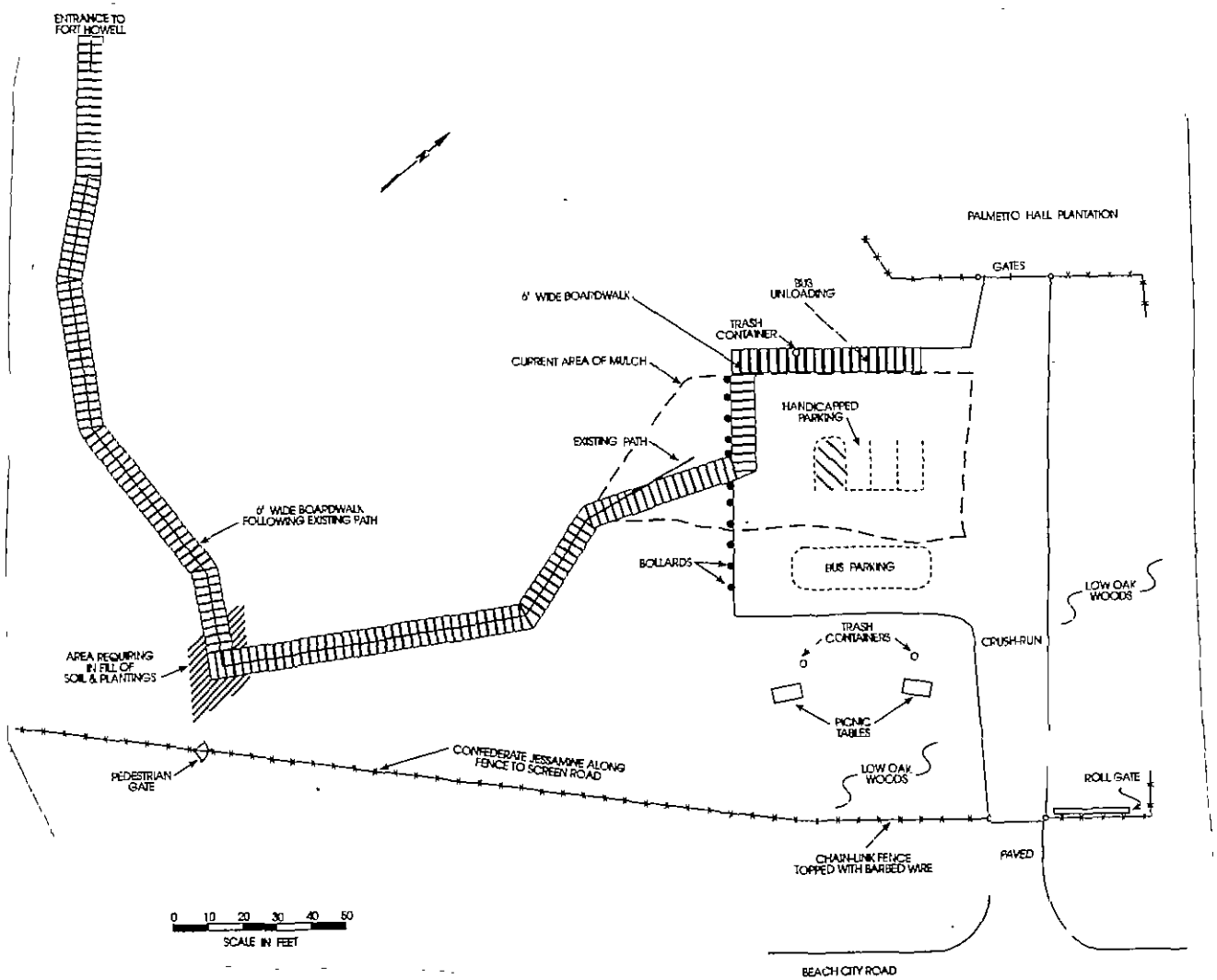

Figure 26. Sketch map of the Fort Howell parking area and path, showing proposed improvements.

its expense and its unnatural appearance. Wood chips, mulch, and gravel were all dismissed because they do not provide acceptable handicapped access (see ADAAG A4.5.1). In addition, they all have high long-term maintenance costs.

Soil cement was initially dismissed because of the long-term problems associated with the erosion of such paths (observed by the authors first hand at several historic sites in the Southeast). Recently, however, a new and dramatically improved product has been introduced by Green Mountain International, Inc.[7] Their Mountain Grout Soil Stabilizer consists of a moisture cured single component polyurethane. The new formulation has a much lower viscosity, allowing greater penetration into the soil. In addition, the new formulation has significantly greater compressive strength (10,000+ psi, well over that of standard concrete) and tensile strength (5,500 psi).

This product can be applied to a pre-graded sand pathway at a rate of about 1 gallon per 20 ft^2. It cures in about 24 hours and an accelerator may be used if there is standing water (which should not occur if the pathway has been pre-graded for appropriate drainage). The resulting path is ADA compliant.

Another appropriate walkway consists of nominal 2-inch planks riding on side sleepers. All materials should be pine, pressure treated to retard decay and insect attack, and rated for ground contact.[8] The connectors may be either hot galvanized spiral nails or stainless steel annular/angular.[9]

The path should be constructed flush (or no greater than ¼-inch above grade) with the ground surface, requiring very minor excavation for nominal 6-inch depth of the sleepers at each side and the 2 by 6 cross pieces. As long as this pathway is flush (or nearly so) with the ground it will not be required to have handrails for ADA compliance (ADAAG 4.3). Further, we believe the understory vegetation in this area will serve to keep visitors on the designated path, without need for handrails or other control devices.[10]

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[7] Green Mountain International, Inc. may be reached at 800/942-5151.

[8] Wood is preserved by pressure treating with a variety of EPA registered pesticides to protect it from pest attack and decay. Treated wood should be used where such protection is required, as in this instance, but the Land Trust should recognize that exposure to preservatives may present certain hazards. In particular, precautions should be taken in handling, using, and disposing of treated wood. The Land Trust should also refer to local codes for more detailed handling or disposal instructions.

[9] The Land Trust should avoid the use of electrogalvanized and mechanically galvanized nails since USDA tests reveal that these nails will quickly fail. Hot-dipped galvanized nails, by comparison, will last at least 14 years. Spiral nails provide excellent pop-resistance and are often used for decking. Double spirals provide even greater gripping power, but are difficult to drive and should be avoided if volunteers are used. Annular or angular nails also provide excellent resistance to popping, but they lose much of their holding power when hot-dip galvanized because the zinc tends to clog the rings — hence they should be avoided.

More costly, but more likely to survive over the long-term are stainless steel nails, with either type 304 or 316 being acceptable for Fort Howell. An alternative which the Land Trust may wish to explore is the use of silicon bronze nails, often found in marine supply stores.

Sixteen to twenty penny sizes (3½ to 4 inches) are commonly recommended for decking.

[10] The Land Trust may wish to use bollards spaced 4 to 6-feet apart around the edges of the parking area. Their use would allow unrestricted, barrier-free flow of pedestrians and wheelchair traffic, while restricting the passage of cars. They may be 4 or 6-inch diameter steel pipes filled with concrete, 6 by 8 inch timbers with a 30° top cut, or even 12 to 18-inch round concrete sewer tiles filled with concrete. They should be buried to a depth at least equal to their height above ground. A height above ground of 30 to 36-inches is typically adequate. The Land Trust, however, should consider the potential need to use light vehicles (compact pick-up trucks, for example) to remove debris from the site area or transport materials. This may require the use of removable bollards and may also affect the minimum/maximum width of the selected

There is no clear choice between the Soil Stabilizer and the wood walkway. The cost for the soil stabilizer is just under $2/ft^2 compared to about $1.50/ft^2 for wood (materials only). A cost reduction, however, may be possible if the Land Trust is interested in working with Green Mountain to promote their product. It is likely that the wood walkway will require much greater labor than the soil stabilizer. Wood, however, is a well-known and often-used material. There is certainly more long-term information concerning its life expectancy. Neither technique is visually intrusive — both would be appropriate in a setting where there is an interest in maintaining the existing aesthetics. Although the treated lumber leaches small quantities of chemicals, these are not evaluated by the manufacturer to have a significant environmental impact. Likewise, polyurethane, once cured, is essentially inert. Since it is moisture cured, there is no VOC off-gassing.

Consequently, the choice between the two approaches may likely be decided on the basis of final cost. The Land Trust, however, may wish to evaluate the Soil Stabilizer where it has been used (one such test area is currently undergoing evaluation at Historic Williamsburg). In addition, it may be inappropriate to use the Soil Stabilizer in the area where fill material is recommended to be added (see below) — it may be impossible to achieve adequate compaction to prevent erosion.

