REPORTS

Measuring Hohokam Household Inequality with Construction Costs of Domestic Architecture at Pueblo Grande

David R. Abbott, Douglas B. Craig†, Hannah Zanotto, Veronica X. Judd, and Brent Kober

Recent archaeological efforts to explain the emergence and persistence of social inequality have been hampered by little information about how wealth was transmitted across generations, and how it may have accumulated or diminished over time. Building on studies that have shown domestic architecture to be an excellent material expression of household wealth, we provide a method for reconstructing the amount of labor invested in house construction among the Hohokam of southern Arizona. We also account for different architectural styles from different time periods. To illustrate the utility of the method for addressing broader social issues, we investigate the relationship among population increases, resource shortages, and wealth differentials at Pueblo Grande—one of the preeminent settlements in the Hohokam region. Inequality at Pueblo Grande was tracked over time and compared to similar results at the Grewe site. High-status households at both sites were distinguished architecturally by larger and, in some instances, more elaborate houses. The proximity of these households to public areas for ceremonial expression further suggests that access to ritual played a key role in creating and maintaining inequality in Hohokam society.

Keywords: Hohokam, architectural styles, construction costs, social inequality, Pueblo Grande

Los recientes esfuerzos arqueológicos para explicar el surgimiento y la persistencia de la desigualdad social se han visto obstaculizados por poca información sobre cómo se transmitió la riqueza a través de las generaciones, y cómo puede haberse acumulado o disminuido con el tiempo. Sobre la base de estudios que han demostrado que la arquitectura doméstica es una excelente expresión material de la riqueza de los hogares, proporcionamos un método para reconstruir la cantidad de trabajo invertida en la construcción de viviendas entre los Hohokam del sur de Arizona. Contamos con diferentes estilos arquitectónicos de diferentes períodos de tiempo. Para ilustrar la utilidad del método para abordar cuestiones sociales más amplias, investigamos la relación entre el aumento de la población, la escasez de recursos y las diferencias de riqueza en Pueblo Grande, uno de los asentamientos preeminentes en la región de Hohokam. La desigualdad en Pueblo Grande se rastreó con el tiempo y se comparó con resultados similares en el sitio de Grewe. Los hogares de alto estatus en ambos sitios se distinguieron arquitectónicamente por casas más grandes y, en algunos casos, más elaboradas. La proximidad de estos hogares a las áreas públicas para la expresión ceremonial sugiere además que el acceso al ritual jugó un papel clave en la creación y el mantenimiento de la desigualdad en la sociedad Hohokam.

Palabras clave: Hohokam, estilos arquitectonicos, costos de construccion, desigualdad social, Pueblo Grande

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Archaeologists have long been interested in the conditions that gave rise to permanent forms of social inequality. For decades, the focus of attention has been on institutions that promoted inequality in ancient state-level societies (Adams 1966; Childe 1951; Johnson and Earle 1987). The scope of research has expanded in recent years to include a consideration of institutionalized inequality in pre-state, middle-range societies (Ames 2007; Hayden 1995; McIntosh 1999; Price and Feinman, ed. 1995, 2010). In such cases, the seeds of inequality are often sown among households in the form of differential access to domestic labor (e.g., McIntosh 1999:6–7; Netting 1982; Wilk 1991:196–197). Households also play an important role in the transmission of property and wealth across generations (Blanton 1995; Goody 1990). Consequently, they have become key analytical units in efforts to understand the development of social differentiation (Douglass and Gonlin 2012:8, 13–15).

We examine the evidence for social dissimilarities at the household level among the Hohokam of southern Arizona. They built the largest irrigation works in prehispanic North America. Traditional archaeological narratives viewed Hohokam social organization as fundamentally egalitarian, a "benign primitive democracy," in the words of Emil Haury (1976:353). The demands of survival in a harsh desert environment supposedly dictated that everyone who lived along the same canal worked together and shared rights to the means of production. More recent narratives recognize nonegalitarian relationships, but researchers disagree about the nature of those ties, as well as the underlying social dynamics (Abbott 2003; Doyel 1974; Ensor 2013; Gregory 1991; McGuire 1992; Wilcox 1991, 1999).

We direct our attention to the physical domain of Hohokam households—their architecture. In a previous article (Abbott et al. 2019), we provided a method for reconstructing the labor costs for house construction, taking into account different architectural styles from different time periods. We examine the labor costs involved in building houses at Pueblo Grande, one of the most densely populated and politically prominent villages in the Hohokam region. We focus our analysis on testing several expectations related to wealth, status, and domestic architecture; in particular, the degree to which social inequality was expressed in variable house construction costs. In addition, we investigate the degree to which inequality, as reflected in domestic architecture, persisted across generations. Even relatively egalitarian societies can have pronounced wealth differences on a short-term or cyclical basis (e.g., Cancian 1976; Wolf 1966). What precludes them from becoming stratified are the social mechanisms (e.g., egalitarian ethos, marriage and inheritance practices) to prevent the continuance and growth of social inequality over the long term (McGuire and Netting 1982; Netting 1993:200–202; Wilcox and Sternberg 1983).

Hohokam domestic architecture has the added advantage of being easily linked to household-level social groups, because dwellings for most time periods were stand-alone structures. Also, the high degree of residential stability seen at many sites, combined with their long occupation spans (300+ years), makes it possible to track the changing fortunes of individual households over time. This individual-based, long-term perspective is rare in studies of social differentiation in premodern, middle-range societies (Bowles et al. 2010:8; Drennan et al. 2010:73). As such, it provides a useful frame of reference for testing different evolutionary models.

