Ancient Architecture at Aztalan, Wisconsin:

Implications for Multi-Ethnic Community Formation and Migrant/Local Interaction

By

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Abstract

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In this dissertation I consider how expressions of identity, especially ethnic and cultural identity, shape the daily interactions between diverse people and address why some migrants are able to successfully integrate among culturally different local populations more easily than others. By "success," I mean migrants achieving an assumed goal of establishing themselves among locals in at least some aspects of life, be that social or economic inclusion, or simply coexisting peacefully in a place. I examine this question using architectural and ceramic evidence from the archaeological site of Aztalan in southern Wisconsin. Aztalan is an excellent case example to study these issues because co-residence of peoples with distinct cultures and geographic origins between approximately A.D. 1100-1200 has been well-documented in multiple forms of material culture as well as in bone chemistry. In the context of migrations and population coalescence, people from diverse homelands, backgrounds, and cultures may come to live among one another and their exposure to each other's beliefs and practices, and multi-directional influences, can result in blended traditions, material hybridity, and transformed identities. It can also accentuate existing differences between migrants and locals. These make group identity, how it is expressed, and how it is perceived, especially important factors in successful integration.

To examine identity expression at Aztalan, I focused on three forms of material culture that differ significantly in form, style, and production between migrants and locals, specifically the technological and visible styles of 34 domestic structures, the technological styles of ceramic assemblages deposited in those structures during or after abandonment, and the architectural designs and metric measurements of palisade walls. Middle Mississippian and Late Woodland structures in Wisconsin ca. AD 900-1300 have patterned, diagnostic differences in their technological style (foundation type) and "visible" style (shape and entrance type) that reflect their culturally and geographically distinct learning communities. I use the technological style of structures to infer members of Mississippian and Late Woodland learning communities, and visible style to infer their publicly expressed identities. Mississippian and Late Woodland pottery also differ in technological style (temper type) and visible style (form and decoration). I use ceramic temper types present in abandoned house basins at Aztalan as proxies to determine the presence of Mississippian and Late Woodland households nearby. Mississippian and Late Woodland palisade traditions differ, with Mississippian walls featuring regularly spaced symmetrical bastions and large diameter posts while Late Woodland walls lack bastions and are made of smaller diameter posts. Together, these lines of evidence allow me to address how group identities were expressed and manipulated by the diverse peoples of Aztalan in daily practice and communal activities.

My results include several factors that I argue may have facilitated successful integration over time: Hybrid structures that combine Mississippian technological style with Late Woodland visible style, and the relative lack of archetypal Mississippian structures at the site, lead me to suggest that Mississippians were willing to adopt local architectural traditions. The presence of grit- and shell-tempered pottery in assemblages recovered from many structure contexts, the

apparent absence of spatial isolation of house forms within the site, and the contemporaneity of different house forms indicate that Mississippian and Late Woodland peoples lived in close proximity within the community. Palisade walls constructed in a Mississippian style but with Late Woodland construction practices lead me to suggest shared participation and an intentional choice of Mississippian appearance for the community. I provide new construction and population estimates for the palisade walls that show how the walls could have been built within a single year, or by a smaller population than previously estimated. I argue that Mississippian and Late Woodland people at Aztalan converged over time toward a new, hybridized cultural tradition that emphasized different cultural identities at different scales. This provides a new dimension to typical views of Aztalan as a Mississippian town. More broadly, my research demonstrates how material culture may become hybridized in the context of population coalescence and how some material signals of identity may change while others are more resilient.

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For Annie and Eden

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I think my journey in archaeology officially began around 2007 in La Crosse, Wisconsin, and unofficially many years before that among the overgrown foundations of a historic logging camp in northern Wisconsin. Over the last decade or more, across Wisconsin and across the country, I have received the help, guidance, and friendship of many, many people:

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Chapter 1: Introduction of Theory and Methods: Interaction, Identity, and Integration at Aztalan, Wisconsin

Why are some migrants able to successfully integrate among culturally different local populations more easily than others? By "success," I refer to migrants achieving an assumed goal of establishing themselves among locals in at least some aspects of life, be that social or economic inclusion, or simply coexisting peacefully in a place. Integration may be experienced differently by different segments of a population and can be difficult to quantify, so my use of the term is fairly subjective, Migrations can be risky and immigrants who move into occupied areas, and their descendants, are often subjected to spatial segregation, physical violence, economic exploitation, and social exclusion, which can prevent migrants from integrating among locals socially, economically, spatially, or in other aspects of life. The presence and severity of these forms of marginalization, and the migrants' ability to integrate, depend on numerous historically particular factors and strategies, including (but certainly not limited to) economic relationships, resource availability, relative migrant and local group sizes, the importance of social groups that cross-cut local/non-local divisions like gender, age, occupation, and status, willingness of migrants to assimilate and of locals to accept them, religious differences, and how group identities are expressed and received (Batiuk 2013; Bloom et al. 2015; Cameron 2011:191; Clark 2001; Cook and Schurr 2009; Goldstein 2015; Hantman 1990; Lyons et al. 2008; Manzanilla 2015a, 2015b; Neuzil 2005; Stone 2000, 2003). Migrants may also choose to remain independent in some ways, with positive, negative, or no impacts on their ability to integrate in other aspects of life (Batiuk 2013; Goldstein 2015; Stone 2003).

This issue is important because, in our globalized modern world, small and large communities alike are becoming increasingly diversified. According to Amnesty International

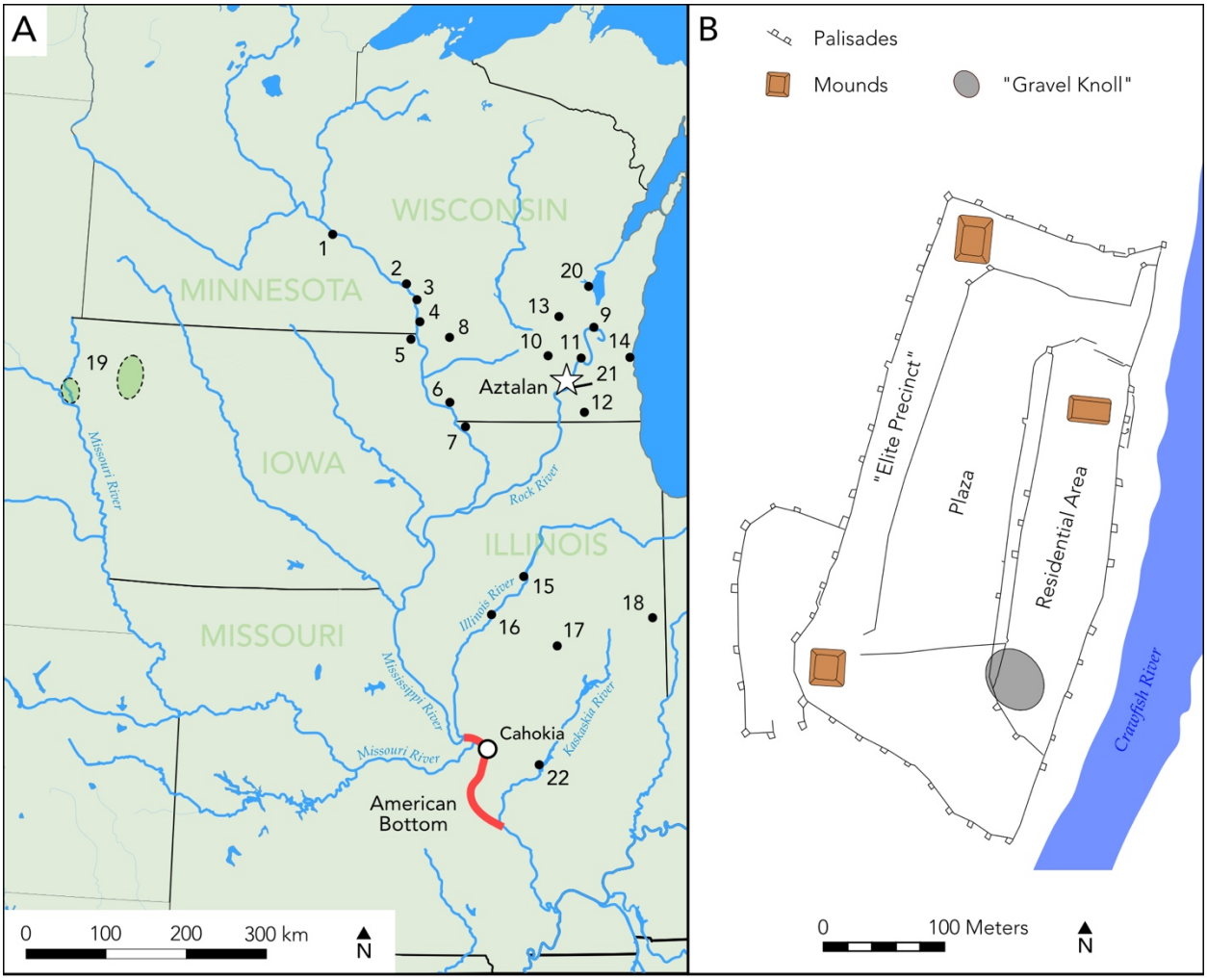
(2017), an estimated 244 million peoples live outside the country where they were born, many of whom have fled war, political unrest, persecution, or economic hardship. Upon reaching their new homes, many immigrants are faced with challenges that originate in their ethnic and cultural difference from locals. Prejudice against Muslim immigrants in Europe and Hispanic migrants in the United States are some current examples (Alba and Foner 2015; Haddad et al. 2006; Strabac and Listhaug 2008; Szkupinski Quiroga et al. 2014). The longevity and lasting effects of such discrimination will need to be evaluated over several decades, though some short-term effects have already been studied (e.g., Elsayed and de Grip 2017).

Interaction, strategies for integration, and the severity of marginalization may change over generations as the descendants of migrants come to see themselves as locals and identify with their place of birth. Even if the cultures of migrants and locals differ, and their distinct traditions are maintained over generations, the descendants of both groups will share the common experience of being born and raised in the same place. Over time, intermarriage and exposure to each other's beliefs and practices can result in blended traditions, material hybridity, and transformed identities that unite people whose ancestors may have been more diverse (Alt 2006b; Bernardini 2005; Burmeister 2000; Deagan 1990; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Meyers 2002). Thus, challenges faced by first-generation immigrants may disappear over time (for example, German-Americans are no longer discriminated against as they were following World War I; Fouka 2017; Moser 2012), and hybridization and new identities play roles in that process.

Many migrants and their descendants can and do integrate among local populations, especially over generations (Batiuk 2013; Bernardini 2005; Birch 2012; Fouka 2017; Moser 2012; Stone 2003). In this dissertation I consider how expressions of identity, especially ethnic

and cultural identity, shape the daily interactions between diverse people, and how their continued interactions over generations may result in new, shared identities. I examine this topic using material culture that reflects and influences group identity in daily practice and communal activities – domestic and monumental architecture and ceramics – from the multi-cultural archaeological site of Aztalan in southern Wisconsin.

Aztalan is an excellent case example because co-residence of peoples with distinct cultures and geographic origins between approximately A.D. 1100-1200 has been well-documented in multiple forms of material culture as well as in strontium isotope values of human bone (Baerreis and Freeman 1958; Barrett 1933; Christiansen 2003; Goldstein 1991; Price et al. 2007; Richards 1992, 2003; Stoltman 2001). The presence of a Mississippian descent group at Aztalan with ties to the American Bottom in southwest Illinois, an expansive floodplain along the Mississippi River between the confluence of the Missouri and Illinois rivers to the north and the Kaskaskia River to the south (Figure 1.1; Fortier et al 2006:172), is inferred from multiple lines of evidence: shell-tempered Ramey Incised and Powell Plain pottery types and other distinctively Mississippian vessel forms, flat-topped pyramidal mounds with summit structures, substantial palisades with bastions, culturally-distinct residential architectural practices, and strontium isotope values of human bone that are inconsistent with local values. The presence of local and possibly non-local Late Woodland peoples is inferred on the basis of collared and/or cordmarked grit-tempered pottery and their own respective domestic architectural practices.



1 - Red Wing Area
2 - Trempealeau
3 - Iva
4 - Fisher Mounds
5 - Hartley Fort
6 - Fred Edwards
7 - Apple River Valley sites
8 - Gottschall Rockshelter
9 - Weisner III
10 - Statz
11 - Bethesda Lutheran Home
12 - Mile Long
13 - Hamilton-Brooks
14 - Klug Island
15 - Rench
16 - Central Illinois River Valley Sites
17 - Shire
18 - Collins
19 - Mill Creek sites
20 - Bell
21 - Lake Koshkonong
22 - Hatchery West

Figure 1.1. (A) Regional map with sites mentioned in the text. (B) Schematic map of Aztalan.

Aztalan includes the conventional components of a walled Mississippian town: flat-topped pyramidal mounds, central plaza, residential area, and palisade wall with bastions (Figure 1.1; Birmingham and Goldstein 2005; Goldstein and Richards 1991; Lewis and Stout 1998; Richards and Jeske 2002). These site features and its distant location from the Mississippi River and its major tributaries have led archaeologists to consistently argue that migration explains the site's appearance and its Middle Mississippian occupation (Baerreis and Freeman 1958; Birmingham and Goldstein 2005; Richards 1992, 2003; Schroeder and Goldstein 2016; Stoltman 1986:29; Strong similarities between Aztalan and Mississippian sites to the south was also recognized early on by Barrett 1933). Late Woodland pottery is commonly found at Aztalan in the same contexts and stratigraphic layers as Mississippian pottery, which is usually used to infer co-residence (Birmingham and Goldstein 2005; Richards 1992, 2003; Wittry and Baerreis 1958; Zych 2013). It has also been suggested that the Late Woodland residents originated outside the Aztalan area, perhaps northern or east-central Illinois, based on the abundance of different varieties of collared ware pottery with hypothesized southern antecedents (Chapter 3; Goldstein 1991:223-224). The variation in Late Woodland pottery types present at Aztalan, whether the people who produced them perceived themselves as different from one another, and how they saw themselves in relation to Mississippian peoples, add additional complexity to questions about group identity there.

To investigate ancient group identities at Aztalan I analyzed material remnants that archaeologists use as diagnostic indicators of different archaeological cultures with distinct geographic origins: architectural designs, construction methods, and metric attributes of 34 domestic structures (albeit, a small sample size); ceramic assemblages deposited in those structures during abandonment; and the architectural designs and metric measurements of

palisade walls. The culturally and geographically distinct differences between these material indicators make them suitable for investigating group identity, which is based on the recognition of similarities with some and differences with others – such as common origins, history, homeland, and material practices (Barth 1969; Emberling 1997; Jones 1997; Keyes 1976; Lave and Wenger 1991; Manzanilla 2015b). Specifically, I explore (1) how group identity was expressed (actively and passively) in the technological and visible style of domestic structures; (2) cultural diversity within the community as indicated by the ceramics deposited during and after structure abandonment; and (3) whether the Mississippian and Late Woodland peoples of Aztalan actively collaborated on the design and construction of their palisade walls. Together, these lines of inquiry address how group identities were expressed and manipulated by the diverse peoples of Aztalan at the household and community levels in daily practice and communal activities.

1.1 Theoretical and Archaeological Overview

1.1.1 Identity, Style, and Learning Communities

Ethnic identity and ethnic groups are the focus of this research because they are often defined as being based in part on perceived common origins, history, homeland, and shared material practices (Barth 1969; Jones 1997; Keyes 1976; Manzanilla 2015b), which are typically different between migrants and locals. Additionally, ethnic groups are observed on the basis of perceived differences with others, which are likely to be clear in cases of migrant and local interaction (Barth 1969; Emberling 1997; Jones 1997; Rothman 2015). I argue that these qualities make ethnic identity and ethnic groups identifiable archaeologically when material practices and geographic origins are distinctly different — such as at Aztalan, where Mississippian material culture linked to the American Bottom and elsewhere in Illinois is found

alongside Late Woodland material culture local to southern Wisconsin and northern Illinois (Figure 1.1). So, throughout this dissertation I use the terminology "Mississippians" and "Late Woodland peoples" to refer to people who 1) left behind distinctive artifacts associated with the Mississippian and Late Woodland archaeological traditions, and 2) had geographically distinct ancestries and homelands. In this way, I use "Mississippians" and "Late Woodland peoples" to refer to inferred ethnic groups as well as archaeological cultures (Mississippian and Late woodland terminology is discussed further in Chapter 3).

Ethnic differences are a common source of discord and conflict in migrant and local interactions and can strongly influence the development of a community (Barth 1969; Burmeister 2000; Cameron 2013; Emberling 1997:304; Herr and Clark 1997; Lyons et al. 2008; Milner et al. 1991; Morey 1975:296-297; Stone 2003:54-58; Upton 1996). For example, political factioning often occurs along ethnic and cultural lines (Barth 1969; Burmeister 2000; Upton 1996). Migrants and their descendants may unite along the lines of their shared identity for security or other strategic purposes, but reinforcement of their "outsider" identity only perpetuates differences. Therefore, an emphasis on material culture that signals outsider identity in multi-ethnic contexts should be detrimental to integration. Put another way, integration in one or more aspects of life is dependent on how a migrant group represents themselves within their new community and how willing they are to manipulate signals that may publicly identify them as outsiders, like the style of their material culture (Kroskrity 1993; Rothman 2015; Spence 2005; Stone 2003:50-54). *Style* (involving the choice to do things in a particular way [Hegmon 1992:517-518]) includes highly-visible attributes like external appearance ("visible style") as well as other attributes that have limited visibility and are more hidden or even invisible in a finished object ("technological style"; Dietler and Herbich 1998; Hegmon 1992; Stark 1998;

Wiessner 1983, Wobst 1977). Both kinds of style can communicate information about the producer or user, but highly-visible attributes have greater potential to do so than low-visibility ones which may be seen by a limited audience – or possibly only during deliberate archaeological analysis (e.g., Doumani 2014; Gorogianna *et al.* 2016; Minar 2001; Minar and Crown 2001; Stark 1999; Stark *et al* 2000).

Thus, migrants may choose to express their identity privately and/or by manipulating their visible style to resemble that of locals, thereby minimizing the perceived distinction between the groups (Kroskrity 1993; Lyons et al. 2008; Stone 2003:50-54). The most likely signals of identity for a migrant group to manipulate are those that most strongly communicate outsider affiliation and those that are relatively easy to change. Two examples are adopting local pottery design styles and living in houses that externally conform to the local style (Alt and Pauketat 2011; Bowser 2000; MacEachern 1998; Stone 2003; Voss 2005; Wiessner 1983; Wobst 1977).

Pottery and Domestic Structures

Pottery is visible to different members of the community depending on the context of use. Utilitarian pottery that is used in mundane activities of daily life might be seen only by family members, working groups, or close neighbors, whereas vessels intended for special events might be seen by larger groups or visitors (Bowser 2002; Bowser and Patton 2004; Mills 2007). Ceramics play a central role in interaction involving feasting or sharing of food and drink, are containers for exchanging goods, and are objects of exchange themselves. The decoration of pottery thus has great potential for communicating information in special settings, but vessel form can also be an aspect of visible style in mundane contexts where decoration might be absent

or minimal. For example, Hyer Plain pottery at Aztalan combines a Mississippian vessel form (Powell Plain) with “grit” (crushed rock) tempering technology that is usually associated with the Late Woodland tradition (Richards 1992:348-352; Stevenson et al. 1997; Figure 1.2). However, even though the visible style of mundane everyday pottery has potential to communicate information and thus is more like to be manipulated, it still has less communicative potential than vessels that are used in special circumstances or seen by larger or special audiences (Bowser 2000, 2002; Bowser and Patton 2004; Mills 2007).

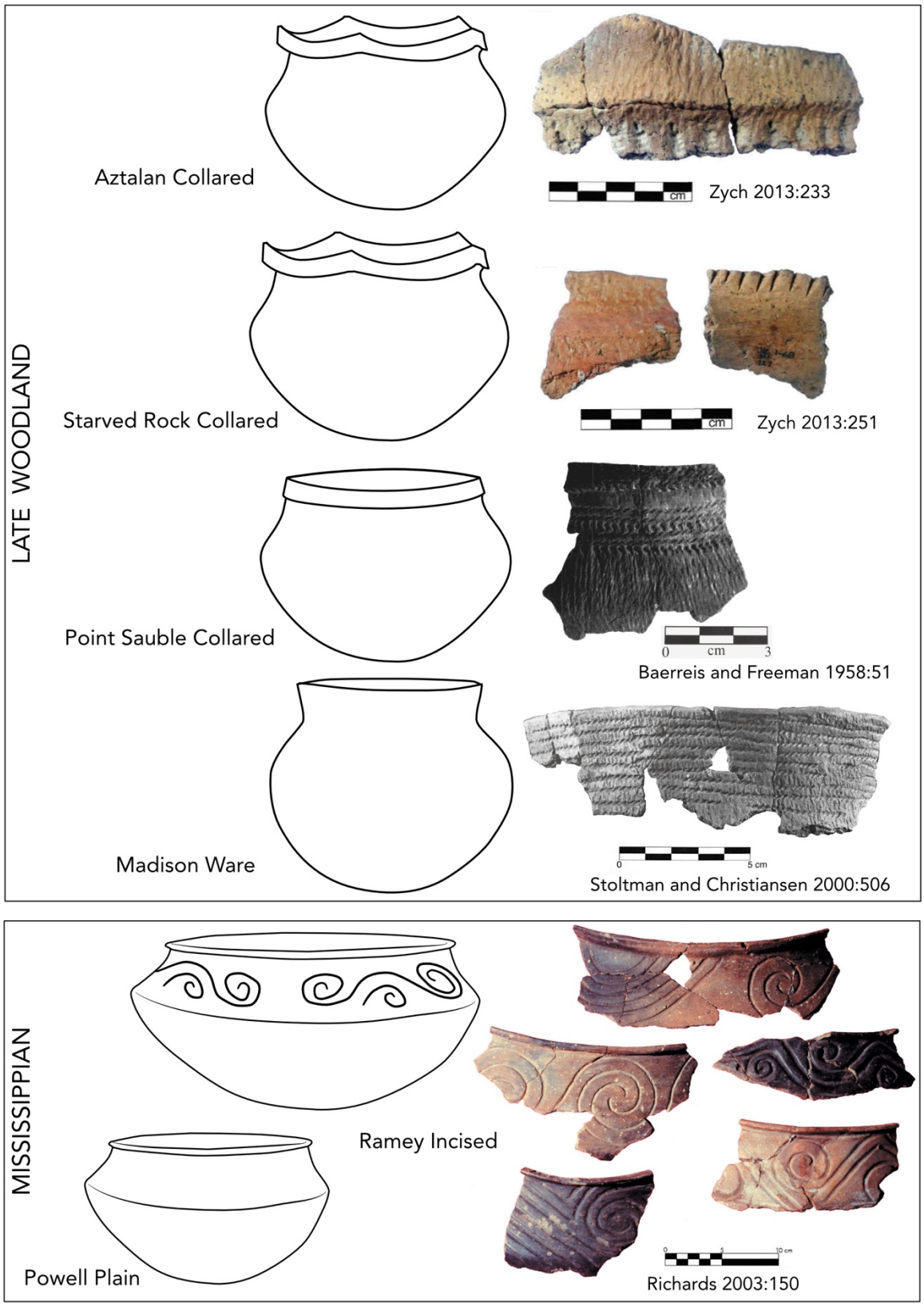


Figure 1.2. Comparison of select diagnostic Late Woodland pottery types found in southern Wisconsin and northern illinois and Mississippian jars from the American Bottom, ca. A.D. 1100-1200.

In some ways, domestic structures have greater potential to communicate information than pottery because they are larger (more visible), might be occupied for a number of years (and communicate stylistic information for the duration), and are associated with multiple individuals at once (a domestic unit). If residential structures are openly visible in a community (rather than hidden behind walls, for example) then aspects of visible style such as overall shape, roof type, exterior wall decorations, and entrance type have great potential to communicate information about the builders and/or occupants to all members of the community, especially when variation is present (Clark 2001; Deagan and Koch 1983; Voss 2005; Wiessner 1983:258; Wobst 1977:329). Another factor in architectural style is that builder-occupants might need greater foresight when making stylistic choices because their labor investment might make it prohibitively "expensive" to replace a structure unless absolutely necessary (for example, one experimental Mississippian-style structure required nearly 570 person-hours to construct, even with modern tools and excluding material transportation time [Blanton and Gresham 2007]). In comparison, the use-life of pottery vessels in many ethnographic groups is only one or two years, depending on the raw materials, production method, dimensions, and how they are used (Mills 1989; Schott 1996; Tite et al. 2001). The more frequently that pottery is replaced, the more opportunities there are for manipulating visible style and the less consequential those stylistic choices are. Therefore, if non-local peoples manipulate the visible style of their structures to match local styles it might indicate greater commitment to blending in among the local population. Visible style attributes of structures that are evident in the archaeological record in eastern North America include overall shape, wall type (rigid or flexed, which can sometimes be inferred through wall post diameter and spacing), and entrance type.

Material expressions of identity that are less likely to change in the context of interaction are learned behaviors expressed in early stages of the technological process. Learning develops through social interaction in communities of participants and usually involves interaction between novices and masters (Minar and Crown 2001; Lave and Wenger 1991; Sassaman and Rudolphi 2001). The "technological style" of an object reflects those behaviors developed in learning communities and includes particulars of the production process, such as the twist direction of cordage or the use of trenches or individually dug holes for erecting wall posts, that are not necessarily determined by physical or technical limitations but instead are passed through generations of masters and learners as the "correct" way something is done (Gorogianna 2016; Lemonnier 1992; Minar 2001; Minar and Crown 2001; Wiessner 1983; Wobst 1977).

Private, hidden, or "low-visibility" attributes that may not be visible in a finished structure at (like construction methods and materials), have less potential to communicate information to the community as a whole (Dietler and Herbich 1998; Lyons et al. 2008; Schroeder 2011; Singleton 1995:125; Wiessner 1983; Wobst 1977). The low-visibility and low communicative potential of such attributes make them poor candidates for manipulation as a strategic choice or result of interaction, which in turn makes them useful for identifying migrants archaeologically (e.g., Clark 2001:6-22). Technological style attributes that are observable archaeologically in eastern North America include post diameter and spacing, wall construction method, foundation type, and floor preparation (Table 1.1).

Table 1.1. Architectural attributes of perishable architecture in the U.S. Midwest at the time of Aztalan's co-resident occupation (A.D. 1100-1200) that are analyzed in this dissertation. LW = Late Woodland, M = Mississippian, x = not useful for differentiating between Late Woodland and Mississippian architecture.

Variables	Style	LW	M	Qualitative Categories or Method of Measurement
Structure shape	Vis	Rect, ovoid, irregular	Rect.	*Rectilinear*, *ovoid*, or *other/unknown*
Foundation type	Tech	Single-set post	Wall-trench	*Wall-trench*, *single post*, *basin only*, *composite*, or *unknown*
Entrance type	Vis	Variable	Simple	*Extended*, *screened*, *simple*, *curled*, *other*, or *not visible*
Inferred wall type	Vis	Flexed or either	Rigid or either	*Flexed* (dia. <7.6 or possibly <11.4 cm., spaced <30.5 cm apart), *rigid* (dia. > 7.6 or 11.4 cm, spaced >25.4 cm apart), or *unknown*.
Mean wall postmold diameter	Both	x	x	Calculated by averaging the diameters of all postmolds associated with a structure with real mapped dimensions (indicated by measure marks at the postmold edges or by individually noted diameters, rather than postmolds that appear "sketched" around a center point). In centimeters. Can be used to infer above-ground architecture.
Mean wall postmold spacing	Both	x	x	The measured distance from the mapped center point of one postmold to the center point of the next adjacent postmold in the wall, repeated for every pair of adjacent postmolds, then averaged. In centimeters.
Mean wall-trench width	Both	x	x	Measured in centimeters at each trench's midpoint and averaged for the structure (Lacquement 2007; Schroeder 2011).
Footprint	Both	x	x	Indicator of structure size. Length times width for rectilinear structures, or π(L*W/2) for ovoid structures, in square meters.
Length	Both	x	x	Measured in meters along the longest axis of a structure from the center point of one wall to the center point of the opposing wall. (Lacquement 2007; Schroeder 2011).
Width	Both	x	x	Measured in meters along the shortest axis of a structure from the centerpoint of one wall to the center point of the opposing wall. (Lacquement 2007; Schroeder 2011).
Width:Length	Both	Variable	~0.5-0.6	Structure width divided by length, as an indicator of "square-ness" or "roundness."

Technological and visible style of a structure can reflect different, overlapping identities simultaneously, because the outward appearance of a structure can reflect one identity while construction method and internal layout reflect another (Beaudoin 2013; Croucher and Wynne-Jones 2006; Taube 2003). In the context of culturally-distinct architectural practices, migrants

and their descendants can hide their ethnic affiliation by manipulating the visible style of their domestic architecture. Their identities can still be expressed intentionally or unintentionally through a structure's technological style. The resulting structure can thus display contrasting identities simultaneously.

1.1.2 Population Coalescence, Palisade Walls, and Community Identity

A characteristic of many coalescent communities is the integration of previously-distinct groups through communal ceremonies and events and conformity to community norms (Adler and Wilshusen 1990; Arkush 2017; Birch 2012; Kowalewski 2014:117). These strategies for integration are especially important in times of crisis, when survival depends on successful coalescence; many coalescent communities are fortified (e.g., Arkush 2017; Birch 2010, 2012; Birch and Williamson 2013; Kowalewski 2014). Palisade walls are typically thought of as defensive fortifications (Emerson 2007; Keeley et al. 2007; Krus 2013; Milner 1999), but they can also serve other purposes and have other effects on a community that influence the ongoing process of coalescence (Birch 2012).

Collaboration on wall design and construction can link a coalescent population through shared memories and experiences and establish enduring, common ties to the physical place that result in new, group identities at the moment of construction and over time (Canuto and Yaeger 2000; Cobb and Butler 2006, 2017; Cobb and King 2005; Cohen 1985; DeMarrais et al. 1996; Inomata 2006). Walls can also result in the formation of communal identities by differentiating interior residents from outsiders ("Us" versus "Them"; Kenzle 1997; Raffield et al. 2016), especially when the palisaded community is located in an area of culturally-different populations like in a hinterlands or frontier. Those inside the walls, even if they are culturally diverse, can all

share a common identity as members of the community even if other differences exist. Walls also symbolize political, economic, ideological, and military power and communicate simultaneous messages about the community as a whole (Schroeder 2006; Smith 1999, 2000). The presence of the walls suggests community solidarity to outsiders, and outsiders may ascribe identities to the residents based on the presence of walls and their external appearance. Thus, the presence of walls and the act of their construction can unite a coalescent community and shape their identities over generations.

However, walls also have the power to create and maintain divisions between migrants and locals: If migrants are pushed to the community's margins it might mean living outside of the walls, whereas the outskirts of an unwalled town may have a less obvious separation. In this way, a wall can be a very visible reminder of the differences that exist within a coalescent population. Given the "insider-outsider, "us vs. them" dichotomy created by a wall, migrants' acceptance into the interior, when they want it, is thus a significant factor in their successful integration.

1.1.3 Inter-ethnic Interactions at Aztalan, Wisconsin

The bastioned palisade walls at Aztalan resemble typical Mississippian constructions in terms of post size and bastion style (Iseminger 1990; Krus 2013; Lewis et al. 1998; Milner 1999; Schroeder and Goldstein 2016). When combined with the site's platform mounds and apparent community layout around a central plaza, it is understandable that Aztalan is routinely considered a "Mississippian town" (Barrett 1933; Birmingham and Goldstein 2005; Goldstein and Freeman 1997; Richards 1992; see Schroeder and Goldstein 2016 for a critique of previous interpretations). However, there is also substantial evidence of Late Woodland peoples at

Aztalan, and co-residence of both archaeological cultures is evident in material culture as well as in strontium isotope values of human bone (Baerreis and Freeman 1958; Barrett 1933; Christiansen 2003; Goldstein 1991; Goldstein and Gaff 2002:105; Price et al. 2007; Richards 1992, 2003; Stoltman 2001). Excavations in 1984 revealed a refuse midden in which the oldest strata (radiocarbon dated to the ninth century A.D.) contained only Late Woodland pottery, while more recent (ca. A.D. 1100) intact layers contained Late Woodland and Mississippian pottery mixed together. These findings have been interpreted as indicating that Aztalan was initially occupied by Late Woodland peoples who were later joined by Mississippians sometime between A.D. 1050 and 1100. The two groups co-resided until A.D. 1250 when the site was abandoned (Birmingham and Goldstein 2005; Christiansen 2003; Goldstein 1991; Richards 1992, 2003; Richards and Jeske 2002; Richards and Picard 2013; Richards et al. 2012).

Cahokian pottery styles (Richards 2003), clays sourced to the American Bottom (Porter 1966; Stoltman 2001) and strontium isotope values of human bones and teeth consistent with levels in the American Bottom (Price et al. 2007) all support the argument that strong connections existed between Aztalan and Cahokia. Moreover, at least some of the people interred at the site migrated or had their remains brought from another as-yet unidentified area (Price et al. 2007). These lines of evidence, when considered alongside numerous other examples of Mississippian intrusion into areas of Late Woodland populations (Chapter 3), support an inference of a Mississippian diaspora.

Despite the abundance of material evidence that supports the key role of migration in the formation of Aztalan as we know it, in-depth investigations into the consequences of Mississippian migration to the site have been limited and are reliant on a model of passive "Mississippianization" of the Late Woodland peoples (Christiansen 2003:1; Birmingham and

Goldstein 2005:46; Krause 1985; Richards 1992:120, 386, 2003:146). The popular Mississippianization concept cites Mississippian expansion, proselytism, and diffusion of ideas and material culture as the sources of Late Woodland culture change (Bardolf 2014:73-76) and emphasizes Mississippian culture while minimizing the agency of Late Woodland actors. This unidirectional model relies on and emphasizes the differences in social complexity between Mississippian and Late Woodland societies, which resembles other models of asymmetrical culture change based on acculturation and colonization (Silliman 2005; Stein 2002). The alternative possibility that Mississippians and Late Woodland peoples jointly and actively participated in their community at Aztalan has only been explored in detail recently (Zych 2013).

A shift away from asymmetrical models that emphasize a culturally dominant role for Mississippians at Aztalan is further supported by ceramic assemblages from across the site: shell-tempered vessels comprised between 20% and 50% of site-wide ceramic assemblages (Christiansen 2003:219-223; Richards 2003:146-147). Mixed ceramic assemblages from features across the site, and the presence of locally and nonlocally born individuals interred side-by-side within the northwest mound (Figure 1.1), are also inconsistent with scenarios in which the Mississippians enslaved or conquered locals, or vice versa (Price et al. 2007; Richards 2003; Sanjek 2003:321-323; Zych 2013; Alt 2008).

I explore an alternative perspective that Mississippian migrants at Aztalan may not have been hegemonically dominant and that they would have been influenced by the Late Woodland peoples with whom they interacted in daily life. This perspective differs from many discussions of interaction that are framed around colonialism, acculturation, core-periphery relationships, and dominant-subordinate dichotomies (e.g., Peregrine 1992; Wallerstein 1974. For critiques, see Gosden 2004; Lightfoot and Martinez 1995:475-477; Silliman 2005; Stein 2002). Overall,

viewing Aztalan from this perspective gives greater agency to the Late Woodland peoples there by de-emphasizing the "Mississippianization" process. In this dissertation I explore the possibilities that Mississippian and Late Woodland peoples at Aztalan adopted some aspects of each other's cultures while other practices were more resilient to change.

1.2 Research Questions, Material Culture, and Hypotheses

1.2.1 Research Questions

I argue that Aztalan is a valuable case example of migration and is suitable for addressing my overarching research question: **Why are some migrants able to successfully integrate among culturally different local populations more easily than others?** Understanding the strategies employed by migrants to integrate is also especially relevant given the recent global crisis in which millions of Syrian migrant refugees have fled to Europe and the United States. Not unlike at Aztalan, they are incorporated into the local societies with varying degrees of ease.

My overarching question about the integration of migrants and locals and, over time, their descendants can be addressed more easily by focusing on two sub-questions: First, **does the visible style of domestic structures (as highly-visible, long-lasting focal points of daily life) play a role in the integration of migrants and their descendants among local people who may be culturally different?** It may be the case that the ability of migrants to integrate into their new communities is impacted by their similarity to the local peoples (Bloom et al 2015; Kroskrity 1993; Stone 2000, 2003). Alternatively, migrants can sometimes capitalize on their difference from locals to make novel contributions that aid their success (Batiuk 2013; Manzanilla 2015a). Second, **is there a relationship between integration (or lack thereof) and how the community physically portrays itself (such as through palisade walls and other monumental works)?** Community walls can potentially factor into integration through: (1)

collaboration in their design and construction, which creates shared memories and experiences (Canuto and Yaeger 2000; Cobb and Butler 2006, 2017; Cobb and King 2005; Cohen 1985; Inomata 2006)); (2) senses of shared identity created by the division of people living inside versus outside (Kenzle 1997; Raffield et al. 2016); or (3) through the visible style of the walls, which can communicate diverse messages that represents the community as a whole; Schroeder 2006; Smith 1999, 2000). Alternatively, if migrants are prevented from living within the walls, excluded from collaborating in the construction and design, or are exploited as laborers for wall construction, the potential shared identities would not develop; instead, animosity could hinder integration.

1.2.2 Late Woodland and Mississippian Houses, Palisades, and Pottery

I focus on domestic structures because their high visibility, longevity, and association with a domestic unit make them potentially powerful communicators of identity. If migrants choose to adopt local visible styles, it may reduce the degree to which they are viewed as outsiders. Conversely, maintaining the architectural practices of their homeland might remind their local neighbors of their migrant identity for the life of the building. Domestic architecture is suitable for studying cultural difference because in the U.S. Midwest, Mississippian and Late Woodland architecture exhibited distinct cultural differences.

Mississippian structures in the Midwest are typically semi-subterranean, rectangular with fairly straight, parallel walls and approximately 90° corners, lack complex entrances, and are constructed using wall-trenches (Figure 1.3; Alt and Pauketat 2011; Butler et al. 2011; Collins 1990; Conrad 1991; Davis et al. 2015; Emerson 1991; Lacquement 2007; Mehrer 1995; Pauketat 1998a, 2003; Pauketat et al. 2015; Wilson 2010). Wall-trench construction involves digging

linear trenches into which posts or possibly pre-fabricated walls are placed (Pauketat and Alt 2005). Walls built in this way are visible archaeologically as linear stains in the soil. Special L-, T-, and cross-shaped structures are found at some Mississippian sites, including Cahokia (Collins 1990; Pauketat 1998a) and, for example, Orendorf in the central Illinois River valley (Conrad 1991:124-125).

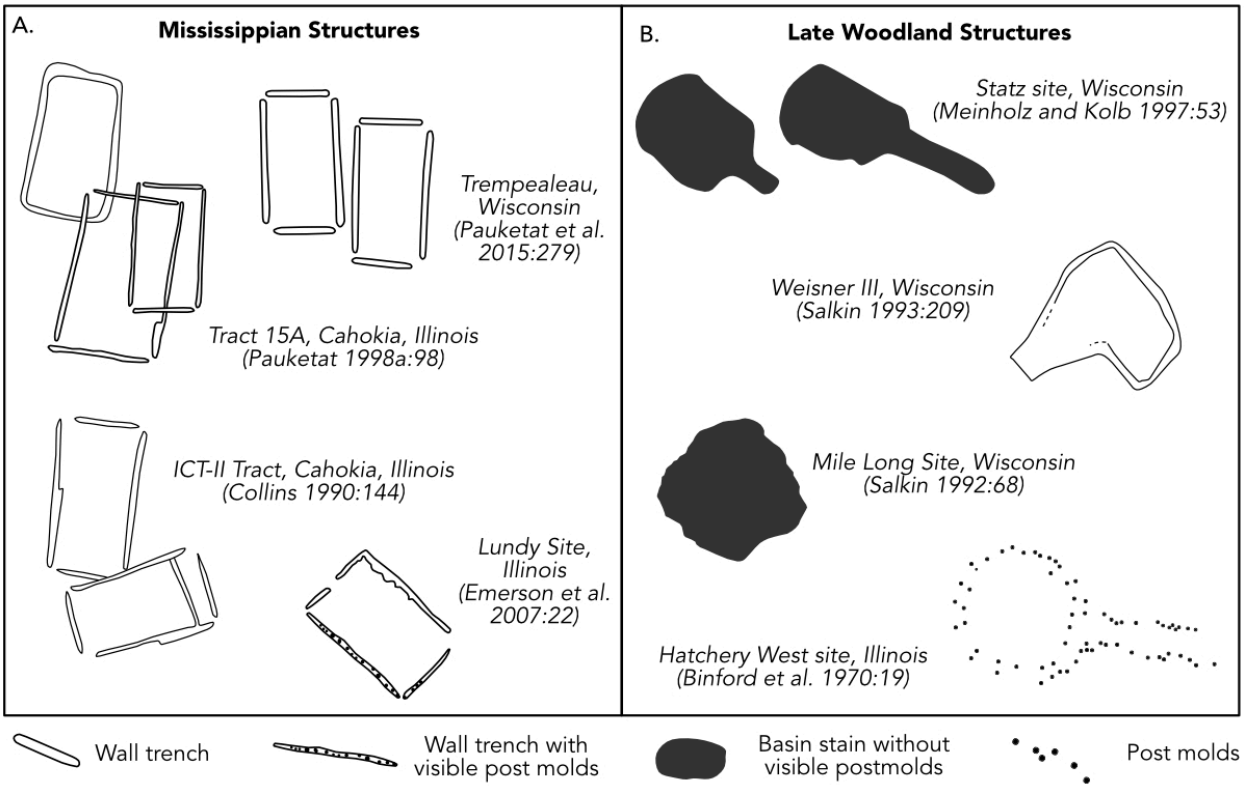


Figure 1.3. Representative Mississippian and Late Woodland structures in the Midwest. Note that single-set post Late Woodland structures are typically difficult to discern, so the clearest examples are identified as basins or, in a few cases, wall-trenches that leave more visible soil stains. Numerous other examples are cited in the text.

In contrast, Late Woodland structures in the Midwest vary in shape — often within the same spatio-temporal context – and include rectangular, ovoid, circular, and irregular forms. Many have extended entryways of varying lengths that form a “keyhole” shape (Figure 1.3; e.g., Binford et al. 1970:79-81; Butler and Wagner 2000:695; Fortier and Jackson 2000:134-136;

Green and Nolan 2000:362, 363; Holley 2000:156; Meinholz and Kolb 1997:Figure 6.2; Redmond and McCullough 2000:648; Salkin 2000:527, 530-532; Schroeder 2002:23). They are typically semi-subterranean and most exhibit "single-set post" construction, in which posts or poles are erected into individually-prepared holes. Some are defined only by a basin stain. Thus, the patterned cultural differences between Mississippian and Late Woodland architecture makes structures useful diagnostic indicators of the two cultural traditions. Because Mississippian people at Aztalan may have come from the American Bottom rather than southern Wisconsin or northern Illinois, the two architectural traditions originated in learning communities that were quite separate geographically. That separation makes it unlikely that the Mississippian and Late Woodland populations at Aztalan would have shared architectural practices prior to their co-residence. It further strengthens the usefulness of technological style for differentiating between architectural traditions there. While my sample size of 34 non-moundtop structures is small, it represents nearly a century of investigations. Despite the long history of investigations, I estimate (based on the known locations and sizes of all excavations) is that less than ten percent of the residential area and less than one percent of the "plaza" have been excavated to date.

Like domestic architecture, Late Woodland and Mississippian palisade walls have regionally patterned differences (Krus 2013; Milner 1999:118-120). Non-Mississippian palisades across the Upper Midwest and Northeast were generally lightweight screens constructed with small posts (average <15 cm diameter), lacked bastions, and enclosed a high-density community (Milner 1999:118-120; Salkin 2000; Stevenson et al. 1997:175-176). Late Woodland palisades in southern Wisconsin follow this patterns and were constructed using single-set posts (Finney 1993; Salkin 1993, 2000). In contrast, Mississippian palisades in the southeast and Midwest were built from larger diameter posts (average >15 cm diameter), were studded with regularly spaced

bastions, featured well-designed defensive entrances, and enclosed residential, extensive public, and ritual spaces (Conrad 1991; Iseminger 1990; Keeley et al. 2007; Krus 2013; Lewis et al. 1998; Milner 1999:118-120). Cahokia had palisaded "compounds" that enclosed small residential spaces as well as large palisades that surrounded the city center (detailed in Chapter 3). Both use-cases utilized large posts (20 cm and greater) set into wall-trenches.

Palisade wall architecture might also tell about the identities of its builders, though at a different scale from that of domestic structures (at the community level rather than at the level of individual households). Palisade walls can serve a variety of purposes, including strategic defense, controlling access, maintaining privacy, and communicating power and identity (Schroeder 2006), and variation in wall design can result from those functions. However, in a multi-ethnic context where people might have different ideas about palisades, the chosen design might also indicate control by one group or an intention to send a particular message (or express a specific identity) to other groups on the landscape. Joint participation in wall construction by diverse peoples would help form identities by creating shared memories and experiences that might persist among descendants as stories (Canuto and Yaeger 2000; Cobb and Butler 2006; Cobb and King 2005; DeMarrais et al. 1996; Inomata 2006). The palisade walls at Aztalan have been extensively documented and the outer walls appear to have been nearly completely exposed (Barrett 1933; Hurley 1977).

The third line of evidence I rely on, pottery, also differed between Mississippian and Late Woodland traditions. Mississippian pottery at the time of Aztalan's co-resident occupation (A.D. 1100-1200) was primarily tempered with crushed mussel shell while Late Woodland pottery was grit-tempered. Mississippian pottery in the American Bottom and to the north was produced in a variety of forms, but the most abundant forms at the time of Aztalan's occupation were jars with

sharp angled shoulders, inslanting rims, and incised motifs (if not plain). In contrast, Late Woodland vessels were mostly globular jars with straight or thickened ("collared") rims decorated with cord impressions and/or notches. A number of Late Woodland pottery styles are found at Aztalan and across southern Wisconsin and northern Illinois, with some primarily found in areas of Wisconsin and others primarily found in Illinois (Kelly 2002). Despite stylistic differences in decoration and some morphological attributes, Late Woodland pottery types at the time of Aztalan's occupation and during the centuries before and after (ca. A.D. 700-1300) are recognizably similar to one another and are noticeably different from Mississippian jars at the time of Aztalan's co-resident occupation (ca. A.D. 1100-1200). Given the relatively straightforward nature of differentiating Mississippian and Late Woodland tempering agents, I rely on the temper identifications of others for excavations not conducted by the University of Wisconsin-Madison in 2015 and 2016 (Chapter 4). My reliance on temper, as an aspect of technological style, reduces potential variability (especially in regard to hybrid pottery) and constrains my view into a dichotomy of Mississippian vs. Late Woodland. However, given the fundamental differences in the use of grit- and shell-tempering by Mississippian and Late Woodland populations at the time of Aztalan's occupation, temper type is still useful for differentiating Mississippian and Late Woodland learning communities.

These differences in technological and visible style are used in part to define the traditions (Baerreis and Freeman 1958; Griffin 1949, 1967; Kelly 2002; Richards and Jeske 2002; Schroeder 2004; Stevenson et al. 1997), which has made it all too easy to conflate archaeological pottery styles with distinct peoples and identities (Conkey 1990). When ceramic styles are geographically separated and thus likely originate in distinct learning communities it is reasonable to accept that the different styles do represent real and independent cultures or ethnic

groups. When those different styles are well represented in the same archaeological contexts, and they represent both local and non-local origins, it might indicate co-residence and migration, especially when the cultural or ethnic groups are also represented by non-portable kinds of material culture like domestic architecture (Cameron 1995; Clark 2001; Stone 2003; Zedeño and Triadan 2000).

1.2.3 Hypotheses

The patterned differences between Late Woodland and Mississippian structures, pottery, and palisades and their geographically distinct origins make them useful diagnostic indicators in multi-ethnic contexts like Aztalan. Domestic structures are also useful for investigating social group diversity within a community because technological and visible styles can reflect complex and overlapping identities. Therefore, I propose a null hypothesis and three alternative hypotheses about domestic structures, palisades, and pottery at Aztalan, how interactions might have affected material culture, and vice versa:

My **null hypothesis** is that co-resident migrants and locals and their descendants maintained independent practices in everyday material culture that reflect their distinct learning communities, including the visible styles of their material culture. Visible and technological styles will align and correspond with their respective cultural practices. Maintaining independent practices in everyday life would foster the resilience of distinct cultural traditions over time, limiting the potential for hybridization and the transformation of identities and hindering long-term integration (Deagan 1990; Lightfoot and Martinez 1995; Lightfoot et al 1998; Stone 2003). This null hypothesis would be supported by archaeological evidence that Aztalan's palisade walls were either strictly Mississippian or Late Woodland in their design and construction, by

domestic structures that demonstrate separate Mississippian and Late Woodland traditions, by the spatial separation and co-association of Mississippian pottery with Mississippian structures and Late Woodland pottery with Late Woodland structures, and lack of hybrid forms of material culture.

Alternatively, if migrant and local descent groups transformed and blended their traditions and created new, shared identities, I would expect evidence of blended practices in everyday material culture and in the physical formation of the community. I propose three **alternative hypotheses** to specify these expectations for each form of material culture:

1) If migrants sought to reduce their appearance as outsiders, then they should have adopted the visible styles of local architecture to blend in to the community. Simultaneously, the technological style of migrants' architecture would be maintained because it is primarily influenced by their socially and geographically distinct learning communities.

2) If the community formed through the coalescence of people from different cultures, then palisade walls should reflect shared participation because they are intensive construction projects at the community-level and key components in the physical dimensions, layout, and appearance of a walled community.

3) If migrant and local households were spatially intermingled in the community, then refuse of daily practice in abandoned house basins (including pottery) should be include mixes of migrant and local technological styles.

I focus on these three alternative hypotheses because (1) these forms of material culture have potential to reveal information about identity at Aztalan but have not been used in these ways before; (2) the entire sample (albeit small) of domestic structures has never been fully

analyzed; and (3) the fine details of palisade design and construction have not been fully studied. Other alternative hypotheses are also possible and might include changes to architectural hybridity over time, collaboration in mound construction (though, Zych [2013] has argued this alternative hypothesis is supported based on his research on the Northeast Mound), identifying the integration or segregation of local and non-local burials through mortuary data like grave goods or strontium isotope analysis. I exclude these other possible hypotheses because of a lack of fine temporal control at Aztalan, the large areas of the site that have not been excavated, and challenges related to mound excavation.

1.3 Overview of Chapters

In this chapter I asked why some migrants are able to successfully integrate among culturally different local populations more easily than others. I introduced the theoretical framework that is the foundation of my dissertation: in the context of interaction, the observable differences between migrants and locals (and their descendants) hinder integration, but by manipulating visible style, those perceived differences can be reduced. Simultaneously, migrants may maintain technological styles developed in learning communities in their ancestral homelands. One possible result is that technological and visible styles contradict. The physical appearance of their community, especially that of palisade walls, can also create and reflect shared group identity. Over time, as diverse peoples interact and are exposed to each other's beliefs and practices, blended traditions, material hybridity, and new identities can emerge. I use the Aztalan site as a case example for examining style, integration, hybridity, and identity because the intermingling of Mississippian migrants and local Late Woodland peoples there is well established but not well understood.

Chapter 2 details and weaves together theoretical frameworks of material style, identity, migration and interaction, and community formation to form a basis for my argument that the interactions between diverse peoples at the time of migrant arrival and between their descendants over time are influenced by how identity is expressed. Specifically, I examine how identity expressed through domestic architecture impacts integration and the relationship between integration, group identity, and how the community physically portrays itself. I hypothesize that migrants and their descendants adopt the visible styles of local architecture while simultaneously maintaining the technological styles of their homelands, that those houses will be spatially intermingled, and that the physical appearance of a pluralistic community reflects shared participation by diverse peoples. These alternative hypotheses describe a scenario of hybridization, integration, and formation of new long-term community identities.

Chapter 3 presents the culture histories of southern Wisconsin and northern Illinois, and the American Bottom of southwest Illinois between approximately A.D. 700 and 1300 to provide context for the cultural traditions represented at Aztalan. Late Woodland populations in the area around Aztalan exhibited temporal and spatial variation which complicate our understanding of their social groupings. In the American Bottom, a number of gradual changes occurred over the span of several hundred years before the rapid appearance of the Mississippian phenomenon at A.D. 1050, centered around the massive population and ceremonial center at Cahokia.

Differences in pottery, architecture, palisade design, and community layout, among others, make it possible to identify and distinguish between Mississippian and Late Woodland occupations archaeologically. The differences between many forms of Mississippian and Late Woodland material culture, especially houses, pottery, and palisade walls, make discerning them relatively easy archaeologically. The appearance of Mississippian material assemblages of

varying degrees of completeness in the "northern hinterlands" of Cahokia indicates the spread of Mississippian materials, ideas, and people out of the American Bottom (Emerson and Lewis 1999; Stoltman 1991b). A number of sites with evidence of Mississippian and Late Woodland interaction are summarized in terms of various "culture contact situations" (Stoltman 1986, 1991c, 2000). These are often explained using the "Mississippianization" concept, which asymmetrically emphasizes Mississippian culture (e.g., Bardolph 2014:73-76; Birmingham and Goldstein 2005:46; Christiansen 2003:1; Emerson 1991; Emerson et al. 2007; Goldstein 1991:224; Gibbon 1972; Harn 1991; Krause 1985; Millhouse 2012; Richards 1992:120, 386, 2003:146; Rosebrough 2010; Stoltman 1986; Theler and Boszhardt 2006; Wilson et al. 2017).

In Chapter 4, I discuss how conventional interpretations of the Aztalan site have been guided and constrained by the long history of excavation there. The early focus on palisade walls and site organization led to Mississippian-centric narratives that have not been able to adequately reconcile the site's Mississippian appearance with its well-represented Late Woodland component (Schroeder and Goldstein 2016). Aztalan scholars have recognized this and other problems and have worked toward addressing them by revisiting longstanding interpretations (Goldstein and Gaff 2002; Richards 2003; Schroeder and Goldstein 2016). Excavations by the University of Wisconsin-Madison in 2015 and 2016 revisited interpretations about the walled division between the plaza and residential area and discovered the remains of at least six structures in an area of the site traditionally viewed as the plaza. This increases the number of known non-moundtop structures from 28 to 34, a 20% increase.

Chapter 5 describes my methods of testing my hypotheses using three complementary sources of data: 1) archival maps, documents, and reports from past excavations at Aztalan, especially large-format field maps, that include information on many of the structures and

palisades excavated to date; 2) samples of pottery assemblages from structures excavated by WAS, SHSW, UWM, and UW, which show whether refuse from different cultural groups was mixed at structure abandonment as would be expected if different cultural groups were not spatially separated; and 3) original fieldwork in 2015 and 2016, the first since the 1960s to explicitly seek out residential structures, provides new information about community layout, and provides assemblages that were recovered through systematic screening.

My methods for analyzing domestic architecture at Aztalan primarily relies on archival plan maps, documents, and reports, especially large-format field maps, for structures mostly excavated before 1970. I recorded fourteen variables for each structure, such as shape, foundation type, dimension, and postmold size and spacing that are aspects of technological or visible style. Using regional patterned differences for reference, I classified each structure as Mississippian, Late Woodland, or a hybrid according to technological and visible styles and by their combination. I also compiled temper types for samples of pottery excavated from 18 structures excavated by the Wisconsin Archaeological Survey, State Historical Society of Wisconsin, University of Wisconsin-Milwaukee, and University of Wisconsin-Madison to understand separation or intermingling of material culture during abandonment mode activities. In addition, I analyzed palisade wall design, construction method, and postmold diameter with the intention of identifying technological and/or design traits consistent with Late Woodland palisades and Mississippian ones. I calculate labor requirements and population estimates, based on palisade wall metrics, to enhance my interpretations of the community.

Finally, in Chapters 6 and 7, I synthesize my results, assess the plausibility of my hypotheses, draw several conclusions about Aztalan, and discuss how my results at Aztalan can inform my original research questions: Why are some migrants able to successfully integrate

among culturally different local populations more easily than others? Does the visible style of domestic structures (as highly-visible, long-lasting focal points of daily life) play a role in the integration of migrants and their descendants among local people who may be culturally different? And is there a relationship between integration (or lack thereof) and how the community physically portrays itself (such as through palisade walls and other monumental works)? These research questions are independent of time and location. My dissertation can thus be of broad anthropological interest in addition to making a useful contribution to Aztalan archaeology.

Chapter 2: The Intersection of Migration, Interaction, Identity, Community, & Material Culture

Interactions between migrants and locals and their descendants are influenced by their similarities and differences and by the ways their group identities are expressed and manipulated (Alt 2006a; Clark 2001; Herr and Clark 1997; Kroskrity 1993; Manzanilla 2015a). One way that expressions of identity, and the presence of diasporas, can be observed archaeologically is through the technological and visible styles of material culture (Alt 2006a; Batiuk 2013; Beaudoin 2013; Clark 2001; Cook and Shurr 2009; Goldstein 2015; Hegmon et al. 2000; Herr and Clark 1997; Hill et al. 2004; MacEachern 1998; Spence 2005; Stone 2003). Technological style, the result of a craftsperson's series of production choices learned from previous generations, is commonly assumed to be resilient to change and can provide stable indication of social identity when those choices differ from those of another social group (Lave and Wenger 1991; Lechtman 1977; Lechtman and Merrill 1977; Lemonnier 1986; Minar 2001; Stark 1998, 1999). Visible style (such as decoration) can be manipulated to communicate certain messages for strategic purposes (Bowser 2000; Dietler and Herbich 1998; Weissner 1983; Wobst 1977, 1999:121). Besides the interaction of local and non-local people, style can also relate to other social categories like gender, kin groups, and political factions, as demonstrated by the relationship between pottery style and women's active political behavior in Conambo, a small egalitarian community in the Ecuadorian Amazon (Bowser 2000, 2000; Bowser and Patton 2004).

The two forms of style can be contradictory: visible styles can be manipulated by migrants and their descendants to hide their difference from local peoples and their status as outsiders, while the technological styles of their material culture can betray their migrant

identity. The interrelatedness of style and identity thus plays an important role in migrant/local interaction and population aggregation and is valuable for examining the question of why some migrants are able to integrate more easily than other. Other factors that influence integration include (but certainly are not limited to) resource availability (Lyons et al. 2008; Neuzil 2005), economic relationships between migrants and locals (Batiuk 2013; Hantman 1990; Manzanilla 2015a), migrant group size relative to the local population (Cameron 2011:191; Cook and Schurr 2009; Stone 2000, 2003), willingness of migrants and their descendants to assimilate (Clark 2001), religious differences (Bloom et al. 2015), and pre-existing relationships.

At Aztalan, in southern Wisconsin, ceramic styles of different cultural traditions are found mixed together in some contexts and stratigraphic levels spanning a century, and platform mounds, palisade walls, and overall layout that give the site a very distinctive Mississippian appearance are consistent with the expectations of successful integration of migrants and locals. Mississippian migration to Aztalan from the Cahokia area in southwest Illinois is indicated by strontium isotope values of human bones and teeth (Price et al. 2007) and by pottery, much of which exhibits Cahokian styles and has been petrographically sourced to the Cahokia area (Porter 1966; Richards 1992, 2003; Stoltman 2001). The platform mounds and palisade walls at Aztalan, which have not been found elsewhere in southern Wisconsin, have also led archaeologists to suggest that the site is the product of Mississippian migration there (Baerreis 1958; Birmingham and Goldstein 2005). Mixed pottery types recovered from the intact upper strata of a refuse midden indicate that Mississippian migrants joined an existing community of Late Woodland peoples (Richards 1992). While the inference of Middle Mississippian migration to Aztalan is widely accepted (Baerreis 1958; Birmingham and Goldstein 2005; Christiansen 2003; Picard 2013; Price et al. 2007; Richards 1992, 2003; Rosebrough 2010; Zych 2013), the

interrelatedness of style, identity, and Mississippian/Late Woodland interaction is poorly understood. This means that my study makes a significant contribution to the scholarship on the ways Mississippian and Late Woodland peoples interacted and how Aztalan came to have such prominent Mississippian features.

The first part of this chapter is an expanded discussion of my theoretical frameworks: the interactions between people of local and non-local heritage, and style, identity, and material culture. I discuss the challenges facing migrants and their descendants and various factors and strategies for integration that influence interactions with people at their destination area, especially focusing on ethnic and other forms of group identity. I explain technological and visible style and how group identity may be reflected in the public and private/unconscious attributes of material culture. I explain my use of architecture to examine whether migrants and their descendants (identified through the presence of a foreign technological style) might manipulate the visible style of their domestic structures as a strategy for integration. I also examine how the architectural style of palisade walls can be used to explore the relationship between integration and the physical appearance of the community as a whole. The technological style of pottery in domestic refuse can also be used to infer intermingling or separation in structure abandonment and, by extension, cultural diversity in residential space in order to draw inferences about spatial integration. I connect these theoretical frameworks and discuss how the technological and visible styles of material culture, in the context of diversity, can impact integration. Over generations, interaction can result in blended traditions, hybridity, and new identities. In the second part of the chapter, I outline my research questions about how material culture and identity relate to integration and the strategies employed by migrants, present testable

hypotheses based on those research questions, and describe archaeologically observable expectations for each hypothesis.

2.1 Migration, Interaction, Community Formation, Style, Identity, and Material Culture

Migrants and locals have different origins, history, homelands, and material culture. Differences like these are typically the basis of observed ethnic boundaries in the modern world (Barth 1969; Keyes 1976) and are inferred for the ancient world (Emberling 1997; Jones 1997; Manzanilla 2015b; Rothman 2015). Because migrants are often disadvantaged among locals at their destination area, partially because of their status as outsiders, perpetuation of those cultural and ethnic differences can be counter-productive to successful integration (e.g., Stone 2003). However, migrants can successfully integrate in some aspects of life while maintaining their differences in other ways, so partial independence does not preclude integration (e.g., Batiuk 2013; Goldstein 2015; Stone 2013). One strategy for integration is for migrants to reduce apparent differences by portraying themselves in ways familiar to locals, such as by manipulating the public, visible style of their material culture to match that of locals. Simultaneously, low-visibility attributes of material culture are more likely to be resistant to change because they often result from unconscious production choices passed down through generations in learning communities (Lave and Wenger 1991; Minar 2001; Minar and Crown 2001; Stark 1998, 1999), and can thus be more revealing about identity than high visibility style in some cases. In this section I explain these theoretical frameworks in greater detail and how they relate to three kinds of material remains that archaeologists use as diagnostic indicators of different archaeological cultures – domestic structures, pottery, and palisade walls.

2.1.1 Migration, Interaction, and Community Formation

Migrants are individuals or groups of people who permanently or temporarily move their residence from one geographic location to another, resulting in changes in their social circumstances and environmental context (Anthony 1990; Burmeister 2000; Rouse 1958; Sanjek 2003). Migrations can vary in distance, duration, group size, complexity, reason, and willingness, and each of these factors impacts the people who move and their interactions with others (Alt 2008; Anthony 1990; Burmeister 2000; Cameron 2011; 2013; Sanjek 2003). For example, migrants who leave their homes as refugees are typically disadvantaged (Bloom et al. 2015; Cameron 2013), while people who relocate as part of a colonizing force are typically in positions of power (e.g., Giovas and Fitzpatrick 2014). Likewise, "local" and regional migrations in which people move around a small area frequently and are able to maintain many of their social networks (Smith 2014) differ greatly from long-distance migrations in which immigrants may effectively cut all ties with their homeland. Limiting the definition to cases that result in changes to social circumstances and geographic context focuses the definition on situations where diverse cultural groups interact, which would not be the case when a group moves to another location within their familiar cultural area. The place migrants leave at the start of their migration is their *homeland*, and the place to which they relocate is their *destination area*. *Locals* are the individuals or groups of people who already occupy the destination area when migrants, travelers, newcomers, etc. arrive there, and may have ancestral ties to the place going back many generations. Or, locals may have been relatively recent newcomers themselves.

Within the last several decades, migration and the interaction of local and non-local peoples has been studied with emphasis not just on identifying migrants archaeologically, but examining the consequences of migration, such as population coalescence, community

transformation, social and cultural change, and historical processes, to name a few applications (e.g., Alt 2006a, b; Anthony 1990; Arkush 2017; Batiuk 2013; Beaudoin 2013; Birch 2010; Birch and Williamson 2013; Cameron 2011; Cobb 2005; Cobb and King 2005; Crawford and Smith 1996; Curtis 2014; Fowles 2005; Goldstein 2015; Hakenbeck 2008; Lightfoot et al. 1998; Neuzil 2005; Pauketat 2003; Slater et al. 2014; Snow 1995; van Dommelen 2014; Zedeño and Triadan 2000). These lines of research have led to an understanding of the dynamic relationships between people in pluralistic communities and how those interactions yield new traditions, hybridized material culture, and transformed identities, especially over generations (Alt 2006a, b; Beaudoin 2013; Bernardini 2005; Deagan 1990, Lightfoot and Martinez 1995; Lightfoot et al. 1998; Meyers 2002; Voss 2005).

Investigating the long-term effects of migration on the migrants themselves as well as on the local people with whom they interact yields a problem of terminology, in that "migrant" and "local" inaccurately describe the locally-born descendants of actual migrants, especially over generations. *Diaspora* can be a useful term to refer to migrants and their descendants who maintain their cultural practices over generations. Various definitions and characteristics of diasporas have been summarized by Brubaker (2005) and include: (1) Dispersion across space from the homeland; (2) Orientation toward the homeland, such as maintaining ties to the homeland, keeping a collective memory or myth about the homeland, continuing to relate to the homeland in a way that shapes personal and group identity, and in some cases a desire to return to the homeland; and (3) The preservation of a distinctive identity in relation to people of local ancestry. Diasporas typically refer to situations in which the migrant population and their descendants live among a culturally-different population with local ancestry (Anthias 1998; Brubaker 2005; Sanjek 2003).

While some aspects of diaspora (myths, memories, identity, desires) are inferential in archaeology, Mississippian migration to Aztalan and dispersal throughout Cahokia's northern hinterlands (Chapter 3) generally fit the characteristics of diaspora. Some scholars have referred to the northward movement of Mississippian peoples out of Cahokia as such (e.g., Cobb 2005:567; Emerson and Hedman 2015:156; Millhouse 2012; Pauketat et al. 2017:208). Likewise, I conceptualize the Mississippian migrants and their descendants who maintained the material traditions of their homeland in terms of diaspora.

The definitions of migrants and diaspora above include *captives* – people who are unwillingly taken from their home societies and forced into new social groups (Cameron 2011:172). Captives are assigned social roles by their captors ranging from slaves to adopted individuals with full or near-full rights (Cameron 2008, 2011). Cameron (2011, 2016) argues from a wide range of data that captives were frequently women, were typically taken through raiding and warfare, and were present in many (if not most) prehistoric societies. Identifying captives archaeologically can be challenging because practices that signaled their ethnic identity would most likely be suppressed (Cameron 2011:192).

Even willing migrations are risky despite the fact that migrants often have existing social relationships with people already living in the places to which they move or some prior knowledge about resources or other opportunities that might be available (Anthony 1990; Burmeister 2000). The degree to which migrants and their descendants experience marginalization when they join an existing community is influenced by how they navigate social, political, and economic issues that may arise in dealing with the local people (Figure 2.1; Batiuk 2013; Burmeister 2000; Cameron 2013; Clark 2001; Hantman 1990; Herr and Clark 1997; Neuzil 2005:268-276). Immigrants often are relegated to living in physically or ecologically

marginal locations because they are targets of hostility (e.g., Stone 2003), were forced there because of resource stress (Lyons et al. 2008; Neuzil 2005), or simply found unoccupied space (Spence 2005). Migrant group size also plays a role in success because small minority groups are more easily absorbed into local communities and social networks than large groups with greater negotiation power and capacity to maintain the social structure and practices of their home regions (Cook and Schurr 2009; Stone 2000, 2003). Consequently, larger migrant groups often have more enduring expressions of their ethnic identities.

I define *successful integration* as the mixing of migrants and locals and their descendants in some way, that results from the migrant descent group achieving an assumed goal of establishing themselves among locals in at least some aspects of life. This includes merely coexisting peacefully in proximity to one another (spatial integration at a broad scale), even if little other interaction takes place between them. However, it is important to note that "success" is subjective; interaction can be experienced differently by different segments of a population, may be present in some aspects of life but not others, and can be difficult to quantify. Because my definitions revolve around migrants and their descendants achieving a goal of co-existence with locals, they do not include slaves or other captives who are forced to live among the local people, except in cases when they are given their freedom. *Unsuccessful integration* is defined by migrants or their descendants voluntarily leaving or being expelled from the destination area, or being killed, as a result of the interactions (or lack of interactions) with local populations. Again, "unsuccessful integration" is subjective and various kinds and degrees of marginalization can occur in both successful and unsuccessful integration (Cameron 2013; Herr and Clark 1997; Milner et al. 1991; Neuzil 2005; Stone 2003). Marginalization might be visible archaeologically as migrant material culture found restricted to community margins; skeletal trauma in migrant

individuals (identified as such through bone chemistry or associated material culture); or wealth inequality indicated through location in the community, house size, or valuable items (Bloom et al. 2015; Clark 2001; Hally 2008:500; Manzanilla 2015a; Stone 2000, 2003).

An inference of unsuccessful or weak integration might be seen archaeologically as the presence of some forms of marginalization, perhaps increasing in severity thought time, followed by disappearance of the migrant group from the archaeological record while signatures of the local population remain (e.g., Stone 2003). Successful or strong integration is indicated by evidence of material hybridization, spatial intermingling of migrant and local houses, a reduction in the use of foreign visible style (and the adoption of local ones), or evidence that the migrant group and their descendants occupy their destination area for some time. In these definitions *success* is from the perspective of willing migrants who, presumably, want to establish themselves among the local population. I acknowledge that the factors that impact integration are complicated. Groups can successfully integrate in one part of life and not others, and those integrations can change over time. Integration may be experienced differently by different segments of the population. As a result, determining successful integration is subjective and precisely ordering case examples from unsuccessful to successful may not be practical or even possible. It may be easier to broadly compare cases and discuss integration in very general terms or refer to specific aspects of life (Figure 2.1).

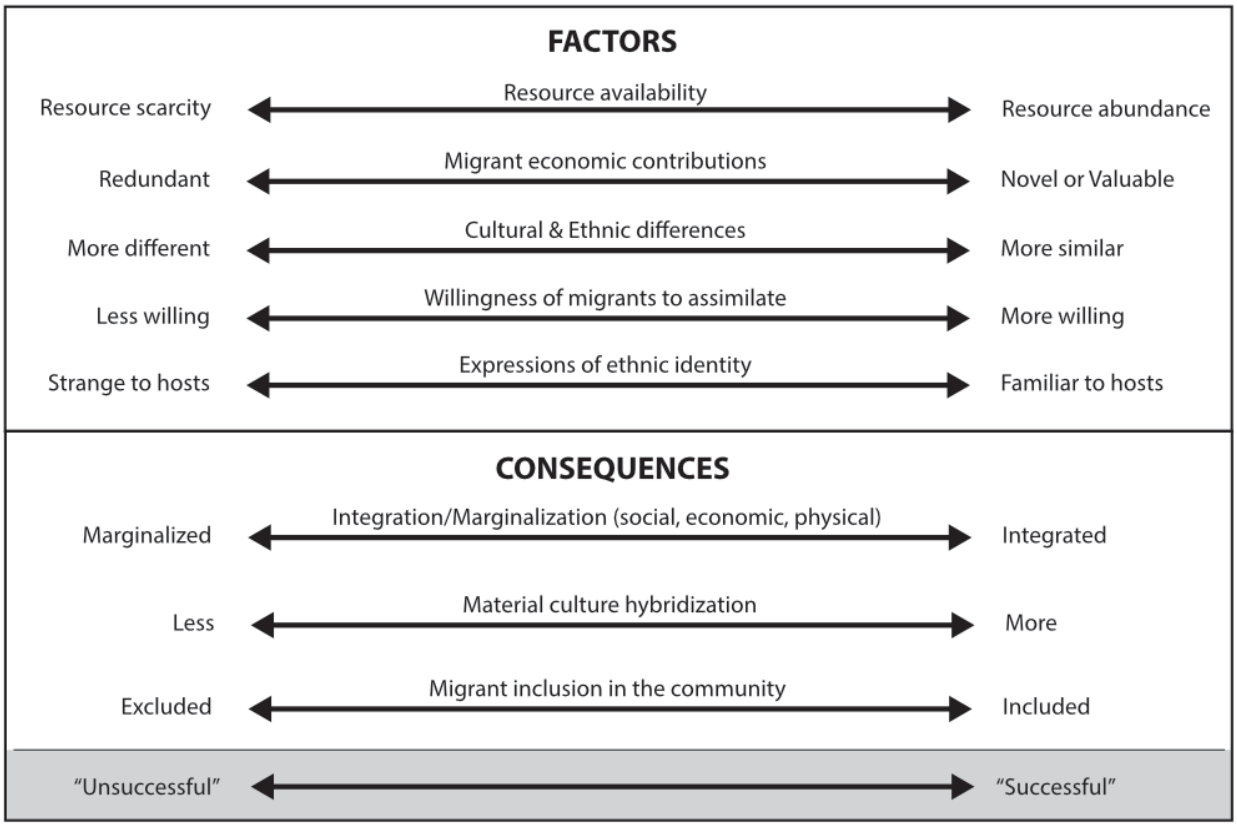


Figure 2.1. A selection of factors and strategies that influence the interactions between migrants and locals, the consequences of their interactions, and how they relate to integration.

Intermingled locals and migrants (willing and captive) are exposed to each other's material culture, practices, and beliefs. In these situations, practices and material culture are selectively appropriated (and selectively rejected) on each side of interaction (Beaudoin 2013; Deagan 1990; Dietler 2010; Peelo 2011). They are not unidirectional, but affect everyone involved. This perspective differs from acculturation models (Arkush 2000:194; Herskovitz 1958; Lewis 1984:1-2; Wallerstein 1974) where a "recipient culture" makes a directional shift toward that of the "donor culture" (Silliman 2005:65). Selective adoption maintains cultural continuity while simultaneously creating change, resulting in blended traditions. Silliman (2005) has argued that selective adoption can be a strategy for dealing with foreigners. Likewise, migrants may selectively appropriate aspects of the local culture (Beaudoin 2013). Even captives

have at least some effect on culture change by bringing novel technologies, ideologies, and social behaviors into their captors' society (Cameron 2011). Captives can best preserve aspects of their home culture, and potentially impart those practices onto their captors, when multiple captives from the same place remain as an interacting group (Cameron 2011:191).

Selective appropriation and rejection of different practices and material culture results in cultural blending and hybridization (Alt 2006a, b; Barth 1969; Blitz and Lorenz 2002; Burmeister 2000; Deagan 1990; DeAtley and Findlow 1984; Goldstein 2015; Green and Perlman 1985; Koldehoff and Galloy 2006; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Meyers 2002). Comparison of technological and visible styles in coalescent communities can reveal how diverse peoples appropriate each other's material practices and any identities expressed through them. In the context of inequality, any identities adopted by disadvantaged peoples (like captives and marginalized migrants) might show which social groups had greater power, lived more comfortably, or were subjected to less discrimination.

2.1.2 Technological Style, Visible Style, Identity, and Material Culture

Style and Learning

I use a comparative analysis of the *technological style* and *visible style* of domestic structures, pottery, and palisade walls to differentiate the material culture of migrants from locals and explore how identity is expressed through high-visibility aspects of material culture. Technological style refers to the material reflections of the *chaîne opératoire* (Lechtman 1977; Lemonnier 1986, after Leroir-Gourham 1943, 1945), the series of choices an object's creator makes during the process of production and design (Dietler and Herbich 1998; Dobres 2000; Ehrhardt 2005, 2013; Lechtmann 1977; Lechtman and Merrill 1977; Lemonnier 1986; Stark et

al. 2000). Those choices are the products of distinct learning communities and often are made unconsciously, and therefore may reflect social boundaries (Doumani 2014; Gorogianni 2016; Lave and Wenger 1991; Minar 2001; Minar and Crown 2001; Stark 1998, 1999). Visible style includes the more visible, often decorative, attributes of an object which, because they are more readily visible, have greater potential to communicate information about social groups, affiliation, and identity (Dietler and Herbich 1998; Weissner 1983; Wobst 1977, 1999). That information can be controlled by manipulating the visible style, which "allows people to surficially approximate others and thus hide their own individuality" (Wobst 1999:121). Visible style (and to a lesser extent, technological style) changes as a result of interactions as craftspeople participate in multiple communities of practice (Doumani 2014; Sassaman and Rudolphi 2001; Wallaert-Pêtre 2001). Technological style is more resilient to change than visible style because it often includes unconscious production choices that are passed down from generation to generation and has less potential to communicate information because it is less visible or even invisible in a finished object (Sackett 1990; Stark 1999; Stark et al. 2000). Because technological style is less prone to conscious manipulation, it is primarily determined by the multi-generational learning process and the interaction between novices and masters (Lave and Wenger 1991; Minar and Crown 2001; Stark et al. 2000; Wallaert-Pêtre 2001). Therefore, archaeologists commonly accept that technological style better reflects social boundaries such as ethnic identities than visible style does (Chilton 1999; Gosselain 1992; Sackett 1990; Stark 1999; Stark et al. 2000).

Identity and Ethnic Groups – An Archaeological Problem

Ethnic identity is only one type of innumerable identities a person may possess, but is the focus of this research because it is based in part on common origins, history, homeland, and is often expressed in shared material practices that originated in communities of practice and contribute to cultural continuity (Barth 1969; Jones 1997; Keyes 1976; Lave and Wenger 1991; Manzanilla 2015b; Minar and Crown 2001). It is "that aspect of a person's self-conceptualization which results from identification with a broader group in opposition to others on the basis of perceived cultural differentiation and/or common descent" (Jones 1997:xiii) – and so is as much about similarities as it is about differences. Further, *ethnic groups* are groups of people who recognize themselves to be, or are recognized by others, as sharing common origins and culture and who perceive similarities among themselves and differences with others (Barth 1969; Emberling 1997; Jones 1997:xiii). Recognizing ethnic groups archaeologically is problematic because, by definition, ethnic identity exists as a dynamic and situational recognition of differences by the people themselves, and those differences are not necessarily grounded in material culture. Relying on material culture to identify ethnic groups also conflates them with archaeological cultures (Conkey 1990), which are merely suites of material patterns recognized by archaeologists across space at a particular point in time (e.g., McKern 1939). Material indicators of ethnic identity are also problematic considering the flexibility of visible style and the ways it can be manipulated to change the message it communicates.

Yet, I argue that in cases of interaction, where the material culture and geographic origins of those people differ, they can be considered distinct ethnic groups for the purpose of archaeological interpretation. The fewer similarities between two groups, the more likely they

are to recognize themselves as different, and it is that recognition of similarity with some and difference with others that defines ethnic identity.

If visible style differs between migrant and local descent groups it may be noticeable or even very obvious and can thus draw attention to the boundaries between them; but the malleability of visible style means it is not necessarily a good indicator of those boundaries archaeologically. Ethnic groups might be more reliably identified through examination of technological style instead, so long as it differs between those groups. The low visibility of technological style means any identities reflected are less likely to be observed by people during an object's use, have less potential to communicate information, and are less likely to be manipulated. Because people have multiple, fluid, overlapping identities simultaneously (of which ethnic identity is only one), and because identity is partially self-ascribed, visible style can be manipulated to communicate identities that may contradict those reflected through technological style (Croucher and Wynne-Jones 2006; Haley and Wilcoxon 2005; Insoll 2007; Voss 2005). In this way material style is problematic for examining identity, but also can be informative of various simultaneous identities.

