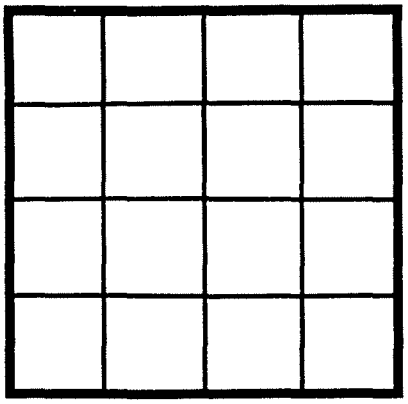

ARCHEOLOGICAL ASSISTANCE PROGRAM
Technical Brief No. 5, September 1989 (Revised 1991)

INTENTIONAL SITE BURIAL:

A Technique to Protect against Natural or Mechanical Loss

By Robert M. Thorne
Center for Archaeological Research, University of Mississippi

U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

This is the second technical brief in the series on site stabilization and maintenance developed through cooperation among the Center for Archaeological Research at the University of Mississippi, the Tennessee Valley Authority, and the National Park Service. The series is based upon existing knowledge and stabilization project experiences to provide programmatic guidance appropriate for problem solving. As baseline information, the series demonstrates the highly variable conditions surrounding archeological site loss, discusses alternatives, and suggests how applicable stabilization techniques can be modified to meet needs.

Information exchange is an important objective of this series. The National Clearinghouse for Archaeological Site Stabilization is organized as a central location at which to seek information as well as to foster interactions among governmental agencies, professionals, and the private sector. It is one solution to the concern for improving technology transfer in historic preservation. The address and telephone number of the Clearinghouse are given at the end of this technical brief.

Introduction

In an absolute sense, the preservation of archeological sites is an unattainable goal, since the aging process of all materials is ongoing. Techniques are available, however, to retard losses to site integrity that are the result of natural and/or cultural processes. To the extent that the processes that cause these losses can be slowed, resources can be stabilized and protected, and in that sense, preserved. Intentional site burial is offered as another of several alternatives that may prove to be appropriate means of achieving that goal.

Covering archeological sites is not a new phenomenon, since the natural burial of sites is a common occurrence. The Murray Springs site in southern Arizona (Haynes and Hemming 1968) and the Bacon Bend site in eastern Tennessee (Chapman 1978) were covered as a result of gradual colluvial and/or alluvial deposition, while the ancient Roman cities of Herculaneum and Pompeii were rapidly sealed by volcanic activity. Natural covering in these instances has worked in much the same manner as artificial covering: some kinds of artifacts and ecofacts are well preserved, while the loss of other kinds may be accelerated.

In reality, stratified archeological deposits may be viewed as microcosmic cases of site burial. Each succeeding occupation or each succeeding flooding episode buries the preceding deposits and to some extent, protects the earlier, lower occupational levels from changes that may be the result of physical and chemical processes on the land surface. Cultural and environmental changes proceed at sufficiently gradual rates so that in most cases succeeding depositions are chemically and biologically compatible with the lower levels and decay of the lower levels is not accelerated. Mechanical loss of the lower levels of sites occurs as new pits are dug, new posts are set, and as a result of bioturbation associated with the latest in the series of occupations. Like the burial of the Murray Springs and Bacon Bend sites, differential preservation of the various artifact classes is an accepted property of archeological sites.

The burial or intentional covering of archeological properties has been used as a means of protecting resources from natural or mechanical loss (U.S. Department of the Interior 1975; Jensen 1976; Chace 1981; Klinger 1982; Garfinkel and Lister 1983; Thorne, et al. 1987; Wilkie, Aide, and Knox 1986). Most of the completed intentional site burial projects that have been reported are in or adjacent to construction areas. An annotated bibliography describing some of those efforts is given at the end of this technical brief.