The purpose of our investigations has been threefold. First, in our previous publication (Abbott et al. 2019), we developed and implemented a methodology to calculate construction costs of various styles of Hohokam architecture, which we hope will be widely applied for other Hohokam projects and beyond. To facilitate future applications, we described in detail the variables used, the rationale and justification for their measurement, the way the measurements were made, and the way the construction costs were derived. Second, we calculated and analyzed the costs of building Hohokam houses to determine if there were architectural expressions of household inequality at Pueblo Grande and what they might mean for Hohokam society. Third, in agricultural societies—and especially in those employing technologies that supplement human labor (e.g., irrigation)—high levels of

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inequality can emerge as productive land becomes limited due to rises in population or changes in weather patterns (Flannery and Marcus 2012; Goody 1976:97; Kohler and Higgins 2016:691; Kohler et al. 2017; Smith et al. 2018:10). In a Hohokam context, we examine this oft-cited model about the relationship between population increases, resource shortages, and wealth differentials. We expect to encounter marked differentiation among the prehistoric residents in the irrigated valleys of the Phoenix Basin during the Late Sedentary and Classic periods, when demographic pressures arose from rapid and large-scale episodes of immigration.

Hohokam Culture

The Hohokam people are best known for their continuous, 1,000-year occupation of the Phoenix Basin (AD 450–1450; Figure 1; Table 1[1]). Their villages were anchored to the landscape by huge investments in irrigation infrastructure. Multivillage irrigation cooperatives, called "canal systems," brought water from the lower Salt and middle Gila Rivers up onto the river terraces. The largest of the farmer collectives is referred to as "Canal System 2," which encompassed 20 settlements and nine main canals that irrigated more than 6,070 ha (15,000 acres) of corn, beans, squash, and cotton on the north bank of the Salt River (Howard 1991:5–15).

The Phoenix Basin settlements had a typical spatial layout and shared a long-term developmental sequence. The earliest habitations were arranged around a central plaza with public facilities, such as cemeteries and communal cooking areas, situated near the plaza margins (Wallace 2007; Wilcox et al. 1981). Starting around AD 800, large earthen courts for the playing of a ritual ball game were built adjacent to the central plaza. A regional network of interaction and conjoint beliefs was apparent by the distribution of 190 ball-court sites over an area the size of South Carolina (Marshall 2001). The regular gatherings of people from many places and ecological settings made the ball games and possibly associated marketplaces conduits for large volumes of exchange goods (Abbott 2010; Abbott et al. 2007; Doyel 1991; Wilcox and Sternberg 1983).

The ball-court complex ended abruptly around AD 1070, and demographic instability followed. Migrants from outside the irrigated lowlands streamed into the riverine villages, doubling the population at Pueblo Grande (Abbott and Foster 2003) and probably at many other sites (Doelle 1995). The influx likely stimulated the construction of platform mounds and walled central precincts on the edge of the central plaza where community rituals were staged or where elevated residences were built for an elite class (Downum and Bostwick 2003; Doyel 1981; Gregory and Nials 1985; Wilcox 1987).

By the beginning of the fourteenth century, Hohokam residents throughout the Phoenix Basin and beyond enclosed their dwellings behind massive compound walls, marking a fundamental social change (Haury 1991:70). Domestic life was transformed from a relatively inclusive and equitable existence to one distinguished by greater exclusivity and inequality (McGuire 1992:204–207; Wilcox 1991:267–269). But by AD 1375, the compound walls were reduced to rubble, and the domestic architecture reverted to earlier styles. Population sizes along the Salt River plummeted, and at Pueblo Grande and elsewhere, a few scattered residence groups lingered until the final exodus from the valley around AD 1450. Many people probably moved to the middle Gila River valley, where their descendants still proudly reside today.

Hohokam Households

Households are task-oriented, co-residential family units that structure daily life in human societies throughout the world (Blanton 1995:108; Netting et al. 1984:xx). They are usually defined by the range of activities they perform, particularly those related to subsistence and social reproduction (Douglass and Gonlin 2012:2–5; Wilk and Rathje 1982:618). Hohokam households of the Sedentary and Early Classic periods were manifest by a cluster of contemporaneous structures arranged around a common courtyard space, which equated with extended-family or multifamily units. During the Late Classic period, residence