Structures and Identity

I focus heavily on how identity is expressed through the technological and visible styles of *domestic structures*, defined as a physical building composed of a roof and walls, within which activities required for everyday living take place, because of their high visibility in a community, longevity, and association with multiple people at once (a domestic unit). My usage of domestic structure is synonymous with a dwelling or house, and excludes other constructions that may be related to domestic actives, like granaries. A domestic structure is defined by its

architecture - the design, materials, and methods employed to construct the building - by the activities that take place in it such as cooking, sleeping, tool production, and other activities related to everyday life, and can be recognized archaeologically by size, spatial layout, and associated material culture of everyday life. Archaeologically, domestic function of a structure can be inferred on the basis of size, architectural style, and associated domestic artifacts.

The technological style of a structure might include its method of construction, raw material preferences (when not externally visible), floor preparation, and size and dimension. Internal organization and features are also low-visibility expressions of identity in the sense that their visibility is restricted to those with access to the structure interior, which limits their potential for communicating information externally (Beaudoin 2013). Because low-visibility attributes have less potential to publicly communicate information and reflect the learning communities of their builders, they can be useful for identifying non-local people archaeologically (Clark 2001:6-22). The technological style of domestic structures has been used to identify migrants and their descendants in the uplands near, and associated with, Cahokia (Alt 2006a, b); in western Wisconsin (Pauketat et al. 2015); in the American Southwest (Clark 2001; Hill et al. 2004; Stone 2003); and at Teotihuacan (Spence 2005; Taube 2003), for example.

The visible style of a structure is most likely to include attributes that determine its external appearance such as shape, length/width proportion, entrance type, roof type, materials (e.g., wood vs. brick) and size (when it noticeably differs from other structures). Domestic structures are usually openly visible, so the visible style of a structure has great potential to communicate information to all members of the community (Clark 2001; Deagan and Koch 1983; Voss 2005; Wiessner 1983:258; Wobst 1977:329). Comparing high- and low-visibility

attributes of a domestic structure can reveal how identities expressed in public and private spheres may overlap and even contradict each other (Burmeister 2000).

Visible style attributes of structures that are evident in the archaeological record in U.S. Midwest include overall shape, wall type (rigid or flexed, as inferred through wall post diameter and spacing), and entrance type, while technological style attributes that are observable archaeologically include post diameter and spacing, wall construction method, foundation type, and floor preparation (Table 1.1). Interior features such as benches and screens (inferred from interior postmolds) and interior storage pits are also low-visibility because their visibility is restricted to those with access to the structure interior.

Pottery and Identity

Pottery can be ideal for examining technological and visible style because of the multi-stage production process, its malleability, and potential for decoration. Ceramic production is an additive process so a pot embodies many of the choices made in the production sequence, and those choices are the product of knowledge passed down from one generation to the next (Chilton 1999:2; Stark 1999). However, an individual vessel may not necessarily reflect the learned behavior of a single craftsperson. An object (or architecture) can be produced by multiple people at various stages, and as such would represent a collective body of knowledge shared by the social group rather than a single person's series of choices (Crown 2007). Identities expressed through these objects would also represent multiple people rather than a single individual.

Utilitarian pottery can reflect social boundaries better than non-utilitarian goods which are more likely to be traded or viewed and used in special contexts (Lightfoot et al. 1993; Stark

1999:30). The technological style of pottery, especially utilitarian pottery, thus may be the most resilient indicator of social boundaries like ethnicity, more so than visible style and special-use pottery (Stark 1999:42). The technological style of pottery includes attributes such as temper choice and production method (e.g., molded, coiled, or wheel-thrown), and the twist direction of cordage used for surface impressions (Hegmon et al. 2000; MacEachern 1998; Minar 2001; Peelo 2011; Sassaman and Rudolphi 2001; Sinopoli 1995:16-33; Stark 1999; Wallaert-Pêtre 2001). The visible style of pottery included high-visibility attributes such as rim form, vessel morphology, and external decoration or appearance (Bowser 2000; Croucher and Wynne-Jones 2006; MacEachern 1998; Rosebrough 2010:254-257).

The contradiction of technological and visible styles, and the information reflected and communicated through style, may actively and passively signal complex overlapping of multiple identities at multiple scales (Croucher and Wynne-Jones 2000). For example, Late Woodland pottery in Wisconsin is generally globular, grit-tempered, and with cord-roughened surfaces, but the contemporaneous Late Woodland types Madison Cord-Impressed and Aztalan Collared differ in their visible styles (rim forms and decoration) while they share technological style (grit-tempering). Their technological style makes them more alike than either is to Mississippian shell-tempered pottery. Hybrid pottery that combines the technological style (tempering agent) of one tradition with the vessel morphology and surface treatment of the other is found throughout the Midwest, including at Aztalan (e.g., Conrad 1991; Emerson 1991; Finney 1993; Richards 1992), which makes visible style by itself unreliable for identifying the cultural tradition of the potters in the context of multi-cultural interaction. For that reason, I rely solely on temper type to differentiate Mississippian from Late Woodland ceramic learning communities and work under the framework that temper choice, as an aspect of technological style, reflects a history of

learning within the associated cultural tradition. Circa A.D. 1100-1200 (the period of Aztalan's co-residence), Late Woodland pottery was typically grit-tempered and Mississippian pottery was typically shell-tempered. Likewise, I presume that the temper type of hybrid pottery reflects the learning community that utilized that temper type even though the external appearance may be more consistent with the other. Vessel morphology can also be related to function and use (Hally 1983), which is another reason that visible style may not be a consistent indicator of cultural affiliation.

As with other forms of material culture, the visible style of pottery can be manipulated to serve a specific purpose. Pots are routinely observed by small numbers of people in the mundane activities of everyday life, but can also be visible in the context of visitors, special events, feasts, and rituals. Pottery plays a central role in interaction involving feasting or sharing of food and drink, they are containers for exchanging goods, and are objects of exchange themselves. The importance of pottery in interaction means that adopting local pottery styles by immigrant groups would be a relatively easy way to blend in (MacEachern 1998:125). Spatial distributions of pottery recovered archaeologically can also be used to infer the residential patterning of local and non-local people by showing how domestic refuse from each group is distributed. Intermingled migrant and local pottery in local domestic contexts might indicate that they lived side-by-side or that one group replaced the other in rapid neighborhood succession, whereas spatially separated pottery might indicate that they lived in isolation from one another (and possibly that migrants were restricted to one area of the community).

Coalescence, Community Events, Palisades, and Identity

Group identities can also be created, changed, and reinforced at the community level – the social institution that generates and is generated by supra-household interaction in a particular place and time (Canuto and Yaeger 2000:5) – through shared participation in ceremonies and events, such as construction of monumental works (Adler and Wilshusen 1990; Birch 2012; Canuto and Yaeger 2000; Cobb and Butler 2006; Cobb and King 2005; Cohen 1985; Inomata 2006; Knight 1986). A characteristic of many coalescent communities is the integration of previously-distinct groups through communal ceremonies and events and conformity to community norms (Kowalewski 2014:117). For example, Adler and Wilshusen (1990) note the construction of Great Kivas at the time of population aggregation in Southwestern Pueblos, and Arkush (2017) argues that the architecture and layout of an Andean hillfort facilitated "social monitoring" and promoted conformity. Birch (2012) has argued that a fortified Iroquoian community was redesigned to eliminate longhouse clusters and create a central plaza following coalescence. These efforts to "make community" as strategies for integration are especially important in times of crisis, when survival depends on successful coalescence; many coalescent communities are fortified (e.g., Arkush 2017; Birch 2010, 2012; Birch and Williamson 2013; Kowalewski 2014)

Palisade walls are typically thought of as defensive fortifications (e.g., Emerson 2007; Keeley et al. 2007; Krus 2013; Milner 1999), but they can also serve other purposes. For example, walls can be used to control the flow of people and goods in and out (Kenoyer 1998). As resource- and labor-intensive monumental works, they symbolize political and economic power and can be means of legitimizing authority (Anderson 1994; Kim et al 2015; Schroeder 2006). The various functions and messages communicated by walls, including defense, do not

need to be mutually exclusive, such as in the Urartian empire of southwest Asia (ca. 750-600 B.C.), in which the military power and depoliticized sacredness of fortified outposts were communicated simultaneously (Smith 1999, 2000).

Walls can also result in communal identities for the people within. For example, monumental works that define the layout, boundaries, and appearance of sedentary communities, such as Mississippian palisade walls and platform mounds, provide ways for people to participate in the literal, physical formation of their community. The act of collaboration can help people of non-local heritage establish enduring, common ties to the physical place alongside local peoples (DeMarrais et al. 1996). The memories, experiences, and traditions created during such events unite the diverse participants despite their differences and identities like ethnicity, kinship, factions, and gender (Adler and Wilshusen 1990; Birch 2012; Brumfiel 1992). Using, viewing, and living in the midst of finished monuments may also instill new, shared identities upon the builders and their descendants that exist alongside or supersede old identities, including ethnic identity, facilitating integration in other aspects of daily life. On the other hand, being excluded from participation prevents those shared memories and senses of solidarity from forming. Coerced participation might create animosity, strengthen existing social boundaries, and create further separation. The high visibility and longevity of palisade walls would be a regular reminder of any resulting shared memories or group identities, or their absence, having enduring effects on a coalescent population over time.

Walls can result in communal identity by differentiating interior residents from outsiders ("Us" versus "Them"; Kenzle 1997; Raffield et al. 2016), especially when the palisaded community is located in an area of culturally-different populations like in a hinterlands or frontier. Those inside the walls, even if they are culturally diverse, can all share a common

identity as a member of the community even if other differences exist. However, walls also have the power to create and maintain divisions between migrants and locals: If migrants are pushed to the community's margins it might mean living outside of the walls, whereas the outskirts of an unwalled town may have a less obvious separation. In this way, a wall can be a very visible reminder of the differences between a diaspora and locals. Given the "insider-outsider, "us vs. them" dichotomy created by a wall, migrants' acceptance into the interior, when they want it, is thus a significant factor in their successful integration that could have lasting consequences for their descendants as well.

The presence of the walls suggests community solidarity to outsiders, and outsiders may ascribe identities to the residents based on the presence of walls and their external appearance. Because palisade walls are such prominent and visible features on the landscape and communicate diverse messages about the community as a whole (Schroeder 2006; Smith 1999, 2000), the visible style of walls at a culturally diverse community like Aztalan can shed light on community-level identities. These identities could exist at the time of wall construction (thus reflected in the stylistic choices about design), but they can also result from the sense of commonality held by all those living within the walls, from the shared memories created during collaborative construction, and from the messages communicated by walls about the community as a whole.

The potential for walls to shape group identity make collaboration in their design and construction a strong factor in integration and community formation, and at a larger scale than in domestic architecture at the household level. Coalescence is an ongoing process rather than a singular event (Birch 2012), and the effects that walls have on a diverse community endure

beyond the act of construction itself. Walls thus have the power to unite diverse peoples in the moment of their construction and shape their collective identity over time.

2.1.3 Summary of Theoretical Frameworks

As defined and discussed above, ethnic identity is an appropriate focus in researching the interaction between migrant and local descent groups because ethnic groups are based in part on perceived common origins, history, and homeland (Barth 1969; Jones 1997; Keyes 1976; Manzanilla 2015b), and are defined on the basis of perceived differences with others (Barth 1969; Emberling 2007; Jones 1997). If local and non-local peoples consider themselves to be culturally or ethnically different, ethnic differences expressed through the visible style of material culture are likely to be observed and emphasized during negotiations (Barth 1969; Wiessner 1983:258; Wobst 1977:329). In other words, when an ethnic group's identity is expressed through the visible style of their material culture, that identity becomes more obvious in the presence of people who are different. Additionally, political factioning is often along ethnic and cultural lines, which would also inhibit the integration of diasporas into the community (Barth 1969; Burmeister 2000; Upton 1996). Therefore, an emphasis on visible styles that signal ethnic differences can be detrimental to successful integration.

Migrants who put themselves at the mercy of locals, perhaps because of smaller group size or relatively low access to local resources and support networks, might be especially concerned with minimizing conflict. Types of migrants like in imperial expansion and conquest that utilize force to establish themselves are exceptions. For a migrant minority to successfully establish themselves it would be in their best interest to suppress signals that publicly identify them as being outsiders; in other words, to assimilate in the public sphere by altering their

practices and by manipulating the visible styles of their material culture to more closely match those of locals (Kroskrity 1993; Spence 2005; Stone 2003:50-54). Because material culture both reflects and influences identity, the adoption of local material practices could also be the adoption of local identity on top of their own (e.g., Beaudoin 2013; Peelo 2011). Meanwhile, if technological style differs between migrant and local learning communities, the identification of distinct differences in technological style may reveal the presence of diasporas in multi-ethnic communities (Bowser 2008; Cameron 1998; Clark 2001; Gosselain 2000). Domestic architecture and pottery are both useful for identifying non-local people in the midwestern U.S. circa A.D. 700 to 1300 because they differ both technologically and visibly between Mississippian and Late Woodland cultural traditions.

Like domestic structures, Mississippian and Late Woodland palisade walls also differ technologically and visibly. In the context of their co-residence, voluntary construction of palisade walls would create and reinforce shared community-wide identities by creating shared experiences and memories, by tying diverse peoples to the physical place, and by drawing a simple distinction between "us" and "them" – those inside the walls and part of the community, and those outside. Spatial marginalization of migrants in walled communities is thus a very important factor in their success because being relegated to living outside the walls would deny them any shared "insider" identity that would otherwise bridge differences. Examining the technological and visible styles of palisade walls can reveal what kind of message the community attempts to send to other peoples on the landscape, and if that message aligns with or contradicts the practices of the builders. Integration in walled communities hinges, in part, on residence inside, collaboration in construction and design, and whether diverse peoples are represented by messages communicated through the wall's visible style.

2.2 Research Questions, Formal Hypotheses, and Expectations

Diverse populations may integrate in some or many aspects of life, including socially, economically, or spatially while maintaining their independence in others. Over time, interaction results in blended traditions, hybridized material culture, and new identities (Alt 2006b; Burmeister 2000; Deagan 1990; Goldstein 2015; Lightfoot and Martinez 1995; Lightfoot et al 1998; Meyers 2002). To better understand strategies for integration and the multi-generational effects of coalescence, I examine domestic structures for evidence of hybridization and manipulation of visible style as a strategy tto integrate residentially; the technological style (tempering agent) of pottery refuse in abandoned houses to draw inferences about spatial integration or segregation; and palisade walls to draw inferences about collaboration in community events and resulting, long-term communal identities.

My dissertation ultimately contributes to the question of why some migrants are able to successfully integrate among culturally different local populations more easily than others. More specifically, does the visible style of domestic structures (as highly-visible, long-lasting focal points of daily life) play a role in the integration of migrants and their descendants among local people who may be culturally different? Is there a relationship between integration (or lack thereof) and how the community physically portrays itself (such as through palisade walls and other monumental works)? Integration would result in a greater degree of exposure to and selective appropriation of aspects of each other's culture as evident in hybrid material culture (Beaudoin 2013; Deagan 1990; Dietler 2010; Peelo 2011; Silliman 2005). Conversely, maintaining independence from one another limits the amount of hybridization that can occur and perpetuates differences. Therefore, an abundance of hybrid material culture (created through the selective appropriation and rejection of material traits) would support an inference of

successful or strong integration. Lack of hybrid material culture, especially when accompanied by multiple forms of marginalization, might support an inference of weak integration.

Hybrid pottery is already defined at Aztalan (Richards 1992:348), but if the residents of Aztalan were integrated then other forms of hybrid material culture should also be evident at the site. For example, in the Midwest Mississippian and Late Woodland domestic structures exhibit clear differences in technological and visible style and have the potential to be hybridized. Mississippian and Late Woodland palisade walls also differ in technological and visible style and may have been another medium for hybridization. Therefore, I propose a null hypothesis and three alternative hypotheses about identity as expressed through pottery, domestic architecture, and palisade walls, and the implications of these for migrant success or lack of success.

2.2.1 Null Hypothesis

My **null hypothesis** is that co-resident local and non-local peoples maintain independent practices in the material culture of everyday life and community appearance, including visible style. Visible and technological styles will align and correspond with their respective cultural practices as a reflection of distinct learning communities. The houses of migrants and locals, and of their descendants, will be spatially separated. Failure to reject the null hypothesis would support an inference of weak integration in everyday life and in how each group was represented in outward expressions of the community. The following archaeological evidence would be expected at Aztalan if the null hypothesis is true:

1) Perishable architecture from non-mound contexts will demonstrate separate Mississippian and Late Woodland visible and technological styles through variable patterns in structure shape and dimensions; foundation type and wall construction

method (wall-trenches vs. single set posts); post diameter and spacing; entrance type and dimensions; and inferred above-ground appearance when considered in concert with each other (Table 1.1).

2) Mississippian and Late Woodland material culture of everyday life, including residential structures, pottery, and domestic refuse, will be spatially separated into distinct areas of the community.

3) Mississippian-style pottery will be found predominantly in association with Mississippian structures, and Late Woodland-style pottery will be found predominantly in association with Late Woodland structures.

4) Palisade wall design (including curtain form and the presence and form of bastions) and post size will be wholly consistent with either Mississippian or Late Woodland palisade walls across eastern North America (or both, but for separate construction episodes; Finney 1993; Hammerstedt 2005; Iseminger et al. 1990; Keeley et al. 2007; Krus 2011, 2013; Milner 1999, 2000; Salkin 2000; Schroeder 2006).

Alternatively, if migrant and local descent groups transform and blend their traditions and create new, shared identities, I would expect evidence of blended practices in the construction of domestic architecture, ceramics, and palisade walls.

2.2.2 Alternative Hypothesis 1

My **first alternative hypothesis** is that Mississippian migrants and their descendants adopt the visible styles of Late Woodland architecture to blend in to the preexisting Late Woodland community and reduce how they are perceived as outsiders. Simultaneously, the technological style of Mississippian architecture (wall-trench foundations) would be maintained because it is primarily influenced by their culturally and geographically distinct learning

communities. In comparison, Late Woodland locals would not feel as great a pressure to blend in so would not adopt migrant architectural styles as frequently. The following archaeological evidence would support this hypothesis at Aztalan:

1) Archetypal Mississippian wall-trench structures, determined by the presence of both Mississippian technological and visible styles, will be scarce in relation to "hybrid" structures that show a combination of Mississippian technological style with Late Woodland visible style. Late Woodland structures, determined by the presence of both Late Woodland technological and visible styles, will be the most abundant. Inferences I will draw from possible combinations of technological and visible styles of domestic structures and my Alternative Hypothesis 1 predictions are summarized in Table 2.1.

2) Mississippian technological style will be disproportionately more common than Mississippian visible styles, because technological style has less potential than visible style to communicate migrant identity.

3) Mississippian, Late Woodland, and hybrid structures will be interspersed throughout the community.

Table 2.1. Predictions and inferences for possible combinations of technological and visible style in domestic structures at Aztalan if hybrid material culture developed.

	Technological style consistent with MISSISSIPPIAN	**Technological style consistent with LATE WOODLAND**
Visible style consistent with MISSISSIPPIAN	***Interpretation:*** *Archetypal Mississippian structure* ***Prediction:*** *Few of these*	***Interpretation:*** *"Hybrid" structure* *Mississippian adoption of Late Woodland construction practices* *-or-* *Late Woodland manipulation of visible style to resemble Mississippian structures (if outside the range of variation for Late Woodland structures)* ***Prediction:*** *Few of these*
Visible style consistent with LATE WOODLAND	***Interpretation:*** *"Hybrid" structure* *Mississippian manipulation of visible style to reduce visible differences* *-or-* *Late Woodland adoption of Mississippian construction techniques* ***Prediction:*** *Many of these*	***Interpretation:*** *Archetypal Late Woodland structure* ***Prediction:*** *Many of these*

Alternative Hypothesis 1 would be supported by the identification of "hybrid" structures with Mississippian technological style (wall-trench construction) but visible style consistent with Late Woodland structures (rectilinear structures crooked walls, rounded corners, or irregular shapes, ovoid structures, or structures with complex entrances). Identification of hybrid structures with Mississippian-like technological style but Late Woodland-like visible style would lead to rejection of the null hypothesis.

2.2.3 Alternative Hypothesis 2

My **second alternative hypothesis** is that the physical appearance of a coalescent community reflects collaboration of its diverse residents. Specifically, palisade walls should

reflect shared participation because they are integrative practices that generally require community-wide involvement. As key components in the physical dimensions, layout, and appearance of a walled community, the choices made during their construction both reflect and transform how the community perceives itself and how it is perceived by outsiders. The following archaeological evidence is expected at Aztalan:

> Mississippian (posts greater than 15 cm in diameter and regularly spaced square or rectangular bastions) and Late Woodland (posts less than 15 cm in diameter, without bastions) patterns of palisade construction will both be present either individually or combined in Aztalan's numerous palisade walls, demonstrating shared participation across the site as a whole.

2.2.4 Alternative Hypothesis 3

My **third alternative hypothesis** is that the residences of migrants and locals were spatially intermingled, meaning that migrants were not pushed to live in one part of the community (or did not choose to live apart from locals). The following archaeological evidence is expected at Aztalan:

> Refuse pottery in abandoned house basins should include mixes of Mississippian (shell-temper) and Late Woodland (grit-temper) technological styles as a result of Mississippian migrants and Late Woodland locals living side by side and disposing of trash in communal places.

2.2.5 Other Alternative Hypotheses

The hypotheses presented about are only some alternatives to the null hypothesis and focus on the roles of identity and material style, which have not been explored at Aztalan in these ways. Other alternatives are also possible but I exclude them for various reasons, such as lack of temporal control, excavation constraints, and insufficient information. Some examples are:

1. If the descendants of migrants and locals became integrated over the course of generations, then examples of architectural hybridity should increase over time.

   Temporal control at Aztalan has been a major challenge due to a relatively short occupation history, rarity of deep cultural stratigraphy across much of the site, erosion and plowing, and the statistical similarity of many radiocarbon dates from the site (Figure 4.2; Richards and Jeske 2002). Few known structures at Aztalan are superimposed.

2. If diverse peoples collaborated on monumental works, then construction histories of the mounds at Aztalan should show evidence of shared participation in their design and construction.

   This alternative hypothesis is partially supported by Zych's (2013) research on the Northeast Mound, but existing information about the Southwest and Northwest Mounds is insufficient to address this hypothesis without extensive excavation.

3. If diverse people shared a community cemetery, then local and non-local burials may be identifiable via the presence of culturally-diagnostic grave goods or strontium isotope analysis. Integration or partial integration could be understood by intermingled local and non-local burials or by partially-intermingled burials (such as clustering or separation of local and non-local burials within the cemetery).

   Numerous examples of human remains have been found across the site in a wide variety of contexts (Zejdlik Rudolf 2009), but no formal cemetery has been found at Aztalan. Individuals have been identified in the special mound-top mortuary structure in the Northwest mound with local and non-local strontium isotope signatures, but only 3 of 20 individuals tested were consistent with the Cahokia area (Price et al 2007). While important, these results are not sufficient for understanding integration.

I focus on three alternative hypotheses related to domestic architecture, the technological style of pottery, and palisades because (1) these forms of material culture have potential to reveal information about identity at Aztalan but have not been used in these ways before; (2) the entire sample (albeit small) of domestic structures has never been fully analyzed; and (3) the palisade walls have been extensively documented but the fine details of their design and construction have not been fully studied.

2.3 Chapter Summary

In this chapter I presented roles played by group identity in the interactions between migrants and locals and their descendants, and how perpetuating differences can impede success by reinforcing diasporic people as “outsiders.” Identity is unconsciously reflected and actively

signaled though the technological and visible styles of material culture. Identity can also be created and changed during the adoption and abandonment of material practices (e.g., Beaudoin 2013; Peelo 2011). Technological style results from the series of sometimes unconscious, sometimes arbitrary production choices learned in distinct communities of practice (Dietler and Herbich 1998; Lave and Wegner 1991; Minar 2001; Minar and Crown 2001; Stark 1998, 1999; Stark et al. 2000). In the context of human migration, where members of a coalescent population have geographically distinct ancestry, learning communities are likely to be distinctive which can make technological style useful for identifying diasporas archaeologically. Technological style is useful for identifying social boundaries because it is more resilient to change, and its low-visibility in a finished product makes it less likely to communicate information and thus less likely to be manipulated to control that information. In contrast, visible style (like decoration) has high potential for communicating information, but is also more subject to manipulation to communicate certain messages (Wobst 1999:121). In the context of interaction between culturally different migrant and local descent groups, visible style is an important factor in how they can signal their identities, alliances, and other information. Technological style may be useful to identify objects produced by non-local people when visible style may have been altered to signal otherwise (Hegmon et al. 2000; Sassaman and Rudolphi 2001). Stylistic analysis is routinely applied to pottery for studying social boundaries and interaction because pottery has great potential for communicating information through visible decoration and form, but also reflects technological styles well (Croucher and Wynne-Jones 2006; Crown 2001; Delaney-Rivera 2007; Gorogianni et al. 2016; Hegmon et al. 2000; Minar 2001; Peelo 2011; Rosebrough 2010; Sassaman and Rudolphi 2001; Stark 1999, 2006; Stark et al. 2000; Wallaert-Pêtre 2001).

Domestic structures are another form of material culture with great utility for studying social boundaries and interaction through style because 1) external appearance is highly visible to members of a community, which gives great potential for communicating information about its residents and makes it more likely to be manipulated; and 2) in the context of interaction between people of local and non-local ancestry, the potential contrast between the technological and visible styles of domestic structures can reveal how migrants and their descendants represent themselves among locals via the visible style of their dwellings.

Voluntary participation in community-wide events and monumental constructions like palisade walls can also aid migrant success by creating shared memories and experiences between local and non-local groups that connect them to the physical place and bridge their differences. Walls also create a sense of "Us vs. Them" that can foster a shared identity for diverse residents inside the wall compared to those outside. This is important considering the potential for diasporas to be spatially marginalized and prevented from residing in the interior. The visible style of a palisade wall can send messages to others on the landscape about the residents within, beyond messages related to defense. For example, constructing a wall using a Mississippian palisade design would send a different message to other primarily Late Woodland groups on the landscape than building it in the Late Woodland style, regardless of the actual cultural demographics of the community.

The formal hypotheses I proposed in this chapter are designed to examine the resilience and flexibility of style in domestic architecture, pottery, and palisade walls and identify material hybridity. The geographic separation of their homelands, and thus the geographic separation of their learning communities, is foundational in the cultural differences between migrants and locals. Population coalescence removes that separation and creates openings for formation of

new material culture, new social and political relationships, and new identities (Alt 2006b; Birch 2012; Burmeister 2000; Cusick 2000; Deagan 1990; Frangipane 2015; Goldstein 2015; Green and Perlman 1985; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Upton 1996). In the next chapter I present detailed information about the archaeological context of the Midwest and known situations of Mississippian and Late Woodland interaction.

Chapter 3: Diversity & Interaction: Culture Histories of the Aztalan Area & American Bottom

Evidence for two distinct archaeological traditions — Late Woodland and Mississippian — are found to co-reside at Aztalan (occupied A.D. 1100-1200). Late Woodland material culture across southern Wisconsin and northern Illinois was similar in many ways in the centuries leading up to, and contemporaneous with, Aztalan's occupation, but there was also spatial and temporal variation in ceramic styles, settlement patterns, subsistence, and mound construction (e.g., Emerson and Titelbaum 2000; Kelly 2002; Rosebrough 2010; Salkin 2000; Stoltman and Christiansen 2000). Other traditions – Oneota, Langford, and Fisher – were also present in southern Wisconsin and northern Illinois between A.D. 1050 and 1450+, but no distinctive artifacts representing these archaeological cultures have been found at Aztalan. Meanwhile, in the American Bottom in southwest Illinois, a densely populated, hierarchical Mississippian society arose out of Late Woodland populations between A.D. 900 and 1050 following a period of increasing sedentism, community organization around public spaces, reliance on maize, and other developments (Fortier and McElrath 2002; Fortier 2006; Kelly 1990, 2000; Pauketat 1994). Concurrent with the archaeological appearance of the Mississippian tradition at A.D. 1050 and during the two centuries after, intrusive Mississippian sites and material culture appeared among Late Woodland sites in southern Wisconsin and northern Illinois – including at Aztalan (Baerreis and Freeman 1958:36; Benden 2004; Benden et al. 2011; Boszhardt 2004; Boszhardt et al. 2012; Birmingham and Goldstein 2005; Emerson 1991; Emerson et al. 2007; Finney 1993, 2013; Finney and Stoltman 1991; Hall 1967:179; Green and Rodell 1994; Goldstein et al. 1989; Hendrickson 1996; Millhouse 2012; Pauketat et al 2015; Porter 1966; Richards 1992, 2003; Salkin 2000; Stoltman 1989, 1991a, 1991b, 1991c, 2000; Stoltman et al. 2008).

It is my intent in the following sections to present the culture history of southern Wisconsin, northern Illinois, and the American Bottom ca. A.D. 700-1300 as they are the cultural traditions and geographic areas most closely associated with Aztalan. I describe the clearest differences between Late Woodland and Mississippian traditions that can be used to identify them archaeologically with emphasis on domestic structures, pottery, and palisade walls because these forms of material culture are distinctly different and, as I argue in Chapter 2, are potentially useful expressions of identity. The cultural differences, reproduced across space and through time, derived from their geographically and culturally distinct and historically contingent learning communities. In the context of migration and pluralistic population coalescence, the differences make it possible to distinguish between Mississippian immigrant and Late Woodland populations.

After establishing the material differences between the traditions and how they are identified archaeologically, I highlight numerous case examples of mixed Mississippian and Late Woodland material culture in the Midwest. Many sites, including Aztalan, illustrate the likely movement of Mississippian peoples, objects, and ideas out of the American Bottom into Cahokia's "northern hinterlands" (Bardolph 2014; Benden 2004; Boszhardt 2004; Emerson and Lewis 1991; Emerson et al. 2007; Pauketat et al. 2015; Richards 2003; Stoltman 1991; Stoltman et al. 2008). As a whole, they show that a great deal of interaction, population movement, and cultural development occurred between Mississippian and non-Mississippian peoples in the upper Midwest between approximately A.D. 1050 to 1200. The interaction is often discussed in terms of the "Mississippianization" of Late Woodland peoples post A.D. 1050 (Bardolph 2014:73-76; Birmingham and Goldstein 2005:46; Christiansen 2003:1; Emerson 1991; Emerson et al. 2007; Goldstein 1991:224; Gibbon 1972; Harn 1991; Krause 1985; Millhouse 2012;

Richards 1992:120, 386, 2003:146; Rosebrough 2010; Stoltman 1986; Theler and Boszhardt 2006; Wilson et al. 2017). The Mississippianization concept implies asymmetrical culture change and Mississippian hegemony – themes that have also been incorporated into interpretations of Aztalan. Examining Aztalan from the perspective of Mississippianization emphasizes Mississippian culture while minimizing the agency of Late Woodland actors. However, multi-cultural interaction, especially in a residential context where learning communities are exposed to each other, can result in multi-directional cultural influences that affect everyone involved (Beaudoin 2013; Deagan 1990; Dietler 2010; Peelo 2011). It is therefore important to examine Aztalan and other cases of "culture contact" from multiple perspectives.

3.1 "Late Woodland" and "Mississippian" Terminology in the Midwestern U.S.

The terminology "Late Woodland" and "Mississippian" are used in Midwestern archaeology to refer to distinctly different suites of material culture and inferred behaviors (detailed below), but also sometimes include a temporal dimension (i.e., "the Late Woodland period" is a temporally-ordered stage of material culture that follows the Early and Middle Woodland, all of which are part of the encompassing Woodland tradition [Stoltman 1978:34]). The material culture by which each tradition is defined have different temporal boundaries in different regions and sometimes overlap, which can result in inconsistent usage and confusion (Schroeder 2004:318; Stoltman 1978). For example, in the American Bottom, Late Woodland traditions (ca. A.D. 350-900) precede the *in situ* development of Mississippian practices between A.D. 900 and 1050, with the "Mississippian period" formally beginning at A.D. 1050 (e.g., Fortier and McElrath 2002; Fortier et al. 2006; Kelly 1990, 2000).

In contrast, Late Woodland traditions in southern Wisconsin and northern Illinois were practiced approximately A.D. 500 to 1300 (Emerson and Titelbaum 2000; Rosebrough 2010:86; Stevenson et al. 1997:166-179; Stoltman and Christiansen 2000) and Mississippian and Late Woodland material culture are found mixed together in various ways in northern Illinois and southern Wisconsin (discussed below in terms of five "culture contact scenarios" [Stoltman 1986, 1991b, 2000]). The terms are also commonly extended beyond suites of material culture to name the distinct groups of people, which is especially true for the producers of Mississippian material culture who are almost universally called "Mississippians," as in, *Who Met the Mississippians at the Mouth of the Apple River?* (Benn 1997) and, *Ancient Cahokia and the Mississippians* (Pauketat 2004). Similar pluralization of Late Woodland peoples ("Late Woodlanders") is less common (though see Christiansen 2003:223).

I use the terms *Mississippian* and *Late Woodland* to refer to the distinctive suites of material culture and their stylistic properties. I use *Mississippians* and *Late Woodland peoples* to refer to the peoples who produced those distinct suites of material culture, but I also recognize that archaeological cultures are merely organizational units created by archaeologists and may not correspond with real groups of people. However, I argue it is appropriate in this case given that Late Woodland and Mississippian material cultured differed in many aspects of life, their inferred behaviors also differed, and (in southern Wisconsin ca. A.D. 1100-1200, the time of co-residence at Aztalan) they were contemporaneous and had distinct geographic origins. In the following sections I describe the details of relevant Late Woodland traditions in southern Wisconsin and northern Illinois between A.D. 700 and 1300, and Mississippian and preceding traditions in the American Bottom between A.D. 650 and 1350, leading up to, contemporaneous with, and after the co-resident occupation at Aztalan (A.D. 1100-1200).

3.2 Late Woodland and Other Traditions in Southern Wisconsin and Northern Illinois

The Late Woodland tradition across southern Wisconsin between A.D. 700 and 1300 is best known for zoomorphic earthen mounds known as effigy mounds (which are also found in adjacent portions of Minnesota and Iowa) in addition to conical and linear forms. Effigy mound forms include a variety of bird, mammal, and other animal shapes, as well as more enigmatic forms that are typically interpreted as "water spirits" or water panthers (Birmingham and Eisenberg 2000:109-136; Rosebrough 2010; Stevenson et al. 1997; Stoltman and Christiansen 2000). Effigy mounds were usually built in clusters overlooking rivers or around lake margins. Many contain burials, most of which are secondary bundle burials of single individuals (Rosebrough 2010). Some scholars have argued that effigy mounds were territorial markers and/or symbols of clan identity (Birmingham and Rosebrough 2017; Boszhardt and Goetz 2000; Mallam 1976; Rosebrough 2010, 2014). The primary period of Effigy mound construction is generally thought to have been between approximately A.D. 700 and 1200 across the area, with the practice possibly ending one to two centuries sooner in western Wisconsin (Theler and Boszhardt 2000, 2006; Stoltman and Christiansen 2000; Rosebrough 2010:125-128).

Despite their widespread presence across southern Wisconsin, there is variation in the spatial distribution of zoomorphic mounds forms (e.g., Boszhardt and Goetz 2000; Rosebrough 2010:416-427) as well as a great deal of variation in other forms of material culture, especially ceramics. Some variable kinds of evidence, like the presence of maize, larger settlement size, and the presence of palisade walls, have been cited as evidence of increasing sedentism by some groups while more ephemeral habitation sites without palisades and with less evidence of maize use have been inferred as the remnants of other groups that remained more mobile (Salkin 2000).

I structure the following section using Late Woodland sub-periods proposed for southern Wisconsin by Stoltman and Christiansen (2000) and followed by Rosebrough (2010). Another temporal organization scheme used in northern Illinois is similar (Emerson and Titelbaum 2000). Late Woodland traditions in southern Wisconsin are generally better understood than in northern Illinois, but ceramic, subsistence, and architectural data are similar across the region (Emerson and Titelbaum 2000:413; Kelly 2002:35-36; Rosebrough 2010:111). Given my research focus on domestic structures, palisade walls, and pottery because of their potential uses in exploring identity (Chapter 2), I emphasize those forms of material culture in my descriptions of Late Woodland variation below. Projectile points are also very commonly found, but across the study area they were mostly simple, unnotched triangular or teardrop-shaped arrow points, with some side-notched triangular points also found after A.D. 1000 (Rosebrough 2010:93, 102; Stoltman and Christiansen 511).

3.2.1 Mature Late Woodland, A.D. 700-1000

The Mature Late Woodland period is characterized very broadly by the proliferation of effigy mound construction and ceramics that include cord-impression decorations and/or "collars." Most subsistence information comes from southwest Wisconsin, where seasonality has been determined for a number of rockshelter and open-air sites, leading scholar to infer a seasonally-mobile lifestyle. A number of material traits persisted after A.D. 1000, including effigy mound construction, ceramic styles, and architectural construction methods and styles.

Ceramics

Mature Late Woodland ceramics are generally characterized as globular or sub-conical jars tempered with crushed rock (grit), with surfaces that are either cordmarked or smoothed

over, circular orifices, and straight or curved rims (identified as Madison wares; Richards 1992:262-266; Rosebrough 2010:93; Stevenson et al. 1997:171; Stoltman and Christiansen 2000:505; Wittry 1959). Decoration includes cord and fabric impressions, sometimes in geometric designs (Figure 1.2; Table 3.1). Madison ware ceramics are found across the study area after A.D. 700 and have been closely affiliated with the builders of effigy mounds, especially prior to A.D. 1000 (Salkin 2000; Stoltman and Christiansen 2000:505).

"Collared" ceramics with thickened rims created by either folding the rim over or adding a strip of clay appeared in southern Wisconsin and northern Illinois between A.D. 800 and 900 and persisted until A.D. 1200 (Emerson and Titelbaum 2000:415, 420; Kelly 2002; Salkin 2000:527). Four abundant collared types are found in the study area: Aztalan Collared, Starved Rock Collared, Point Sauble Collared, and Hahn Cord Impressed; Unfortunately, there are too few radiocarbon assays associated with specific collared wares to give precise ages for the introduction and use of each type (Kelly 2002:108-116). Hahn Cord Impressed is the only collared ware not found at Aztalan (Richards 1992:258).

Each collared ware is differentiated from the others by decoration and sometimes morphology. Aztalan Collared is defined by cordmarked surfaces, cord or fabric impression decorations at the lip, interior or exterior lip notching, and/or knotted punctates at the base of the collar (Baerreis and Freeman 1958; Richards 1992:279-287; Rosebrough 2010:225). Aztalan Collared orifices are either circular or polygonal with rounded or angular peaks (or polygonal without peaks; Baerreis and Freeman 1958:41; Richards 1992:269-270). Aztalan Collared is primarily found in southeast Wisconsin and (to a lesser extent) northeastern Illinois, but also occasionally in southwest Wisconsin (Kelly 2002; Richards 2003:143; Stoltman and Christiansen 2000).

Starved Rock Collared is extremely similar to Aztalan Collared morphologically but is defined by its lack of cord or fabric impression decorations (Hall 1987; Kelly 2002:43-44; Richards 1992:288 ; Rosebrough 2010:225); its only decoration is tool notching at the lip or interior rim margin. Starved Rock Collared is primarily found in northern Illinois and is the most common type of collared ware there, but is also found in south-central Wisconsin (Kelly 2002 ; Rosebrough 2010:225).

Point Sauble Collared is defined on the basis of cord or fabric impression decorations on the collar and neck areas and sometimes the interior rim margin and the shoulder (Baerreis and Freeman 1958; Richards 1992:298). Point Sauble Collared orifices are either circular or polygonal with peaks. Point Sauble Collared vessels are most abundant in eastern Wisconsin (especially northeastern Wisconsin) but also in several sites in northeast Illinois (Kelly 2002).

Hahn Cord Impressed differs from the other collared wares by flattened, weakly pronounced collars and cord impression decorations that are stylistically very similar to Madison Cord Impressed (Kelly 2002:40; Keslin 1958; Richards 1992:266-267). The stylistic similarity and weak collars have led some scholars to suggest that Hahn Cord Impressed is an intermediary type between Madison Cord Impressed and Point Sauble Collared (Keslin 1958; Hall 1962:83). Compared to the other collared wares, Hahn Cord Impressed is found at the fewest number of sites and in the lowest percentages of each assemblage (Kelly 2002). Hahn Cord Impressed is almost entirely found in south-central Wisconsin (Kelly 2002).

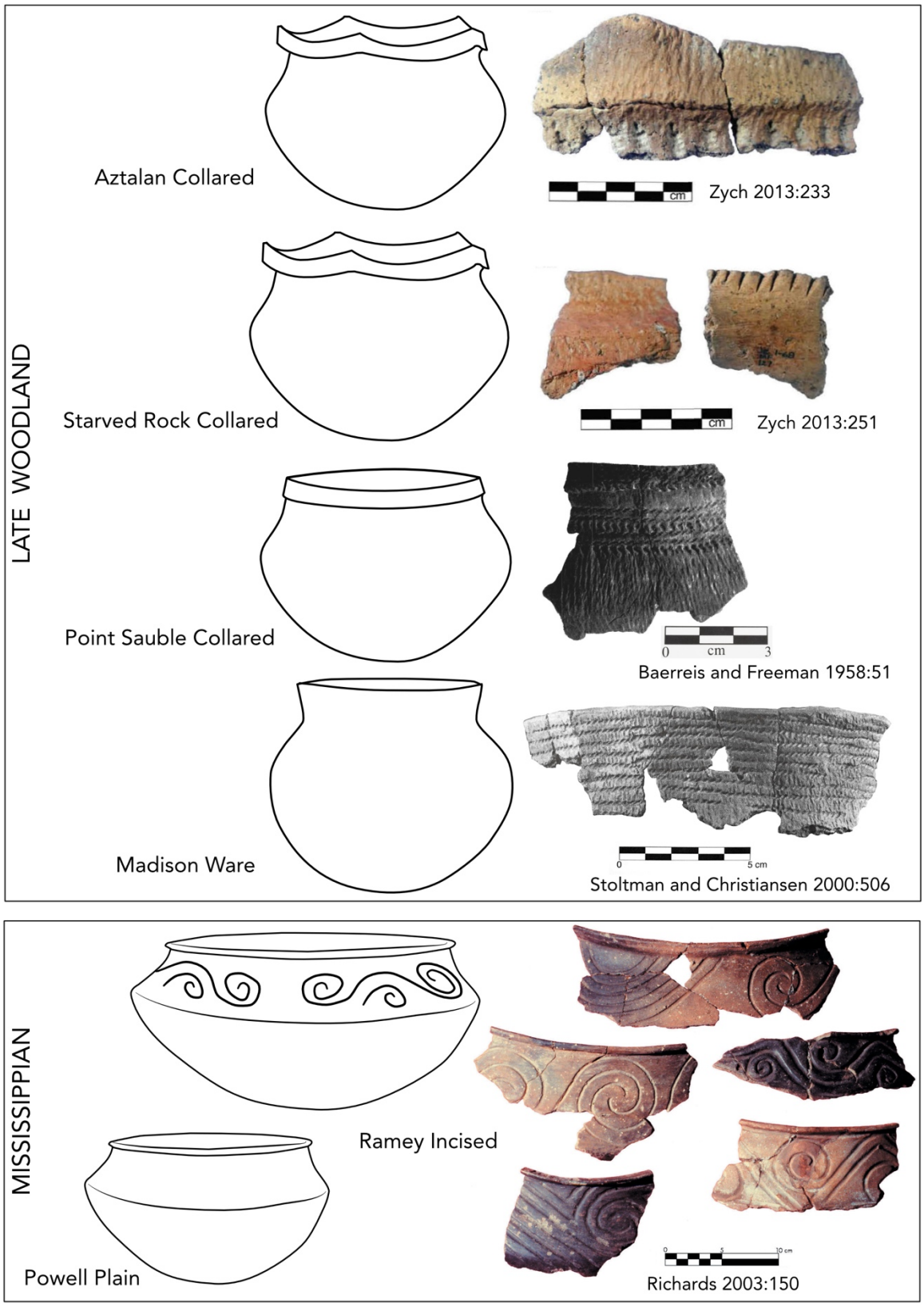


Figure 3.1. Comparison of select diagnostic Late Woodland pottery types found in southern Wisconsin and northern Illinois and Mississippian jars from the American Bottom, ca. A.D. 1100-1200.

Architecture and Settlement Patterns

Ceramics (and projectile points) are the most common artifacts found to indicate the presence of Mature Late Woodland sites (Rosebrough 2010:93). Most Mature Late Woodland open-air sites are ephemeral and consist of scattered debris, so it is presumed that most structures utilized small diameter poles that leave little in the way of archaeological signatures (Rosebrough 2010:98). Few Mature Late Woodland structures have been identified, but those that have appear to have been semi-subterranean by the presence of basin stains. For example, structures at the Statz site, intermittently occupied between AD 800 and 1100, exhibit keyhole shaped basin stains (Meinholz and Kolb 1997:53). In northern Illinois, some sites have semi-subterranean oval to circular-shaped single-set post structures (Emerson and Titelbaum 2000:414). In southwestern Wisconsin, floral and faunal assemblages from Late Woodland sites indicate seasonal mobility, with movement between the Mississippi River floodplain environment in warm months and interior river valleys in the fall and winter (Arzigian 1993; Stevenson et al. 1997; Theler 1987; Theler and Boszhardt 2006), while southeastern Wisconsin had a more open landscape of rolling hills, lakes, rivers, and wetlands and people generally settled around the aquatic resources in lakes and wetlands (Stevenson et al. 1997:157).

Subsistence

Mature Late Woodland Subsistence practices were focused on a wide range of wild plant and animal resources specific to local environments, supplemented with horticulture of native cultigens (such as *Chenopodium*, knotweed, sumpweed, and sunflower; Arzigian 1987, 1993; Rosebrough 2010:101; Stevenson et al. 1997:173, 175; Stoltman and Christiansen 2000:512-513). Maize is present at some Mature Late Woodland contexts in southern Wisconsin and

increased in importance between AD 800 and 1000 (Arzigian 1987, 1993; Rosebrough 2010:101; Stevenson et al. 1997: 173, 175; Stoltman and Christiansen 2000:512-513). White-tailed deer is almost always present at Mature Late Woodland sites along with other animals (Stoltman and Christiansen 2000:513). Aquatic animal resources are common at sites near bodies of water. Mussel shell, in particular, is common at Mature Late Woodland sites in southwestern Wisconsin in the form of large shell middens (Stoltman and Christiansen 2000:500; Theler 1987).

3.2.2 Final Late Woodland, A.D. 1000-1300

Many Late Woodland material traits dated to A.D. 700-1000 persist into the Final Late Woodland. One difference is the increase in the number of some habitation sites in southeast Wisconsin that are larger, appear to be more sedentary, are occasionally palisaded (without bastions), and contain collared ceramics and maize (and that are also some of the best documented; Rosebrough 2010:101-102; Salkin 2000; Stoltman and Christiansen 2000:514). Salkin has defined the Kekoskee phase based on these attributes (2000:530) and dates the phase to A.D. 800-1200 based on 25 of 29 uncalibrated radiocarbon dates from ten sites (Salkin 2000:527, Table 20.1). However, Stoltman and Christiansen (2000:511) argue on the basis of calibrated dates that most of these larger, more sedentary sites post-date A.D. 1000.

Ceramics

Madison ware and collared ware pottery are both found at Final Late Woodland sites in southern Wisconsin and northern Illinois like the centuries prior, though collared wares increased in their usage compared to Madison wares (Kelly 2002; Stoltman and Christiansen 2000:509-

510). Stoltman and Christiansen (2000:514) have argued for fairly clear temporal separation between Madison ware and collared wares, with a period of transition from Madison ware to collared ware between A.D. 900 and 1000. Still, this would not have been a total replacement as Madison ware is still found at some sites in the study area after A.D. 1000 (Stoltman and Christiansen 2000:Table 19.2). Madison ware, Aztalan Collared, Point Sauble Collared, and Starved Rock Collared are found at Aztalan (Christiansen 2003; Richards 1992, 2003; Zych 2013).

Other Final Late Woodland pottery types with narrower spatial distributions include Angelo Punctate jars, distinguished by small triangular or wedge-shaped punctuations, found primarily in a small area of western Wisconsin (Boszhardt and Goetz 2000); Grant wares (which include Cordmarked, Cord-Impressed, Collared, and Plain types), associated with the Fred Edwards site in southwest Wisconsin (Finney 1993:111-117); and Hyer Plain, a "hybrid" that incorporates grit-tempering with Mississippian Powell Plain morphology, found at Aztalan (Richards 1992:348-352; see Chapter 4).

Architecture and Settlement Patterns

Semi-subterranean keyhole and rectangular-shaped structures have been found at a number of Final Late Woodland sites in eastern Wisconsin, including Statz, Mile Long, Weisner III, and Elmwood Island (Meinholz and Kolb 1997; Salkin 1992, 1993, 2000:530-532). The clearest examples of Late Woodland structures in northern Illinois are semi-subterranean oval to circular-shaped single-set post structures, though most sites are small and lack evidence of structures (Emerson and Titelbaum 2000:416, 420, 422). Final Late Woodland structures are essentially the same as earlier ones, but more have been discovered (particularly at the larger

sites in southeastern Wisconsin). These architectural styles are also found at Late Woodland sites across the Midwest (Binford et al. 1970:79-81; Butler and Wagner 2000:695; Fortier and Jackson 2000:134-136; Green and Nolan 2000:362, 363; Holley 2000:156; Redmond and McCullough 2000:648). Whether structures have been found or not, open-air sites feature clusters of storage pits. Many final Late Woodland sites in eastern Wisconsin have far greater archaeological visibility than Mature Late woodland sites or Final Late Woodland sites in western Wisconsin and northern Illinois (Rosebrough 2010:103-104; Salkin 2000:530-532; Stoltman and Christiansen 2000).

Palisade Walls

Some Final Late Woodland communities in southeastern Wisconsin were surrounded by unbastioned palisade walls (Salkin 2000). Hartley Fort, a Late Woodland site in northeast Iowa, also had a palisade wall (Tiffany 1982). Palisades found at Late Woodland sites in Wisconsin are similar to late prehistoric stockades across the upper Midwest and Northeast, which were generally lightweight screens constructed with small posts (average less than 15 cm diameter), lacked bastions, and enclosed high-density communities (Table 3.1; Milner 1999:118-120; Salkin 2000). Most Late Woodland palisades in the study area have been found at sites in southeastern Wisconsin (Salkin 2000), though two western examples are at the Fred Edwards site in southwest Wisconsin (Finney 1993) and Hartley Fort in northwest Iowa (Tiffany 1982). The palisaded sites are generally larger, appear to have been more sedentary, and have more evidence of maize use (Salkin 2000).

Subsistence

As during the Mature Late Woodland period, wild plant and animals continued to make up a significant portion of the diet after A.D. 1000, supplemented at some sites with horticulture of squash, sunflower, *Chenopodium*, and tobacco, and, especially at some sites in southeastern Wisconsin, more maize than before (Arzigian 1987, 1993; Rosebrough 2010:101; Salkin 2000:532; Stevenson et al. 1997:173, 175; Stoltman and Christiansen 2000:512-513).

3.2.3 Late Woodland Phase Organization in Southern Wisconsin & Northern Illinois

Five spatio-temporal phases have been defined for the Late Woodland ca. A.D. 700-1300 in southern Wisconsin and northern Illinois: the Kekoskee and Horicon phases in southeastern Wisconsin, the Lewis phase in western Wisconsin, the Eastman phase in southwestern Wisconsin, and the Des Plaines phase in northeast Illinois – although Rosebrough points out that Eastman, Horicon, and Des Plaines are all defined on the bases of similar material traits (particularly the use of Madison ware pottery; Rosebrough 2010:111). As discussed above, Salkin's Kekoskee phase was defined on the basis of collared ceramics, larger, more sedentary, sometimes palisaded settlements, and greater evidence of maize (Salkin 2000). The Horicon phase, also in southeastern Wisconsin, was defined by Salkin as a parallel phase to Kekoskee on the basis of smaller, less permanent settlements with less evidence of horticulture, and Madison ware ceramics (Salkin 2000). He also associated effigy mound construction with the smaller, more ephemeral Horicon phase sites. Stoltman and Christiansen (2000) and Rosebrough (2010:115-116) interpret the Horicon and Kekoskee phases as sequential. I agree with Rosebrough's assessment (2010:116) that most Kekoskee settlements were occupied between

A.D. 1000 and 1300, but that some apparently were earlier than others (such as Statz, Dietz, Milford, and Elmwood Island).

In western and southwestern Wisconsin, the Lewis and Eastman phases are spatially separated by a single river valley, argued by Boszhardt and Goetz to be the boundary between two Late Woodland territories (2000:276). The Lewis phase, in western Wisconsin stretching along the Mississippian River north of the Bad Axe River valley, is characterized by the abundance of long-tailed effigy mounds and single-tailed birds over other forms, Angelo Punctated pottery, and orthoquartzite triangular projectile points (Boszhardt and Goetz 2000). In contrast, the Eastman phase, situated in southwest Wisconsin south of the Bad Axe River valley, is characterized on the basis of riverine shell middens, Madison ware ceramics, chert triangular and side-notched projectile points, and effigy mound forms dominated by birds and quadrupeds with short tails or no tails (Boszhardt and Goetz 2000; Rosebrough 2010:114).

The Des Plaines phase includes Late Woodland sites in northeastern Illinois dating to A.D. 800-1100 (Emerson and Titelbaum 2000). Collared and uncollared ceramics, primarily Starved Rock Collared and Madison wares, are combined into the single phase. Few Effigy mounds are found South of Wisconsin. In general, Des Plaines sites are small, ephemeral, and poorly understood (Emerson and Titelbaum 2000:413; Rosebrough 2010:116).

3.2.4 Oneota and Langford Traditions

Other (non-Late Woodland) archaeological cultures with in situ development in southern Wisconsin and northern Illinois include the Oneota tradition in southern Wisconsin and Langford and Fisher traditions in northern Illinois (Bird 1997; Hunter 2002; Jeske 2003; Overstreet 1997; Schroeder 2004:316-317). These related traditions generally date to about A.D. 1050-1450,

though around the city of La Crosse in western Wisconsin they persisted until the seventeenth century (Boszhardt 1994, 1998; Overstreet 1997). The primary differences between Oneota, Langford, and Fisher are ceramic styles, mortuary practices, and geographic distribution (Foley Winkler 2011; Jeske 2003; Schroeder 2004:316-317). These traditions differ from Late Woodland as a whole by their use of shell-tempered ceramics, the prevalence of large, often palisaded (without bastions) villages, longhouses at some sites (especially after A.D. 1400), greater reliance on maize cultivation, and (in some areas) abundant hide-scraper tools (Griffin 1943; Hall 1962; Jeske 2003; McKern 1939; Moss 2010; O'Gorman 1993; Overstreet 1997; Schroeder 2004:316, 325). Like Late Woodland populations, they also relied on wild plants and animals (especially aquatic resources) and their domestic structures were typically constructed using single-set posts and varied in size and shape (Arzigian et. al 1989; Hunter 2002; Moss 2010; Schroeder 2004:325). Oneota and Langford/Fisher sites in southern Wisconsin are typically found in discrete site clusters adjacent to rivers and lakes.

3.2.5 The Cultural Landscape of Southern Wisconsin and Northern Illinois, Summarized

Overall, archaeologists interpret Late Woodland societies as small communities of hunter/gatherer/fisher/horticulturalists with tribal-level sociopolitical organization (Table 3.1; Rosebrough 2010; Stevenson et al. 1997; after Service 1962). Some Late Woodland communities were larger and more sedentary than others and placed greater importance on maize, especially in southeast Wisconsin after A.D. 1000 (Salkin 2000). Some of these larger settlements were surrounded by unbastioned palisades. Effigy mound construction was practiced primarily in Wisconsin, potentially differentiating the peoples there from those in northern Illinois. In some areas, distinct spatial differences in material culture seem to indicate distinct populations (as with

Lewis and Eastman phases in western Wisconsin; Boszhardt and Goetz 2000), but similar ceramic styles were produced across much of southern Wisconsin and northern Illinois and three of the five phases defined for the area (Horicon, Eastman, and Des Plaines) are based on very similar material culture (Rosebrough 2010:111). Broadly speaking, there are many similarities in the inferred lifestyles of Late Woodland peoples across southern Wisconsin and northern Illinois for much of the period between A.D. 700 and 1300, but there are also spatial and temporal differences in various kinds of material culture (Figure 3.2). Some of these differences correspond spatio-temporally, such as with larger, more sedentary sites, palisades, and greater maize usage in southeastern Wisconsin but not elsewhere in the study area. Other forms of material culture cross-cut each other spatially and temporally. Effigy mounds and Madison ware pottery are found across the study area (Figure 3.2) between A.D. 700 and 1000 and less so after A.D. 1000, while the different varieties of collared ceramics are most abundant after A.D. 1000 (though first appear earlier [Stoltman and Christiansen 2000:511]). Each collared type has a different spatial distribution, with Aztalan Collared spread across southern Wisconsin and northeast Illinois; Point Sauble Collared primarily in eastern Wisconsin; Starved Rock Collared primarily in northeast Illinois; and Hahn Cord Impressed in south-central Wisconsin (Figure 3.2).

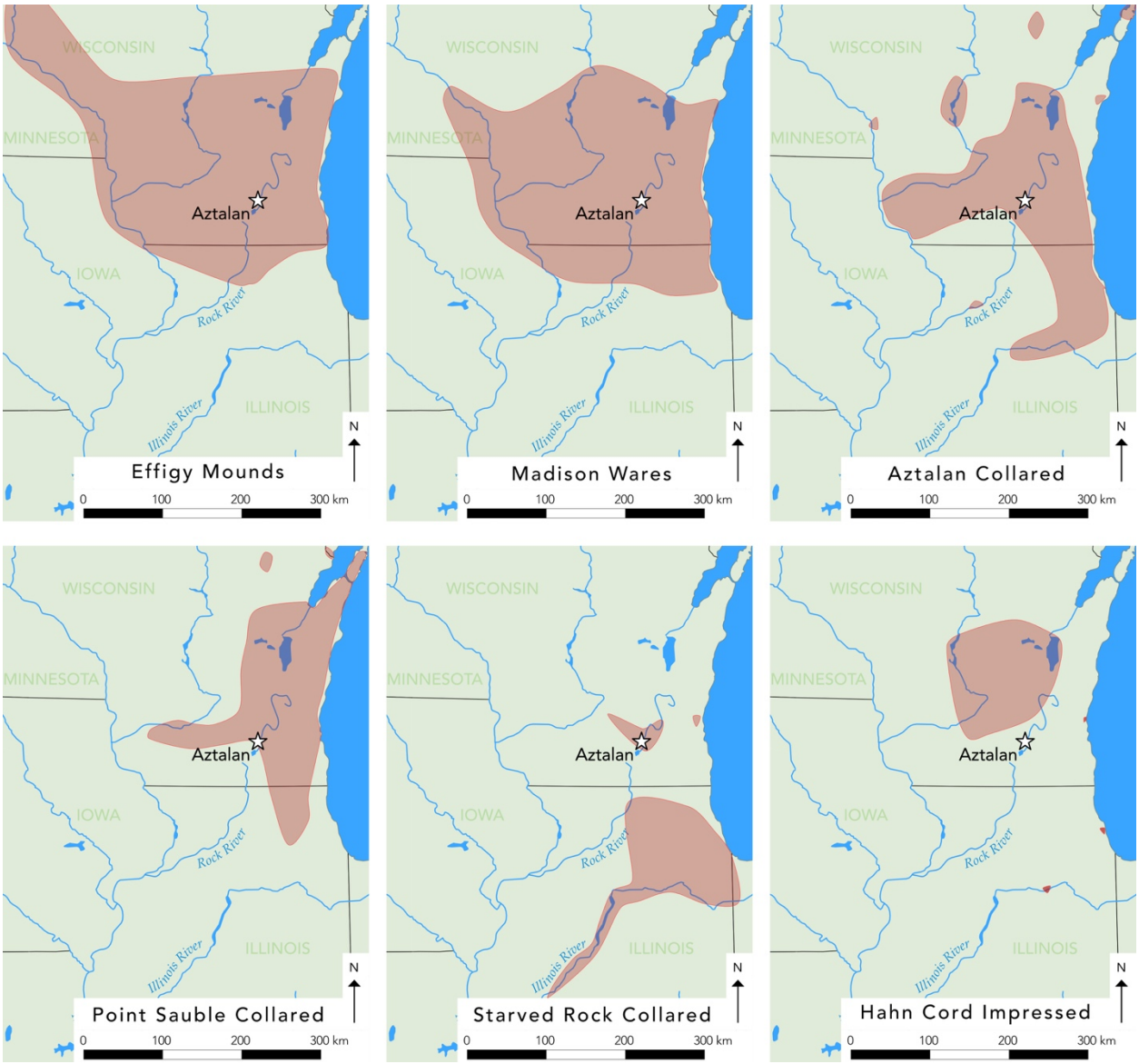


Figure 3.2. Generalized distributions of effigy mounds and relevant Late Woodland pottery types in southern Wisconsin and northern Illinois ca. A.D. 700-1300. Adapted from maps and specific site distributions in Kelly 2002, Rosebrough 2010, Stoltman and Christiansen 2000, and Stevenson et al. 1997.

Oneota groups in southern Wisconsin are somewhat easier to differentiate from one another, as they tended to cluster together in discrete locations around aquatic resources. Archaeologists also interpret Oneota/Langford/Fisher manifestations as tribal-level societies (e.g., Emerson 1999; Schroeder 2004:316; after Service 1962). The relevant Oneota sites closest to Aztalan were those clustered around Lake Koshkonong such as Crescent Bay Hunt Club and

Carcajou Point, located about 25 km downriver from Aztalan (Richards and Jeske 2002; Schneider 2015:75-76). Anyone (including Mississippians) traveling up the Rock River toward the Crawfish River and Aztalan would have had to pass the Lake Koshkonong shoreline settlements. Despite the geographic proximity between Aztalan and Lake Koshkonong, no Oneota material culture has been recovered at Aztalan, nor definitive Mississippian material culture from Lake Koshkonong sites, suggesting that there was little interaction between the Aztalan and Lake Koshkonong populations. The relationships between Mississippian sites in Wisconsin (including Aztalan) and Oneota groups remains poorly understood and contested, but the development of the Oneota tradition has been suggested as the result of blended Late Woodland and Mississippian traditions ca. A.D. 1000-1100 (discussed in additional detail below as "Culture Contact Situation 5"; Overstreet 1997; Richards and Jeske 2002; Schneider 2015; Stoltman 1986, 1991b, 2000; Theler and Boszhardt 2000, 2006).

Table 3.1. Essential differences between Late Woodland traditions in Southern Wisconsin and northern Illinois ca. A.D. 700-1300 and the Mississippian tradition in the American bottom ca. A.D. 1050-1350.

	Late Woodland	**Cahokian Mississippian**
Subsistence	Broad wild subsistence base supplemented with horticulture of native cultigens and some maize	Intensive maize agriculture, with other cultigens. Reliance on wild plants and animals, especially aquatic resources.
Settlement size, permanence, and landscape preference	Small, often ephemeral, and semi-sedentary. Seasonally mobile, especially in western Wisconsin where rockshelters were utilized. Some larger, more sedentary settlements in southeast Wisconsin, especially after A.D. 1000.	Farmsteads, hamlets, towns, possibly "cities". Permanent settlements. Settlement hierarchy of centralized "mound centers" supported by smaller communities and farmsteads. Floodplain settings are common.
Ceramics	Grit-tempered. Mostly jars decorated with cord-impressions (e.g., Madison Cord Impressed) or lip notches. "Collared" wares have thickened rims (e.g., Aztalan Collared).	Shell-tempered with wide range of vessel forms. Jars have sharp shoulder angles and are decorated with incised lines or are plain (e.g. Ramey Incised, Powell Plain) or are sharply inslanting with constricted orifices (seed jars).
Domestic Architecture	Highly variable across and within sites. Rectilinear, ovoid, and irregular. Some "keyhole" forms. Mostly single-set post construction.	Rectangular with neat, parallel walls. Uniformity across sites. Wall-trench construction.
Palisades	Present at some larger, more sedentary sites, mostly in southeast Wisconsin. Flimsy screens of small (<15 cm) dia. posts. No bastions. Enclosed compact residential spaces.	Substantial walls usually composed of large (>15 cm dia.) posts. Bastions are evenly-spaced ~20-25 m apart. Enclosed more spacious and organized ceremonial and residential spaces.
Mound Construction	Conical, linear, and animal/human/spirit effigy shapes. Often used for burial, but not always.	Flat-topped platform mounds topped with mortuary structures and elite residences are the diagnostic form. "Ridgetop" mounds used for special burial.
Inferred Sociopolitical Complexity	Tribal-level	Hierarchical organization (Chiefdoms)

3.3 American Bottom Mississippian

The American Bottom Mississippian is identified materially by shell-tempered pottery of specific types (listed below), flat-topped platform mounds, wall-trench architecture, bastioned palisades, and intensive maize cultivation, for example. These material traits are diagnostically different from those of Late Woodland populations in southern Wisconsin and northern Illinois, making it possible to differentiate them in the archaeological record. The presence of diagnostic shell-tempered pottery types, platform mounds, bastioned palisades, and some wall-trench structures at Aztalan, as well as human remains with strontium isotope values consistent with the American Bottom, have been cited as evidence of a Mississippian presence there (Baerreis and Freeman 1958; Barrett 1933; Birmingham and Goldstein 2005; Christiansen 2003; Goldstein 1991; Price et al. 2007; Richards 1992, 2003; Stoltman 2001).

The Mississippian phenomenon in the American Bottom was preceded by several centuries of cultural changes that culminated in the rapid appearance of a new complex regional polity centered at Cahokia around A.D. 1050 (e.g., Fortier and Jackson 2000; Kelly 1990; Kelly et al. 1984; Koldehoff and Galloy 2006; Milner 1990, 1998; Pauketat 1994; Simon and Parker 2006). Cahokia itself is typically considered the center of this new complex society and is comprised of over 100 mounds, numerous plazas, and residential areas that housed thousands of people at one time (Figures 3.3 - 3.4; Fowler 1997). The East St. Louis site, another mound and habitation site, is found 8 km southwest of Cahokia near the Mississippi River; additional mounds comprise the St. Louis site immediately across the Mississippian River (Pauketat et al. 2013). Numerous other contemporaneous town-and-mound sites with Cahokia-style ceramics are found along the Mississippi River from the confluence with the Missouri River in the north to the confluence with the Kaskaskia River in the south (Betzenhauser 2011; Milner 1998, Schroeder

1997). Pauketat (1994, 2004) has interpreted the Cahokia, East St. Louis, and St. Louis sites as three parts of a "central political-administrative complex." The densely populated Cahokia complex was surrounded by dispersed floodplain and upland farmsteads that shared in the material culture of Cahokia proper in many ways, but remained unique in others, including hybrid architecture (Alt 2002, 2006; Alt and Pauketat 2011; Pauketat 1994, 2003).

Below, I describe the Patrick phase Late Woodland traditions in the American Bottom between A.D. 650 and 900, the "Terminal Late Woodland" period between A.D. 900 and 1050, and the four phases of the Mississippian period between A.D. 1050 and Cahokia's end at 1350 (Figure 3.5). In my descriptions, I emphasize domestic architecture, ceramic styles and technology, and palisade walls in addition to other material culture.

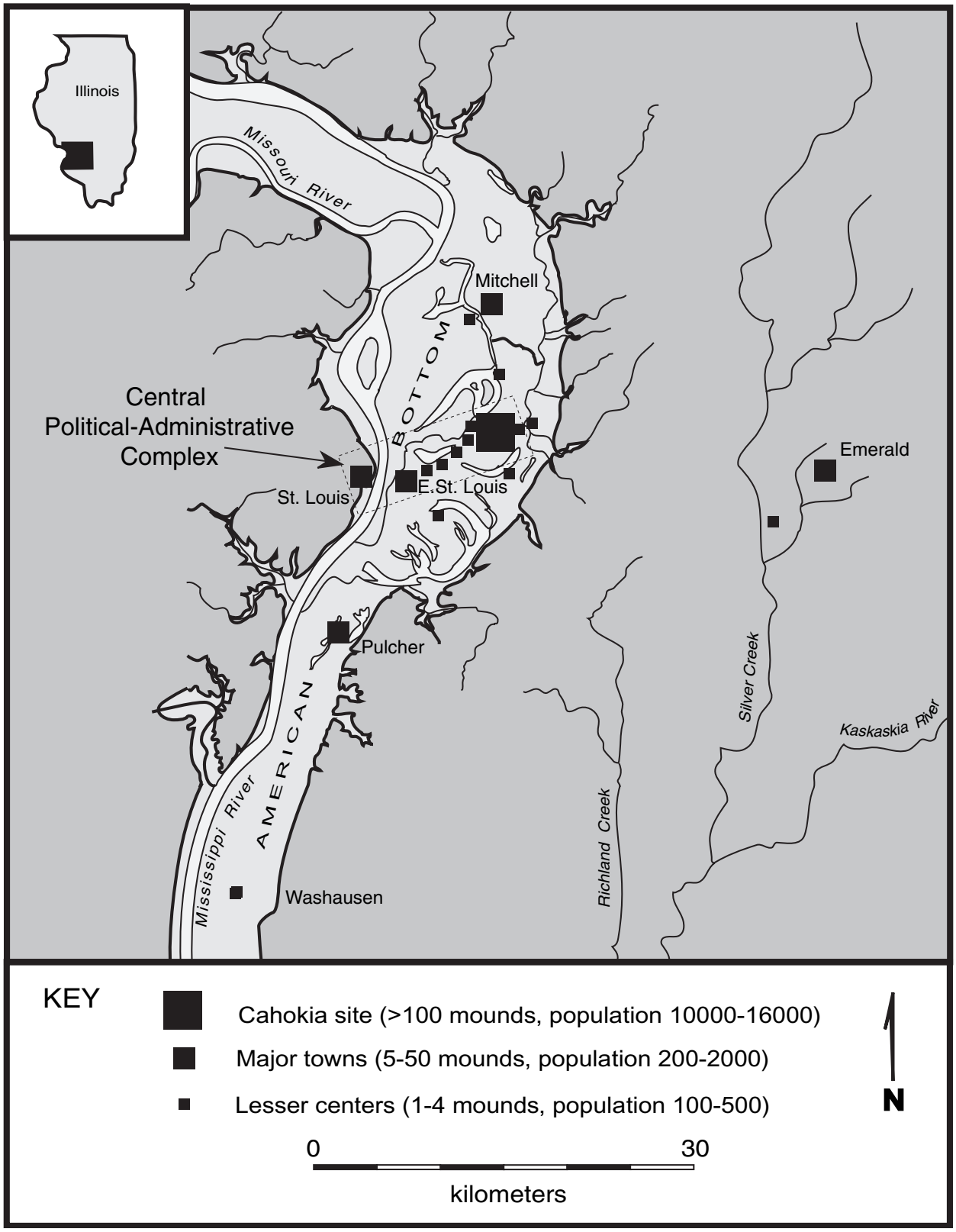


Figure 3.3. Locations of Cahokia and major Mississippian mound sites, ca. A.D. 1100 (Pauketat 2005:Figure 8.3).

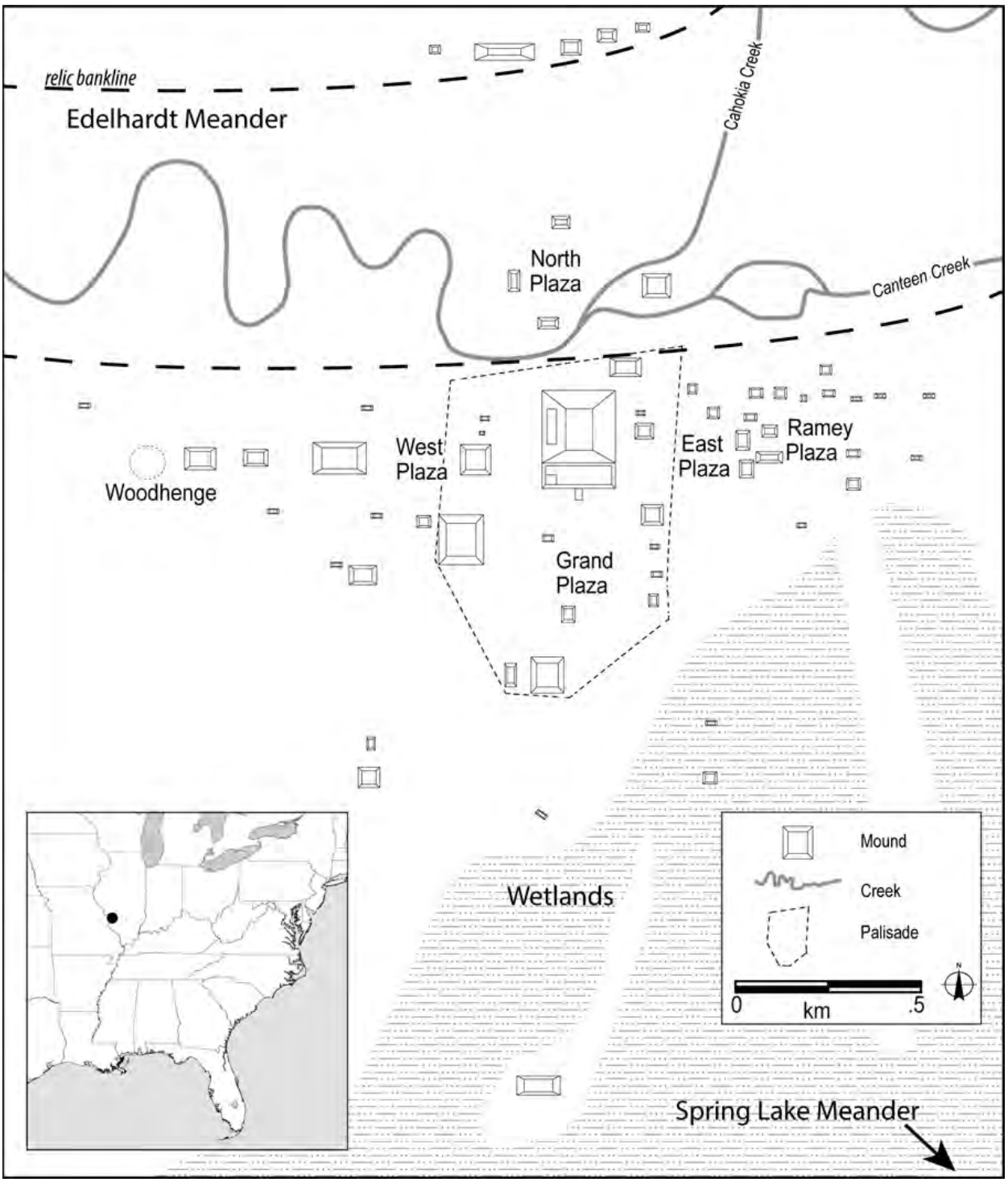


Figure 3.4. Palimpsest schematic map of central Cahokia (Schilling 2005:Figure 1).

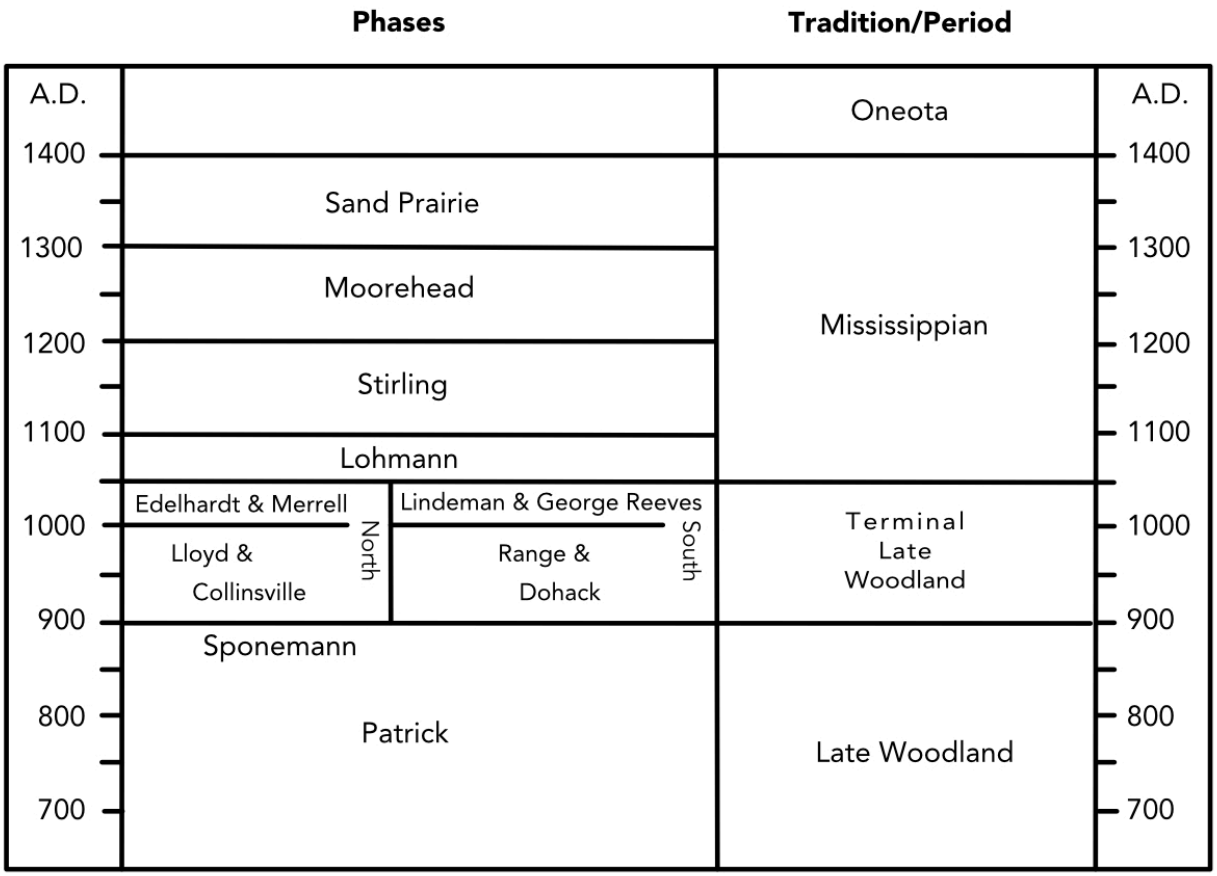


Figure 3.5. Chronology in the American Bottom (after Fortier et al.2006).

3.3.1 Pre-Mississippian Cultural Developments in the American Bottom, A.D. 650-1050

Late Woodland in the American Bottom, A.D. 650-900

The Late Woodland Patrick phase (A.D. 650-900, Figure 3.5) in the American Bottom is characterized by gradual increases in population, community size and complexity, and reliance on cultivation (Fortier and Jackson 2000; Kelly 1990; Koldehoff and Galloy 2006; Milner 1998). Domestic structures were generally small, semi-subterranean keyhole and rectangular buildings constructed using single-set posts very similar to Late Woodland structures in southern Illinois and Wisconsin (Kelly 1990; Milner 1990:15). Over time, rectangular structures mostly replaced

the keyhole form and average house size decreased (Kelly 1990:74-75, 108). Larger, presumably public structures became common in larger settlements, sometimes attached to central "community squares" (Fortier et al. 2006:191; Kelly 1990). Other sites were small, single family homesteads. Subsistence was based on wild plant and animal resources and horticulture of native cultigens (Koldehoff and Galloy 2006; Simon and Parker 2006). Floodplain and uplands forests were cleared to make space for cultivation (Munoz et al 2014). Maize appeared sporadically at Late Woodland sites (Simon and Parker 2006).