Design of an Effective Project

The objective of this technical brief is to provide guidance on design of an effective project for intentional site burial. It identifies the process by which an archeological program manager can: (1) evaluate the components of the site; (2) measure potential impacts, including decay processes, against the goals for protecting the site; (3) assess the benefits of intentional site burial; and (4) specify the methods and procedures to be used in the project, including cost considerations.

Documented cases of site burial can be referred for background technical and methodological support when a new project is being considered, but every site that is considered for artificial covering must be treated as a separate case. This is due in part to the extent of variability among individual sites as well as the degree to which the components

of a single site will vary internally. Each site incorporated into a stabilization design must be judged on its particular internal and external components, even though several sites, in close proximity to each other, may be scheduled for treatment.

Evaluation of Site Components

Since the stabilization of an archeological site follows an orderly sequence of events (Thorne 1988a), a site's archeological components will have already been defined at the beginning of a preservation project. Testing for National Register eligibility will have demonstrated the range of artifacts that must be protected, including bone, shell, ceramic and lithic artifacts, wood and charcoal, and the variety of features that must be considered in the development of a preservation plan. In order to complete the evaluation of site components that is necessary for the development of a design for the burial of a particular site, additional information on components other than artifacts will be required. These data may go beyond those that are collected during the course of normal archeological investigations and may include: pH determinations taken from a number of loci within the site; data indicating ongoing and potential oxidation/reduction processes; and soil samples of the site's matrix as well as the underlying strata. Many approaches to the analysis of archeological soils have been taken. One example is from resistivity surveys (Carr 1982). The definition for site matrix follows Mathewson (1988) and Mathewson and Gonzales (1989). (See Figure 1 below.) The soil samples may have to be tested for compression strength and permeability.

The collection of these data will allow the development of reasonable estimates of how a site's artifact and ecofact components have reacted to their physical and chemical environments through time. A model can then be derived to predict how the artifact component will be affected by the placement of an artificial covering. These additional data are necessary for the proper selection of the fill material that will be used to cover the site, since chemical and organic compatibility of both the site and fill are necessary. Post-burial monitoring assessments must also rely on these data since they will form the baseline from which all evaluations will be made.

Measurement of Impacts and Setting Goals for Protection

The design plan for intentional burial must be conceived in a manner that will insure that maximum protection is afforded the resource while minimizing any negative effects caused by such an overburden. In order to determine the best design, a multidisciplinary team of specialists is recommended. This team should include an archeologist, a geologist, and an engineer. Each will have specific responsibilities in developing the stabilization design plan.

SITE COMPONENTS

E = ENHANCES PRESERVATION
A = ACCELERATES DECAY
N = NEUTRAL OR NO EFFECT

PROCESSES

	ANIMAL BONES	SHELL	PLANTS	CHARCOAL	CRYSTALLINE LITHICS	GRANULAR LITHICS	CERAMICS	ARCHAEO. FEATURES	SOIL ATTRIBUTES	METALS	CONTEXT	ISOTOPE CONTENT	TOPOGRAPHY
ACID ENVIRONMENT	A	A	E	N	N	A	N	N	A	A	N	A	N
BASIC ENVIRONMENT	E	E	A	N	N	E	N	N	A	A	N	N	N
DRY (CONT.)	E	E	E	E	N	E	N	N	N	E	N	E	N
WET ANAEROBIC(CONT.)	E	E	E	A	A	A	A	A	A	A	N	A	A
COMPRESSION	A	A	A	A	N	N	A	A	A	N	A	N	A
MOVEMENT	N	N	N	A	N	N	N	A	A	N	A	N	A
WET-DRY	A	A	A	A	A	A	A	A	A	A	N	A	A
MICOORGANISMS	A	N	A	A	N	N	N	N	N	A	A	A	N
MACROORGANISMS	A	A	A	A	N	A	N	A	A	N	A	N	N
WET AEROBIC	A	A	A	A	N	A	A	A	A	A	N	A	N
FREEZE-THAW	A	A	A	A	A	A	A	A	A	N	A	A	A
FREEZE	A	A	A	A	N	A	A	N	E	N	A	E	N
THAW	N	N	N	N	N	A	N	N	A	N	A	A	N