It will be necessary to ensure that pathway has a clear head room of at least 6 feet 8 inches (ADAAG 4.2.1). Based on our inspection of the proposed path area this should not present any problems. As previously discussed, use of the extant, widening pathway will also eliminate the need to remove vegetation.

There is a "blow-out" area measuring about 20 by 40 feet where it would be beneficial to infill with approximately 1.5 feet of soil. This would create a more level surface, ensuring that the walkway has only minimal variation in slope. Approximately 45 cubic yards of topsoil will be necessary for this. Afterwards this will be an area where plantings are necessary to prevent erosion.

We estimate that approximately 370 linear feet of walkway will be necessary to provide access from the expanded parking area to the entrance or sally port of Fort Howell.

Fort Howell Entrance

As previously mentioned it is possible that the fort's traverse was at some point used for ditch fill, creating a land bridge into the earthwork. Archaeological investigations should be conducted to (1) determine if the ditch fill may represent material originally associated with the fort and (2) determine if a traverse was at some point present in the fort.

Archaeological research should be able to determine if there are artifacts associated with the ditch fill and these, in turn, may help estimate when the ditch fill was put in place and where it originated. Archaeological excavations in the area of the traverse as shown in Figure 3 will be able to determine if it was, in fact, present and later removed.

This work is an essential component of site interpretation. Since the ditch fill is not original to the fort as constructed during the Civil War, based on both Figures 2 and 3, it should be removed. This recommendation assumes that the Land Trust intends to interpret the site as it existed during the Civil War. Extreme care should be taken during removal not to go deeper than the ditch on either side of the earthen ramp. Care should also be exercised that the equipment being used does not damage the side scarp or counterscarp of the ditch — work close to the end might best be done by hand. Further, once done, this area of bare soil will need to be stabilized to prevent erosion.

Once removed it could be used to reconstruct the missing traverse, based on both the archaeological research and the Fort Howell site plan (Figure 3). We estimate that the ditch currently contains about 150 cubic yards of soil. In contrast, the traverse will require about 210 cubic

pathway.

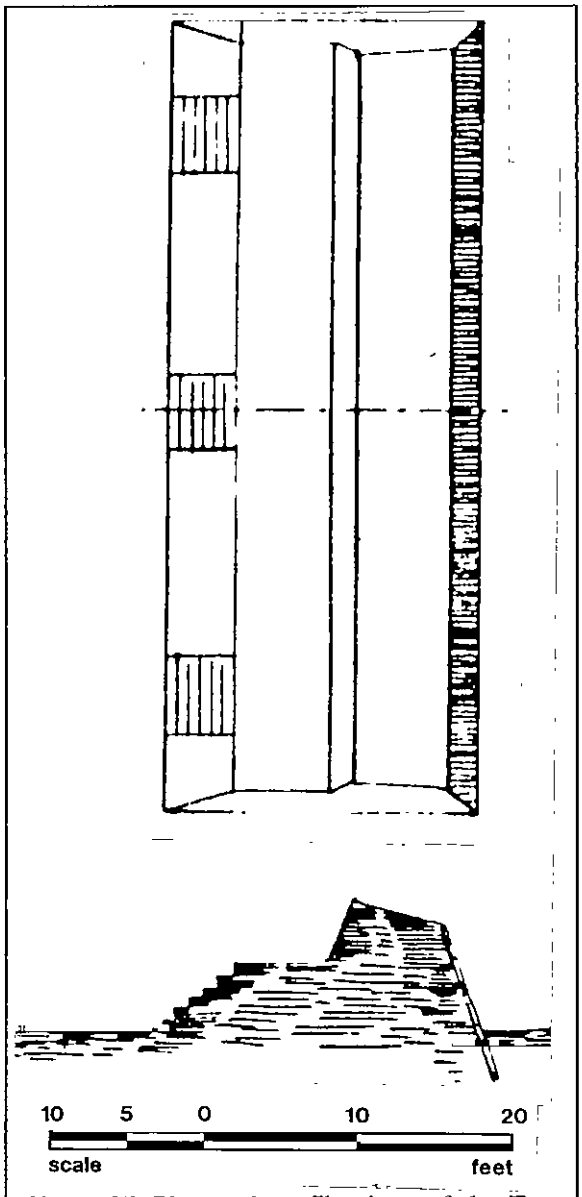

Figure 27. Plan and profile views of the Fort Howell traverse.

yards of soil, as well as well as wood posts (10-12 feet in length and about 6-inches in diameter) for the revetment (Figure 27).[11]

With the ditch fill removed, an effort should be made to replicate the wood bridge shown in Figure 3. This should tie into the pathway from the parking area and connect to the pathway system inside the fort. This bridge was 60 feet in length and 14 feet in width. There was a 4-foot high railing on both sides, with a bumper strip at about 2-feet. We recommend that the railing on the replacement bridge be made no higher than 38 inches with the bumper strip or secondary railing at an intermediate distance. The Land Trust, however, should consult the Town of Hilton Head for local codes on this (and all other) building issues. Figure 3 also reveals that the bridge consisted of 14 timber bearing piles, with each of the seven sets topped by a pile cap, above which was the chock and decking (Figure 28). The piles appear to be at least 1-foot in diameter, with the pile caps being perhaps 8x8s. The chocks were likely 4x8s or possibly 4x12s. The decking might have been 2x12s, In each case the Land Trust should abide by the local code and treated lumber should be used. It is likely that the original construction used both bolts and spikes, so the use of similar connectors will not be inappropriate in the replacement.

Ditches

In order to provide the visitor with a visual impression of the ditch surrounding Fort Howell, it is essential to open up the feature as visitors move into the fort. This will entail the removal of the small pines to the right and left of the existing ditch fill.

This work must be conducted only after consultation with the Town of Hilton Head Island since it will be necessary to comply with the new provisions protecting understory vegetation. However, we believe that it is an essential part of the site experience to have some understanding of the earthwork and its appearance. By removing a relatively minor amount of vegetation from the ditch this can be accomplished. In addition, the vegetation which we recommend removing includes primarily closely growing pine — trees which have

[11] While originally the revetment would have been constructed of pine logs, we recommend that treated de-barked logs be used instead to make maintenance more manageable.

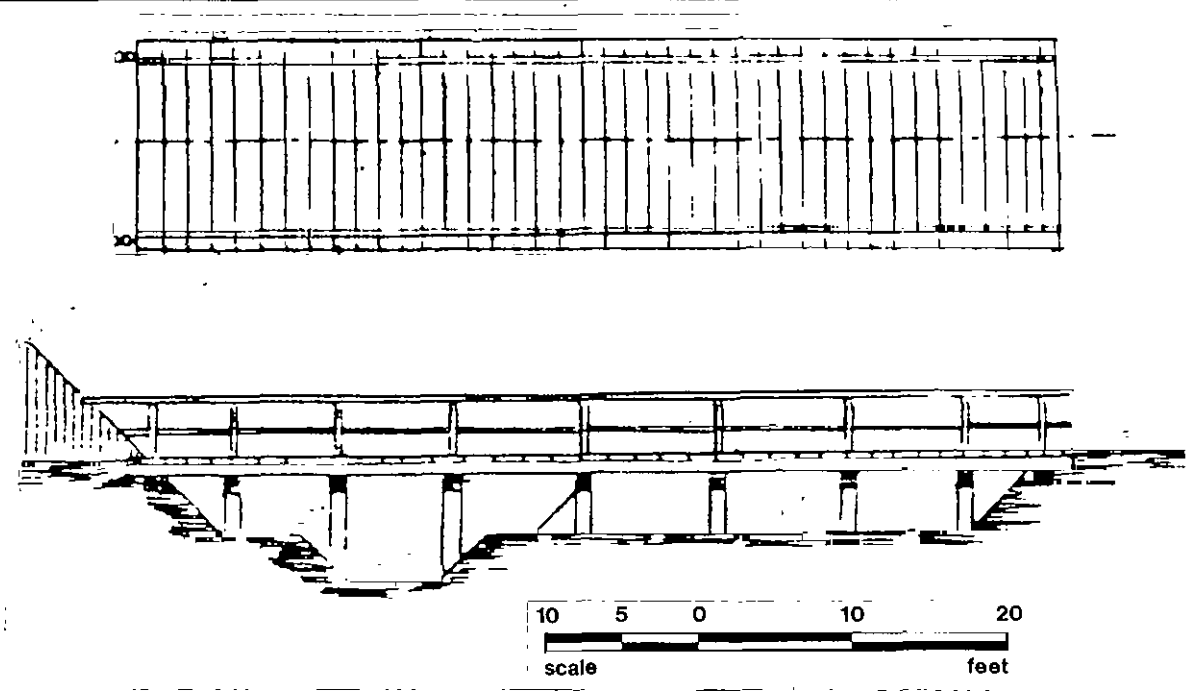

Figure 28. Plan and profile view of the wooden bridge providing access to Fort Howell.

little potential for healthy growth.