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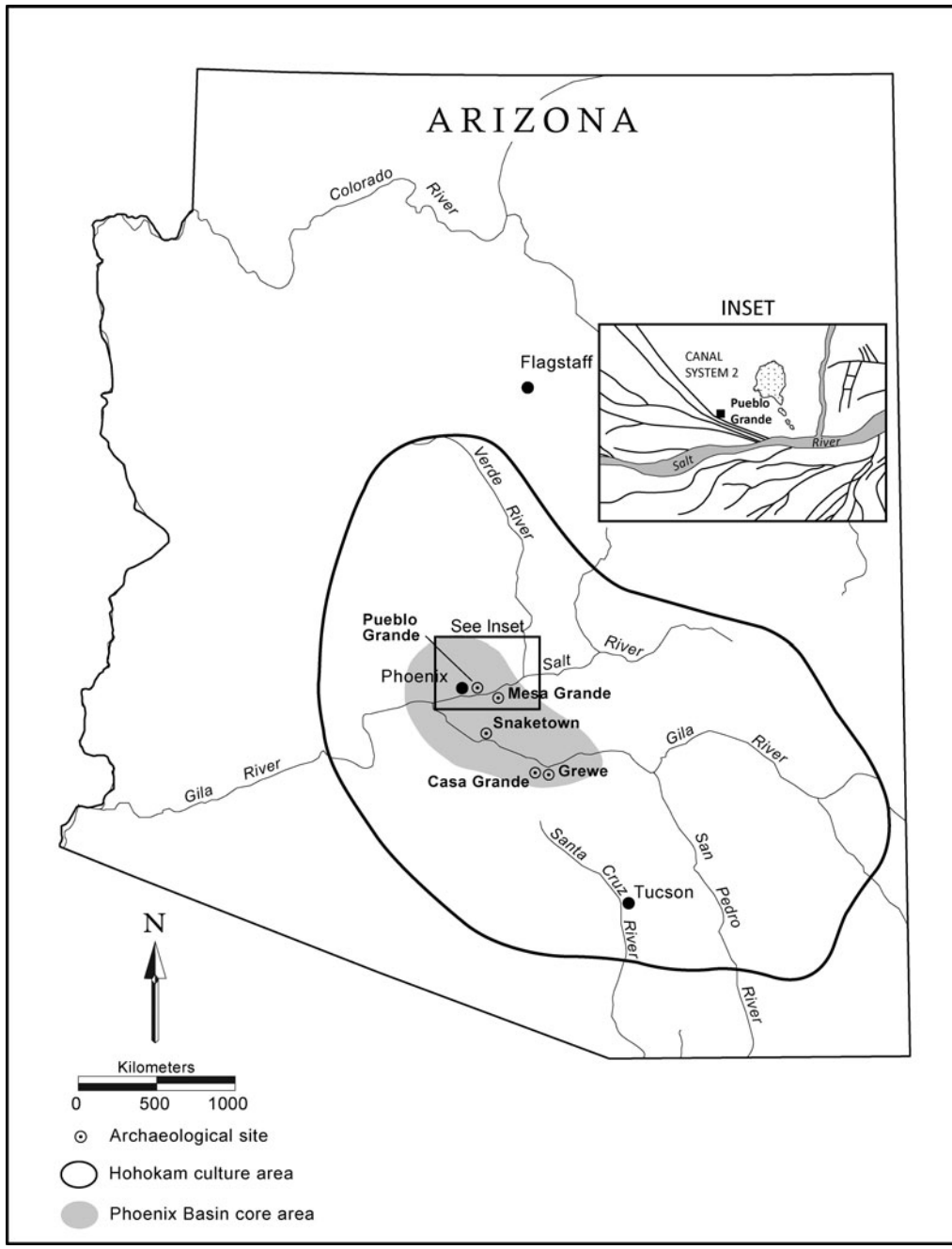

Figure 1. The Hohokam culture area.

groups composed of one to several households were enclosed in walled residential compounds (Craig and Henderson 2007). Hohokam households did most of the work associated with building and maintaining the canals (Howard 2014). They also provided most of the labor involved in preparing fields and growing and harvesting crops (Henderson and Clark 2004).

Given the size of the canal systems, there can be little doubt that irrigation water was a common-

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Table 1. Hohokam Temporal Intervals.

Period	Sub-period/Phase	Date
Pioneer	Early Pioneer	AD 450–650
	Late Pioneer	AD 650–750
Colonial		AD 750–950
Sedentary		AD 950–1100
Classic	Early Classic / Early Soho	AD 1100–1200
	Early Classic / Late Soho	AD 1200–1275
	Late Classic / Civano	AD 1275–1375[a]
Postclassic		AD 1375–1450

[a]Controversial dating (see Note 1).

property resource managed at the community or district level (Hunt et al. 2005). In contrast, rights approximating those of private ownership likely developed to manage plots of irrigable land (Mabry 1996:16–17; Netting 1993:158). The long-term and stable usufruct also reflects a commitment to maintaining the household's corporate holdings over time. As a result, some households may have become dependent on others for access to basic resources such as water and land. Similarly, although ceramics and other craft items were probably produced by part-time specialists working at the household level, most households were dependent on multiple and often distant producers for everyday items, such as cooking and storage pots (Abbott 2009; Abbott et al. 2007). These relationships suggest that dependencies were a key component of the Hohokam political economy, possibly fueling the emergence and persistence of social inequality.

Pueblo Grande

The Pueblo Grande residents oversaw the intake of river water into Canal System 2, thereby placing them in a position of political prominence and economic security. Not surprisingly, the village grew to be the largest in the lower Salt River Valley, supporting a population that exceeded 1,000 citizens in the latter part of the Classic period (Abbott and Foster 2003). But, prior to the multivillage irrigation cooperatives, the early settlement was simply a light scattering of small residence groups (Bostwick 1994; Ensor 2013:174–176; Foster 1995).

Around AD 1070, when the ball courts were abandoned and populations in outlying areas were on the move, habitation levels surged at Pueblo Grande with the first of three waves of migration. These waves were well documented in the eastern third of the ancient site with excavations by Soil Systems Inc. (SSI) prior to highway construction (Mitchell 1994; Figure 2). Each wave pushed the site boundaries outward and successively farther from the central precinct of the village.

The SSI fieldwork exposed 14 habitation areas (HAs), each one measuring 1,200–3,000 m^2, demarcating a discrete cluster of structures, extramural spaces, and a cemetery. Undoubtedly, each HA was home to a self-recognized residence group, which was typically composed of multiple households and which often persisted for multiple generations. HA-5, 6, 8, and 9 were all established when newcomers arrived during the time when the ball-court network dissolved. They built pithouses of a style defined by Haury (1976:53–57), called "Type S-1."

