2. Research Orientation and State Plan

PREVIOUS ARCHÆOLOGICAL research in the region has provided valuable insights into the locations of human activities through time. In some cases, as in the project area, settlement models are so well developed that sites can be predicted with uncanny accuracy, but there is yet much to be learned about human utilization of this part of Kent County.

THEORETICAL ORIENTATION

The research for this project reflects a cultural materialist theoretical orientation. Cultural materialism refers to the study of the effects of technology and environment on human behavior. Culture is viewed as a form of adaptation to both the natural environment and the social environment that results from the interaction of human individuals and groups (Custer 1986:2; cf. Harris 1968:240-41; Harris 1979).

This theoretical approach is explicitly incorporated into the Delaware management plan for prehistoric archæological resources (Custer 1986:2). The state plan for historic archæological resources (DeCunzo and Catts 1990:8), on the other hand, stresses the need to compare and evaluate interpretations resulting from different theoretical approaches. The plan emphasizes the need to "allow archæologists with different theoretical perspectives to address their own questions through the resource base in Delaware ... ."

A cultural materialist approach is implicit in the development of models which use features of the natural environment (such as soil types or topography) or elements of the cultural environment (such as roads, landings, or farmsteads) to predict the locations of a variety of property types, including prehistoric settlements, cemeteries, and industrial sites.

Using this theoretical position, local researchers have developed a strategy designed for the efficient identification of both prehistoric and historic sites. The research strategy consists of the identification and application of models that predict the locations of the major historic property types which can be expected within the project area. These property types include both prehistoric settlements and historic tofts and are of particular concern because they can provide information on a wider range of research questions than other properties considered in this study. Such an approach can be considered an empirical test of the positive statements of the models. It should be kept in mind, however, that this does not constitute a formal test of any model.

Consistent with the cultural materialist approach is an approach to sites of the historic period which emphasizes commercial networks, transportation, and settlement patterns. For the interpretation of spatial relationships between places and their regional significance, the insights of geographers are particularly useful.

While prehistoric settlement patterns may smack of central-place theory, historic settlement patterns can be explained almost entirely by application of the central-place paradigm.

A systematic, top-down approach to material culture demands that each element be viewed as part of a system, further divisible into subsystems and, in turn, sub-subsystems.

If one follows this line of reasoning, a house or object cannot be considered in isolation, but as part of a toft. Each toft, in turn, is part of an agricultural or domestic system that includes production, consumption, disposal, and governmental systems, all of which in turn are belong to larger regional or national systems.

In more immediate terms, the systems approach demands interdisciplinary survey strategies that will identify all parts of the system, past and present, buried and visible, built and natural, tangible and intangible.

PREHISTORIC BACKGROUND

People arrived in the Delaware Valley near the end of the last (Wisconsin) glaciation

(Kraft 1986:31). Glaciers entrapped so much water that the ocean lay fifty miles east of the present Sandy Hook, New Jersey. As glaciers retreated and the ocean advanced, area ecology changed.

During the twelve millenia before European settlement, Delaware's climate evolved from glacial tundra to temperate hardwood forest. Man's adaptation to the changing climate was marked by gradual cultural evolution. Custer and DeSantis (1986) have provided a useful table that correlates human and climatic change:

TABLE OF PREHISTORIC CHRONOLOGY

Dates	*Environmental Episode*	*Cultural Period*
8080 BC	Late Glacial	Paleo-Indian /Early Archaic
6540 BC	Pre-Boreal/Boreal Atlantic	Middle Archaic
3110 BC	Sub-Boreal	Late Archaic
810 BC	Sub-Atlantic	Woodland I
AD 1000		Woodland II
AD 1600		

These environmental changes over the millenia have forced changes in man's subsistence strategies, family structure, and social organization.

HISTORICAL BACKGROUND

Roads and dams defined the geography of inland Delaware from earliest settlement to the present century. The great period of mill-building in Kent County was the eighteenth century, when Delaware became a major grain producer. Every available mill seat was claimed and developed, as the counties on the Delaware exported flour and other grain products.

Dominant historical features of the project area are the highway and the mill complex, both of which have existed since the earliest European colonization.

In the political history of Delaware, the project area is potentially significant because it traverses the home farms of two governors who were also notable Revolutionary patriots: Cæsar Rodney and Henry Molleston.

PLANNING CONSIDERATIONS

The Delaware prehistoric cultural resources management plan identifies the Dover area as a region with "high/medium significant site potential with development pressure" that deserves special attention (Custer 1986:206). The project area itself is located in the Mid-Drainage Management Unit (Custer 1986:178).