The area to the right, or north, of the ditch fill has tended to collect rain water in the past. This is a breeding area for mosquitoes, as well as a potential hazard to small children. At the present time there is no evidence of any wetland vegetation, so it appears that after several weeks the soils dry out and return to their "normal" xeric condition.

Since there is really no way of moving stormwater out of the ditch once it finds its way there, it may be more appropriate to explore methods of retaining the water upslope, in ways that pose no erosive threat and recharge it into the soil where plant roots can use it.

At the present time the exterior and superior slopes of the ramparts are covered only in leaf litter. One action which may slow the movement of water down is to establish plantings on the earthwork, on either side of the entrance. This issue will be discussed in greater detail in a following section.

Another approach which may be worth considering is the application of soil treatments to improve water infiltration rates.[12] Such treatments, however, are water soluble and must be re-applied, especially after periods of heavy rainfall. It may be more appropriate to use this as a secondary technique, should plantings not be successful in eliminating or dramatically reducing the problem.

Areas of Erosion on the Earthwork

As discussed in the previous assessment, there are 14 major erosional areas at Fort Howell (and several more minor areas) (Figure 29). Some are today more stable than others, but all pose a serious threat to the long-term preservation of the earthwork and require immediate attention.

[12] One such product is Four Star Services' Pene-Turf Soil Treatment. Four Star Services may be reached at 800/348-2608.

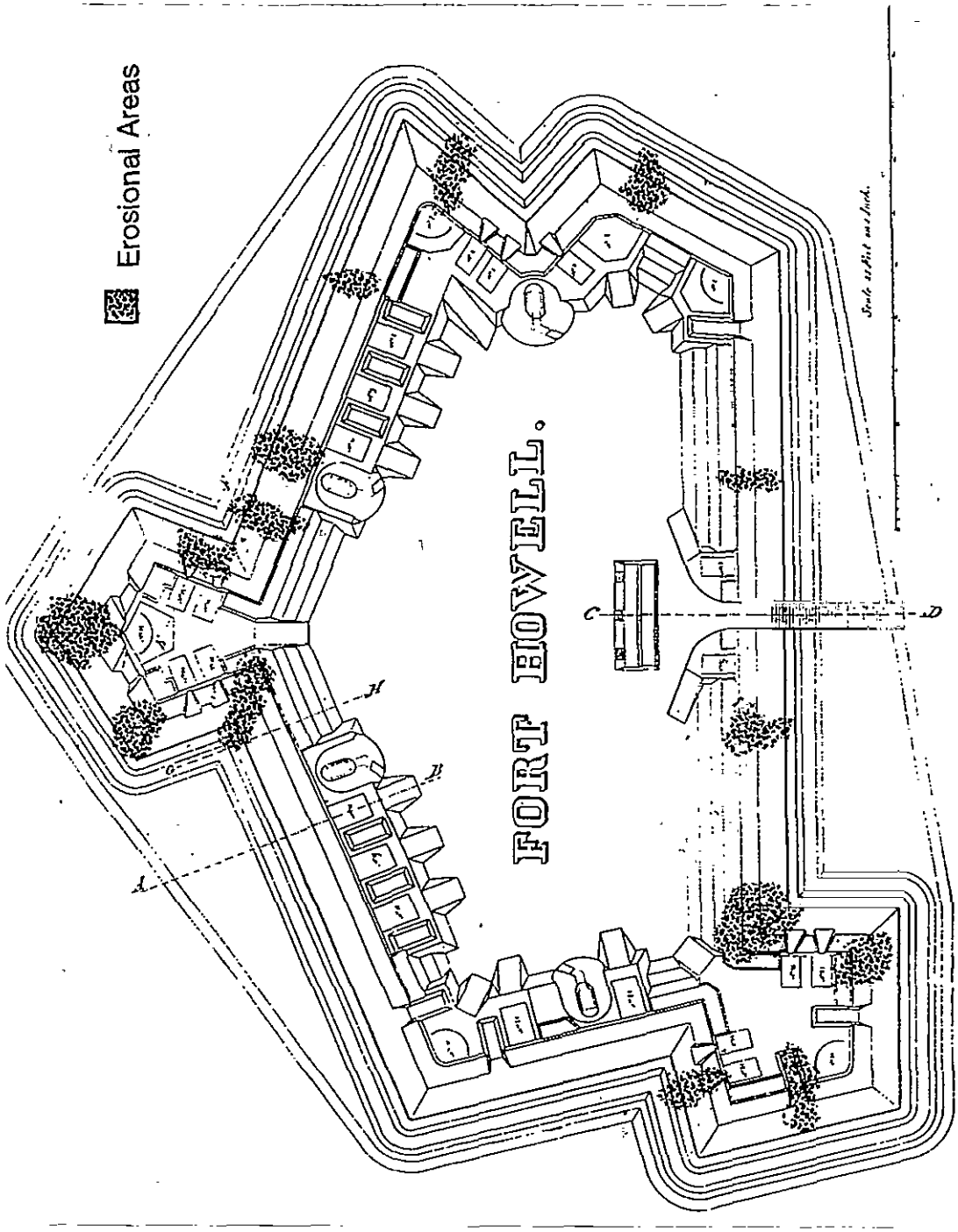

Figure 29. Areas of major erosion at Fort Howell.

All work to Fort Howell should be additive, especially in the absence of archaeological investigations. This means that no effort should be taken to redistribute soil present on the site. Front end loaders or other equipment should not be used to push eroded soil back into place. In the process of doing so important information concerning the earthwork may be lost or damaged.

By far the more appropriate response is to infill — replace the lost soil with new soil. Fort Howell's earthworks currently require approximately 234 cubic yards of soil.

This soil should be clean topsoil. It will likely be transported to the site in dump trucks, likely with a capacity of about 10 to 11 cubic yards per load. From the dump site, somewhere in the parking area, it would be appropriate to use a front end loader to transport the soil to the different areas on the rampart which need soil. If the front end loader bucket can reach from the base of the slope to the eroded area, the soil may be dumped in. However, under no circumstances should the equipment be allowed to ride up the slope. This will case extensive disturbance of the ground and likely result in additional erosion. In some areas it may be necessary to place the soil by hand.

The common approach, prior to placing soil in erosional areas, is to line the fill area with filter fabric or mat.[13] This serves to distinguish between the original site material and those which have been used as infill. At Fort Howell, approximately 6,000 square feet of mat would be required.

The problem with this approach, however, is that most filter fabrics are exceedingly slippery and soils are meant, in essence, to lay over the mat on a flat horizontal plain. On slopes it is very difficult to keep the soil in place. Compaction is almost impossible and the soil may slip or erode downslope before plantings are able to stabilize the slope.

As a consequence, we do not recommend the use of filter fabric or matting on the Fort Howell slopes (it should, however, be used in flat or level areas). On the slopes we instead recommend the use of a product called Enkamat, produced by Akzo Nobel.[14] Enkamat is a three-dimensional geomatrix of heavy nylon monofilaments fused at their intersections. It is available in three different weights and thicknesses. The light weight type 7010 is suitable for the Fort Howell applications.

Once buried, this product will likely have the same life expectancy as filter fabric and will create a clear barrier between the "original" site and the added fill. Being three-dimension and largely open, it will hold the soil and will not be prone to the same sliding action on the slopes as traditional filter fabric.

Once put in place, steps must still be taken to prevent erosion. The most appropriate technique is to vegetate these slopes. Gray and Leiser (1982) note that herbaceous vegetation helps control erosion by the leaves intercepting rainfall energy, the roots restraining the soil particles, the resulting plant residues retarding water run-off, the roots encouraging infiltration, and the leaves' transpiration delaying the onset of saturation and runoff.

Both native and introduced (or "exotic") species have been used in erosion control. Native species have developed under local soil and climatic conditions and are typically well suited to the microsite. Once established they are well adapted to the variations in rainfall and temperature. Native materials, however, are at times more difficult to acquire in the quantities necessary for erosion control projects. In addition, native species do not always offer special advantages at artificially disturbed or altered sites.

In contrast, the number of introduced or "exotic" species available for erosion control projects is usually much larger than native species.

[13] Two manufacturers are Carthage Mills (800/543-4430) and Fabricscape (800/992-0550).

[14] Akzo Nobel Geosynthetics Company, PO Box 1057, Enka, North Carolina 28728, 704/665-5050.

Moreover, they are often easier, and less costly, to obtain. Sometimes introduced plants will be better adapted to an area than the native plants.

Fort Howell presents an extremely difficult setting. The soils are almost entirely excessively drained, or droughty, sands. It is unlikely that any long-term irrigation will be available for Fort Howell. Some modification of the infill soil, however, can be achieved by using gels which help manage the water in the root zone of the plant by absorbing moisture and releasing it to the plant roots as needed.[15]

Sunlight varies from dappled to near complete shade, with a few areas (because of an absence of canopy) being in full sun.