A second wave around AD 1100 doubled the size of Pueblo Grande virtually overnight (Abbott and Foster 2003). Six new HAs (HA-1, 2, 3, 7, 10, 12) were established in the eastern part of the settlement. The migrants built five distinct house styles, including Post-Reinforced surface structures and four categories of pithouses (Type S-2; Rock-Lined; Deep, Adobe-Lined; and Deep, Post-Supported). Presumably, the variability corresponded to a multiplicity of homelands from which the new arrivals originated. Just a few decades later, the wide diversity of house types gave way to architectural conformity as a single new style, Narrow-Walled Adobe pithouses, was constructed across the community. Also at this time, two platform mounds were built side by side at the village center, and one new residence group (HA-11) was founded in the SSI project area.

During the final migration between AD 1275 and 1375, the entire community adopted a new architectural form. Clusters of Massive-Walled Adobe surface structures were enclosed behind towering compound walls. Many of the HAs grew significantly, as newcomers probably exercised kinship options to crowd into long-occupied habitation areas. Three new residence groups—HA-4, 13, and 14—also took root at the northeastern edge of the site. In addition, the Pueblo

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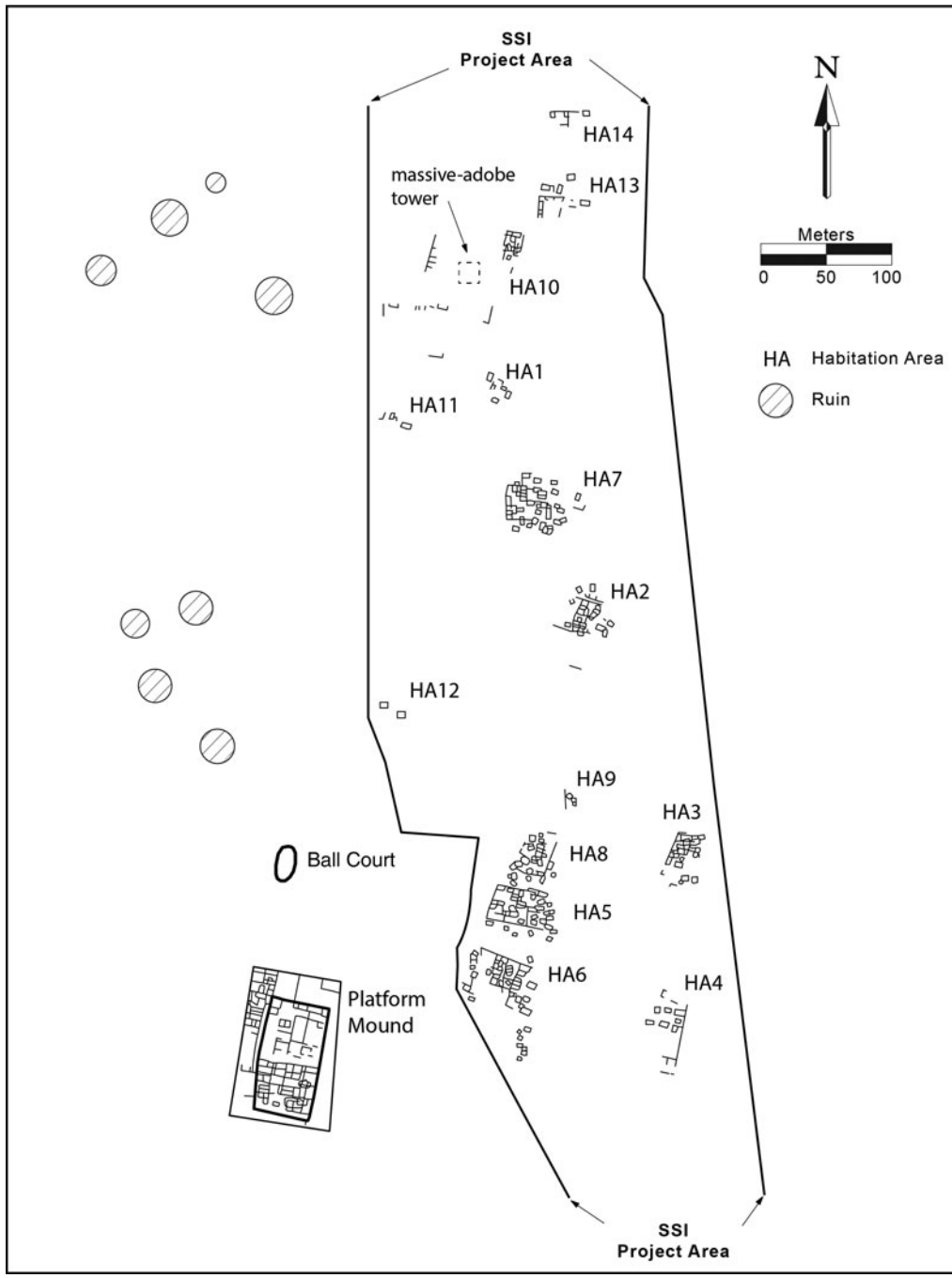

Figure 2. The SSI project area.

Grande citizens joined their side-by-side platform mounds into a single immense edifice. Its 4 m high elevated surface became crammed with an elaborate complex of open-air courts and Massive-Walled Adobe structures accented with many unusual architectural details (e.g., corner entryways, lofty ceilings, cylindrical pillars, altars, a multicolored floor, a solstice marker).