The study of sites in this zone which are likely to have been occupied during the Archaic Period has been identified as a priority research topic (Custer 1986:174). The study of Woodland I and Woodland II procurement and micro-band base camp sites is also important (Custer 1986:174-6).

The Delaware Comprehensive Historic Preservation Plan (Ames et al. 1989:33) places the project area in the Upper Peninsula geographic zone. European settlement had taken place near the project area by the middle of the seventeenth century, so that all but the earliest of the time periods established by the comprehensive plan are likely to be represented (Ames et al. 1989:37). Two of the historic themes defined by this study, Agriculture and Settlement Patterns and Demographic Change, are represented by historic properties within the project area. Agriculture has been identified as the highest priority historic context for the Upper Peninsula zone for the periods 1770 to 1830 and 1830 to 1880 (Ames et al. 1989:83-4).

Settlement Patterns and Demographic Change are defined as the second highest priority historic context for this zone during the same periods of time.

EXPECTED PROPERTY TYPES

The number of property types which can be expected in the project area is quite limited, since the project is confined to an existing highway. For the prehistoric period, procurement sites are the most likely property type in all time periods (Custer and Galasso 1983:10). These sites can be identified by their small size and the limited range of tool types. A limited number of micro-band base camps may also have existed in the project area. These sites are larger than procurement

sites and a wider range of tool types is present.

However, the places where these sites should be expected are the very places where the most disturbance has taken place. Deep road cuts on both sides of Isaac's Branch have almost certainly destroyed any prehistoric sites along the stream.

For the historic period, four property types can be expected. The first of these is the toft, defined as "a homestead; the site of a house and its outbuildings" in the *Oxford English Dictionary*. In the catalogue of historic property types provided as Appendix C in the Delaware Comprehensive Historic Preservation Plan, the less precise term "plantation and rural farm sites" appears to be roughly equivalent to the toft (Ames et al. 1989:146).

THE TOFT AS A PROPERTY TYPE

Systems-oriented researchers tend to favor the term "toft" because it commonly is construed to refer to all the land, buildings and artifacts related to the homestead, not merely to the random collection of buildings that might happen to survive above ground at the time of a cultural resource survey .

In an agricultural holding, the toft is distinguished from the croft, a term which refers to the fields, meadows, woodlots, and other parts of the holding not in immediate use by the homestead. Kenneth Lewis, who used the toft as the sampling unit in his study of the frontier town of Camden, South Carolina, pointed out the importance of considering the toft as a unit of all the physical evidence immediately associated with the household (1977:175).

AGRICULTURAL FIELDS OR CROFTS

A second historic period property type is the agricultural field, one element of the croft and the locus of a particular variety of human activity. In the catalogue of property types for the Agriculture historic context (Ames et al. 1989:141), fields are seen as exemplifying the products of agriculture, specifically fruits and vegetables and textiles. In this study, agricultural fields are seen as providing evidence of agricultural practices, particularly the use of soil additives, or "amendments." Not only archæology, but soil science, chemistry, and farm-equipment history resources can be used to interpret the croft.

Third, and potentially most significant, of the property types is the mill seat. Since the mill itself stood far beyond the project boundaries, only one part of the mill complex will be impacted.

MILL SEATS AS A PROPERTY TYPE

Mill seats contain much more than just structures in which milling takes place. A mill seat consists of a power source, usually a dam, a headrace, a tailrace, waste gate, granaries, housing, and miscellaneous associated outbuildings and roads. Many mill seats also include public highways, including bridges that were built across mill dams (Heite 1991).The highways, of course, were essential to the business of the mill, in addition to being a historic property type in their own right.

Mill dams might be the largest and most expensive part of a mill system, consuming much of the miller's money and effort to maintain them. As in the case of Moore's Mill, a dam might stand a considerable distance upstream from the mill. In some systems, there might be several mills or several dams, all interconnected through a system of raceways and gates. A proper survey of any part of a mill system will necessarily involve the entire system, without which an understanding of the mill operation is impossible.

A mill's horsepower, its location, and its ability compete are likely to be dictated by the water supply. The first consideration in this department is the reliability of the supply. A dam should be located on a stream that flows regularly, even in dry seasons. The milling season is generally during the wetter part of the year, but the miller relied upon stored water in his pond to provide steady power. Some millers even went so far as to build ponds upstream to store extra water for the pond (Heite 1991).