Early Patrick phase ceramics included grog-tempered (crushed ceramic) cordmarked globular or subconical jars and bowls decorated with interior lip impressions and sometimes small lugs, effigy heads, or spouts (Kelly 1990). Over time, ceramic tempering shifted from grog to limestone, jars with constricted orifices became more common, lip lugs became more frequent than notching, and handles were added to some vessels (Kelly 1990). Stumpware appeared for the first time (Kelly 1990:76). Overall, between A.D. 650 and 900 populations increased, settlement patterns became more complex, maize was introduced (but is present in low quantities), and ceramic styles began to diversify.

Terminal Late Woodland, A.D. 900-1050

Between A.D. 900 and 1050, people in the "Emergent Mississippian" or "Terminal Late Woodland" (as it is now typically called; Figure 3.5; Fortier and McElrath 2002; Fortier et al. 2006; Kelly et al. 1984) periods in the American Bottom continued to live in small, sedentary, nucleated communities, sometimes with houses organized into clusters surrounding central community squares with associated public buildings, central posts, or storage pits (like the Range and BBB Motor sites; Kelly 1990; Kelly et al. 1984; Milner 1990:14-15). Most domestic

structures were small, rectangular, semi-subterranean single-set post buildings without the extended “keyhole” entrances (Alt and Pauketat 2011; Kelly 1990; Kelly et al. 1984; Mehrer 1995; Milner 1990:15). Subsistence still included wild resources, but greater importance was placed on starchy and oily native seed crops as cultivation intensified (Munoz et al. 2014; Simon and Parker 2006). Maize rapidly increased in abundance between A.D. 900 and 975 and by A.D. 1050 was an important component of the diet alongside native seed crops (e.g., Hedman et al. 2002; Schoeninger 2009:635; Simon and Parker 2006:230-232).

Terminal Late Woodland ceramics are characterized by limestone, grit, and grog tempering agents but during the Edelhardt phase between A.D. 1000 and 1050 shell-tempered ceramic technology appeared (Holley 1989:3; Kelley et al. 1984). Vessel forms during the Terminal Late Woodland include jars, bowls, pans, bottles, stumpware, and seed jars (Holley 1989; Fortier et al. 2006; Kelly et al. 1984:134-139; Pauketat 1998a:137). Most jars had smooth surfaces rather than cordmarked exteriors or had cordmarking only on their lower bodies, but red-slip surface treatment also occurred (Holley 1989:3; Kelly 1990, 2000; Kelly et al. 1984). Lip impressions and lugs continues as decoration styles; some vessels also have thickened lips, impressions and/or loop handles (Kelley et al. 1984:147).

Overall, the period between A.D. 900 and 1050 saw several changes that would become important parts of the subsequent Mississippian period: first, centralized community squares with associated public buildings became more formalized in some villages; second, maize became an important part of the diet alongside native starchy and oily seed crops, and cultivation contributed a major component of the diet; and third, ceramic styles diversified and crushed mussel shell was added as a tempering agent.

3.3.2 The Mississippian Period in the American Bottom, A.D. 1050-1350

Lohmann phase, A.D. 1050-1100

The Mississippian period in the American Bottom formally begins with the Lohmann phase (A.D. 1050-1100). Shell-tempered pottery became common during the Lohmann phase and vessel forms continued in their diversity, including bowls, bottles, stumpware, beakers, funnels/seed jars, and jars with extruded rims and sharp, angular shoulders called Powell Plain (Holley 1989; Pauketat 1998a:159). Lohmann phase subsistence was based on intensive agriculture of maize and native crop cultivation, in addition to utilization of floodplain plant and animal resources (Milner 1990:5-6; Munoz et al 2014; Simon and Parker 2006:233). Nearly all Lohmann phase assemblages contain evidence of maize (Simon and Parker 2006:235).

An architectural shift to wall-trench construction also occurred after A.D. 1050, which involves erecting posts or possibly pre-fabricated walls into previously dug linear trenches. Wall-trenches are visible archaeologically as linear soil stains of a different color from the surrounding soil, caused by the decaying walls or by infilling of topsoil after wall placement or removal. (Alt and Pauketat 2011; Pauketat 1998a; Pauketat and Alt 2005). Cahokian wall-trench structures are typically semi-subterranean and rectangular with straight, parallel walls, approximately 90° corners, and length:width ratios that are approximately 0.6-0.7 (Figure 1.3; Collins 1990; Conrad 1991; Emerson 1991; Mehrer 1995; Pauketat 1998a, 2003; Pauketat et al. 2015). The well-defined pattern of uniform rectangular wall-trench houses is easily seen in the large mechanically-stripped excavation blocks at Cahokia and other sites in the American Bottom like the BBB Motor and Julien sites (e.g., Collins 1990:17; Emerson and Jackson 1984:227; Milner 1984:16; Pauketat 1998a). Special L-, T-, and cross-shaped structures are also found in the Cahokia area during the Lohmann phase (Collins 1990:76; Pauketat 1998a). In the 15B and

Dunham excavation tracts at Cahokia, the Terminal Late Woodland community pattern of houses clustered around courtyards appears to have ceased. Instead, houses were segregated bimodally by size and were possibly arranged around central plazas (Pauketat 1998a:135). Lohmann phase residential areas in central Cahokia were established in unoccupied locations, possibly due to population nucleation (e.g., the ICT-II tract; Collins 1990:229-230).

The population of the northern American Bottom and surrounding uplands is estimated to have rapidly peaked during the Lohmann phase, likely due to an influx of people from some southern floodplain sites and from elsewhere (Betzenhauser 2017; Milner 1990; Pauketat 2003; Pauketat and Lopinot 1997; Slater 2014; White et al. 2018). Some Terminal Late Woodland villages in the floodplain were depopulated by the start of the Lohmann phase (e.g., Kelly 1990), possibly moving to the largest population aggregation at Cahokia itself (Betzenhauser 2017), while other outlying sites were replaced by low-density farmsteads (Betzenhauser 2017; Milner 1990). Dispersed farmsteads were established between A.D. 1050 and 1100 in the uplands east and south of Cahokia (the "Richland Complex") in places with no immediately prior occupations (Pauketat 2003).

The central portion of Cahokia itself was radically reorganized into a formal arrangement of mounds and plazas over the course of the Lohmann phase (Figure 3.4; Holley et al. 1993; Pauketat 2002; Schilling 2015). At the center was a massive "Grand Plaza" flanked by eight mounds, including Monks Mound, the largest ancient monument north of Mexico. Both were likely constructed between A.D. 1050 and 1100, and the main body of Monks Mound may have been built in as few as five years, based on Bayesian analysis of radiocarbon dates from the mound (Holley et al. 1993; Schilling 2015). Significant earthmoving was required to modify the

ridge-swale topography to create a level surface, and Monks Mound is estimated to be the result of hundreds of thousands of basket-loads of soil (Holley et al 1993; Schilling 2015:23.

Stirling Phase, A.D. 1100-1200

During the subsequent Stirling phase (A.D. 1100-1200), residential buildings continued to be constructed in a similar style as in the Lohmann phase with wall-trench foundations, rectangular shapes with fairly straight, parallel walls, approximately 90° corners, and without complex entrances (Alt and Pauketat 2011; Collins 1990:17; Pauketat 1998a). Community reorganization occurred in at least one part of Cahokia between Lohmann and Stirling phases (Tract 15A [Pauketat 1998a]) in which residential space approximately 1 km west of Monks Mound was vacated and repurposed for monumental works in the form of four sequential rings of wood posts ranging in diameter from 72 to 138 m ("woodhenges" [Fowler 1997:110]). Their construction during the Stirling phase is indicated by radiocarbon dates, Terminal Late Woodland and Lohmann phase refuse in the postmolds, an absence of Stirling phase or later artifacts in the postmolds, and three instances of postmolds superimposed over Lohmann phase buildings (Pauketat 1998a:122). Other residential areas persisted from the Lohmann phase (e.g., in the Dunham tract immediately south of the woodhenges and the ICT-II tract at the east side of the Grand Plaza; Collins 1990; Pauketat 1998a). Three residential "compounds" surrounded by wall-trench palisades with circular bastions found to the west of Monks Mound and the Grand Plaza may be elite households attached to the central monuments (Pauketat 2013:88, 91, 301).

Stirling phase pottery was generally shell-tempered, and the signature pottery types were thin-walled, sharp-shouldered jars. Other vessel forms include bowls, pans, seed jars, water bottles, beakers, funnels/juice presses, and stumpware (Holley 1989; Pauketat 1998a:157). Some

vessels were treated with red slip (Monks Mound Red), especially seed jars (Holley 1989:47; Pauketat 1998a:159). Sharp-shouldered jars were either undecorated (Powell Plain) or were decorated with incised motifs called Ramey Incised (Figure 1.2; Griffin 1949). The Ramey Incised type is a diagnostic marker of the Stirling phase (Griffin 1949; Holley 1989). Its presence at Aztalan and radiocarbon dates firmly align the site with the Stirling phase (Richards 2003; Richards and Jeske 2002). In fact, stumpware is the only Stirling phase vessel form not present at Aztalan (Richards 2003:147). Stirling phase material culture, especially pottery, has been found in varying quantities at numerous outlying sites in Cahokia's "northern hinterlands" (e.g., Benden et al. 2011; Boszhardt 2004; Claflin 1991; Conrad 1991; Emerson 1991; Emerson et al. 2007; Finney and Stoltman 1991; Hendrickson 1996; McConaughy 1991; Millhouse 2012; Pauketat et al. 2015; Salkin 2000; Tiffany 1982, 1991). I review many of these sites in a separate section below.

Cahokia's bastioned palisade wall surrounded Monks Mound, the Grand Plaza, and adjacent mounds (Figure 3.4). Feature superposition and radiocarbon dates indicate the first iteration of the wall may have been constructed near the end of the Stirling phase (Fowler 1997:190), but statistical analyses of radiocarbon dates indicate it may have been constructed during the Moorehead phase in the early to mid-1200s (Schilling 2010:269-270) or after A.D. 1250 (Krus 2013:85-87). Palisade construction after A.D. 1200 may explain the use of walled elite residential compounds. The main palisade was rebuilt three times and each of the four building episodes utilized wall-trench construction (Iseminger et al. 1990). The first iteration featured circular bastions, the second iteration had square bastions with closed backs where the bastion joins the curtain, and the third and fourth iterations used smaller square bastions with open backs where the bastion joins the curtain (Iseminger et al. 1990). Each iteration utilized

larger diameter posts than the one before, resulting in fewer posts and lesser labor requirements (Krus 2011). Average postmold diameter ranged from 20.3 to 30.9 cm between the first and fourth iterations (Krus 2011:235). The initial main palisade around the Grand Plaza and mounds was very similar to the residential compound palisades in terms of design and postmold diameter.

Archaeobotanical evidence for the Stirling phase comes from sites across the northern American Bottom, covering the full range of settlement variation from small, single-structure farmsteads to residential areas at Cahokia and East St. Louis (Simon and Parker 2006:Table 13). Subsistence remained based on intensive cultivation of maize and native seed crops, especially Maygrass and *Chenopodium* (Simon and Parker 2006:241). However, the dispersed Richland Complex farmsteads in the uplands east and southeast of Cahokia were almost all abandoned by A.D. 1150 (Pauketat 2003). Nutshell is abundant at the upland sites prior to their abandonment.

Moorehead Phase, A.D. 1200-1300, and Cahokia's Reorganziation

The tradition from Stirling to Moorehead phases marks a turning point in the history of Cahokia and Mississippian peoples in the American Bottom. Much of the East St. Louis site was catastrophically burned late in the Stirling phase and never rebuilt, in an event that Pauketat and colleagues have interpreted as a ritual closure of the civic-ceremonial center (Pauketat et al. 2013). The final woodhenge monument was dismantled by the start of the Moorehead phase and the space was once again filled with domestic residences, indicated by the superposition of Moorehead houses over woodhenge postmolds (Pauketat 1998a:120). However, the Dunham tract immediately to the south was vacant, and the ICT-II tract at the east edge of the Grand Plaza had fewer structures than during earlier phases, positioned only on the highest terrain

(Collins 1990:230). Moorehead phase houses continued the rectangular wall-trench pattern from earlier phases, but were larger, squarer, and less densely present within the site (Pauketat 1994:128, 139). The community-wide segregation of bimodal house sizes seen in the Lohmann and Stirling phases ceased; instead, different-sized structures were intermingled (Pauketat 1994:139).

Moorehead phase subsistence data come from 12 sites across the northern American Bottom (Simon and Parker 2006:241). All assemblages from these sites reflect continuing reliance on agricultural production focused on maize and, to a lesser extent, native seed crops. Wild plants and animals continued to be exploited.

Shifts in Moorehead ceramic practices are evident in the residential contexts at Cahokia (Collins 1990; Pauketat 1998): Most ceramics produced during the Moorehead phase were tempered with shell, but some were also tempered with grog. Moorehead vessel forms include jars, bowls, bottles, funnels, beakers. Bowls increase representation, but seed jars are almost totally absent. Ramey Incised jars are present in the early Moorehead phase but disappear completely by A.D. 1250 (Pauketat 1998a:217). An additional change from Lohmann and Stirling phases is the re-appearance and abundance of cordmarking as a surface treatment on jars (Pauketat 1998a:217).

As discussed above, the bastioned, wall-trench palisade surrounding Monks Mound, the Grand Plaza, and adjacent mounds was probably started in the mid-1200s. Later iterations were certainly constructed during the Moorehead phase, with the fourth and final wall probably built after A.D. 1300 in the subsequent Sand Prairie phase (Krus 2013:87).

Less-dense residential areas at Cahokia, the burning and abandonment of East St. Louis, fecal stanol levels, and the abandonment of the dispersed upland Richland Complex sites support

an inference that the population of the greater Cahokia area began to decline prior to A.D. 1200 (Milner 1998; Pauketat 2003; Pauketat and Lopinot 1997, White et al. 2018). Pauketat and colleagues (Pauketat et al. 2013) have argued that possible ritual closure of the East St. Louis complex corresponds with the regional disappearance of special circular, T-, and L-shaped buildings, possibly resulting from changes to the Cahokian political-religious system. Construction and reconstruction of the massive palisades during the Moorehead phase may indicate increased regional hostilities after A.D. 1250 (Krus 2013:94). In the context of population decline and changes to the political-religious system, palisade construction may represent a shift from sacred to secular attempts at legitimization of chiefly authority, as has been suggested for Mississippian societies in the Savannah River Basin (Anderson 1990).

The reorganization of Cahokia may also relate to a catastrophic flood ca. A.D. 1200 that would have flooded much of the American Bottom (Munoz et al. 2015). Such an event would have driven people from their homes in the floodplain and would have required major rebuilding of communities, compounding the effects of other political, religious, and social changes that were already underway. Fecal stanol levels from Horseshoe Lake sediments indicate that the population of Cahokia continued to decline after A.D. 1200 (White et al. 2018). The Mississippian phenomenon centered around Cahokia was completely dissolved by A.D. 1350 (Milner 1998; Pauketat 1994).

3.3.3 Summary of Mississippian and Late Woodland Lifeways

Overall, Mississippian and Late Woodland material culture differ in distinctive ways that are easily recognizable archaeologically during the time period of Aztalan's co-resident occupation (A.D. 1100-1200). Mississippian pottery was primarily shell-tempered and was

produced in a variety of forms, including diagnostic Ramey Incised jars decorated with incised lines (Griffin 1949; Holley 1989). Meanwhile, Late Woodland pottery vessels in southern Wisconsin and northern Illinois ca. A.D. 1100-1200 were grit-tempered jars, were primarily collared wares, and were decorated with cord impressions and/or notches (Kelly 2002; Rosebrough 2010; Stevenson et al. 1997; Stoltman and Christiansen 2000).

Mississippian houses during the Stirling phase (A.D. 1100-1200) were rectangular with straight, parallel walls, 90° corners, lacked complex entrances, and were constructed using wall-trenches (Alt and Pauketat 2011; Pauketat 1998). In contrast, Late Woodland structures were rectangular, ovoid, or irregular shapes generally constructed using single-set posts and sometimes had extended "keyhole" entrances (e.g., Meinholz and Kolb 1997; Salkin 1992, 2000). Palisades were first constructed at Cahokia around small residential compounds between A.D. 1100 and 1200, and between A.D. 1200 and 1350 around Monks Mound, the Grand Plaza, and adjacent mounds (Figure 3.4; Iseminger et al. 1990; Krus 2013; Pauketat 2013:88, 91). All palisades at Cahokia featured bastions, were constructed using wall-trenches, and had postmolds at least 20 cm in diameter. Late Woodland palisades (found primarily in southeast Wisconsin, with a few exceptions) lacked bastions, were constructed using single-set posts, and used smaller diameter posts (e.g., Salkin 1993:215).

In addition to material differences, the lifeways of Mississippian peoples from the vicinity of Cahokia and Late Woodland peoples in southern Wisconsin and northern Illinois ca. A.D. 1100-1200 would have also differed. American Bottom Mississippian society was hierarchical with complex community organization and a regional settlement hierarchy (Milner 1998; Pauketat 1994), whereas northern Late Woodland societies are inferred to be less complex and more mobile, with only some larger, more permanent settlements appearing in southeastern

Wisconsin. Mississippian subsistence generally emphasized maize agriculture (though maize was not consumed equally by all Mississippian peoples in the greater Cahokia area [e.g., Ambrose et al. 2003; Schoeninger 2009:635-636; Hedman et al. 2009]), while most Late Woodland groups utilized wild plants and animals to greater degrees, supplemented with native cultigens and some maize (particularly in southeast Wisconsin, but never to the degree of Mississippians). Overall, Mississippian and Late Woodland peoples had distinct traditions, material culture, and socio-political systems. They surely would have noticed these differences during their interactions.

However, they also may have been accustomed to coalescent communities in which people of diverse backgrounds lived among each other. Rosebrough has inferred from stylistic diversity in Late Woodland material culture (2010) that multiple, independent, yet interacting Late Woodland communities existed in southern Wisconsin and northern Illinois, who practiced different levels of mobility within the same space. A diverse Mississippian population at Cahokia has been argued by Slater and colleagues (Slater et al. 2014) based on strontium isotope values of burials from a variety of contexts across the site. Their results show people with distinct geographic origins were present in every mortuary context they investigated, covering multiple areas of Cahokia and representing a range of statuses (inferred from mortuary contexts). Mississippian and Late Woodland peoples who were already familiar with diversity in their own social networks may have been open to coalescence together.

3.4 Mississippian Expansion and Interaction in Cahokia's Northern Hinterlands

Mississippian-style artifacts, structures, and platform mounds in various combinations and quantities at many sites in Cahokia's "northern hinterlands" (see below) indicate northward movement of people, materials, and ideas out of the American Bottom (e.g., Boszhardt 2004; Emerson 1991; Emerson et al. 2007; Finney and Stoltman 1991; Emerson 1991:229;

McConaughy 1991; Pauketat et al. 2015; Stoltman 1991b, 1991c; Richards 2003). The kinds and quantities of Mississippian material culture at northern sites vary greatly: Some northern sites with ceramic assemblages dominated by Late Woodland types have yielded relatively small amounts of Mississippian-style pottery (e.g., Bethesda Lutheran Home, Iva, and Weisner III; Boszhardt 2004; Hendrickson 1996; Salkin 2000), while other sites have yielded larger amounts of Mississippian artifacts as well as platform mounds and Mississippian-style site layout (e.g., at Aztalan, John Chapman in northwest Illinois, and in the town of Trempealeau in western Wisconsin (Emerson et al 2007; Green and Rodell 1994; Millhouse 2012; Pauketat et al. 2015; Richards 1992, 2003; Schroeder and Goldstein 2016). Ceramic petrography has repeatedly demonstrated that Mississippian-style vessels at many sites were likely imports from the American Bottom (Pauketat et al 2015:278; Porter 1966; Stoltman 1989, 1991; Stoltman et al. 2008). Sites with the richest and most complete Mississippian assemblages like in the Apple River Valley of northwest Illinois, and in western Wisconsin at the Fisher Mounds Site Complex and in the town of Trempealeau are the most convincing candidates for community-scale human migration. Many other sites with more limited Mississippian assemblages may be the result of trade or the movement of fewer Mississippian individuals.

In an attempt to make sense of the great variation in Mississippian representation in Cahokia's northern hinterlands and draw regional interpretations about Mississippian, Late Woodland, and Oneota interaction, James Stoltman has categorized Midwestern sites into five "culture contact situations" based on the relative proportions of Mississippian and non-Mississippian artifacts (especially pottery), the "completeness" of the Mississippian assemblage, the presence of non-portable Mississippian material culture, and the cultural context (Table 3.2;

Stoltman 1986, 1991, 2000). I present each "contact situation" and use them to organize descriptions of northern sites with varying kinds and quantities of Mississippian material culture.

Table 3.2. James Stoltman's Culture Contact Situations (1986, 1991b, 2000).

Contact Situation	Description	Inference about Interaction	Site Examples
1	Portable Mississippian artifacts makes up a relative minority among an otherwise Late Woodland assemblage	Native Late Woodland group with at least indirect contact with Mississippians, such as through trade.	Bell, Bethesda Lutheran Home, Hamilton-Brooks, Iva, Klug Island, Weisner III
2	Portable and non-portable Mississippian material culture among an otherwise Late Woodland assemblage. Mississippian-style structures, mounds, and/or site layout are present.	Minority Mississippian population living among a Late Woodland majority.	Aztalan? Rench, Shire, Collins
3	Portable Mississippian artifacts makes up a relative minority among an otherwise Late Woodland assemblage with no local antecedent.	Intrusive Late Woodland group with at least indirect contact with Mississippians, such as through trade.	Fred Edwards, Hartley Fort
4	"Complete" Mississippian assemblage of portable and non-portable material culture, including artifacts, ecofacts, structures, mounds, and site layout. Site is consistent with Mississippian sites in the American Bottom.	Immigrant Mississippian population intrusive into a region of otherwise Late Woodland sites. A minority Late Woodland component may be present.	Aztalan? Orendorf, Eveland, Lawrenz Gun, Larson, John Chapman, Lundy, Mills, Fisher Mounds, Trempealeau, Silvernale, Bartron, Mero, Bryan
5	Oneota sites with pottery assemblages that show similarities with Mississippian pottery styles, especially Ramey Incised motifs.	Oneota populations influenced by Mississippian contact, or that developed out of Late Woodland/Mississippian interaction.	Silvernale, Bartron, Mero, Bryan, Carcajou Point, Crescent Bay Hunt Club

3.4.1 Contact Situation 1 - Late Woodland sites with some portable Mississippian artifacts

Culture Contact Situation 1 is identified by the presence of a limited number of diagnostic Cahokian Mississippian artifacts (especially Ramey Incised and Powell Plain pottery) that are minority items found in Late Woodland contexts dominated by Late Woodland material culture. Stoltman suggests these sites indicate indirect or maybe limited direct contact between Mississippian and Late Woodland peoples, possibly through trade and exchange.

Many Late Woodland sites in southern Wisconsin and Iowa have yielded diagnostic Stirling Mississippian material culture among an otherwise Late Woodland site assemblage. Some examples are Bethesda Lutheran Home, Weisner III, and Klug Island in southeastern Wisconsin, Bell and Hamilton-Brooks in east-central Wisconsin, Iva in western Wisconsin, and Mill Creek sites in northwestern Iowa (Boszhardt 2004; Hall 1967:179; Goldstein et al. 1989; Hendrickson 1996; Salkin 2000; Tiffany 1991). In each case Mississippian pottery makes up a minority component of the total ceramic assemblage, and hybrid pottery was found at Bethesda Lutheran Home and Iva (Boszhardt 2004; Hendrickson 1996). Some (like Hamilton-Brooks, Weisner III, and some Mill Creek sites) appear to have had basic Late Woodland-style palisades without bastions (Salkin 2000; Tiffany 1991), while Wittrock, a Mill Creek site in northwest Iowa, had a bastioned palisade (Tiffany 1991:186). All of these sites are at least partially contemporaneous with the Stirling phase in the American Bottom. Overall, these Situation 1 sites demonstrate that Mississippian artifacts were widespread across the upper Midwest, and Late Woodland populations had at least intermittent contact with Mississippians, or other Late Woodland groups, with ties to the American Bottom.

3.4.2 Contact Situation 2 – Mississippian Culture in Otherwise Late Woodland Context

Culture Contact Situation 2 is also identified by the presence of a minority of Mississippian artifacts in a predominately Late Woodland cultural context, but with "greater richness and completeness of the cultural inventory of Mississippian materials" than in Situation 1 (Stoltman 1991b:350). Situation 2 sites have more than just portable Mississippian artifacts and also include non-portable attributes like Mississippian-style platform mounds, plazas, site layout, and Cahokian-style wall-trench structures. But, Stoltman suggested that Mississippian migrants were demographic minorities at these sites. Stoltman initially based Situation 2 on Aztalan (Stoltman 1991b:350), but some other sites in central and eastern Illinois (Rench, Shire, and Collins) also fit the qualifications.

Aztalan as interpreted in the second half of the 20th Century

Stoltman argued that the presence of Mississippian-style platform mounds, plaza, palisades, and site layout at Aztalan strongly suggest the presence of a "governing Mississippian elite" (Stoltman 1991b:350). Extensive excavations of Mississippian-style platform mounds, palisades, and wall-trench architecture in the residential area by the Wisconsin Archeological Survey (WAS, 1949-1954) and State Historical Society of Wisconsin (SHSW, 1962, 1964, 1967) supported interpretations of a substantial Mississippian component at Aztalan. Previously, Barrett argued that the Mississippian tradition was "unquestionably the main and dominant culture type" at Aztalan (Barrett 1933:371) and suggested that Cahokia was the "parent cultural center" (1933:60). However, analyses of ceramic assemblages that followed the WAS and SHSW excavations (Bleed 1970; Baerreis and Freeman 1958; Hall 1991:13) led scholars like Stoltman and Robert Hall to conclude that pottery at Aztalan was predominantly Late Woodland

and that Mississippian pottery was in the minority (Hall 1991:13; Stoltman 1986:29, 1991:350). In his first discussion of his contact situations Stoltman suggested that Aztalan had a predominantly Late Woodland context and described the site as a "Late Woodland outpost with a resident elite who were agents of, or possibly even immigrants from, Cahokia" (1986:29), perhaps as a way of reconciling the abundance of Late Woodland pottery with the Mississippian-style monumental architecture and site layout.

However, two lines of research published since the early 1990s (discussed in greater detail in Chapter 4), suggest that 1) Mississippian pottery was not a minority and actually accounts for nearly half of pottery at Aztalan (Richards 1992, 2003; see Christiansen 2003:223 for an alternative interpretation); and 2) both local and non-local people were interred side-by-side in the "obvious elite class mortuary structure" (Stoltman 1986:29) on the northwest mound (Price et al. 2007). These newer lines of evidence lead me to suggest that perhaps more Mississippians lived at Aztalan than was thought in earlier decades and complicate the narrative that a minority of Mississippian elites ruled over a much larger Late Woodland population.

Central and Eastern Illinois

The Rench site in the central Illinois River valley has also yielded American Bottom Powell Plain pottery among a predominately Late Woodland assemblage (McConaughy 1991; McConaughy et al. 1985). In addition, hybrid pottery is indicated by grit-tempered versions of Mississippian forms. Most of the site is made up of an early Late Woodland component, but two adjacent structures contained the Powell Plain pottery and yielded wood charcoal radiocarbon dates that together indicate contemporaneity with Lohmann or Stirling phases in the American Bottom. One of the structures is an archetypal Cahokian wall-trench house and the other is of

single-set post construction (McConaughy et al. 1985). The presence of the wall-trench structure and Mississippian pottery suggest a Mississippian occupation. Mississippian migrants may have joined an existing Late Woodland community, indicated by the earlier Late Woodland component. The Shire site in central Illinois and the Collins site in eastern Illinois also have Mississippian architecture and artifacts mixed in predominately Late Woodland assemblages (Claflin 1991; Douglas 1976).

3.4.3 Contact Situation 3 - Mississippian artifacts at intrusive Late Woodland sites

Culture Contact Situation 3 is similar to Situation 1 (Late Woodland sites with a minority of Mississippian materials) but differs in that the Late Woodland materials also appear to be non-local in origin. Stoltman based Situation 3 on evidence from two sites, Fred Edwards in southwestern Wisconsin and Hartley Fort in northeast Iowa (Finney 2013; Finney and Stoltman 1991; Stoltman 1991a; Tiffany 1982). Both sites yielded Late Woodland pottery that appears not to have any local antecedents and Ramey Incised and Powell Plain pottery that have been petrographically sourced to the American Bottom. The site layouts are also unusual for their respective areas, with Hartley Fort enclosed by a Late Woodland-style wooden palisade atop an earthen embankment, and Fred Edwards organized into clusters of single-set post houses surrounding small courtyards. Fred Edwards also had a Late Woodland-style palisade without bastions. Both sites have hybrid pottery that are Mississippian forms but grit-tempered. Finally, Hartley ware ceramics and Aztalan Collared pottery were found at Fred Edwards, possibly indicating interaction and/or movement of people among the Fred Edwards, Hartley Fort, and Aztalan (Finney 1993:150-151). Together, Hartley Fort and Fred Edwards provide evidence of

Late Woodland population movement and some form of interaction between Late Woodland peoples in the upper Midwest and American Bottom Mississippians.

3.4.4 Contact Situation 4 - Intrusive Mississippian sites on a Late Woodland landscape

Culture Contact Situation 4 sites are Mississippian sites that are intrusions into regions of Late Woodland sites that formerly were, or still were, occupied by local non-Mississippian peoples. Some of these sites may have a relative minority of Late Woodland materials. Stoltman suggests these are the best evidence of Mississippian migration, and I argue that Barrett's interpretations of Aztalan in the early twentieth century as a primarily Mississippian site fits Situation 4 (Barrett 1933:60, 370-371). Situation 4 sites are primarily found in four areas along the main Mississippi River trench (Apple River Valley, Fisher Mounds, Trempealeau, and Red Wing) and in the central Illinois River valley. Two exceptions are Gottschall Rockshelter, located inland in western Wisconsin, and Aztalan, located on a relatively small river more than 360 river kilometers from the Mississippi River (Figure 1.1).

Aztalan as interpreted in the early to mid-20th Century

Barrett recognized the presence of both Mississippian and Late Woodland pottery at Aztalan (Barrett 1933:298-344) but also saw strong similarities in artifacts and mounds between Aztalan and Cahokia and other Mississippian sites to the south (Barrett 1933:60, 80, 82, 370-371). He argued that the Mississippian tradition was "unquestionably the main and dominant culture type" at Aztalan (Barrett 1933:371) and suggested that Cahokia was the "parent cultural center" (1933:60). The Mississippian-centric perspective persisted during and after the Wisconsin Archaeological Survey excavations between 1949 and 1954 and is illustrated by

Baerreis and Freeman's view that Aztalan was founded by Mississippian migrants who had incorporated Late Woodland people into their community (Baerreis and Freeman 1958:36). As discussed above in Contact Situation 2, interpretations of Aztalan from the 1950s through 1980s argued for a substantial Late Woodland population and a fewer number of Mississippian elites.

Central Illinois River Valley – Central Illinois

In the central Illinois River valley seven "temple towns" with platform mounds arose after A.D. 1000 in an area that had previously been, and to a lesser extent may still have been, occupied by Late Woodland peoples (Conrad 1991:119-120; Green and Nolan 2000:360-368). Orendorf, Larson, Kingston Lake, and Crable had single platform mounds while Hildemeyer, Lawrenz Gun Club, and Walsh were multi-mound sites (Conrad 1991). Extensive excavations at Orendorf revealed more than 150 wall-trench structures (with nearly 300 rebuilding stages combined) organized around a plaza and surrounded by a bastioned palisade (Conrad 1991:132-136). Most pottery vessels at Orendorf are Powell Plain jars or are decorated with motifs similar to Ramey Incised. A minority are shell-tempered, cordmarked hybrids (Conrad 1991:135-136). Another site, Eveland does not have a platform mound itself but its associated cemetery, Dickson Mounds, does (Conrad 1991; Harn 1980). Eveland has American Bottom Mississippian pottery types, some local and regional Late Woodland types, and hybrids that are either grit-tempered Mississippian forms or shell-tempered Late Woodland forms (Conrad 1991). Most structures at Eveland are consistent with Cahokian wall-trench houses. Overall, there is strong evidence for substantial Mississippian occupations in the central Illinois River valley in an area that had previously been occupied by Late Woodland people. Diverse forms of hybrid pottery suggest continuous Mississippian and Late Woodland interaction after Mississippian site development.

Apple River Valley – Northwest Illinois

In northwest Illinois, a cluster of sites at the confluence of the Apple and Mississippi Rivers consists of two mounded settlements (John Chapman and Mills) with smaller hamlets and farmsteads (such as Lundy and Savanna Proving Ground) surrounding them (Emerson 1991; Emerson et al. 2007; Millhouse 2012:81-82). The area was occupied by Late Woodland peoples just prior to, or at the time of, the appearance of Mississippian culture materials there (Benn 1997). Emerson (1991) has argued that between A.D. 1050 and 1200 the Apple River sites closely matched Lohmann and Stirling phase Mississippian sites near the American Bottom in artifacts, mounds, and site layout, but also incorporated Late Woodland-style cordmarking and lip notching on otherwise Mississippian vessels. Grit-tempered sherds with Mississippian-style incised lines, chevrons, and/or rim forms are also found (Emerson 1991). Both single-set post and wall-trench buildings are present. The two mound centers, John Chapman and Mills, may have been palisaded (Emerson 1991:176; Millhouse 2012:330). Millhouse's excavations and detailed analyses of the John Chapman site (2012) led him to argue that it was occupied by co-resident Mississippian immigrants and local Late Woodland peoples. In all, the Apple River sites are very reminiscent of Aztalan in that they contain Stirling phase artifacts and Mississippian-style mounds and site layout, but also have substantial evidence of Late Woodland occupation and interaction. The difference is that Aztalan apparently lacked the surrounding hamlets and farmsteads that were found around the John Chapman and Mills mound centers (Goldstein and Gaff 2002).

Fisher Mounds and Trempealeau – Western Wisconsin

Farther north, approximately 900-950 km up the Mississippi River from Cahokia, are two other Mississippian occupations in western Wisconsin: The Fisher Mounds Site Complex (FMSC) in Stoddard, and the Little Bluff, Pelkey, and Uhl sites in Trempealeau. At FMSC, both Edelhardt (A.D. 1000-1050) and Lohmann phase (A.D. 1050-1100) structures, pottery, and lithic artifacts were found (Benden 2004; Pauketat et al. 2015; Stoltman et al. 2008). Several stone discoidals ("chunkey stones," found at many Mississippian sites) and at least one Cahokia tri-notch projectile point have also been found in the vicinity by local collectors (Benden 2004). Pottery at FMSC has been petrographically sourced to the American Bottom (Stoltman et al. 2008). Of the four structures discovered at Fisher Mounds, one was composed of single-set posts and the other three of wall-trench construction (Pauketat et al. 2015). Architecture and lithic materials at FMSC may correspond with the transition from Edelhardt to Lohmann phases in the American Bottom (Pauketat et al. 2015). During the Edelhardt to Lohmann transition in the American Bottom, wall-trench structures generally replaced single-set post construction and there was a greater utilization of Burlington rather than Ste. Genevieve chert (Alt and Pauketat 2011; Koldehoff and Brennan 2010). Overall, the material assemblage at FMSC is consistent with late Edelhardt and Lohmann phase assemblages in the American Bottom.

The Mississippian occupation in Trempealeau, approximately 50 km north of FMSC, is indicated by a blufftop three-tier arrangement of platform mounds, two other singular platform mounds below the bluff, wall-trench houses, Lohmann phase pottery, and lithic raw materials common in the American Bottom (Benden et al. 2011; Boszhardt et al. 2012; Green and Rodell 1994; Pauketat et al. 2015). Three platform mounds are arranged into stepped terraces on a blufftop above residential areas with wall-trench structures and residential debris. Another

platform mound with adjacent wall-trench structures is located approximately 350 meters southeast, and a fifth north of that. Most of the excavations in Trempealeau have occurred in since 2010 and the sites are located in modern residential areas, so the area between these individual sites has seen relatively little testing (Pauketat et al. 2015). Even so, the Trempealeau sites together paint a picture of a spatially extensive Mississippian occupation.

At both FMSC and Trempealeau, as much as 89% of pottery and 80% of lithic artifacts may have been imported from the American Bottom (Pauketat et al. 2015; Stoltman et al. 2008). The pottery, lithics, structures, and platform mounds all suggest an influx of Mississippian peoples from the American Bottom. However, little evidence has been found at either site complex of any sustained interaction with local Late Woodland peoples (Pauketat et al. 2015). One explanation may be that the FMSC, at least, was settled in an unoccupied area in a buffer zone between Late Woodland territories (Boszhardt and Goetz 2000). Hostile interactions between immigrants and local peoples could have also resulted in an absence of Late Woodland materials at the Mississippian sites, but currently there is no evidence to support this [Pauketat et al. 2015]).

Red Wing Area – Southeast Minnesota

Other possible evidence of Mississippian population presence has been found at several Oneota sites (Silvernale, Bartron, Mero, Bryan) around Red Wing, Minnesota in the form of Mississippian-style pottery, platform mounds, and other Mississippian artifact types and motifs like long-nosed god masquettes, earspools, chunkey stones, and side-notched triangular points (Emerson 1991:229; Gibbon 1991; Gibbon and Dobbs 1991; Maxwell 1950; Rodell 1997). A wall-trench structure was found at Bartron but its wall-trench was nearly a meter wide,

significantly thicker than recorded for wall-trench structures at Cahokia (Gibbon 1991:213). Several rectangular and circular single-set post structures were discovered at Bryan. The diverse suite of Mississippian traits around Red Wing is argued by Emerson to be the result of Mississippian population movement (1991:229). However, Oneota pottery bears many technological and stylistic similarities to Mississippian pottery. Mississippian and Oneota shell-tempered pottery sherds were found in the mound fill of numerous conical mounds and a panther effigy mound at Mero/Diamond Bluff, illustrating the complicated relationships between Oneota, Mississippian, and Late Woodland traditions in the area (Maxwell 1950:441; Rosebrough 2010:212-213).

Gottschall Rockshelter – Southwest Wisconsin

Gottschall Rockshelter in southwestern Wisconsin may also represent Mississippian movement, but in a very different way from the other Situation 4 sites. The rockshelter contains numerous pictographs, some of which depict symbols and human figures that are strongly linked to Mississippian iconography (Salzer 1987). The pictographs include general and specific Mississippian iconographic motifs such as forelocks, rhomboid-shaped eyes, Mississippian-style long-stemmed pipes, concentric circles, the "Akron Grid" pattern, forked eyes, and others (Salzer 1987:454). These are motifs found at major Mississippian mound centers like Cahokia, Spiro, and Etowah, most notably in engraved shell (Brown 2007; King 2007; Reilly and Garber 2007). Some of the pictographs may depict several characters from the Red Horn legend told historically by the Ho-Chunk, including Red Horn (also called He-who-wears-human-heads-as-earnings; Hall 1997:148-151; Salzer 1987). While Gottschall Rockshelter lacks Mississippian

artifacts, structures, and platform mounds, it may provide evidence of Mississippian intrusion into a region of Late Woodland peoples.

3.4.5 Contact Situation 5 – Oneota stylistic copying of Mississippian pottery

Culture Contact Situation 5 is identified as Oneota sites with pottery that shows stylistic copying of Ramey Incised iconography and Powell Plain morphology and technology. Specifically, some Oneota pottery motifs (e.g., scrolls, nested chevrons, and nested arches) bear strong resemblance to Ramey Incised decorations (Figure 3.6; Boszhardt 1994; Hall 1962:11, 55, 128; Overstreet 1997:257; Schneider 2015:75-76; Stoltman 1986:29-30). While there are similarities in temper, vessel morphology, and decoration, Oneota pottery in eastern Wisconsin have higher rims and rounder shoulders than Ramey Incised and Powell Plain pottery (Overstreet 1997; Schneider 2015; Stoltman 1986:30). The cultural similarities between Oneota and Mississippian traditions have led some scholars to argue that Oneota developed out of sustained Mississippian influences on Late Woodland peoples through northward movement of Cahokian migrants, goods, and information (Gibbon 1972; Stoltman 1986; Theler and Boszhardt 2006). As discussed in Situation 4, diverse Mississippian artifacts are found alongside Oneota pottery at Oneota sites around Red Wing, Minnesota. These sites may illustrate the complex interactions between Mississippian, Late Woodland, and Oneota peoples and the fluidity of cultural practices in such situations.

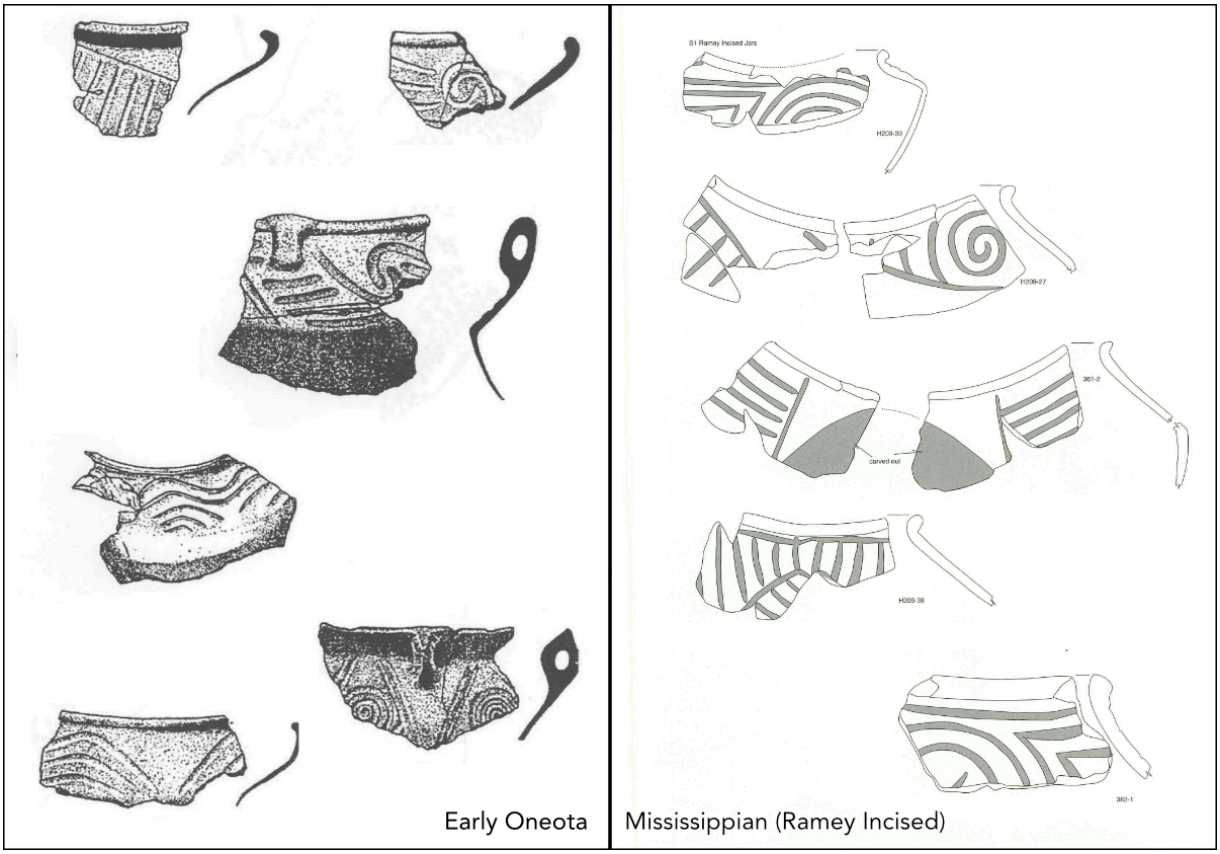


Figure 3.6. Comparison of contemporaneous Oneota and Mississippian pottery motifs. Oneota pottery illustrations from multiple sites in Wisconsin and Minnesota (modified from Overstreet 1997:Figure 10.9). Mississippian pottery from Cahokia (modified from Pauketat 1998a:Figure 7.28).

3.4.6 Summary of Culture Contact Situations

These scenarios of culture contact between Late Woodland and Mississippian peoples range from limited interaction indicated by the presence of few Mississippian artifacts at otherwise Late Woodland sites (Situations 1 and 3) or the possible copying of Mississippian stylistic elements (Situation 5), to the northward intrusion of migrants from the American Bottom indicated by suites of Mississippian artifacts, architecture, and monuments (Situations 2 and 4). The dispersal of Mississippian peoples from the American Bottom into various northern areas has been referred to by some as a diaspora (e.g., Cobb 2005:567; Emerson and Hedman 2015:156; Millhouse 2012; Pauketat et al. 2017:208). Upon reaching their destinations,

Mississippian migrants and their descendants experienced varying kinds of interaction with local populations: sometimes they were apparently a minority living among local Late Woodland peoples (Rench, Shire, and Collins); at other places they established more typical Mississippian towns with some Late Woodland occupants (in the central Illinois River and Apple River valleys). The Mississippian population at Aztalan has been interpreted by some as a demographic minority (Situation 2; Hall 1991:13; Stoltman 1986:29, 1991b:350) and by others as a majority (Situation 4; Baerreis and Freeman 1958:36; Barrett 1933:371) relative to Late Woodland residents. The size of migrant and local groups plays a role in interaction (e.g., Stone 2000, 2003), and the presence of hybrid practices (pottery) could be seen as a tentative indicator of integration at these sites (Alt 2006a, b; Burmeister 2000; Deagan 1990; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Meyers 2002). The occupants of Fisher Mounds and Trempealeau apparently had no local interactions at all (and thus no local support networks), which I speculate could have contributed to their short occupation histories (though Pauketat et al. 2015 explain them as repeated temporary occupations). It could have also played into their successful settlement (even if short-lived) by eliminating the possibility of marginalization and conflict.

Integration of Mississippian migrants in Cahokia's "northern hinterlands" among Late Woodland populations would have been influenced by the historical particulars of each place and the people involved. Movement of people over the landscape would have involved interactions with numerous groups between Cahokia and the final destination areas, each one potentially influencing each other's practices. However, one commonality of apparently successful Mississippian occupations in the central Illinois and Apple River valleys was the presence of some Late Woodland groups with permanent, walled communities and maize-based diets (Benn 1997; Green and Nolan 2000:360-368). That way of life would have been somewhat familiar to

Mississippian people from the American Bottom. Likewise, those Late Woodland groups may have been receptive of life in Mississippian communities if they already lived in similar communities and had similar diet. These cultural similarities could have facilitated interaction and would have aided successful establishment of migrant populations (Clark 2001; Kroskrity 1993; Stone 2000, 2003). Some Late Woodland sites in southeastern Wisconsin also yielded evidence of more permanent, walled settlements and maize consumption, so similarities in lifestyle could have played a role in integration at Aztalan. My analyses of domestic structures, pottery, and palisade walls examines integration from other dimensions.

3.5 Chapter Summary - Interaction and Mississippianization

The preceding discussion lays out strong evidence that Late Woodland and Mississippian peoples in the upper Midwest produced different forms of material culture and had different practices, that they interacted with one another in various ways through trade and co-residence, and that Mississippian people certainly migrated north out of the American Bottom to Aztalan, Rench, the central Illinois River Valley, the Apple River valley, Fisher Mounds, Trempealeau, the Red Wing area, and possibly Gottschall Rockshelter. Late Woodland sites with at least some portable Mississippian artifacts are scattered across the upper Midwest, and sites with the most convincing evidence of Mississippian occupations are found along the Mississippi and central Illinois River valleys. Aztalan, located more than 360 river kilometers from the Mississippi River, is the exception.

Northward dispersal of Mississippian peoples from the American Bottom has been referred to by some as a diaspora with varying kinds of interaction with local populations (e.g., Cobb 2005:567; Emerson and Hedman 2015:156; Millhouse 2012; Pauketat et al. 2017:208). However, those interactions are also usually discussed in terms of Late Woodland culture change

and their adoption of Mississippian practices — "Mississippianization" (e.g., Bardolph 2014:73-76; Birmingham and Goldstein 2005:46; Christiansen 2003:1; Emerson 1991; Emerson et al. 2007; Goldstein 1991:224; Gibbon 1972; Harn 1991; Krause 1985; Millhouse 2012; Richards 1992:120, 386, 2003:146; Rosebrough 2010; Stoltman 1986; Theler and Boszhardt 2006; Wilson et al. 2017). The concept often cites Mississippian expansion, prosthelytism, and diffusion of ideas and material culture as the sources of Late Woodland culture change (Bardolph 2014:73-76). In doing so, it emphasizes Mississippian culture as static and hegemonically dominant, and Late Woodland cultures peoples are passive recipients of culture change. It is often used in a way that is asymmetrical and resembles acculturation: interaction leads to changes in Late Woodland culture, but not Mississippian culture (Silliman 2005). However, multi-cultural interaction, especially in a residential context where learning communities are exposed to each other, can result in multi-directional cultural influences (Beaudoin 2013; Deagan 1990; Dietler 2010; Peelo 2011). American Bottom Mississippians and Late Woodland populations in southern Wisconsin had sufficient geographic separation prior to Mississippian expansion that they had distinct learning communities and thus distinct cultural practices prior to their interaction. While the visible style of material culture can be imitated and technologies can be reverse-engineered, the interaction of *learning communities* results in more abundant and diverse material culture hybrids like are seen in the central Illinois River and Apple River valleys, Fred Edwards and other Late Woodland sites, and Aztalan. In the next chapter I present current Mississippian-centric narratives of Aztalan and how they are influenced by the long history of investigations there.

Chapter 4: Aztalan: Interpretations and Excavations

In this chapter I outline conventional interpretations of Aztalan and describe how they are rooted in nearly two centuries of investigations at Aztalan. Mixed Mississippian and Late Woodland material culture has been recognized at Aztalan since the earliest professional excavations at the site by Samuel Barrett in the first half of the twentieth century (Barrett 1933). Barrett's and subsequent excavations have largely focused on the palisade walls, mounds, and residential area. The site's Mississippian artifacts and Mississippian-style palisade walls and platform mounds are generally recognized as evidence of a successful Mississippian intrusion into a region of otherwise Late Woodland and Oneota populations (Birmingham and Goldstein 2005; Christiansen 2003; Price et al. 2007; Richards 1992, 2003; Stoltman 1986, 1991b, 2000; Zych 2013). However, the relationship between Mississippian and Late Woodland peoples at Aztalan is not well understood (Goldstein and Gaff 2002), nor are the strategies for Mississippian integration there.

The well-documented co-residence of Mississippian and Late Woodland peoples at Aztalan, and unanswered questions about their interactions and integration, make Aztalan a useful case example for exploring the issue of migrant success. As explained in Chapter 2, palisades, domestic structures, and pottery have great potential for revealing various public and private expressions of identity, which influences interaction. The fact that the construction methods of the palisades have rarely been analyzed in detail (Barrett 1933:49-50; Richards:1992:66-69, 163-165), and that most domestic structures at Aztalan have never been fully analyzed, make them potentially valuable sources of new information about Aztalan.

4.1 Conventional Interpretations of Aztalan

Aztalan is commonly described as a "Mississippian town" because of its Mississippian-style palisades, platform mounds arranged around a presumed central plaza, and the presence of Mississippian pottery (Barrett 1933; Birmingham and Goldstein 2005; Goldstein and Freeman 1997; Richards 1992, 2003). While physical features and site layout provide a Mississippian appearance to the community, both Mississippian and Late Woodland traditions have been recognized in the artifacts and structure foundations at Aztalan since the early twentieth century (Baerreis and Freeman 1958; Barrett 1933; Birmingham and Goldstein 2005:12, 15; Goldstein and Gaff 2002:105; Richards 1992, 2003; Zych 2013). Excavations along the Crawfish River by the University of Wisconsin-Milwaukee in 1984 revealed a refuse midden (Location E, Figure 4.1) in which the oldest strata (radiocarbon dated to the ninth century A.D.) contained only Late Woodland pottery, while more recent, intact layers radiocarbon dated to the eleventh and twelfth centuries contained Late Woodland and Mississippian pottery mixed together (Goldstein 1985; Richards 1992). The stratified refuse midden lies along the eastern edge of an area interpreted as the residential sector because of the density of structures and other features there (Figure 4.1), but another area of habitation containing early Late Woodland as well as Mississippian materials has also been found approximately 150 meters south of the palisaded area (Goldstein and Gaff 2002:104-105).

While there is evidence for an earlier Late Woodland occupation, seventeen calibrated radiocarbon date ranges from Aztalan span the period between approximately A.D. 1050 and 1250 (Figure 4.2; Goldstein and Gaff 2002; Harrison and Goldstein 2015; Krus 2013:88; Richards and Jeske 2002). Each of the seventeen calibrated date ranges partially falls between A.D. 1100 and 1200 at 1-sigma, and the abundant Mississippian Ramey Incised and Powell Plain

pottery at Aztalan are associated with the Stirling phase at Cahokia, dated to A.D. 1100-1200 (Griffin 1949; Holley 1989), so the co-resident period at Aztalan likely dates from A.D. 1100 to 1200. These stratigraphic, ceramic, and radiometric data indicate that the Aztalan location was occupied by Late Woodland peoples some centuries prior to the Mississippian arrival between A.D. 1050 and 1100, after which the site was more intensely occupied by both Late Woodland and Mississippian peoples until A.D. 1200 or 1250 at the latest (Figure 4.3).

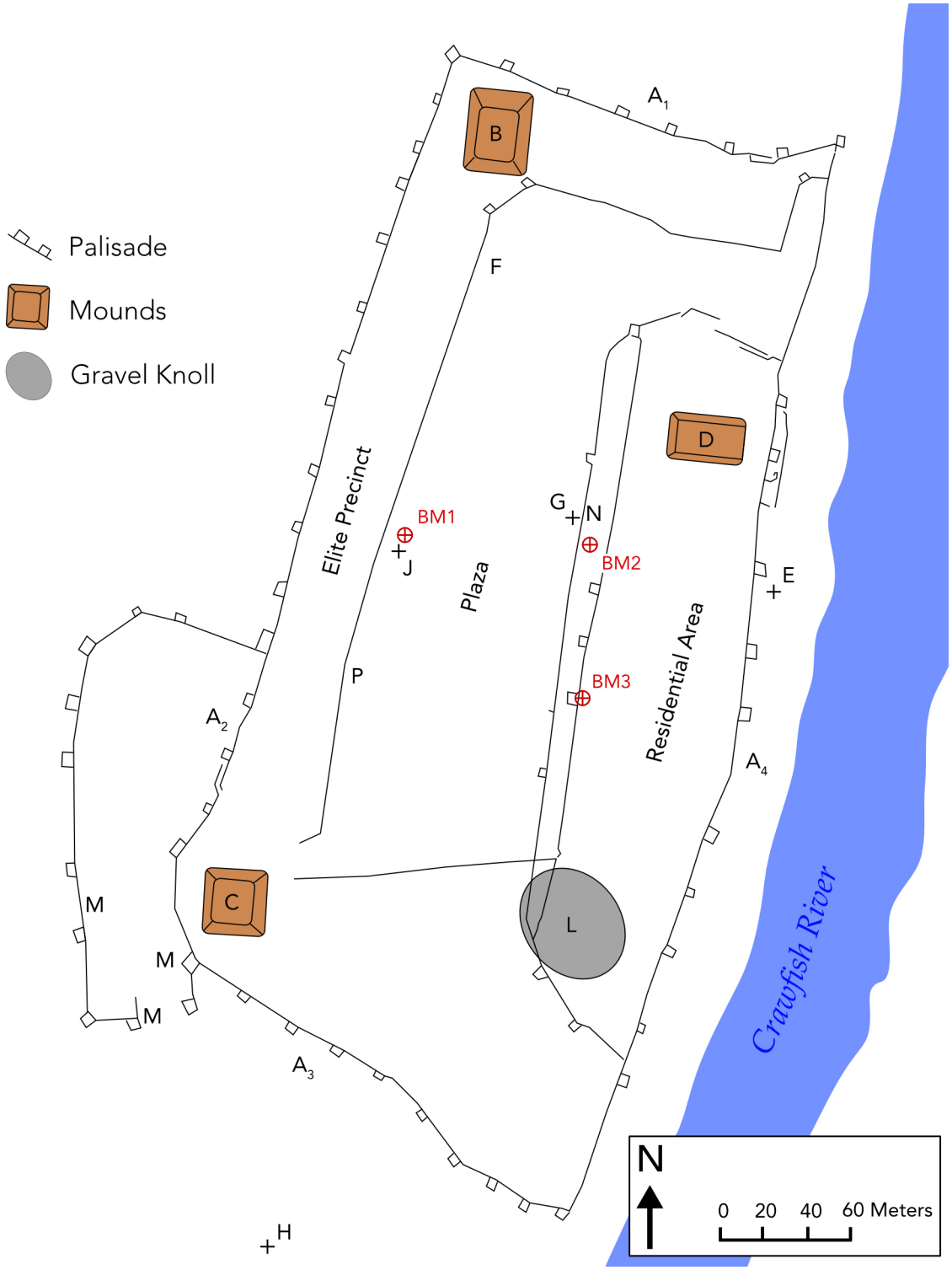


Figure 4.1. Map of palisaded area of Aztalan with key locations referenced in the text.

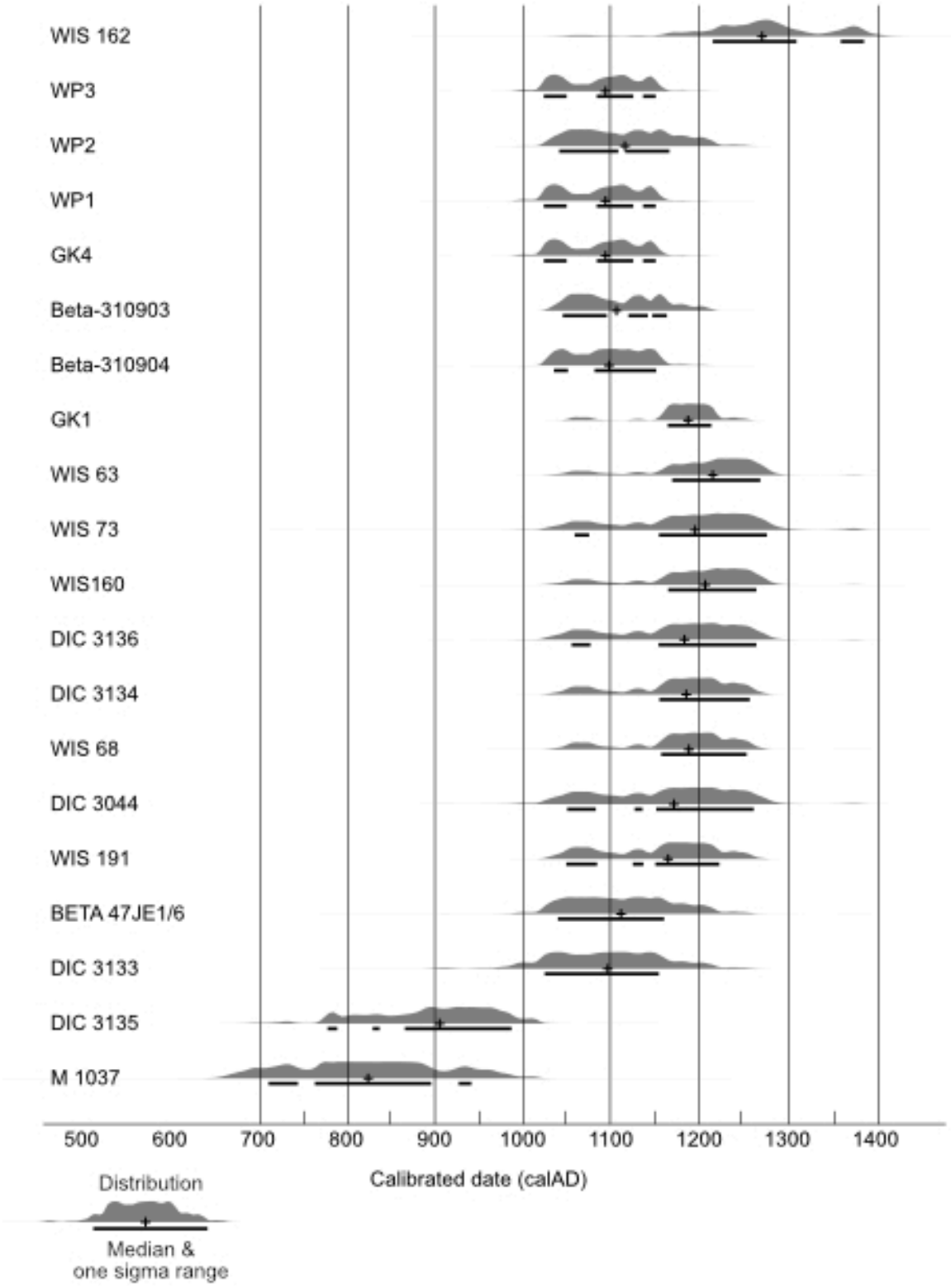


Figure 4.2. Calibrated published radiocarbon dates from Aztalan, excluding post-A.D. 1400 outliers. Calibrated using OxCal 4.3 and IntCal 13 curve. Compiled from Goldstein and Gaff 2002; Harrison and Goldstein 2015; Krus 2013:88; Richards and Jeske 2002.

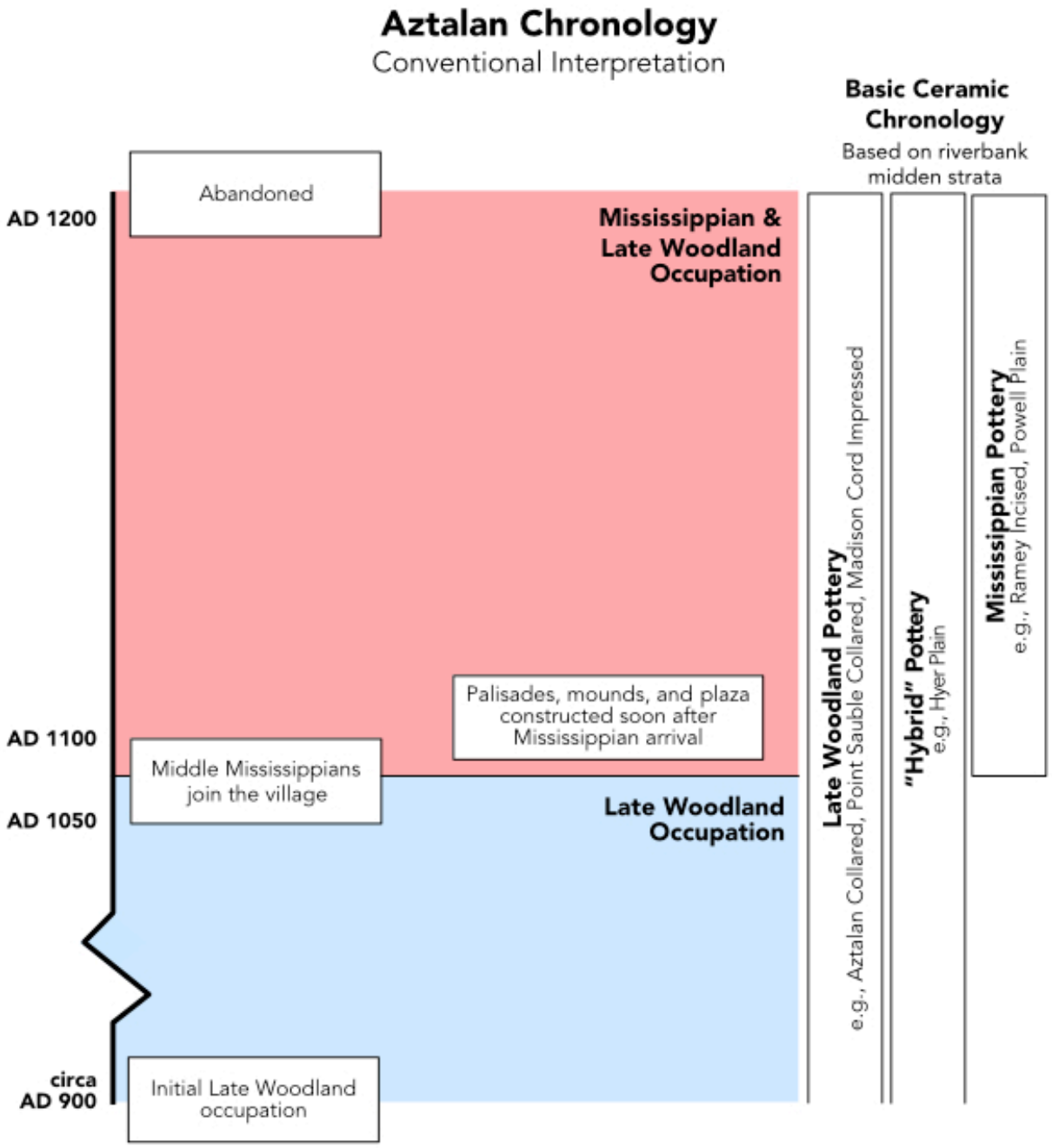


Figure 4.3. Current conventional interpretation of the chronology of Late Woodland and Mississippian occupation at Aztalan.

Cahokian pottery styles (Barrett 1933:322-342; Christiansen 2003; Richards 1992, 2003; Zych 2013), clays petrographically sourced to the American Bottom (Porter 1966; Stoltman 1991a), and strontium isotope values of human bones and teeth consistent with levels in the American Bottom (Price et al. 2007) all support the argument that strong connections existed between Aztalan and Cahokia, the presumed homeland of at least some of the Mississippians at Aztalan (Birmingham and Goldstein 2005). Moreover, at least some of the people interred at the site migrated or had their remains brought from another as-yet unidentified area (Price et al. 2007). The two (or more) groups co-resided until A.D. 1200 or 1250 when the site was abandoned for unknown reasons (Birmingham and Goldstein 2005; Christiansen 2003; Goldstein 1991; Richards 1992, 2003; Richards and Jeske 2002; Richards and Picard 2013; Richards et al. 2012).

Goldstein and Richards (Goldstein 1991; Goldstein and Richards 1991) have also argued on the abundance of collared pottery that the Late Woodland residents at Aztalan may have also originated elsewhere. The Late Woodland population may have also been internally diverse (Chapter 3; Rosebrough 2010). Likewise, the population of Cahokia grew rapidly through population nucleation of people from diverse geographic origins (Slater et al. 2014, meaning that Mississippian migrants to Aztalan and their descendants *also* may have had diverse ancestry. The demographic makeup of Aztalan is clearly not well understood, nor is the relationship between Late Woodland and Mississippian populations there (Goldstein and Gaff 2002). Despite the many unanswered questions about Aztalan, Late Woodland and Mississippian interaction there (and across Cahokia's northern hinterlands) is often discussed in terms of "Mississippianization," the transformation of the site and people from Late Woodland into Mississippian, which

emphasizes the Mississippian component. (e.g., Christiansen 2003:1; Birmingham and Goldstein 2005:46; Richards 1992:120, 386, 2003:146).

These interpretations of Aztalan are the culmination of investigations spanning nearly two centuries and reflect diverse research goals. The remainder of this chapter summaries the most significant of those investigations and discusses how they have led to current narratives about the site. Based on fieldwork by the University of Wisconsin-Madison in 2015 and 2016, I also suggest why the interpretation of Aztalan as a Mississippian dominant town should be revisited. Finally, I return to my overarching research questions about migration and interaction offer a revised interpretation of the cultural formation history of Aztalan.

4.2 Nearly two centuries of investigations at Aztalan - 1836 to 2016

As an iterative discipline, prior archaeological investigations are fundamental to current interpretations; however, the influences of longstanding views can be constraining. Lynne Goldstein neatly summarized this in an unpublished conference paper presented at the 2015 Midwest Archaeological Conference in Milwaukee, “Aztalan: How the Questions We Ask Frame the Answers We Get” (Goldstein 2015b). The most significant example at Aztalan is how the extensive palisade excavations by Samuel Barrett in the early twentieth century resulted in a narrative that the site’s physical features (palisades and mounds) were synchronous, which has guided and constrained where archaeologists have excavated since — the result of what Schroeder and Goldstein have called the hegemony of archaeological cartography (Schroeder and Goldstein 2016). Reviewing the long history of investigations at Aztalan shows how the early focus on the palisades, mounds, and site layout constrained later investigations — and highlights work that can be done to revisit interpretations of site configuration, cultural demography, and others.

4.2.1 Mid-Nineteenth-Century Investigations: Hyer and Lapham

Barrett was not the first to take an interest in Aztalan's walls and mounds. The first known Angloamerican map of the site was created by Nathaniel Hyer in 1836 and 1837 and published in the *Greenwich Eagle* in New York state, locally in the *Milwaukee Advertiser*, and in a number of other papers in the eastern U.S. (Richards 2007). In the text accompanying his maps, Hyer interpreted the rectangular embankments and mounds as being the remnants of a great walled citadel originally built of brick. Hyer is usually credited with naming the site "Aztalan" after the legendary northern ancestral homeland of the Aztecs, "Aztlan", and posited that the place must have been created by the Aztecs themselves. Hyer's published accounts of the "ruins" (wall embankments and mounds) inspired many travelers to visit the site in the following decades (Richards 2007).

In 1850 Increase A. Lapham visited the site. Lapham had considerable experience with recognizing and mapping earthen mounds in Wisconsin and, while he mapped many of the same features that were recognized by Hyer, he did so with far greater detail and accuracy (Bergland 2014; Lapham 1855). Lapham also described the site as a walled town, but his maps included earthworks, other cultural landforms, and natural landforms that did not appear on Hyer's map, including mounds outside the walls. Lapham noted at the time of his investigations that a number of amateur excavations had occurred into the mounds, including those of "money-diggers" (Lapham 1855:50).

4.2.2 1919-1954 – Barrett and the Wisconsin Archaeological Survey

Samuel A. Barrett of the Milwaukee Public Museum (MPM) conducted fieldwork at Aztalan in 1919, 1920, and 1932 (Barrett 1933). Barrett's project was the first professional

excavation at the site, and also one of the first professional archaeological excavations in Wisconsin. He was primarily concerned with testing the hypothesis that the embankments were the remnants of walls, which he confirmed when he identified lines of large post molds under the embankments. He also excavated trenches into the tops of the southwest and northeast platform mounds (Locations C and D, Figure 4.1) where he documented stratigraphy and mapped postmolds indicating mound top architecture. Apart from his extensive wall and mound excavations, he also conducted unsystematic test excavations mostly in the east portion of the site along the Crawfish River bank, where he found numerous pits and other features as well as two structures (e.g., Barrett 1933:Section IV-47, IV-51). He traced interior palisades across the "gravel knoll" in the site's southeast corner (Location L, Figure 4.1) where he also conducted several scattered test excavations. Barrett's project was a major contribution to understanding the community layout at Aztalan because of his extensive exposure of the palisades. He also identified both Mississippian and Late Woodland pottery types at the site which established that both cultural traditions are represented there (Barrett 1933:298-344). Barrett suggested the possibility that the various palisade walls were constructed sequentially as the community grew, but ultimately argued that the walls were contemporaneous constructions that divided the site into discrete areas and offered a "triple line of defense" (1933:51-53).

Barrett's "timeless" interpretive framework defined a formal residential area along the eastern part of the site (Figure 4.1), which later guided work by the Wisconsin Archaeological Survey (WAS; 1949-1954) when they focused on that area and generally avoided the area of the site thought to be a large empty plaza (Figure 4.1). The WAS projects began soon after the site was acquired by the Wisconsin Department of Natural Resources in 1948 to be a Wisconsin State Park and were conducted with the purpose of learning more about the site's walls, mounds,

and domestic structures so that features might be reconstructed as park attractions. In accordance with these goals, WAS focused on tracing out portions of palisade walls left unexcavated by Barrett, excavating into the Northwest and Southwest platform mounds, and mechanically scraping excavation blocks in the Residential Area as it was defined by Barrett (Figure 4.1). Their work unearthed portions of two structures in the Residential Area and a third structure outside the walls to the south (Location H, Figure 4.1), one structure atop the Southwest Mound, and a structure with remains of 11 individuals (dubbed the "Crematorium") atop the Northwest Mound (Maher 1958; Rowe 1958; Wittry and Baerreis 1958).

4.2.3 1962-1968: State Historical Society of Wisconsin

The results of Barrett's work, and that of WAS, guided projects by the State Historical Society of Wisconsin (SHSW) in the 1960s. In 1962, William Hurley directed a project that was focused on nearly completely exposing unexcavated sections of palisade walls, especially along the Crawfish River bank. His project was successful in exposing long sections of palisade wall, but also uncovered portions of six structures and probable-structures under the eastern palisade (Hurley 1977). Most of these structures discovered by Hurley are superimposed by (and thus predate) the easternmost palisade wall. In 1964, 1967, and 1968, SHSW conducted more excavations in the Residential Area under the direction of Joan Freeman. Freeman's investigations were specifically focused on finding domestic structures, examining the basics of daily life, and on excavating the Northeast Mound. Freeman utilized mechanical stripping to expose wide horizontal excavation blocks, which was very effective at revealing numerous structures and other features. In all, the SHSW excavations in the 1960s identified 12 structures in the Residential Area, six of which were fully exposed, bringing the total number of non-

mound top structures to 25. Results of the Freeman excavations were not fully analyzed nor published; however, the collections are starting to be used in masters and doctoral research (e.g., this dissertation; Picard 2013; Zych 2013).

4.2.4 1970s through 1990s: Goldstein and Richards (UWM)

The WAS and SHSW projects significantly expanded knowledge of the palisades and domestic architecture, but also left the plaza area relatively uninvestigated, constrained by the view established by Barrett that it was a vacant space. In the 1970s Lynne Goldstein from the University of Wisconsin-Milwaukee (UWM) began to expand Aztalan research beyond an interest in walls, mounds, and site layout. For four decades she and her students investigated Aztalan's regional context, established an occupation history, compiled a GIS of all major excavation at the site, examined uninvestigated areas, and explored mortuary behavior and ritualized landscape modification.

Goldstein, along with John Richards, initiated excavation at Aztalan in 1984 with a focus on the large domestic refuse midden in the Crawfish River bank along the site's eastern boundary to establish a site chronology and occupation history (Location E, Figure 4.1; Goldstein 1985; Richards 1992). Richards utilized pottery and radiocarbon dates from the midden's deep, intact stratigraphy to determine a cultural chronology for the site (Figure 4.3). The deepest, intact strata contained Late Woodland pottery and indicated that the site was initially occupied in the ninth century A.D. Higher intact strata contained mixed assemblages of Mississippian and Late Woodland pottery indicating that Mississippians joined the community after A.D. 1050. The two groups co-resided until A.D. 1250 when the site was abandoned for

unknown reasons (Birmingham and Goldstein 2005; Christiansen 2003; Goldstein 1991; Richards 1992, 2003; Richards and Jeske 2002; Richards and Picard 2013; Richards et al. 2012).

Goldstein and Richards also conducted limited excavations at the western edge of the Plaza to investigate erosion and site formation processes (Location J, Figure 4.1). They uncovered four shallow pit features, a maximum of 50 post molds, an isolated section of wall trench, and a large dark soil stain approximately 2x2.7 m (Richards 1992:14-15, 169). Richards interpreted these features to be the remnants of at least one structure. One feature at the center of the large dark stain contained several hundred grit-tempered sherds and rims from five Aztalan Collared vessels and five Hyer Plain vessels.

In 1988 and 1996, Goldstein conducted more field school investigations focused on the area of the plaza south of the northwest mound (Location F, Figure 4.1; Goldstein 1989; Goldstein and Gaff 2002). A member of the public alerted her that a series of ovals had become visible in the grass when viewed from atop the northwest mound, likely due to differential moisture retention of feature fill during a drought year (Goldstein, personal communication). In 1988, Goldstein observed 57 ovals and three larger rectangles visible in the ground vegetation. 1 x1 m test excavations into two ovals revealed underlying feature fill, and excavation into one of the rectangles revealed a postmold and wall-trench (Goldstein 1989:105-106). More extensive excavations in 1996 revealed numerous large pits, each more than two meters in diameter and two meters deep (Goldstein and Gaff 2002:102). Some pits contained fragments of human remains (Goldstein and Brinkman 1997). Further, geomorphological coring revealed that the landform itself may have been modified into tiers (although it may have been further modified in 1954 by removing soil from the area in order to reconstruct the Northeast Mound [Baerreis 1958; Rowe 1958]). The sculpted landform, combined with the mortuary component, led Goldstein to

name the area the "Sculptuary" (Birmingham and Goldstein 2005; Goldstein 1989:104-107; Goldstein and Brinkman 1997; Goldstein and Gaff 2002:102-104). Its discovery, like that of the possible structure excavated in 1984, demonstrated that Aztalan's "plaza" was not simply a vacant space. In 2002 Goldstein and Gaff pointed out that a large percentage of not only the plaza but the entire area within the palisade had not been excavated. My own estimate (based on the known locations and sizes of all excavations) is that less than ten percent of the residential area and less than one percent of the plaza have been excavated to date. The small sample size of 34 non-moundtop structures may be related to unequal sampling across the site and the large amount of space that has not been excavated, in general. Surely future excavations will continue to discover structures in multiple areas of the site.

4.2.5 2000-2013: Goldstein (MSU), Gaff (UNI), Richards (UWM), and Schroeder (UW)

In 2001 and 2002, Goldstein (then at Michigan State University) and Donald Gaff conducted field schools approximately 150 meters south of the palisaded area near a small stream (Goldstein and Gaff 2002). Their excavations yielded postmolds and habitation debris including Late Woodland and Mississippian pottery. A maize kernel recovered from a pit feature yielded a radiocarbon date of cal. A.D. 983-1154 (2-sigma, 100% probability distribution), which matches the period of Mississippian and Late Woodland co-residence.

Richards returned to Aztalan with a UWM field school in 2011 to conduct excavations of another riverbank midden similar to the one excavated in 1984. While the 1984 excavations were intended to develop an overall chronology of the site, the 2011 research was designed to expose sequences from the later Mississippian occupation and site abandonment (Richards et al. 2012). Several excavation units revealed undisturbed "buckshot" fill superimposed by a layer

containing Mississippian and Late Woodland artifacts, suggesting that portions of the easternmost edge of the site along the riverbank had been manually built up and leveled off during the co-resident period.

In 2013, a joint field school directed by Goldstein (MSU), Gaff (University of Northern Iowa), and Sissel Schroeder (University of Wisconsin-Madison) conducted test excavations atop the so-called "gravel knoll" in the southeast corner of the palisaded area and at the southwest corner of the site directly outside the main palisade adjacent to the Southwest Mound (Locations L and M, Figure 4.1; Goldstein 2015a; Schroeder and Goldstein 2016). Their goal was to examine how these two areas fit into the overall site layout and determine the formation history of the knoll. Eight 2x2 m test pits were placed on the knoll and revealed extensive anthropogenic modification. Each of the eight test pits exhibited distinct stratigraphy composed of alternating and mixed layers of gravel, freshwater mussel shell, sand, and various types of soil. The resulting interpretation is that the "knoll" was heavily used and built up by the ancient occupants, possibly in ways that mirrored the extensive modification and deep pits in the Sculptuary in the site's northwest corner (Goldstein 1991, 2007, 2015). Two radiocarbon dates from wood and charcoal (cal. A.D. 1025-1165 and 1155-1260) date the landscape modification of the "knoll" to the general period of Mississippian and Late Woodland co-residence (Harrison and Goldstein 2015:51-54).