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The last phase of occupation began at about AD 1375. In the habitation areas, the Massive-Walled Adobe structures and the towering compound walls surrounding them fell into ruin, but in five of the SSI HAs (HA-2, 3, 4, 5, 7) the occupants persisted whereas the other residence areas were vacated. The later inhabitants built Narrow-Walled Adobe and Deep, Adobe-Lined pithouses, sometimes through the foundations of fallen compound walls (Abbott et al. 1994). By the mid-fifteenth century and after 800 years of continuous occupation, Pueblo Grande was totally uninhabited.

Why Pueblo Grande?

If there was social inequality in Hohokam society expressed in variable construction costs for domestic architecture, then there are reasons to believe we should find evidence for it at Pueblo Grande. Platform mounds were built in the thirteenth and fourteenth centuries at Pueblo Grande and elsewhere, probably reflecting increasing social differentiation and political centralization across the Hohokam world at those times (Bayman 2001; McGuire 1992). As described above, multiple waves of immigrants impacted Pueblo Grande during the Late Sedentary and Classic periods, possibly limiting the availability of irrigable land and thereby promoting economic disparities. Under contested circumstances, the mounds probably marked social boundaries and reaffirmed property rights (Abbott 2000:204–206; Bayman and Sullivan 2008; Elson 1998; Fish and Fish 1994, 2000). On a political level, the people who lived in the affiliated households on or near the elevated platforms are the most obvious candidates for elite groups in Hohokam society. They likely controlled access to the mound precincts and were the primary beneficiaries of mound-related activities (Craig 2010; Ensor 2013).

From an archaeological perspective, the conditions at Pueblo Grande were excellent. The SSI excavations in the eastern third of the village unearthed 14 discrete and well-defined habitation areas, most of which were associated with the intergenerational transfer of property, and, likely, the long-term maintenance of an estate (Craig 2007, 2010; Craig and Henderson 2007). Presumably, those residence groups with enduring property represented the social circumstances and sufficient time for the seeds of permanent social inequality and wealth to germinate among the households. Also, it is likely that the newcomer arrivals at different times differentially favored residence groups with unequal degrees of longevity (Plog and Heitman 2010:19624). At Pueblo Grande, the conditions were ripe for wealth gaps and social inequality. Hundreds of years of occupation, 14 distinct habitation groups, and a sample of approximately 350 structures built with multiple styles of construction make Pueblo Grande an ideal context for the present research.

Grewe's Role

Many of the methods utilized in this investigation were initially developed as part of a study of domestic architecture at the Grewe site, a large Hohokam village located along the middle Gila River (see Figure 1). Excavations by Northland Research Inc. uncovered a large residential district in the heart of the village with more than 250 pithouses (Craig 2001a). A ceremonial precinct with a ball court and a communal cooking area used for ritual feasting was found directly adjacent to the residential district. Ceramic and chronometric evidence indicated that the site was occupied continuously from about AD 450 to 1100 (Henderson 2001). Throughout much of its occupation, Grewe was one of the largest Hohokam villages in the region, with an estimated peak population of between 800 and 1,000 residents (Craig 2001b). Following the collapse of the ball-court network in the late eleventh century, the site was abandoned and a large segment of the population is believed to have moved a short distance away (<1 km) and established residence at Casa Grande (Craig 2007).

Analysis of the Grewe house data focused on a sample of 132 well-preserved pithouses, all made of wattle and daub, similar to the S-1 style pithouses at Pueblo Grande. A wide variety of internal features was commonly associated with habitation structures, including hearths, floor pits, plastered floors, and benches or raised platforms (Craig 2001a:93). This variability in domestic architecture formed the basis for an examination of potential wealth differences

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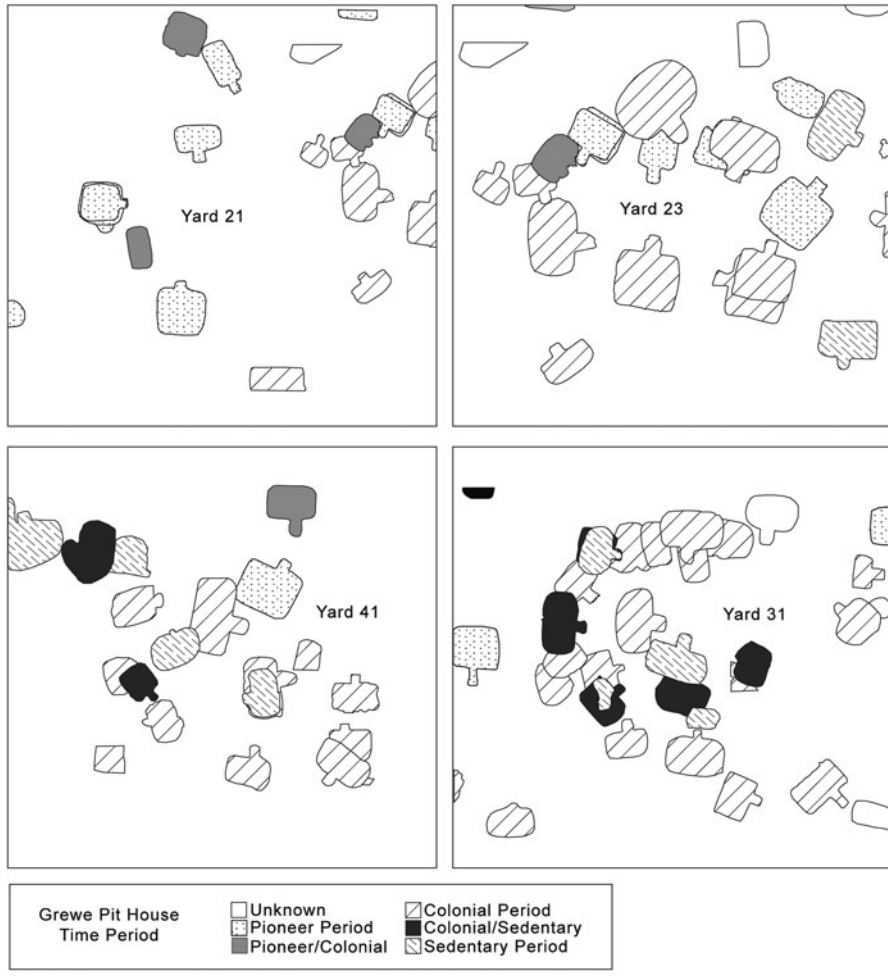