The second consideration is head, or elevation, of the water. A water wheel or turbine is turned by the force of gravity impelling water across it. Power systems use different methods to convert the energy of

falling water into rotary energy that powers rotating mill machinery.

If a stream has sufficient flow and head, it is said to be a good mill seat. Downstate Delaware is rich in strong flowing streams, but has little relief to provide heads. A copious but relatively level stream like Isaac's Branch, which powered three mill seats in two miles, would have been best suited to turbine or undershot wheels, which depend upon flow and do not need high heads.

Mill seats typically were occupied for a hundred or more years, often by successions of mills and millers. Not uncommonly, millers rebuilt their plants to improve the power source, the machinery, or the variety of products (Heite 1992).

HIGHWAY-RELATED PROPERTY TYPES

The fourth expected property type is the highway system elements within the project area. These include borrow pit, roadway, bridges (PLATE 1), abandoned bridges, footways, cuts, and fills.

Abandoned or superseded roadways (PLATE 2) are potentially significant cultural resources if one seeks to understand past transportation patterns or property boundaries.In the project area, the main road to the south end of Delaware has been routed through at least three different rights-of-way since the time of the American Revolution.

EVALUATION CRITERIA

A primary purpose of any Phase I survey is to identify the locations of historic properties. If any historic properties are found, it will be necessary to evaluate them in terms of possible eligibility for listing on the National Register of Historic Places. This evaluation function normally is part of the Phase II evaluation, but Phase I projects commonly make a "first cut" or triage, dividing sites among those that are clearly eligible or ineligible, and those which require further study.

In a group of planning documents for the Route 13 Relief Route corridor studies, Custer and his associates have developed a framework for evaluating both prehistoric and historic sites (Custer, Jehle, Klatka, and Eveleigh 1984:113-129; Custer and Bachman 1986:192-194; Custer, Bachman, and Grettler 1986:178-180). The framework for prehistoric sites can be summarized as follows, in descending order of significance:

1. All unplowed sites, regardless of period of occupation or site type, are of high potential significance.

2. Late Paleo-Indian and Archaic sites which have been plowed, but which are otherwise undisturbed, are of high potential signi-ficance.

3. Plowed base camps of all time periods are considered potentially highly significant.

4. Plowed sites which are not procurement sites and are associated with bay/basin features are potentially of medium significance.

5. Plowed, disturbed, and eroded sites of all types are potentially of low significance.

6. Plowed procurement sites are also potentially of low significance.

Criteria for evaluating historic period sites developed in the planning studies cited above apply primarily to toft sites. The characteristics of significant sites are summarized as follows (derived from Custer and Bachman 1986:194):

1. Sites containing well preserved remains are highly significant.

2. Sites which display a range of well-defined activity areas are highly significant.

3. Sites which contain dense deposits of cultural material are highly significant.

4. Sites in which temporally distinct occupation loci can be identified, either as part of a long term occupation of the site or as a single short term occupation, are highly significant.

Because these criteria were defined for application to tofts, they are not readily applicable to other rural historic property types defined for the project area.

Plate 1
Highway Bridge

Photograph by the author of the Route 113 bridge over Isaac's Branch, looking northeast. The guardrail dates from the widening 35 years ago.

VALUE OF PREDICTIVE MODELS

Because they are imposed artificially by researchers, survey strategies, by definition, will skew results. Today's site surveyors attempt to minimize subjective errors by using predictive models, random samples, and fixed interval tests. None of these strategies can conclusively demonstrate the absence of sites; nor can they guarantee identification of all sites that exist in a given study area.

Short of 100% excavation, any strategy is nothing but an educated guess, tempered with statistics. However, experience over the last 20 years has shown that the use of an informed strategy is the most effective way to maximize site identification, that is to say, to identify the largest number of sites with the least amount of effort.

The oldest strategy is the predictive model, used intuitively for decades and most recently codified and quantified on the basis of non-exclusive random surveys. Predictive models attempt to identify and quantify factors that help determine site locations, based upon data derived from surveys.

Too often, however, underlying surveys have been either subjective or less than exhaustive, causing models to be skewed. A good predictive model, to be accepted as more or less reliable, must be based entirely upon data that was not generated in a subjective manner.

Such a model exists for the St. Jones drainage (Custer and Galasso 1983) and has been incorporated into the state management plan for prehistoric resources (Custer 1986).