Excavations in the southwest area (Location M, Figure 4.1) were designed to determine whether the unusual palisade extension in that corner of the site was fully closed (unlike depicted in Figure 4.1) and identify how the space was used. A small excavation trench was placed in the southern segment of the enclosure, where no previous excavations had taken place. No evidence of the palisade was found here; rather, archaeologists encountered an anthropogenic, horizontally

expansive gravel feature several meters in length. Three test pits placed in the interior of the enclosed space produced very few artifacts and no features (though, like with the Northwest Mound, topsoil was removed from the area in 1951 in order to reconstruct the Southwest Mound [Baerreis 1958; Maher 1958]). Together, the excavations in this area suggest that this southwest enclosure was possibly a large entryway or staging area that was used before entering through the large gate near the Southwest Mound (near location A_2, Figure 4.1).

4.2.6 Migration and Interaction at Aztalan

Most interpretations of Aztalan from the past several decades emphasize the wealth of information about palisades, pottery, mounds, and site layout, that are interpreted as products of the Mississippian occupation (e.g., Birmingham and Goldstein 2005; Goldstein 1991; Krus 2013:39-41; Richards 1992; Richards and Jeske 2002; see Schroeder and Goldstein 2006 for an alternative perspective). Because Aztalan's physical appearance is unusual for a site as far north as Wisconsin, professional archaeologists have consistently hypothesized that migration from Cahokia explains its Mississippian occupation (Baerreis and Freeman 1958; Barrett 1933; Birmingham and Goldstein 2005; Lapham 1855; Richards 2003). Several lines of evidence support this interpretation: First, Cahokian Mississippian pottery styles (especially Ramey Incised and Powell Plain) are routinely recovered from many areas of the site (Goldstein 2015:28-29; Pfaffenroth et al 2016; Richards 1992, 2003; Zych 2013). Richards has argued that Mississippian Ramey Incised pottery motifs at Aztalan (specifically, curvilinear and rectilinear designs) closely resemble a sub-set of those at Cahokia, more than any other site does (Richards 2003). Second, petrographic analysis of Mississippian sherds from Aztalan has found that at least some have paste characteristics consistent with manufacture in the American Bottom rather than

in southern Wisconsin (Porter 1966; Stoltman 2001). Finally, strontium isotope values of human bones and teeth has demonstrated that of the 20 individuals tested, three (possibly four) individuals interred in the Northwest Mound were likely recent arrivals at Aztalan from elsewhere – and their strontium isotope values are consistent with those expected for the American Bottom (Price et al. 2007). A fifth individual was born in another as-yet unidentified area. Together, these lines of evidence support the conclusion that strong connections existed between Aztalan and Cahokia, and that Mississippians from the American Bottom migrated to Aztalan or had their remains brought there after death.

However, it appears that there are no other comparable Mississippian occupations in the area. Between 1976 and 1984 Goldstein used close-interval pedestrian survey and shovel testing to survey over 7000 acres sampled from 70 square miles around Aztalan, with the goal of identifying Mississippian archaeological sites that might be related to a settlement hierarchy around Aztalan (Goldstein 1991, 1997). The project area included the lower half of the Crawfish River extending from near Mud and Chub lakes in southern Dodge County to just south of the confluence of the Rock and Crawfish Rivers in the town of Jefferson. The 15% stratified random sample resulted in over 400 new archaeological sites recorded — only six of which could be associated with the Mississippian tradition. Goldstein concluded (1991, 1997), based on the 15% stratified random sample, that Aztalan and the other very small Mississippian sites did not constitute a settlement hierarchy like other Mississippian polities (e.g., Milner and Schroeder 1999; Smith 1978).

Conflict between Aztalan and other populations in the region has been posited as reason for Aztalan's position on the landscape and its massive palisades (Krus 2013:95-96; Richards 1992:419-420; Richards and Jeske 2002; Zejdlik Rudolf 2009). Violence, warfare, and captive-

taking were common components of Mississippian culture, as inferred from the widespread construction of labor- and resource-intensive palisade walls after A.D. 900, especially at Mississippian sites (Emerson 2007; Krus 2013; Milner 1999, 2000); artistic motifs in a variety of media that depict warriors, captives, and trophy-taking (Alt 2008; Cobb and Giles 2009; Dye 2007; Emerson 2007); and key kinds of skeletal trauma like parry fractures, celt blows to the head, and embedded projectile points (e.g., Milner et al. 1991). Captives were probably present at Aztalan, as they likely were in many Mississippian societies and ancient societies in general (Alt 2008; Cameron 2008, 2011). For example, "mourning wars" were sometimes undertaken by the Iroquois to obtain captives for adoption to replace their deceased (Hall 1997:32-33, 42-43; Seeman 2011:109). The Iroquois specifically targeted the Huron-Wendat in the early 1600s for captive-taking because they were culturally very similar in language, religious beliefs, architectural styles, and diet (Seeman 2011:109-110).

Katie Zejdlik Rudolph argued (2009) that the people of Aztalan were involved in regional violence based on her analysis of skeletal trauma at Aztalan. I agree that regional violence between Aztalan Late Woodland, and Oneota groups was likely, but internal violence among the residents of Aztalan has not been formally investigated. Therefore, I explore an alternative to a violence-based narrative for the relationship between Mississippian and Late Woodland peoples internally at Aztalan, framed around willing aggregation rather than slavery or coercion for several reasons. In ancient non-state societies captives were primarily obtained as individuals through raiding and warfare (Cameron 2011), and the riverbank midden excavations by Goldstein and Richards showed an existing Late Woodland population at Aztalan prior to Mississippian arrival. If the Late Woodland population was taken captive, it would be a case of conquest rather than raiding and would involve the abduction of many people who would then

need to be either enslaved, imprisoned, or adopted. Further, the roughly equal proportions of Late Woodland and Mississippian materials from a variety of contexts found across the site, including mixed together, indicates that Late Woodland practices were prevalent during the period of co-residence. Zych (2013) has argued that Late Woodland and Mississippian practices and materials were also blended during construction of the Northeast Mound (Location D, Figure 4.1) in a way that established a new, hybridized community. So, while the presence of Mississippian-style platform mounds typically associated with Mississippian elites may be explained by conquest or coercion, this does not adequately account for the considerable mixing of Late Woodland and Mississippian artifacts. Human remains showing evidence of violence and trophy taking (Zejdlik Rudolph 2009) could have possibly resulted from Mississippians violently conquering the local population, but those remains may also reflect regional hostility (Krus 2013:95-96; Richards 1992:419-420; Richards and Jeske 2002; Zejdlik Rudolf 2009), leaving open the possibility that Mississippian migrants were successful for reasons other than violent domination.

4.3 UW-Madison Geophysics and Excavation in 2015 and 2016

My dissertation research was inspired by questions about Mississippian success and multi-cultural interaction at Aztalan, and by the value of revisiting longstanding interpretations about the site (Goldstein and Gaff 2002; Price et al. 2007; Schroeder and Goldstein 2016; Zych 2013). My research relies on archival documents from old excavations and new fieldwork to analyze domestic structures, a sample of associated pottery, and re-examine the palisade walls (hypotheses are laid out in Chapter 2 and methods in Chapter 5). While excavations by the SHSW in the 1960s nearly doubled the number of non-mound top structures documented at the site, as of 2015 only 28 non-mound top structures were known inside the palisaded area or

immediately outside of it. New fieldwork was conducted in an attempt to increase the sample of known domestic structures at the site and recover materials from structures using systematic screening.

In 2015 and 2016 the University of Wisconsin-Madison conducted geophysical survey and excavations to locate and excavate domestic structures within the residential area and at the boundary of the residential area and plaza. Our fieldwork is summarized here; for greater detail see Appendix IV.

The 2015 primary field crew consisted of Sissel Schroeder (Director), Jake Pfaffenroth (Co-Director), and eight undergraduate and graduate field school students[1]. Consultancy was provided in the field for short periods by Dr. David A. Anderson of the University of Wisconsin-La Crosse, Dr. John Panuska of the UW-Madison Department of Biosystems Engineering, Dr. Lynne Goldstein of Michigan State university, and Dr. Donald Gaff of the University of Northern Iowa. The 2016 field crew consisted of Sissel Schroeder (Director), Jake Pfaffenroth (Co-Director), Marissa Lee (field supervisor), and seven undergraduate students[2].

At the start of the 2015 field season, fluxgate gradiometer (magnetometry) and ground-penetrating radar (GPR) surveys were conducted to locate soil anomalies that might be structures and other features for excavation (Pfaffenroth et al. 2016). Two areas within the residential zone and extending into the adjacent plaza were surveyed, comprising 4,800 square meters divided into 20x20 m blocks (Figure 4.4). Several geophysical anomalies were identified in the plaza and residential zone. The preliminary GPR data revealed a north-south running linear anomaly that

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[1] Jessica Button, Shannon Caldwell, Consuelo Guevara Knoch, Jessie Kovach, Marissa Lee, Gabrielle Peterson, Jess Rodriguez, and Sarah Tate. Gregg Jamison and Heather Walder also assisted.

[2] Emily Eichstadt-Anderson, Lupe Granados, Kirsten Hines, Timothy Lemond, Kelly Martin, Sarah Taylor, and Kenneth Xavier. Gregg Jamison also assisted.

corresponds with the location of the westernmost inner palisade line separating the Residential Area and Plaza, and at least partially excavated by Barrett in 1932 (Location N, Figure 4.1). We identified a rectilinear anomaly in the plaza immediately west of the linear (palisade) anomaly (Location G, Figure 4.1). The area within the rectilinear anomaly showed signatures of sub-plowzone compacted soil surfaces while the margins of the rectilinear anomaly showed less compact soil. Magnetometry data also revealed numerous anomalies consistent with pit features, and several consistent with size and shape of structures at Aztalan. Magnetometry also clearly identified earlier excavations.

A total of nine test pits were excavated in 2015 and 2016 (Figure 4.4). Six test pits were positioned to ground truth the rectangular GPR anomaly in the plaza and the adjacent north-south linear (palisade) anomaly (Figure 4.5). These test pits revealed extensive superimposed cultural features and numerous post molds I interpret as the remains of six structures (Figure 4.6). Two are defined as semi-subterranean basins lacking remains of postmolds or wall-trenches; three were identified as basin-shaped features ringed by postmolds. The sixth possible structure is defined by a linear arrangement of postmolds with entryway, although these linear postmolds could also be the corners of two adjacent structures. I interpret them as a single structure because their pattern resembles other structures excavated at Aztalan (SHSW-1964-H3 and SHSW-1964-H6; Appendix I). The fill in structure basins contained both Mississippian and Late Woodland pottery, indicating that they were abandoned and infilled during the period of co-residence or post-date it.

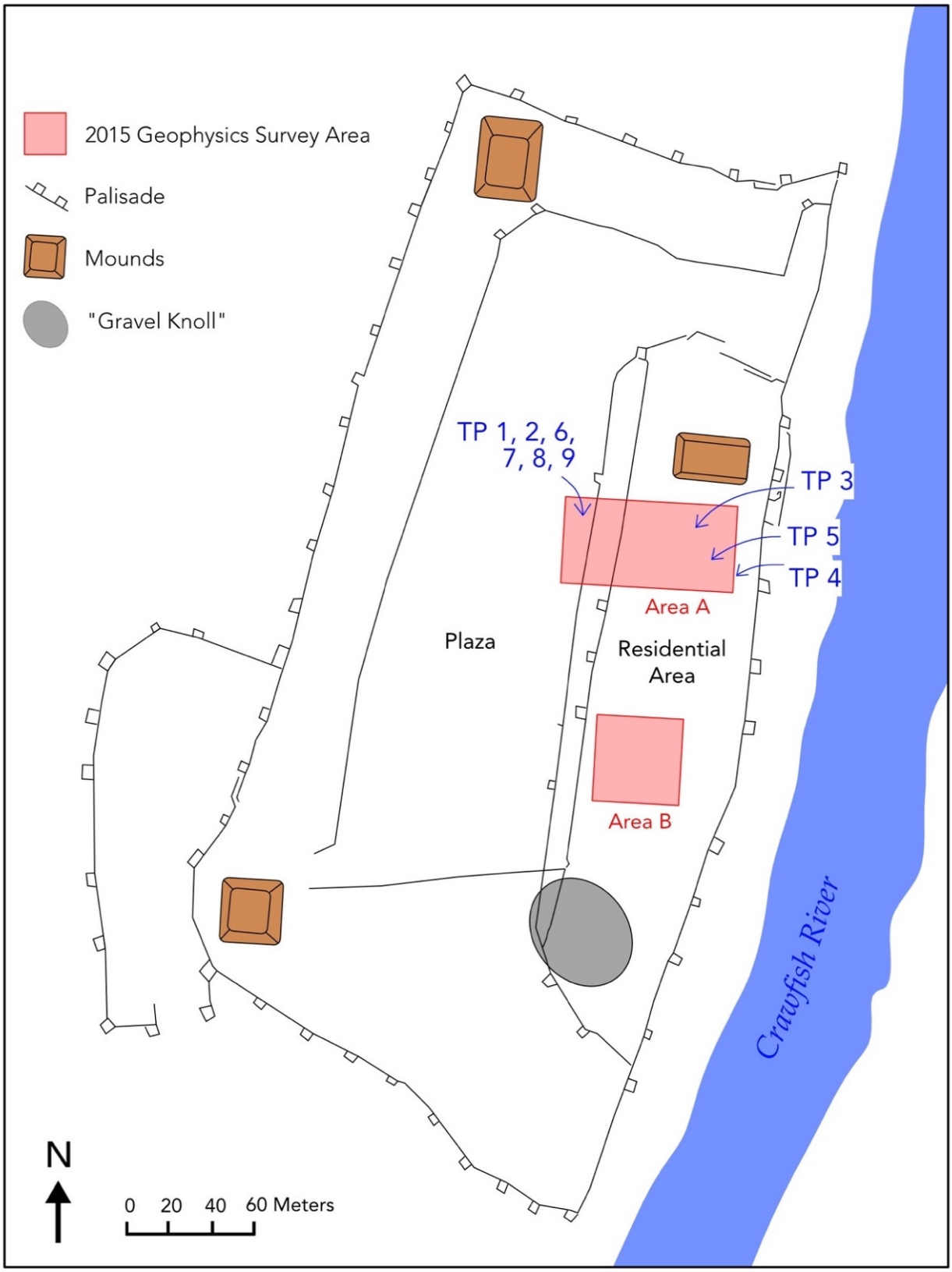

Figure 4.4. Locations of 2015 and 2016 geophysics and excavations.

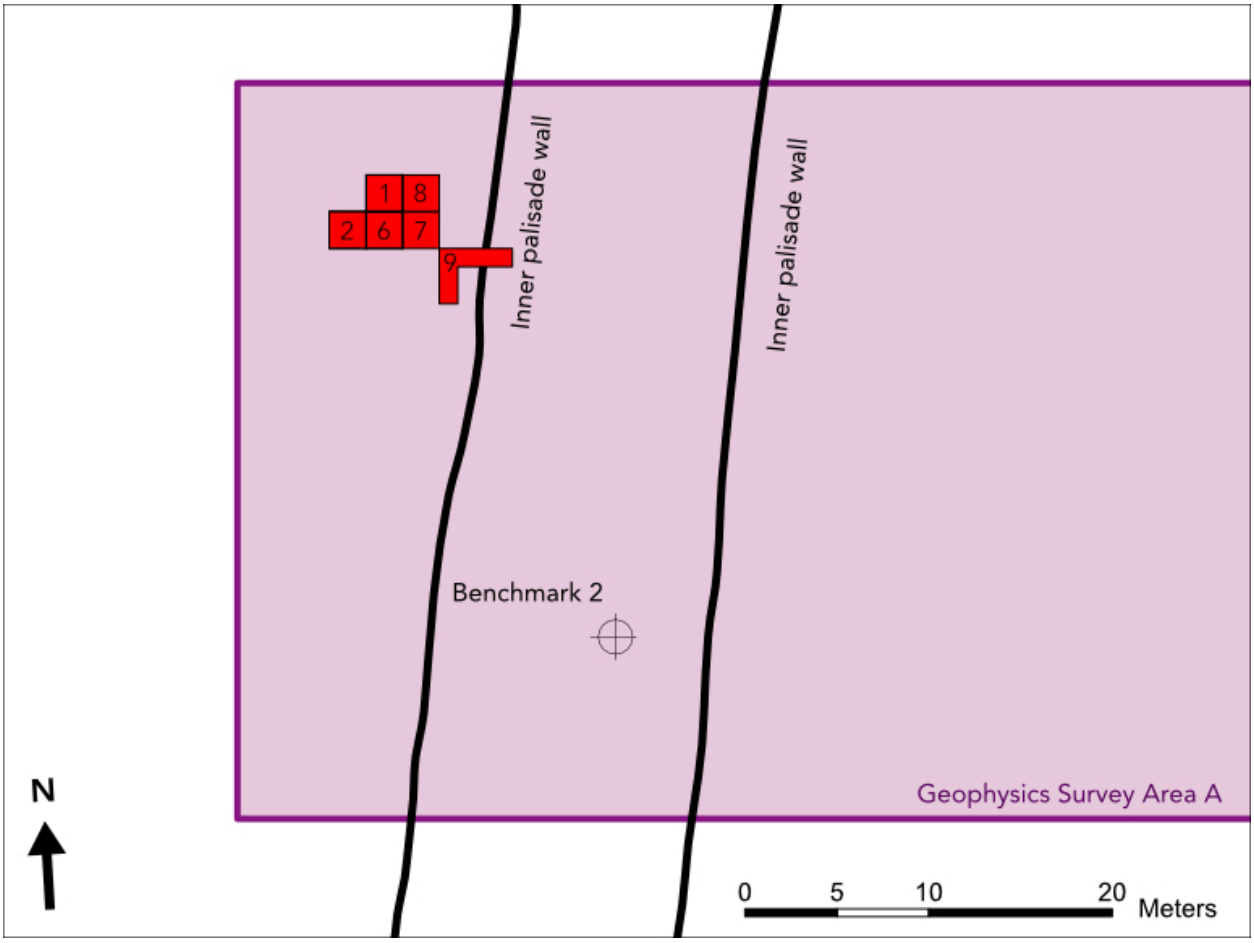

Figure 4.5. Test pits placed to ground-truth a rectangular geophysical anomaly.

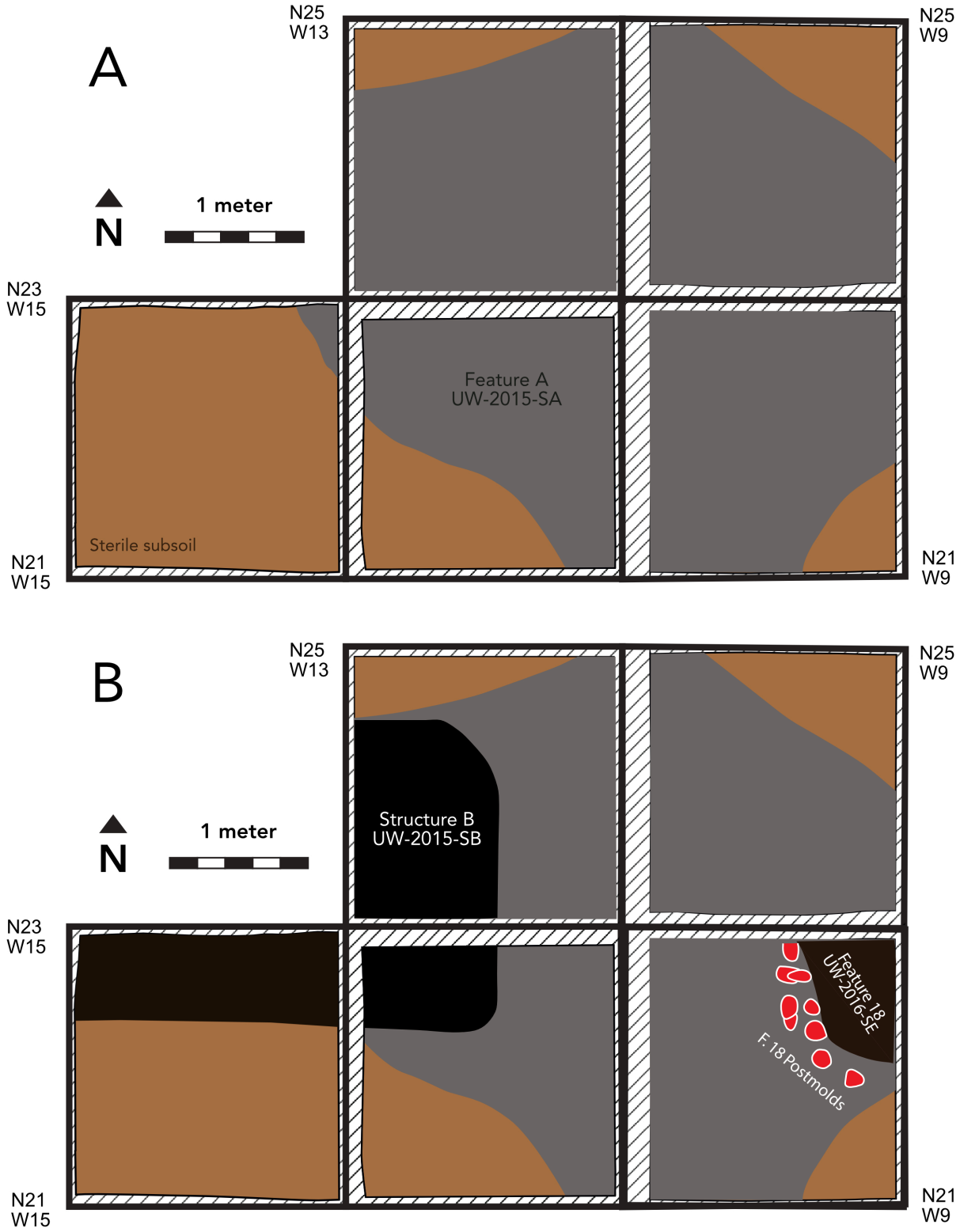

Figure 4.6. Superimposed features excavated during 2015-2016 UW fieldwork. (A) Deepest cultural fill, structure UW-2015-SA. (B) UW-2015-SA is superimposed by two structures - UW-2015-SB and UW-2016-SE.

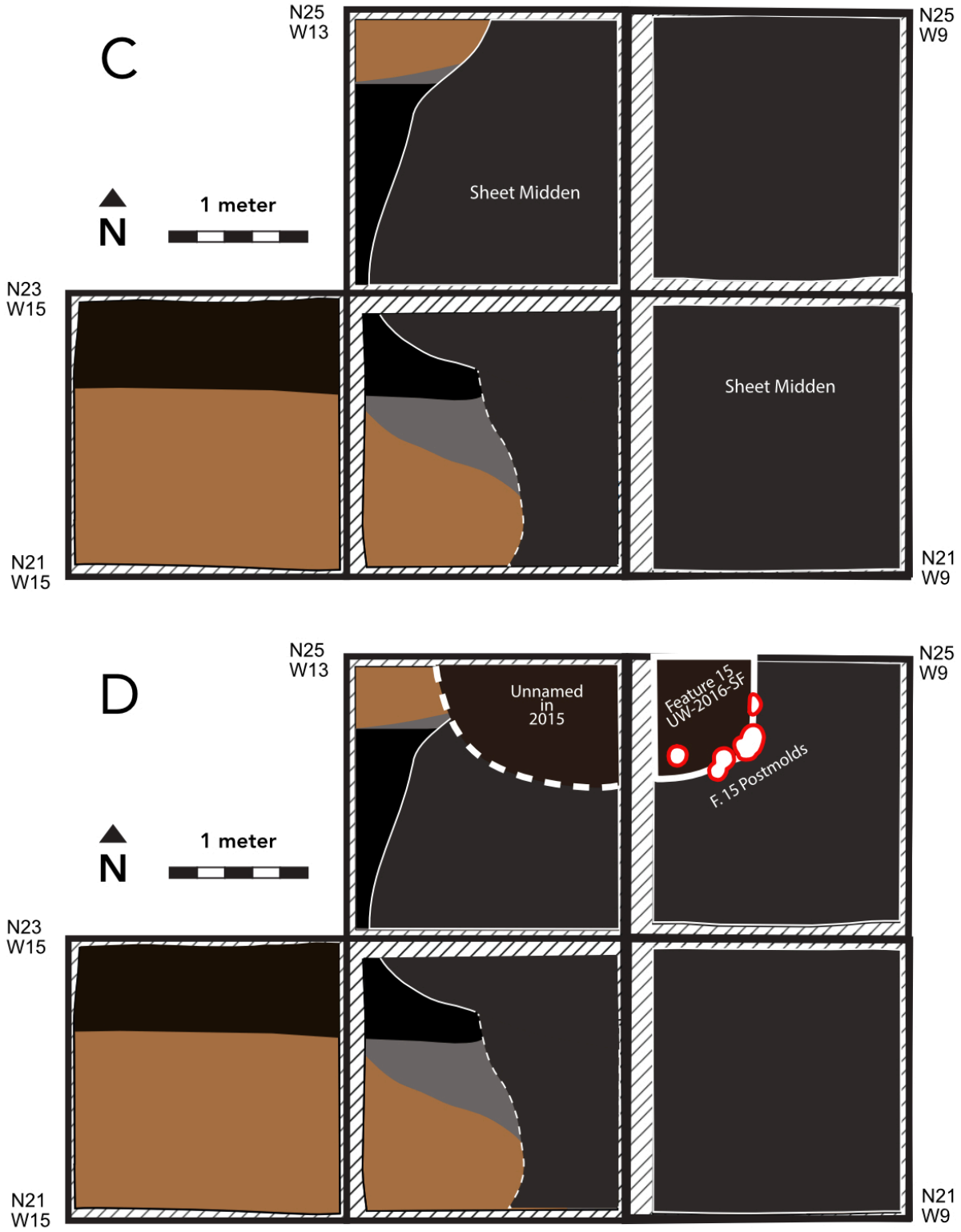

Figure 4.6 (continued). (C) UW-2015-SA, UW-2015-SB, and UW-2016-SE are superimposed by a horizontally expansive sheet midden. (D) The sheet midden is superimposed by structure UW-2016-SF. The western portion of SF was not recognized in plan view but is visible in north and east wall profiles.

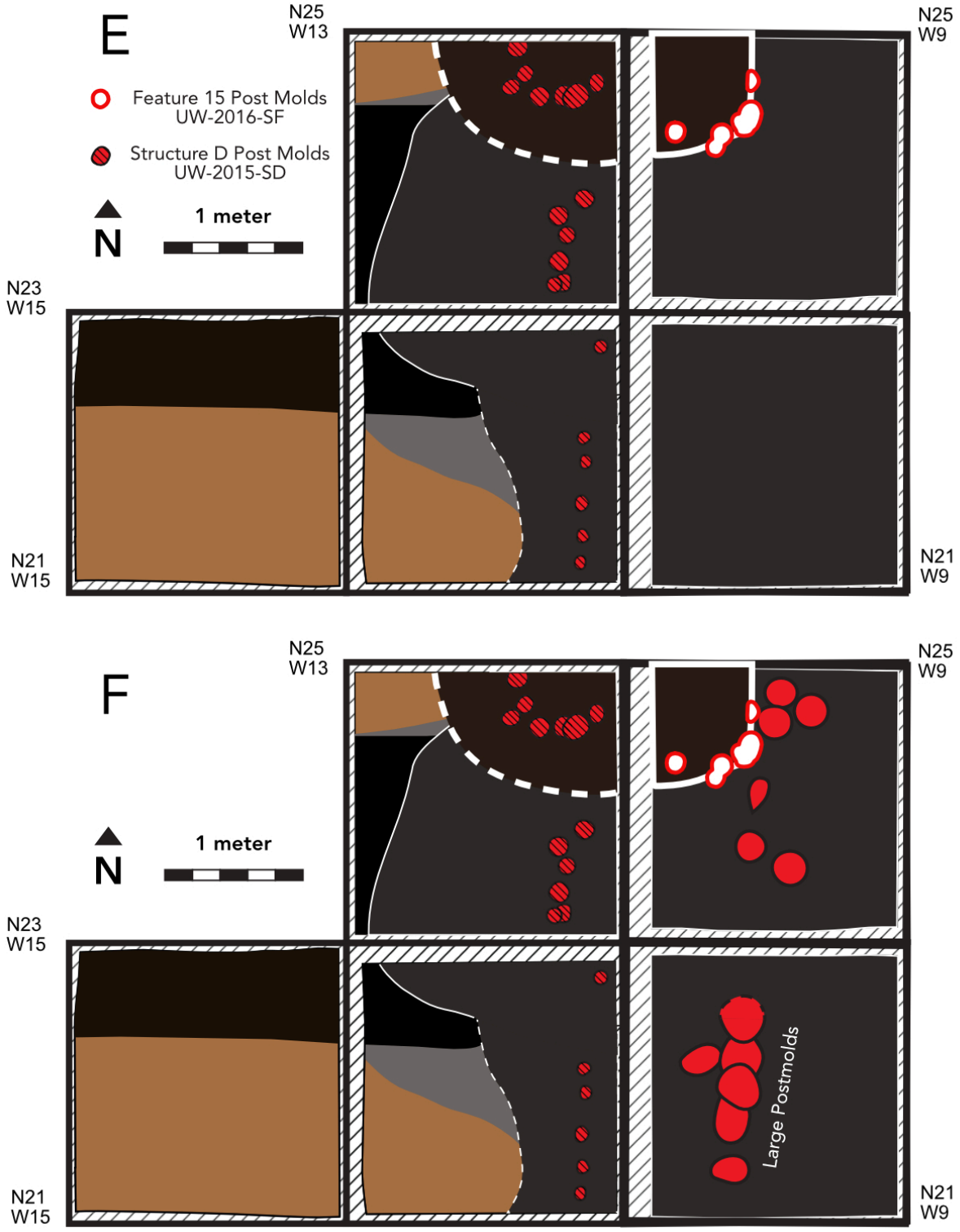

Figure 4.6 (continued). (E) Structure UW-2015-SD consists of postmolds and is intrusive into the sheet midden and UW-2016-SF. (F) A line of large postmolds (20-29 cm dia.) is intrusive into the sheet midden. Its temporal relationships with UW-2015-SD and UW-2016-SF are unclear.

G

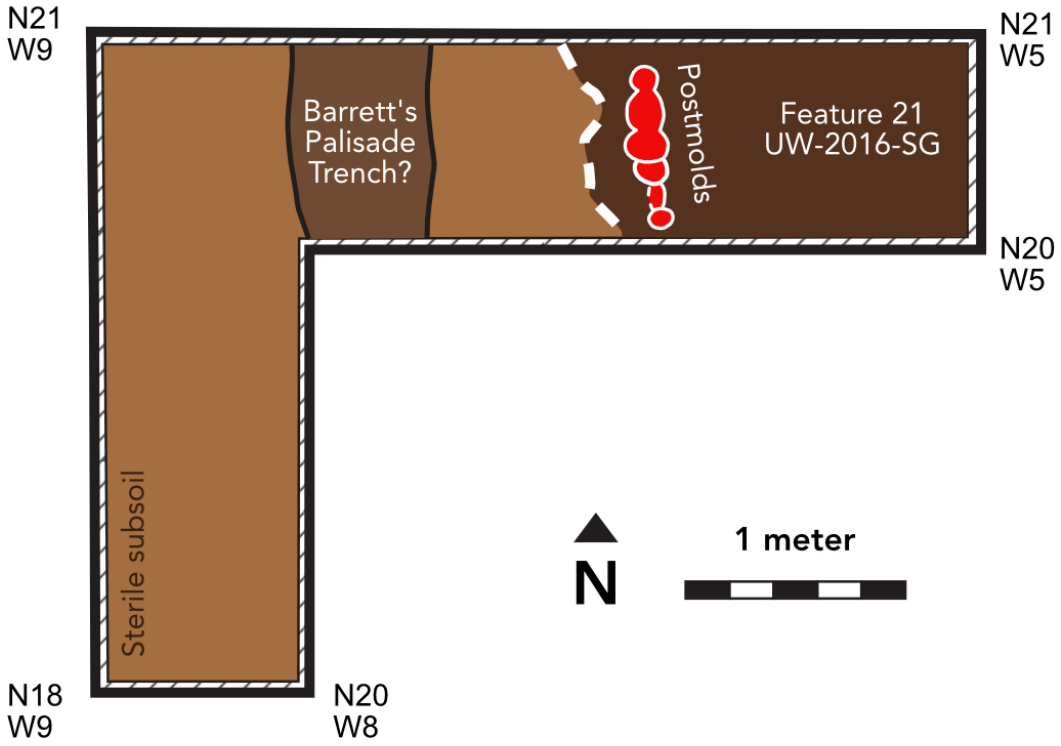

Figure 4.6 (continued). (G) UW-2016-SG was located between two and four meters southeast of the other structures. Its temporal relationship with the other structures is unknown. A 50-60 cm wide feature west of SG, composed of mottled soil, may be Barrett's palisade excavation trench.

A horizontally expansive sheet midden several centimeters thick and composed of heavily mottled mix of variable soil colors and textures was found superimposed over and by the structures. Twelve large post molds were exposed in an approximate north-south line through the centers of Test Pits 7 and 8, intrusive into the midden (Figure 4.6F). These post molds vary in diameter between 20 and 29 cm, which are consistent with post mold diameters for previously excavated palisade lines elsewhere at Aztalan (see Chapter 6). However, they do not correspond

with the location of any previously discovered palisades (Figure 4.5). These large post molds are intrusive into the sheet midden, which itself is superimposed over three structures, meaning that the large posts were erected after the three structures had been abandoned and after the sheet midden was deposited. The superpositioning of these structures, postmolds, and midden illustrate a dynamic history of building, dismantling, rebuilding, and changing uses of space at the edge of the plaza. However, the temporal relationships between the large post molds and the remaining three structures are unknown.

Three other test pits were also excavated in 2015 (Figure 4.4; Pfaffenroth et al. 2016). Test Pit 3 (1x4 m), was placed to test a north-south oriented linear geophysical anomaly south of the Northeast Mound. A large, slightly bell-shaped feature (Feature 2) was found at the east end of this test pit and extending into the south profile wall. To the west of feature 2 was a cluster of faint post molds and possible wall trench; however, these features were difficult to discern in plan and profile views.

Test Pit 4 (1x2 m) was situated toward the east edge of the residential area adjacent to a large erosion gully. Test Pit 4 was situated to location intact portions of three adjacent structures partially excavated by SHSW in 1964 (SHSW-1964-H3, -H4, and -H5; Appendix I). Instead, TP4 intersected with backdirt from the 1964 excavations, inferred by mottled soils and buried A horizon. No prehistoric features were encountered in this unit.

Test Pit 5 (2x2 m) was located directly west of TP4 and directly south of TP3 to test an area that appeared, based on records of prior excavations, to have seen only limited subsurface investigation. Results indicate that the test pit was placed into an area of the site that likely had been machine stripped or otherwise substantially disturbed during historic times and then

backfilled. Backfilling is inferred by substantial mottling and mixed soils visible in the unit profiles. No prehistoric features were found during TP5 excavations.

Barrett's interpretation of Mississippian-style palisades and mounds arranged around a central plaza is one line of evidence used to support the conventional interpretations of Aztalan as a Mississippian town (Birmingham and Goldstein 2005; Goldstein 1991; Goldstein and Freeman 1997; Lewis and Stout 1998). Our fieldwork demonstrates that new research has the potential to alter that longstanding interpretation of site layout. By extension, it can also challenge Mississippian-centric narratives and explore the nature of Mississippian and Late Woodland interaction in ways that give agency to both Late Woodland and Mississippian occupants. My research examines Mississippian and Late Woodland interaction at Aztalan through analysis of their domestic structures and samples of associated pottery and a re-analysis of the palisades walls, through the perspective that Mississippians might *not* have been a dominant cultural force at Aztalan.

4.4 Chapter Summary

To summarize, the conventional interpretation of Aztalan since the 1990s is that it was a "Mississippian town" of Mississippian migrants and their descendants with direct ties to Cahokia and that a partially Mississippianized Late Woodland population resided alongside them. A Cahokia connection is indicated by shell-tempered Ramey Incised and Powell Plain pottery types (Richards 1992, 2003). Ceramic petrography of Mississippian vessels at Aztalan suggests that at least some were produced in the American Bottom (Porter 1966; Stoltman 1991a). Strontium isotope analysis of human remains demonstrates that of 20 individuals sampled from the Northwest Mound, burials, pits, and middens across the site at least three individuals may have been recent arrivals from the Cahokia area (Price et al. 2007). A Late Woodland component is

indicated by the presence of grit-tempered collared and Madison Ware pottery types (Baerreis and Freeman 1958; Richards 1992, 2003; Zych 2013). The arrangement of Mississippian-style palisades and platform mounds around a central plaza, established by Barrett in the early twentieth century, has been consistently cited in support of Mississippian-centric interpretations (Barrett 1933:371; Birmingham and Goldstein 2005; Goldstein and Freeman 1997, Richards 1992, 2003); Stoltman 1991b:350).

While the presence of Late Woodland and Mississippian material culture have been found together at Aztalan, it is also possible (if not likely) that there was diversity present *within* Late Woodland and Mississippian groups. As discussed in Chapter 3, spatial and stylistic diversity in Late Woodland material culture has been interpreted by Rosebrough (2010) to indicate the presence of multiple, independent, and interacting Late Woodland groups of varying mobility on the landscape. These groups may have had fluid membership as a result of interaction and intermarriage, and there is no reason to believe the Late Woodland population at Aztalan was an exception. This would especially be the case if some were migrants themselves from northern Illinois, as has been proposed by Goldstein and Richards (Goldstein 1991; Goldstein and Richards 1991). First-generation Mississippian migrations to Aztalan may have also been diverse among themselves, given that the population at Cahokia was comprised of people with diverse geographic origins (Slater et al. 2014).

All archaeologists at Aztalan, and their interpretations, have been guided and constrained by Barrett's early and influential framework. Barrett's, the WAS, and the SHSW excavations were all at least partially focused on the palisade walls (Barrett 1933; Baerreis 1949-1954; Hurley 1977). The WAS and SHSW also deliberately sought out domestic contexts by excavating in the residential area as it was defined by Barrett (Baerreis 1949-1954; Freeman

1963-1967; Wittry and Baerreis 1958). Neither project prioritized the plaza area, though Freeman has suggested that the relative lack of artifacts and structures there might be due to erosion (Goldstein and Freeman 1997:232). This issue was investigated by Goldstein and Richards in 1984, who did locate a single-set post structure in the plaza as well as evidence of down-slope erosion in a deep midden along the riverbank (Richards 1992). They used diagnostic pottery from intact midden strata to establish that the site was initially occupied by Late Woodland peoples in the ninth century A.D., who were later joined by Mississippians (Richards 1992). Mississippian Ramey Incised and Powell Plain pottery types place the co-resident period as contemporaneous with the Stirling Phase in the American Bottom (A.D. 1100-1200; Griffin 1949; Holley 1989), which is supported by radiocarbon dates (Figure 4.2; Richards and Jeske 2002).

At the same time, scholars have acknowledged many uncertainties about Aztalan and have slowly made progress in challenging these longstanding assumptions of timelessness (e.g., Goldstein and Gaff 2002; Schroeder and Goldstein 2016; Goldstein 2015, Price et al. 2007). A recent example is fieldwork conducted by UW in 2015 and 2016 as part of my dissertation, in which we used geophysical survey to search for possible structures in the plaza. Our excavation of one geophysical anomaly in the plaza revealed five superimposed structures, a sixth adjacent structure, other cultural fill, and large postmolds consistent in diameter and orientation with palisade posts at Aztalan. This fieldwork highlights the value of revisiting longstanding narratives (specifically regarding the timeless walled separation between residential area and plaza). My dissertation research also enhances our interpretations of Aztalan through analysis of domestic structures and associated pottery that can reveal aspects of the interaction between migrants and locals and their descendants, and by reanalyzing the palisade walls from the

perspective that they may be more than just Mississippian constructions. In the next chapter I describe the methods I use to analyze domestic architecture, associated pottery assemblages, and palisade walls.

Chapter 5: Methods for Compiling and Analyzing Structures, Palisade Walls, and Pottery

Why are some migrants able to successfully integrate among culturally different local populations more easily than others? More specifically, does the visible style of domestic structures (as highly-visible, long-lasting focal points of daily life) play a role in the integration of migrants and their descendants among local people who may be culturally different? Is there a relationship between integration (or lack thereof) and how the community physically portrays itself (such as through palisade walls and other monumental works)? To address these research questions, I presented a null hypothesis and three alternative hypotheses (presented in more detail in the following section) that focus on the resilience and malleability of material style, how identity is passively reflected and actively expressed through style, and how strategic manipulation of style can facilitate integration by reducing perceived differences. I analyze domestic architecture to draw inferences about non-local people strategically altering their house forms to blend in and integrate; palisade wall construction and design to draw inferences about shared participation in communal events, collaboration in community appearance, and communal identity; and samples of pottery from domestic structure contexts to infer whether people of local and non-local heritage were spatially intermingled within the community.

I test my hypotheses using three complementary sources of data: 1) archival maps, documents, and reports from past excavations at Aztalan, especially large-format field maps, that include information on many of the structures and palisades excavated to date; 2) samples of pottery assemblages from structures excavated by WAS, SHSW, UWM, and UW, which show whether refuse from different cultural groups was mixed at structure abandonment as would be expected if different cultural groups were not spatially separated; and 3) original fieldwork in

2015 and 2016, the first since the 1960s to explicitly seek out residential structures that increases the total dataset of excavated structures at Aztalan by 21% (from 28 to 34), provides new information about community layout, and provides assemblages that were recovered through systematic screening.

The field maps and notes produced during past excavations at Aztalan are invaluable sources of information about structures and palisades at the site because most excavation at the site was conducted prior to 1970 at a time when mechanical stripping and large scale excavations could still occur at the site. Large horizontal exposures are unlikely to occur at Aztalan again because of the site's National Historic Landmark status and current site management policies. The limitation of these curated materials is that they resulted from excavations conducted prior to the development of modern recovery methods such as screening, flotation, and/or systematic sampling.

I use qualitative info and quantitative measurements of architectural features documented in excavation field maps and new fieldwork to classify them as Mississippian, Late Woodland, or hybrids of the two traditions. I also use samples of the pottery temper types to tentatively identify the cultural identity of people utilizing nearby activity areas, based on assumptions that pottery temper type (as an aspect of technological style) reflects cultural differences of the makers, and that trash in abandoned house basins was most likely generated nearby. I use pottery assemblages from structures, when reported, to understand how material culture from Mississippian and Late Woodland households was combined or kept separate during structure abandonment. I use palisade design and metric post mold data to distinguish between Mississippian and Late Woodland palisade architecture. I also calculate labor and population estimates for the site based on palisade raw material requirements, which demonstrate how a

project of that scale might have interrupted daily life in the community and how quickly the walls could have been built (and how quickly the community would have assumed any identities portrayed through the walls). Population estimates have implications for power dynamics between migrants and locals because a group of migrants who join a small community would comprise a greater portion of the total population than the same number of migrants in a large community.

My **null hypothesis** states that co-resident local and non-local peoples maintain independent practices in the material culture of everyday life and community appearance, including visible style. Visible and technological styles will align and correspond with their respective cultural practices as a reflection of distinct learning communities. The houses of migrants and locals, and of their descendants, will be spatially separated. Failure to reject the null hypothesis would support an inference of weak integration in everyday life and in how each group was represented in outward expressions of the community. At Aztalan, the null hypothesis would be supported by:

1) The separation of Mississippian and Late Woodland visible and technological styles in perishable non-mound structures
2) Spatial separation of Mississippian and Late Woodland material culture, including structures, pottery and domestic refuse into distinct areas of the community
3) Mississippian-style pottery found predominantly in association with Mississippian structures and Late Woodland-style pottery found predominantly in association with Late Woodland structures

4) Palisade wall designs (including curtain form and the presence and form of bastions) and post sizes that are wholly consistent with either Mississippian or Late Woodland palisade walls across eastern North America (or both, but for separate construction episodes; Finney 1993; Hammerstedt 2005; Iseminger et al. 1990; Keeley et al. 2007; Krus 2011, 2013; Milner 1999, 2000; Salkin 2000; Schroeder 2006).

Hybrid pottery is already recognized at Aztalan (described below, Richards 1992:186-91, 348-352; 2003; Zych 2013:184) and the methods I describe below, organized according to two alternative hypotheses, further test this null hypothesis.

5.1 Alternative Hypothesis 1 – Domestic Structures

My first alternative hypothesis is that Mississippian migrants and their descendants adopt the visible styles of Late Woodland architecture to blend in to the preexisting Late Woodland community and reduce how they are perceived as outsiders. Simultaneously, the technological style of Mississippian architecture (wall-trench foundations) would be maintained because it is primarily influenced by their culturally and geographically distinct learning communities. In comparison, Late Woodland locals would not feel as great a pressure to blend in so would not adopt migrant architectural styles as frequently. In the case of Mississippian and Late Woodland interaction at Aztalan, the technological and visible styles of their respective architectural traditions both have patterned differences. This makes it possible to test Alternative Hypothesis 1 by identifying structures at Aztalan that match the Mississippian and Late Woodland archetypes, and hybrid structures that combine the technological style of one with the visible style of the

other in order to infer whether Mississippians may have built their houses to resemble those of locals.

To review, Mississippian structures in the Midwest were rectilinear with neat 90-degree corners, were constructed using wall-trenches, and lacked extended entrances. They generally have width to length ratios around 0.5 to 0.6 (Calculated from data in Pauketat 1998:Table 6.8 and Collins 1990:Table 5.56, Table 5.86, Table 5.109). In contrast, contemporaneous Late Woodland structures were mostly built using single-set posts and are found in a variety of shapes including ovoid and rectilinear. Rectilinear Late Woodland structures often do not have neat corners and parallel walls like Mississippian structures do. In southern Wisconsin some Late Woodland structures had long, extended entrances that gave the structure a “keyhole” shape (Meinholz and Kolb 1997:159, 165; Salkin 1993:207, 209). In sum, Mississippian and Late Woodland structures were built using different methods (technological style) and had different external appearances (visible style). I classified each structure according to 12 variables that either directly relate to Mississippian or Late Woodland architectural practices or are secondary attributes that can be used to distinguish between Late Woodland and Mississippian (Table 5.1).

Table 5.1. Architectural attributes of perishable architecture in the U.S. Midwest at the time of Aztalan's co-resident occupation (A.D. 1100-1200) that are analyzed in this dissertation. LW = Late Woodland, M = Mississippian, x = not useful for differentiating between Late Woodland and Mississippian architecture.

Variables	Style	LW	M	Qualitative Categories or Method of Measurement
Structure shape	Vis	Rect, ovoid, irregular	Rect.	*Rectilinear*, *ovoid*, or *other/unknown*
Foundation type	Tech	Single-set post	Wall-trench	*Wall-trench*, *single post*, *basin only*, *composite*, or *unknown*
Entrance type	Vis	Variable	Simple	*Extended*, *screened*, *simple*, *curled*, *other*, or *not visible*
Inferred wall type	Vis	Flexed or either	Rigid or either	*Flexed* (dia. <7.6 or possibly <11.4 cm., spaced <30.5 cm apart), *rigid* (dia. > 7.6 or 11.4 cm, spaced >25.4 cm apart), or *unknown*.
Mean wall postmold diameter	Both	x	x	Calculated by averaging the diameters of all postmolds associated with a structure with real mapped dimensions (indicated by measure marks at the postmold edges or by individually noted diameters, rather than postmolds that appear "sketched" around a center point). In centimeters. Can be used to infer above-ground architecture.
Mean wall postmold spacing	Both	x	x	The measured distance from the mapped center point of one postmold to the center point of the next adjacent postmold in the wall, repeated for every pair of adjacent postmolds, then averaged. In centimeters.
Mean wall-trench width	Both	x	x	Measured in centimeters at each trench's midpoint and averaged for the structure (Lacquement 2007; Schroeder 2011).
Footprint	Both	x	x	Indicator of structure size. Length times width for rectilinear structures, or π(L*W/2) for ovoid structures, in square meters.
Length	Both	x	x	Measured in meters along the longest axis of a structure from the center point of one wall to the center point of the opposing wall. (Lacquement 2007; Schroeder 2011).
Width	Both	x	x	Measured in meters along the shortest axis of a structure from the centerpoint of one wall to the center point of the opposing wall. (Lacquement 2007; Schroeder 2011).
Width:Length	Both	Variable	~0.5-0.6	Structure width divided by length, as an indicator of "square-ness" or "roundness."

5.1.1 Previously Excavated Structures in Archival Documents: Variation in Documentation

In documenting architectural attributes, I referred to the original excavation maps and field notes when available and recorded qualitative and quantitative information for the variables

listed in Table 5.1. The goals, excavation methods, recording methods, measurement systems, and states of publication of past excavations vary greatly, and as such the quantity, quality, and types of information that were recorded in archival documents such as maps and field notes also vary. Residential structures were excavated by Samuel Barrett (1919, 1920, 1932), by the Wisconsin Archaeological Survey (1949-1954), by William Hurley (1962) and Joan Freeman (1964-1967) of the State Historical Society of Wisconsin, by Lynne Goldstein and John Richards of the University of Wisconsin Milwaukee (1984-1996), and by Sissel Schroeder and myself (2015-2016).

The structures I selected for analysis are located inside the main palisaded area of the site or in one case nearby outside. Another structure located approximately 150 meters south of the palisaded area on the opposite side of a creek drainage (Goldstein and Gaff 2002:104-105) was excluded because of its distance from the main palisaded area and separation by the creek drainage. In all, my dataset consists of 34 non-moundtop structures. While some may consider this a small sample size, especially considering that some of the structures are incompletely documented, it is substantially greater than many other "Mississippian contact" sites in Cahokia's northern hinterlands. For example, the Lundy site in the Apple River valley of northwest Illinois has one single structure (Emerson et al. 2007) and John Chapman, also in the Apple River valley, has 13 (Millhouse 2012:91). The Mississippian presence in Trempealeau only includes seven structures (Pauketat et al. 2015) and nine were excavated at Fred Edwards in southwest Wisconsin (Finney 1993:82). The only comparable sites with more known structures than Aztalan are in the Central Illinois River Valley (for example, more than 150 wall-trench structures are known from Orendorf [Conrad 1991:132-136]). So, while a larger sample of

structures would make for more robust inferences, Aztalan is the best site for this research outside of the central Illinois River valley.

Barrett's excavations emphasized palisade walls and yielded considerable information that has guided most interpretations of overall spatial layout since his time. In addition, his sampling of interior space discovered two structures. Barrett's original field notes and excavation maps are missing, and the only maps held by the Milwaukee Public Museum are the same ones reproduced in his monograph *Ancient Aztalan* (Richards 1992:12, 209). As such, we are limited to his published figures and text describing these two structures. For example, he provides a detailed (for Barrett) plan map of the structure labeled 51 in Section IV while the structure labeled 47 (also in Section IV) is described only in the text (Barrett 1933). The shape, dimensions, and foundation type of structure IV-51 are clear from his text and plan map (Appendix I). Only the shape (rectangular) and approximate dimension of one side (~1.58 meters) are known from his identification of two corners of structure IV-47.

The Wisconsin Archaeological Survey (WAS) exposed three non-mound structures they called houses and published detailed plan maps and descriptions of each (Wittry and Baerreis 1958) that are accurate reproductions of the original field plan maps, but include additional surrounding features including walls, burials, and pits. Structure shape, dimensions, foundation type, and entrance type can be determined from the WAS plan maps. Dimensions, mean post diameter, and mean wall-trench width are provided in written descriptions, along with descriptions of other associated features. WAS also excavated extensive portions of the palisade on the west and south sides of the site (Locations A_2 and A_3, Figure 4.1). Their palisade excavation field maps appear to accurately map the postmolds they excavated and recorded

postmold diameters, making it possible to classify wall design as Late Woodland, Mississippian, or hybrid.

The State Historical Society of Wisconsin (SHSW) excavations in 1962 directed by William Hurley focused on tracing additional sections of the palisade on the east side of the site (Location A_3, Figure 4.1; Hurley 1977). He encountered six features along the eastern wall that resemble structures because of their apparent shape and/or construction, but did not investigate them in detail or expose them beyond the limits of the 1.5 to 2 meter wide excavation trench. He did not describe any of the structures – in fact, the only published information on them is at the end of a paper about Aztalan pottery in a set of figures showing foundation type and apparent shape (Hurley 1977: Figures 5-12). Hurley's original field maps are on file at the Wisconsin Historical Society's Museum Archaeology Program, but his field notes were not present in their collection of 1960s SHSW Aztalan excavations. Several of the features exposed by Hurley appear to be rectangular wall-trench structures, and all are superimposed by the eastern palisade. Although lacking information on size, these structures show eastern palisade construction happened after the space had been used for residences.

The SHSW excavations directed by Joan Freeman from 1964-1967 uncovered 12 structures, six of which were fully exposed. While the structures were never formally analyzed or published, field maps and notes are accessible at the Wisconsin Historical Society's Museum Archaeology Program. Every structure was mapped (some more than once), allowing for accurate *post hoc* measurements of structure dimensions and in some cases post mold diameters and wall-trench widths. Most postmolds were indicated by sketching a circle around a mapped centerpoint, but some postmolds have pencil tick marks at their X and Y coordinates that imply their dimensions were measured and mapped. Detailed notes were provided for some structures,

including the diameters of individual postmolds. Foundation type (wall-trench, single-set posts, or a combination) is visible on the maps for each structure, shapes are determinable for 17, and entrance types are visible for eight. Twelve were exposed enough to allow at least one dimension to be measured. Overall, the quantity of structures excavated by the SHSW and the details provided on their field maps and notes provide the largest set of available information about Aztalan's previously excavated structures.

Three structures were excavated by UWM in 1984 (Goldstein 1985; Richards 1992). Richards published detailed plan maps of two of the structures with detailed information regarding depth, post mold diameter, post mold profiles, associated features, and associated artifacts (Richards 1992:137-170). One rectangular wall trench structure was located along the riverbank (Location E, Figure 4.1); the other is a possible single post structure in the plaza (Location J, Figure 4.1). The third structure is known by an isolated section of wall trench in the same excavation block as the single post plaza structure (Goldstein 1985:98). Another possible structure was exposed by Goldstein in the Sculptuary in 1988 (Location F, Figure 4.1; Goldstein 1989:104-107) and is known by a single corner of wall trenches. Because of their minimal exposure, information about these latter two structures is limited to identifying wall trenches as their foundation types and therefore classifying them as Mississippian in terms of technological style.

In 2015 and 2016 UW-Madison at least partially uncovered a minimum of six structures and possible structures. Our fieldwork was designed to assess the usefulness of geophysical techniques for locating structures at Aztalan and to increase the total number of known structures at Aztalan through ground-truthing of geophysical anomalies (detailed in Chapter 4). As was the case for UWM, UW-Madison utilized small excavation units with limited horizontal exposure.

This technique differs from those of WAS and SHSW who excavated extensively across the site and made use of heavy machinery to strip wide excavation blocks. As such, most of the structures excavated by UWM and UW-Madison are only partially exposed.

5.1.2 Unified Structure Naming Scheme

Because structures have been documented by numerous researchers and institutions, there has not been a single standardized naming scheme used to inventory structures. As a result, some are called structures, some are called houses, and there are duplicate identifier labels ("House 1"). To reduce confusion I created a descriptive naming scheme that gives each structure at Aztalan an identifier that includes the institution, year, and original structure number/letter given by that institution. For example, a structure excavated by the Wisconsin Archaeological Survey and designated as "House 1" by Wittry and Baerreis (1958:64-67) receives the identifier WAS-1949-H1. Structures that were not given formal designations originally receive sequential "structure numbers" — for example, the single post structure exposed by Richards in the plaza (Richards 1992:167-170) is designated UWM-1984-S1. The structures documented by Barrett are an exception to the naming scheme because the year of their excavation is not always clear and because Barrett used a unique identification scheme based on site section and order of discussion. For example, the structure I label "Barrett IV-51" is described in *Ancient Aztalan* as notable feature number 51 in Section IV (Barrett 1933:163-164). Each structure is described in detail in Appendix I.

5.2 Analytical Methods - Structures

For each structure, I classified it according to the cultural traditions evident in each of the attributes listed in Table 5.1 and then combined these attribute-based classifications into

technological style classification, visible style classification, and a combined technological/visible classification. Technological and visible style classifications are determined independently of each other and their combination compares them to determine the cultural tradition that describes the structure as a whole. The comparison of technological and visible styles — whether they match or contradict — is used to evaluate my first alternative hypothesis, that migrants and their descendants manipulated the visible style of their architecture to blend in among locals while maintaining the technological style of their home learning communities (Table 5.2). Alternative Hypothesis 1 predicts that:

1) Archetypal Mississippian wall-trench structures will be scarce in relation to hybrid structures that show a combination of Mississippian technological style with Late Woodland visible style (Hybrid Type 1).
2) Mississippian technological style (wall-trench construction) will be disproportionately more common than Mississippian visible style (rectangular structures without extended entrances)

Table 5.2. Predictions and inferences for possible combinations of technological and visible style in domestic structures at Aztalan.

	Technological style consistent with MISSISSIPPIAN	**Technological style consistent with LATE WOODLAND**
Visible style consistent with MISSISSIPPIAN	***Interpretation:*** *Archetypal Mississippian structure* ***Prediction:*** *Few of these*	***Interpretation:*** *"Hybrid" Type 2* *Late Woodland manipulation of visible style to resemble Mississippian structures* ***Prediction:*** *Few of these*
Visible style consistent with LATE WOODLAND	***Interpretation:*** *"Hybrid" Type 1* *Mississippian manipulation of visible style to reduce visible differences* ***Prediction:*** *Many of these*	***Interpretation:*** *Archetypal Late Woodland structure* ***Prediction:*** *Many of these*

To test these predictions, the technological and visible styles of each structure must be categorized as Mississippian, Late Woodland, or a hybrid. When technological and visible styles match, the structure as a whole can be categorized as Mississippian or Late Woodland. When the technological and visible styles contradict, the structure as a whole is considered one of three types of hybrids. The process of classifying each structure is illustrated in Figure 5.1.

I categorized the quantitative and qualitative architectural variables as aspects of technological or visible style, which I defined based on their external visibility in a finished structure (Table 5.1). Visible style attributes such as structure shape are visible to the community as a whole and thus have greater potential to communicate information compared to

technological style attributes, like foundation type, which are not as obvious from the exterior or may not even be visible in a finished structure (though see the section on technological style below for correlation between foundation type and the use of flexed or rigid walls). Physical dimensions were measured from original or published plan maps using scales provided. Maps by Barrett, WAS, and SHSW were produced using the Imperial system so measurements were converted to metric. In these cases, my measurements were first made in feet using the scales provided on the maps and then were converted to metric and entered into a database. I use attributes that are poorer indicators of archaeological culture (inferred wall type, structure size, and structure "square-ness") to identify patterned differences that are not clearly visible in foundation, shape, or entrance type.

A limitation to my analytical methods is that architectural attributes have varying degrees of measurability in structures, which results in small sample sizes for some attributes. Some structures are only partially exposed, preventing full length and width measurements (which in turn prevent calculation of other attributes). Another example is that average postmold diameter cannot be determined for many structures because their postmolds are only sketched. Our 2015-2016 fieldwork was an effort to increase the total number of known structures and to record detailed information about postmold diameters.

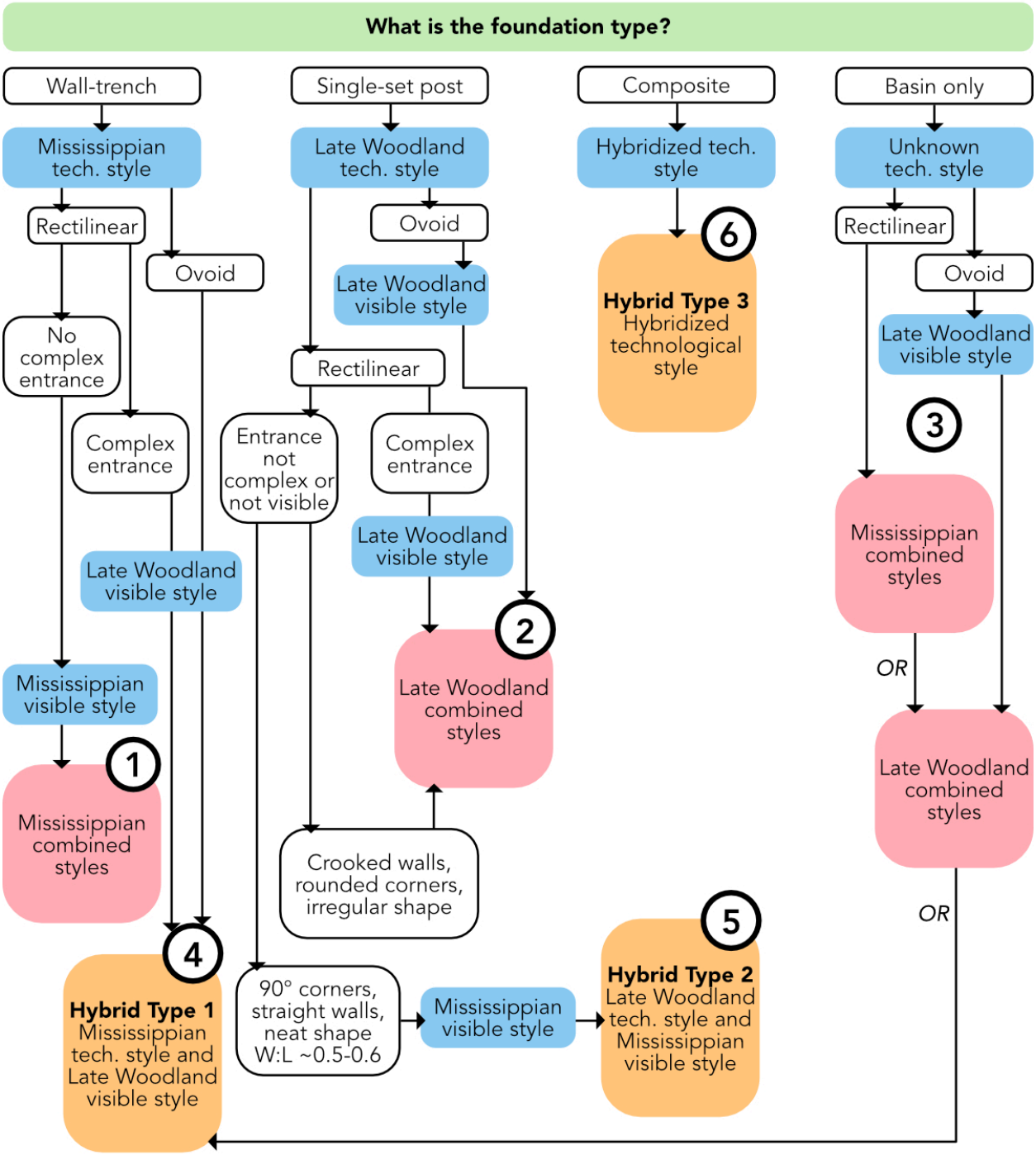

Figure 5.1. Technological and visible style classification process. Numbers refer to specific results described in section *5.2.3 Overall Classification*.

5.2.1 Classification by Technological Style

Foundation type is the most diagnostic and archaeologically visible difference between Mississippian and Late Woodland structures. American Bottom Mississippian structures were constructed using wall-trenches, in which the builders would erect individual posts or possibly pre-fabricated walls into linear trenches (Alt and Pauketat 2011). In contrast, Late Woodland structures were most often built by erecting poles into individually dug holes. I analyze foundation type to identify technological style because wall-trench or single-set post foundations could be used regardless of above-ground appearance. Mississippian wall-trench residential structures across the Midwest and Southeast may have typically been built using rigid walls, but flexed wall-trench structures have also been found (Brennan 2007; Lacquement 2007c; McConaughy 2007; Alt and Pauketat 2011; Schroeder 2011). Single-set post structures also could be built with flexed or rigid walls, with or without the use of internal support posts (Brennan 2007; Alt and Pauketat 2011; Schroeder 2011). So while there may be trends, foundation type is not inherently tied to above-ground appearance.

The difference between single-set post and wall-trench traditions reflects the distinct learning communities of Late Woodland and Mississippian populations. As such, I classify structures that have only wall-trenches as Mississippian. If they have only single-set posts I classify them as Late Woodland. Structures that have composite foundations of both wall-trenches and segments of single-set posts are classified as hybrids. Structures with unidentifiable foundation types, like those known only by basin stains, are categorized as unknown.

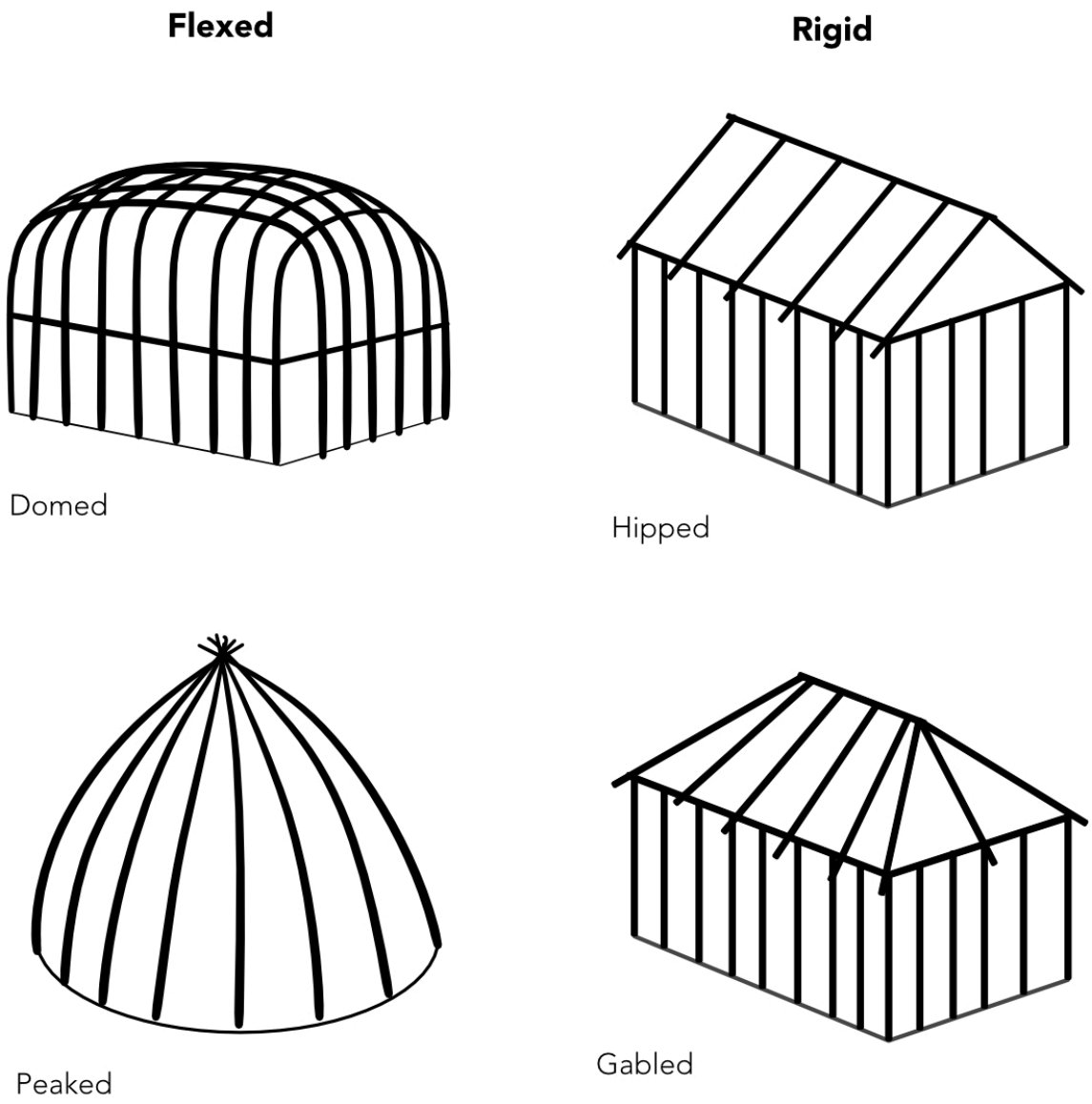

Figure 5.2. Examples of flexed and rigid pole construction.

5.2.2 Classification by Visible Style

In my analyses, the visible style of a structure includes structure shape, entrance type, and wall and roof type. The visible style of Mississippian structures closely follows a pattern of symmetrical rectangular shape without complex (extended, curled, or screened) entrances. They have straight, parallel walls and sharp corners that approach 90 degrees. Other structure shapes

found in the greater Cahokia area are not nearly as common as symmetrical rectangular structures and are argued to be sweatlodges or elite residences with ritual antechambers (Alt 2006a:142-149; Collins 1990:76, 81; Pauketat 2013:76). In contrast, Late Woodland structures are found in a range of shapes, with straight or curved walls and corners ranging from sharp to rounded. Complex entrances (such as keyhole entrances) may or may not be visible.

Shape and Entrances

Structure shape and entrance type are fairly diagnostic because Mississippian structures are neatly rectangular and lack complex entrances, whereas Late Woodland structures in the upper Midwest are found in a variety of shapes and often have extended entrances that form a "keyhole" shape (Figure 5.3). Some Late Woodland structures are rectangular (e.g., at the Statz site; Meinholz and Kolb 1997), or do not have visible complex entrances (e.g., at the Mile Long site; Salkin 1992). However, rectilinear Late Woodland structures generally do not have neat 90°corners and parallel walls and therefore are recognizably different than Mississippian structures. Thus, it is still possible to differentiate between Mississippian and Late Woodland visible style even with the wide range of variation present in Late woodland structures. Ovoid structures, and structures with complex entrances, are far simpler to classify as Late Woodland because those characteristics are not commonly observed in Mississippian domestic structures. Circular structures are found at American Bottom Mississippian sites but they are not nearly as common as symmetrical rectangular structures and often are interpreted at sweatlodges (e.g., Alt 2006a:142; Collins 1990:81; Pauketat 2013:76). The visible style of a structure is classified as "other/unknown" if it cannot be classified as Mississippian or Late Woodland due to insufficient information.

I classify structure shape into rectilinear, ovoid, and other/unknown based on the presence of corners. Rectilinear includes rectangular and square structures; ovoid includes circular and oval. I consider structures with rounded corners to be rectilinear if they have relatively straight walls, such that it is the corners that are rounded and not the structure sides (Figure 5.4). My intention is to differentiate based on how a structure would have appeared from eye level rather than from an archaeologist's plan view. This way, my use of structure shape reflects differences that would have been visible in a finished structure as an aspect of visible style. If the ancient people at Aztalan recognized structure shape as a difference between cultural groups (especially associating neat, uniform, rectangular buildings with the Mississippian people), then shape may have been subject to manipulation as a way to control how the residents of a structure were perceived by others.

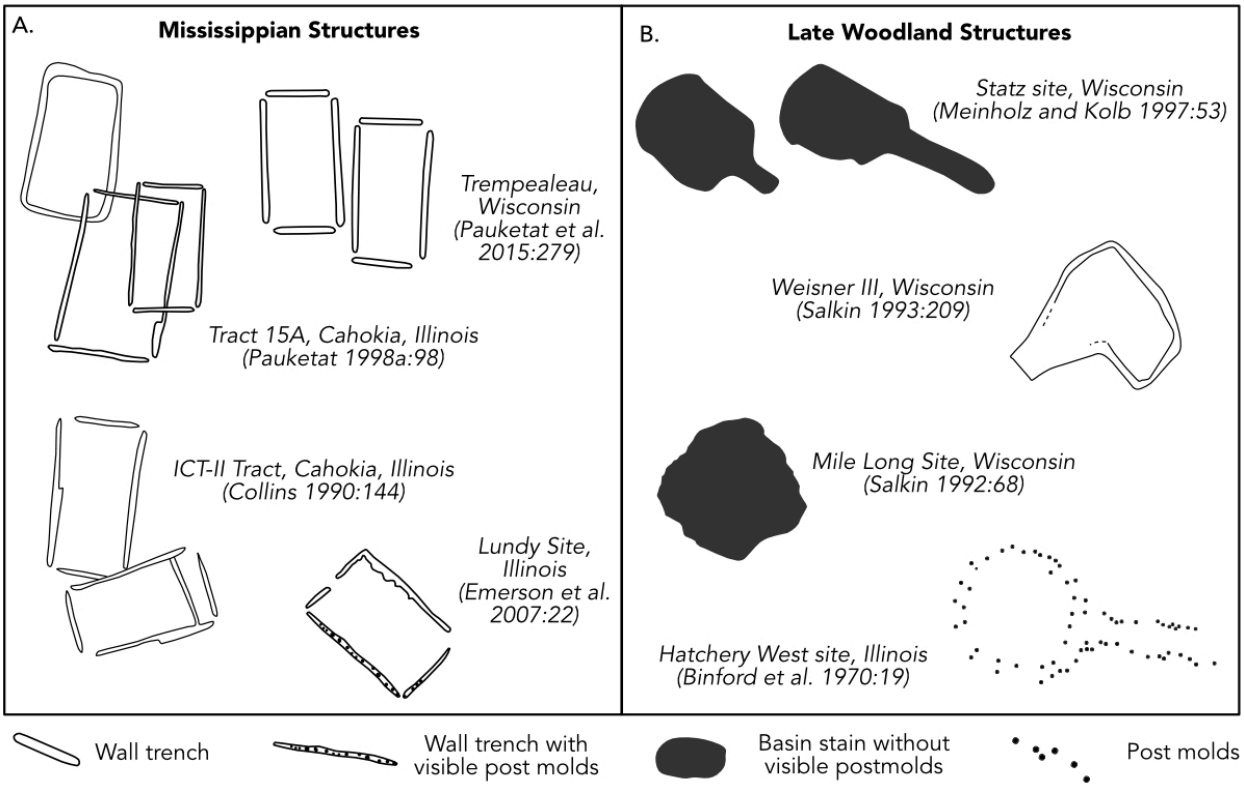

Figure 5.3. Representative Mississippian and Late Woodland structures in the Midwest. Note that single-set post Late Woodland structures are typically difficult to discern, so the clearest examples are identified as basins or, in a few cases, wall-trenches that leave more visible soil stains. Numerous other examples are cited in the text.

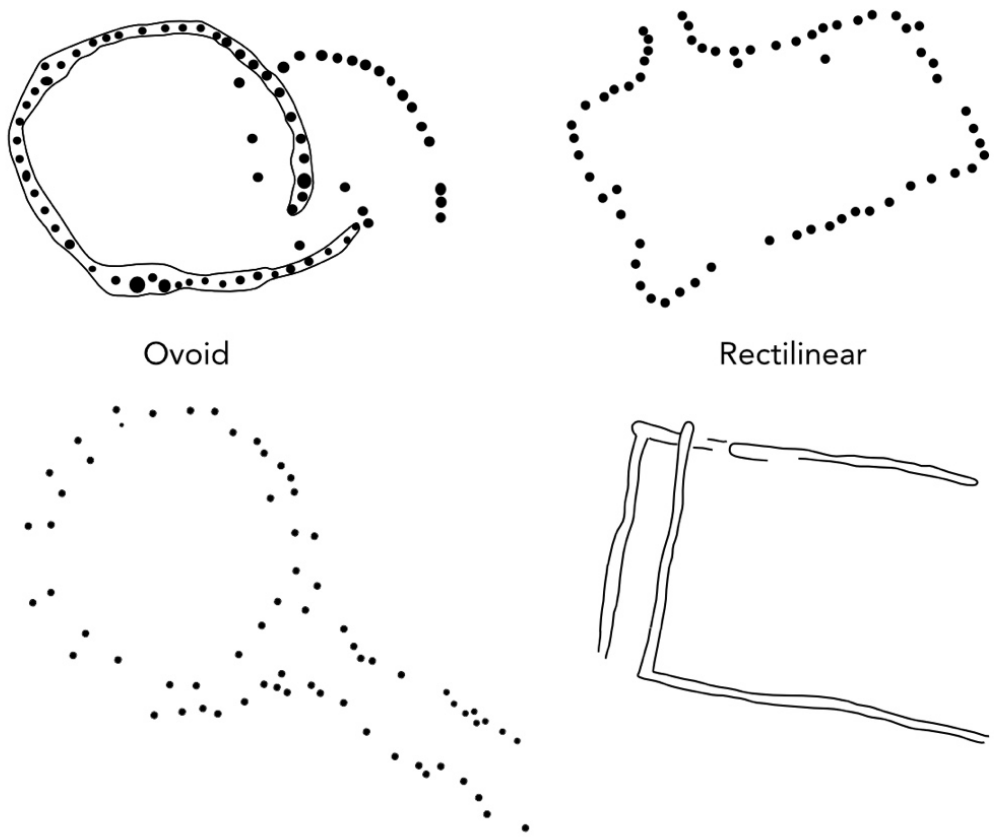

Figure 5.4. Examples of rectilinear and ovoid structures.

Wall Type – Flexed vs. Rigid

Wall type must be inferred from the diameters and spacing of wall postmolds. There are two basic types of walls: flexed pole and rigid pole (Figure 5.2). In flexed structures, the individual wooden posts/poles are bent to form a curved roof in such a way that the walls and roof are continuous and form a domes arch or, if the poles are tied at the roof apex it can form a peak. A rigid post structure has straight walls and typically is thought to have a separate hipped or gabled roof that rests on the walls, with or without the support of internal posts that directly supported the weight of the roof or braced the structure walls from slanting outward (Alt and

Pauketat 2011; Brennan 2007:81; Reed 2007:23-26; Schroeder 2011). I determine the pattern of interior postmolds, if present, for each structure to aid my inferences about wall and roof type.

Ethnographic, archaeological, and experimental data indicate that posts less than 7.6 cm in diameter (though potentially up to 11.4 cm depending on the species) could be bent to form flexed walls (Alt and Pauketat 2011; Blanton and Gresham 2007; Brennan 2007; Callahan 1981; Lacquement 2005; Le Page du Pratz 1774:359; Reed 2007; Schroeder 2011; Watts 1999; Webb 1938:191-192). Posts larger than 11.4 cm cannot be bent by hand and are therefore associated with rigid walls that could have supported the weight of an attached roof (Reed 2007:12-14; Schroeder 2011:320). Posts between 7.6 and 11.4 cm in diameter could feasibly be either flexed or rigid, depending on the species.Postmold spacing less than 25.4 cm indicates flexed pole construction, spacing greater than 30.5 cm rigid posts, and spacing between 25.4 and 30.5 could be either flexed or rigid walls(Schroeder 2011:319). Generally, small postmolds spaced close together are associated with flexed pole construction while larger postmolds spaced farther apart may reflect rigid walls.

Individual postmold diameters and wall-trench widths were measured from the archival maps if it was clear that they were accurately mapped rather than sketched. Accurate mapping is usually apparent by a map-maker's use of pencil marks to indicate measured X and Y dimensions. However, postmold spacing could still be determined so long as the centerpoints were mapped. In a few cases the excavators provided the overall mean postmold diameter or wall-trench width for a structure as a whole. I used any provided measurements if I could not determine my own from the plan maps. Mean postmold diameters were calculated by averaging the diameters of all postmolds that appear to be associated with a structures walls, when measurable. Mean postmold spacing is calculated by measuring the distance from the mapped

center point of one postmold to the center point of the next adjacent postmold in the wall, repeated for every pair of adjacent postmolds, then averaged. Mean wall-trench width is calculated by measuring at the wall's midpoint and then averaging for all walls in the structure (Schroeder 2011).