Figure 3. Courtyard groups at Grewe.

among households at Grewe (Craig 2001c). Labor costs were calculated for individual houses based on a combination of field data and published experimental data. Twenty house clusters were each arranged around a courtyard that served as shared domestic space for household activity (Figure 3). The smallest courtyard group (i.e., household) contained two pithouses and covered a total area of about 100 m^2; the largest contained 26 pithouses built over multiple centuries and covered a total area of more than 600 m^2.

Some courtyard groups were occupied for only one or two generations, whereas others were occupied for centuries. Their longevity implies a lasting recognition of place and the emergence of household property rights transferred across generations (Craig 2007, 2010). Household members presumably pooled labor, shared resources, and acted as a unified body in making decisions about food production and land tenure. Presumably they were also committed to maintaining their corporate holdings over time (Hayden and Cannon 1982).

The labor costs associated with building a typical structure at Grewe averaged 200–250 person-hours, with an overall range of 140–385 person-hours (Craig 2001c). Although the most labor-intensive house also happened to be the largest (21.9 m^2), it was also quite elaborate, with a 2 cm thick plastered floor and a raised wood-and-brush platform that covered the entire structure.

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The two Grewe courtyard groups with the largest area (>600 m^2), most houses (>20), and the longest-lived occupations (>200 years) contained the most labor-intensive houses (see Craig 2001a). One contained five of the 10 most labor-intensive houses, and the other contained houses that were, on average, 30%–50% more labor intensive than those in other courtyard groups. Their proximity to the communal cooking area and ball court led Craig (2007:458, 2010:81) to propose that wealthy households at Grewe may have sponsored feasts associated with ball court–related events.

Justification for Studying Domestic Architecture

Household inequality is generally measured in terms of differential access to valued goods, services, and status (Blanton 1995:108–109; Netting 1993:189; Wilk 1991:197–203). The methods used by archaeologists to measure inequality are diverse, and they reflect the importance of both material and immaterial forms of wealth (Price and Feinman, ed. 1995, 2010). There is increasing recognition that inequality can also vary by degree and kind (Ames 2007; Drennan et al. 2010). Consequently, it can take a variety of forms and may not be apparent in all classes of archaeological evidence (Price and Feinman 2010:6). Burial data, for example, might indicate a slight degree of differentiation, whereas domestic architecture or household artifact assemblages might indicate a much higher level (Drennan et al. 2010:46–64). The extent to which wealth differences were transmitted across generations is another factor that needs to be considered given that intergenerational wealth transmission is one of the defining characteristics of persistent social inequality (Borgerhoff Mulder et al. 2009; Bowles et al. 2010; Shenk et al. 2010).

Our approach focuses on the variability in construction costs of domestic architecture to study status and wealth differentials across Hohokam households. In many societies around the world, households of higher status and/or more wealth live in homes that are bigger, more extravagant, and better made than those composed of poorer and low-status members (Abrams 1989; Ames 2007; Kramer 1979). As Feinman and Neitzel (1984:57–59) found among 51 pre-state sedentary societies, large and ornate domestic architecture was often a marker of elite status. In contrast, less complex societies tend to build homes of similar form, composition, and energy expenditures per capita (Abrams 1989:54; Rapoport 1969; Wilk 1990). In our study, we measure and compare construction costs to determine their variability across households.

Concerning the cost of architectural construction, there are three complementary aspects to be kept in mind: dwelling size, construction materials, and extravagance. Generally, and at Pueblo Grande specifically, house size (i.e., roofed floor area) was a major contributor to the building costs of each structure. When all else is held constant, larger structures obviously require more building materials and labor inputs than smaller houses. It is also true that structures with the same roofed floor area need not be equal in construction costs. As described below, Hohokam houses were built with multiple styles distinguished in large part by the variation in construction materials, which incurred different expenses and probably withstood the elements variably. Variability in construction costs also entailed "luxurious" extras, such as elevated floors, benches, raised platforms for sleeping, and formally designated storage space. Some Hohokam homes were better built with more expensive and longer-lasting building materials and/or appointed with more lavish amenities. This variability in quality may also be emblematic of wealth and status differentials, and it can be captured by a calculation of relative cost (cost per m^2 of floor space).

Dwelling size can be related to status and wealth inequality because successful households often attract junior members, making the households of the wealthy larger than those of the poor (Wilk 1983:111). In turn, the labor of subordinates can contribute to the accumulation of wealth (Netting 1982; Wilk 1983). The larger residence memberships of high-status households consequently require more residential space, usually in the form of larger or more numerous houses.