Figure 1. This model relates a change in the physical, chemical, or biological environment of a site buried for preservation to the impact of that change on a specific site component or spatial relationship. (Matrix courtesy of Dr. Christopher Mathewson, Texas A and M University)

Their efforts must be integrated and not performed as a series of independent steps. The archeologist must define the various classes of artifacts that are to be preserved and indicate what classes, if any, may ultimately be unprotected or lost (more about this later). The geologist must review the basic preservation (artifact class) requirements that have been set by the archeologist. The geologist should understand the mechanisms of artifact decay and on that basis be able to prescribe fill materials that will best fit the preservation needs of the resource. Finally, the engineer will be charged with designing the mechanics of the burial procedure. His or her level of understanding must extend from fill acquisition and placement to the hydraulic properties of the site and how hydraulic changes will affect the site's contents. He or she will also be responsible for designing the placement of the fill so the site components will not warp as a result of heavy equipment movements or the weight of the fill column over time.

During the process of arriving at the best plan for covering a site, engineering and geologic design criteria that are imposed on the project may seem unreasonable or unrealistic from the perspective of the archeologist. Such instances should be overcome through team negotiations. Successful design negotiations will be dependent on a shared understanding of the preservation needs of the resource by all team members. Frequently, however, design standards that must be met are set by the land managing agency or by one of the organizations that have established governing regulations for construction, e.g., the American Society for Testing Materials (ASTM). When external criteria of this kind must be taken into account, the archeologist must be prepared to yield to those constraints. The best solution to problems of this kind may be to seek innovative ways of meeting required standards while protecting the archeological resource.

Decay Processes

Predictions about future reactions must be based on an understanding of the decay processes that operate on the various components of an archeological site. Mitigation of the effects of the decay processes and the external forces that impact the resource is the primary goal of the stabilization effort. A secondary goal of not accelerating ongoing decay or adding new destructive processes must be a consideration of the stabilization design.

Chemical processes related to oxidation and reduction combined with soil pH characteristics are most likely to be the primary causes for naturally stimulated site content loss. Cyclical wetting/drying and freezing/thawing can affect the decay process through both chemical and mechanical means. Culturally derived disturbance can act as a catalyst that will speed up chemical and mechanical loss. Biological degeneration of a resource is accelerated by macroorganism activities, e.g., burrowing animals. Any environmental alteration that increases the number of microorganisms will hasten the decay of some classes of artifacts and ecofacts.

Current preservation technology, combined with the nature of the decay processes that affect archeological materials, is such that not all artifact classes can be protected simultaneously. Mathewson (1988) has outlined some of the problem areas in site burial, and the model of site decay can be useful in both understanding and predicting how the preservation-natural decay process will proceed (Figure 1).

Even though our current technology limits how far we can go toward total stabilization, we can successfully design against further loss of some of a site's components. As can be seen from the Mathewson model, some design criteria will promote the preservation of one kind of artifact while accelerating the loss of some others. This suggests that when stabilization through burial is considered, the design team may need to allow the loss of certain classes of artifacts for the sake of preserving others. The natural decay processes that occur as a midden develops will almost always include an aspect of differential preservation of artifact classes. The artificial burial of a cultural deposit will embody those same aspects, but in a carefully conceived framework.

To illustrate the usefulness of the model, it is possible through inspection to predict that if a continuously dry environment is designed, preservation of some aspects of the site will be enhanced while other artifact classes will remain unaffected. This type of dry environment would be nearly identical to those found in the caves of semi-arid and arid areas. In most parts of the United States we are unlikely to construct a continuously dry environment. We can, however, engineer site covering plans in such a manner that the hydraulic character of the site is altered dramatically from its natural state and a site's matrix dried considerably. Conversely, and as can be seen from the model, the rate of loss to more classes of artifacts increases with the level of moisture.