The wall and roof types of Mississippian structures have been studied and debated extensively (e.g., Lacquement 2007:4-7; Steere 2017:39-42). Reed (2007) argues that Mississippian structures in the southeast were primarily built with flexed walls and domed roofs and Sullivan (2007) reports on a WPA-era reconstruction of a flexed and peaked roof.In contrast, Schroeder (2011) demonstrates that rigid walls with hipped or gabled roofs may have been the dominant style at Jonathan Creek in western Kentucky. Alt and Pauketat (2011) suggest that both designs were practiced by American Bottom Mississippians. Late Woodland structures in the Midwest usually have closely-spaced small diameter posts, suggesting they had flexed walls and curved or peaked roofs (Alt and Pauketat 2011:112; Steere 2017:39-42; depicted in Sullivan 2007:129). In sum, wall and roof type are not reliable attributes for differentiating between Mississippian and Late Woodland architecture. But, if wall and roof type *did* differ between Mississippian and Late Woodland traditions at Aztalan, then it could be useful for identifying distinct learning communities when used alongside the more reliable diagnostic indicators (foundation type, shape, and entrance type).

Square-ness or Roundness (width to length ratio)

A representation of a rectilinear structure's "square-ness" or an ovoid structure's "roundness" is the ratio of its width to length (W:L; width divided by length). A perfectly square or perfectly circular structure has equal width and length, so W:L equals 1. A structure that is

twice as long as it is wide has a W:L ratio of 0.5. The longer and more narrow a structure, the smaller its W:L ratio. I consider W:L ratio to be a high-visibility attribute, and thus an aspect of visible style, when a structure is very obviously more or less square than surrounding structures: such as a very long and narrow structure (perhaps with a W:L ratio of 0.3) surrounded by square structures (W:L ratio = 1.0). However, in the absence of stark differences in W:L ratio the attribute is more subtle and thus more similar to aspects of technological style. Square-ness or roundness might also influence internal organization because a square structure has four roughly equal corners and a circular structure has no inherent division of interior space, whereas space within a long narrow structure might be divided into two halves. The potential influence on internal organization makes W:L a low-visibility attribute similar to technological style.

Archetypal Mississippian structures in the Midwest have W:L ratios between approximately 0.5 and 0.6, while Late Woodland structures are variable in their square-ness. This makes W:L alone insufficient for differentiating between Mississippian and Late Woodland structures. But, it is still useful for identifying Mississippian structures when used alongside foundation type, shape, and entrance type. If archetypal Late Woodland and Mississippian structures at Aztalan show distinct differences in their W:L ratios, then their attribute could be applied to hybrid structures to determine if they were most likely designed and built according to Late Woodland or Mississippian architectural principles.

Structure Size

Structure size also varies between high- and low-visibility depending on the scale of the differences. Building a large house next to small ones can be a dramatic statement (visible style), whereas differences are far less noticeable when all structures are approximately the same size.

Domestic structure size can also be a function of status difference (Hally 2008; Hammerstedt 2005; Pauketat 1994; Pluckhahn 2010:347-351; Schroeder 2011; Steere 2017:138-156), the size of households and basic social units (Hally 2008:271–279; Pauketat 1998:135–136; Steere 2017:24; Wilk 1983; Wilson 2008:75) or settlement size (Steere 2017:158-162), so it needs to be considered alongside other architectural attributes that are diagnostic of architectural traditions (like foundation, shape, and entrance type, in the case of Mississippian and Late Woodland buildings).

Separate from style, structure size can also be used to estimate population size because in traditional societies interior floor area is commonly assumed to be associated with the number of individuals who lived in a structure (LeBlanc 1971; Naroll 1962; Richards 1992:115; Schroeder 2011:317-319; Steere 2017:21-33; Wilk 1983; Wilk and Netting 1984). At Aztalan, postmolds associated with many structures are indicated as sketched circles around mapped centerpoints, making it impossible to know the postmold diameters and thus accurately measure the interior space. Given this limitation, I instead calculate areas using the postmold and wall-trench centerpoints, which are almost always indicated. This is not truly the interior living space, so I refer to it as the structure "footprint." I calculate footprint for rectilinear structures by simply multiplying length times width. The footprint of ovoid structures is calculated using the equation $\pi(\text{length*width}/2)$. It is somewhat comparable to interior livable space, though is skewed slightly larger. For example, a structure 4 m long and 4 m wide (measured from the centerpoints of postmolds) with 10 cm postmolds has a livable space of 15.21 m^2. The "footprint" of the same structure is 16 m^2, a difference of 0.79 m^2. The difference is exaggerated for larger structures, structures with larger postmolds, and especially for small structures with large postmolds: the difference between livable space and footprint in a 4 m x 4 m structure with 18 cm postmolds is

1.4 m^2. As such, the structure footprint is more useful as a representation of structure size than it is as a measurement of livable space.

5.2.3 Overall Classification

The third classification assigned to a structure is based on the comparison of technological and visible style. While technological and visible style classifications may represent the identities expressed unconsciously and publicly by the structure, taking both classifications into account allows me to classify the structure as overall conforming to Mississippian style, Late Woodland style, or hybrid when it exhibits the attributes of each tradition. With regard to hybrid structures, the next step is to determine if the structure illustrates Mississippians adopting local architectural practices or Late Woodland people adopting Mississippian practices.

Mississippian structures follow a narrow definition with essentially one possible combination of attributes: wall-trench foundation, rectangular shape with neat corners, no complex entrance, and likely a W:L ratio of ~0.5-0.6 (Result 1, Figure 5.1). Equifinality is particularly problematic for Late Woodland structures because there are multiple combinations of attributes that fall within the Late Woodland range of variation, including visible styles that resemble Mississippian structures. The *strongest candidates* for Late Woodland structures are those constructed with single-set posts and that are ovoid or rectilinear with complex entrances (Result 2, Figure 5.1). Rectilinear single-set post structures without complex entrances could also be classified as Late Woodland when they lack neat, straight walls and corners (Figure 5.1). Equifinality is also an issue when the foundation elements are not preserved (Result 3), and for hybrid structures with mixed attributes from both traditions.

I categorize hybrid combinations into three types: Hybrid Type 1 includes structures that combine Mississippian technological style (wall-trench construction) with the strongest indicators of Late Woodland visible style (ovoid shape and rectilinear with complex entrances; Result 4). These are the types of hybrids predicted by Alternative Hypothesis 1, that migrants and their descendants adopt the visible style of local architecture while simultaneously maintaining the technological style of their homeland. Hybrid Type 2 includes possible hybrids that pair Late Woodland technological style with Mississippian visible style (Result 5). I would interpret Type 2 Hybrids as Late Woodland people adopting the visible style of Mississippian structures. Hybrid Type 3 describes hybridized technological style – composite foundations that utilize both wall-trench *and* single-set post construction (Result 6). Because the foundation itself is hybridized, the structure as a whole is a hybrid regardless of the above-ground appearance. Structures known only by basin stains are difficult to assign to an archaeological culture unless they are clearly ovoid or are well-defined rectangles without visible entrances and with a W:L ratio of 0.5-0.6. Ovoid basin stains would not be classified as Mississippian structures, though then could be Type 1 Hybrids. Rectangular basin stains without complex entrances could be classified as Mississippian structures (especially if they have a W:L ratio of 0.5-0.6) or could be Type 2 Hybrids (Late Woodland adoption of Mississippian visible style).

I examine structure footprint, W:L ratio, and inferred wall type to identify patterned differences that may relate to Mississippian and Late Woodland practices in an attempt to solve some issues of equifinality. On their own, these attributes are generally less reliable for differentiating between the cultural traditions in the Midwest. They may be useful, however, if patterned differences can be identified between archetypal Mississippian and Late Woodland structures at Aztalan. The footprint, W:L ratio, and inferred wall types of problematic structures

can then be compared to patterns observed in archetypal structures to support classification as Mississippian or Late Woodland.

5.3 Alternative Hypothesis 2 – Palisades

The palisade walls at Aztalan have long been interpreted as Mississippian constructions because of their size and appearance (Barrett 1933:76-77; Birmingham and Goldstein 2005:53; Krus 2013:39-41; Richards 1992:1). However, as key components in the physical dimensions, layout, and appearance of a walled community, the choices made during wall construction both reflect and transform how the community perceives itself and how it is perceived by outsiders. Therefore, my second alternative hypothesis is that the physical appearance of a coalescent community reflects collaboration of its diverse residents. Specifically, palisade walls should reflect shared participation because they are integrative practices that generally require community-wide involvement. This hypothesis is an alternative to the hegemonic perspective that walls express the identity of a conquering or dominant group. Mississippian and Late Woodland palisades in the Midwest differ in design and material size preferences (Table 5.3), so Alternative Hypothesis 2 can be tested at Aztalan by examining the site's walls for evidence of Late Woodland architectural practices. Specifically, I expect to find at least some segments of the walls were constructed with small posts less than 15 cm in diameter (which is typical for non-Mississippian palisades [Milner 1999:118-120, 2000]). This hypothesis would also be supported by the presence of walls without bastions (also typical of Late Woodland palisades) if they can be dated to the period of co-residence.

5.4 Analytical Methods - Palisades

I utilized large-format field maps produced during Wisconsin Archaeological Survey (WAS) and the State Historical Society of Wisconsin (SHSW) palisade excavations in the 1940s through 1960s, on file at the Wisconsin Historical Society's Museum Archaeology Program (Baerreis 1949-1954; Freeman 1962-1967). The WAS and SHSW excavations both documented extensive lengths of palisade walls at Aztalan, though not as much as Barrett's impressive work in 1919, 1920, and 1932 (Barrett 1933). Barrett's original field maps are missing and the only maps held by the Milwaukee Public Museum are the same ones reproduced in his monograph *Ancient Aztalan* (Richards 1992:12, 209) and they do not detail diameters of individual posts. Therefore, I primarily rely on the WAS and SHSW excavations and use Barrett's text and published maps as supplemental information. I used the large-format maps to calculate average post mold diameter (when postmolds were drawn to scale or diameters were specified), measure bastion spacing and the width or length of bastions salients, flanks, curtains, and perimeters, and categorize bastion shape. Bastions are associated with Mississippian palisades and square, rectangular, and circular bastions have been reported for eastern North America (e.g., Blitz 1993:115-118; Hammerstedt 2005:Figure 62; Hally 2008:167; Iseminger et al. 1990; Krus 2011; Pauketat 2013:88-93; Schroeder 2006). Palisade attributes are described in Table 5.4 and illustrated in Figure 5.5. I then compared my observations to patterned differences between Mississippian and Late Woodland palisades in southern Wisconsin, the American Bottom, and eastern North America (Blitz 1993:115-123; Finney 1993; Hally 2008:163; Hammerstedt 2005:129; Iseminger et al. 1990; Krus 2011, 2013; Milner 1999, 2000; Pauketat 2013:88-93; Salkin 1993:215, 2000; Schroeder 2006).

Table 5.3. Differences between Late Woodland and Mississippian palisades in the U.S. Midwest.

Palisade Characteristic	Late Woodland	Mississippian
Sites where found	Present at some larger, more sedentary sites, mostly in southeast Wisconsin	Present at many “mound and town” sites
Postmold diameter	Average <15 cm	Average >15 cm
Bastions	No	Yes – Square, rectangular, and circular shapes. Typically uniform design and evenly-spaced ~20-25 m apart
Settlement organization inside the walls	Compact residential space	More spacious and organized ceremonial and residential spaces

Table 5.4. Palisade attributes and components measured or discussed in this dissertation. LW=Late Woodland. M=Mississippian. (Hammerstedt 2005; Iseminger et al. 1990; Keeley et al 2007; Krus 2013; Schroeder 2006).

Attribute	Description and Measurement Method
Curtain	The primary component of a palisade wall, comprised of wooden posts arranged linearly. The curtain is a barrier that defensively and/or visually shields occupants.
Bastions	Regularly spaced external projections of the curtain and historically were often towers large enough to hold several defenders (Keeley 2007:67). Bastions are also buttresses that support the curtain.
Bastion salient width	The length of the line of post molds forming the bastion salient, measured between the first and last post mold of the segment from center point to center point.
Bastion flank length	Each flank of a bastion is measured between the point where the flank meets the wall curtain and the point where the flank meets the salient, from post mold center point to center point. If both flanks are mapped in their entirety, the two flank lengths are then averaged to determine the bastion's flank length value. If only one flank is measurable, that measurement is the flank length value.
Bastion curtain width	The distance between the points where the bastion flanks meet the wall curtain. This dimension can be a line of posts that continues from the wall curtain, or can be "open" without posts. I refer to this dimension as the bastion curtain. Measured from center point to center point of the posts where the bastion flanks meet the wall curtain.
Bastion shape	General categorical shape: square, rectangular, circular, "flared", or "tapered".
Bastion perimeter	The total length in meters of a bastion's sides protruding from the wall curtain. The calculated value is the bastion flank length times two, plus the bastion salient width. For circular bastions, it is the diameter.
Gates	Gates are breaks in the wall that allow people to enter and exit the enclosure. They may be configured in a way that makes them defensible, either by shielding the opening with baffles or screens, or by placing them adjacent to bastions.
Average Postmold diameter	Average of individual post mold diameters of bastions or wall curtains, as indicated from labels on field maps. In some cases individual post molds were labeled with their diameters. In other cases the excavators noted the average diameters for the entire wall segment in lieu of individual labels.
Number of postmolds per meter (pmpm)	Calculated by counting the number of mapped posts in a wall segment or bastion and dividing by the total mapped length of the segment or by the length of the mapped portions of the bastion perimeter.

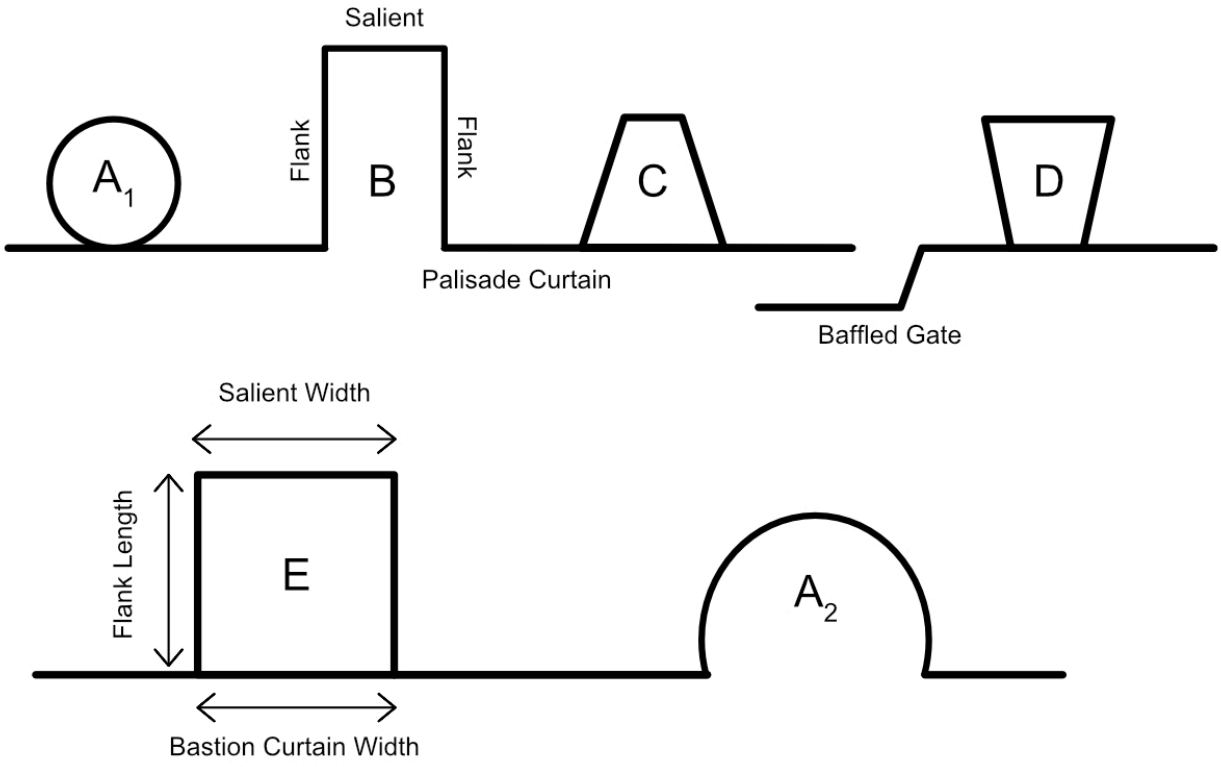

Figure 5.5. Palisade terminology and categorical bastion shapes: A_1) Circular; A_2) Semi-circular; B) Rectangular; C) Tapered; D) Flared; E) Square.

The field maps were produced in feet and had postmold diameters recorded in tenths of feet for individual post molds or, in a few cases, as averages. I measured curtain lengths, bastion salient, flank, and curtain widths or lengths, and bastion perimeters myself. Measurements I made from the maps as well as measurements provided by the excavators were all converted to metric prior to calculations. Bastions were identified as arrangements of postmolds protruding from palisade walls. The curtain-side of bastions may be open or closed (Figure 5.5). Width and length of each bastion were determined where possible, by measuring from the centerline of posts on opposite sides (Figure 5.5). Measurements were from centerlines because in some cases the post mold circumferences were sketched around a mapped center point, meaning that the only accurate measurement could be taken from those center points themselves. Diameters were

sometimes noted for individual postmolds. In other cases, the average diameter is provided for an entire wall segment. To calculate the average number of postmolds per meter I counted the total number of mapped postmolds and divided by the total length of mapped segments. I similarly calculated the number of postmolds per meter in each bastion by dividing the number of postmolds by the length of the bastion perimeter and extrapolated for unmapped portions of bastions to determine the average number of postmolds per bastion. I measured the mapped and extrapolated lengths of each known palisade wall at Aztalan and estimated the number of bastions on each wall using an average spacing of 25 meters from center to center (the average spacing on the outer walls). I then used my postmolds per meter and postmolds per bastion results to estimate the total number of postmolds required for each wall. I do not estimate material requirements for bastion platforms, ladders, laths, or daub.

5.4.1 Labor and Population Requirement Estimates

I also calculate labor force and project duration estimates for the palisades to demonstrate whether the labor force requirements could feasibly be small enough that not everyone had to participate in the work (meaning that collaboration could be a function of choice rather than necessity) and how quickly the walls could have been built (and how quickly the community would have assumed any identities portrayed through the walls). I then use labor force estimates to calculate total population size ranges. Population size has implications for power dynamics between migrants and locals because a group of migrants who join a small community would comprise a greater portion of the total population than the same number of migrants in a large community. A group of migrants that comprises a small portion of the population is more easily absorbed, but a relatively larger group has greater power to negotiate their integration, lower risk

of marginalization, greater capacity to maintain the social structure and practices of their home regions, and more enduring expressions of their ethnic identities (Cameron 2011:191; Cook and Schurr 2009; Stone 2000, 2003). Thus, it can be easier for a migrant group to integrate into a smaller community in which they might comprise a larger portion of the population, and there may be greater likelihood that their traditions are preserved.

After calculating the estimated material requirements for the walls, it is relatively straightforward to calculate labor requirements by multiplying the number of posts by the number of person-hours required to harvest and erect each post. Labor requirements for Mississippian palisades have been calculated by a number of scholars and vary widely depending on which tasks are included in the estimates (Blitz 1993:122; Hammerstedt 2005:51-64; Iseminger et al 1990:35-37; Krus 2011; Milner 1998:147). For example, Blitz uses 1.17 person-hours per post, based on tree cutting, trimming, hauling, and placement (1993:122) while Krus uses Milner's estimated 17 person-hours per post, based on tree cutting, transportation, placement, and covering with daub (Krus 2011:238; Milner 1998:147-148).

Table 5.5. Per-post labor requirements used in this dissertation.

Task	Person-hours per post
Tree cutting (Example: 20 cm post)[a]	0.37
Post preparation[b]	1.5
Post hauling and placement[c]	2.5
Post hole digging[d]	0.5
TOTAL	**4.87**

[a] $t = \exp(-1.766058) * d^{1.622969}$
Using stone tools to fell trees of unknown species less than 30 cm in diameter (Hammerstedt 2005:51-52, 59)

[b] Estimated 1-2 hrs to remove bark and branches (Iseminger et al 1990:35). I use 1.5 hrs.

[c] Six people carrying a log at a speed of 2.4 km per hour (Iseminger et al 1990:36)

[d] Approximately 0.08 m^3 of soil excavated per hour using stone tools (Meighan 1964:377) equals 22.5 minutes, plus estimated extra time to reflect the difficulty of excavating a narrow hole.

Based on my review of existing studies, I chose to include tasks that others have also used: Tree cutting, post preparation (bark and branch removal), log transportation, and post hole excavation (Table 5.5). The labor estimates I use for tree cutting are calculated using an equation devised by Hammerstedt (2005:51-64) for trees of unknown species that are less than 30cm in diameter: $t = \exp(-1.766058) * d^{1.622969}$, where t=time and d=diameter. As an example, a tree of unknown species that is 20 cm in diameter requires 0.37 person-hours to cut down. Tree species and skill level might result in shorter or longer cutting times, but this is a reasonable average estimate and using it makes my results comparable to others. I estimate 1.5 person-hours for post preparation, derived from an estimated 1-2 hours used by Iseminger et al (1990:35). Iseminger et al. (1990:36) also estimated a team of six people could haul a log at a speed of 2.4 km per hour, a rate that is also used by Hammerstedt (2005:63-64). I use this rate to estimate 2.5 person-hours

per post to transport a trimmed log 1 km. I use 1 km in my calculations because Picard (2013:41) has estimated that 41% of the land within 2 km of Aztalan (~5,200 km^2, on the east side of the Crawfish River) was forested with trees like sugar maple, shagbark hickory, varieties of oak, black walnut, black cherry, basswood, and other species. Labor would have been significantly reduced by floating logs down the Crawfish River, but also would have increased for traveling greater distances or over/around difficult terrain. I believe that 1 km is a reasonable average. Finally, a person can excavate approximately 0.08 m^3 of soil in one hour using stone tools (Meighan 1964:377). A post hole 20 cm in diameter and one meter deep would thus require approximately 22 minutes to dig. However, this estimate does not include the difficulty of digging a deep, narrow hole, so I estimate an arbitrary additional eight minutes. My resulting estimate is 0.5 person-hours to dig a post hole 20 cm in diameter to a depth of one meter. As every archaeologist knows, the time required to dig a hole also varies greatly depending on the soil type and moisture, tool type and sharpness, and hole size, but I believe my estimate is reasonable. The estimated labor requirement per post is multiplied by the total number of posts in each wall to determine the total labor requirement in person-hours for each wall. I use total person-hour requirements to calculate a range of labor force sizes using four, six, and eight hour workdays and 30, 90, and 180 day project durations. For example, by these parameters 50,000 person-hours would equate to a labor of minimum of 69 people (50,000 / 8 hrs / 30 days) and maximum of 208 people (50,000 / 4 hrs / 180 days). Finally, I use these ranges of labor force requirements to estimate total population size. I calculate population ranges by arbitrarily assuming that the workforce was 20%, 30%, 40%, or 50% of the total population. I calculated population size for a range of labor force proportions for several workday length and project

duration scenarios. In addition to minimum-maximum ranges I also provide results of various intermediate combinations of parameters.

5.5 Alternative Hypothesis 3 – Pottery from Structure Contexts

My **Third Alternative Hypothesis** is that the residences of migrants and locals were spatially intermingled, meaning that migrants were not pushed to live in one part of the community (or did not choose to live apart from locals). Specifically, if people from Mississippian and Late Woodland learning communities were intermingled in the residential area of the site, then refuse pottery in abandoned house basins should include mixes of Mississippian (shell-temper) and Late Woodland (grit-temper) technological styles, reflecting distinct learning communities.

5.6 Analytical Methods - Pottery from Structure Contexts

I use samples of pottery assemblages from structure basin fill and postmolds excavated by WAS, SHSW, UWM, and UW-Madison to determine if the assemblages contain only pottery produced using Late Woodland ceramic tempering agent (grit), only pottery produced using Mississippian ceramic tempering agent (shell), or a mix of pottery produced using Late Woodland and Mississippian tempering agents). There are several ways that ceramics might be deposited on structure floors or in the fill of semi-subterranean house basins or postmolds: they might be left in place on the floor during catastrophic abandonment like fire or flooding (Schiffer 1985); they might be unwanted or forgotten items or trash left behind during planned abandonment before the structure is dismantled, intentionally burned, or left to rot (Cameron 1990; Seymour and Schiffer 1987:557); they could be intentionally left behind in ritual abandonment (Baires and Baltus 2017; Schiffer 1985; Wilshusen 1986); a structure might be

cleaned out during planned abandonment (Cameron 1990); or a structure might be cleaned out, rebuilt in the existing basin, and reoccupied until eventually abandoned for another reason. Whatever the reason and method of abandonment, an open house basin would be a hazard in a residential area and would be a more convenient place for people living nearby to dump their trash than carrying it across the site. The need to fill hazardous open house basins, and convenience, would result in refuse assemblages in the fill of abandoned structure basins. Assemblages would also differ depending on the reasons and methods of abandonment.

A catastrophic event like a fire or sudden flood would force a quick evacuation, resulting in a ceramic assemblage that includes complete vessels (Seymour and Schiffer 1987:557) and other materials associated with the occupants. Trash could be thrown into the basin later (Cameron 1990), perhaps stratigraphically above a layer of burned roof material or water-born sediment while the materials associated with the occupants would be found lying horizontally on the floor. In contrast, useful objects are likely to be removed from a structure during planned abandonment resulting in a small assemblage consisting mostly of trash left on the structure floor (Cameron 1990). Filling the hazardous open basin could result in more trash in the basin fill at elevations higher than the floor. A structure that is cleaned out and then burned, dismantled, or left to rot would still be a hazard, and filling the basin with soil and trash would result in a mixed layer of refuse and soil. Finding materials in postmolds indicates that the posts were pulled and materials fell or were placed into the open holes. A structure that is cleaned out, rebuilt, and reoccupied might yield microartifacts on an original house floor with the rebuilt floor over superimposed over it (Milek 2012).

Any of these scenarios could result in an abandoned house basin being filled with trash. If Late Woodland and Mississippian people both lived in and used the residential area of Aztalan

(simultaneously or sequentially) then I expect their trash to be mixed within the residential area. Thus, if mixed temper types are found on structure floors and in basin and postmold fill, this indicates sequential or simultaneous occupation of the area. Based on the placement of whole, upside-down Late Woodland and Mississippian pots in the fill of the Northeast Mound during its construction (Zych 2013), mixed trash deposits in the riverbank midden (Richards 1992), and generally mixed Late Woodland and Mississippian materials in a variety of contexts across the site, I infer simultaneous occupation.

If structures near each other contain only grit-tempered pottery and are classified as Late Woodland, then I argue that the surrounding area was primarily used by people from Late Woodland learning communities. If structures near each other contain only shell-tempered pottery and are classified as Mississippian, then I argue that the surrounding area was primarily used by people from Mississippian learning communities. If structures near each other are classified as Late Woodland but contain mixes of grit- and shell-tempered pottery, then I argue that the area was primarily occupied by Late Woodland people who used pottery produced by both Late Woodland and Mississippian potters, or that Mississippian potters lived within primarily Late Woodland households. If structures near each other are classified as Mississippian but contain mixes of grit- and shell-tempered pottery, then I argue that the area was primarily occupied by Mississippian people who used pottery produced by both Late Woodland and Mississippian potters, or that Late Woodland potters lived within primarily Mississippian households.

If Late Woodland structures containing only grit-tempered pottery and Mississippian structures containing only shell-tempered pottery are found together in the same parts of the site, then I argue that Late Woodland and Mississippian peoples were spatially integrated in that area

but kept independent ceramic practices. If Late Woodland and Mississippian structures are found near each other and contain mixes of grit- and shell-tempered pottery, then I argue that the people were integrated spatially and in their use of ceramics, perhaps as a result of intermarried potters or trade. Grit- and shell-temper types can be used to infer the learning communities of the potters because of the culturally and geographically distinct temper choices made by Late Woodland and Mississippian populations in the Midwest at the time of Aztalan's occupation (A.D. 1100-1200). Both tempering agents were available at Aztalan, so the choice to use one or the other was not a function of availability.

Grit- and shell-temper identification was a mature practice by the mid-twentieth century (Ford and Willey 1941; McKern 1939) and grit and shell temper types are so different that few people would mistake them (Figure 5.6). Grit-temper is identified macroscopically as particles of crushed rock or minerals. Shell-temper is identified macroscopically as particles of crushed mussel shell, or as flat voids left from decomposed flakes of shell. Other temper types such as sand, limestone, and grog are also found in Late Woodland and Mississippian pottery, but none are unique only to Late Woodland or Mississippian pottery. For the UW-Madison excavations, I identified temper type for all ceramics recovered through screening and excavation in 2015-2016. For the older projects, I relied on temper types reported by Wittry and Baerreis (1958), Richards (1992:184), Zych (2013:124), and unknown SHSW staff (artifact inventories on file, Wisconsin Historical Society, Madison). Because the difference between grit and shell temper is so distinctive, I consider the reported temper types to be reliable.

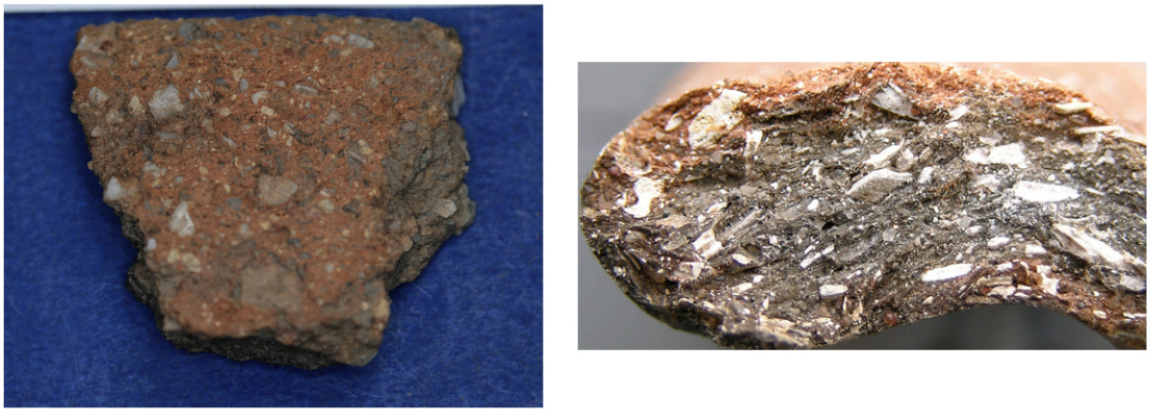

Figure 5.6. Grit- (left) and shell-temper (right). Note the blocky nature of grit-temper and the flakey nature of shell-temper.

As discussed in Chapter 2, the technological style of pottery is less likely to be manipulated and is more reliable for identifying social boundaries that result from distinct learning communities: in this case, grit- and shell-temper reflect Late Woodland and Mississippian ceramic practices, respectively. In contrast, the visible style of pottery (form and decoration) can differ depending on the vessel's intended purpose and is more likely to be strategically manipulated or imitated. Because I am interested in identifying the presence of Mississippian and Late Woodland peoples, and technological style is more appropriate for identifying social boundaries, I rely *only* on temper type, consider rim- and body-sherds equally, and do not consider pottery typology in my analyses, even though pottery types are commonly used as diagnostic indicators of Archeological cultures in North America (including at Aztalan). More detailed analyses of pottery types, rim forms, decoration, paste, and vessel size is beyond the scope of my dissertation and could constitute an entire thesis by itself (for example, Richards 1992 and Zych 2013). I justify this choice because I expect material hybridization to occur in the context of population coalescence, which conceivably includes people of Late Woodland heritage copying the vessel morphology of their Mississippian neighbors, and vice versa.

In fact, hybrid "Hyer Plain" pottery that combines Late Woodland grit-temper with Mississippian Powell Plain vessel morphology is well-documented at Aztalan (Richards 1992:348, 2003; Zych 2013:156). Richards defined Hyer Plain as a local, grit-tempered analog of Powell Plain and considered it to be a Mississippian type (1992:186-91, 348-352), but also discusses Hyer Plain in terms of "local imitation of extra-local ceramic industries" (1992:190-191). Zych specifically describes Hyer Plain vessels as imitations of Powell Plain jars made by Late Woodland potters (2013:184) and analyzes them alongside Late Woodland types (2013:174). It seems that both Richards and Zych infer from grit-tempering that Hyer Plain vessels were manufactured by people belonging to Late Woodland learning communities. I agree, and thus rely on temper type alone to identify Mississippian and Late Woodland learning communities that underlaid more visible blended traditions and hybridization.

I recorded the presence/absence or quantity of grit- and shell-tempered pottery sherds for each WAS, SHSW, UWM, and UW structure that had pottery reported. The WAS reported presence and absence of Mississippian and Late Woodland sherds (rather than grit- and shell-tempered) in the published report of the structures by Wittry and Baerreis (1958). I take their reference to Late Woodland and Mississippian sherds to mean grit- and shell-tempered because Baerreis and Freeman associated grit-temper with the Late Woodland tradition and shell-temper with Mississippian in a separate article from the same issue of the *Wisconsin Archeologist* (Baerreis and Freeman 1958:36). Their use of presence and absence is sufficient for my purposes because I am concerned with identifying the presence of Mississippian and Late Woodland technological styles and their intermingling during abandonment mode.

For the SHSW assemblages, counts of grit- and shell-tempered sherds are recorded in the Wisconsin Historical Society inventories. Ceramic inventories associated with structures SHSW-

1967-S1, -S2A, and -S2B were updated following detailed ceramic analyses by Zych (2013:124). Pottery sherds recovered from structures during the UWM excavations were analyzed and reported by Richards (1992:184). UW-Madison pottery assemblages were analyzed by myself and students under my supervision. I exclude pottery from Barrett's excavations because he focused heavily on tracing out palisades and less on investigating residential features. In addition, Richards reported that MPM accession records rarely include provenience information for the Barrett collections (Richards 1992:209).

5.7 Chapter Summary

I proposed a null hypothesis and three alternative hypotheses designed to address my research questions about integration of migrants and their descendants among culturally-different locals and the relationships between architecture, expressions of identity, and community formation. I test my null hypothesis, that migrant and local descent groups maintain independent practices, through analyses of Aztalan's domestic structures, palisade walls, and pottery assemblages recovered from structures. If my results do not support the null hypothesis then my alternative hypotheses are probable.

My first alternative hypothesis states that if migrants sought to reduce their appearance as outsiders, then they should adopt the visible styles of local architecture to blend in to the community. Simultaneously, the technological style of migrants' architecture would be maintained because it is primarily influenced by their socially and geographically distinct learning communities. I analyzed the technological and visible style of each domestic structure at Aztalan through 12 variables. Each structure is classified based on its technological style, its visible style, and the combination of two. The technological style of structures in the Midwest ca. A.D. 700-1300 is primarily its foundation type, with Mississippian structures utilizing wall-

trenches and Late woodland structures utilizing single-set posts. Structure square-ness and size can also be aspects of technological style. Visible style includes shape, entrance type, wall and roof type, square-ness, and size. Like foundation type, structure shape and entrance type are also distinctly different between Mississippian and Late Woodlands structures which makes it possible to identify the cultural association of a structure. When technological and visible style contradict each other, it suggests cross-cultural influences, active manipulation, and hybridity. When they align, it indicates maintenance of independent cultural traditions in architecture. If structures with Late Woodland (single-set post) and Mississippian (wall-trench) foundations are found near each other, I argue that the people were spatially intermingled. If the foundation types are separated to distinct areas of the site, then I argue that people were segregated.

I test my second alternative hypothesis, that the physical appearance of a coalescent community reflects collaboration of its diverse residents, by analyzing the design and construction of palisade walls at Aztalan. Mississippian and Late Woodland palisades differed in their design and material size preferences, which makes it possible to determine whether Aztalan's walls are strictly consistent with Mississippian palisades. My null hypothesis predicts that the walls at Aztalan would be consistent with *either* Mississippian or Late Woodland design and construction, but not both. However, if the walls contain evidence of both Mississippian and Late Woodland construction it would support my second hypothesis of collaboration. I also used metric measurements of postmolds, wall length, and bastion size to determine material and labor requirements and calculate population estimates for Aztalan. Considering the intense labor and resource requirements of monumental constructions like palisade walls, these estimates provide context for understanding the dynamics of interaction. Further, population estimates have

implications for migrant group size relative to the local population, which is a factor in successful integration (Cameron 2011:191; Cook and Schurr 2009; Stone 2000, 2003).

Finally, I infer whether Mississippian and Late Woodland peoples were spatially integrated in residential space by identifying the temper types of pottery recovered from structure contexts. Temper choice, as an aspect of pottery technological style, reflects Late Woodland (grit) and Mississippian (shell) learning communities of ceramic production. I argue that mixed assemblages of grit- and shell-tempered pottery indicate trade or intermarried potters, and when combined with spatially intermingled Late Woodland and Mississippian structures it indicates integration. I present the results of these analyses in the next chapter (Chapter 6).

Chapter 6: Results of Structure, Pottery Assemblage, and Palisade Wall Analyses

The ability of migrants and their descendants to integrate among locals is dependent on numerous factors such as cultural similarity between migrant and local descent groups, group size relative to the local population, willingness to assimilate, and how identities are expressed and received (Bloom et al. 2015; Clark 2001; Cook and Schurr 2009; Manzanilla 2015; Stone 2000, 2003). Successful or strong integration (meaning the ability of migrants and their descendants to achieve an assumed goal of establishing themselves among locals in at least some aspects of life, acknowledging the subjectivity of the concept) may be visible archaeologically as material hybridization, spatial intermingling of migrant and local houses, a reduction in the use of foreign visible style (and the adoption of local ones), collaboration in construction or use of public spaces, or evidence that the migrant group and their descendants occupy their destination area for some time. Lack of hybrid material culture, especially when accompanied by multiple forms of marginalization, might support an inference of weak integration. Unsuccessful integration (migrants or their descendants leaving, being expelled, or killed as a result of their interactions with local populations) might be visible archaeologically as the presence of some forms of marginalization, perhaps increasing in severity thought time, followed by disappearance of the migrant group from the archaeological record while signatures of the local population remains (e.g., Stone 2003). Because my definitions revolve around migrants and their descendants achieving a goal of co-existence with locals, they do not include slaves or other captives who are forced to live among the local people, except in cases when they are given their freedom.

Differences in material culture alone do not necessarily indicate weak integration, but may when evidence of marginalization is also present – migrant material culture found restricted to community margins; skeletal trauma in migrant individuals (identified as such through bone chemistry or associated material culture); or wealth inequality indicated through location in the community, house size, or valuable items (Bloom et al. 2015; Clark 2001; Hally 2008:500; Manzanilla 2015a; Stone 2000, 2003). Integration is a complex, subjective concept because integration can occur (or weaken) over generations, can be experienced differently by different segments of the population, and may take place in one aspects of life while independence or marginalization are simultaneously experienced in others.

In my dissertation I investigate hybridization and identity expression in domestic structures through technological and visible style; spatial intermingling of migrant and local descent groups in domestic life (as inferred by the technological style of pottery deposited during structure abandonment); and how integration may be reflected in the construction of monumental works such as palisades and the physical layout of their community. My null hypothesis states that co-resident migrant and local descent groups maintain independent practices in everyday life, including in the visible styles of their material culture. A consequence of maintaining independent practices is that if migrant and local descent groups have visible cultural differences, those differences can become planes of social and political conflict. So, it would be in diasporic people's best interest to selectively adopt aspects of local culture to reduce those differences and improve conditions for their success.

At Aztalan, between 7 and 14% of pottery vessels (depending on the assemblage; Christiansen 2003:223; Richards 1992:Table 5.5; Zych 2013:Table 5.3) are Hyer Plain vessels that combine Mississippian visible style and Late Woodland technological style, indicating

hybridization occurred in ceramic practices (Richards 1992:348, 2003; Zych 2013:156). Shared practices are also evident in the construction of the Northeast Mound, in which Mississippian, Late Woodland, and hybrid pottery vessels were deliberated buried in the mound fill as part of what Zych has inferred to be a single behavioral event (2013). These two lines of evidence are inconsistent with my null hypothesis that the diverse peoples of Aztalan maintained independent practices throughout the period of co-residence. I further test the null hypothesis through my analyses of domestic structures, pottery, and palisade walls. Three alternative hypotheses describe my predictions for ways hybridization and collaboration may be indicated by these kinds of material culture. Alternative Hypothesis 1 states that Mississippian migrants and their descendants adopted the visible styles of Late Woodland architecture while simultaneously maintaining the technological style of Mississippian architecture (wall-trench foundations). Alternative Hypothesis 2 states that the palisade walls at Aztalan show mixed Late Woodland and Mississippian traditions of design and construction resulting from their collaboration. Alternative Hypothesis 3 states that the residences of migrants and locals were spatially intermingled, meaning that migrants were not pushed to live in one part of the community (or did not choose to live apart from locals). While these are not the only possible alternatives to the null hypothesis, I focus on them because they focus on the roles of identity and material style, which have not been explored at Aztalan in these ways.

To test these alternative hypotheses, I examined the architectural attributes of structures and palisade walls to determine their similarity to regional patterns of distinctive Mississippian and Late Woodland architecture. I compiled information about the temper types of pottery assemblages associated with structures, specifically grit- and shell-temper (reflecting distinct Late Woodland and Mississippian learning communities) to infer whether diverse peoples

intermingled in daily life. In Chapter 5 I described my assumption that refuse in abandoned house basins was generated nearby, and that filling the basin of a recently abandoned structure with trash would be more convenient than carrying it across the site and would mitigate the dangers of having an open pit in the middle of a residential area. Finally, I calculated raw material and labor requirements for the palisades and population estimates for the community based on those labor estimates to demonstrate whether the labor force requirements could feasibly be small enough that not everyone had to participate in the work (meaning that collaboration could be a function of choice rather than necessity) and how quickly the walls could have been built (and how quickly the community would have assumed any identities portrayed through the walls). Further, population estimates have implications for migrant group size relative to the local population, because a group of migrants who join a small community would comprise a greater portion of the total population than the same number of migrants in a large community, and a relatively larger migrant group has greater power to negotiate their integration, lower risk of marginalization, and maintain the practices of their home regions (Cameron 2011:191; Cook and Schurr 2009; Stone 2000, 2003). I present the results of my analyses, explain whether my alternative hypotheses are supported, and describe how my results indicate diversity, hybridity, integration, and migrant success at Aztalan. I first discuss Alternative Hypotheses 1 and 3 (relating to domestic structures and residential integration) and then Alternative Hypothesis 2 (relating to community-level identities and collaboration in palisade wall construction).

6.1 Alternative Hypothesis 1 – Domestic Structures

Alternative Hypothesis 1 states that Mississippian migrants and their descendants adopt the visible styles of Late Woodland architecture to blend in to the preexisting Late Woodland

community and reduce how they are perceived as outsiders. Simultaneously, the technological style of Mississippian architecture (wall-trench foundations) would be maintained because it is primarily influenced by their culturally and geographically distinct learning communities. In comparison, Late Woodland locals would not feel as great a pressure to blend in so would not adopt migrant architectural styles as frequently. Detailed descriptions of each domestic non-mound top structure identified at Aztalan through 2016, with measurements and pottery assemblage information can be found in Appendix I. Additional summary tables beyond the ones in this chapter can be found in Appendices II-III.

6.1.1 Technological and Visible Styles of Structures

In brief summary, Mississippian wall-trench and Late Woodland single-set post structures are represented nearly equally at Aztalan, each making up more than one third of structures. An additional 12% have hybrid foundations composed of both wall-trenches and single-set posts and 15% are known only by basin stains or are unknown (Table 6.1). In contrast, there are more than twice as many structures with Late Woodland visible style as there are with Mississippian visible style (47% and 21%, respectively; Table 6.3). When structures are classified by their combined technological and visible styles, there are again twice as many Late Woodland structures as there are Mississippian structures (18% and 9%, respectively). Twenty-nine percent are hybrids that combine Mississippian and Late Woodland attributes, while another 35% are ambiguous.

There are only three archetypal Mississippian structures at Aztalan, identified by the combination of Mississippian technological and visible styles (wall-trench construction, rectangular shape with 90 degree corners and straight, parallel walls, and without complex

entrances). There are five Hybrid Type 1 structures that combine Mississippian technological style with Late Woodland visible style. Four ambiguous structures could be Mississippian *or* Hybrid Type 1 structures, and a fifth could be Mississippian or Hybrid Type 2. The various possible classifications of those ambiguous structures, when added to the well-classified structures, result in possible ranges of three to eight Mississippian (9-24%) and five to nine (15-26%) Hybrid Type 1 structures (Table 6.3). In comparison, there is a minimum of nine Late Woodland structures and possibly as many as 13 depending on how ambiguous structures are classified. To summarize, Alternative Hypothesis 1, which predicts that archetypal Mississippian structures will be rare relative to hybrid structures that combine Mississippian technological style with Late Woodland visible style (Hybrid Type 1), is tentatively supported by the *presence* of Hybrid Type 1 structures, though they may only slightly outnumber archetypal Mississippian structures.

Table 6.1. Foundation type frequencies.

Foundation Type	Cultural Association	Count	Percentage
Single-Set Post	LW	13	38%
Wall-Trench	Miss.	12	35%
Composite	Hybrid (Type 3)	4	12%
Basin only	LW, Miss, or Hybrid	4	12%
Unknown		1	3%
TOTAL		34	100%

Table 6.2. Technological and visible style frequencies.

	Tech. Style		Visible Style	
Classification	Count	Percentage	Count	Percentage
Late Woodland	13	38%	16	47%
Mississippian	12	35%	7	21%
Hybrid Type 3	4	12%		
Unknown	5	15%	11	32%

Table 6.3. Results of structure classification by their combined technological and visible styles.

	Minimum		Maximum		Range	
Classification	**Count**	**Percentage**	**Count**	**Percentage**	**Count**	**Percentage**
Late Woodland	9	26%	13	38%	9-13	26-38%
Mississippian	3	9%	8	24%	3-8	9-24%
Hybrid 1	5	15%	9	26%	5-9	15-26%
Hybrid 2	1	3%	6	18%	1-6	3-18%
Hybrid 3	4	12%	4	12%	4	12%
Unknown	3	9%	3	9%	3	9%
LW/H2 combined	14	41%	15	44%	14-15	41-44%
M/H1 combined	12	35%	13	38%	12-13	35-38%
Columns do not add						

Alternative Hypothesis 1 also predicts that Mississippian technological style (wall-trenches) will be disproportionately more common than Mississippian visible style (rectangular with 90 degree corners, without complex entrances) due to Mississippian people adopting Late Woodland visible style while simultaneously maintaining the technological style of their home learning communities.

Wall-trench construction (excluding composite foundations that combine segments of wall-trenches and single-set posts) is present in 12 structures (35%) and Mississippian visible style can be identified in 7 structures (21%). However, the Mississippian visible style may be underrepresented because there are more structures with unknown visible style (n=11, 32%) than with unknown technological style (n=5, 15%). This difference could be due to the reality that a larger portion of the structure must be exposed to determine visible style, while technological style can be determined from a smaller portion so long as it reveals the foundation type. Alternative Hypothesis 1 is tentatively supported by the greater frequency of structures with Mississippian technological style than with Mississippian visible style.

Sixteen of the structures have measurable postmold diameters and/or spacing, which are related to flexed vs. rigid wall types. I infer flexed wall construction from average postmold diameters less than 7.6 cm or spacing less than 30.5 cm, flexed or rigid walls from average postmold diameters between 7.6 and 11.4 cm, and rigid wall construction from average postmold diameters larger than 11.4 cm or spacing greater than 30.5 cm (Alt and Pauketat 2011; Brennan 2007; Reed 2007; Schroeder 2011). If postmold diameter and spacing contradict each other I infer the wall type from the postmold diameter because of the limitations in flexing large diameter poles. Based on these differences, 11 structures may have had rigid walls, five flexed walls, and 18 structures have unknown wall types (Table 6.4). Interior postmolds, which can also relate to roof type (Brennan 2007:81; Reed 2007:23-26; Schroeder 2011), are visible in four structures but were helpful only for inferring wall/roof type in one house (WAS-1950-H3, rigid, see Appendix I) because in the remaining three the postmolds are scattered with no discernible pattern.

Table 6.4. Inferred wall and roof type frequencies, by foundation type, structure shape, and combined style classification.

	Flexed	Rigid	Unknown
Total	5	10	18
Foundation Type			
Single-Set Post	2	6	5
Wall-Trench	1	2	9
Composite	1	3	0
Basin only or Unknown	1	0	4
Structure Shape			
Rectilinear	4	5	11
Ovoid	1	4	1
Other/Unknown	0	1	6
Combined Style			
Late Woodland	1	5	3
Mississippian	0	0	3
Hybrid Type 1	1	2	2
Hybrid Type 2	1	0	0
Hybrid Type 3	1	3	0
LW or Hybrid Type 1	0	0	0
LW or Hybrid Type 2	0	1	3
M or Hybrid Type 1	0	0	4
M or Hybrid Type 2	0	0	1
Unknown	1	0	2

6.2 Alternative Hypothesis 3 – Pottery from Structure Contexts

My **third alternative hypothesis** is that the residences of migrants and locals were spatially intermingled, meaning that migrants were not pushed to live in one part of the community (or did not choose to live apart from locals). Specifically, if people from Mississippian and Late Woodland learning communities were intermingled in the residential area of the site, then refuse pottery in abandoned house basins should include mixes of Mississippian

(shell-temper) and Late Woodland (grit-temper) technological styles, reflecting distinct learning communities.

Pottery is reported from the basin fill or post molds of 18 structures. Twelve of those yielded mixes of both grit-and shell-tempered pottery, six yielded only grit-tempered, and no structures yielded only shell-tempered (Table 6.5). One each of Late Woodland, Hybrid Types 1, 2, and 3, and an ambiguous LW/H2 structure contain only grit-tempered pottery. No Mississippian structures, and only one Hybrid Type 1 structure, contained only grit-tempered pottery. To summarize, Alternative Hypothesis 1 predicts that Late Woodland and Mississippian pottery (indicated by grit- and shell-temper, as aspects of technological style) will be found together in refuse in structure contexts and is supported by the mixture of both Mississippian and Late Woodland pottery in many of the structures.

Table 6.5. Grit- and shell-tempered pottery frequencies, by foundation type, structure shape, and combined style classification.

	Shell-temper Only	**Grit-temper Only**	**Grit- and Shell-temper Together**	**None Recovered / Unknown**
Total	0	6	12	16
Foundation Type				
Single-Set Post	0	4	6	3
Wall-Trench	0	1	3	8
Composite	0	1	1	2
Basin only or Unknown	0	0	2	3
Structure Shape				
Rectilinear	0	3	7	11
Ovoid	0	2	2	2
Other/Unknown	0	1	3	3
Combined Style				
Late Woodland	0	1	4	3
Mississippian	0	0	1	2
Hybrid Type 1	0	1	2	2
Hybrid Type 2	0	1	0	0
Hybrid Type 3	0	1	1	2
LW or Hybrid Type 1	0	0	1	0
LW or Hybrid Type 2	0	1	3	0
M or Hybrid Type 1	0	0	0	4
M or Hybrid Type 2	0	0	1	0
Unknown	0	0	0	3

6.3 Alternative Hypotheses 1 and 3 Discussion

The Mississippian-style platform mounds and presence of American Bottom Mississippian pottery in addition to Late Woodland material culture (that possibly originated in northern Illinois) has led to the longstanding interpretation that Aztalan was a Mississippian town built by migrants from the Cahokia area, and that a poorly-understood, possibly non-local Late Woodland population was also present (Barrett 1933; Baerreis and Freeman 1958; Birmingham and Goldstein 2005; Richards 1992, 2003; Ritzenthaler 1958; Stoltman 1991:350; Zych 2013). It seems logical, then, that there should be many archetypal Mississippian structures at Aztalan similar to the Lohmann-phase Mississippian occupation at Trempealeau where all seven excavated structures are Mississippian (Pauketat et al. 2015). However, my analysis of the 34 non-moundtop structures at Aztalan does not satisfy that expectation – only three of 34 are consistent with Mississippian houses elsewhere in the Midwest in terms of foundation type, shape, and entrance type.

Furthermore, the riverbank midden excavations by Goldstein and Richards (Goldstein 1985; Richards 1992) showed that the site was occupied by Late Woodland peoples prior to Mississippian arrival. With that in mind I would expect that there might be more Late Woodland structures at Aztalan than Mississippian (and Hybrid Type 1) structures, simply because there was already a Late Woodland occupation there before the first Mississippians even arrived (indicated by the presence of Aztalan Collared, Starved Rock Collared, Madison wares, and Hyer Plain vessels; Richards 1992:Table 4.7). However, control over time is difficult at Aztalan because the occupation history is relatively short, many radiocarbon dates from the site are from woody charcoal and are statistically identical (Richards and Jeske 2002; see Figure 4.2 for calibrated dates), cultural stratification is lacking across most of the site (the riverbank midden

being a clear exception), there are few cases of structure superposition that would aid in establishing a chronological sequence of architectural forms, and extensive historic plowing and erosion have led to feature truncation (Goldstein and Freeman 1997:232; Richards 1992:123, 143-144, 155, 169). It is not clear how the proportion of Late Woodland to Mississippian structures changed through time, and without more refined temporal control that will be difficult to determine.

The abundant mixing of grit- and shell-tempered pottery in structure contexts is notable (Table 6.5). Twelve of 18 structures (67%) contained both grit- and shell-tempered pottery. I assume that refuse assemblages in abandoned house basins was generated nearby, and that filling the basins with trash would be more convenient than carrying it across the site. If Mississippian and Late Woodland people were spatially segregated (for example, by interior walls or because migrants were pushed to the perimeters) then their respective trash would also be segregated. Thus, I tentatively conclude that Mississippian and Late Woodland peoples generally lived in proximity to one another rather than spatially separated. A review of structure locations does not reveal any spatial patterns along the lines of stylistic classification, which also supports spatial intermingling.

Six of the 18 structures (33%) with reported pottery contained only grit-tempered sherds (Table 6.5). Two were Late Woodland, one each were Hybrid Types 1, 2, and 3, and one is either Late Woodland or Hybrid Type 2. None of the six were Mississippian structures. SHSW-1967-S1 (Hybrid Type 2) and the Late Woodland structures (SHSW-1967-S2A and –S2B) were superimposed by the northeast mound, which may have been constructed early in the co-resident period (Zych 2013:180). Other sub mound features also contained only grit-tempered pottery (Zych 2013:75-86), although some of the pottery vessels represented were hybrids (Hyer Plain)

that combine Late Woodland technological style with Mississippian visible style. Thus, these structures may date to the time of, or shortly prior to, Mississippian arrival. A similar pottery assemblage of only grit-tempered pottery (from Aztalan Collared, Madison ware, and Hyer Plain vessels), was recovered from features identified in the plaza by Goldstein and Richards in 1984 (UWM-1984-S1; Richards 1992:168-170; Goldstein 1985:98-101). Hybrid pottery in both locations suggests at least indirect contact with Mississippian peoples, (the Hyer Plain type stylistically resembles Mississippian Stirling Phase Powell Plain pottery) so the two sets of features probably date to approximately the time of Mississippian arrival, or just before. If these structures date to before, or early in, the period of co-residence, then there is greater strength to the interpretation that mixed pottery was ubiquitous during the co-resident period.

6.3.1 Summary of Alternative Hypotheses 1 and 3 Results

To conclude, the null hypothesis (that co-resident migrant and local descent groups maintain independent practices in everyday material culture) is falsified by the abundance of hybrid structures that combine Mississippian and Late Woodland attributes, by the common mixing of Mississippian and Late Woodland pottery during structure abandonment mode, and by the presence of hybrid pottery in diverse contexts across the site (Christiansen 2003; Richards 1992; Zych 2013). Alternative Hypothesis 1 is tentatively supported in three ways: First, Hybrid Type 1 structures (combining Mississippian technological style with Late Woodland visible style) are present and may be more common than archetypal Mississippian structures. I compare my results to my original predictions for various combinations of technological and visible styles in Table 6.6. Second, wall-trench foundations are found in nearly as many structures as are single-set post foundations, while Mississippian visible style (rectangular with 90 degree corners,

width:length ratio ~0.5-0.6, and lacking a complex entrance) is rare. Hybrid structures were common, and most would not have had Mississippian appearances. There is no single house style that dominates; rather there are several repeated forms and a number of unique examples. Third, 12 of 18 pottery assemblages from structures contained mixes of Mississippian and Late Woodland pottery which leads me to infer that diverse peoples lived near each other or at least intermingled during the utilization of abandoned structures. This corroborates my prediction that migrants and their descendants blended in to the community by suggesting they lived alongside local peoples rather than in isolation at the community margins. Together, these three lines of evidence support a scenario in which diverse peoples lived amongst each other, migrants and their descendants adopted local architectural styles, and new architectural forms were created in dynamic, individualistic ways. They are consistent with other pluralistic communities in which diverse peoples selectively adopt and reject each other's practices, ideas, and material culture (Alt 2006b; Beaudoin 2013; Deagan 1990; Dietler 2010; Lightfoot and Martinez 1995).

Table 6.6. Results compared to predictions and inferences for possible combinations of technological and visible style in domestic structures at Aztalan.

	Technological style consistent with MISSISSIPPIAN	**Technological style consistent with LATE WOODLAND**	**Technological style COMPOSITE**
Visible style consistent with MISSISSIPPIAN	***Interpretation:*** *Archetypal Mississippian structure* ***Prediction:*** *Few of these* ***Result:*** *3-8 (9-24%)*	***Interpretation:*** *"Hybrid" Type 2* *Late Woodland manipulation of visible style to resemble Mississippian structures* ***Prediction:*** *Few of these* ***Result:*** *1-6 (3-18%)*	***Interpretation:*** *"Hybrid" Type 3* *Joint participation in construction* ***Prediction:*** *Not anticipated* ***Result:*** *4 (12%)*
Visible style consistent with LATE WOODLAND	***Interpretation:*** *"Hybrid" Type 1* *Mississippian manipulation of visible style to reduce visible differences* ***Prediction:*** *Many of these* ***Result:*** *5-9 (15-26%)*	***Interpretation:*** *Archetypal Late Woodland structure* ***Prediction:*** *Many of these* ***Result:*** *9-13 (26-38%)*	***Interpretation:*** *"Hybrid" Type 3* *Joint participation in construction* ***Prediction:*** *Not anticipated* ***Result:*** *4 (12%)*

6.4 Alternative Hypothesis 2 – Palisades

Alternative Hypothesis 2 states that the physical appearance of a coalescent community reflects collaboration of its diverse residents. Specifically, palisade walls should reflect shared participation because they are integrative practices that generally require community-wide involvement. This hypothesis is an alternative to the hegemonic perspective that walls express the identity of a conquering or dominant group. The null hypothesis states that co-resident local

and non-local peoples maintain independent practices, and palisade wall designs (including curtain form and the presence and form of bastions) and post sizes that are wholly consistent with either Mississippian or Late Woodland palisade walls across eastern North America (or both, but for separate construction episodes).

Below I describe the palisade walls at Aztalan based on my close study of original excavation maps produced by the Wisconsin Archaeological Survey and State Historical Society of Wisconsin. I identified two separate palisade designs that are repeated across distinct construction episodes in multiple areas of the site (Figures 6.2 - 6.3). The separate construction episodes are noted by Richards (1992:419, citing personal communication with Wittry and Freeman) and Goldstein and Freeman (1997:226), but to my knowledge they are the only scholars to discuss these two palisade designs in published literature. To summarize, one design (Design A) is indicated by postmolds that average 16.6 cm in diameter and regularly-spaced flared bastions that vary in size and shape. The other design (Design B) is indicated by larger postmolds that average 21.7 cm in diameter, uniform square bastions, and small baffled gates adjacent to bastions. Superposition of palisade curtains and bastions indicates separate construction episodes and a repeated Design A-B sequence. Metric measurements and qualitative descriptions are summarized in Table 6.7 and illustrated in Figure 6.1. Below, I describe each design in detail and how I determined their construction sequence.

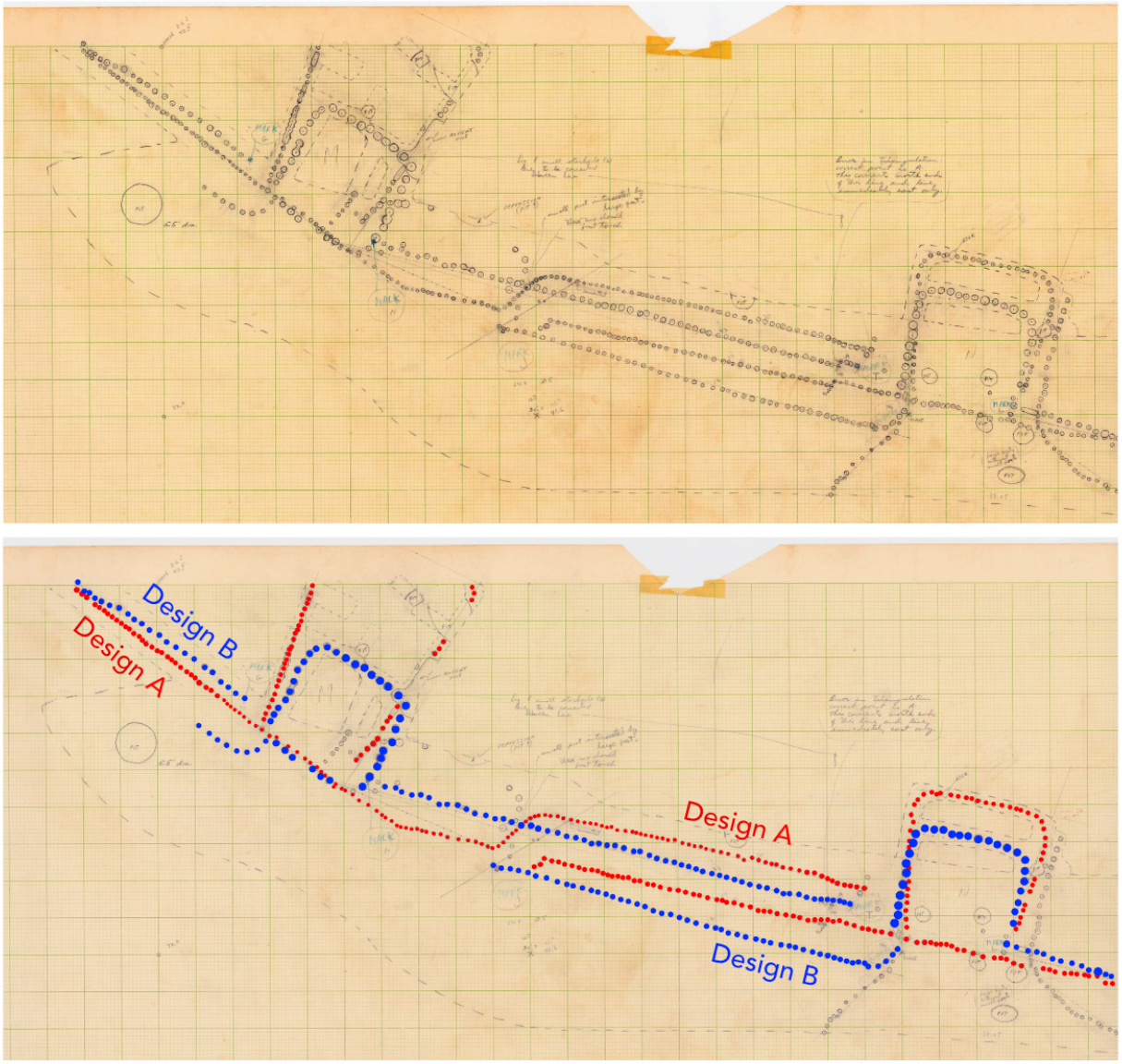

Figure 6.1. Palisade Designs A and B overlaid on an original excavation map (Wisconsin Archaeological Society excavations). Map shows bastions B_2 and B_3 in Figure 6.2.

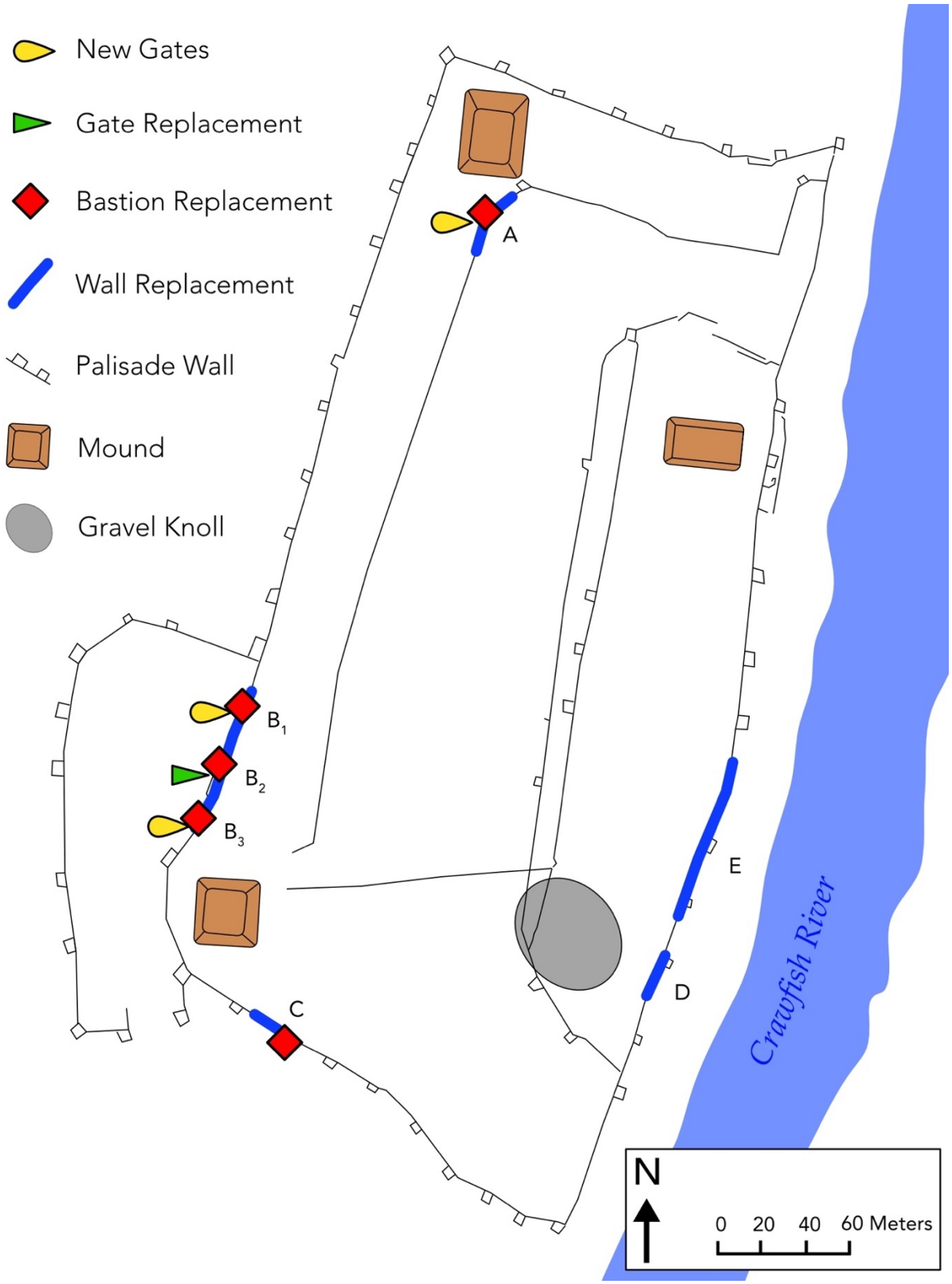

Figure 6.2. Locations of palisade curtain, bastion, and gate replacement used to identify Designs A and B.

Table 6.7. Summary of Palisade Designs A and B dimensions and attributes. *Actual mapped curtain segments - not extrapolated length.

	Design A	Design B
Categorical post mold size	Smaller	Larger
CURTAINS		
Post mold diameter range (cm)	12.2 - 17.4	20.1 - 24.4
Average post mold diameter (cm)	16.6	21.7
Total measured curtain length (m)*	137	137
Number of mapped posts in curtains	498	374
Average number of posts per meter	3.6	2.7
BASTIONS		
Bastion shape	Flared	Square
Bastion spacing (center to center)	25 m	25 m
Bastion flanks		
Average length (m)	7.3	5.2
Length S. deviation (m)	1.4	0.2
Number of posts in flanks	17-20	8-10
Bastion salients		
Average width (m)	6.7	5.4
Width S. deviation (m)	0.2	0.2
Number of posts in bastion salients	16-20	10-12
Bastion curtains (m)		
Average width (m)	5.2	5.4
Width S. deviation. (m)	0.8	0.2
Average perimeter of bastions (m)	21.36	15.82
Number of posts per bastion	50-60	26-32

6.4.1 Palisade Designs A and B

Palisade Designs A and B are present in the east, west, and south sides of the outer palisade and in an inner palisade (Figure 6.2). There are five instances in the archival maps where palisade walls were initially constructed with posts of 12.2-17.4 cm diameter and were then dismantled and replaced with larger diameter posts, averaging 20.1-24.4 cm. There are also five cases where bastions were flared in shape and then replaced by rectilinear bastions, three

locations where gates were present in one construction episode but not the other, and one case where a large gate was slightly reconfigured and replaced (Figure 6.2).

In each case of visible replacement, the first wall (Design A) was constructed of smaller posts than the second (Design B). Post diameters are labeled on maps of four of the wall segments (Segments A, C, D, E, Figure 6.2). In these four segments, the average diameters for Design A postmolds range from 12.2 to 17.4 centimeters and average 16.6 centimeters (Table 6.7). Design B post molds range from 20.1 to 24.4 centimeters and average 21.7 centimeters. These postmold diameters result in averages of 3.6 posts per meter in Design A and 2.7 posts per meter in Design B. In the fifth wall segment near the southwest mound (Segment B, Figure 6.2), small- and large-post lines were labeled as such without metric measurements. Excavators also noted directly on the field map that the small-post wall was intersected by the large-post wall, indicating the same Design A - B sequence (Baerreis 1949-1954).

There are five instances where bastions were replaced (Segments A, B, and C, Figure 6.2). Some bastions have a "flared" shape, in that they are narrow where they join the palisade wall curtain and are wider at the bastion salient; the other bastion design was square (Figure 6.3). The flared bastions were larger and more variable in dimensions than the square bastions, which were uniform in size and dimensions (Table 6.7). On some of the field maps, written notes or clear sketched differences indicate that the square bastions were constructed using larger diameter posts than their flared counterparts (Baerreis 1949-1954).

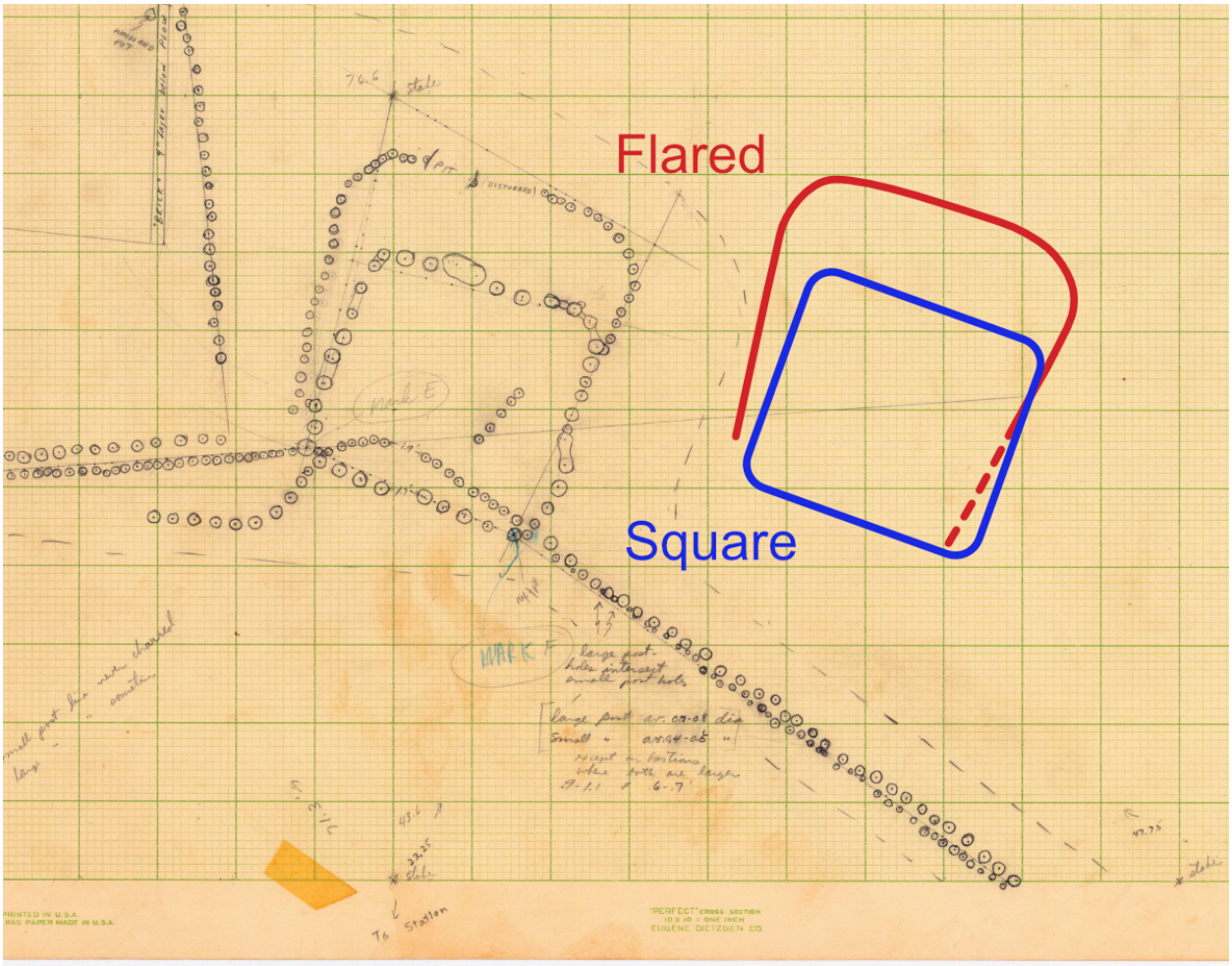

Figure 6.3. Flared and square bastions. Note the small baffled gated and superposition of small and large postmolds in palisade curtains.

The temporal order is clear at three of the bastion locations (Segments A, B_1, and B_2, Figure 6.2), where the earlier bastions were of the flared shape and the later bastions were square. The order of superposition at these locations is indicated by notes written directly on the map and in drawings of the posts that clearly show larger diameter posts in square bastions intruding into small posts of flared bastions. The flared and square bastion designs are also visible at the remaining two locations where temporal sequence was not clear (Segments B_3 and C, Figure 6.2). The repetition of bastion forms across these five areas leads me to posit that the "flared, then squared" sequence was also present along the entire outer wall and outermost

interior wall, if not throughout the entire palisade system. The flared and square bastions are spaced an average of 25 meters apart (Table 6.7).

Three bastion replacements also had small baffled gates added where none existed before (Segments A, B_1, and B_3), and at a fourth location near the southwest mound a large gate was replaced (Segment B_2). The new baffles are accompanied by gaps in the large-post walls, indicating that they are associated with the wall. The same kind of baffled gates were also excavated by Barrett in the early 20th century in the northeast corner of the residential area and north wall (Barrett 1933: Plats V, VA, VI). However, he did not identify any cases of bastion or wall replacement. Barrett disclosed that his crews worked very quickly in tracing out the walls, excavating a narrow trench to follow out the line of posts (Figure 6.5). In addition, in some areas they had great difficulty identifying posts (Barrett 1933:98, 103, 106). Barrett's excavation strategy and difficulty seeing posts in some locations could have led to him not recognizing the superposition of Designs A and B.

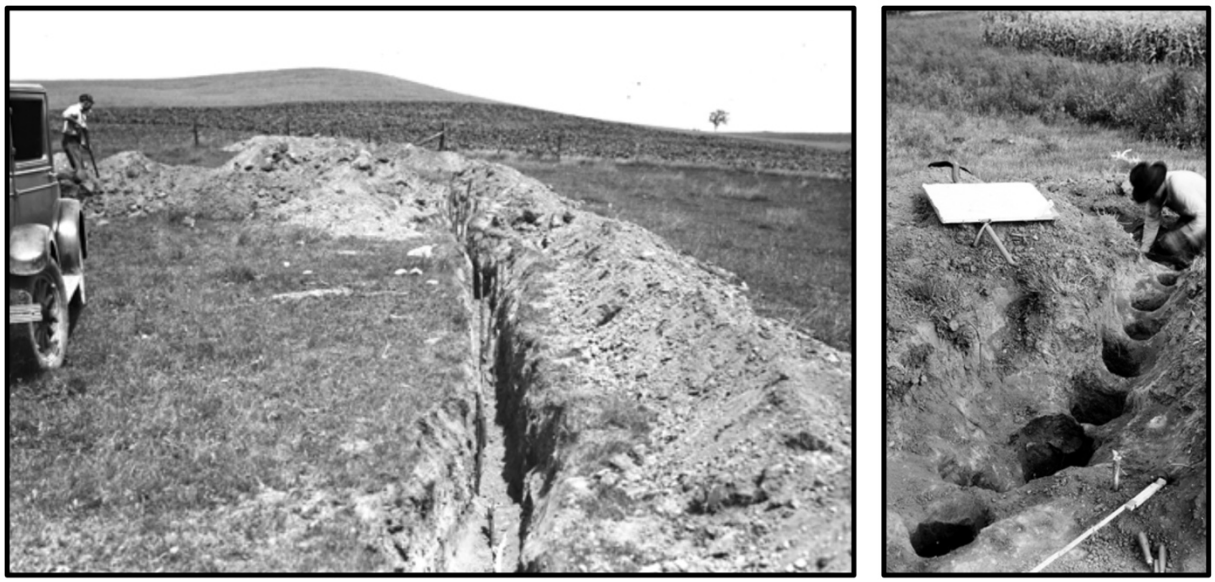

Figure 6.4. Barrett's narrow palisade excavations trenches. Courtesy of the Milwaukee Public Museum.

In three locations (Segments A, B, and C), the bastion replacement sequence can be fit into the small- and large-post wall sequence. At each of these locations — in different areas of the site, on different walls — the square bastion is superimposed over the flared bastion and is also superimposed over the small-post lines. It is clear that the earlier flared bastions were associated with the earlier small-post walls in Design A, and the later square bastions with baffled entrances were associated with the large-post walls in Design B.

6.4.2 Alternative Hypothesis 2 Summary and Discussion

To conclude, my null hypothesis, that the physical appearance of a coalescent community reflects collaboration of its diverse residents and that palisade walls should reflect shared participation because they are integrative practices that generally require community-wide involvement., is falsified by the difference in technological choices made during palisade construction, evident as postmold size differences between Designs A and B. The same evidence supports Alternative Hypothesis 2. Design A postmolds range in diameter from 12.2 to 17.4 cm (average 16.6 cm) while Design B postmolds range from 20.1 to 24.4 cm diameter (average 21.7 cm). These differences in technological choice may have originated in distinct Late Woodland and Mississippian learning communities (Lewis and Stout 1998; Milner 1999; Salkin 2000). Late Woodland palisades in the Midwest were generally lightweight screens constructed with small posts (average less than 15 cm diameter) without bastions (Milner 1999) and enclosed high-density communities. In comparison, Mississippian palisades across eastern North America were generally built from large posts usually greater than 15 cm in diameter, were studded with regularly spaced bastions, featured well-designed defensive entrances, and enclosed communities that included one or more large open plazas (Table 5.3; Keeley et al. 2007; Lewis et al. 1998;

Milner 1999). Many Mississippian sites had more than one palisade, built sequentially (Blitz 1993; Iseminger et al. 1990; Krus 2011, 2013; Schroeder 2006).