It is also essential that the selected plant remain close to the ground and not "mound up," since this will create bare soil on the groundplane below the mound and create a very high potential for erosion. Of particular concern is this regard is the degree of maintenance the selected plant requires. Japanese honeysuckle, for example, is often recommended to stabilize erosional slopes and is quite effective in this, *if it is kept closely trimmed*. Otherwise, it tends to mound and increases the erosional potential of the area it is intended to protect. The ideal plant for Fort Howell will require minimal maintenance.

It is also important, whether a native or exotic species is used, that it is one which can be removed — either manually or using herbicides — should the necessity arise. This becomes an issue if the Land Trust, in future years, desires to change the setting of the site. Grasses, in particular, tend to be rather difficult to kill off or manually remove.

In other words, we are seeking a plant that can thrive with no irrigation, is capable of adapting to conditions of partial to total shade, can survive in sandy soils with few nutrients and which are likely highly acidic, require no maintenance, are excellent at holding soils, and which can be easily removed at a later date if necessary.

As you might imagine, there are relatively few plants which meet all of these criteria — and there are none which are perfect. Our goal will be to outline several possible choices for evaluation by the Land Trust.

One native plant which comes close to meeting all of our requirements is periwinkle (*Vinca minor*). It is an aggressive, low growing vine which thrives in habitats such as Fort Howell. It is drought tolerant and requires relatively low levels of nutrients. It is commonly found at abandoned house sites, where it has spread out of cultivated areas, taking over large areas of the yard. Should the need arise, it can be either manually removed or killed with a mild herbicide. Its only real short coming is that its root system is not as aggressive as some grasses. Periwinkle would be planted during the dormant fall/winter season, allowing for its roots to expand before an active growing season. Periwinkle is commonly available from wholesale nurseries.

Another possible plant is lilyturf (*Liriope muscari* or *L. spicata*). This plant grows 12 to 24 inches high and exhibits an equal spread. It is an evergreen with variegated leaves and lilac or white flowers. It is particularly effective moving from areas of full sun to full shade, exhibiting wide tolerances. It is also tolerant of heat, humidity, and drought. In addition, it is remarkably free of ailments and pests.

A potential grass for erosion control is weeping lovegrass (*Eragrostis curvula*), a South African native that is well suited to loose, sandy soils. It is fairly resistant to drought, does well on low fertility, and sends down very long roots. Three varieties are found, including Ermelo, Morpa, and Common. Seeds are sown during the warm season, at a rate of about 15 pounds per acre. The major drawback of this plant is that it is difficult to kill using conventional herbicides. Weeping lovegrass may be available from wholesale nurseries or may

[15] Widely available, one such product is Terra Sorb™, distributed by Terra Tech, Inc., PO Box 5547, Eugene, OR 97405, 800/933-4569.

be ordered from seed companies.[16]

Other possibilities include English ivy (*Hedera helix*) and even Virginia creeper (*Parthenocissus quinquefolia*), although it does require more maintenance than the others.

We have received very different recommendations from the sources we consulted, with especially divided opinions regarding periwinkle and weeping lovegrass. The National Center for Archaeological Site Stabilization highly recommends periwinkle as a native species suitable for the conditions we described. In contrast, the Town of Hilton Head Island strongly recommends weeping lovegrass, claiming that its root system is far superior to periwinkle.

The Land Trust may wish to try both plants, perhaps beginning with periwinkle plantings in the fall, to be followed by overseeding with weeping lovegrass in the late spring. Regardless, it is important to realize that there is no "silver bullet" and each of the plants discussed have their limitations, especially on a site as difficult as Fort Howell.

For any of these plants to thrive it will be necessary to incorporate some fertilizer and organic material. There are several alternatives. One is the use of a slow release pellet fertilizer. Another option is the use of organic soil conditioners, such as chicken manure or mushroom compost which can be mixed with the infill soil prior to application.

Along the pathway to the fort entrance, where we have proposed partial soil infill of an old roadbed, the Land Trust may wish to consider plants such as the butterfly bush (*Lantana* spp.) and trumpet vine (*Camus radicans*) to diversify the flora, making the walk to the site more enjoyable.[17] These plants may also attract butterflies and hummingbirds to the area. Some consideration may be given to growing Confederate jessamine (*Trachelospermum jasminoides*) on the chain link fence along Beach City Road. This plant likes the full sun of this location, would quickly hide the fence, and produces very fragrant flowers. While it tolerates some dryness, it is not considered drought resistant, so some watering might be necessary.[18]

Confederate jessamine may also be appropriate for those areas adjacent to the green storage container and the nearby house, in order to provide visual screening of these features.

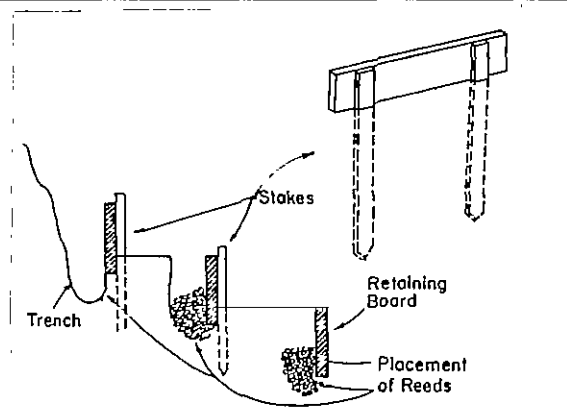

Figure 30. Reed-trench terracing diagram, adapted from Gray and Leiser (1982:Figures 7.23 and 7.24).

The Land Trust may wish to select several ground covers, based on specific needs and also to explore which do best at Fort Howell.

Beyond selecting the appropriate plants, it

[16] Examples of seed companies include Bamert Seed Company, 806/272-5506 and Jonathan Green, 800/526-2303.

[17] These plants are often available in local retail or wholesale nurseries or can obtained through companies such as Woodlanders, 803/648-7522.

[18] A hardier selection, *Trachelospermum jasminoides 'Madison'* is available from Woodlanders, 803/648-7522.

is also necessary to hold the soil in place until the plants become established.

One technique which has been extensively used in erosion control projects is reed-trench terracing. A series of wooden barriers, or checkboards are staked out along the contours, with a trench dug behind (upslope). This trench is then filled with reed grass (*Phragmites communis*) and then covered with sand (Figure 30). The series of terraces tends to arrest downward movement of soil and also provides areas for vegetation to become established. The reeds serve important functions in this process — preventing the sand from drifting under the checkboards, reducing gullying, serving as an underground reservoir of water, and providing nutrients. Plantings on these terraces tend to establish very deep root systems. The wood checkboards should be made of untreated lumber and may either be left in place to rot, or may be removed when the vegetation is stable.

An alternative to this approach, which has been somewhat more successful, largely since it doesn't rely on as careful attention to detail during installation, is the previously discussed three-dimensional Enkamat. Packaged in rolls that are easy to install, the matting should be applied and staked when the erosional cuts are filled to within a half-inch of the surface. The last half-inch of infill should be added and tamped into the mat. Afterwards the plants or seeds can be added. The open weave of the mat is especially effective at catching silts and stabilizing the soil surface. It increases the natural erosion resistance of vegetation by creating the open space for roots to penetrate.

An alternative approach is the use of jute fabric.[19] Made from natural materials it will not harm the environment and has a life expectancy of about 2 years. It will absorb upwards of 5-times its own weight in water, reducing soil run-off and providing a reservoir for plants. Jute is far preferred to plastic mats. To be avoided are jute or other organic mats which contain embedded reinforcement mats. Once the organic materials have dissolved or decayed, the reinforcement is left as a stringy mass which is hazardous to both people and wildlife. Extreme care should be taken to avoid the use of these reinforced mats or blankets.

An alternative to jute mats are excelsior blankets.[20] These consist of pulped wood fiber mats, which often have photodegradable, extruded plastic mesh backers (often with a life-span as short as 60 days). These blankets are especially good at holding moisture, but tend to have relatively short life-spans. Being solid, they are also more visible than jute mats.

We recommend the use of jute mats only on the less steep areas. The jute mat is particularly appropriate for the top or superior slope of the parapet, were visitors might trip or hurt themselves on stakes or retaining boards. On the steeper walls of the fortification Enkamat is preferable and more likely to achieve long-term stabilization.

Enkamat (or, the less highly recommended checkboards) and jute mats may also be combined in areas of very steep slopes, where the two can work in combination with each other.

We do not anticipate any sort of irrigation system at Fort Howell, at least in the near term. Consequently, we recommend (as previously mentioned) that water holding gels or beads be included with the plantings. This will help the plants establish themselves.

In time we envision that these plants will spread beyond the eroded areas and this is good. They will far better stabilize the earthworks than the extant leaf litter and tree roots.