Again, drawing from the model, if an alkaline environment is artificially created, bone, shell, and the granular lithic assemblage would be better preserved while plant material, soil attributes, and metal artifacts would be lost at a faster rate. If by design the site stays continuously wet and an aerobic state exists, decay of all organic artifacts and remains will be hastened.

Benefits of Intentional Site Burial

The difficulties of covering a site are more apparent than real and can be overcome through a stabilization program that is designed with care. Advantages will accrue to the resource that have been previously unavailable. Protection from loss can be extended to both natural and cultural processes. (A convenient summary of these processes appears in Mathewson 1989.)

Protection from cultural processes

Culturally derived site loss includes vandalism, looting, and the full range of development activities. Vandalism, which is considered to be acts of deliberate or unintentional damage to or destruction of archeological resources, will be totally eliminated since the site and its contents will be removed from immediate accessibility. Site burial should at least make looting of site contents for personal pleasure or financial gain more difficult, if not impossible. Protection from develop-

ment activities is the most direct benefit, particularly when the multidisciplinary team responsible for the stabilization design plan clearly defines and sets such goals.

Protection from natural processes

Naturally occurring loss is a combination of site and content aging with some form of erosion. If a site is not shielded from the consequences of rainfall, the combined effects of frost heaves, subsequent rainfall and strong winds, deflation of the surface will be continuous. The effects of acid rain on site contents are as yet poorly understood, but some form of protection may be necessary.

An obvious advantage of site burial is that surface erosion of the archeological matrix is eliminated when a new land surface is produced. Similarly, future freezing and thawing can be eliminated by designing the fill depth to exceed the depth of the frost line. Newly created land surface or strata can also provide relief from the absorbed effects of acid rain as well as serving to shed rainwater. Sites that are within reservoir or lake drawdown zones or along the splash zone of lake margins are not considered to be prime candidates for this treatment. Earth burial is only an appropriate means of stabilizing sites in wave impact environments if the design plan includes some form of hard covering that will protect the newly created surface, e.g., riprap, bulkheads, or filter fabric. (See Thorne 1988b for discussion of the use of filter fabrics as protective hard covering.)

Revegetation should be a part of the stabilization plan to insure land surface stability, and the newly created land surface can be used for a variety of purposes within specified limits. In specific instances, surface stability can be assured while cash crops are being cultivated on the newly placed fill. Care must be exercised in allowing agricultural production to continue after fill is in place (Figure 2), and there must be regular monitoring to insure that post-burial damage is minimized (Figure 3).

Figure 2. The Rock Creek Site, Natchez Trace Parkway, Alabama: Site returned to cultivation.

Figure 3. The Rock Creek Site, Natchez Trace Parkway, Alabama: Buried site approximatively two years later showing damage from farm equipment.

If properly designed, the site and the superimposed fill can be used as extra-load bearing strata for parking lot construction. The broadest possible post-burial uses of the new land surface should be anticipated during the preservation planning and design phase. The design criteria for those uses must be incorporated into the stabilization program.

Project Methods and Procedures

Several other concerns must be taken into account before proceeding with the actual burial of an archeological resource. First among these is the establishment of a reference or benchmark system so that the site and specific loci within it can be relocated in the future. This is particularly important if future scientific investigation is specified as a goal for the burial project. Permanent markers should be set and appropriate maps should be marked to indicate the location of the site. Pertinent benchmark data should be noted on the maps as well as contained in a written report. Clear and easily located on-the-ground marking is particularly important if the site is likely to be in a construction impact zone in the future. If post-burial use of the newly created stratigraphic layer is anticipated, benchmark placement should be done in such a manner as to accommodate the new use.