Palisade postmold sizes at Aztalan could be explained in other ways (such as functional differences or tree size availability), but differences in bastion design also supports the interpretation that learning communities were the source of variation. Both Designs A and B had bastions (a Mississippian practice), but the flared bastions of Design A, with variable size and dimensions, are distinctly different from the smaller, square, uniform bastions of Design B. The Design A bastions appear as if they were engineered by people without up close, firsthand knowledge of Mississippian bastion design. As a whole, Design A appears to incorporate concepts of construction and design derived from both Mississippian and Late Woodland traditions, whereas Design B is wholly consistent with palisades built in Mississippian learning communities. Alternative Hypothesis 2 is thus supported by the expression of both cultural traditions in the technology and visible design of the palisade walls.

Despite differences in post size and bastions, both Designs A and B had defensive qualities, indicated by the 25 meter bastions spacing (a suitable distance for defending with bow-and-arrow [Keeley et al. 2007:Table 1]), well-designed baffled gates, and by their sheer size and sturdiness. However, defense may not have been their only, or even primary, purpose. Both Designs A and B would be impressive and unique to many local peoples and familiar to Mississippian migrants and those who had seen Mississippian palisades further south. Palisade walls and other monumental works that define the appearance of a community send messages to residents and other groups on the landscape (Schroeder 2011). Walls represent a highly visible physical and conceptual distinction between community members and outsiders, and the messages sent by walls come to represent the community as a whole from the outside

perspective. In this way diverse peoples living inside the walls are linked by their shared "insider" identity. It is possible that Design A was intended to portray Aztalan in a Mississippian style even though its builders only had a limited knowledge of Mississippian palisades.

Design B may then represent a deliberate choice by the people of Aztalan (or their leadership) to reinforce their portrayal as a Mississippian community. It may have involved more people with firsthand experience in palisade construction obtained in Mississippian learning communities. The differences between Designs A and B may indicate distinct cultural traditions rooted in Mississippian and Late Woodland learning communities, and the repeated A-B sequence at multiple areas on multiple walls may indicate the intentions and shared identity of a diverse population.

6.4.3 Construction, Labor, and Population Estimates

I calculated raw material and labor requirements and used those estimates to demonstrate whether the labor force requirements could feasibly be small enough that not everyone had to participate in the work (meaning that collaboration could be a function of choice rather than necessity) and how quickly the walls could have been built (and how quickly the community would have assumed any identities portrayed through the walls). Then, I use labor force size ranges to estimate population size for Aztalan at the time of wall construction. Population estimates have implications for migrant group size relative to the local population because a group of migrants who join a small community would comprise a greater portion of the total population than the same number of migrants in a large community, and a relatively larger migrant group has greater power to negotiate their integration, lower risk of marginalization, and great potential to maintain the practices of their home regions (Cameron 2011:191; Cook and

Schurr 2009; Stone 2000, 2003). To better understand the significance of palisade construction at Aztalan, both in terms of the role of the walls at the site and potential logistical burdens of each design episode, I calculated raw material and labor requirements and used those estimates to infer total populations sizes. Estimates of project duration and labor force size can inform inferences about how taxing each wall construction episode may have been on the population, whereas population estimates might inform interpretations of demographics and cultural dynamics (e.g., a diaspora would comprise a greater portion of the total population in a small community than the same number of migrants and their descendants in a larger community).

I calculated per-post labor requirements separately for Designs A and B using the equation for tree cutting outlined in Chapter 5 ($t = \exp(-1.766058) * d^{1.622969}$) to account for their different average post diameters (Table 6.8). Raw material requirements are summarized in Table 6.9 and the locations of each wall are keyed to Figure 6.6. Design A across all walls would have required 17,604 posts (not including bastion platforms) whereas Design B would have required 11,708. Nearly 84,000 person-hours would be required to build all the Design A walls and ~57,600 person-hours for Design B, taking into account harvest, transportation, and construction. Detailed labor requirements are presented in Table 6.10. In terms of labor force size, the entire palisade system in Design A could have been constructed by 350 people working 8 hours a day for 30 days. This is perhaps an unrealistic pace except in the context of immediate threats, so alternatively a 4-hour workday over the course of 90 days would have required 233 people. Design B, which utilized fewer posts and thus had lesser labor requirements (even factoring in the larger diameter of the posts), would have required between 89 and 134 people using the same workday and project duration parameters. If construction occurred over the course of 180 days during spring, summer and fall (i.e., mid-April through Mid-October), with 4-

hour workdays, Designs A and B could have been built by labor forces of only 116 and 45 people. The latter scenario could result from a lack of immediate threats or because those workforce size and workday lengths were the most that could be devoted to wall construction. Calculations for additional parameters and for each individual wall section are presented in Table 6.10. My labor force estimates for Design B of the outer walls are fairly similar to those given by Richards, who calculated that "the entire village enclosure could have been erected in 40 days by 70 laborers working 8 hours per day" (1992:68; my calculations result in 46 days by 70 people working 8 hours per day).

Table 6.8. Per-post labor requirements, calculated separately for Designs A and B to account for different postmold diameters.

	Person-hours per post	
Task	**Design A**	**Design B**
Tree cutting (Design A posts)[a]	0.27	
Tree cutting (Design B posts)[a]		0.42
Post preparation[b]	1.5	1.5
Post hauling and placement[c]	2.5	2.5
Post hole digging[d]	0.5	0.5
TOTAL	**4.77**	**4.92**

[a] $t = \exp(-1.766058) * d^{1.622969}$
Trees of unknown species, less than 30 cm in diameter (Hammerstedt 2005:59)

[b] Estimated 1-2 hrs to remove bark and branches (Iseminger et al 1990:35). I use 1.5 hrs.

[c] Six people carrying a log at a speed of 2.4 km per hour (Iseminger et al 1990:36) over a distance of 1 km (based on ~5,200 km^2 of forested land within 2 km of Aztalan; Picard 2013:41)

[d] Estimated.

Table 6.9. Estimated post counts for each individual palisade wall at Aztalan, keyed to Figure 6.6.

			Design A	Design B	Combined
A	**Outer Walls**	Curtain length (m) Bastion count			
	Curtain	1340	4824	3618	
	Bastions	54	2970	1566	
	Total		7794	5184	12978
B	**Separates Residential Area & Plaza (west)**	Curtain length (m) Bastion count			
	Curtain	525	1890	1418	
	Bastions	21	1155	609	
	Total		3045	2027	5072
C	**Separates Residential Area & Plaza (east)**	Curtain length (m) Bastion count			
	Curtain	88	317	238	
	Bastions	4	220	116	
	Total		537	354	890
D	**Separates "Elite Precinct" & Plaza**	Curtain length (m) Bastion count			
	Curtain	514	1850	1388	
	Bastions	21	1155	609	
	Total		3005	1997	5002
E	**SW Mound to Knoll (north)**	Curtain length (m) Bastion count			
	Curtain	135	486	365	
	Bastions	5	275	145	
	Total		761	510	1271
F	**SW Mound to Knoll (south)**	Curtain length (m) Bastion count			
	Curtain	127	457	343	
	Bastions	5	275	145	
	Total		732	488	1220
G	**SW Extension**	Curtain length (m) Bastion count			
	Curtain	297	1069	802	
	Bastions	12	660	348	
	Total		1729	1150	2879
	TOTAL POST REQUIREMENT		**17604**	**11708**	**29312**

Table 6.10. Estimated labor requirements for each separate palisade wall at Aztalan with labor force sizes calculated according to various parameters. Walls are keyed to Figure 6.6.

		Design A	Design B	Combined
A	**Outer Walls**			
	Total Posts	7794	5184	12978
	Labor requirement (Person-hours)	37177	25505	63852
	Labor force (4hr days, 90 days)	100	70	177
	Labor force (8hr days, 90 days)	52	35	89
	Labor force (4hr days, 30 days)	310	213	532
	Labor force (8hr days, 30 days)	155	106	266
	Population estimate (20%, 90 days)	250-500	175-350	
	Population estimate (20% 30 days)	750-1550	500-1010	
B	**Separates Residential Area & Plaza (west)**			
	Total Posts	3045	2027	5072
	Labor requirement (Person-hours)	14525	9970	24952
	Labor force (4hr days, 90 days)	40	28	69
	Labor force (8hr days, 90 days)	20	14	104
	Labor force (4hr days, 30 days)	121	83	208
	Labor force (8hr days, 30 days)	61	42	104
	Population estimate (20%, 90 days)	100-200	70-140	
	Population estimate (20%, 30 days)	300-600	210-415	
C	**Separates Residential Area & Plaza (east)**			
	Total Posts	537	354	890
	Labor requirement (Person-hours)	2561	1740	4381
D	**Separates "Elite Precinct" & Plaza**			
	Total Posts	3005	1997	5002
	Labor requirement (Person-hours)	14336	9824	24611
E	**SW Mound to Knoll (north)**			
	Total Posts	761	510	1271
	Labor requirement (Person-hours)	3630	2507	6251
F	**SW Mound to Knoll (south)**			
	Total Posts	732	488	1220
	Labor requirement (Person-hours)	3493	2400	6003
G	**SW Extension**			
	Total Posts	1729	1150	2879
	Labor requirement (Person-hours)	8248	5658	14165
	Total Labor Requirement (Person-hours)	**83969**	**32099**	**116068**
	Person-days (8 hour work days)	10496	4012	14509
	# of people working 8 hrs/day for 90 days	117	45	161
	# of people working 4 hrs/day for 90 days	233	89	322
	# of people working 8 hrs/day for 30 days	350	134	484
	# of people working 4 hrs/day for 30 days	700	267	967
	# of people working 4 hrs/day for 180 days	116	45	161

My labor force estimates can then be used to estimate total population sizes. Many construction scenarios are presented in Table 6.11, but several in particular are notable: First, a scenario in which it was necessary to construct Design A of every wall as quickly as possible (such as in response to violence, in 30 days, working 8 hours per day, with 50% of the population contributing) would have required a total population of 700 people. Second, a slightly smaller population of about 580 working at a more relaxed pace (such as in the absence of an immediate threat) still could have built every Design A wall in 180 days, even with only 20% of the population contributing only 4 hours per day. According to these two opposite scenarios, Aztalan's population at the time of Design A construction may have been between 580-700 people. However, every Design A wall could have also been built by a much smaller population of only 200 people or fewer if they worked 8 hours per day for 180 days and at least 30% of the population contributed. Finally, the use of larger but fewer posts in Design B meant that those walls could be built approximately 1.5 times faster than Design A by the same size workforce. This means that smaller populations were necessary to construct Design B walls. Put another way, Design B walls would have been less of a burden than Design A on a similar size population.

Table 6.11. Population estimates necessary to support the construction of every wall at Aztalan. Similar calculations for select inner and outer walls individually are included in Table 6.10.

		Workday length (hrs)	Population sizes based on 20% Workforce	30% Workforce	40% Workforce	50% Workforce
DESIGN A	30 days	4	3499	2332	1749	1399
		6	2332	1555	1166	933
		8	1749	1166	875	700
	90 days	4	1166	777	583	466
		6	777	518	389	311
		8	583	389	292	233
	180 days	4	583	389	292	233
		6	389	259	194	155
		8	292	194	146	117
DESIGN B	30 days	4	1337	892	669	535
		6	892	594	446	357
		8	669	446	334	267
	90 days	4	446	297	223	178
		6	297	198	149	119
		8	223	149	111	89
	180 days	4	223	149	111	89
		6	149	99	74	59
		8	111	74	56	45

The population estimates in Table 6.11 are based on the start-to-finish construction of every wall. If the walls were sequential rather than synchronous, labor force and population size could have been less. A possible scenario is that the inner wall separating the residential area from the plaza (wall B, Figure 6.6) was the first built and represents the village limits at the time of Mississippian arrival and prior to construction of the Northwest and Southwest mounds. Design A of the inner wall could have been built in 90 days by 40 people or fewer working at least 4 hours days (wall B, Table 6.10). A 20% workforce then equates to a population of 100-200 people at the time of initial wall construction. The population could have been even smaller,

50-100 people, if the inner walls were completed over 180 days (by a 20% workforce of 20 people or fewer).

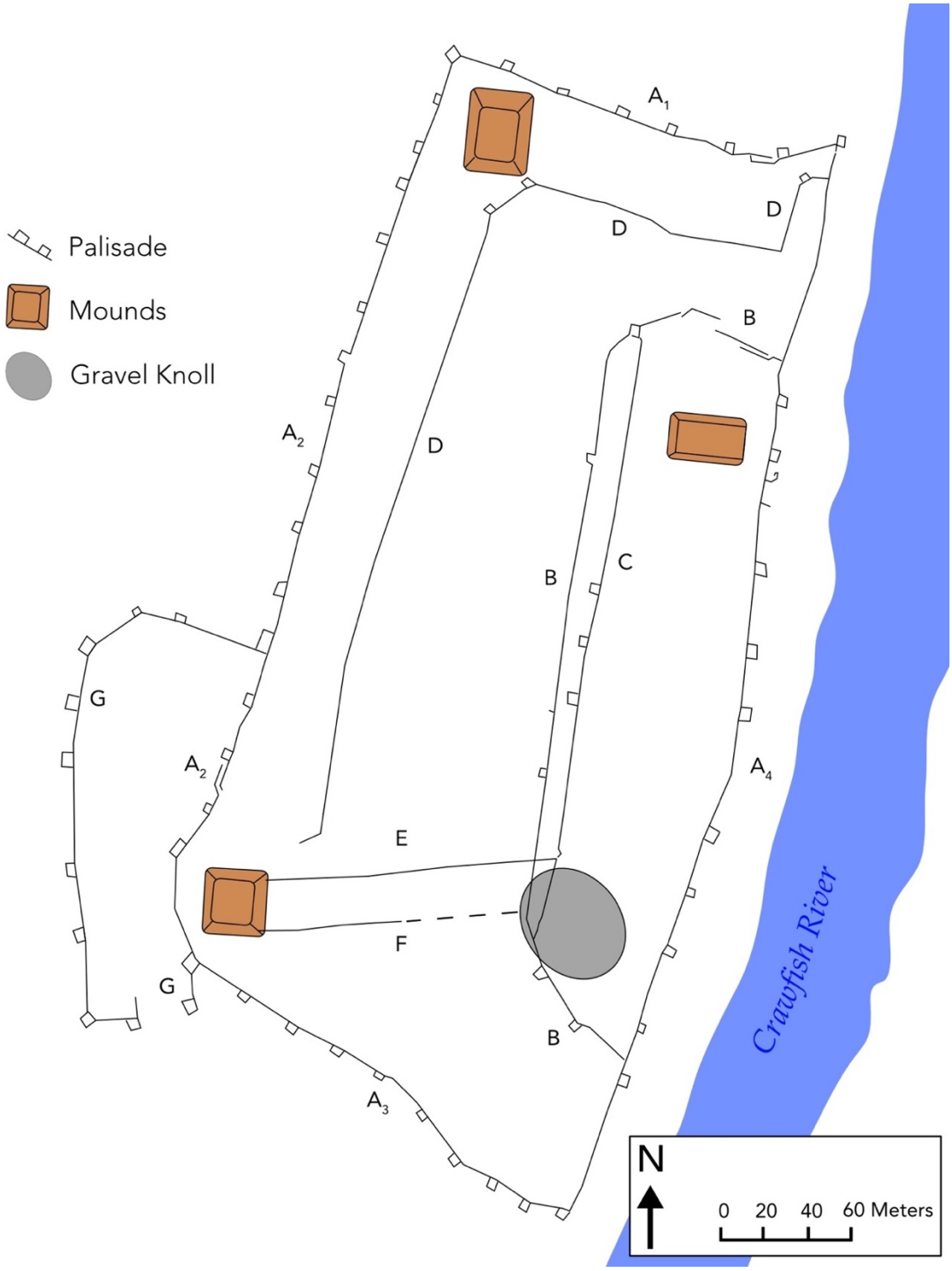

Figure 6.5. Distinct palisade walls and wall segments, keyed to material and labor estimates in the text and in Tables 6.9-6.10.

Implications of Labor Force and Population Estimates

These estimates are significant for drawing conclusions about demographics and cultural dynamics at Aztalan because they show that the entire palisade system could have been built by a part-time workforce in a single year, or in 90 days by a harder laboring population of 600 people or fewer. Whether 90 days or 180, this would have been a dramatic change in the community's appearance. Given the external Mississippian appearance of Design A, it could represent a conscious, rapid transformation in how the community chose to portray itself. The bastions that appear to have been engineered by people with incomplete knowledge of Mississippian bastion design and Late Woodland-style preferences for post size may reflect a largely Late Woodland population.

It is also significant that, if the walls were built sequentially over several years, Aztalan could have had a small initial population of 200 or fewer when the first walls were built, presumably around the time of Mississippian arrival. This estimate compares favorably with one calculated by Richards' (approximately 150 people), which he arrived at using several formulas that relate house floor area to the number of occupants (1992:115). Richards rejected this estimate as too low, arguing that there would not be enough men present in the population to hunt, maintain the walls and mounds, and defend the settlement (1991:118). However, Richards' discussion was based on the premise that every wall stood simultaneously (1992:118-120) while my estimate of 200 or fewer is based on the inner wall being constructed first and standing alone. In the latter scenario there would be a smaller area to defend and the Southwest and Northwest Mounds would have been outside the walls, so they likely were not yet constructed and thus would not require maintenance.

The significance of a smaller population is that in a small community, migrants and their descendants would comprise a greater proportion of the total population than the same number of people in a large community. The arrival of additional migrants has a greater impact on the cultural demographics of a small population than it does on a larger population because fewer migrants would need to arrive for their cultural group to reach equal numbers with locals or even shift a diaspora into the majority. A small group of migrants is more easily absorbed into a local population, but a larger group has greater negotiation power, lower risk of marginalization, greater capacity to maintain the social structure and practices of their home regions, and more enduring expressions of their ethnic identities (Cameron 2011:191; Cook and Schurr 2009; Stone 2000, 2003). Thus, a smaller community facilitates integration by offering a diaspora a lower risk of marginalization alongside greater negotiating power and potential to maintain cultural traditions.

Richards ultimately settled on an estimate of 350 people (based on four other models of population density, space per household, ethnographic analogy, and caloric requirements) which he suggested is "rather low" (1992:120). He also suggested, based on this estimate, that there is no need to infer a large group of initial Mississippian migrants and that the site's Mississippian appearance could have resulted from a small group of Mississippian migrants (Richards 1992:120). This is effectively the point made above, that a small group of migrants can more easily integrate into and influence a small population than a large one. If the size of Mississippian migrant group(s) remains constant between Richards' and my scenarios, the effects of relative group size would only be increased in a population of 200 or fewer compared to Richards' estimate of 350 people.

The possibility that 200 people or fewer lived at Aztalan at the time of Mississippian arrival is also significant because, if the inner walls were built first and casually over the course of a single year (in 180 days, rather than as quickly as possible in the event of immediate threat), the labor force could have been only 20 people – 10% of a total population of 200. A workforce of 20 laborers could have been entirely made up of Mississippians if they chose to build the walls or were forced to, but this scenario is not supported by the postmold diameters and bastion designs of Design A walls. A 10% workforce also means that it was probably not necessary for every potential laborer to help. By extension, it is feasible that Mississippian peoples could have chosen whether or not to participate. The use of bastions in Design A suggests that they may have collaborated with local peoples on design as a strategy for, or result of, integration. Whether Mississippian people chose to participate in wall construction is just speculation based on one of several possibilities, but my calculations demonstrate that it is logistically possible.

6.5 Chapter Summary

Through my analyses of domestic and palisade architecture, and pottery assemblages from structure contexts, I have shown that a great deal of hybridization, cross-cultural intermingling, and complex community formation and change occurred at Aztalan during its relatively short period of Mississippian and Late Woodland co-residence. Between a third and half of structures (29-56%) are hybrids of some kind, and grit- and shell-tempered pottery (which are associated with Late Woodland and Mississippian respectively) are mixed in two thirds of the structures where pottery was reported. Combined with existing knowledge about hybridized pottery and mixed assemblages across the site (e.g., Richards 1992), these results allow me to reject my null hypothesis that migrant and local descent groups maintained independent practices.

My first alternative hypothesis, that Mississippian migrants and their descendants adopt the visible styles of Late Woodland while simultaneously maintaining the technological style of Mississippian architecture (wall-trench foundations), is supported by the presence of hybrid structures that combine Mississippian technological style with Late Woodland visible style (Hybrid Type 1). Mississippian technology is represented by 35-38% of structures (Mississippian and Hybrid Type 1 combined). In comparison, Late Woodland structures make up between 26 and 38% and Hybrid Type 2 (interpreted as occupied to Late Woodland people) an additional 3-18%. Only 9% of structures are in the archetypal Mississippian style. Cahokia-style structures are the norm at Trempealeau, Wisconsin (Pauketat et al. 2015). The relative lack of such structures at Aztalan is surprising given the site's Mississippian-style mounds, palisades, and layout. Thus, this case study seems a good example of a pluralistic community.

From the outside, Hybrid Type 1 structures would have looked like ones built by local Late Woodland peoples, while wall-trench foundations in those hybrid structures are Mississippian in style. Foundation type is not visible in the finished structure and has no impact on above-ground appearance, so it is less prone to strategic manipulation, more resilient to change, and thus is primarily determined by the multi-generational learning process (Lave and Wenger 1991; Minar and Crown 2001; Wallaert-Pêtre 2001). Foundation type also, therefore, reflects social boundaries such as ethnic identities, permitting the identification of Mississippian and Late Woodland traditions (Chilton 1999; Gosselain 1992; Sackett 1990; Stark 1999). Hybrid Type 1 structures thus may reflect Mississippian builders who adopted the outward appearance of local architecture. This would have reduced their differences with locals, removing one barrier to successful integration (Clark 2001; Bloom et al. 2015; Manzanilla 2015b Stone 2003). Spatial integration is also supported by the mixture of grit- and shell-tempered pottery in 12 of 18

structures where it was reported. Temper type, as an aspect of technological style, reflects Mississippian and Late Woodland learning communities (e.g., Baerreis and Freeman 1958; Griffin 1949; Hegmon et al. 2000; Holley 1989; Kelly 2002; Stark 1999). If we assume that refuse in abandoned house basins was generated nearby, then the mixture of pottery indicates that Mississippian and Late Woodland households were located in the vicinity of each mixed pottery assemblage.

My second alternative hypothesis, that the palisade walls at Aztalan will show mixed Late Woodland and Mississippian traditions of design and construction, is tentatively supported by patterned differences in post sizes across two design canons that reflect distinct technological choices. Both designs included bastions that would have given Aztalan the external appearance of a Mississippian community, but the earlier (Design A) was composed of smaller diameter posts and the bastions were crudely made. In comparison, the later Design B walls were built with larger posts and featured uniform bastions. Those technological choices regarding post size signify two distinct learning communities and are consistent with Mississippian (postmolds larger than 15 cm diameter) and Late Woodland (smaller postmolds) palisade traditions (Milner 1999). I interpret these post size differences as the involvement of both Mississippian and Late Woodland peoples, and the Mississippian appearance of both walls as a deliberate portrayal of a Mississippian identity. Portraying Mississippian identity through the walls would communicate that message with other groups on the landscape and would have united diverse residents as "insiders (Cobb and Butler 2006; Cobb and King 2005; Cohen 1985; DeMarrais et al. 1996; Inomata 2006; Schroeder 2011).

Calculations of raw material requirements, labor force sizes, and population estimates show that Design A of every wall could have been built within a single year. Doing so would

have resulted in a rapid and dramatic change in Aztalan's appearance and in the way the community was perceived by other groups on the landscape as a Mississippian town. Alternatively, sequential construction over several years could have been done by a smaller population of 200 people or fewer. The possibility that Aztalan had a small population is significant because a Mississippian diaspora would comprise a greater portion of the total population in a small community than the same number of people in a larger community. Forming a relatively larger group could provide lower risk of marginalization and greater chance of successful integration with locals (Cameron 2011:191; Stone 2000, 2003). In the final chapter (Chapter 7), I return to my overarching research question of why some migrants are able to successfully integrate among culturally different local populations more easily than others and discuss whether the diverse peoples of Aztalan were integrated and what strategies might have been employed, if any, to achieve integration.

Chapter 7: A New Cultural Tradition and Complex, Conflicting Identities at Aztalan

Material identity, community formation, and the interaction between local and non-local people are interrelated on several key points. First, the *visible style* of material culture, which includes high-visibility attributes resulting from conscious design choices, readily transmits information and can be actively manipulated to serve specific purposes (Dietler and Herbich 1998; Weissner 1983; Wobst 1977, 1999:121). Simultaneously, the low-visibility *technological style* of material culture has less potential to overtly communicate information because it results from sometimes arbitrary, sometimes unconscious choices in the production process passed down over generations from teacher to learner within learning communities (Dietler and Herbich 1998; Ehrhardt 2005, 2013; Lave and Wenger 1991; Lechtman and Merrill 1977; Minar 2001; Minar and Crown 2001; Sackett 1990; Stark 1999; Wallaert-Pêtre 2001). Thus, technological style may reveal social boundaries between the separate learning communities of culturally and socially distinct groups (Chilton 1999; Doumani 2014; Gorogianni 2016; Gosselain 1992; Lave and Wenger 1991; Minar 2001; Minar and Crown 2001; Stark 1999).

Second, when people view themselves as different, such as in coalescent communities and in the context of diaspora, the ways they express their identities can draw attention to or mute their differences. Social conflict and political factioning often occur along ethnic and cultural divisions (Barth 1969; Burmeister 2000; Upton 1996), so it is in the best interest of diasporas to reduce perceived differences and blend in in some ways. Migrants and their descendants can suppress signals that publicly identify them as different by manipulating the visible style of their material culture to match that of local peoples (Wobst 1999:121). It would be most effective to manipulate highly visible, enduring forms of material culture. Domestic

structures are excellent candidates for manipulation because they are usually openly visible within the community and reflect upon an entire domestic unit simultaneously.

Third, diverse peoples can be united by the communal identities that arise from the shared memories and experiences created during shared events and collaboration on monumental works, like construction of palisade walls (Canuto and Yaeger 2000; Cobb and Butler 2006; Cobb and King 2005; Cohen 1985; DeMarrais et al. 1996; Inomata 2006). Shared identities can also result from living together within a walled community because the walls physically differentiate between insiders and outsiders (Kenzle 1997; Raffield et al. 2016). Walls are also highly visible features on the landscape, making them powerful tools for communicating political, economic, militaristic, and ideological information about the community as a whole (Schroeder 2011; Smith 1999, 2000). The presence of walls suggests power and community solidarity to outsiders, and outsiders may ascribe identities to the residents based on the presence of walls and their external appearance. Thus, the presence of walls and the act of their construction can unite a coalescent community. Their intensive construction can produce enduring shared memories that shape identities over generations.

Why are some migrants able to successfully integrate among culturally different local populations more easily than others? The presence and severity of marginalization against migrants and their descendants and their ability to integrate, depend on numerous historically particular factors and strategies, including (but certainly not limited to) economic relationships, resource availability, relative migrant and local group sizes, willingness of migrants to assimilate and of locals to accept them, religious differences, and how group identities are expressed and received (Batiuk 2013; Bloom et al. 2015; Cameron 2011:191; Clark 2001; Cook and Schurr 2009; Goldstein 2015; Hantman 1990; Lyons et al. 2008; Manzanilla 2015a, 2015b; Neuzil

2005; Stone 2000, 2003). Migrants may also choose to remain independent in some ways, with positive, negative, or no impacts on their ability to integrate in other aspects of life (Batiuk 2013; Goldstein 2015; Stone 2003). Integration is easier when the members of a coalescent population are culturally similar, and similarities increase over time as people are exposed to each other's traditions and if the descendants of migrants come to see themselves as locals and identify with the place. Over time, intermarriage and exposure to each other's beliefs and practices can result in blended traditions, material hybridity, and transformed identities that unite people whose ancestors may have been more diverse (Alt 2006b; Bernardini 2005; Burmeister 2000; Deagan 1990; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Meyers 2002).

How identity is expressed and how it is transformed over generations are thus critical factors in the interactions of a coalescent population. **Success can be heavily facilitated by the development of common identities by people who are otherwise different**. Common identities can be created in a number of ways, including the active manipulation of visible style to blend in; through communal events (like construction of palisade walls, mounds, or other monumental works) that result in shared experiences and traditions; by living together within walls that clearly demarcate the boundary between "insiders" and "outsiders," which reminds insiders of their commonality and is perceived as solidarity by outsiders; and by messages and identities communicated by the walls that represent the community as a whole at the time of wall construction, or that come to represent them over time. Each of these can be inferred at Aztalan, making it a valuable case example for studying the expression and transformation of identity and the integration of a coalescent population.

7.1 Theoretical Significance: Successful Integration at Aztalan

My results align with and extend prior work at Aztalan and, I argue, demonstrate the integration of a Mississippian diaspora and Late Woodland peoples. There are several factors that I argue may have facilitated integration. First, the presence of Hybrid Type 1 structures and relative lack of archetypal Mississippian structures leads me to conclude that Mississippians adopted Late Woodland architectural traditions. This would have reduced their visible differences at the household level. Because material culture not only reflects identity but also transforms it, the adoption of local architectural visible styles would have aided the creation of shared community identities. This is not to say the Mississippian peoples would identify as Late Woodland, but rather the observation of common architectural styles might serve as a reminder that all were members of the same community.

Second, I suggest from the mixing of grit- and shell-tempered pottery in the assemblages recovered from many structure contexts, and from the lack of correlation between house forms and location within the site, that people of diverse ancestry likely lived in close proximity to each other within the community. Had there been spatial segregation between Late Woodland and Mississippian residents, I should have found spatial differences in the distribution of pottery temper types and iconic Mississippian and Late Woodland houses.

Third, Zych (2013:114-118) noted that whole Mississippian, hybrid, and Late Woodland pots appeared to have been intentionally placed, upside-down, in a line during the construction of the Northeast Mound, which he inferred meant shared participation in its construction. The Mississippian-style Northeast Mound was built over the spot of a Late Woodland ceremonial structure and was topped with a large structure that approximately recreated the Late Woodland form, size, and orientation of the earlier one. The use of a platform mound was a Mississippian

practice, while the builders also maintained continuity in the Late Woodland ceremonialism by recreating the pre-mound structure on top of the mound. In this way the earlier ceremonial space was recreated in a form that blended the cultural traditions of both groups. The Northeast Mound construction seems to be an example of shared participation in a community event and the literal, physical creation of the community. The act of joint participation would have contributed toward a common identity, and the mound would have been a visible and lasting reminder of integration. If Mississippians intended to be dominant at Aztalan, collaborating with Late Woodland people in ways that resulted in Mississippian-style monuments could be a strategy for achieving that goal. Collaboration could be a way of introducing Mississippian beliefs and sociopolitical structure to eventually legitimize their authority.

The Southwest Mound may have similarly been constructed over an existing ceremonial space, this time in the form of a leveled gravel surface with deep pits (containing little material culture; Maher 1958). The Southwest Mound was built up in three levels over the gravel surface, each topped with a structure or post (it is unclear if the posts are isolated or part of structures) placed in approximately the same location each time (Maher 1958:78, 92-93). The initial leveled gravel surface was deposited directly onto the "old sod line" (Maher 1958:83), into which three pits were dug. A single tier platform mound similar to the Northeast Mound was later constructed over the gravel surface. Three pits were again dug into the surface, after which the platform was capped with buff colored clay. At this point a square moundtop structure was built (Barrett 1933:222; Maher 1958). A linear arrangement of postmolds (apparently part of a wall) was also built running up the mound slope and connected to the moundtop structure. The structure and presumably the wall were later dismantled or destroyed, the mound was built higher, and isolated posts or a second structure were erected. A third stage of the mound was

topped with another structure or isolated posts. This construction sequence is strongly Mississippian in style (e.g., Anderson et al. 2013; Monaghan and Peebles 2010; Schilling 2010).

Fourth, the Mississippian-style palisade walls indicate that Late Woodland residents of Aztalan embraced that aspect of Mississippian culture (or were coerced into accepting it). The former would be in line with at least partial social acceptance of Mississippian culture (a kind of integration), and the latter scenario would mean that Mississippian people were in a dominant position (also successful integration). Aztalan's Mississippian-style palisades and platform mounds are inconsistent with scenarios in which Mississippian people were heavily marginalized and prejudiced against. Rather, the walls would have sent a message of solidarity to other groups on the landscape, and would symbolize their political, economic, and military power to outsiders.

The walls also would have given Aztalan a unique outward appearance on the landscape that would have yielded a consolidated group identity shared by those inside. From the exterior Aztalan would have resembled contemporaneous walled Mississippian towns further to south, such as in the Apple River valley of northwest Illinois (Emerson 1991:176; Emerson et al. 2007; Millhouse 2012:330). Even if most visitors had no knowledge of other Mississippian-style palisades, the walls still would have made Aztalan appear vastly different from other communities in southeastern Wisconsin, even palisaded ones. The most obvious difference would have been the use of bastions at Aztalan, which were lacking from Late Woodland palisades in southern Wisconsin (Finney 1993; Salkin 2000). If visitors were familiar with the appearance of Mississippian towns, then Aztalan could have been externally perceived as one regardless of how the residents viewed themselves.

Fifth, my construction estimates for the palisades demonstrate that the entire Design A palisade system could have been built rapidly in a single year (180 days from mid-April through

mid-October) by a workforce of ~60-120 people, representing a total population between 117 and 583 people. This includes a scenario of part-time construction by a workforce comprising only 20% of the total population, working only 4 hours per day (workforce: 117; population: 583). Completing the entire palisade system within a single year would have been a dramatic and rapid change in the community's appearance, and the "Mississippian-ness" communicated by the walls could represent a rapid transformation in how the community chose to portray itself to other groups in the region. My construction estimates demonstrate that such a rapid mobilization of labor and transformation or community representation was possible.

Alternatively, if the walls were built sequentially and the inner walls separating the residential area and plaza were the first to be built, then the total population of Aztalan could plausibly have been as low as 50 to 100 people if the inner walls were built in 180 days by a 20% workforce working 4 hours per day or 100 to 200 people if they were built in 90 days. The significance of this plausibility is that in a small community, a Mississippian diaspora would have comprised a greater proportion of the total population than the same number of people in a large community. The arrival of additional migrants also would have had a greater impact on the cultural demographics of a small population because fewer migrants would need to arrive for a diaspora to reach equal numbers with locals or even shift into the majority. A small group of migrants is more easily absorbed into a local population, but a proportionally larger group has greater negotiation power, lower risk of marginalization, greater capacity to maintain the social structure and practices of their home regions, and more enduring expressions of their ethnic identities (Cameron 2011:191; Cook and Schurr 2009; Stone 2000, 2003). Thus, a smaller community facilitates integration by offering a diaspora a lower risk of marginalization alongside greater negotiating power and greater potential to maintain their cultural traditions. Maintaining

some cultural traditions while simultaneously experiencing new ones, as would be the case in a coalescent community, creates an environment in which multiple, competing, and blended cultural identities can exist (Alt 2006b; Beaudoin 2013; Burmeister 2000; Deagan 1990; Dietler 2010; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Peelo 2011). The possibility that Aztalan began as a small community in which an initial group of Mississippian migrants joined an already diverse population of Late Woodland peoples and had strong negotiation power could explain how the site came to have such an overt Mississippian appearance but diverse material culture of daily life.

My analyses of architecture, palisade walls, and pottery assemblages from abandoned house basins at Aztalan contribute to studies of human migration, cross-cultural interaction, identity, and multiethnic communities by demonstrating: 1) How material cultural may become hybridized in the context of cultural diversity; and 2) how material signals of identity may change in the context of interaction while others are more resilient. Adoption of local architectural styles may have been a strategic choice by a Mississippian diaspora to visibly blend their homes into the community. This aligns with research about social identity and material strategies by Voss (2005), for example, in which the formerly diverse architectural forms of multi-cultural residents at El Presidio de San Francisco, a Spanish-colonial military settlement in California, were replaced by a single style that united diverse residents under a shared colonial expression. As at El Presidio de San Francisco, the diverse people of Aztalan appear to have expressed multiple identities simultaneously, in different ways, and at different scales.

7.2 Empirical Significance: Architecture and Archives

My dissertation offers an in-depth look at both Late Woodland and Mississippian (and hybrid) structures together at one site, with an emphasis on variation. Many efforts to

systematically investigate perishable architecture in eastern North American have focused on Mississippian architecture, no doubt partially due to the large size and permanence of many Mississippian sites and the large numbers of documented structures that have resulted from salvage archaeology (e.g., Alt and Pauketat 2011; Brennan 2007; Cook and Genheimer 2015; Kanter et al. 2015; Kennedy and Carter 2015; McConaughy 2007; Polhemus 1987; Reed 2007; Redmond and Genheimer 2015; Schroeder 2011; Sullivan 2007). Fewer examples cover multiple cultural traditions beyond Mississippian and synthesize examples from many sites (e.g., Pluckhahn 2010; Steere 2017). My analysis of Mississippian and Late Woodland structures together at a single site investigates which architectural practices are resilient or flexible in the context of cross-cultural interaction at the community level. My use of architectural style to identify cultural tradition also demonstrates an alternative to the emphasis on ceramic typology to identify archaeological cultural traditions in Wisconsin and the Midwest (Schroeder 2004:320-322). Outside of the central Illinois River valley, no other "Mississippian contact" site in Cahokia's northern hinterlands has as many documented structures at Aztalan, making my research a significant contribution to understanding Late Woodland and Mississippian interaction and effects on architecture.

My dissertation has also produced an updated depiction of Aztalan houses that takes the entire sample of non-moundtop domestic structures within the walls excavated to date into account. Prior to my research, two types of structures were often presented together as representative of houses at Aztalan: ovoid with a curled entrance and wall-trenches, or rectilinear with straight walls, 90-degree corners, interior perimeter posts, and an "antechamber" entrance (Based on WAS-1949-H2 and WAS-1950-H3; Goldstein and Freeman 1997:Figure 9.7; Wittry and Baerreis 1958; See Appendix I). Both examples are depicted with wall-trench foundations.

However, my results show that these examples are not representative of most structures at Aztalan. Of the 34 structures I analyzed, there are five examples of the ovoid wall-trench structure with curled entrance (plus a sixth without an exposed entrance), and only one clear example of the rectilinear structure with "antechamber" entrance (WAS-1950-H3). Most structures (62%) were somewhat rectilinear, but many did not have straight walls and neat corners. WAS-1950-H3 has a similar shape to the "T-shaped" structures in the American Bottom (e.g., Alt 2006a:Figure 4.16; Collins 1990:76). Alt (2006:144-149) has argued that T-shaped structures were chiefly residences and that the antechambers were not entrances but were inner sanctums or for storage of ritual paraphernalia. I classified the "antechamber" entrance of WAS-1950-H3 as an extended entrance because it was mapped as such, but it is different and larger than the other three extended entrance examples at the site. Wall-trench and single-set post foundations are nearly equally represented. There is no single structure form that is truly representative at Aztalan.

Finally, my research highlights the value of archival materials from past excavations, especially at sites like Aztalan where the extensiveness of past excavations is unlikely to be repeated due to the site's National Historic Landmark status. My analyses of structures and palisades documented in archival records resulted in a revision to the representative description of Aztalan houses and the first in-depth analysis of the two distinct canons of palisade design. These outcomes would not have been feasible relying on new excavation alone.

7.3 Limitations and Future Research

While the differences between Mississippian and Late Woodland traditions are easily recognizable in many ways (such as pottery, subsistence, architecture, village layout, palisades, and monumental works), identity is fluid and complex — especially in cases of interaction

between diverse peoples such as Aztalan. Studies that incorporate many lines of evidence may reveal social boundaries more effectively than by relying on a single form of material culture because multiple lines of evidence might be complementary. Other limitations to my study are specific to the archaeological record at Aztalan: First, control over time has been a major challenge at Aztalan because of its relatively short occupation, rarity of deep cultural stratigraphy across much of the site, and statistical similarity of many radiocarbon dates from the site (Richards and Jeske 2002). Thus, I was unable to exclude time as a source of change in structure forms. It is also possible that the lack of archetypal Mississippian house forms at Aztalan is a function of climate, and that Cahokia-style houses are simply not suitable for harsh Wisconsin winters. Testing this possibility through experimental reconstructions could be very interesting. Second, only 11 of the 34 structures have been completely or almost completely excavated, which precludes full classification of many of the structures and effectively reduces the sample size. That said, 11 completely or almost completely excavated structures is more than at most "Mississippian contact" sites at the far reaches of Cahokia's northern hinterlands. Considering that each of the 34 structures yielded at least some information, the dataset from Aztalan is only smaller than Mississippian "town and mound" sites in the central Illinois River valley (like Orendorf, with over 150 wall-trench houses [Conrad 1991:132-136]).

These limitations specific to Aztalan may be solved by future research targeted at locating and excavating additional structures. Geophysical survey, in particular, has great potential to efficiently locate potential structures for ground-truthing. Sissel Schroeder, Jarrod Burks, and John Richards completed a collaborative magnetometry survey of the majority of the area inside the walls in 2017; analysis is in progress (Schroeder, personal communication). Achieving a more precise chronology may be possible through Bayesian analyses of radiometric

dates from superimposed structures, especially when dates are obtained from annuals like nutshell that provide more precise dates than woody charcoal. Obtaining information about additional structures from across the site, especially outside the Residential Area, will enhance the results of my dissertation. For example, the discovery of a cluster of archetypal Mississippian structures along the site's periphery or adjacent to the platform mounds (in the "Elite Precinct"; Birmingham and Goldstein 2005:68-70) would have implications for inferring spatial marginalization or elevated status. This will be challenging given the current conservation goals as a Wisconsin State Park and National Historic Landmark that restrict the possibility of large-scale horizontal exposures. Again, geophysical survey will be critical in locating structures for localized excavations.

Identifying structures outside the Residential Area and investigating interior walls in greater detail, with close attention to site formation processes, will also be very important for refining our understanding of site layout and how the community changed over time. Our discovery of houses on the plaza side of the interior palisade walls separating the plaza from Residential Area demonstrates the value of investigating new areas of the site. Additionally, an extension of my research would search for artifactual evidence of inequality among houses and site areas. This could be useful for inferring discrimination and differential status between cultural groups. Differences between archetypal Mississippian and Hybrid Type 1 houses could also reveal the consequences of maintaining traditional practices instead of adopting local ones.

Another limitation of my work is my reliance on other people's identification of pottery temper. While I believe the temper identification done by Richards (1992), Zych (2013), Baerreis and Freeman (1958) and staff of the State Historical Society of Wisconsin are trustworthy, I blindly trust their accuracy. My results will be subject to modification if prior temper

identifications are altered. By relying only on the difference between grit- and shell-temper I have also reduced the intricacies of temper and paste variation into a simple binary. These are fine-grained details of technological style and may be revealing of social boundaries in ways that a simple grit vs shell dichotomy does not. I focus on overlapping ethnic and group identities, but other multi-scalar identities such as gender, status, kin group, and factions are planes of interaction and sources of material variation that may be detectable through Aztalan ceramics. I believe more detailed analyses of ceramic technological style will prove especially useful given the great variation in Late Woodland pottery in southern Wisconsin and northern Illinois, and the diversity represented at Aztalan. Detailed ceramic analysis at Aztalan has been a popular and productive line of research, and future ceramicists should approach questions of hybridity, identity, and integration at Aztalan using ceramic evidence, especially from structure contexts. I look forward to future contributions in these areas because I expect they will lead to new inferences about interaction and coalescence at Aztalan.

Research to date has not been able to fully address how Late Woodland and Mississippian peoples interacted at Aztalan, whether Mississippians actually comprised a ruling elite, or why the site has such an overt Mississippian appearance. In order to address these questions, future research must seek out new evidence of the Late Woodland population (especially in platform mound construction), their day-to-day interactions with Mississippians (perhaps through fine-grained analyses of pottery styles), and whether ethnically-distinct learning communities remained independent or intermingled. Doing so will contribute to a fuller understanding of Aztalan that emphasizes the dynamics of multi-cultural interactions rather than the site's physical features. For example, the Southwest Mound may be another example of

hybridized monumentalism like the palisades and Northeast Mound, indicated by continuity in the use of a pre-mound space.

7.4 Concluding Discussion: A New Cultural Tradition and Complex Identities

I argue that Mississippian and Late Woodland people at Aztalan converged toward to a new cultural tradition in which they selectively adopted aspects of each other's culture, maintained certain practices from their respective learning communities, and developed new hybridized material culture. The overlapping, multi-layered quality of identity means that shared community identities could include an internally-developed, self-ascribed Late Woodland-Mississippian blended identity (possibly evidenced by the Northwest Mound) as well as a more Mississippian-influenced identity expressed externally – whether by conscious choice or unintentionally. If the northward Mississippian expansion ca. A.D. 1100-1200 can be considered a diaspora, then Aztalan is a case example of the strategies that might be employed to facilitate integration, and the long-terms effects of integration that transform the community as a whole.

7.4.1 Complex, Conflicting Identities

My analyses of Aztalan's palisade walls verified the site's Mississippian appearance and demonstrated that the entire palisade system could have been constructed in a single year by a population of ~120 to 580 people. The Design A walls may have been built by members of a Late Woodland learning community (indicated by smaller post diameter) in a Mississippian style, which I argue reflects deliberate portrayal of a Mississippian identity at the community level. Construction of the wall would have united people through that shared experience (Cobb and Butler 2006; Cobb and King 2005; Cohen 1985; Inomata 2006; Knight 1986). People may have also been linked by a shared "insider" identity relative to those living outside the walls. An

insider identity may have also been a Mississippian identity because both were tied to the Mississippian-style palisades. Identity is multi-layered, self-ascribed, and assigned by others, so any perceptions by outsiders could exist alongside identities self-ascribed by the people of Aztalan themselves. Identity is also shaped by material culture, so while the palisade designs could have been implemented for purely functional, defensive reasons their unique appearance would have influenced identity at Aztalan over time. Embracing (at least eventually) a Mississippian or Mississippian-inspired identity may have helped, or been helped by, the adoption of Mississippian-style platform mounds and central plaza. If the palisades were constructed early in the co-resident period, they would have heavily influenced community formation and the development of common Mississippian-Late Woodland identities. The Design B walls reflect a commitment to Mississippian community appearance and any identities the people gained

The Design A-B sequence could have been a deliberate, ritual undertaking meant to represent the duality of Late Woodland and Mississippian cultures. A similar duality took place in the construction of the Northeast Mound, during which Mississippian and Late Woodland pots were deliberately buried in the mound fill (Zych 2013). In this scenario Designs A and B could have represented the residents' perceived differences between Late Woodland and Mississippian culture. Both designs would have displayed a Mississippian appearance to other people on the landscape which reveals how the people of Aztalan represented themselves externally, even while *internally* exercising ritual duality.

While Aztalan resembles a Mississippian town in some ways, my analyses of their structures indicate that many of its residents were likely not culturally or ethnically Mississippian. I infer this because more structures that any other (38%) are of single set post

construction, reproduced in Late Woodland learning communities. The abundance of houses with Late Woodland visible style would have made Aztalan resemble a Late Woodland village at the residential level (with the exception that the structures appear to have been denser than in typical unpalisaded Late Woodland villages). I argue this contradiction between residential and site-wide appearances justifies a re-examination of our characterization of Aztalan as a "Mississippian town". The earliest and most extensive excavations at Aztalan focused on visible features: palisades and mounds (Barrett 1933; Maher 1958; Rowe 1958). These projects collapsed time into a single moment and established a narrative about site appearance analogous to similar-looking Mississippian sites (critiqued in Schroeder and Goldstein 2016). The Mississippianization concept (the process of Late Woodland peoples becoming Mississippian, indicated by mixed assemblages and hybrid material culture) is often used to explain mixed Mississippian/Late Woodland sites (e.g., Bardolf 2014:73-76; Emerson et al. 2007; Goldstein 1991; Millhouse 2012; Stoltman 1986; Wilson et al. 2017). Explaining mixed Mississippian/Late Woodland sites in this way emphasizes Mississippian culture, makes Late Woodland peoples into passive recipients of external forces, and ignores the ways that Mississippians adapted in response to interaction – such as their adoption of local architectural practices at Aztalan. Reducing Aztalan to a "Mississippian town" disregards the complexities of the multi-ethnic interactions, hybridization, and creation of new identities. It also masks diversity that likely existed within the Late Woodland and Mississippian populations. This is perhaps my dissertation's greatest contribution to studies of Mississippian diaspora and Cahokia's northern hinterlands because it highlights an understudied dimension of Late Woodland and Mississippian interaction – the likelihood that, in some ways, the traditions and beliefs of dispersed Mississippian peoples were transformed. The resulting view is one of dynamic cultural change in

every direction, perhaps with far-reaching consequences at Cahokia itself (Alt 2006a; Pauketat 2003; Pauketat and Alt 2005; Slater et al. 2014).

7.4.2 A Mississippian Town?

The issue of describing sites based on mixed suites of material culture also highlights the complication of relating archaeological cultures with actual social groups in the past. Classifying Aztalan as a Mississippian town effectively ascribes a Mississippian identity to the ancient people who lived there. What did it mean to be Mississippian? Cahokia was very likely a multi-cultural place. While "Mississippian-ness" is observed archaeologically through certain pottery styles, platform mounds, and bastioned palisades (among other things), perhaps diversity was a major part of what it meant to be Mississippian. In this definition that emphasizes people and interaction over material culture, Aztalan certainly is a Mississippian town.

Put another way, is Aztalan a Mississippian town because it resembles one? Or because the people portrayed a Mississippian or Mississippian-inspired identity at the community level, despite the diversity and hybridization of material culture at the household level? I argue that the latter acknowledges the dynamics of multi-cultural interaction while the former is superficial. If Aztalan is a Mississippian town, it is because culturally-diverse people chose that as one of several multi-layered, overlapping, and sometimes contradictory identities.

A modern-day example of multi-layered community identity is the town of New Glarus, Wisconsin. New Glarus claims to be home to many Swiss settlers, exhibits Swiss chalet-style architecture in its downtown area, is proud to actively engage in Swiss culture, and refers to itself as America's "Little Switzerland" (https://www.swisstown.com/about). On the surface, New Glarus looks like a Swiss town, identifies itself as a Swiss town, and is widely recognized by

outsiders as a Swiss town. However, most residents of New Glarus are not Swiss (German and Norwegian ancestries are the largest groups according to the 2010 US Census [http://www.census.gov]) and most residential homes and businesses outside the downtown area do not follow the chalet-style architecture. Yet the town actively markets itself as Swiss and the people of New Glarus actively maintain that identity, regardless of their actual ancestry or the culture of their daily life. New Glarus is a Swiss town because the people as a community have decided to represent themselves in that way. Similarly, Aztalan may have portrayed itself in a Mississippian style at the community level, while at the same time the people expressed themselves in non-Mississippian ways through their domestic architecture.

7.4.3 A Narrative of Interaction at Aztalan

A narrative of the interactions between Late Woodland and Mississippian peoples at Aztalan that incorporates my results might be summarized as follows: The site was initially occupied in the ninth century A.D. by Late Woodland peoples along the Crawfish Riverbank, as indicated by intact midden strata that contained grit-tempered Late Woodland pottery, but lacked shell-tempered Mississippian pottery. Late Woodland populations in southern Wisconsin and northern Illinois were likely quite diverse with multi-scalar, overlapping territories and social networks (Rosebrough 2010). The range of Late Woodland pottery types at Aztalan may indicate that the population there was diverse even prior to Mississippian arrival. The presence of grit-tempered hybrid pottery with Mississippian visible style (Hyer Plain) in the early strata (dating to the ninth century A.D.) indicate that Mississippian material influences had begun prior to Mississippian arrival at the site between A.D. 1050 and 1100 (Richards 1992:187-191). Willing migrants usually have some knowledge of their destination area prior to relocating, so an existing

relationship with a Late Woodland community at Aztalan may have "pulled" Mississippian peoples north (Anthony 1990). If the Late Woodland population was already accustomed to diversity it may have been perfectly normal to form a coalescent community with Mississippians. Coalescent communities are often defined in terms of aggregation for mutual defense (e.g., Arkush 2017; Birch 2010, 2012; Birch and Williamson 2013; Kowalewski 2014), and this has been posited for Aztalan's relationship with Oneota populations around Lake Koshkonong to the south (Richards and Jeske 2002:43).

While strong material connections exist between Aztalan and Cahokia and I believe it is the origin of the Mississippian immigrants to Aztalan because the Mississippian artifacts at Aztalan compare so favorably to those in Cahokia (Richards 2003), they also may have originated somewhere between Aztalan and Cahokia (Goldstein 1991:220). This may have been the case, given that Mississippian groups with ties to the American Bottom were dispersed widely across Cahokia's northern hinterlands ca. A.D. 1100-1200. An early group could have initially settled somewhere north of Cahokia before some or all of their group relocated a second time to Aztalan.

Comparing Aztalan to other northern sites reveals how unique it is. Aztalan has an obvious Mississippian appearance, but the artifacts and architecture reveal significant hybridization and interaction. It is not clear whether people of Late Woodland or Mississippian ancestry were in the majority at any given time. In contrast, the central Illinois River valley town and mound sites contain materials and architecture consistent with predominantly Mississippian populations that accompany clear Mississippian appearances (like Orendorf, which has over 150 wall-trench houses and a pottery assemblage dominated by Powell Plain and Ramey Incised jars [Conrad 1991:132-136]). A closer comparison might be made to the Apple River valley sites

which, as a whole, have greater mixing of Late Woodland and Mississippian materials including Mississippian-style site appearance, Mississippian and Late Woodland pottery, hybrid pottery, and single-set post and wall-trench buildings (Emerson 1991; Emerson et al. 2007, Millhouse 2012). However, the architectural diversity seen at Aztalan is not present among the 13 structures at John Chapman, which are all rectangular, single-set post structures (Millhouse 2012:91).

After Mississippian arrival, their interaction with Late Woodland peoples is indicated in public and private space. I argue that the presence of hybrid structures that combine Late Woodland visible style with Mississippian technological style indicates that Mississippian people adopted local architectural practices. This would have helped to reduce their differences and would have aided in their integration. Mixed Late Woodland and Mississippian pottery assemblages from abandoned house basins lead me to conclude that Mississippian and Late Woodland households were spatially integrated rather than segregated. Hybridization results from interaction and exposure to diverse traditions, and trade and migration back and forth between the American Bottom, Aztalan, and a hypothesized Illinois origin (not to mention between Aztalan and other sites like Fred Edwards [Finney 1993:150]) would have resulted in significant interaction and hybridization between broadly and locally distinct peoples. The wide variation in architecture and the lack of any one common house form at Aztalan potentially illustrates this point. It may also explain why Aztalan is so unique in southern Wisconsin. A "step-by-step" migration in which Mississippians would come to interact with multiple groups of people along the way to Aztalan, with each step introducing new practices and possibilities of variation would be a unique historical process that resulted in new cultural forms specific to Aztalan.

In terms of public space, deliberate burial of whole Late Woodland and Mississippian pots into the fill of the Northeast Mound, and the mound-top recreation of an earlier Late Woodland ceremonial structure, is arguably evidence of community-level hybridization soon after Mississippian arrival (Zych 2013). Palisade walls built by members of a Late Woodland learning community, in a Mississippian style, with possibly limited Mississippian involvement at first, may further indicate the successful integration of Mississippians at Aztalan. It also may indicate that a Mississippian identity was intended by the people of Aztalan at the community level, even while Late Woodland practices were well represented, if not dominant, in household architecture. From this perspective, Aztalan must be discussed in terms of complex demographics and contradicting identities that were presented at different scales, for different audiences. Aztalan was ultimately abandoned by A.D. 1200 or 1250 for unknown reasons, though it coincides with potential religious and social changes and population decline at Cahokia (Pauketat et al. 2013).

While my dissertation uses Aztalan as a case example for studying how identity influences, and is influenced by, the interactions of diverse people and the integration of migrant and local descent groups, these and other factors that influence integration are timeless and global. Immigrants are faced with challenges that originate in their ethnic and cultural differences from locals, and I have shown how success might be heavily facilitated by the development of common identities. In considering the successful integration of migrants and locals and their descendants, it is important to remember that people have multiple, fluid, overlapping, and independent identities simultaneously, and a common overarching identity can exist alongside differences. In the end, accepting differences is greatly aided by recognizing similarities.

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Appendix I: Structure Summaries

I.1 Barrett (MPM)

Structure Barrett-IV-47 was identified by Barrett in the residential area as an unknown number of "charred logs" about 7-8 cm in diameter forming two corners about 1.6 meters apart. Barrett exposed the logs at about 70 cm below the ground surface and encountered a possible floor approximately 6 cm deeper. Barrett does not provide information on foundation type or provide a plan map. Pottery assemblages in the Barrett collections cannot be associated with specific proveniences.

Structure Barrett-IV-51 (Figure I.1) was recognized by Barrett as a roughly rectangular pattern of wall-trenches within the residential area (Barrett 1933:IV-51). The structure was exposed in its entirety and measured approximately 6x4 meters. Barrett noted post molds within the wall-trenches, and the remains of charred poles running horizontally between the post molds is if the roof had collapsed. A layer of packed sand and gravel across portions of the structure interior may be evidence of a floor. Pottery assemblages in the Barrett collections cannot be associated with specific proveniences.

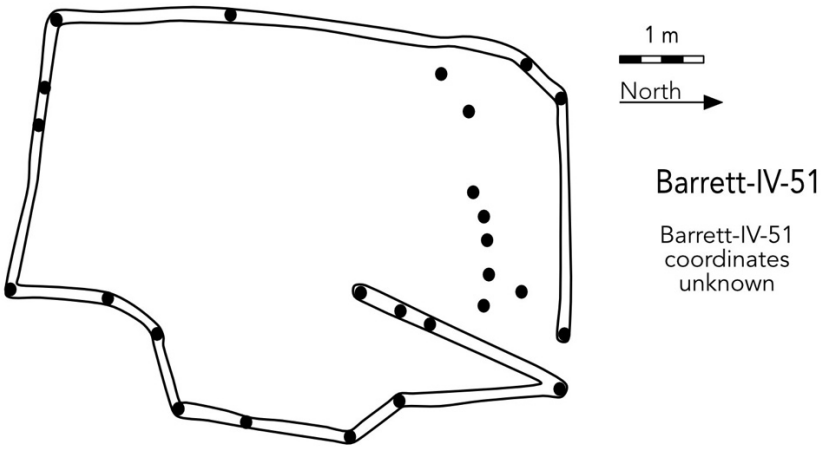

Figure I.1. Structure Barrett-IV-51.

I.2 Wisconsin Archaeological Survey

Structure WAS-1949-H1 (Figure I.2) was excavated in 1949 south of the main palisaded enclosure and was recorded as House 1 on field maps and in publication (Wittry and Baerreis 1958). The structure was identified as a pattern of individual post molds and sections of wall-trench forming a rectangular shape with rounded corners. It is fairly large for Aztalan structures at 12.2 m long and 8.5 m wide. Wittry and Baerreis report that the average post mold diameter is 18.3 cm and average wall-trench width is 24.4 cm (1958:66). Notably, the structure is bisected along its long axis by a line of post molds extending past the limits of the structure. Wittry and Baerreis do not mention the size of the post molds, and their diameters are not determinable from maps. The line of posts appears to be superimposed over the structure, based on the WAS map. The structure contained “scanty” materials (Wittry and Baerreis 1958:67), but adjacent pit features contained combinations of grit- and shell-tempered pottery.

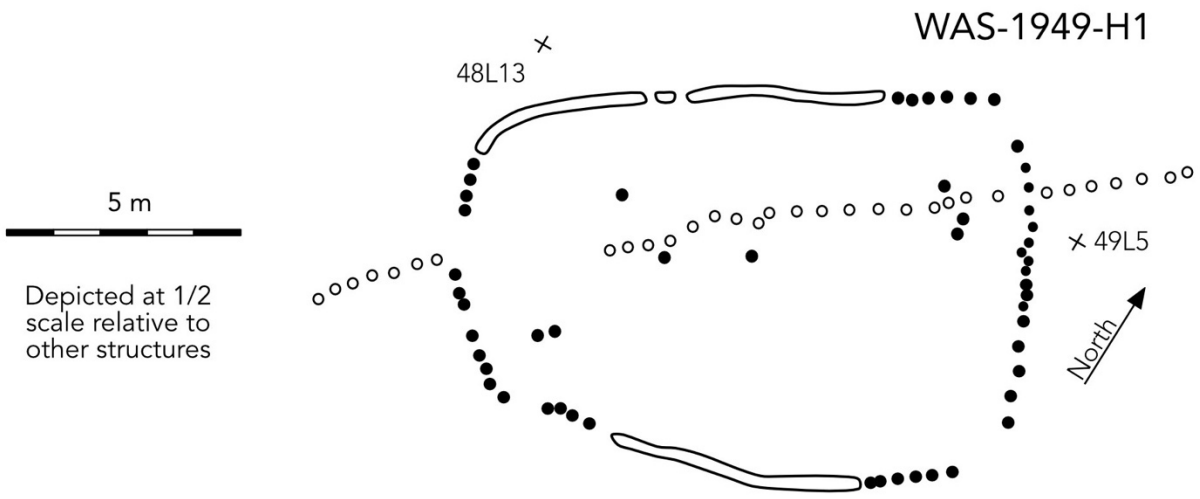

Figure I.2. Structure WAS-1949-H1.

Structure WAS-1949-H2 (Figure I.3) was excavated in 1949 in the Residential Area and was recorded in field maps and publication as House 2. The structure was identified in the field as an ovoid wall-trench pattern with an estimated length of 5.1 m and width of 4.6 m. Wittry and Baerreis report the average diameter of post molds visible within the wall-trenches is 24.4 cm, and the trenches themselves average 36.6 cm in width (1958:67-68). Wittry and Baerreis note that a human femur was found in one post mold, which they claimed was "placed as a wedge to brace the post" (1958:68). The structure entryway is a curled screen that creates a vestibule outside the main chamber. This structure has become the archetype of circular structures at Aztalan. The structure contained both grit- and shell-tempered pottery.

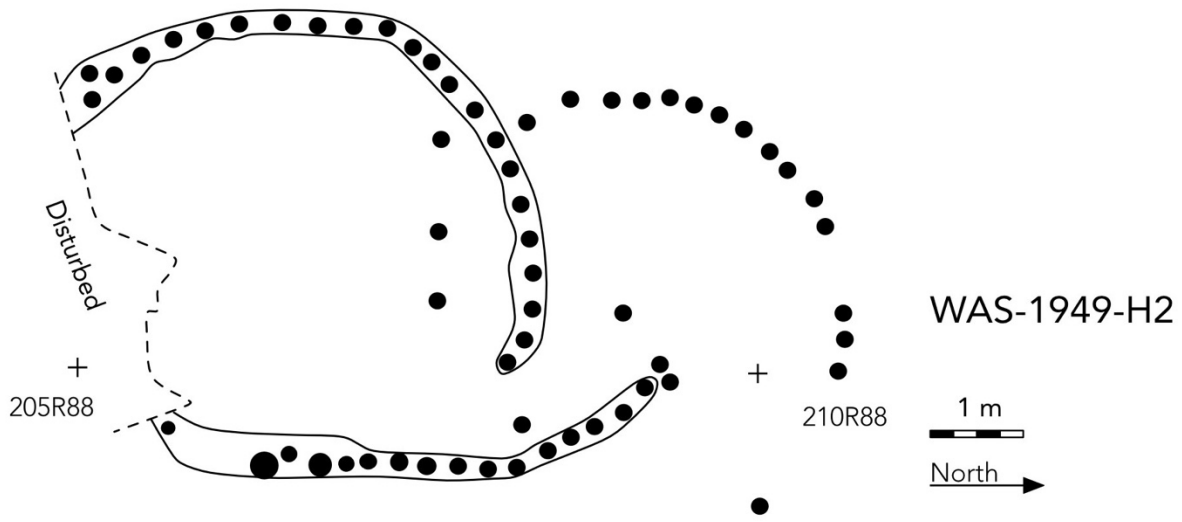

Figure I.3. Structure WAS-1949-H2.

Structure WAS-1950-H3 (Figure I.4) was excavated in 1950 within the Residential Area and was recorded in field maps and publication as House 3. The structure was identified in the field as a rectangular pattern of wall-trenches with an extension that gives it a T shape. Interior posts follow the perimeter of the structure and average 13.7 cm in diameter. Wittry and Baerreis report that wall-trenches were average 15.2 cm wide. The structure is 6.3 m in length and 3.2 m wide. An entryway is apparent in the front of the extension by a gap in the wall-trenches.

Two notable phenomena were documented during excavation of WAS-1950-H3: First, a number of charred poles were found lying within the structure and perpendicular to the walls, apparently resulting from the burning and collapse of the walls or roof. In fact, test excavations at this location yielded high quantities of daub and charred wood (Wittry and Baerreis 1958:69). Excavations also revealed numerous thin silty laminations, free of cultural material (including free of pottery), that Wittry and Baerreis suggested may have been deposited by water. The combination of silty laminations overlain by charred poles indicates that the structure was left vacant for some time before it burned.

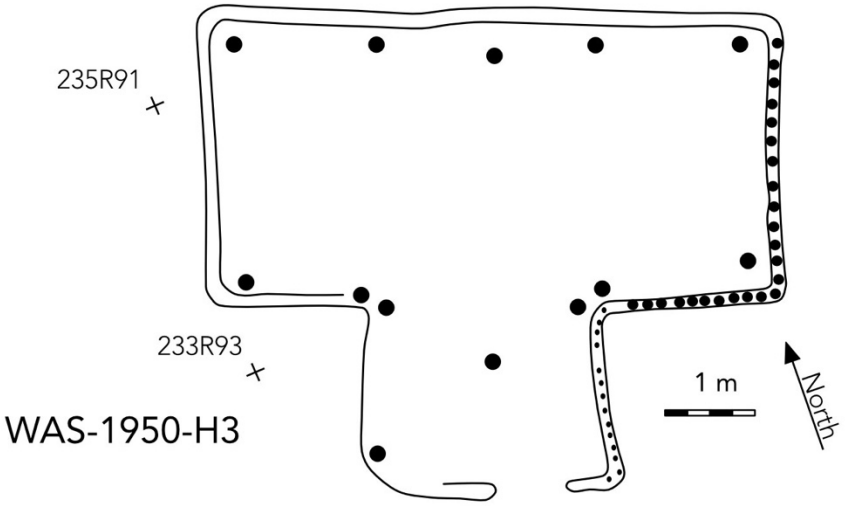

Figure I.4. Structure WAS-1950-H3.

I.3 State Historical Society of Wisconsin (Hurley)

Structure SHSW-1962-WT1 (Figure I.5) was excavated in 1962 and is an isolated section of wall-trench located adjacent and parallel to the eastern palisade wall. The wall-trench measures 25.7 cm wide. It is superimposed by a large circular feature. It is unclear if this section of wall-trench is part of a structure or if it is associated with the eastern palisade, but I tentatively consider it a structure because the palisade at this location is otherwise composed of single-set posts. Information about pottery and other materials from this structure was not included in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society's Museum Archaeology Program.

Structure SHSW-1962-WT2 (Figure I.5) was excavated in 1962 and is a section of wall-trench 44.2 cm wide perpendicular to and superimposed by the eastern palisade wall. The wall-trench extends to the east and west beyond the narrow limits of excavation. A parallel line of post molds averaging 11.6 cm in diameter is approximately one-meter north of the wall-trench but their association with SHSW-1962-WT2 and the palisade is unknown. Information about

pottery and other materials from this structure was not included in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society's Museum Archaeology Program.

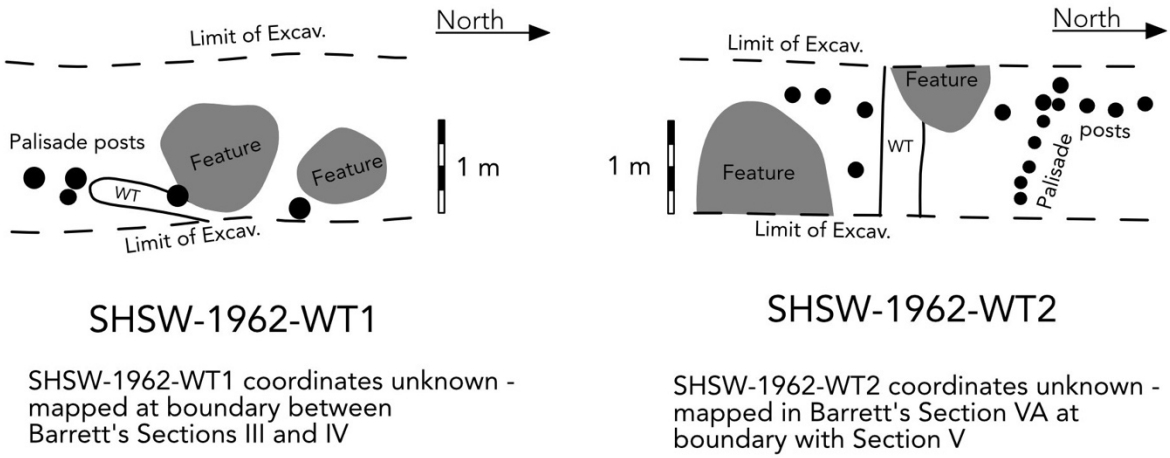

Figure I.5. Structures SHSW-1962-WT1 and SHSW-1962-WT2.

Structure SHSW-1962-H2 (Figure I.6) was excavated in 1962 and is a rectilinear basin stain oriented perpendicular to and superimposed by the eastern palisade wall. It extends east and west beyond the narrow limits of excavation and is approximately 2 m wide along its north-south axis. The basin stain is immediately adjacent to SHSW-1962-H3 to the north. Information about pottery and other materials from this structure was not included in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society's Museum Archaeology Program.

Structure SHSW-1962-H3 (Figure I.6) was excavated in 1962 and is an irregular, or possibly rectangular, basin stain oriented parallel to and superimposed by the eastern palisade wall. It measures approximately 5.2 m long on its north-south axis and is immediately adjacent to SHSW-1962-H2 to the south. Information about pottery and other materials from this structure

was not included in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society's Museum Archaeology Program.

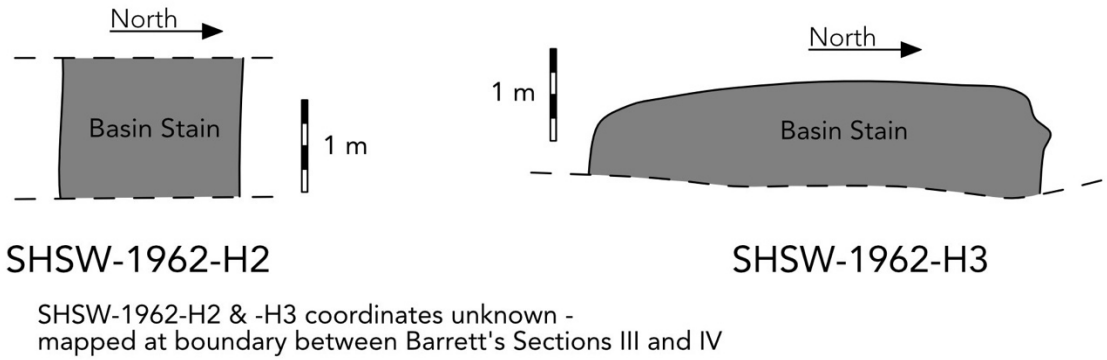

Figure I.6. Structures SHSW-1962-H2 and SHSW-1962-H3.

Structure SHSW-1962-H4 (Figure I.7) was excavated in 1962 and was identified as a rectangular arrangement of wall-trenches parallel to and superimposed by the eastern palisade wall. The wall-trenches comprise three sides of a structure, and form two corners. This wall-trench structure measures 4.6 m in length along its north-south axis and extends beyond the narrow limits of excavation to the east and west. It has a mean wall-trench width of 23.6 cm. Information about pottery and other materials from this structure was not included in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society's Museum Archaeology Program.

Structure SHSW-1962-H5 (Figure I.7) was excavated in 1962 and is also a rectangular arrangement of four wall-trench segments that form three sides of a structure oriented parallel to and superimposed by the eastern palisade wall. One corner of the structure (northeast) is clearly visible and at least one other (southeast) can be inferred by the arrangement of the wall-trenches. A third possible corner (northwest) may be indicated by a mapped "end" of the northern wall-trench. However, both ends of that wall-trench nearly reach the limits of excavation and so may

be incorrectly mapped. The southern wall-trench also may not be associated with the others because it is located approximately 1.2 m to the south. A possible simple entrance is apparent in the eastern side of structure. The SHSW map-maker also noted “Entrance” between post molds adjacent to the structure, but it is unclear if that refers to a gap between post molds or is meant to be associated with SHSW-1962-H5. Information about pottery and other materials from this structure was not included in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society’s Museum Archaeology Program.

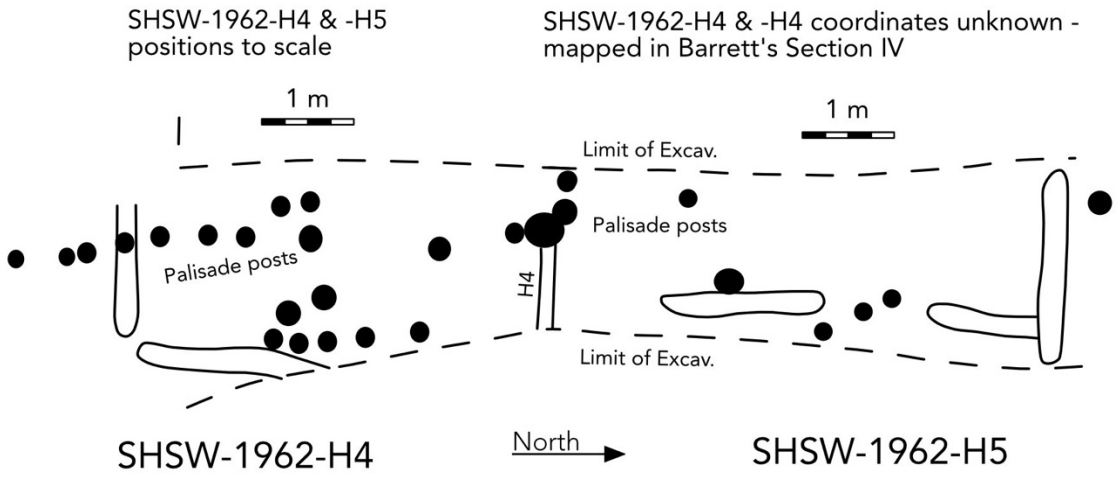

Figure I.7. Structures SHSW-1962-H4 and SHSW-1962-H5.

I.4 State Historical Society of Wisconsin (Freeman)

Structure SHSW-1964-H1 (Figure I.8) was excavated in 1964 and is mapped as an ovoid pattern of post molds with a curled entrance in the residential area near the Northeast Mound. It is exposed in its entirety and has a length and width of 3.9 x 3 m. Individual post mold diameters and spacing can be determined from the plan map (i.e., they are not simply sketched

around a mapped midpoint) and measure 19.2 cm average diameter and 43.4 cm average spacing. The wide spacing suggests that some interspersed postmolds may not have been visible. The entrance is 0.6 m wide. The structure contained 236 potsherds including both shell- and grit-tempered pottery (37% and 63%, respectively).

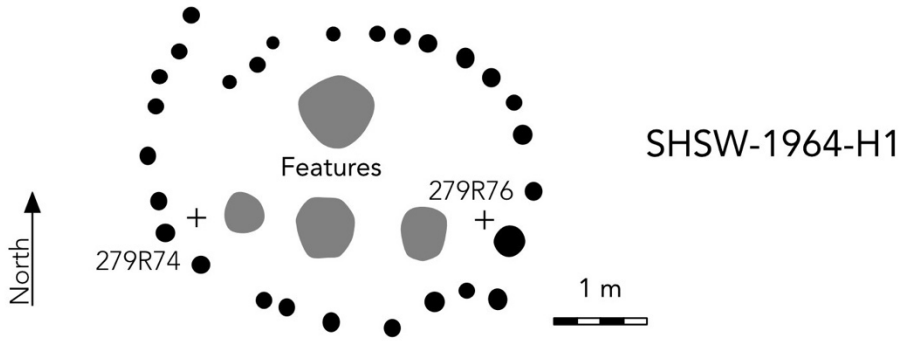

Figure I.8. Structure SHSW-1964-H1.

Structure SHSW-1964-H2 (Figure I.9) was excavated in 1964 and is a large rectangular pattern of wall-trenches in the residential area approximately 25 meters south of the Northeast Mound. Three of four walls were exposed, providing a width of 4.3 meters and a minimum length of 6.9 meters. The exposed portion of the structure shows immediately adjacent and parallel wall-trenches that may be evidence of rebuilding. The Wall-trenches average 17.5 cm in width and yielded 20 potsherds, 18 of which were grit-tempered and two shell-tempered.

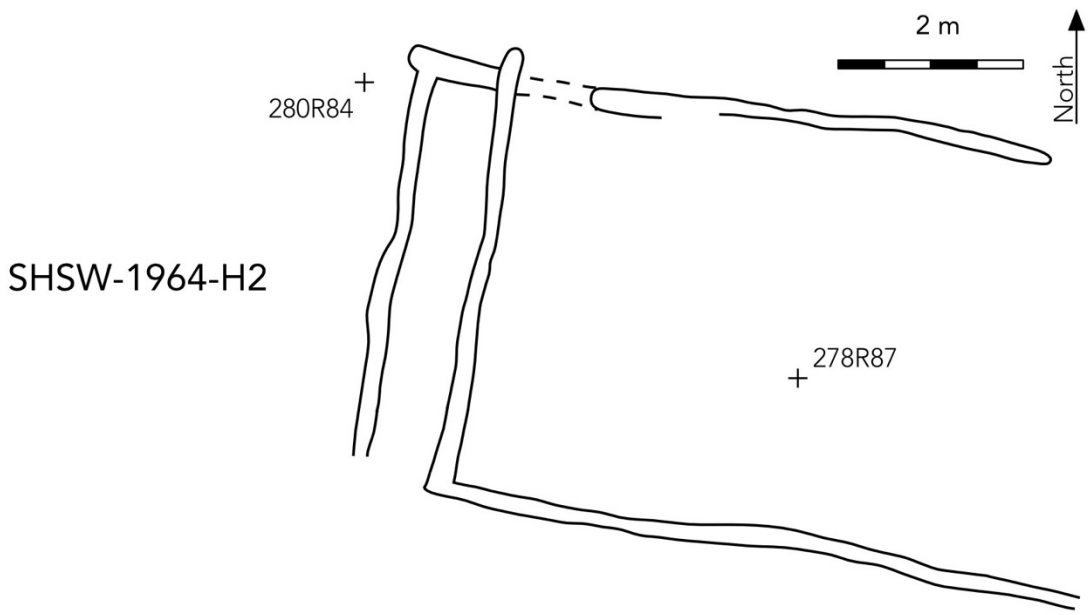

Figure I.9. Structure SHSW-1964-H2.

Structure SHSW-1964-H3 (Figure I.10) was excavated in 1964 and is mapped as a rectangular pattern of single-set posts average 14.9 cm diameter, along the eastern edge of the residential area approximately 55 meters south of the Northeast Mound. Portions of three walls are visible, providing two corners 2.7 meters apart. The eastern portion of the structure was not exposed in 1964 because it extended beyond the limits of machine scraping. In 2015, we attempted to re-locate and excavate the intact portion. We were unsuccessful because cartographic discrepancies prevented us from precisely locating the structures. Additionally, erosion of a gully along the riverbank appears to have destroyed the eastern portion of the area where the structures should be located. We did, however, identify backfill containing artifacts that may be from the 1964 excavation, indicating that not all materials were recovered during excavation. An extended entrance protrudes perpendicularly and measures 0.61 meters long, with an opening 0.58 meters wide. Twelve pieces of pottery were recovered from post molds (nine grit- and three shell-tempered). The structure is superimposed on or by SHSW-1964-H4.