[19] Jute mats are increasingly common in landscaping catalogs. One distributor is Terra Tech, Inc., PO Box 5547, Eugene, OR 97405, 800/933-4569. It is also available from the Jim Walls Company, 12820 Hillcrest Road, Dallas, TX 75230, 214/239-8577.

[20] One manufacturer is the American Excelsior Company, PO Box 5067, Arlington, TX 76011, 800/777-7645.

Trees on the Earthworks

At this point in time, it would be inappropriate and costly to remove all trees on the earthworks. However, trees should be removed as soon as instability, or a decrease in health that could pose a threat to the earthworks, is detected. At the present time one tree on the earthwork has been hit by lightening and should be closely monitored. If it shows any signs of dying-off or insect activity then it should be removed.[21]

This approach will minimize the risk of a blowdown, while dissipating the visual impact and costs of tree removal. At the same time, it will help maintain the dappled canopy shade provided by the existing trees — this helps both visitor comfort and also to ameliorate the harsh microclimate and reduce water stress on the vegetation which is (or will be) stabilizing the earthworks.

As trees on the earthworks are gradually removed, the Land Trust should implement a program of planting trees, preferably native hardwood species. These new plantings should be undertaken adjacent to the earthwork, but outside the sensitive earthwork interpretation zone — essentially the ditch, rampart, and edge terreplein areas.

Once matured, these trees will have a canopy diameter of around 80 feet, so canopy closure can still be achieved if the trees are planted 20 to 40 feet from the edge of the ditch and the inside edge of the parapet. It is not our suggestion that the trees be planted in two rows, each 20 feet from the edge of the earthwork. Rather, they should be planted in natural patterns and groves in this 20 to 40 foot zone.

One exception to these recommendations are the existing pines which are growing predominately on the southern edge of the site. These trees are dropping pine straw and debris, creating an acid environment which discourages the growth of many stabilizing ground covers on the earthwork slopes. We consequently recommend that these pines be selected for removal. Some may require replacement hardwood trees. Others may be in areas of fairly dense hardwoods already. Naturally, this plan will require the approval of the Town of Hilton Head Island.

Vegetation on the Terreplein

The fort interior, or terreplein, has been bush hogged on several occasions. Currently scrub vegetation is returning. This vegetation is detracting from site interpretation, may present a hazard to site visitors, and is a continuing maintenance issue.

We recommend that the interior continue to be bushhogged, with care being taken to avoid damage to the established trees or to the ground surface. The continued mulching of the bushhogged materials will eventually discourage additional growth in this area.

Another approach may be the use of a product called Biobarrier, which is a spunbonded polypropylene geotextile fabric impregnated with plastic nodules containing the herbicide trifluralin.[22] The nodules slowly dispense minute amounts of trifluralin as a vapor in order to control root growth. This material, covered with 3 to 6 inches of mulch, would be helpful in reducing the growth of new vegetation on the terreplein. Its application might significantly reduce maintenance through bush hogging.

Also present in the fort interior are several dead trees which should be removed as soon as possible.

Visitor Access Control

The last significant issue to be solved at Fort Howell is that of visitor trampling which is clearly the deciding factor for control of erosion.

[21] The Land Trust will, of course, have to coordinate such tree removals through the Town of Hilton Head.

[22] Biobarrier Root Control System is available from Biobarrier, PO Box 511, Old Hickory, TN 37138, 800/284-2780.

When visitor trampling is introduced to areas where stabilizing vegetation is already marginal because of water stress, severe soil erosion problems are likely to develop.

There is no potential for any visitor supervision at Fort Howell. An ad-hoc repair approach is also unacceptable since it provides only short-term band-aids and will prove to be a serious drain on resources.

The ultimate solution to visitor trampling rests with establishing clear visitor interpretation techniques. We recommend that the Land Trust direct where the visitor should go by providing clear paths and encouraging the visitor to stay on these paths by providing clear interpretative information.

Several components of such a plan can be easily defined. There should be no visitor access directly on the earthwork surface (Figure 31). Where visitors have established unofficial paths, there is increased erosion.

The two areas most easily interpreted, which also allow maximum visitor access, are the northern bastion and the salient northwest of this bastion.[23] The northern bastion provides a "feel" for the earthwork's elevation and the form of this particular feature. The nearby salient is the only area of the fort where ramps and platform areas are still somewhat discernable.

An appropriate visitor access control system at Fort Howell would involve the use of boardwalks crossing the terreplein and the earthwork horizontally. It would tie into the boardwalk or path leading to the fort entrance, offering a continuous accessible path. It would ideally integrate a ramp, rather than stairs, to the bastion. Once there it would continue to the salient, providing an interpretative flow while keeping visitors off of the sensitive earthwork area.

Unlike the walkway to Fort Howell, we do not recommend the use of Soil Stabilizer within the fort. The soil cement is not reversible and would impact areas which might require archaeological study in the future.

Crossing the terreplein the walk would continue to be 6 feet in width. Like the walk to the entrance, it would not integrate handrails and would be at grade, necessitating the disturbance of only the upper 4 to 6 inches of the soil — a zone which has likely already seen a good deal of disturbance from metal detecting, bushhogging, and deposition from the earthworks.

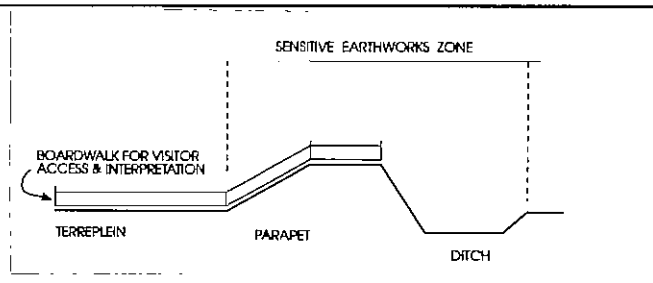

Figure 31. Use of boardwalk to control visitor access on the sensitive earthworks zone.

We believe that most visitors will remain on the path simply because it is easy to do so. This can be re-enforced by signage which explains the importance of doing so — and the damage to the earthworks which can occur if visitors walk on the steep slopes.

If it is found to be necessary to confine visitors to the boardwalk then there are a variety of low plantings which can be used to help form a visible (if not physical) barrier. Suggested plantings are not discussed at this point since we believe it is appropriate to first determine if the boardwalk alone will be adequate.

Although we would like for the boardwalk

[23] A secondary interpretation area may be the southern bastion. This could be integrated into the plan as funds become available.

access to the bastion to be accessible under the ADA, we do not believe this will be possible. The bastion is about 7 feet higher than the fort terreplein, meaning that we have a total rise of 252 inches. At the maximum permissible slope of 1:12 and a maximum permissible unit rise of 30 inches over 30 feet, allowing for the mandatory 5 feet of level rest area, this ramp would have a design length of 275 feet. Although it could be wrapped back and forth on itself, the cost would be prohibitive and it was significantly detract from the interpretative value of the fort.

Consequently, access to bastion and salient will be by stairs only. All of the steps should have uniform riser heights and uniform tread widths. The stairs treads must be at least 11 inches in width. The risers should be closed. There should be continuous handrails at both sides of the stairs. This handrail should be between 34 and 38 inches above the stair nosings. The handrail gripping surface should not be interrupted by newel posts or other construction elements and should be "gripable." It may be that local ordinances also require a bumper strip or an additional railing at a lower level, consequently the Land Trust should be sure to comply with all local codes and ordinances.

Once on the top of the bastion the boardwalk should be constructed above grade, to avoid disturbing the surface, even for the placement of the sleepers. As a consequence, the handrailings should be maintained on both sides of the walkway. This will not only provide a measure of safety, but will help to contain visitors once on the crest of the earthwork.[24]

We recommend that the boardwalk open up on the bastion, encompassing an area of perhaps 20 feet square. This would allow greater mobility, as well as allow larger groups to be present on organized tours.

Leading from the bastion should be an additional boardwalk along the salient. This segment must also be above grade, with handrails incorporated into the design. While a 6-foot width is minimally acceptable, an 8 or 10 foot walk would allow individuals freer access and provide an unobstructed return path when larger groups are present.

At present we believe these are the only two areas appropriate for walkways. The Land Trust, however, may wish to consider opening the southern bastion as well. Here, also, stairs and a boardwalk will be necessary.

Site Maintenance

Maintenance is a relatively simple — even absolute — issue: no maintenance, no site. Stewart Brand observes that:

> Preservationists are so adamant on the subject [of maintenance] that the motto of their department at the US National Park Service declares: "Preservation IS maintenance." John Ruskin himself, the founder of anti-scrape preservation, intoned, "Take proper care of your monuments and you will not need to restore them. A few sheets of lead put in time upon the roof, a few dead leaves and sticks swept out of a water source, will save both roof and walls from ruin. Watch an old building with anxious care; guard it as best you can, and at ***any*** cost, from every influence of dilapidation" (Brand 1994:111).