To insure that there is no inadvertent mixing between the archeological matrix and the covering material, the installation of some form of horizon marker may be desirable. A number of filter fabrics are available that can serve such a purpose (Thorne 1988b). Most of the filter fabrics are chemically inert and have a relatively long lifespan if exposure to the sun is minimized. Alternatively, culturally sterile sand, gravel, furnace slag (1/4"), or a clay-gravel lens may be placed between the fill and the site matrix to clearly mark the stratigraphic contact zone. Gravels and other naturally occurring materials may be used, but only if they have a zero distribution within the archeological matrix. Care must also be taken to insure that the horizon marker does not alter the chemical or hydrostatic character of the cultural deposit unless such a change has been intentionally incorporated into the burial design. The use of tightly compacted clays or clay-gravels has the potential of altering the permeability of the site as well as introducing pH variations.

Burying the site

The mechanical process of burying the site must be designed in a manner that will insure that the site matrix is protected during the placement process. Preconstruction testing can be used to determine the construction equipment and fill material load limits that are allowable without causing compression or warpage of the artifact and feature components of the site. Compression from the weight of the machinery necessary to place the fill should not pose a problem since relatively heavy equipment exerts only a small amount of vertical pressure per square inch. As the depth of the fill increases, the pressure exerted by any equipment crossing the site is further dissipated. Vibrations that might cause settling of the matrix are similarly reduced and dampened as the depth of the fill increases. Consideration should be given to damage to upper levels of the site that may result from the grinding action of heavy equipment traffic. It is essential that the first layer of fill to be placed across the site be thick enough to adequately buffer the matrix. Equipment operators should be provided with sufficient information about the project so that they will understand the need to protect the site from equipment movement. Tracked equipment is preferred because the pads on the tracks effectively spread the weight of the equipment over a greater area.

Monitoring the site

Finally, provisions must be made to monitor the site once the burial process is completed. In this instance, post-burial monitoring of the site may go beyond simply making periodic inspection visits. While monitoring must include regularly scheduled inspections, those visits will be made for the specific purpose of continuing to contribute to the protection of the resource.

Post-burial monitoring, as recommended here, will have several meanings. Any of these can be applied to any site, but each must be used on a site-by-site basis. At its lowest level, monitoring will be completed to do little more than regularly ascertain the condition of the surface of the site and to have those observations recorded. At the next level, site condition observations will be made, problems of stability noted, and some effort will then be made to rectify any problems. These two views of monitoring deal with the condition of the newly created surface and not with the buried archeological site. The most complex of the monitoring procedures will deal with determining the condition of the archeological matrix. Since the resource will no longer be readily accessible, the decision must be made during the design phase of the project as to which monitoring approach will be taken. If it is to be the latter course, evaluation procedures must be incorporated into the total burial plan.

Post-burial test areas should be determined, and these loci must be noted on appropriate maps and tied to the system of benchmarks that will be set to mark the location of the site. If subsurface evaluations are planned for a number of years, a schedule of specific test loci should be prepared. The locations of these successive test units will be in part dependent on the types of evaluation data that are to be recovered. Generally, if test excavation and boring placements are to be used, they should be designed to avoid known or suspected archeological feature locations. Any form of blind subsurface testing such as boring always has the potential of damaging or destroying significant features unless locations are incorporated into the burial design.

Electronic monitoring of subsurface conditions also should be considered during the design phase of the project. Various metering gauges are available to record pressure and soil movement both vertically and horizontally. Magnetic displacement gauges that are designed to measure movement under road surfaces are appropriate for use in an archeological context and their use will not require any subfill disturbance.

If sufficient testing is completed prior to working out a burial design and if the burial design is properly conceived, no additional disturbance should accrue to the cultural deposit as a result of placement of the fill. Responsibility for the adequacy of the design will be in the hands of the geologist and the engineer and, given an appropriate design, site monitoring should be concerned with only the condition of the superimposed fill material.

To insure that the appropriate monitoring regimen is adequately carried out, a schedule should be prepared that details a timetable for the process and the extent to which testing will be taken. A statement specifying the intent of the monitoring as well as the schedule for inspection visits should be incorporated into an agreement that will be signed prior to completing the plans to bury the resource.