Structure SHSW-1964-H4 (Figure I.10) was excavated in 1964 and is mapped as two curved sections of wall-trench 15.2 cm wide with a curled entrance along the eastern edge of the residential area 60 meters south of the northeast mound. Postmolds visible within the wall-trench are 10.6 cm average diameter. As with SHSW-1964-H3, the eastern portion was not exposed in 1964 because it extended beyond the limits of machine scraping. The structure appears to be a similar ovoid form as WAS-1949-H2 and SHSW-1964-H1. While it is only partially exposed, it has a minimum dimension of approximately 2 m. An entrance opening measures 0.76 meters wide. Only five pieces of pottery were recovered from the wall trenches, all of which are grit-tempered.

Structure SHSW-1964-H5 (Figure I.10) was excavated in 1964 and is mapped as a rectangular pattern of wall-trenches average 14.5 cm wide forming three walls of a structure and two corners, located along the eastern edge of the residential area about 65 meters south of the Northeast Mound. As with SHSW-1964-H3 and SHSW-1964-H4, the eastern portion was not exposed in 1964 because out extended beyond the limits of machine scraping. The structure measures three meters along its complete wall and is a minimum of 2.1 meters along its other axis. A screened entrance is present near the center of the one complete wall, with an opening 0.73 meter wide. Four grit-tempered and six shell-tempered potsherds are reported from the structure wall trenches and a small interior feature.

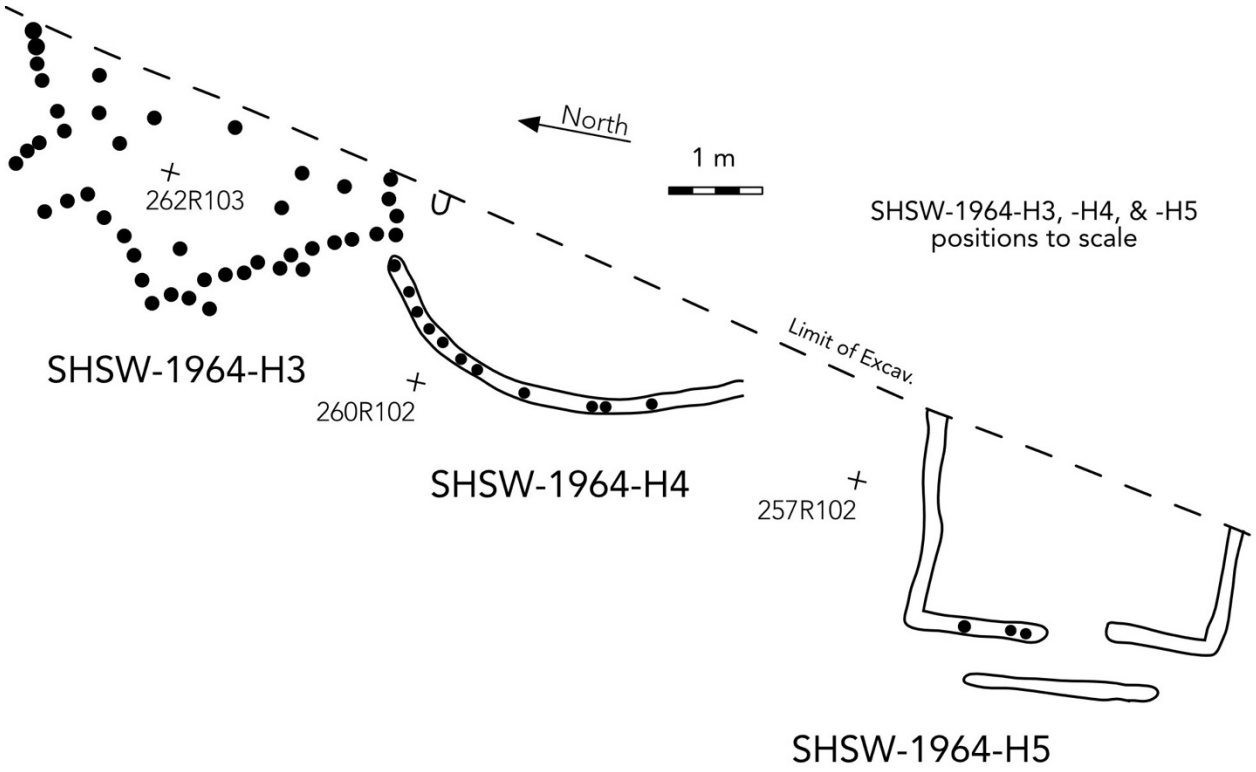

Figure I.10. Structures SHSW-1964-H3, SHSW-1964-H4, and SHSW-1964-H5.

Structure SHSW-1964-H6 (Figure I.11) was excavated in 1964 and is mapped as a rectangular, but irregular, pattern of single-set post molds on the eastern side of the residential area. The structure was completely exposed and measures 4.82 meters long and 2.73 meters wide. An extended entrance is situated off-center along one of the long sides and measures 0.61 meters long, with an opening 0.57 meters wide. Post molds were sketched around mapped center points, so diameters are not available. The post molds contained 89 grit- and 21 shell-tempered potsherds.

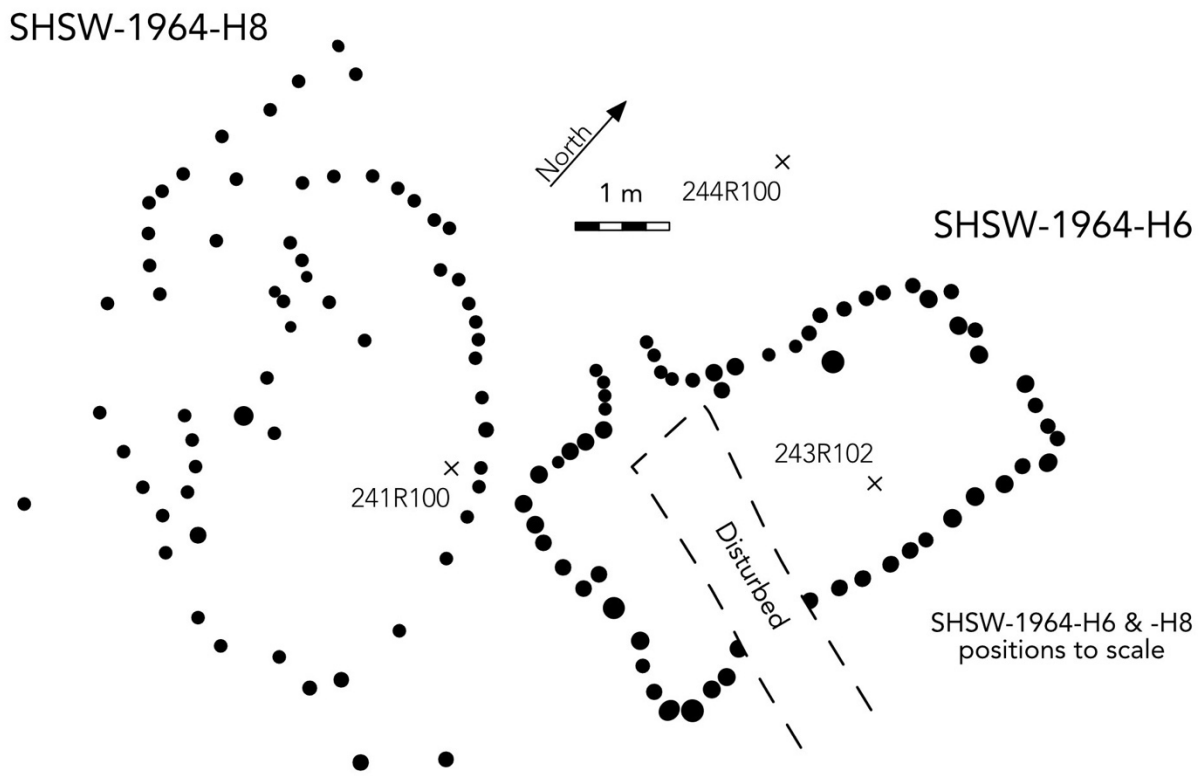

Figure I.11. Structures SHSW-1964-H6 and SHSW-1964-H8.

Structure SHSW-1964-H7 (Figure I.12) was excavated in 1964 in the residential area and is mapped as a large rectangular pattern of walls, some of which are wall-trenches and some single-set post molds. The structure appears to have been completely exposed, but feature superposition and division between two pieces of mapping paper that do not align neatly result in a slightly unclear arrangement of foundation elements on the structure's east side. Even so, it is possible to measure it as 6.4 m long and 6.2 m wide. Multiple segments of wall-trench and single-set post walls are visible, but it is unclear if they are the result of mapping errors, are unassociated with the structure, or if they indicate rebuilding episodes. No definite entrance is

visible and no post mold diameters are available because they were only sketched around mapped center points. 35 pieces of grit-tempered (and no shell-tempered) pottery were recovered from post molds and wall-trenches. SHSW-1964-H7 has a Length to Width ratio of 0.969, making it more square than most at Aztalan and at other Mississippian sites (for comparison, contemporaneous wall-trench structures in Tract 15A at Cahokia have Length to Width ratios between 0.6 and 0.7).

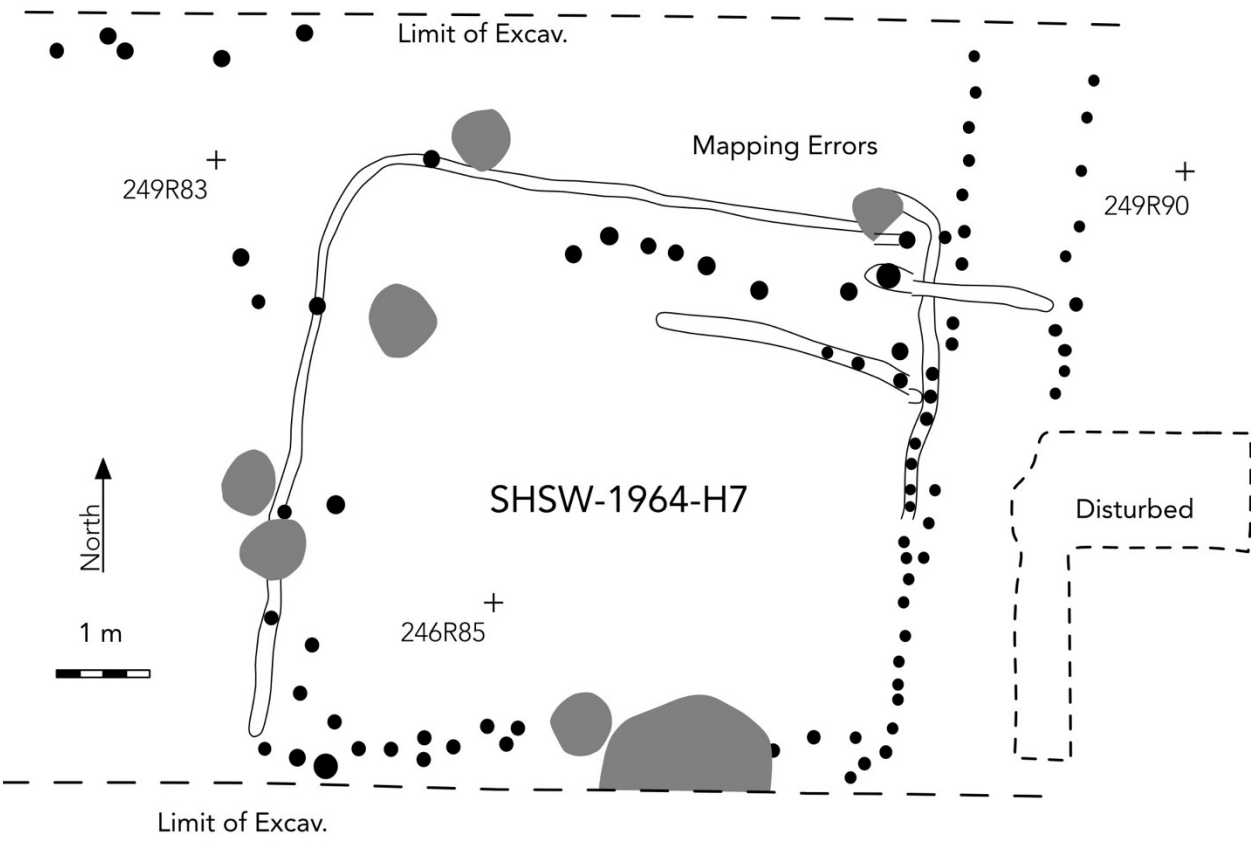

Figure I.12. Structure SHSW-1964-H7.

Structure SHSW-1964-H8 (Figure I.11) was excavated in 1964 and is mapped as a roughly rectangular or possibly ovoid pattern of single-set post molds on the eastern side of the residential area. It is completely exposed, revealing measurable length and width but it has rounded corners (especially on one end) that overall give it an irregular shape. It measures 5.2

meters long and 3.1 meters wide. An entrance is visible and roughly follows the curled form seen in other ovoid structures at Aztalan. A second possible entrance is also visible, but more likely is a rebuilt section of wall or represents unassociated, superimposed architecture. No pottery was reported in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society's Museum Archaeology Program.

Structure SHSW-1964-H9 (Figure I.13) was excavated in 1964 and is mapped as a curved segment of single-set postmolds about 35 meters south of the Northeast Mound. Its curved wall segment makes it likely an ovoid structure, but entrance type and dimensions are unknown. No pottery was reported in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society's Museum Archaeology Program.

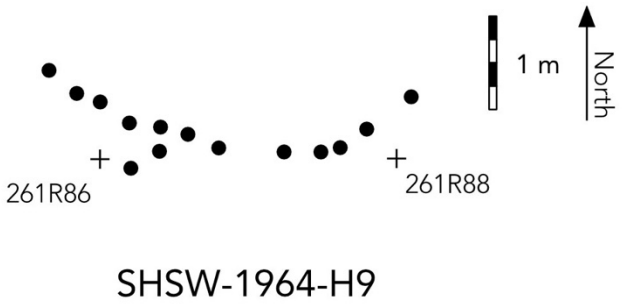

Figure I.13. Structure SHSW-1964-H9.

Structure SHSW-1967-AreaE-S1 (Figure I.14) was excavated in 1967 and is mapped as a semi-rectangular pattern of wall-trench segments and single-set post molds in the Residential Area, approximately 80 meters north of the gravel knoll. However, unlike other structures at Aztalan with combinations of wall-trenches and single-set post molds, the wall-trenches in this structure were mapped with dotted lines and without clear ends. These mapping choices suggest that the wall-trenches were not clearly defined and were more challenging to identify in the field than the post molds within them. I interpret the structure as having been wholly of wall-trench

construction rather than a composite of both foundation types because of those reasons. Portions of all four walls are visible (at least two completely) which permit length and width measurements of 4.39 m and 2.87 m. An apparent entrance is visible, but it is positioned along a partial wall segment and as such cannot be measured or categorized. One end of the structure has rounded corners, and the wall segment next to the apparent entrance is curved more than other segments. No pottery was reported in the inventory of Aztalan materials excavated by SHSW provided by the Wisconsin Historical Society's Museum Archaeology Program.

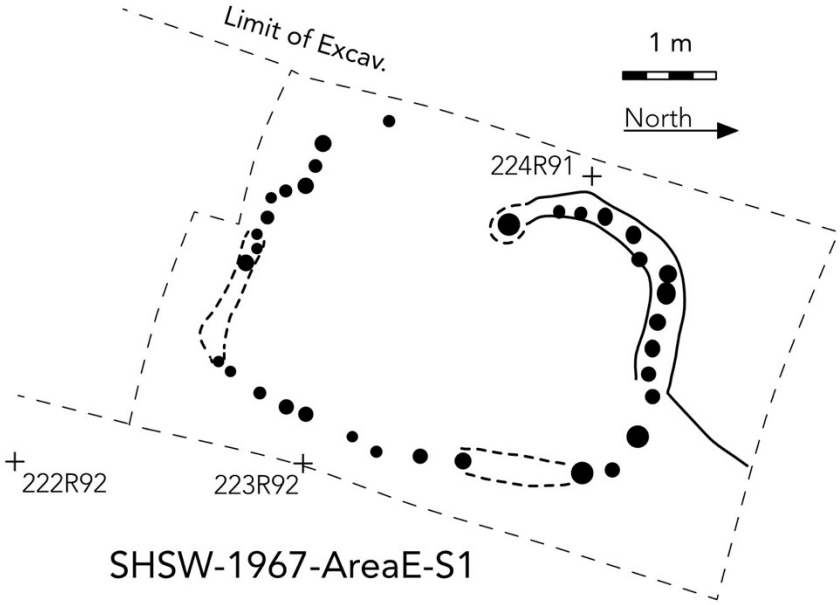

Figure I.14. Structure SHSW-1967-AreaE-S1.

Structure SHSW-1967-S1 (Figure I.15) was excavated in 1967 under the Northeast Mound and is mapped as a rectangular basin stain with single-set post molds around its interior margin. It is completely exposed and measures 2.74 m long and 2 m wide. No obvious entrance is visible. 326 pieces of pottery were recovered from the structure fill, all Late Woodland. Other features superimposed by the Northeast Mound also contained only Late Woodland pottery

(including Hyer Plain, a grit-tempered facsimile of the Mississippian Powell Plain type). The structure as a whole resembles Edelhardt phase (Terminal Late Woodland/Emergent Mississippian, A.D. 1000-1050) structures in the greater Cahokia region (Alt and Pauketat 2011; Mehrer 1995).

Structure SHSW-1967-S2A and **SHSW-1967-S2B** (Figure I.15) were excavated in 1967 and are mapped as two concentric patterns of single-set post molds, also located underneath the Northeast Mound approximately 5 meters east of SHSW-1967-S1. SHSW did not differentiate between the two patterns and labeled them all together at Structure 2. The larger pattern of post molds (S2A) is rectilinear and is comprised of portions of three walls. It measures 5.46 meters long and a minimum of 5 meters wide. No obvious entrance is visible. The smaller pattern (S2B) appears to be ovoid and completely exposed, and may have a curled entrance like other ovoid structures at Aztalan. SHSW-1967-S2B measures 3.4 meters long and 2.2 meters wide. Thirty-four pieces of Late Woodland pottery were recovered from all the post molds combined, and no Mississippian pottery.

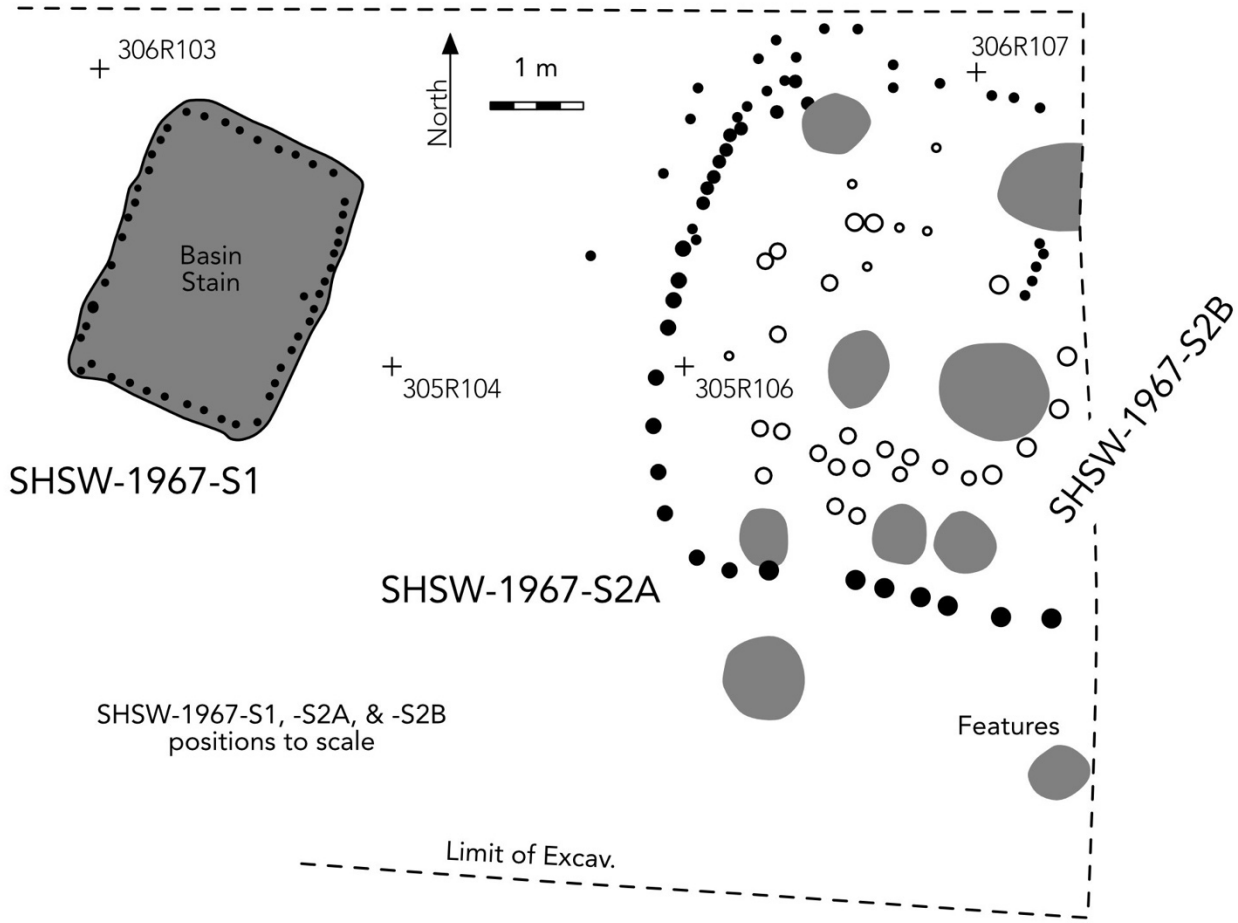

Figure I.15. Structures SHSW-1967-S1, SHSW-1967-S2A, and SHSW-1967-S2B.

I.5 University of Wisconsin-Milwaukee

UWM-1984-S1 (Figure I.16) was identified in 1984 as a pattern of single-set post molds surrounding a large soil stain along the western edge of the Plaza (Richards 1992: 168-170). The features in this area were heavily truncated, leaving only the very bottoms of post molds intact. The structure was only partially exposed and the visible post molds do not form a definite shape. Two possible patterns are recognizable: both show portions of three possible walls, forming two corners of a rectangle. It is unclear if these represent one structure or two. Extraneous post molds could be an entryway, interior benches, or other non-wall architectural elements. The structure(s)

are approximately three meters wide, but the unclear patterns make measurements difficult. 348 pieces of grit-tempered pottery were recovered from the large feature. No shell-tempered pottery was recovered.

Richards tentatively interpreted a set of post molds less than 10 cm in diameter as comprising one structure, with the remaining, outer post molds (mostly greater than 10 cm in diameter) as part of an entrance (Richards 1992:170). He interpreted the large soil stain as a possible floor, citing its position almost entirely within the structure walls. However, my own interpretation from his plan map is that the stain more closely aligns the larger post molds, and the smaller post molds are intrusive into it. From this perspective the stain and larger post molds may be one structure, and the smaller, intrusive post molds a later one. Richards notes that it was difficult to identify post molds in the field (1992:169), so like Richards I conservatively record UWM-1984-S1 as a single structure constructed with single-set posts.

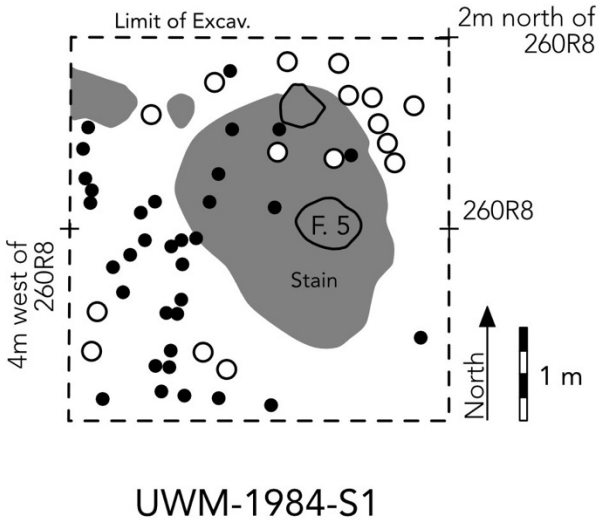

Figure I.16. Structure UWM-1984-S1.

UWM-1984-S2 (Figure I.17) was identified in 1984 in the riverbank midden on the eastern edge of the residential area as a set of parallel wall-trenches with perpendicular length of

single-set post molds (Richards 1992:155-166). The structure is situated about 1.5 meters west of and parallel to the eastern palisade wall (which, notably, originate at a higher stratigraphic level than the structure [1992:163-164]). The wall-trenches and post molds may be three sides of a rectangular structure. If this is the case, then it is a small structure only 1.61 meters wide and 2.74 meters long. The wall-trenches average 17.3 cm wide. The single-set and wall-trench post molds range from 10 to 15 cm in diameter. No pottery was recovered from the wall-trenches or post molds themselves, but 690 potsherds were recovered from the stratigraphic layer the features originated in (Strata 5; Richards 1992:144-145). 95% of those are grit-tempered, and less than 5% are shell-tempered.

Alternatively, the wall-trenches may be sides of two adjacent structures. At 1.61 meters wide the structure would be unusually small, only larger than the partially-exposed and poorly reported Barrett-IV-47. Also, the north end of one of the wall-trenches extends beyond the line of post molds in such a way that they do not appear to be part of a single structure. Richards noted that the north end of that wall-trench was difficult to discern, so it also could terminate at the line of post molds and make a neater corner.

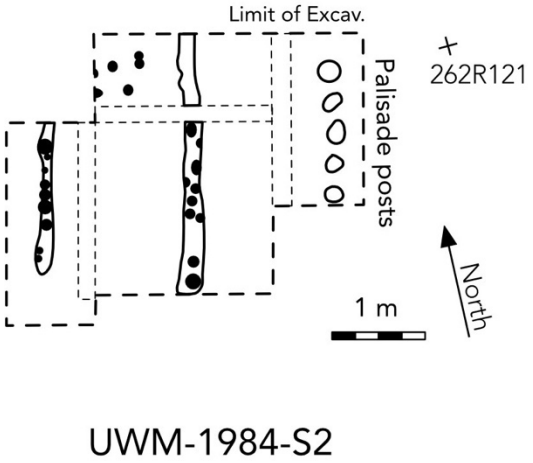

Figure I.17. Structure UWM-1984-S2.

UWM-1984-S3 is known only as an isolated section of wall trench in the plaza at the same location as UWM-1984-S1 (Goldstein 1985; Richards 1992).

UWM-1988-S1 was identified in 1988 as a short segment of wall-trench with post mold in the plaza just south of the Northwest Mound. This wall-trench segment was exposed in a small 1x1 m test pit excavated and completed in a single day. As such, very few details are available for this possible structure (Goldstein 1985). However, it is notable that the small test pit was excavated to test an anomaly visible in the vegetation after a period of drought. Distinct ovals and rectangles could be seen in vegetation coloration, presumably created by differential moisture retention between cultural features and surrounding matrix. UWM-1988-S1 was discovered along the edge of one such rectangle. Two other rectangles were also visible to the east (and also adjacent to the Northwest Mound) but were left untested. If UWM-1988-S1 is a rectangular wall-trench structure, then the nearby rectangles visible likely are as well. There is also a known segment of palisade wall with bastions at this approximate location, so UWM-1988-S1 and the other two rectangular anomalies may be palisade bastions rather than dwellings. However, the palisade segment was already known at the time of UWM-1988-S1 excavation and was constructed with single-set posts rather than wall-trenches. The palisade segment was also completely excavated at this location via machine stripping, which may have impacted the visibility of vegetation anomalies. I tentatively consider UWM-1988-S1 to be a non-palisade structure for those reasons.

I.6 University of Wisconsin-Madison

Structure UW-2015-SA (Figure I.18), discovered in 2015, was identified as a rectangular basin stain lacking wall-trenches or post molds in the Plaza near the interior palisade

lines. Enough of its four sides were exposed that length and width could be measured. It is approximately 4 meters long and 3.5 m wide. No entrance is visible. It was not completed excavated, but 655 pieces of pottery were recovered. 63% are grit-tempered and 37% shell-tempered.

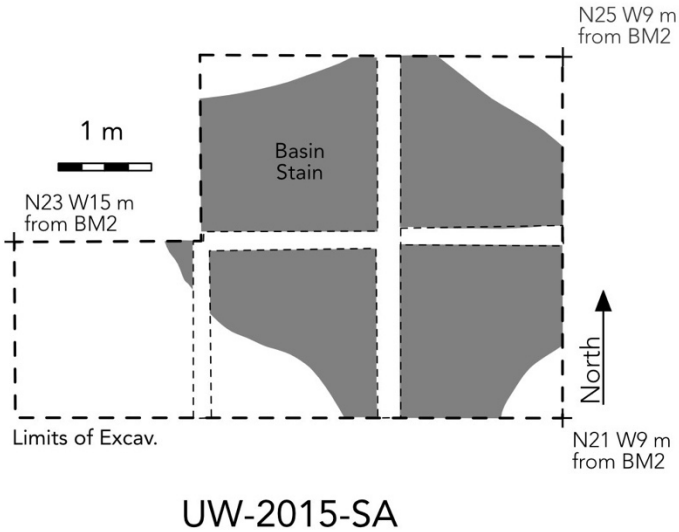

Figure I.18. Structure UW-2015-SA.

Structure UW-2015-SB (Figure I.19) was identified as a rectangular-shaped thin lens of dark brown feature fill in the Plaza near the inner palisade lines in 2015. Portions of three walls were defined, allowing measurements of at least 3 meters long and 2.14 m wide. 93 pieces of pottery were recovered from the structure basin fill, 82% of which were shell-tempered and 18% grit-tempered.

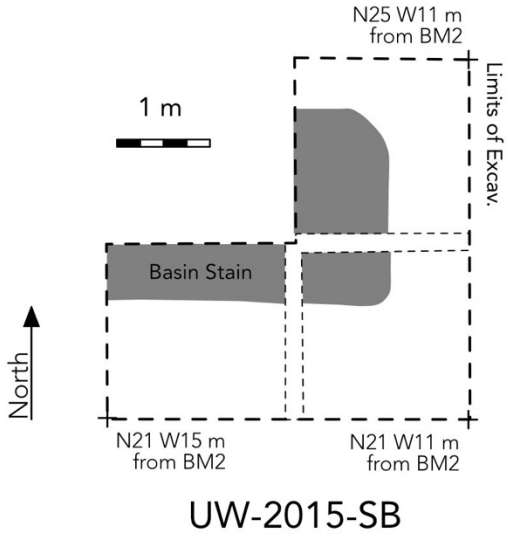

Figure I.19. Structure UW-2015-SB.

Structure UW-2015-SD (Figure I.20) was discovered in 2015 and was defined as a northwest to southeast linear pattern of single-set post molds with extended entryway in the Plaza, near the inner palisade lines. Only a portion of one wall is exposed, providing a minimum length of four meters. The entrance extends approximately 0.45 meters before reaching the limit of excavation. The entrance is 0.72 meters wide. No pottery was recovered from the structure post molds.

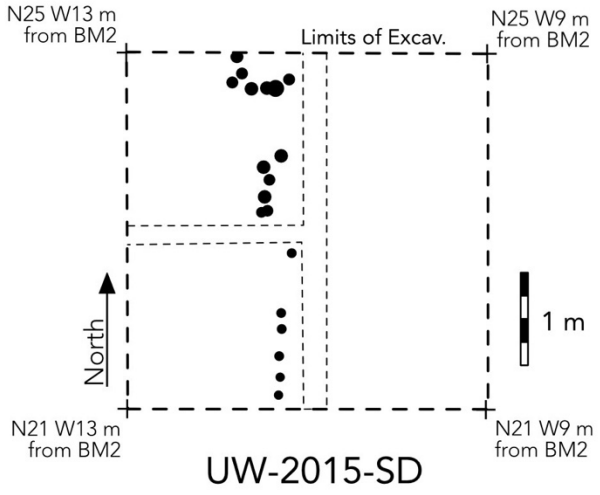

Figure I.20. Structure UW-2015-SD.

Structure UW-2016-SE (Figure I.21) was identified in 2016 as a basin-shaped soil stain ringed by single-set post molds in the Plaza near the inner palisade walls. The structure extends beyond the limits of excavation to the east and is disturbed by other features to the north, preventing structure length and width measurements. Limited exposure prevents a clear interpretation of its shape, but it does not appear to be neatly rectangular. The post molds average approximately 14 cm in diameter. 55 pieces of pottery were recovered from the structure. 98% are grit-tempered; only a single sherd is shell-tempered.

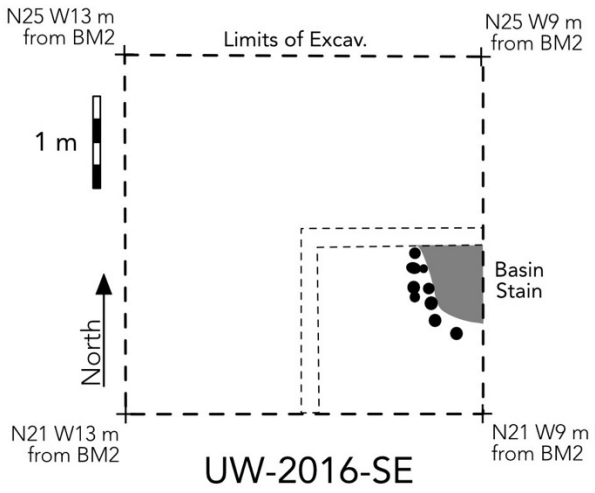

Figure I.21. Structure UW-2016-SE.

Structure UW-2016-SF (Figure I.22) was identified in 2016 as a basin-shaped soil stain ringed by single-set post molds in the Plaza near the inner palisade walls. As discussed in the *Fieldwork Results* section above, the structure was partially exposed horizontally in 2016, and is visible in profile walls of the 2015 test pits. As a result, the structure's width (2.4 meters) is measurable but its overall shape is not clear. The portion exposed in 2016 may include a possible corner, but not enough is exposed to be sure. Only nine pieces of pottery were recovered from the structure, seven of which (78%) are grit-tempered. Two sherds (22%) are shell-tempered.

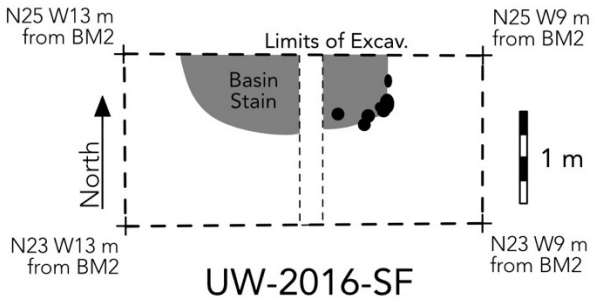

Figure I.22. Structure UW-2016-SF.

Structure UW-2016-SG (Figure I.23) was identified as a basin-shaped feature ringed by shallow postmolds near the inner palisade walls in 2016. I interpret the feature as a structure because of its well-defined basin shape and perimeter postmolds. However, its size and shape are unknown. 380 pieces of pottery were recovered from the basin stain, 86% of which was grit-tempered and 14% shell-tempered.

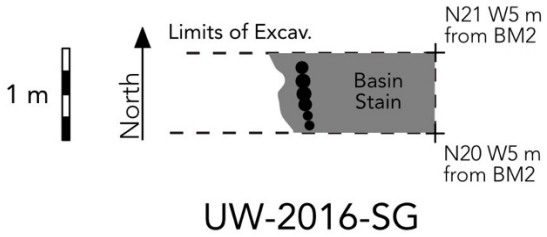

Figure I.23. Structure UW-2016-SG.

Appendix II: Structure Attributes Table

Structure Name	Tech. Style	Vis. Style	Combined Style	Final Classification
Barrett-IV-47	Unknown	Unknown	Unknown	Unknown
Barrett-IV-51	Mississippian	Late Woodland	Hybrid Type 1 (MM tech, LW vis)	Hybrid Type 1
WAS-1949-H1	Hybrid	Late Woodland	Hybrid Type 3 (Hybrid tech)	Hybrid Type 3
WAS-1949-H2	Mississippian	Late Woodland	Hybrid Type 1 (MM tech, LW vis)	Hybrid Type 1
WAS-1950-H3	Mississippian	Late Woodland	Hybrid Type 1 (MM tech, LW vis)	Hybrid Type 1
SHSW-1962-H2	Unknown	Unknown	Unknown	Unknown
SHSW-1962-H3	Unknown	Unknown	Unknown	Unknown
SHSW-1962-H4	Mississippian	Mississippian	Mississippian	Mississippian
SHSW-1962-H5	Mississippian	Mississippian	Mississippian	Mississippian
SHSW-1962-WT1	Mississippian	Unknown	Mississippian or Hybrid Type 1	Mississippian or Hybrid Type 1
SHSW-1962-WT2	Mississippian	Unknown	Mississippian or Hybrid Type 1	Mississippian or Hybrid Type 1
SHSW-1964-H1	Late Woodland	Late Woodland	Late Woodland	Late Woodland
SHSW-1964-H2	Mississippian	Mississippian	Mississippian	Mississippian
SHSW-1964-H3	Late Woodland	Late Woodland	Late Woodland	Late Woodland
SHSW-1964-H4	Mississippian	Late Woodland	Hybrid Type 1 (MM tech, LW vis)	Hybrid Type 1
SHSW-1964-H5	Mississippian	Late Woodland	Hybrid Type 1 (MM tech, LW vis)	Hybrid Type 1
SHSW-1964-H6	Late Woodland	Late Woodland	Late Woodland	Late Woodland
SHSW-1964-H7	Hybrid	Mississippian	Hybrid Type 3 (Hybrid tech)	Hybrid Type 3
SHSW-1964-H8	Late Woodland	Late Woodland	Late Woodland	Late Woodland
SHSW-1964-H9	Late Woodland	Late Woodland	Late Woodland	Late Woodland
SHSW-1967-AreaE-S1	Hybrid	Late Woodland	Hybrid Type 3 (Hybrid tech)	Hybrid Type 3
SHSW-1967-S1	Late Woodland	Mississippian	Hybrid Type 2 (LW tech, MM vis)	Hybrid Type 2
SHSW-1967-S2A	Late Woodland	Late Woodland	Late Woodland	Late Woodland
SHSW-1967-S2B	Late Woodland	Late Woodland	Late Woodland	Late Woodland
UWM-1984-S1	Late Woodland	Unknown	Late Woodland or Hybrid Type 2	Late Woodland or Hybrid Type 2
UWM-1984-S2	Hybrid	Mississippian	Hybrid Type 3 (Hybrid tech)	Hybrid Type 3
UWM-1984-S3	Mississippian	Unknown	Mississippian or Hybrid Type 1	Mississippian or Hybrid Type 1
UWM-1988-S1	Mississippian	Unknown	Mississippian or Hybrid Type 1	Mississippian or Hybrid Type 1
UW-2015-SA	Unknown	Late Woodland	Late Woodland or Hybrid Type 1	Late Woodland
UW-2015-SB	Unknown	Mississippian	Mississippian or Hybrid Type 2	Mississippian or Hybrid Type 2
UW-2015-SD	Late Woodland	Late Woodland	Late Woodland	Late Woodland
UW-2016-SE	Late Woodland	Unknown	Late Woodland or Hybrid Type 2	Late Woodland or Hybrid Type 2
UW-2016-SF	Late Woodland	Unknown	Late Woodland or Hybrid Type 2	Late Woodland or Hybrid Type 2
UW-2016-SG	Late Woodland	Unknown	Late Woodland or Hybrid Type 2	Late Woodland or Hybrid Type 2

Structure Name	Foundation	Shape	Entrance Type	Entrance Opening Width (m)	Extended Entrance Length (m)	Length (m)	Width (m)	W:L Ratio	Footprint (sq. m)
Barrett-IV-47	Unknown	Rectilinear	Not visible				1.58		
Barrett-IV-51	Wall-trench	Rectilinear	Other			6	4	0.67	24
WAS-1949-H1	Composite	Rectilinear	Simple	1.37		12.1	8.2	0.68	99.2
WAS-1949-H2	Wall-trench	Ovoid	Curled	2.1		5.06	4.6	0.91	36.6
WAS-1950-H3	Wall-trench	Rectilinear	Extended	0.9	2	6	3	0.5	18
SHSW-1962-H2	Basin only	Rectilinear	Not visible				2		
SHSW-1962-H3	Basin only	Rectilinear	Not visible			5		0	
SHSW-1962-H4	Wall-trench	Rectilinear	Not visible			4.6			
SHSW-1962-H5	Wall-trench	Rectilinear	Simple	1.4		4.2			
SHSW-1962-WT1	Wall-trench	Other/Unknown	Not visible						
SHSW-1962-WT2	Wall-trench	Other/Unknown	Not visible						
SHSW-1964-H1	Single post	Ovoid	Curled	0.848		3.85	3.04	0.79	18.4
SHSW-1964-H2	Wall-trench	Rectilinear	Not visible			6.9	4.2	0.61	29
SHSW-1964-H3	Single post	Rectilinear	Extended	0.5	0.5		2.7		
SHSW-1964-H4	Wall-trench	Ovoid	Curled	0.76					
SHSW-1964-H5	Wall-trench	Rectilinear	Screened	0.73			3		
SHSW-1964-H6	Single post	Rectilinear	Extended	0.3	0.3	4.8	2.7	0.56	13
SHSW-1964-H7	Composite	Rectilinear	Not visible			6.7	6.1	0.91	40.9
SHSW-1964-H8	Single post	Ovoid	Curled	1		5.2	3.13	0.6	25.6
SHSW-1964-H9	Single post	Ovoid	Not visible						
SHSW-1967-AreaE-S1	Composite	Rectilinear	Not visible			4.4	2.8	0.64	12.3
SHSW-1967-S1	Single post	Rectilinear	Not visible			2.8	2	0.71	5.6
SHSW-1967-S2A	Single post	Rectilinear	Not visible				5.1		
SHSW-1967-S2B	Single post	Ovoid	Curled			3.37	2.23	0.66	
UWM-1984-S1	Single post	Other/Unknown	Not visible				3.1		
UWM-1984-S2	Composite	Rectilinear	Not visible				1.67		
UWM-1984-S3	Wall-trench	Other/Unknown	Not visible						
UWM-1988-S1	Wall-trench	Rectilinear	Not visible						
UW-2015-SA	Basin only	Rectilinear	Not visible			4	3.5	0.88	14
UW-2015-SB	Basin only	Rectilinear	Not visible			3	2.14	0.71	6.4
UW-2015-SD	Single post	Rectilinear	Extended	0.72					
UW-2016-SE	Single post	Other/Unknown	Not visible						
UW-2016-SF	Single post	Other/Unknown	Not visible				2.4		
UW-2016-SG	Single post	Other/Unknown	Not visible						

Structure Name	Interior Post Arrangement	Interior Post Count	Mean Post Dia (cm)	Mean Post Spacing (cm)	Mean WT Width (cm)	Wall Type inferred from PM dia.	Wall Type inferred from PM Spacing	Inferred Wall Type
Barrett-IV-47	None observed		7.6			Flexed		Flexed
Barrett-IV-51	None							Unknown
WAS-1949-H1	Scattered	9	18.29	39.8	24.38	Rigid	Rigid	Rigid
WAS-1949-H2	None	3	24.38	37.9	36.58	Rigid	Rigid	Rigid
WAS-1950-H3	Peripheral	14	13.72	18.8	15.24	Rigid	Flexed	Rigid
SHSW-1962-H2	Unknown							Unknown
SHSW-1962-H3	Unknown							Unknown
SHSW-1962-H4	Unknown				22.1			Unknown
SHSW-1962-H5	Unknown				25.1			Unknown
SHSW-1962-WT1	Unknown				25			Unknown
SHSW-1962-WT2	Unknown				46.1			Unknown
SHSW-1964-H1	None		19.2	43.4		Rigid	Rigid	Rigid
SHSW-1964-H2	None				19.2			Unknown
SHSW-1964-H3	Scattered	9	14.9	23		Rigid	Flexed	Rigid
SHSW-1964-H4	Unknown		10.6	22.2	15.2	Flexed or Rigid	Flexed	Flexed
SHSW-1964-H5	None				14.5			Unknown
SHSW-1964-H6	None			12.7			Flexed	Flexed
SHSW-1964-H7	None		15.7	38.6	13.2	Rigid	Rigid	Rigid
SHSW-1964-H8	Scattered	15	14	31.7		Rigid	Rigid	Rigid
SHSW-1964-H9	Unknown							Unknown
SHSW-1967-AreaE-S1	None			14	14.3		Flexed	Flexed?
SHSW-1967-S1	None			18.8			Flexed	Flexed?
SHSW-1967-S2A	Unknown			37.8			Rigid	Rigid?
SHSW-1967-S2B	Unknown		27.4	18.8		Rigid	Flexed	Rigid
UWM-1984-S1	Unknown			35.7			Rigid	Rigid?
UWM-1984-S2	None		14		17.5	Rigid		Rigid
UWM-1984-S3	Unknown							Unknown
UWM-1988-S1	Unknown							Unknown
UW-2015-SA	Unknown							Unknown
UW-2015-SB	Unknown							Unknown
UW-2015-SD	Unknown							Unknown
UW-2016-SE	Unknown							Unknown
UW-2016-SF	Unknown							Unknown
UW-2016-SG	Unknown							Unknown

Structure Name	Pottery Types	LW Count	LW %	MM Count	MM %	Total pottery count
Barrett-IV-47	None Recovered / Unknown					
Barrett-IV-51	None Recovered / Unknown					
WAS-1949-H1	Mississippian and LW					
WAS-1949-H2	Mississippian and LW					
WAS-1950-H3	None Recovered / Unknown					
SHSW-1962-H2	None Recovered / Unknown					
SHSW-1962-H3	None Recovered / Unknown					
SHSW-1962-H4	None Recovered / Unknown					
SHSW-1962-H5	None Recovered / Unknown					
SHSW-1962-WT1	None Recovered / Unknown					
SHSW-1962-WT2	None Recovered / Unknown					
SHSW-1964-H1	Mississippian and LW	149	63%	87	37%	236
SHSW-1964-H2	Mississippian and LW	18	90%	2	10%	20
SHSW-1964-H3	Mississippian and LW	9	75%	3	25%	12
SHSW-1964-H4	Late Woodland Only	5	100%	0	0%	5
SHSW-1964-H5	Mississippian and LW	4	40%	6	60%	10
SHSW-1964-H6	Mississippian and LW	89	81%	21	19%	110
SHSW-1964-H7	Late Woodland Only	35	100%	0	0%	35
SHSW-1964-H8	None Recovered / Unknown					
SHSW-1964-H9	None Recovered / Unknown					
SHSW-1967-AreaE-S1	None Recovered / Unknown					
SHSW-1967-S1	Late Woodland Only	326	100%	0	0%	326
SHSW-1967-S2A	Late Woodland Only	34	100%	0	0%	34
SHSW-1967-S2B	Late Woodland Only	34	100%	0	0%	34
UWM-1984-S1	Late Woodland Only	348	100%	0	0%	348
UWM-1984-S2	None Recovered / Unknown					
UWM-1984-S3	None Recovered / Unknown					
UWM-1988-S1	None Recovered / Unknown					
UW-2015-SA	Mississippian and LW	413	63%	242	37%	655
UW-2015-SB	Mississippian and LW	17	18%	76	82%	93
UW-2015-SD	None Recovered / Unknown					
UW-2016-SE	Mississippian and LW	54	98%	1	2%	55
UW-2016-SF	Mississippian and LW	7	78%	2	22%	9
UW-2016-SG	Mississippian and LW	325	86%	55	14%	380

Appendix III: Structure Summary Tables

Table 0.1. Summary of structure counts, attributes, and dimensions by foundation type, structure shape, classification, and combination.

	Count		Average Length		Average Width	
Foundation Type	n=	%	m	St. Dev	m	St. Dev
Single-Set Post	13	38%	4.0	1.0	2.9	0.9
Wall-Trench	12	35%	5.5	1.0	3.8	0.7
Composite	4	12%	7.7	4.0	4.7	3.0
Basin Only	4	12%	4.0	1.0	2.6	0.8
Unknown	1	3%			1.6	
	34	100%				
Structure Shape						
Rectilinear	21	62%	5.4	2.4	3.4	1.8
Ovoid	6	18%	4.4	0.9	3.3	1.0
Other/Unknown	7	21%			2.8	0.5
	34	100%				
Final Classification						
Late Woodland	9	26%	4.2	0.7	3.2	0.9
Mississippian	3	9%	5.2	1.5	4.2	
Hybrid Type 1	5	15%	5.7	0.5	3.7	0.8
Hybrid Type 2	1	3%	2.8		2.0	
Hybrid Type 3	4	12%	7.7	4.0	4.7	3.00
LW or Hybrid Type 1	0	0%				
LW or Hybrid Type 2	4	12%			2.8	0.5
M or Hybrid Type 1	4	12%				
M or Hybrid Type 2	1	3%	3.0		2.1	
Unknown	3	9%	5.0		1.8	0.3
	34	100%				
Combination according to homeland learning community						
M/H1	12	35%	5.5	1.0	3.8	0.7
LW/H2	14	41%	4.0	0.9	3.0	0.9
H3	4	12%	7.7	4.0	4.7	3.0
M/H1 or LW/H2	1	3%	3.0		2.1	
Unknown	3	9%	5.0		1.8	0.3
	34	100%				
Total			5.2	2.1	3.3	1.6

Table III.1 (continued). Summary of structure counts, attributes, and dimensions by foundation type, structure shape, classification, and combination.

	Average L:W Ratio		Ave. Footprint Area		Ave. Postmold Dia.		Ave. Postmold Spacing		Ave. WT Width	
Foundation Type		St. Dev	m^2	St. Dev	cm	St. Dev	cm	St. Dev	cm	St. Dev
Single-Set Post	0.67	0.17	26.9	7.9	18.9	7.2	27.7	10.2		10.7
Wall-Trench	0.67	0.09	15.6	8.4	16.2	6.1	26.3	10.9	24.3	
Composite	0.74	0.15	50.8	44.3	16.0	2.2	30.8	14.6	17.3	5.0
Basin Only	0.53	0.47	10.2	5.4						
Unknown										
Structure Shape										
Rectilinear	0.62	0.24	26.2	27.8	14.0	3.6	25.4	11.5	18.4	4.5
Ovoid	0.74	0.14	26.8	9.2	19.1	7.0	30.8	10.3	25.9	15.1
Other/Unknown							35.7		35.6	
Final Classification										
Late Woodland	0.70	0.13	17.7	5.7	18.9	6.1	27.9	11.8		
Mississippian	0.61		29.0						22.1	3.0
Hybrid Type 1	0.69	0.21	26.2	9.5	16.2	7.2	26.3	10.2	20.4	10.8
Hybrid Type 2	0.71		5.6				18.8			
Hybrid Type 3	0.74	0.15	50.8	44.3	16.0	2.2	30.8	14.6	17.3	5.0
LW or Hybrid Type 1										
LW or Hybrid Type 2							35.7			
M or Hybrid Type 1									35.6	14.9
M or Hybrid Type 2	0.71		6.4							
Unknown	0.00				7.6					
Combination according to homeland learning community										
M/H1	0.67	0.17	26.9	7.9	16.2	7.2	26.3	10.2	24.3	10.7
LW/H2	0.70	0.12	15.3	7.4	18.9	6.1	27.7	10.9		
H3	0.74	0.15	50.8	44.3	16.0	2.2	30.8	14.6	17.3	5.0
M/H1 or LW/H2	0.71		6.4							
Unknown	0.00				7.6					
Total	0.66	0.22	26.4	24.4	16.3		28.1			22.2

Table 0.2. Entrance type frequencies and dimensions by foundation type, structure shape, and combined style classification. L = extended entrance length; W = entrance opening width.

	Extended			Screened		Simple		Curled		Other		Not Visible
Foundation Type	n=	L	W	n=	W	n=	W	n=	W	n=	W	n=
Single-Set Post	3	0.5	0.4	0		0		3	0.9	0		8
Wall-Trench	1	2.0	0.9	1	0.7	1	1.4	2	1.4	1		6
Composite	0			0		1	1.4	0		0		3
Structure Shape												
Rectilinear	4	0.6	0.9	1	0.7	2	1.4	0		1		14
Ovoid	0			0		0		5	1.2	0		0
Other/Unknown	0			0		0		0		0		8
Combined Style												
Late Woodland	3	0.5	0.4	0		0		2	0.9	0		1
Mississippian	0			0		1	1.4	0		0		2
Hybrid Type 1	1	0.9	2.0	1	0.7	0		2	1.4	1		0
Hybrid Type 2	0			0		0		0		0		1
Hybrid Type 3	0			0		1	1.4	0		0		3
LW or Hybrid Type 1	0			0		0		0		0		1
LW or Hybrid Type 2	0			0		0		0		0		6
M or Hybrid Type 1	0			0		0		0		0		4
M or Hybrid Type 2	0			0		0		0		0		1
Unknown	0			0		0		0		0		3
Total	4	0.6	0.9	1	0.7	2	1.4	4	1.2	1		22

Appendix IV: 2015 UW-Madison Fieldwork

This appendix contains additional information and results from the 2015 UW-Madison fieldwork as a complement to the results described in Section 4.3. The information presented in this appendix are recreated and modified from the official report of investigations submitted to the Wisconsin Office of the State Archaeologist and the Wisconsin Department of Natural Resources in August 2017 (Pfaffenroth et al. 2017). A report of investigations for the 2016 fieldwork is in preparation and will be available at the Office of the State Archaeologist after its submission.

To achieve our goal of efficiently finding and excavating structures, we employed ground penetrating radar and fluxgate magnetometry surveys over 4800 square meters to identify anomalies for ground-truthing. Several anomalies were identified and tested through excavation. Additionally, field maps produced by SHSW in the 1960s were used to estimate the location of intact portions of structures within the residential area. One small test pit was placed in the location of the 1960s-era excavation.

We used a total station to align all our work with the official Aztalan Grid, consistent with procedures used by the University of Wisconsin-Milwaukee (UWM) and Michigan State University (MSU) in recent decades. We used Benchmark 2 as the origin point (0,0) and used meters as the unit of measurement, which are also consistent with UWM and MSU procedures. The 2015 primary field crew consisted of Sissel Schroeder (Director), Jake Pfaffenroth (Co-Director), and eight undergraduate and graduate field school students. Consultancy was provided in the field for short periods by Dr. David A. Anderson of the University of Wisconsin- La Crosse, Dr. John Panuska of the UW-Madison Department of Biosystems Engineering, Dr.

Lynne Goldstein of Michigan State university, and Dr. Donald Gaff of the University of Northern Iowa.

IV.1 Static GPS (Also see Appendix V)

Our site measurements, and those of others, have demonstrated discrepancies between WAS and SHSW field maps, the Aztalan Grid, and the current permanent benchmark locations (e.g., Zych 2013:31-34). To explore this further, Dr. John Panuska from the UW-Madison Department of Biosystems Engineering provided static GPS services that resulted in refinement of the known coordinates for the three Aztalan Grid benchmarks. Two Sokkia GSR2700ISX dual frequency GPS receivers were positioned over Benchmarks 1 and 2 for approximately 4.5 hours of satellite observation time when satellite coverage was at a maximum and solar storms and magnetic disturbances were at a minimum. The position of Benchmark 3 was calculated using a Sokkia SCT-6 six second total station set up over Benchmark 2 and back-sighted to Benchmark

IV.2 Geophysics

Geophysical survey was conducted May 26-27, 2015 in collaboration with Dr. David A. Anderson of the University of Wisconsin-La Crosse (UW-L), who provided expertise and instruments. GPR survey was conducted with a US Radar Instruments SeekerSPR system with 500MHz antennae. Subsurface readings were taken continuously along transects spaced 0.5 m apart (Figure IV.1). GPR was conducted only in Area A. Magnetometry was conducted using a Barrington Instruments Grad601 Dual Magnetic Gradiometers (Figure IV.2). Transects were spaced 1 m apart and readings were collects at 0.25 m intervals. Magnetometry was conducted in both Areas A and B. Preliminary data from both instruments were processed in the field

immediately following survey completion and were used to form preliminary interpretations. The preliminary GPR data revealed a north-south running linear anomaly that corresponds with the location of the westernmost inner palisade line separating the Residential Area and Plaza, and excavated by Barrett in 1932. We recognized a rectilinear feature immediately west of the palisade anomaly, in the Plaza. The boundaries of this rectilinear anomaly were visible as compositional differences in subsurface soil matrix. The area within the boundaries showed signatures of sub-plowzone compacted soil surfaces. Preliminary magnetometry data also revealed numerous anomalies consistent with pit features, and several consistent with size and shape of structures at Aztalan. Magnetometry also identified signatures of known earlier excavations.

Figure IV.1. GPR instrument and rope transect guides within mowed Area A. Northeast Mound is in background. Photo faces north-northwest.

Figure IV.2. David Anderson (UW-La Crosse) conducting fluxgate magnetometry survey in Area A. Northeast Mound is in background. Photo faces north-northwest.

IV.3 Excavation Methods

The boundaries of test pits were aligned with the Aztalan grid and placed at whole meter intervals, measured from permanent Benchmark 2 as the origin point. This scheme allowed us to indicate the location of each test pit by labeling them with their coordinates in meters in relation of Benchmark 2. For example, the four boundaries of Test Pit 1 (2x2 m) were 23 m and 25 m north, and 11 m and 13 m west, of Benchmark 2, and so its coordinates are simplified to N23-25 W11-13. This scheme is consistent with the methods used by the University of Wisconsin-Milwaukee and Michigan State University since the 1980s and permits any archaeologists in the future to locate these excavation units.

Excavation was done by shovel-skimming and troweling in 10 cm levels or following cultural or natural strata where appropriate. Soil was dry screened through 1⁄4 inch mesh. Soil samples were kept for flotation to recover floral remains and micro-artifacts. Soil color

designations were defined using Munsell Soil Color charts. Soil texture was defined using soil texture reference charts. RBG (red-green-blue) colors were also obtained for soils using an Apple iPhone app, "ColorMeter RGB Hex Color Picker and Colorimeter," that makes use of the iPhone camera to read RGB color values. RGB values and color square accompany Munsell color values in digital maps when both were taken. We also experimented with a "pocket penetrometer" to determine compaction values (reported as kg/cm2). These values are presented on maps if taken. Soil samples were taken for laboratory XRF analysis in the University of Wisconsin – Madison Department of Soil Science. Several "soil blocks" were extracted from Test Pits 1, 2, and 6 for micromorphological analysis. Thin sections were prepared from five samples and are curated at UW-Madison alongside the other recovered materials. We elected not to conduct micromorphological analysis at this time due to budgetary and time constraints.

Features were mapped and photographed in plan view at the time of their definition. In many cases features were "bisected", in which one half was initially excavated and dry screened in order to reveal a vertical profile through the center of the feature for photographing and mapping. The matrix from the second half was then usually kept for flotation. Test pits were photographed and mapped at the base of each level and often mid-level. Baulk walls were kept between adjacent units to maintain vertical control. Test Pits were excavated to the subsoil before they were backfilled.

IV.4 Geophysics Results

Preliminary results of ground-penetrating radar were processed in the field immediately following completion of the survey, and several features of interest were identified in Area A (Figure IV.3). Clearly visible in the results was the generally north-south line of the western

inner palisade trench. Just west of this palisade line, in the Plaza, a rectilinear feature was also visible. The boundaries of this rectilinear feature were clearly visible as variations in the subsurface composition of the soil matrix, while the area within these boundaries had signatures indicative of compacted surfaces in the sub-plowzone deposits.

As with the GPR survey, fluxgate magnetometry data from Areas A and B were post-processed and subjected to preliminary interpretations in the field. Magnetometry identified several areas of earlier excavation including outlines of known structures and excavated features (Figures IV.3-IV.5). More importantly, the magnetometry survey identified several possible new structures and additional pit features. In Area A, the outlines of two possible structures as well as many possible pit features are visible. In Area B at least one rectangular feature as well as evidence of numerous pit features and earlier excavations were also identified. Overall, the geophysical surveys were very successful in identifying structure-like subsurface features.

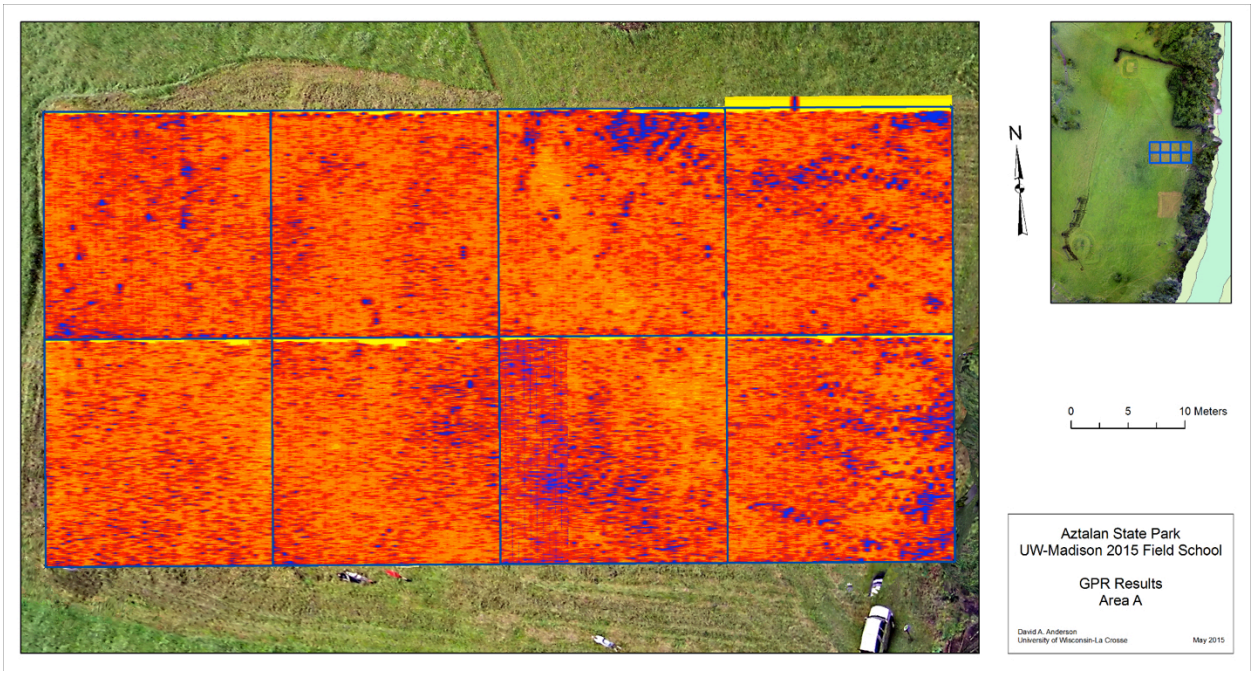

Figure IV.3. GPR Survey Results from Area A (prepared by David Anderson)

Figure IV.4. Magnetometry Survey Results from Area A overlaid on map of past excavations (prepared by David Anderson).

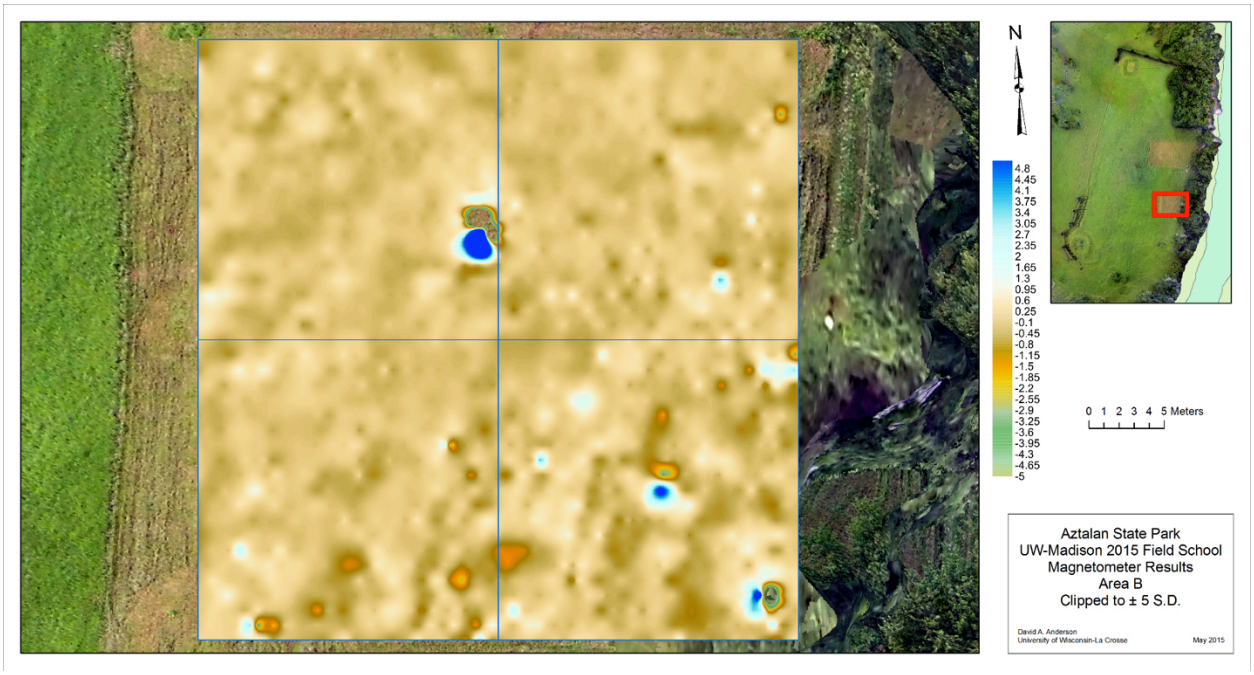

Figure IV.5. Magnetometry Survey Results from Area B (prepared by David Anderson). Past Excavation blocks are readily visible in southeast 20x20 m square.

IV.5 Excavation Results

Test Pits 1, 2, and 6 (2x2 m each) were situated to excavate the rectangular GPR anomaly west of the interior palisade lines (Figure IV.6) and yielded intact archaeological features consistent in size and shape with structures as well as postmolds. The features and postmolds appear to represent three superimposed structures of sizes and shapes consistent with structures previously excavated at the site. These are designated as Structures A, B, and D (Figure IV.7). Another feature was tentatively designated as Structure C in the field - however, subsequent analysis has led us to re-interpret this feature as a sheet midden. Structures A and B are semi- subterranean basins at least two meters wide and at least four meters long, containing feature fill several centimeters thick, but lacking post molds or wall trenches. The fills of the features basins contained both Mississippian and Late Woodland pottery, indicating that they date to the period of co-residence. Feature D is a linear arrangement of post molds that demarcate a wall and entryway similar to some other structures previously excavated at the site. Structures A, B, D, and the sheet midden feature are described in greater detail below.

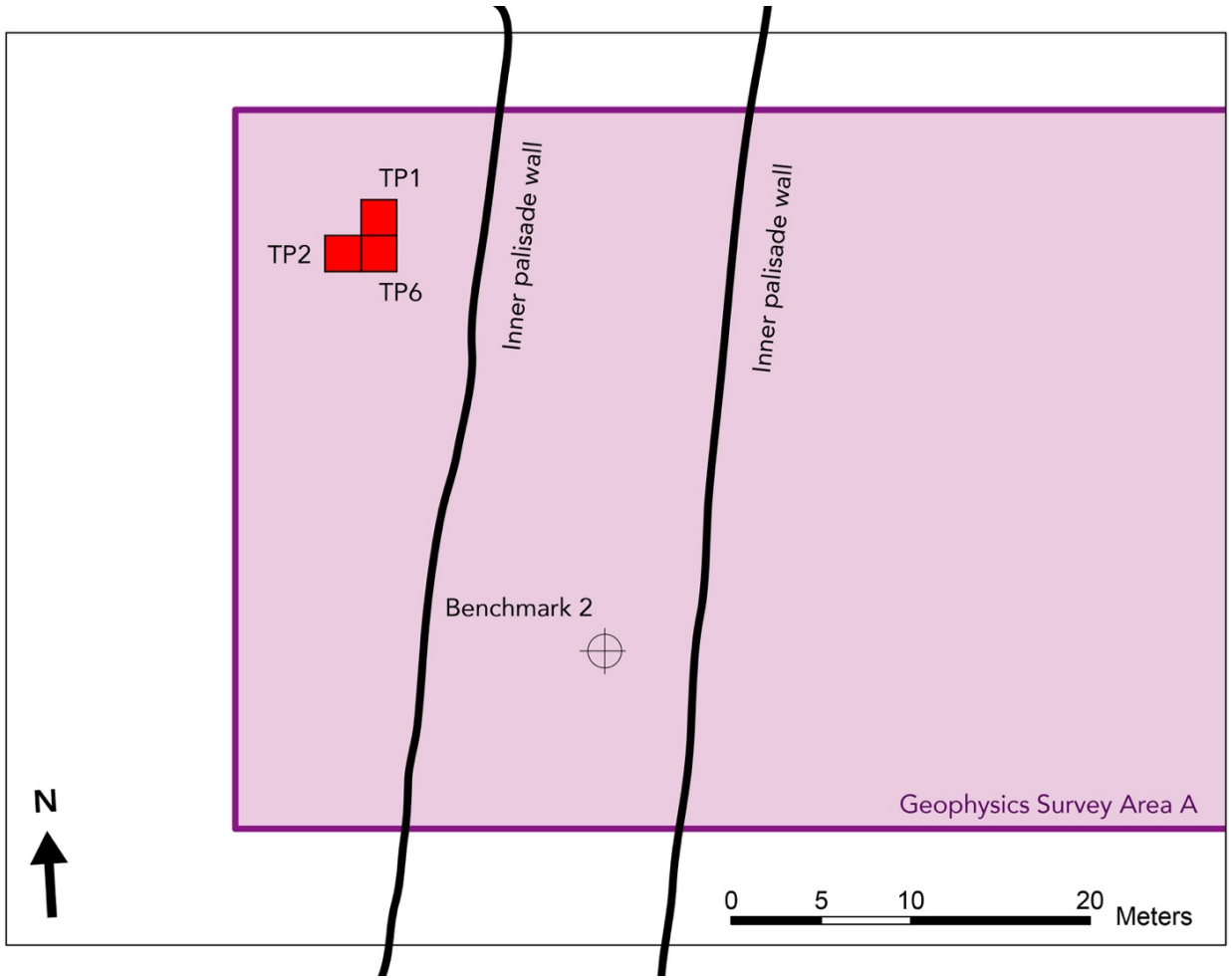

Figure IV.6. Location of Test Pits 1, 2, and 6 in relation to the inner palisade walls and BM 2.

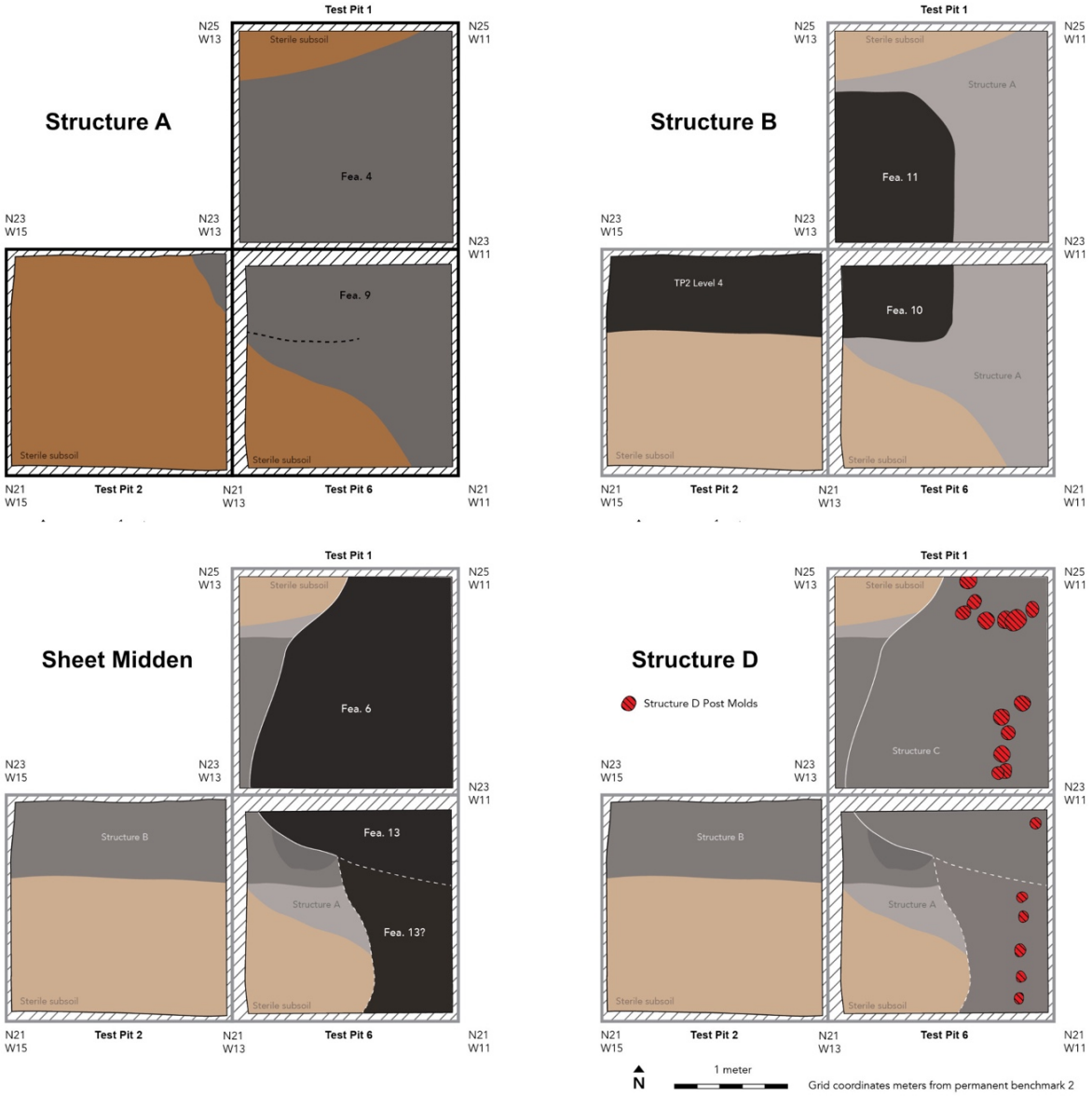

Figure IV.7. Structures A, B, D, and sheet midden in Test Pits 1, 2, and 6. Colors for illustration only.

Test Pit 3 (1x4 m) was placed to test a north-south oriented linear geophysical anomaly south of the Northeast Mound (Figure IV.8). At the east end of this test pit, and extending in to the south wall of the unit, a large, slightly bell shaped feature (Feature 2) was found that we interpret as a trash pit (Figures IV.9-IV.10). Feature 2 yielded mammal bone, fish bone, and mussel shells (N=311); grit-tempered pottery sherds (N=128), shell-tempered pottery sherds (N=22), and two large rocks, one of which had linear striations on the side of the stone facing down that are indicative of tool abrading. To the east of Feature 2 was a cluster of faint post molds and possible wall trench (Figures IV.11-IV.12). However, these features were difficult to discern in plan and profile.

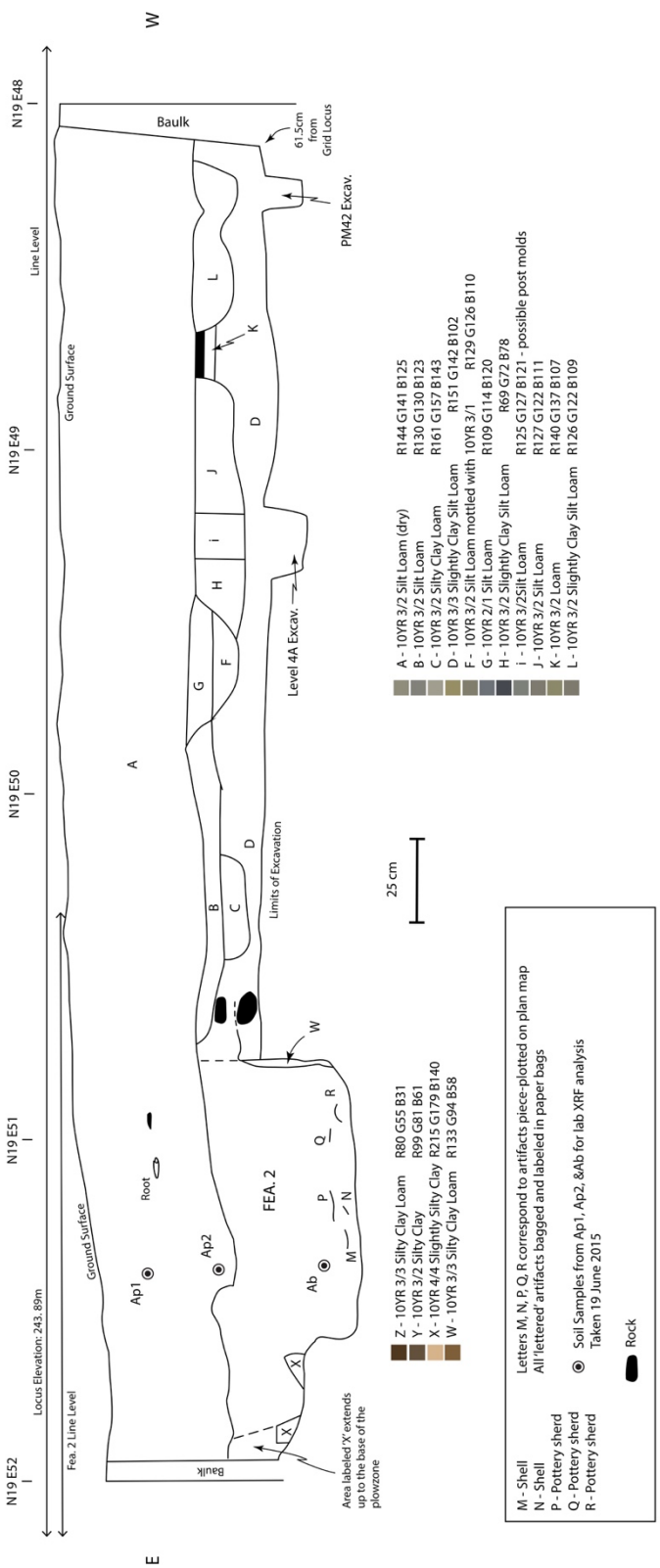

Figure IV.8. Test Pit 3 south wall profile.

Figure IV.9. Base and south profile of Feature 2 in Test Pit 3.