These comments are equally appropriate for earthworks — the mounded soil *being* the structure.

Deferred or improper maintenance is the cause of many serious problems ranging from uncontrolled erosion to serious injury by a visitor. Deferred maintenance is a certain recipe for

[24] The bumper strip or lower additional railing, if used, will also help restrain visitors on the designated walkways. Like all railings, the Land Trust should ensure that the pickets or newels are placed to prevent harm to children.

problems with long-term consequences. Nominal maintenance is highly reactive and fails to meet either the needs of the site or its users. Unfocused maintenance is still reactive, correcting perceived problems without consideration of cause or effect.

An adequate maintenance program includes a listing of activities and controls how often the cycle repeats. It defines, prioritizes, and schedules all maintenance activities. Maintenance must be understood as a continuous, ongoing process — it should be proactive and preventative. Effective maintenance programs integrate assessment, planning, maintaining, and evaluating.

The site's needs are periodically assessed through detailed inspections. The assessment must avoid the temptation to recommend treatments without fully understanding the cause of the problem.

After the assessment, which should be written, a planning phase should determine what needs to be done, how it should be done, who should do it, and how much it will cost. The planning stage should prioritize the needs of the site — treating all of the needs, but concentrating on critical needs first.

The third phase, that of maintaining, emphasizes the need for regular attention. A single person in the organization should be held responsible, and accountable, for site maintenance. This person should also have the authority to intercede in work at the site, if it appears to not be going properly or is damaging the fabric of the site.

Finally, the last stage is evaluating the work — considering the quality, value, and success of the work. This process helps prevent mistakes from being repeated and provides the next cycle of maintenance with solid information on which to build.

Although focusing on standing structures, Building Conservation International offers excellent preservation advice which is equally appropriate for earthworks:

- There are few panaceas.
- The easy answer is often neither the right one nor the cheapest one.
- A quality job will be economical and save time and hassle in the long run.
- There are no hard-and-fast rules. A situation must be judged on its merits.

Naturally, all work at Fort Howell should rigorously adhere to *The Secretary of the Interior's Standards and Illustrated Guidelines*, available from the Superintendent of Documents.

There are maintenance issues which were observed during this current study which need to be incorporated into routine planning.

The site must be policed at least weekly, with all garbage and other refuse collected and moved off-site for disposal. In particular, this will involve collection of trash from receptacles, picking up litter, sweeping the boardwalks, and collection of all downed limbs or tree branches.

This weekly inspection should also examine the boardwalk and stairs, to ensure that they are in good repair. Any problems should be immediately addressed since they might affect public safety.

The weekly inspection should also pay particular attention for the possible presence of metal detecting holes. Any such holes should be reported to the Beaufort County Sheriff, with a completed crime report filed with the Land Trust. Any looting holes should be immediately filled and, if sufficiently large, should be stabilized with plantings.

At least monthly all vegetation on the site should be inspected. Dead trees should be noted and scheduled for removal. Injured trees should be noted for more careful monitoring. This inspection

should also review plantings for water stress, pedestrian damage, and condition. More frequent inspections may be warranted, based on the weather conditions. For example, the site should be visited as soon as possible after serious thunderstorms or windstorms, as well as more frequently during droughts.

At least monthly all signage should be carefully inspected to assess condition and any need for replacement or repair.

Semi-annually the paved areas should be examined and their condition evaluated. Special attention should be paid to the need to add more crush run or to fill potholes.

At least semi-annually, and more often if necessary, dead tree limbs should be pruned back and dead trees removed. Since both dead limbs and trees are hazardous to visitors, this activity should not be postponed. Once down, trees and all debris must be removed from the site. Leaving them on the site detracts from the site interpretation, increases the potential fire threat, and provides cover for rodents and snakes.

At least semi-annually the gate should be inspected, receive preventative maintenance such as lubricating the rollers and adjusting the chain.[25] In addition, the inspection should verify that safety devices built into the gate to prevent it from closing on vehicles are properly working.

At least semi-annually the entire fenced area should be walked to verify that the fence is intact.

Annually the Land Trust should complete a new assessment of the site, following the format provided in the previous section. This assessment should document present conditions, especially those relating to erosion and the condition of the earthworks. It should be coupled with the completion of a new video tape of the earthwork. Approximately every second year new still photographs should be prepared for the entire site area, to supplement those from the current study.

Disaster Planning and Recovery

The first step in disaster planning and recovery is, obviously, to recognize those threats which are preventable and work to prevent them. The second step is to recognize those threats which are not preventable and work to reduce their potential impact.

In the first category is visitor injury through tripping or slipping on vegetation. This problem is largely preventable by coupling weekly maintenance activities with semi-annual tree inspections. Anything which might cause a visitor harm should be identified during the inspections and resolved.

In the second category are hurricanes. While not preventable, the impact of hurricanes to earthwork sites can be reduced through appropriate planning. Even after the disaster, whether preventable or not, the damage can be limited by undertaking the correct actions and steps in a timely manner.

It is essential that the Land Trust institute a program of risk evaluation, hazard mitigation, and emergency preparedness ***which incorporates the property's unique, and irreplaceable, historic and archaeological resources***. This covers a wide range of actions, including identifying past emergencies, determining the types of natural events which pose a threat to the site, determining the types of damage which might be expected, and most importantly, identifying the hazard and emergency preparedness measures which are needed to safeguard against the most probable damage.

Hazard mitigation will include developing a work plan for carrying out the structural and hazard proofing measures identified, developing a schedule for this work, and identifying and securing the necessary resources to ensure the work is correctly performed. It is possible, through appropriate planning, to balance historic preservation interests with disaster protection. Emergency preparedness includes the inventorying

[25] This inspection should include items stipulated by the manufacturer.

and photographing of the site prior to any emergency, developing appropriate protective measures, developing a resource list of professionals to assist in evaluations and recovery, developing an emergency response network, developing a chain of command to ensure the preservation of the site, developing a checklist of emergency tasks, and preparing a plan for how best to recover after a disaster strikes.

The disaster planning and recovery efforts should recognize that often conventional "recovery" efforts cause as much or more damage than the disaster. It is essential that a clear plan be developed that guards against further damage during clean-up efforts (for a brief review of these issues, see Morgan 1993).

For example, after a hurricane it is essential that the soils be dry before downed vegetation is mechanically removed. Even on dry soils only rubber tracked vehicles should be used. If skid trails are necessary they should not be allowed to cross the earthworks. All clearing should be done using the least intrusive methods possible. There should also be recognition that as the vegetation pattern of the site changes, so too may the preservation problems we confront. Burn areas (if burning is allowed by the Town) should be physically removed from the sensitive earthwork area.

As another example, although wildfires are a normal part of vegetative secession, they would be very damaging to the stabilization efforts at Fort Howell. The Hilton Head Fire Department should respond to any woods fire in this area. If necessary, the Land Trust may wish to consider establishing a fire plow area outside their fence in order to protect the property.

Site Interpretation and Signage

A first step in a successful interpretation program is to understand what the program hopes to accomplish. In other words, exactly what are the goals of the interpretation? How is the site important? Why should the visitor be interested?

Appropriate interpretation must foster proper use of the site and must develop advocates for the site. It must encourage public participation in the management of the site. It must, at the same time, provide recreation to the visitors while heightening their awareness and understanding of the site. Ultimately, good site interpretation will inspire the public and add a new perspective to their lives. After years of interpretation at historic sites, museums, and parks, we know that there are certain common principles for success.

Everything at the site must be part of a unified whole. The visitor must receive one message, not a series of conflicting or unrelated stories or concepts. This, of course, is why interpretation must be based on a unified theme. Only once you know what is important at the site are you in a position to develop appropriate, and successful, interpretative signage. We also realize that learning (and we are asking the public to learn something new every time we present them with a sign or exhibit) is best and most successful when it is closely associated with the real experience. It is always best to include concrete objects. It is also essential that the exhibits and signage are compatible with the site. The interpretation should enhance the on-site experience, not detract from it.

Finally, and in many respects most importantly, the best interpretation is short and concise. Too often historic sites attempt to stuff in every possible detail and fact about the site. Visitors become easily bored and tired. Most will not read more than a few lines — ignoring the long, tedious texts and complex messages. The goal must be to encourage interest about the big picture, not bore the visitors with details.

We would recommend the use of up to seven panels in different parts of the site, although the exact number (and their placement) will depend entirely on the theme selected for the site and the funds available for interpretation.[26] More

[26] It is nevertheless important to stress that many experts believe sites lacking interpretation provide no benefit to the public and might as well not be open, or possibly even preserved. While interpretation is often the last issue discussed (as it is in this study), it is

panels with good graphics and short text are strongly preferred to fewer panels loaded with text.