Cost considerations

Costs for the burial of a resource will vary from site to site and are dependent on a number of factors. Certain fixed costs can be anticipated, however. Salary or professional fees and overhead should be included for the multidisciplinary team (archeologist, geologist, and engineer) for both the design and installation phases. Geologic and engineering sample collection and analysis costs must be anticipated, both for the matrix and the fill material. If a natural filter is to be installed, it also should be tested to insure compatibility with the site's geological and hydraulic components. Engineering survey and setting of the permanent benchmarks will be additional essential costs since benchmarks must be carefully located to facilitate post-installation monitoring.

Material costs will include the benchmarks, the filtering agent and its installation, the fill material and its transportation and placement, and any remote sensing monitoring devices. If revegetation of the newly created surface is a part of the design plan, acquisition and installation of cover plants will form part of the total cost. If fertilizer must be used as a part of such a plan, care must be taken that it not affect the chemical composition of the archeological deposits

Monitoring costs for the proposed period should be anticipated, and a mechanism must be devised to insure that future funding is available. Most previously completed projects recommend subsurface testing over a period of years that typically goes beyond the ability of any agency to guarantee funding. The direct consequence is that agencies will be reluctant at best to enter into such an agreement, since budgetary structuring is established on a year-by-year basis.

It may be that the most direct route to post-burial monitoring funds will be through a specific line item request in the operations and maintenance budget of the appropriate branch of an agency. In many instances, the construction unit of an agency will relinquish responsibility for a project once construction is completed, and maintenance for the post-burial period will become the responsibility of another branch. Communication of responsibility between branches is an absolute necessity if these responsibilities are to be adequately met.

To insure that adequate funds are available and that the monitoring process is regular and timely, funds should be placed in the line item budget on a yearly basis. Once the item becomes a specific part of a budget, continuation on a yearly basis will be less difficult and will insure also that the monitoring effort meets preservation requirements.

Request for Assistance

Information exchange about site stabilization is available from and should be reported to:

Dr. Robert M. Thorne
National Clearinghouse for Archaeological Site Stabilization
Center for Archaeological Research
University of Mississippi
University, MS 38677

Archeological Site Stabilization Bibliography

The National Clearinghouse for Archaeological Site Stabilization maintains a bibliography that is intended to support the conceptualization, design, and development of site stabilization and preservation projects. The bibliography is divided into four sections: (1) Philosophy, (2) Technical Support, (3) Management Recommendations, and (4) Practical Applications. Annotations follow some of the entries and provide the user with a brief but sufficient sketch of the entry. As new source materials become available they are entered into the reference work.

Section 1 - Philosophy provides an overview for site preservation and stabilization and provides the user with sufficient background to philosophically justify archeological site stabilization projects. *Section 2 - Technical Support* draws together technical information that is generally unknown to archeologists. Reliance on and knowledge of these data are integral to the design of stabilization projects, particularly if cost effective and innovative stabilization measures are to be put into place. *Section 3 - Management Recommendations* contains a mix of projects to provide the user with an idea of how site stabilization has been approached. *Section 4 - Practical Applications* is devoted to the presentation of specific archeological site stabilization case histories. Data contained in these case histories will provide an insight into the planning and implementation of stabilization projects.

For a copy of the the Bibliography, write to the address listed above.

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Wilkie, Duncan C., Michael T. Aide, and Ray Knox
1986 *Phase III, Archaeological Mitigation of Archaeological Sites 23BU239 and 23BU241.* Report submitted to the Missouri Highway and Transportation Department, Jefferson City.

Annotated Bibliography

Garfinkel, Alan P., and Bobby L. Lister
1983 *Effects of High Embankment Construction on Archaeological Materials.* Transportation Laboratory, California Department of Transportation (CALTRANS), Sacramento.