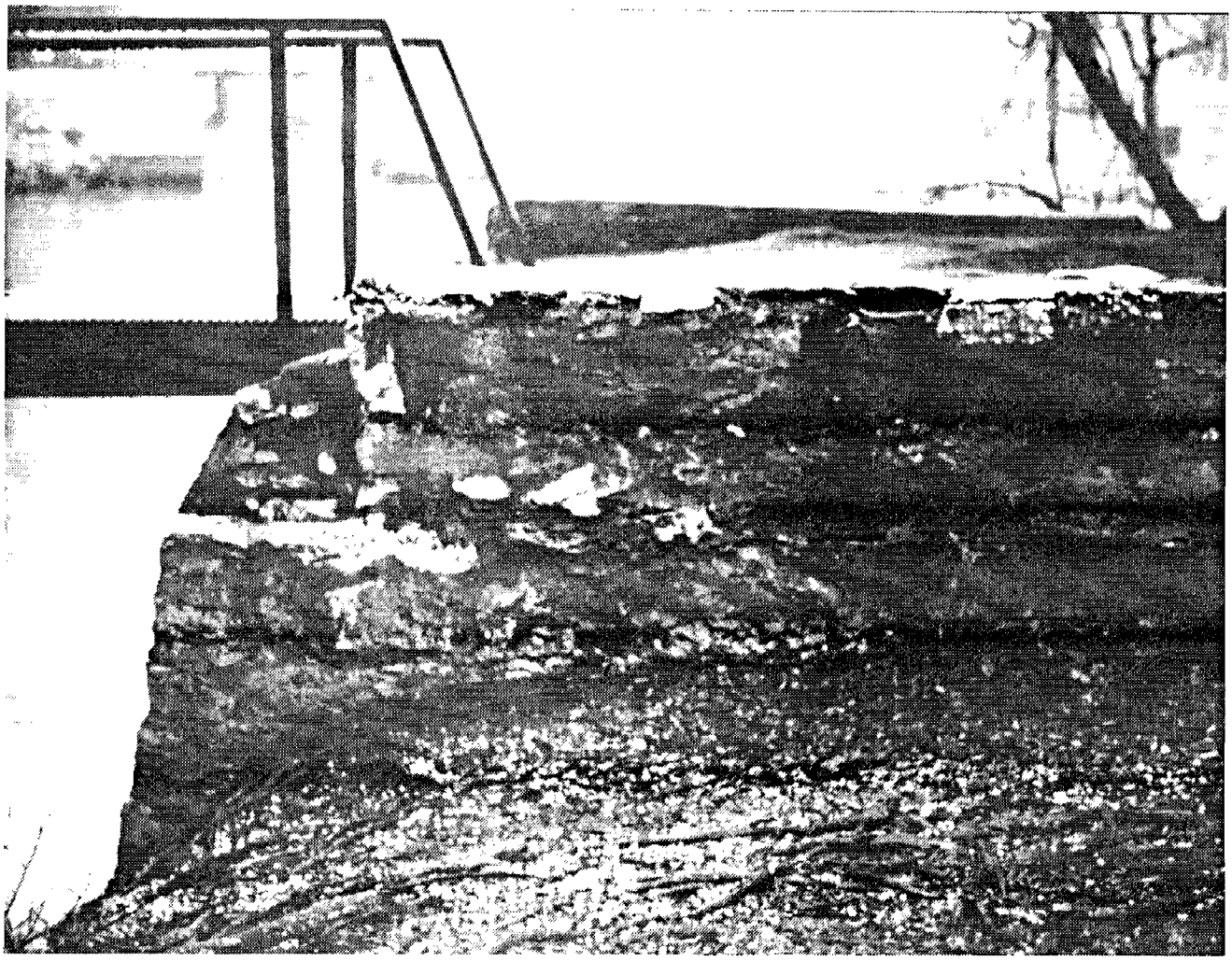

Plate 2
Former Highway Bridge

Photograph by the author of the footbridge that rests on the abutments of the old road to Milford, now Old Mill Road, replaced during the 1920 reconstruction project by the present Isaacs Branch bridge.

At the same time, regional surveys in Kent and New Castle Counties have made it possible to quantify some of the relationships between site location and ecological factors (Custer, Bachman, and Grettler 1986; Custer and Bachman 1986).

Since historically most major sites have been identified by means other than random or non-exclusive surveys, it is difficult to justify using models based upon the whole corpus of survey data in many localities. This difficulty should not exist in the study area.

Approach and Methods

Survey consisted of intensive primary documentary research followed by field reconnaissance, culminating in field testing.

One toft immediately north of Isaac's Branch had been identified as potentially significant during preliminary review by the Bureau of Archæology and Historic Preservation. This residential property was historically associated with the nearby milling system, and is evaluated as an element of that system.