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The association between status and house size, however, is not a simple one. Cross-culturally, house size can correspond with multiple factors, not just status and wealth (Ames 2007:497, 501; Blanton 1994; Feinman and Neitzel 1984; Smith et al. 2018:23). For instance, the size of a dwelling in many societies covaries with the number of inhabitants who resided in it (Cook 1972:16; Hassan 1981:63–77; Narroll 1962; Wilk 1983), which is an assumption commonly made by Hohokam scholars for deriving population estimates (Abbott and Foster 2003; Wilcox et al. 1981) and determining postmarital residence (Ensor 2013).

House size can reflect the amount of labor devoted to construction as well as how much help the builder received from kin and other social connections (Kramer 1979; Wilk 1983). In sedentary societies, the number and intensity of these ties tend to increase over time, thereby favoring members of the earliest-established households. A second expectation at the village scale corresponds to the order in which different residence groups were established. At Pueblo Grande for instance, the village expanded outward over time, with the longest-lived habitation areas near the village center and the youngest residence groups on the margins of the settlement. When large structures occurred, we would expect them among the longest-lived habitation areas near the center of the site.

If house size can be related to multiple, potentially interrelated factors—including the number of residents, the length of the occupation, as well as status and wealth—then house size alone is an insufficient factor for gauging the inequality in Hohokam society. It is for this reason that we consider construction style and elaborateness as well as dwelling size to be essential for this study.

Architectural Styles at Pueblo Grande

Pueblo Grande contained domestic structures that varied in size, shape, and method of construction, which led the SSI excavators to define and describe eight architectural styles at the site (Mitchell 1994). The construction of each style was made unique by the combination of (1) the presence/absence and different forms of house pits and (2) the various means by which the builders made use of locally procured building materials (wood, brush, adobe, and rock) to form the walls and roof. Differences in construction among the various architectural styles at Pueblo Grande are apparent in Figure 4, and more detailed descriptions can be found in our previous publication (Abbott et al. 2019:322–327).

Mitchell (1994:33) reports that SSI identified about 350 architectural features in the Hohokam Expressway corridor at Pueblo Grande. Of that total, 143 houses were sufficiently preserved to assign them to an architectural style and to calculate their construction cost. Severe damage caused by rebuilding within the long-occupied habitation areas and modern disturbance disqualified the others from further consideration. Our sample included every structure that could be assigned to an architectural type and for which its construction cost could be calculated.

Expectations

The results at Grewe illuminated clear evidence for social differentiation among the village households, manifested in the variability of construction costs for domestic architecture. The wealth parameters of entire courtyard groups were estimated by combining the construction costs for all contemporaneous pithouses in each courtyard group. The assumption was that the material wealth of each household was best reflected in its entire architectural portfolio (Craig 2010:78). Using Grewe as a guide, we expected similar or even more pronounced differences at Pueblo Grande due to the increasing social and political complexity in Hohokam society during the Late Sedentary and Classic periods and because Pueblo Grande probably was—both literally and figuratively—at the center of those developments. At Pueblo Grande, however, treating architectural costs for entire residence groups as units of analysis was not feasible due largely to problems with preservation. It would be impossible to calculate the construction costs of all contemporaneous structures within each HA. Within the confines of these long-lived residential units, later building episodes impacted the material remains of earlier structures, and modern disturbances damaged

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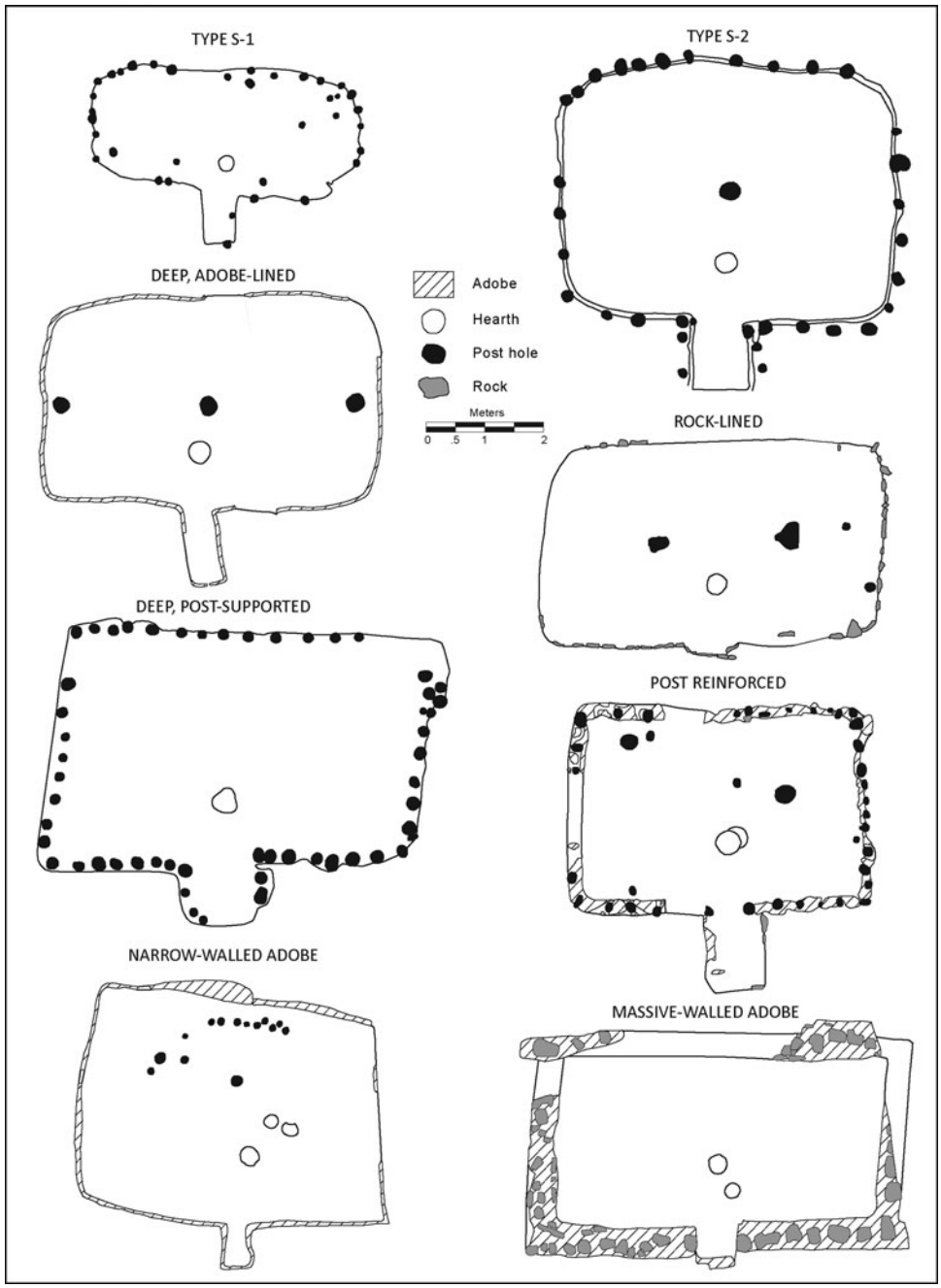