At the parking area we would recommend two panels. One should welcome the visitor to the site, explain that the site was donated to the Land Trust by Greenwood Development, and note that the site is maintained by the Hilton Head Island Land Trust — all in one, or at most, two sentences. Then the panel should explain the guidelines of the park use:

- visitors should understand that the site is a wilderness and be aware of mosquitoes, ticks, chiggers, and snakes;
- visitors should not approach, or feed, any wild animals found in the park;
- visitors must stay on designated walks for their own safety;
- visitors should be told what is handicapped accessible and what isn't — they should also be told the distance from the parking area to the earthworks;
- visitors should understand that Hilton Head has very strict laws protecting archaeological sites like Fort Howell — it is illegal to use a metal detector, to dig, or to remove artifacts from the site; and
- visitors should report any problems or incidents to the local sheriffs department by dialing 911.

The second panel at the parking area should provide the visitor with a very quick overview of Hilton Head's role in the Civil War, perhaps mentioning Mitchelville, since the parking area is at the edge of the freedman's village. This sign, however, should avoid the temptation to go into too much detail. Appropriate graphics might include a period map of Hilton Head, a photograph of Mitchelville and freed slaves, and perhaps a photograph of typical artifacts found at nearby sites.

The third panel should be mid-way between the parking area and the earthworks. We would suggest that it might tie in the current vegetation of the site area to what was present at the time of the Civil War. This would provide the opportunity to explain how the maritime vegetation found by earlier explorers was cut down first for indigo and later for cotton. It could explain a little about forest succession, helping visitors understand how the vegetation got to what they see today, and it would also ensure that they realized the fort was situated in the middle of a cleared field originally. Appropriate graphics might include a map of Hilton Head showing different vegetation — in 1860 and today. Perhaps a photograph of African-Americans hoeing cotton would be appropriate, as would a photograph showing the Drayton cotton gin in the midst of cleared fields.

A fourth panel should be placed just outside Fort Howell, explaining a little about the fort's history — when and why it was built. The Land Trust should avoid the temptation to go into detail about what regiments built the fort and how long it took — these are details that would be appreciated by few visitors. It should be adequate, for example, to simply explain that the fort was built by black troops, as was the custom at the time. This panel could be illustrated by photographs and/or drawings of troops building earthworks. Although not specific to Hilton Head, these illustrations would provide the visitor with a better understanding of how the work was done. It might also include artifacts from camp life, helping the visitor to better understand what the life of the troops building the fort might have been like. It should also be possible to obtain a few quotes from soldiers' letters to re-enforce that these were real human beings and not mere abstractions.

actually very important and should be high on the fund-raising agenda.

A fifth panel should be located along the boardwalk inside the fort, perhaps near the center. This panel should help the visitor understand the fort's layout. Using a map of the fort, perhaps coupled with an artist's three dimensional rendering, key elements should be pointed out, such as the sally port (or entrance), the traverse (whether or not rebuilt), the bastions, the banquette for the troops, the various gun positions, and the four magazines. Again, it would be easy to make this signage too detailed, and this must be avoided. The central graphic should be a site map, supplemented with photographs of other earthworks, in order to help the visitor understand how the fort was built and what it was intended to do. Artifacts might include armament items, coupled with the types of specimens typically found in the terreplein of a fort — personal items, and uniform buttons and insignia.

A sixth panel should be located at the top of the bastion. The central focus of the panel should be a blowup of the map focusing on the bastion. Why were bastions built? What was the purpose of this bastion? What was outside the fort? What types of guns might have been present? A seventh panel might be located on the salient and provide similar information for this different area of the fort. Each panel, however, must provide different information and must not be allowed to focus too heavily on military minutia, since this is of interest to relatively few visitors. Graphics, besides details of maps, might include views of other earthworks, showing similar features intact, preferably with people in the views. Depending on how the text is written, it might be appropriate to also show the effects of such batteries on troops, perhaps helping the visitor to understand the horror of war and the psychological value of earthworks to hide behind.

By organizing the panels in this fashion we can present a coherent, organized picture of the property to the visitor. We can make sure that even handicapped individuals who can't make it to the bastion and salient, still have the benefit of the vast majority of the signage (minimizing what is inaccessible to them). The signage also is intended to "pull" the visitor along, encouraging them to keep going, to see what the next sign might tell them.

There are a variety of sign materials. At least two — wood and metal — allow the inclusion of few, if any, graphics. We discourage their use at Fort Howell for this reason.[27]

The three sign types often suggested for use with graphics are fiberglass embedment, metal micro-imaging, and porcelain enamel. Each has advantages and disadvantages. Porcelain enamel, for example, can incorporate very high resolution photographs and line art, but is slightly more expensive than the others. Metal-micro-imaging can incorporate photographs and line drawings and is somewhat more durable than porcelain enamel, but offers very limited color options which may be important in some graphic presentations. Fiberglass embedment, like the others, permits a wide range of art-work, but the colors are subject to fading and the fiberglass tends to yellow.

Although the Land Trust has already mentioned that they believe fiberglass embedment is the type of signage they want, we suggest that the issue be explored very carefully. Whatever is selected will likely run from $2,000 to $3,000 per panel, so signage is a major investment and should be something that can be lived with for a number of years.

All signage can be vandalized. There is no such thing as a vandal-proof sign. Once a sign type is selected there are steps that can be taken to minimize the potential for damage. A ballistic-laminate sheet can be framed over the sign to absorb direct blows and scratches. Such a sheet is less costly to replace than the sign. There are a variety of chemical sprays today on the market to remove vandalism paint, although they must be used quickly after the event (this is one reason that frequent site inspections are essential). There are also a variety of tamper resistant or proof bolts to affix signs to posts. Although increasing the vandal-

[27] The only exception to this, of course, is the use of a state historical marker (a metal sign) outside the fenced area to encourage individuals to stop at the site.

resistance of signage costs a little extra money, it is a worth-while investment.

The signage, once selected, must be mounted. The ideal mount will be theft-proof and yet still be accessible to all readers. The exact nature of the mount will depend on the type of sign selected — fiberglass embedment requires backing and framing, while metal-micro imaging does not. Mounting must be secure to reduce vandalism. In particular, the posts should be mounted at least as deep as they extend above ground and should be set in concrete. Simply setting a post in a dug hole and backfilling is never adequate.

Signage should be designed to be accessible. It should be mounted about 30 inches off the ground, to allow use by wheelchair-bound individuals. The type should be large and legible.[28] When colors are used, they should be selected to avoid eye strain.

Potential Environmental Impacts

This preservation plan is primarily concerned with archaeological site stabilization and preservation issues. Environmental issues are, as might be expected, of secondary concern. Where appropriate we have mentioned potential environmental issues (such as the issue of pressure treated lumber, polyurethane soil stabilizer, or herbicide use). In addition, we have consulted with Ms. Sally Krebs, Town of Hilton Head Island, for any outstanding environmental impacts of the proposed actions, especially the proposed walkway and site re-vegetation. She does not believe that the proposed actions will have any significant impact on the site or the animal species present. In fact, she noted that the actions proposed would likely have much less impact than the extant fence, which is understandably an essential security need.

Although the Land Trust may wish to evaluate environmental impacts in greater detail, it is important to recognized that Fort Howell's significance lies primarily in its history and archaeology. As such, these must be the essential issues considered when developing site preservation plans.

[28] The National Park Service recommends that titles be in 72 to 60 pt. minimum, that subtitles be minimally 48 to 40 pt., that body text be at least 24 pt. and that captions be minimally 18 pt. To further help in reading, text should be set left justified and right ragged, since this makes it easier for the eye to follow lines.

SUMMARY

Prioritizing Proposed Actions

A number of different actions have been recommended to ensure the long-term preservation of Fort Howell while also maximizing its accessibility and educational potential. Some of the recommended actions are relatively inexpensive, while others will require considerable capital expenditure. The cost of some items can be reduced by soliciting donations and volunteer labor. Some of the proposed undertakings are also eligible for matching grants.

At this point we will prioritize the recommendations, taking into account both cost of the activity and also its need in the scheme of the site's long-term preservation. Those actions which have no cost or only a very nominal cost are recommended to be enacted early, since they can help to build awareness of the site, encourage public support, and development a momentum leading to larger projects.

Immediate Actions
(Next 60 to 90 Days)

- Contact SCDOT to have signs erected to provide notice of the site — this will provide advance warning of motorists possibly turning into the site and will also create additional awareness of the site. At the same time the Land Trust should request that SCDOT explore reducing the speed on this section of Beach City Road because of the curve and increased use of the Fort Howell turn. The cost of this is negligible.

- Contact SCDAH to explore the possibility of developing and erecting a state historic marker for Fort Howell — this will also provide additional awareness of the site and will encourage visitors to take advantage of the site. The cost of this is about $3,000 — $1,000 for a consultant to prepare the sign request and documentation and $2,000 for the cast aluminum sign.