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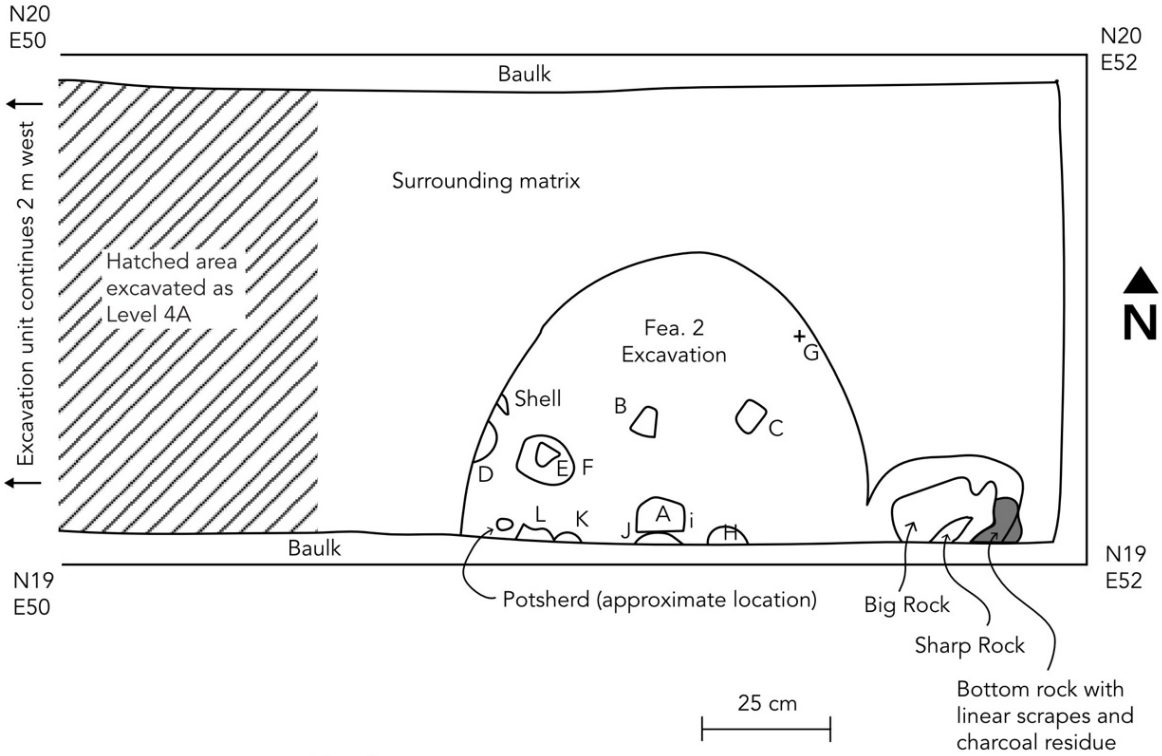
47-JE-0001
TP3
Fea. 2
Plan Map
9-17 June 2015
CGK, SC

Grid locus N20 E48
Locus elevation 243.89 m



	Elevation
A - Pottery sherd	243.23 m
(East 3.21 m, south 0.96 m from locus)	
B - Pottery sherd	243.23 m
C - Shell	243.26 m
D - Shell	243.19 m
E - Pottery sherd	243.17 m
(Smaller than depicted)	
F - Shell	243.14 m
(Below 'E')	
G - Deer(?) tooth	243.13 m
H - Large shell	243.13 m
i - Shell	243.04 m
J - Pottery sherd	243.07 m
K - Pottery sherd	243.08 m
L - Pottery sherd	243.04 m

Fea. 2 ending elevation 242.99 m

Figure IV.10. Feature 2 plan map, Test Pit 3.

Figure IV.11. Faint post molds visible approximately 55 cm below ground surface in west portion of Test Pit 3. Photo faces north.

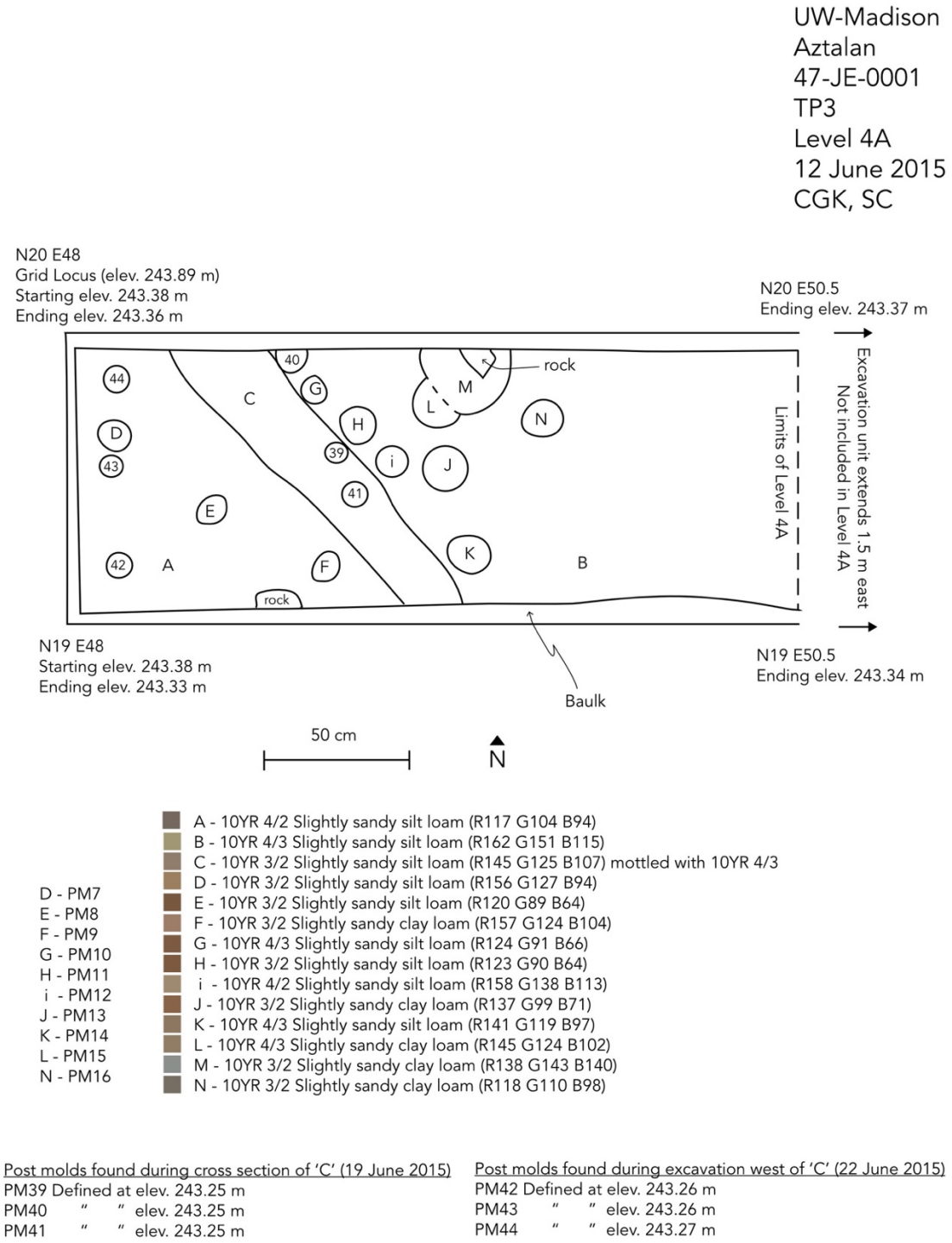


Figure IV.12. Plan map of faint post molds and possible wall trench visible approximately 55 cm below ground surface in west portion of Test Pit 3.

Test Pit 4 (1x2 m) was situated at the far east edge of the residential area adjacent to a large erosion gully (Figure IV.13). Test Pit 4 was placed to locate intact portions of three adjacent structures partially excavated by SHSW in 1964, but instead intersected with backdirt from the 1964 excavations. No prehistoric features were identified in this unit. Materials recovered from this unit include faunal remains (N=221), pottery (N=118), flakes (N=75), daub (N=61), and burned rock (N=1). With the exception of the faunal remains, most of the materials recovered were small, objects overlooked during the 1964 excavations. The amount of faunal material recovered is high compared to other units and may reflect a bias against collecting faunal remains during the 1964 excavations.

Test Pit 5 (2x2 m) was placed directly west of TP4 and directly south of TP3 to test an area that appeared, based on records of prior excavations at the site, to have seen only limited subsurface investigation (Figure IV.14). Results indicate that the test pit was placed into an area of the site that likely had been machine stripped or otherwise substantially disturbed during historic times and then backfilled. There was no evidence that features had been excavated in this unit, and no prehistoric features were found during our excavations. Materials recovered from this unit include faunal remains (N=323), pottery (N=136), flakes (N=30), daub (N=109), and burned rock (N=22). With the exception of the faunal remains, most of the materials recovered were small, likely objects overlooked during previous excavations. The amount of faunal material recovered is high compared to other units, similar to Test Pit 4, and may reflect a bias against collecting faunal remains during earlier excavations.

Figure IV.13. Test Pit 4, located adjacent to erosion gully near Crawfish riverbank, Photo faces east.

Figure IV.14. Test Pit 5 east profile showing hypothesized 1960s-era machine backfill.

IV.6 Structure Summaries

Structure A, designated as Features 4 and 9 in the field and given the identifier *UW-2015-SA*, was a semi-subterranean basin filled with domestic refuse (Figures IV.15-IV.18). Large quantities of ceramics, faunal and floral remains, and lithics were scattered evenly throughout the feature fill. The lower boundaries of this structure were diffuse in many places likely due to soil color bleeding, but the base of the feature was more readily identified by a sudden drop in artifact density.

Of the 429 potsherds found in UW-2015-SA, 69% are grit-tempered. There were seven rimsherds - four grit-tempered and three shell-tempered. Three grit-tempered rims were from cord marked collared-ware vessels and the fourth was decorated with vertically-oriented cord-wrapped stick at the rim margin. One of the shell-tempered rims is most likely from a red-slipped seed jar. Another has a plain surface, and the third has an incised barred-triangle motif; this rim sherd was laying directly on top of a large grit-tempered, collared rim sherd, which was at the base of the feature (Figure IV.18).

A summary of other materials from the UW-2015-SA basin fill is presented in Figure IV.19. Twenty-four flakes were found in this structure: 15 are Prairie du Chien chert, five are Burlington, one Mill Creek, and three are from other local sources. There was also a large quantity of mammal bone, mostly white-tailed deer, and nutshell, mostly hickory. Other materials recovered include an unbroken basalt celt, a piece of copper, abundant burned and unburned rocks, and small pieces of daub.

Figure IV.15. Exposed portion of Feature 4 fill in Test Pit 1 (Structure A) showing grey feature fill, orange subsoil, and high artifact density. Trowel points north.

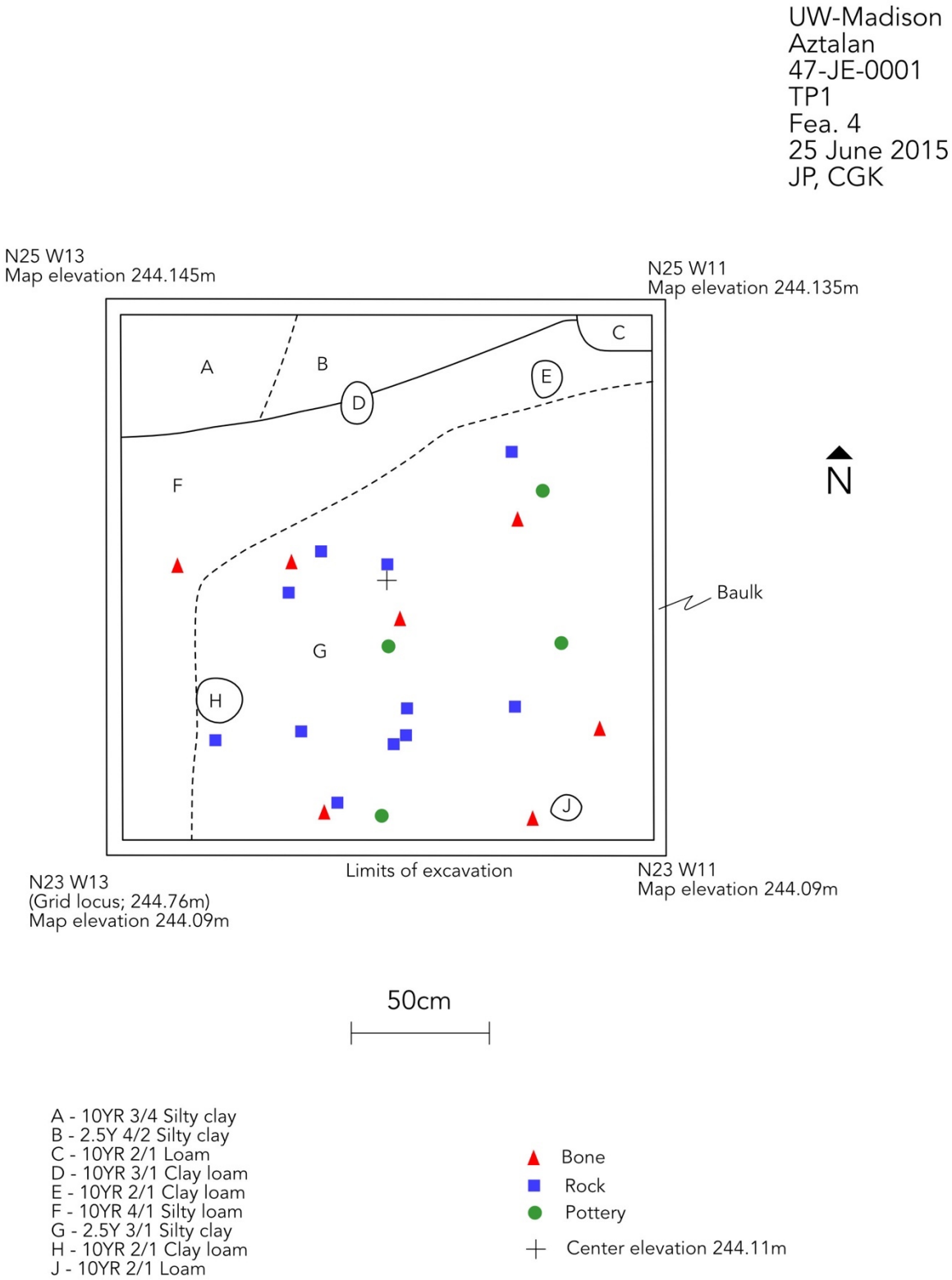


Figure IV.16. Structure A plan map in Test Pit 1 (defined as Feature 4 in Test Pit 1) showing high artifact density.

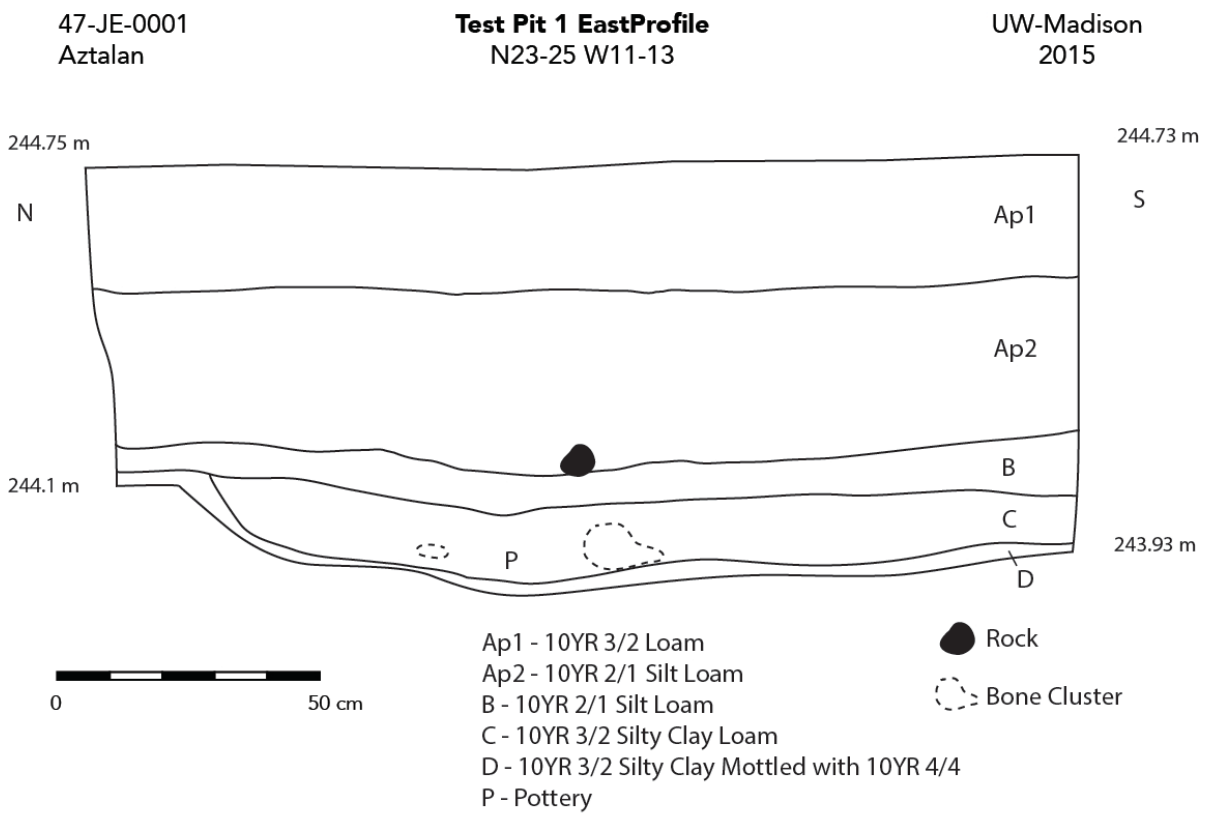


Figure IV.17. Test Pit 1 east profile map and photo showing Structure A basin (labelled 'C') and location of large superimposed rimsherds (labelled 'P').

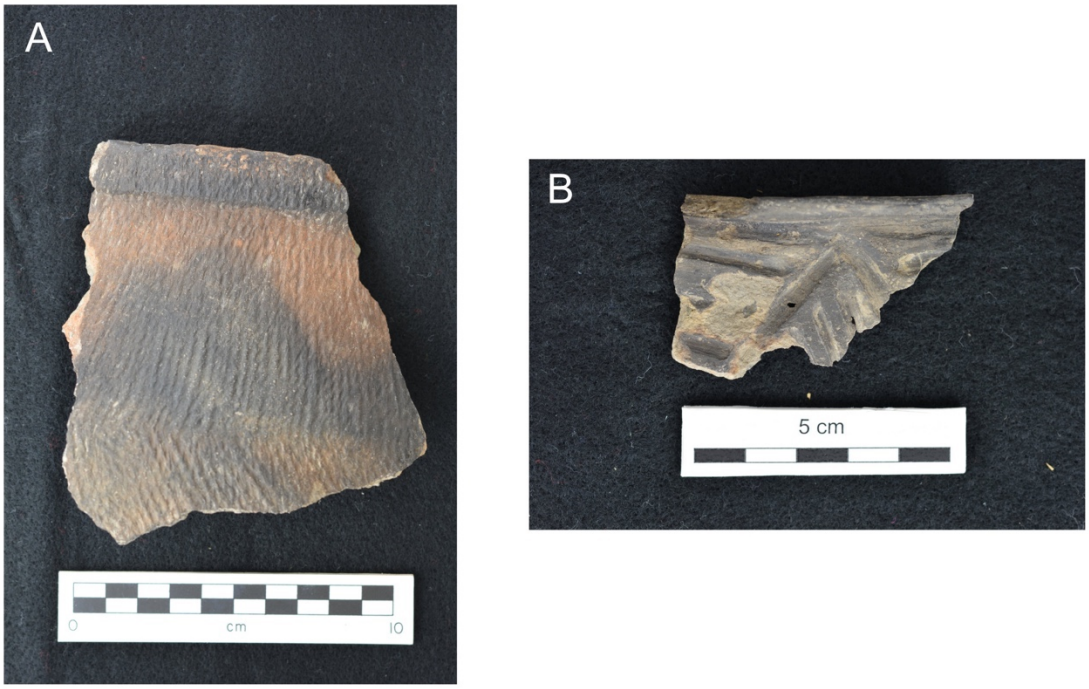
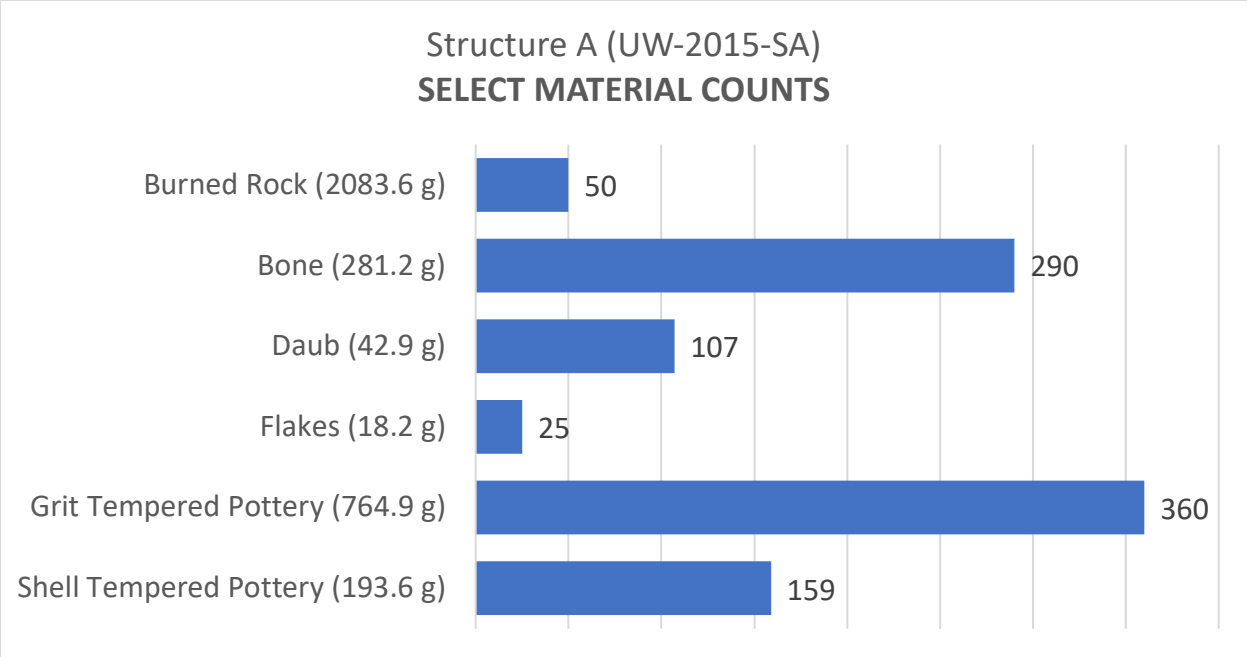


Figure IV.18. Late Woodland Aztalan Collared (A) and Mississippian Ramey Incised (B) rimsherds recovered from base of Structure A. The Ramey Incised sherd was found resting immediately (~1 cm) above the Aztalan Collared sherd.



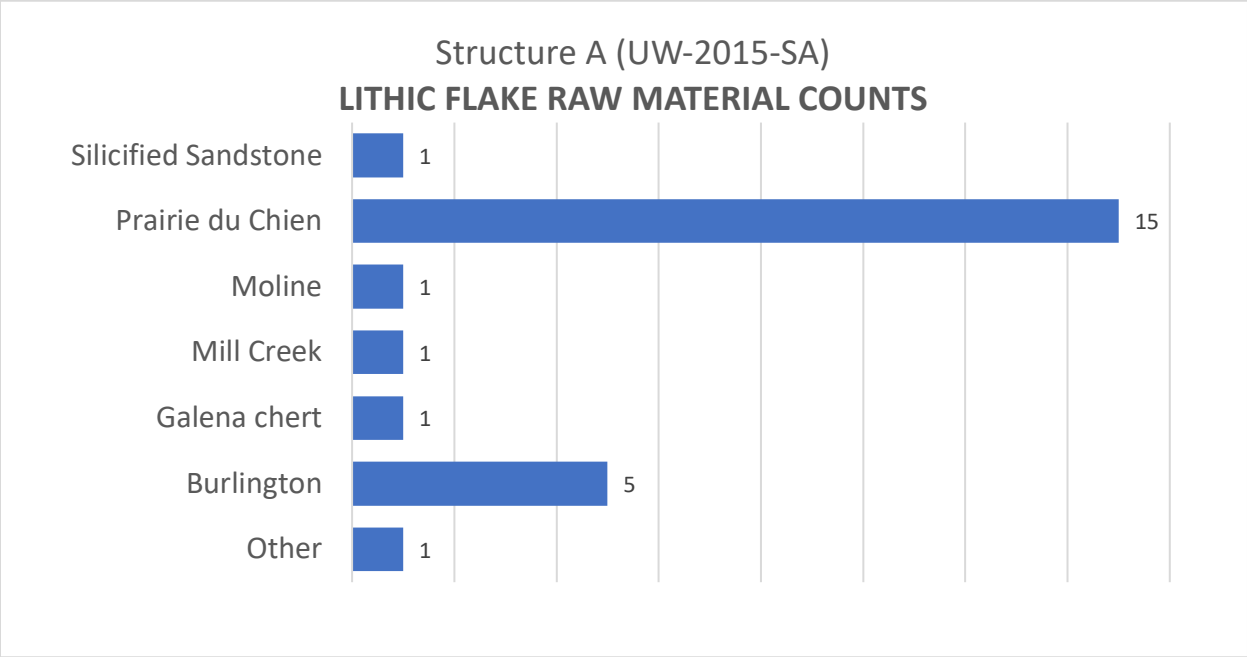


Figure IV.19. Summary of select materials recovered from Structure A.

Structure B, designated as Features 10 and 11 in the field and given the identifier *UW-2015-SB*, was a rectangular feature intrusive into the UW-2015-SA fill. Features 10/11 were evident as an area of dark soil identified in Test Pits 1, 2 and 6 in plan view (Figure IV.20) and as a discrete lens in profile (Figure IV.22). The thinness of Features 10/11 suggest that they are the very bottom of the structure basin and the upper portion was truncated by ancient landscape modification and historic plowing.

UW-2015-SB contained 93 body sherds and no rims - 82% are shell-tempered with plain surfaces and 18% are grit with cord marked or plain surfaces (Figure IV.22). Other materials include several unutilized flakes from local sources, a few pieces of daub and burned rock, and a piece of animal bone.

Figure IV.20. Dark Structure B feature fill visible along north wall of Test Pit 2. Photo faces north.

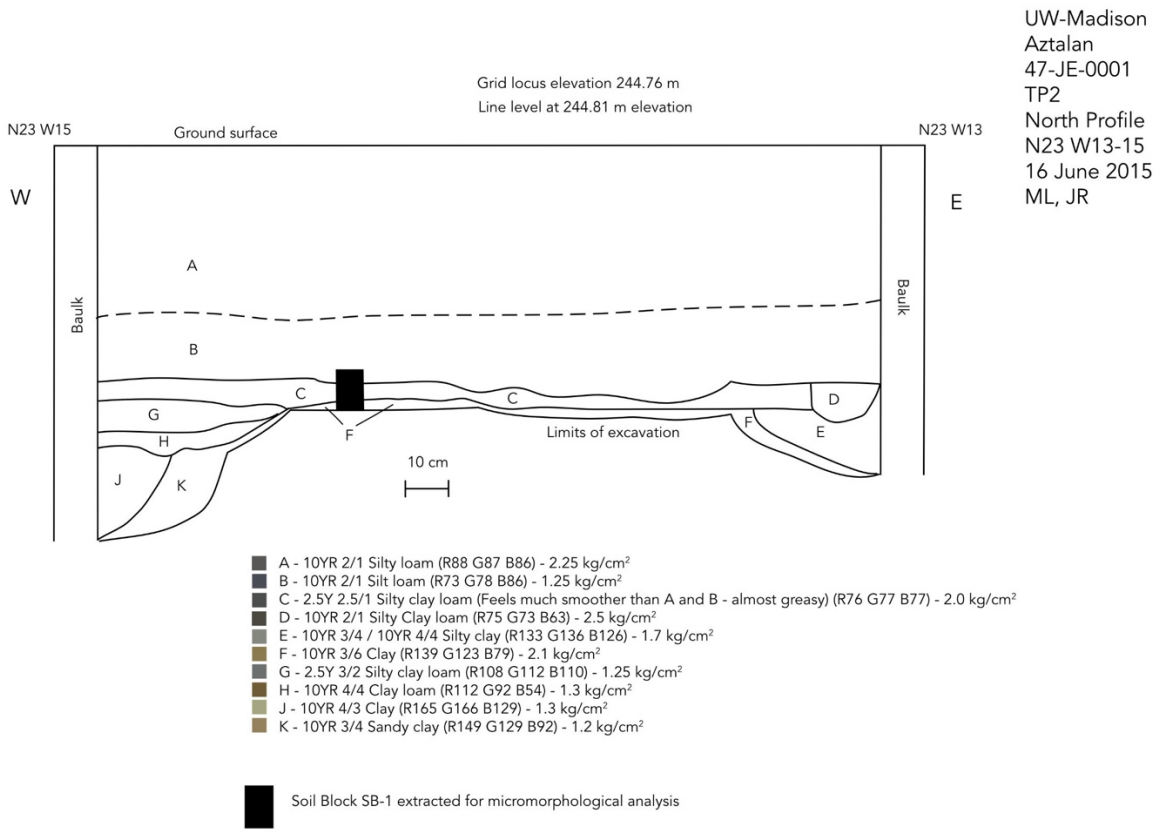
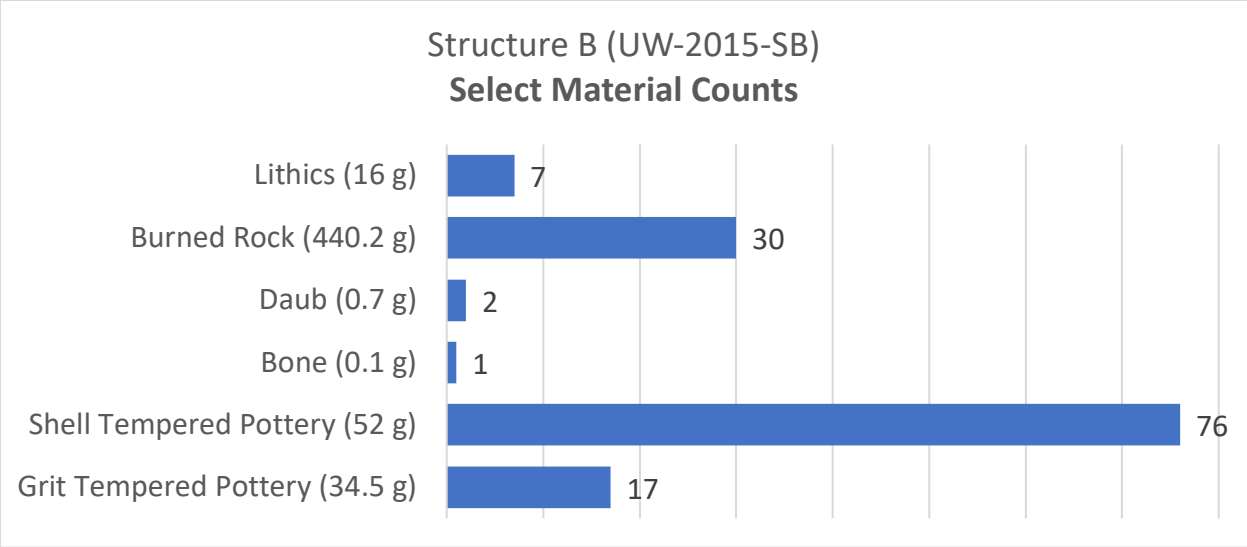


Figure IV.21. Thin lens of Structure B fill (labelled 'C') visible in north profile wall of Test Pit 2.



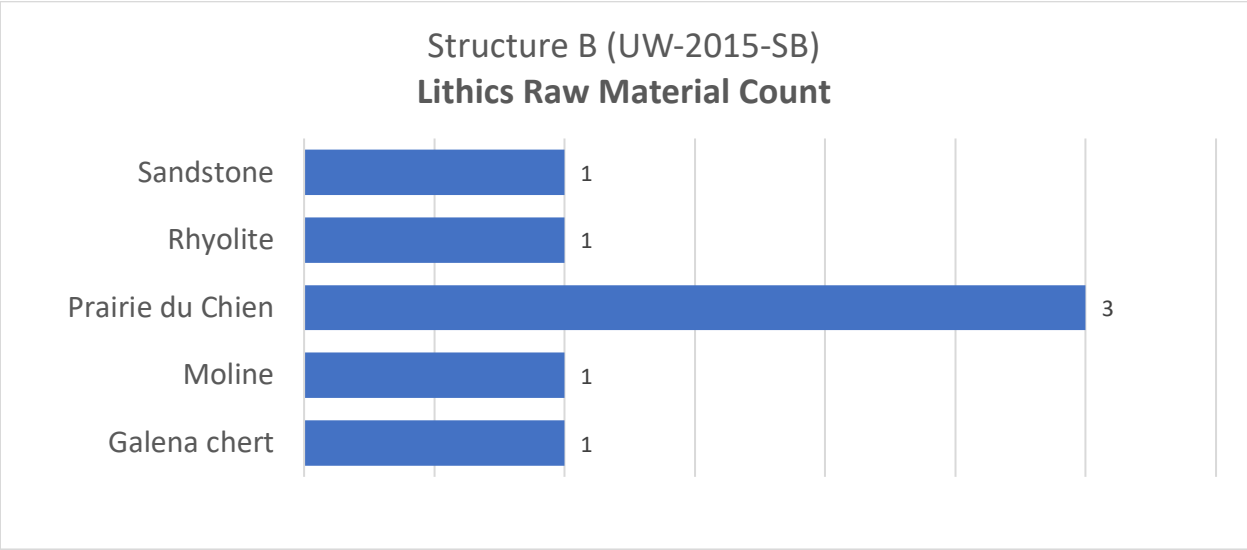


Figure IV.22. Summary of select materials recovered from Structure B.

Features 6 and 13 were a wide, amorphous layer of mottled dark brown soil intrusive into the UW-2015-SA fill in Test Pits 1 and 6 (Figure IV.23). It was interpreted as a possible structure (Structure C) in the field and in preliminary analysis and was defined according to a basin-shaped boundary visible in the profiles created by cross-sectioning post molds in the floor of TP6. However, further excavation in 2016 provided additional information about Features 6/13 and we now interpret them as a sheet midden or intentional leveling of the ground surface.

The boundary between UW-2015-SB and Features 6/13 was only occasionally visible in plan view and is not totally clear in profiles (Figure IV.24). Differences in moisture retention sometimes helped delineate the boundary in the field. As a result, the chronological order between Features 6/13 and UW-2015-SB is not clear. Based on the north profile of TP6, Feature 6/13 tentatively appears to be superimposed over UW-2015-SB and therefore would post-date the structure.

131 potsherds were found in Features 6/13 (Figure IV.25). 73% of those are grit-tempered and 27% are shell-tempered. This is a similar proportion to that found in the earlier UW-2015-SA. The majority of these sherds have eroded surfaces, but some were cord marked, cord impressed, and plain. Both rims were grit-tempered. Other materials include three flakes from local sources, 30 pieces of animal bone, and 14 burned rocks.

Figure IV.23. Floor of Test Pit 6 (approximately 52 cm below ground surface) showing relationship between the Feature 6/13 sheet midden, the southeast corner of Structure B, and the underlying Structure A. Trowel points north.

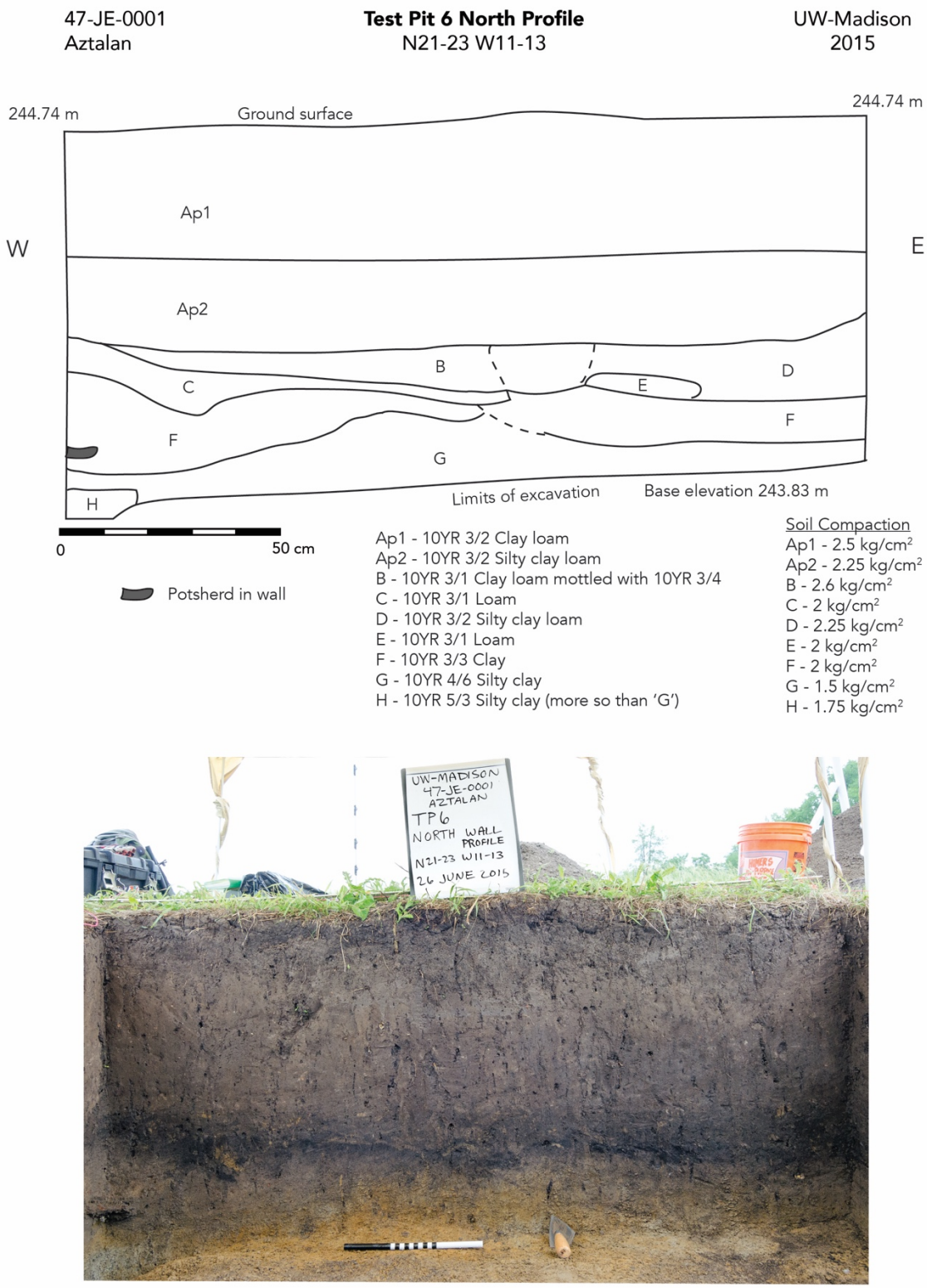


Figure IV.24. Test Pit 6 north profile map and photo showing stratigraphic relationship between Features 6/13 (labelled 'B' and 'D') and Structure B (labelled 'C').

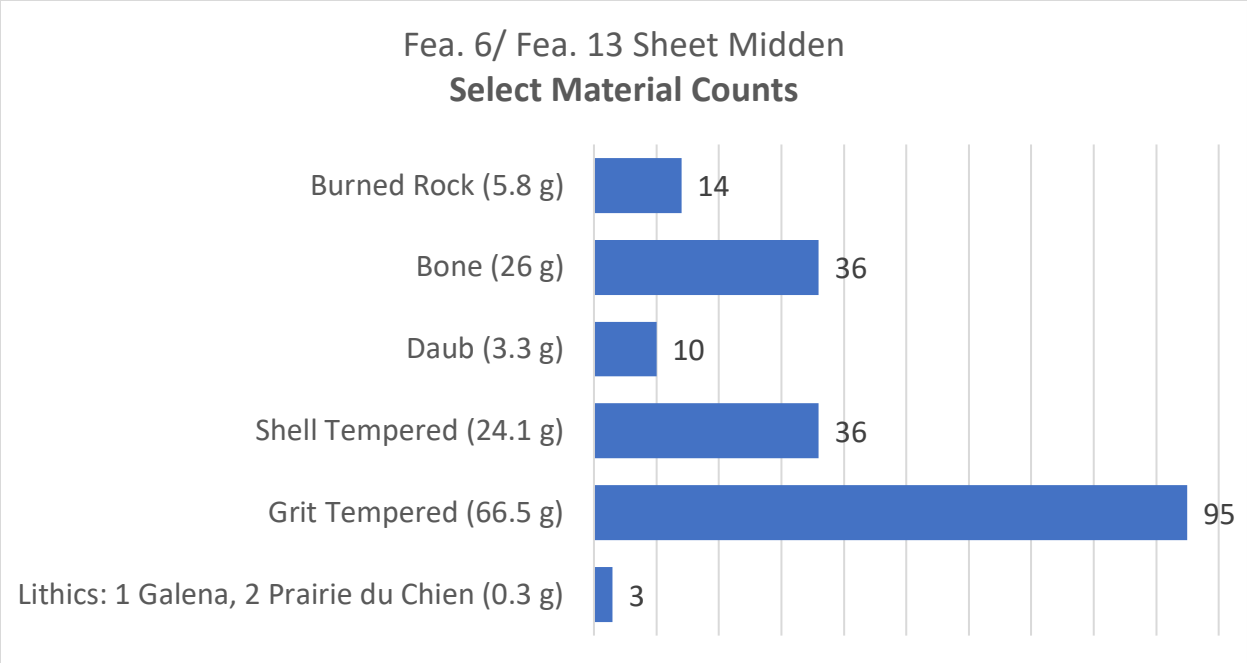


Figure IV.25. Summary of select materials recovered from Features 6 and 13.

Structure D (*ID: UW-2015-SD*) has no identifiable basin fill and was instead defined as a linear arrangement of post molds intrusive into Features 6 and 13 in Test Pits 1 and 6. The structure was initially and best defined in Test Pit 1 (Figures IV.26-IV.27). Six tenuous post molds that were also defined in plan view in Test Pit 6, but could not easily be seen in profile (see Figure IV.29 for complete post mold pattern from both Test Pits). Several post molds were composed of light-colored sandy soil, in stark contrast to the surrounding dark brown Feature 6/13 fill they intruded into. The post molds were arranged linearly in a northwest to southeast direction with a possible entryway extending to the northeast. UW-2015-SD strongly resembles a structure discovered by the State Historical Society of Wisconsin in 1964 (SHSW-1964-H6; Figure IV.29).

Figure IV.26. Light-colored Structure D post molds visible in contrast to dark Feature 6/13 matrix approximately 56 cm below ground surface. Trowel points north.

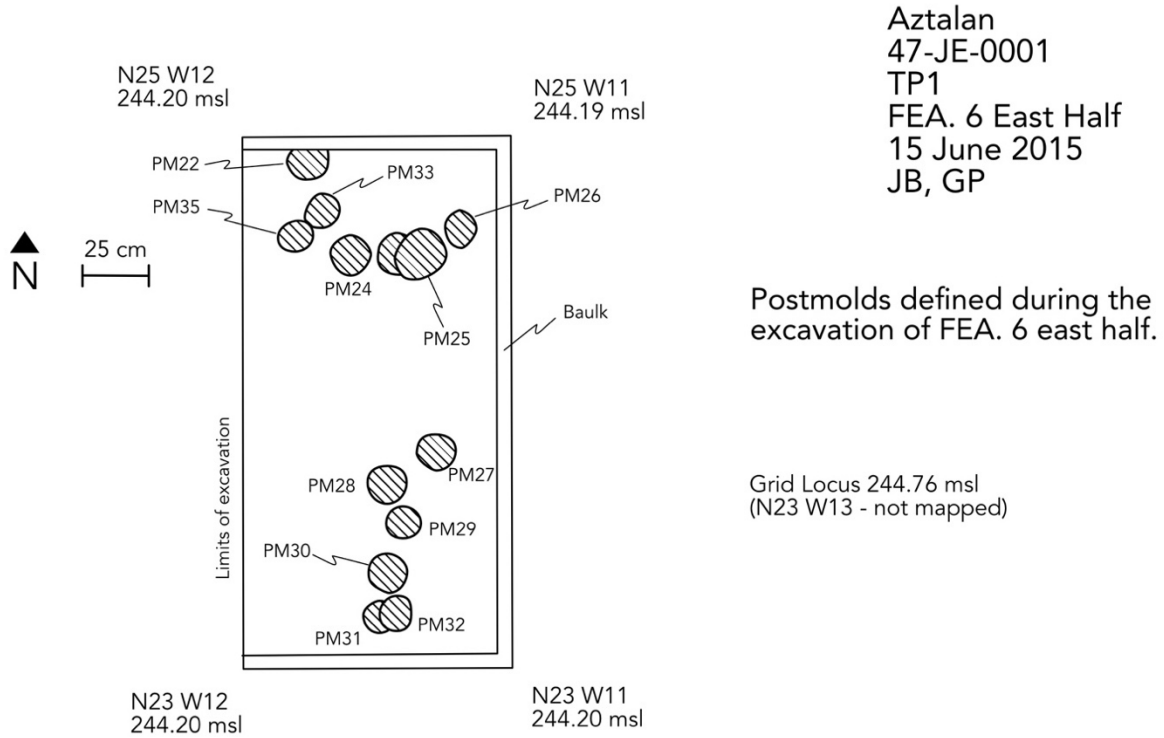


Figure IV.27. Plan map of post molds in Test Pit 1, comprising northern portion of Structure D.

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TP1
17 June 2015
JB, GP

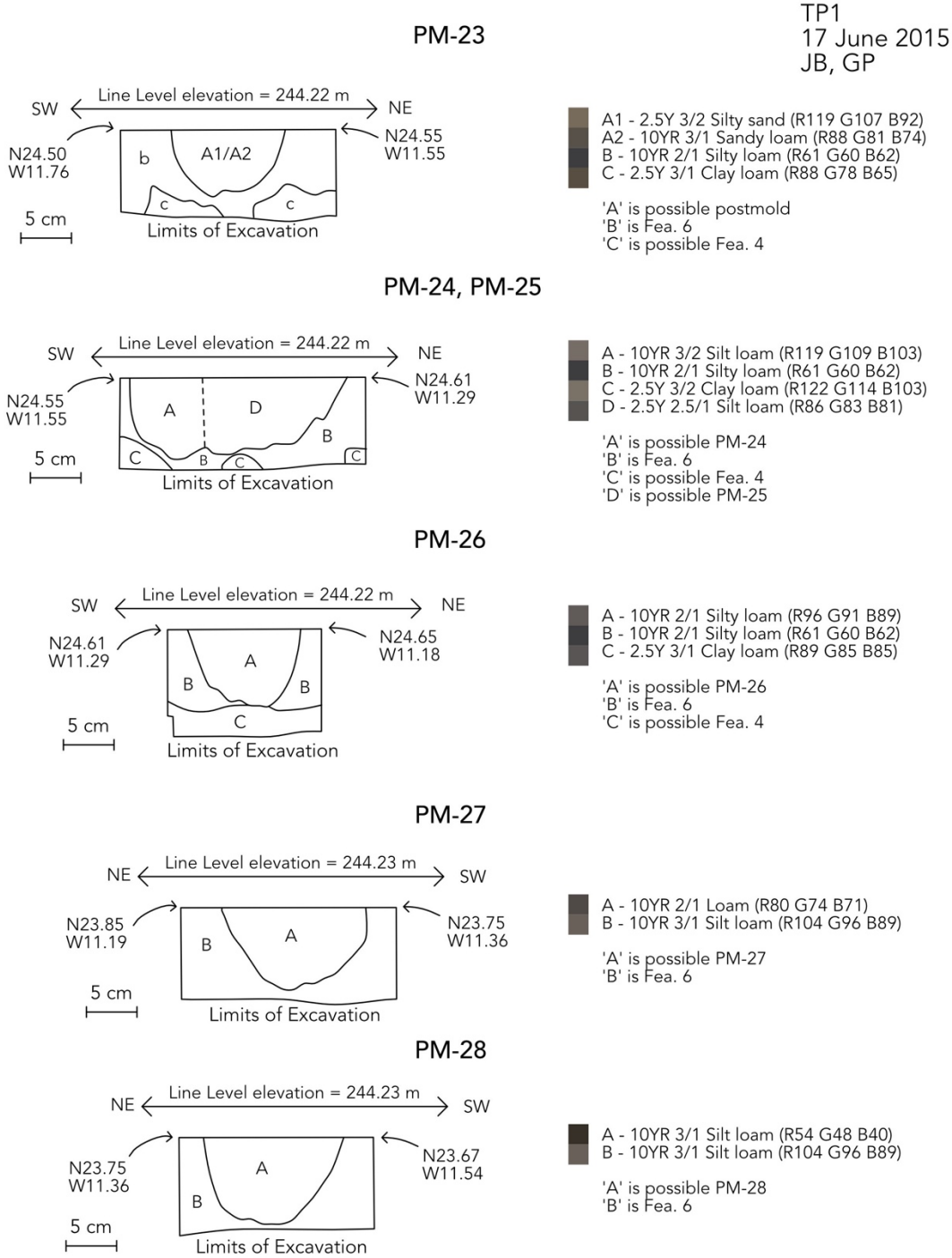

Figure IV.28. Profile maps of post molds in Test Pit 1, comprising northern portion of Structure D.

UW-Madison
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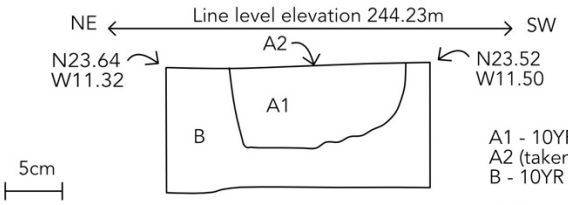
47-JE-0001
TP1
18 June 2015
JB, GP

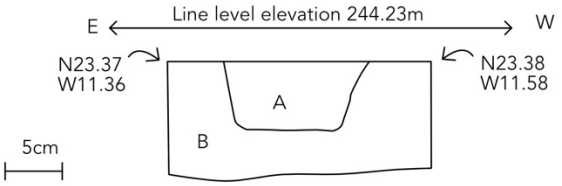
PM-29 NW Profile



A1 - 10YR 2/1 Clay loam (R117 G110 B101)
A2 (taken from top of PM)- 10YR 2/1 Loamy sand (R108 G93 B84)
B - 10YR 3/1 Clay loam (R64 G58 B56)

'A1' is possible PM-29
'B' is Fea. 6

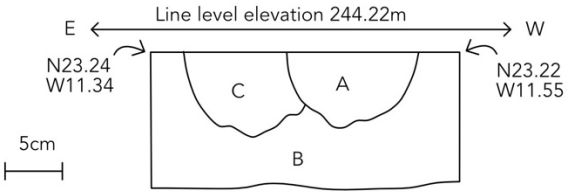
PM-30 South Profile



A - 10YR 3/1 Clay loam (R62 G57 B50)
B - 10YR 3/1 Clay loam (R128 G118 B106)

'A' is possible PM-30
'B' is Fea. 6

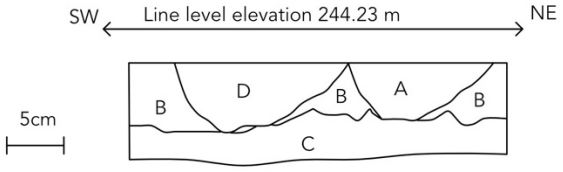
PM-31/PM-32 South Profile



A - 10YR 3/1 Silty clay loam (R137 G126 B115)
B - 10YR 3/1 Silty loam (R120 G111 B103)
C - 10YR 3/1 Silty loam (R112 G104 B97)

'A' is possible PM-31
'B' is Fea. 6
'C' is possible PM-32

PM-33/PM-35 NW Profile



A - 10YR 3/1 Silty loam (R138 G128 B117)
B - 10YR 3/1 Clay loam (R126 G124 B120)
C - 10YR 3/2 Silty clay loam (R178 G162 B139)
D - 10YR 3/1 Silty loam (R91 G85 B82)

'A' is possible PM-33
'B' is Fea. 6
'C' is possible Fea. 4
'D' is possible PM-35

Figure IV.28 (continued): Profile maps of post molds in Test Pit 1, comprising northern portion of Structure D.

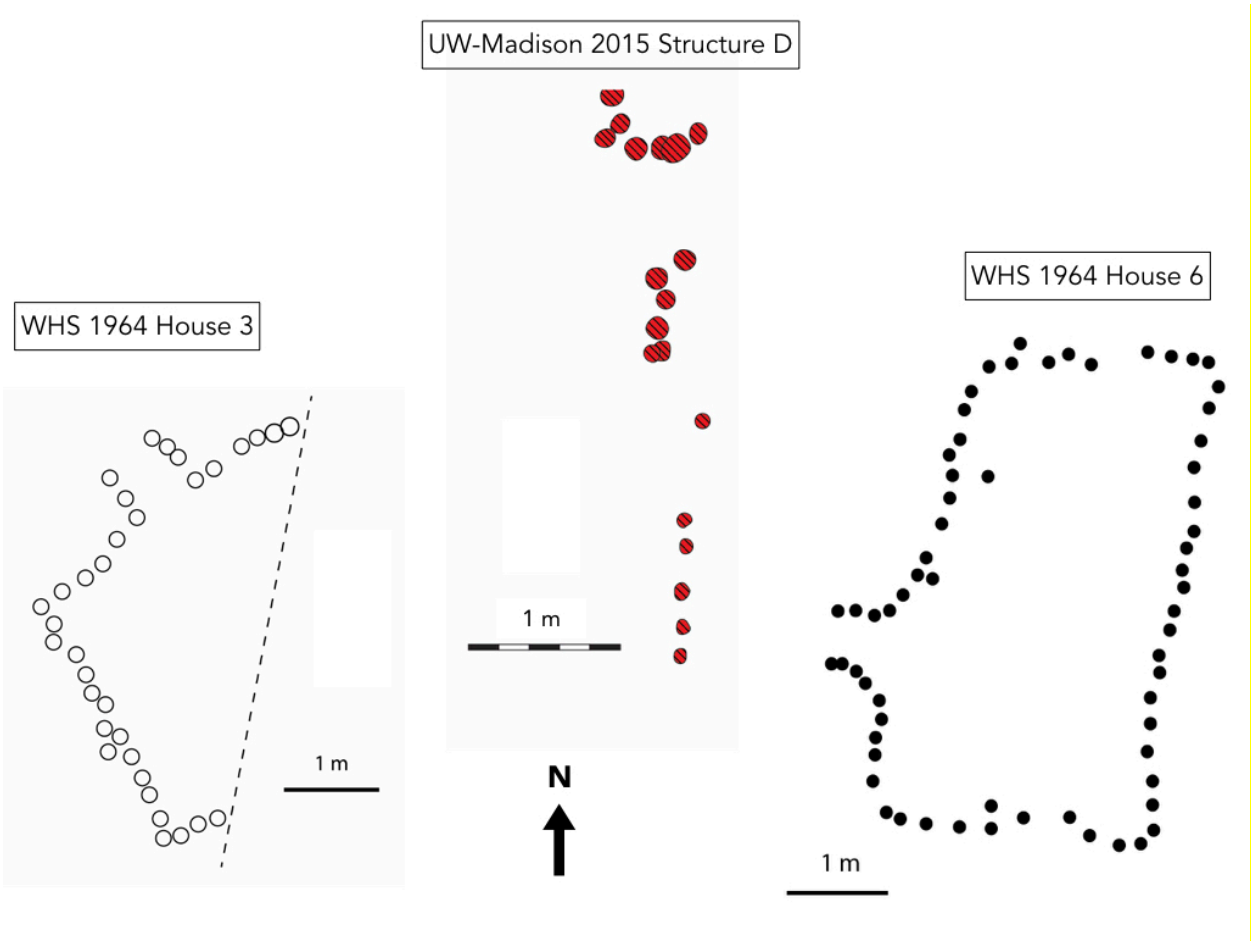
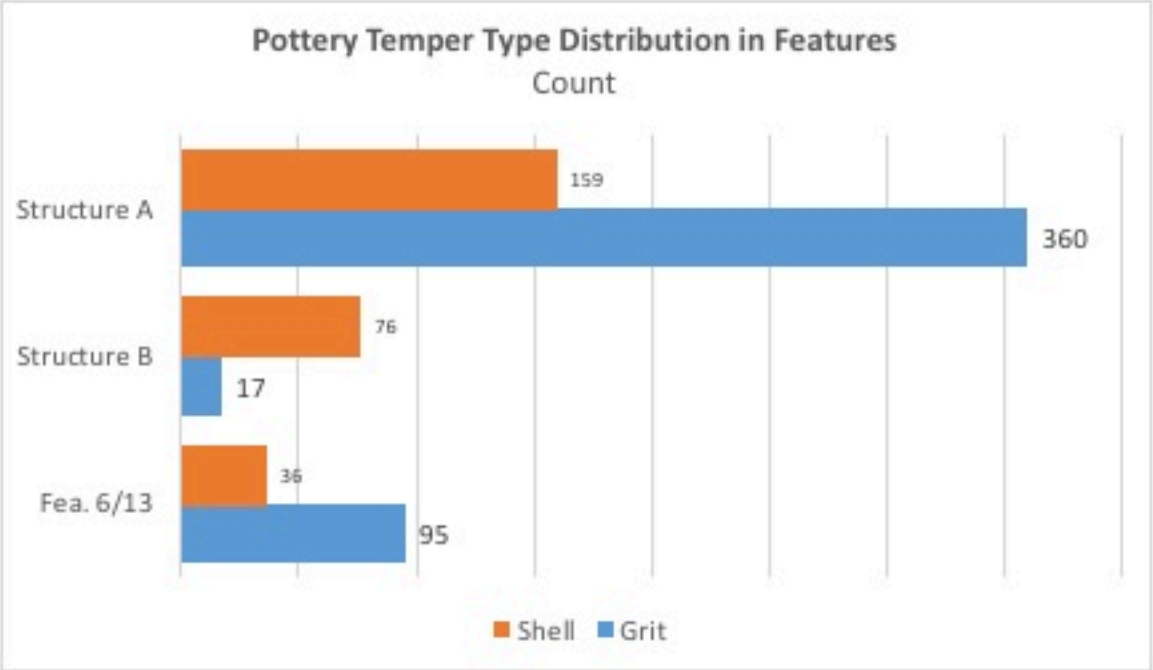


Figure IV.29. Comparison of Structure D with two structures discovered by SHSW in 1964 (SHSW-1964-H3 and SHSW-1964-H6; modified from original field maps on file at Wisconsin Historical Society Museum Archaeology Program). Individual SHSW post molds are not illustrated to scale.

Pottery and lithic comparisons for Structure A, Structure B, and Fea. 6/13 are presented in Figures IV.30-IV.31. Structure A and Fea. 6/13 have very similar compositions in terms of pottery temper type (approximately 70% grit tempered and 30% shell tempered). Structure A has the greatest quantity of pottery, as well as lithics. Structure A also has the greatest variety in lithic raw material types and is the only to contain Burlington chert. Prairie du Chien and Galena Cherts were present in each.



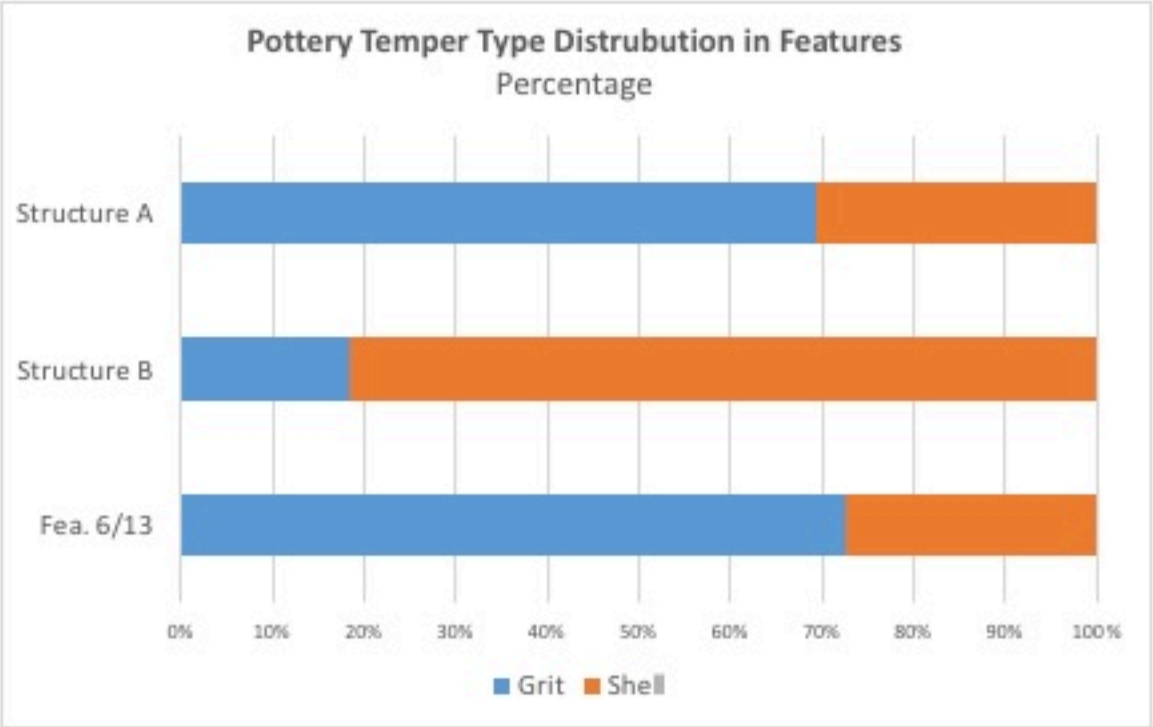
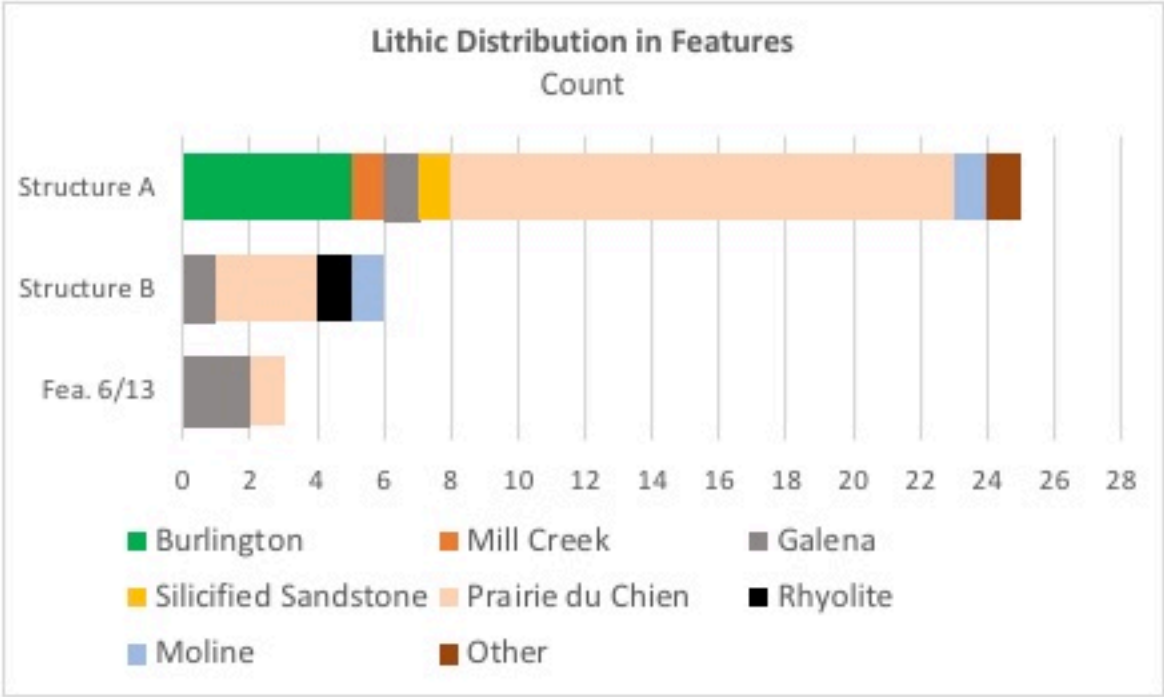


Figure IV.30. Pottery temper type comparisons for Structure A, Structure B, and Fea. 6/13.



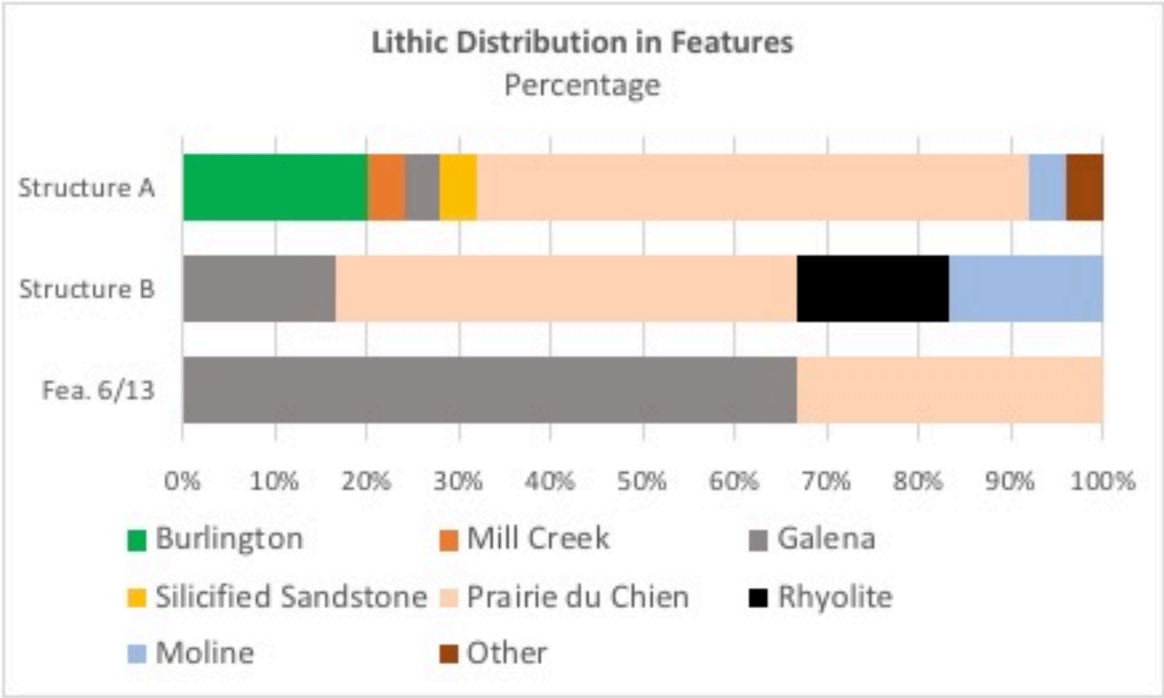


Figure IV.31. Lithic raw material type comparisons for Structure A, Structure B, and Fea. 6/13.

Appendix V: Aztalan Grid Benchmark Static GPS Report

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Bench Mark Position Information

Aztalan State Park

Benchmarks 1, 2 and 3

Prepared by

John Panuska, Ph.D, PE, Biological Systems Engineering

Data collected

June 11, 2015

Aztalan State Park is located in Jefferson County, Wisconsin (S17, 20 and 21, T 7N, R 14E). The park is an important archeological site where research digs often take place. Having good horizontal and vertical position control is important for researchers and hence the reason for this survey. The site contains three brass discs labeled Highway Commission of Wisconsin. Additional site information is also inscribed into the concrete around the brass discs. This information is summarized along with pictures of each monument in Initial Site Assessment in Appendix A. The relative positions of the three monuments are shown in Figure 1 and have been designated BM 1 (most westerly), BM 2 (directly east of 1) and BM 3 (south of 2) for this analysis. All three monuments are located east of the park entrance and west of the Crawfish River. The benchmark names and position information is given in geodetic and multiple plane coordinate systems. Note that (sFt) is US survey feet and (m) is meters. See Appendix B and C for additional position details on BM 1 and BM 2, respectively.

Aztalan Benchmarks - NAD 83 (2011) = 2011 Adjustment

BM 1
Latitude: 43° 3' 57.89399"

W. Longitude: 88° 51' 40.80607"

Orthometric Elevation: 246.760 m

Orthometric Elevation: 809.58 ft. (NAVD 88 Datum using Geoid 2012B)

BM 2
Latitude: 43° 3' 57.77812"

W. Longitude: 88° 51' 37.00451"

Orthometric Elevation: 244.394 m

Orthometric Elevation: 801.82 ft. (NAVD 88 Datum using Geoid 2012B)

BM 3
Latitude: 43° 3' 55.55557"

W. Longitude: 88° 51' 37.23923"

Orthometric Elevation: 244.140 m

Orthometric Elevation: 800.98 ft. (NAVD 88 Datum using Geoid 2012B)

WI State Plane Coordinate System – Southern Zone – NAD83 (2011)

BM 1

NORTHING(sFt)	EASTING(sFt)	NORTHING(m)	EASTING(m)
390631.17	2272766.92	119064.616	692740.722

BM 2

NORTHING(sFt)	EASTING(sFt)	NORTHING(m)	EASTING(m)
390623.30	2273049.24	119062.215	692826.773

BM 3

NORTHING(sFt)	EASTING(sFt)	NORTHING(m)	EASTING(m)
390398.07	2273034.90	118993.566	692822.400

UTM (Zone 16) – NAD83 (2011)

BM 1

NORTHING(sFt)	EASTING(sFt)	NORTHING(m)	EASTING(m)
15649032.07	1143194.90	4769834.364	348446.492

BM 2

NORTHING(sFt)	EASTING(sFt)	NORTHING(m)	EASTING(m)
156489944.19	1438751.74	47698228.882	348532.395

BM 3

NORTHING(sFt)	EASTING(sFt)	NORTHING(m)	EASTING(m)
15648788.86	15648788.86	4769760.233	348528.020

Method of Analysis

A static GPS survey was conducted on June 11, 2015 to document the horizontal and vertical location of the bench marks. Two Sokkia GSR2700ISX dual frequency receivers were used in static mode for observation times of 4.5 hours. One receiver was placed over BM 2 and other over BM 1 from approximately 11:00 AM to 3:30 PM. The position of BM 3 was calculated by forward COGO using a Sokkia SCT- 6 six second total station instrument set up at BM 2 and back sighted to BM 1. Distance and angle readings were repeated 3 times and averaged. The horizontal angle was read in both the direct and reverse telescope positions and averaged.

Both stations were checked frequently for proper operation and level. Satellite position data were downloaded, converted to RIEX format and submitted to the

National Geodetic Survey Online Positioning Users Service (OPUS) (http://www.ngs.noaa.gov/OPUS). The WI State Plane Coordinates for BM 3 were converted into geographic (Lat and Long) coordinates using WISCON V 2.2. Orthometric heights were determined by OPUS and reported in NAVD 88 datum (computed using GEOID2012B). Horizontal position was reported using North American Datum NAD 83 with a 2011 adjustment for all plane system projections.

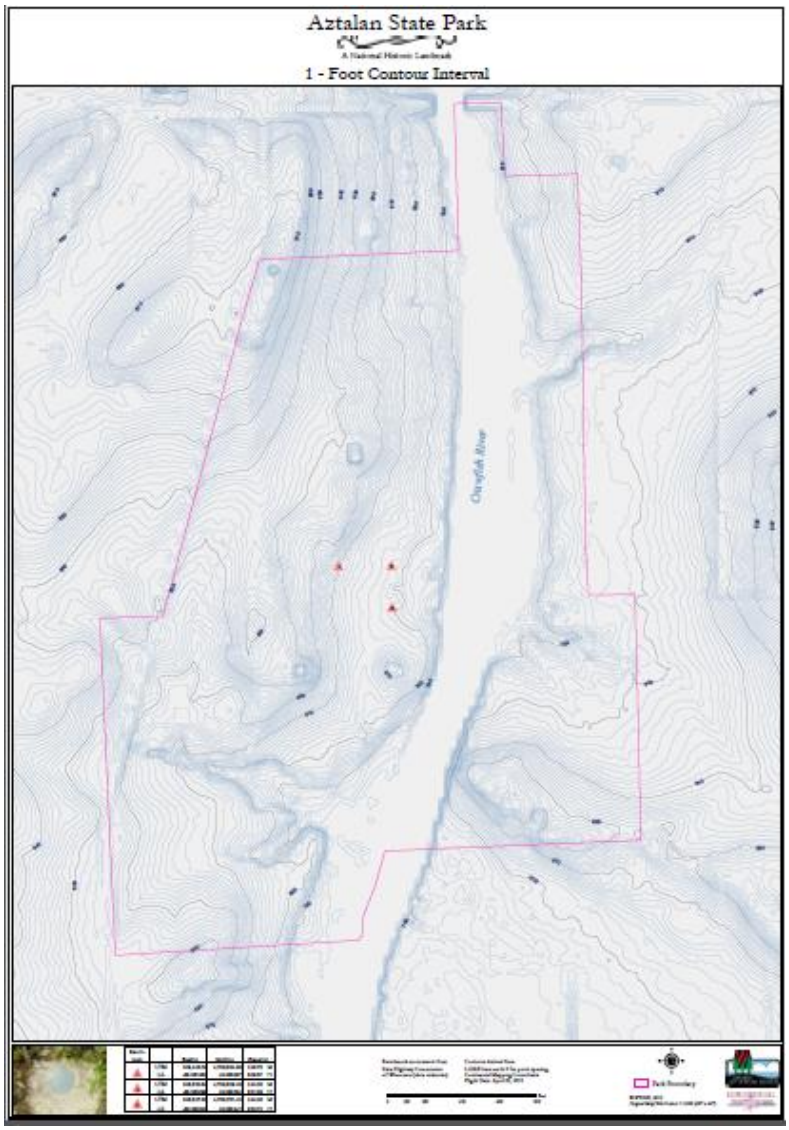

Figure 1. Benchmark position and contour map for Azatlan State Park.

The bottom of the WDNR map shown Figure 1 contains the UTM coordinates for the three monuments at Aztalan available prior to this survey. Information was not available on how these coordinates were derived. Table 1 summarizes the comparison between the existing UTM coordinates for BM 1 - 3 and the positions determined by this survey.

Table 1. Comparison of existing and new UTM coordinates for Aztalan.

	Existing Coordinates [1]			New Coordinates [2]			Existing - New			
BM ID	Easting (meters)	Northing (meters)	Elevation (meters)	Easting (meters)	Northing (meters)	Elevation (meters)	Easting (meters)	Northing (meters)	Elevation (meters)	
1	348445.03	4769834.98	246.76	348446.492	4769834.36	246.760	-1.462	0.616	0	
2	348530.84	4769829.46	244.36	348532.395	4769828.88	244.394	-1.555	0.578	-0.034	
3	348527.33	4769761.42	244.06	348528.02	4769760.23	244.140	-0.690	1.187	-0.080	Note 3
UTM Zone 16										
Notes:										
1. As reported on WDNR contour map dated 2012.										
2. As deteermined using the NGS Online Position Users Service (OPUS) with a 4.5 hr observation time.										
3. Calculated using 6" total station set up at BM 2, averaging direct and reverse angles, repeated 3x.										

AZTALAN
INIITIAL SITE ASSESSMENT FOR GPS SURVEY
June 4, 2015 – John Panuska, PhD, PE

Three monuments were located on the site. All monuments were 3 and 5/8" diameter brass discs set in concrete labeled "Highway Commission of Wisconsin". Each disc also contained two intersecting lines cut into the brass. Identification information for each monument was pressed into the concrete and was in some cases deteriorating to the point being non-readable. The configuration of the monuments is shown in Fig. 1. The identifying information on each herein referred to benchmarks (BM) follows.

BM 1 *	**BM 2**	**BM 3**
265 R-8 6-27-67	265 R-64 6-26-67	220 R-64 6-27-67

* The date was very difficult to read!

BM 1

BM 2

BM 3

BM 1 OPUS OUTPUT

FILE: RINEX_BM_1.15O OP1434299725332

NGS OPUS SOLUTION REPORT
==========

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: jcpanuska@wisc.edu DATE: June 14, 2015
RINEX FILE: rine161p.15o TIME: 16:35:49 UTC

SOFTWARE: page5 1209.04 master93.pl 022814 START: 2015/06/10 15:58:00
EPHEMERIS: igr18483.eph [rapid] STOP: 2015/06/10 20:31:00
NAV FILE: brdc1610.15n OBS USED: 12208 / 12648 : 97%
ANT NAME: SOK_GSR2700ISX NONE # FIXED AMB: 51 / 53 : 96%
ARP HEIGHT: 1.972 OVERALL RMS: 0.015(m)

REF FRAME:	NAD_83(2011)(EPOCH:2010.0000)	IGS08 (EPOCH:2015.4404)
X:	92745.259(m) 0.002(m)	92744.408(m) 0.002(m)
Y:	-4666176.969(m) 0.005(m)	-4666175.618(m) 0.005(m)
Z:	4333012.859(m) 0.004(m)	4333012.793(m) 0.004(m)
LAT:	43 3 57.89399 0.002(m)	43 3 57.92269 0.002(m)
E LON:	271 8 19.19393 0.002(m)	271 8 19.15751 0.002(m)
W LON:	88 51 40.80607 0.002(m)	88 51 40.84249 0.002(m)
EL HGT:	212.273(m) 0.006(m)	211.228(m) 0.006(m)
ORTHO HGT:	246.760(m) 0.012(m) [NAVD88 (Computed using GEOID12B)]	

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 16)	SPC (4803 WI S)
Northing (Y) [meters]	4769834.364	119064.616
Easting (X) [meters]	348446.492	692740.722
Convergence [degrees]	-1.27123788	0.78238039
Point Scale	0.99988256	0.99994956
Combined Factor	0.99984928	0.99991627

US NATIONAL GRID DESIGNATOR: 16TCN4844669834(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DG4137	RRW1 ROCK RIVER COOP CORS ARP	N422104.015	W0890328.859	81043.5
DN6091	SIW2 SEILER FRWI 2 CORS ARP	N425204.533	W0875858.561	74970.3
DI2112	WIM6 MEQUON 6 CORS ARP	N431137.981	W0880335.506	66744.2

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

BM 2 OPUS OUTPUT

FILE: RINEX_BM_2.15O OP1434299758921

NGS OPUS SOLUTION REPORT
==========

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: jcpanuska@wisc.edu DATE: June 14, 2015
RINEX FILE: rine161q.15o TIME: 16:36:22 UTC

SOFTWARE: page5 1209.04 master90.pl 022814 START: 2015/06/10 16:00:00
EPHEMERIS: igr18483.eph [rapid] STOP: 2015/06/10 20:33:00
NAV FILE: brdc1610.15n OBS USED: 12183 / 12527 : 97%
ANT NAME: SOK_GSR2700ISX NONE # FIXED AMB: 60 / 63 : 95%
ARP HEIGHT: 1.877 OVERALL RMS: 0.015(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000)		IGS08 (EPOCH:2015.4404)	
X:	92831.273(m) 0.003(m)	92830.422(m)	0.003(m)
Y:	-4666175.972(m) 0.009(m)	-4666174.621(m)	0.009(m)
Z:	4333008.631(m) 0.003(m)	4333008.565(m)	0.003(m)
LAT:	43 3 57.77812 0.007(m)	43 3 57.80682	0.007(m)
E LON:	271 8 22.99549 0.004(m)	271 8 22.95907	0.004(m)
W LON:	88 51 37.00451 0.004(m)	88 51 37.04093	0.004(m)
EL HGT:	209.907(m) 0.006(m)	208.862(m)	0.006(m)

ORTHO HGT: 244.394(m) 0.012(m) [NAVD88 (Computed using GEOID12B)]

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 16)	SPC (4803 WI S)
Northing (Y) [meters]	4769828.882	119062.215
Easting (X) [meters]	348532.395	692826.773
Convergence [degrees]	-1.27051563	0.78310597
Point Scale	0.99988224	0.99994957
Combined Factor	0.99984933	0.99991665

US NATIONAL GRID DESIGNATOR: 16TCN4853269828(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DG4137	RRW1 ROCK RIVER COOP CORS ARP	N422104.015	W0890328.859	81057.2
DL7702	JFWS JEWELFARMWI 2006 CORS ARP	N425451.349	W0901453.150	114433.0
DN6091	SIW2 SEILER FRWI 2 CORS ARP	N425204.533	W0875858.561	74886.9

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.