The authors report on a field study conducted by CALTRANS to determine the effects of placing a 75-foot-high embankment over an area constructed to simulate a North American Indian archeological site. Two small test units were excavated, and artifacts were placed in three layers. The locations of all artifacts were carefully plotted, and both units were instrumented with soil pressure meters. Access to the test units beneath the fill was monitored through a 5-foot culvert that terminated with a 72-inch "T" section. Ground water levels beneath the fill was measured through a well drilled into the "T" section. Soil pressure meters were also placed in an actual site on an adjacent project to provide comparative data. Examination of the buried materials indicated soil compaction around the artifacts, and gross morphological changes in the test materials were noted. Guidelines and recommendations for future site burial projects are included. This project is also covered by a technical note in the *Archeological Site Protection and Preservation Notebook*, described below.

Jensen, Peter M.
1976 *Archaeological Investigations at CA-MER-27. The First California Site for which Total Coverage with Soil has been Agreed to as Partial Mitigation.* Report prepared for U.S. Bureau of Reclamation, Sacramento.

Jensen presents the results of archeological investigations that were conducted prior to the burial of CA-MER-27. He includes a 10-page discussion of the future burial of the site and raises a series of questions regarding the validity

of site burial as a reasonable mitigation measure. He concludes what appears to be a negative view of site burial by indicating that limited knowledge about a significant archeological site is sufficient justification for its preservation using this method. More importantly, Appendix 2 describes the proposed burial activity. It includes as part of that description portions of the Bureau of Reclamation's original burial proposal with data on compaction, settlement, and slumping which were used to predict how the archeological component might react to burial under a 3-foot protective covering. This appendix provides a great deal of insight into the planning and testing required prior to the burial of an archeological property.

Mathewson, Christopher C. (editor)

1989 *Interdisciplinary Workshop on the Physical-Chemical-Biological Processes Affecting Archeological Sites.* Contract Report EL-89-1, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg.

The information in this report was collected to develop an archeological site decay model that can be applied in planning and design activities for intentional site burial projects. It presents the papers of the workshop as a convenient summary of current scientific knowledge concerning site development processes and their influences on cultural materials. Cultural and natural processes are discussed, particularly to identify interactions of physical, biological and chemical factors with archeological site components. The archeological site decay model is based upon the decay matrix illustrated in Figure 1 (in this technical brief).

U.S. Department of the Army, Corps of Engineers

1988 *The Archeological Site Protection and Preservation Notebook.* Environmental Research Program, Vicksburg.

The notebook contains a regularly updated series of technical notes that summarize original research and abstracted published and unpublished accounts about site preservation. They address the causes of site degradation and techniques for in situ site protection. The notebook is organized into eleven chapters that cover different protection categories. The chapter on intentional site burial contains three technical notes. Two additional notes on the subject will be published in the immediate future.

Wilkie, Duncan C., Michael T. Aide, and Ray Knox

1986 *Phase III, Archaeological Mitigation of Archaeological Sites 23BU239 and 23BU241.* Report submitted to the Missouri Highway and Transportation Department, Jefferson City.

The authors summarize both the Phase I and Phase II work completed at these two sites and the Scope of Work for the mitigation project. Site burial and artifact reburial are included as basic components of the mitigation plan. They further indicate that the research design for Phase III work will be based on an improvement of the CALTRANS site burial test project. They indicate that the present project is designed to test the impact of moderately deep burial on both artifacts and intact site components. Portions of both sites were left undisturbed and scheduled to be covered as a part of the construction phase of Route 60. Following selective excavation and detailed analysis of the recovered artifacts, representative examples were returned to the site and reburied in their original locations.

Recommendations for measuring burial impact include soil chemistry tests at 2-year intervals and excavations to compare undisturbed features and reburied artifacts after a 10-year interval. This interval should allow the detection of any impacts that burial and reburial will have on the site and its contents. A description of the engineering design used in the burial of these two sites is not contained in the Scope of Work, the mitigation proposal, or the archeological report. One is left to assume that standard Missouri Highway and Transportation Department engineering and construction design was used. Complete physical and chemical data as well as some soil compaction data were gathered to serve as a baseline in future studies.