- Integrate a picnic area with wheelchair accessible tables and trash containers into the woods adjacent to the parking area. This would also promote use of the site at a very nominal cost of about $2,500. Volunteer labor could be used to clean the area, assemble the tables, and mount the items in concrete.

- Develop a weekly, monthly semi-annual, and annual maintenance plan for the site which can be easily modified as additional site improvements are added. The cost of this is negligible. Implementation can be by Land Trust volunteers. It may be possible for some activities, such as trash collection, to be undertaken or supplemented by the Town of Hilton Head Island.

- Allocate an annual maintenance budget for Fort Howell, which should include funds for tree removal, periodic bushhogging, repair of facilities, and replacement of signage.

- Develop a disaster plan for the earthworks, following recommendations offered in this

study. Immediate concerns should be hurricanes and other severe storms, fire, serious drought, and criminal activity (including primarily looting, theft and vandalism). The cost of this is negligible.

▫ Begin a periodic program of bushhogging on the interior of the fort or terreplein, in conjunction with a review by the Town of Hilton Head Island. The cost of this is negligible since it is something which should be volunteered labor. It may, for example, be something which Greenwood Development is willing to do on a regular basis.

▫ With the advice and approval of the Town of Hilton Head Island, initiate removal of small vegetation from the ditch on both sides of the access in order to improve the view. Since this is work which can be accomplished by volunteers the cost is negligible.

▫ Establish clear use procedures for Fort Howell to reinforce the Land Trust's policy of equal site access. This should ensure that no one is "selling" access to the site. The cost of this is also negligible and can be done by the Land Trust board.

Actions Within the Next 6 -12 Months

▫ Stabilize the earthworks by in-filling with soil using jute mats and/or reed-trench terracing. This will require trucking of top soil to a central location, use of a backhoe to transport the soil to erosional areas, some hand placement of soil, mixing a water retaining gel in the soil of individual plantings, establishing terracing, planting ground cover, possible use of jute mats in areas of more serious erosion, and watering. This project may also include filling in the low spot and establishing plantings along the proposed boardwalk. The cost of this is estimated to be about $9,400.

▫ Developing a boardwalk for visitors from the proposed parking area to the north bastion and adjacent salient. This will include laying out and constructing the boardwalk, ensuring adequate headroom, and installing "slippery when wet" signs. If not already done, this project would also involve filling in the low spot near the pedestrian gate and establishing plantings in this area. The cost of materials is estimated to be about $5,100.00 for the section from the parking area to the fort entrance. From the fort entrance to the north bastion and salient, the cost will be about $8,800.00. Total cost is estimated at $12,900. No labor costs are included since this is a project which could easily be handled by volunteers, led by an experienced contractor or even handyman. The Land Trust, of course, should investigate permits it may need from the Town.

▫ Begin appropriate signage for the site area with the installation of the first three of seven signs for the site. These three signs should include one at the beginning of the boardwalk (at the proposed new parking area), one at the entrance to the fort,

and one in the center of the fort. The cost, per sign, is estimated to be about $3,000 — $2,000 for the sign, $500 for graphics design, and $500 for a consultant to develop the sign concept and wording. Consequently, total cost will be $9,000.

Actions Within the Next 2 Years

▫ The new parking area for buses, with handicapped parking should be planned and constructed. If necessary, the boardwalk should be extended to provide easy bus unloading and ensure that handicapped access is provided. The cost of this is estimated to be about $9,800.

▫ The new parking facility will open the site to the schools and encourage use of this unique resource among teachers. The land trust should ensure that Beaufort, Jasper, and Colleton county schools are aware of this by sending letters to school principals. The cost of this is estimated to be about $500, largely covering letterhead, envelopes, and postage. The Land Trust may wish to develop and enclose an informational brochure, which would have an additional cost.

▫ Additional signage should be installed at this time. In particular, we recommend the placement of the second proposed sign at the parking area, a sign midway along the boardwalk, and two additional signs on the earthworks. The cost is estimated to be $12,000.

Actions Within the Next 3 to 5 Years

▫ An archaeological project should investigate the area of the now missing traverse in order to verify that one was originally present. This study should also examine the earthen ramp across the ditch, to determine if any artifacts are present in the soil and also to see if it can be determined when it was constructed. The cost of this study will be about $7,000.

▫ Pending the outcome of archaeological studies, the earthen ramp across the ditch should be removed, with the soil stockpiled on the interior of the fort (for eventual use in reconstructing the traverse). The existing boardwalk across the ramp should also be salvaged. In place of the ramp a bridge should be constructed, similar to that shown in the original drawings of Fort Howell. The existing boardwalk should be tied into the new bridge. The cost of removing the soil and constructing a bridge is estimated to be about $8,200.

▫ The traverse, inside the fort entrance should be reconstructed. This will require that the existing boardwalk be re-routed around the traverse, using the materials salvaged from the ramp across the ditch The traverse will likely require the use of considerable hand labor. Probably a landscape firm, directed by an archaeologist, can accomplish the work for about $8,000.

Cost Summaries

The following are estimates of the anticipated costs, based on the best information we have been able to develop. It is likely that landscape architects or contractors could take the information we have provided and refine the figures, making them more specific for the Hilton Head area.

We have also not included all of the available options. For example, we have not included cost comparisons for both the lumber walkway and the Soil Stabilizer. Likewise, we have not compared the prices for all of the available plants. Our goal in this section is simply to provide the Land Trust with some general understanding of the costs likely involved in the appropriate management of Fort Howell. This is particularly important since many groups do not really understand the costs associated with managing archaeological resources. As this outline demonstrates, archaeological sites have very real costs associated with their long-term preservation and interpretation.

Where the work can reasonably be accomplished by the Land Trust using volunteers, for example in the construction of the boardwalks, we have figured the costs for materials only. Where the work was more elaborate, such as for the construction of the parking area, we have figures materials and labor. It is likely that the Land Trust could undertake the erosion control program using volunteer labor, and this would significantly reduce the cost of the undertaking. We have not added in the cost of Town permits, or other local fees.

Throughout we have used CY for cubic yard, SY for square yard, SF for square foot, and bf for board foot.

Erosion Control

Soil for infill, 234 CY @ $20/CY	4680.00
Laying down geotextile, 396 SY @ 0.94¢/SY	346.86
Moving soil from parking area to earthworks, $25.70/100 CY	60.00
Preparing beds, 396 SY @ $3.54/SY	346.86
Plants and planting, $3/plant, est. 900 plants	2700.00
Water gel, 225 SF of planting bed, $15/100 SF	33.75
Fertilizer, slow release	150.00
Enkamat, 600 yd² @ $4/yd²	2400.00
Jute mat, 5 rolls @ $75/roll	375.00
Enkamat	
Placing mat, 396 SY @ 0.60¢/SY	237.60
Total	$ 12,385.05

Boardwalk from Parking to Fort Entrance

2x6 Wolmanized (.40), 5350 bf @ $600/1000 bf	3210.00
Nails, 20d hot-dipped galvanized, 80 lbs. @ 0.70¢/lb	56.00
Safety Signs, 4 @ $100	400.00
Soil for infill, 44 CY @ $20/CY	880.00
Moving soil from parking area to low spot, $25.70/100 CY	25.70
Preparing beds, 89 SY @ $3.54/SY	315.06
Plants and planting, $3/plant, est. 30 plants	90.00
Water gel, 7.5 SF of planting bed, $15.00/100 SF	15.00
Jute mat and/or mulch	75.00
Total	$ 5,066.76

Boardwalk from Fort Entrance to Bastion and Salient

2x6 Wolmanized (.40), 5503 bf @ $600/1000 bf	3301.80
Deck, 400 SF @ $7.49/SF	2996.00
Stairs, ca. 21, @ $46.60 (6' wide 12" treads and 12" risers)	978.60
Railing, 2044 bf @ $600/1000 bf	1226.40
Nails, 20d hot-dipped galvanized, 110 lbs. @ 0.70¢/lb	77.00
Safety Signs, 2 @ $100	200.00
Total	$8,779.60

Parking Area

Site preparation	1900.00
Fine grading, 583 SY @ $3.33/SY	1941.39

Crush-run, 583 SY @ $3.74/SY	2180.42
Trash can, 1	150.00
Permanent concrete-filled 6" pipe bollards, 10 @ $103.80	1038.00
Removable bollard, 1 @ $229.00	229.00
Bike rack, 1	344.00
Parking markers	700.00
Parking Signs	500.00
Boardwalk, 82 linear feet	730.00
Total	$ 9,712.81

Removing Soil Ramp and Building Bridge

Excavation of 150 CY of soil @ $2.30/CY	345.00
Moving soil to traverse area, 150 CY @ $1.56/CY	234.00
Bridge, 840 SF @ $7.49/SF	6291.60
Bridge railing, 120 running feet @ $10.82/foot	1298.40
Total	$ 8,169.00

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