Figure 4. Architectural styles at Pueblo Grande.

both earlier and later features as well. A strict application of the Grewe analytical strategy made little sense for Pueblo Grande, but the Grewe findings did lead to useful expectations for the present study.

In addition to the results at the scale of courtyard groups, Craig's (2004) analysis at Grewe revealed patterning among individual houses. The Grewe findings indicated that the households (courtyard groups) with the highest total

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construction costs were also the households that typically included the largest and most elaborate dwellings in the settlement. The Grewe study implied that tracking wealth differentials was possible at the scale of individual structures, which fit with the strengths of the Pueblo Grande database.

If wealth differentials were expressed at Pueblo Grande with the construction of large (size) and extravagant (relative cost) houses, then several findings would be expected. First, we would anticipate notably large and extravagantly built dwellings to be associated with some but not all HAs, and we would expect these relationships to have persisted over time. Second, well-established households with a history of perseverance and accumulated social and economic advantages are expected to have been wealthier than relative newcomers. Consequently, because occupation length at Pueblo Grande was related to the distance from the central precinct of the village, we would expect the HAs with the largest and most elaborate houses to be closest to the platform mound (see also Wilcox 1991:268). Finally, because Pueblo Grande was the most prominent village inhabited during a time of likely increased social and political differentiation, we expect the large houses to be bigger and the elaborate structures to be more extravagant at Pueblo Grande than those at Grewe.

Methods

Our work is an outgrowth of architectural energetics, which involves quantitative labor-cost reconstructions. As an assemblage of various raw materials and manufactured components, architecture has a composite cost of procuring, processing, transporting, and assembling raw materials into the finished product. Architectural energetics calculates the construction expenses into a common unit of measurement for analytical comparison—in other words, a single analytical attribute in the form of labor-time expenditures.

Architectural energetics avoids a subjective assessment of architectural outlays in comparative research by relying on three lines of evidence accessible to the archaeologist. First, the kinds and amounts of raw materials used in house construction are determined based on excavation data and field maps. Second, the key tasks associated with obtaining and assembling the building materials are identified based on ethnographic data. Third, the labor requirements associated with the various construction tasks are derived from replicative experiments (Craig 2001c:116; Erasmus 1965). We adopt this objective and comparative approach to develop a methodology to calculate construction costs of various styles of Hohokam domestic architecture.

Various elements of our methodology have been published previously as supplementary materials linked to our earlier article (Abbott et al. 2019). They comprise a narrative and other texts to usher the analyst through the construction-cost calculations. The texts include a list of defined variables and the formulas with which to calculate them. Constants, such as wall height and the rate of adobe mixing, are also listed. In addition, three examples of the costs measured for individual structures will aid future applications.

There are many calculations needed to measure the labor costs for each of the Pueblo Grande structures. We rely on base rates obtained from experimental archaeology that translate the amounts of building materials into labor costs measured in person-hours. There were three primary components for construction costs: (1) the labor to dig and mix the adobe; (2) the labor to cut and transport the wood; and (3) the labor to erect the walls, floor, roof, and internal features of the structure. By summing these various expenditures, we derive the total labor cost of the structure. Also, an estimate of the relative cost can be computed by dividing the total cost of the building by the total floor space.

Results

Our analysis was designed, in part, to test if several expectations related to wealth and status differentials were evident in the architectural details at Pueblo Grande. Among the expectations were differences in the architectural costs and extravagance across the Pueblo Grande habitation areas as well as the long-term accumulation of social and economic advantages differentially enjoyed across households and expressed in the

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architectural history of the village. We also took advantage of the comparable data previously amassed at Grewe to determine if the architectural indicators of wealth and status recognized there during the Sedentary period were similarly apparent during the contemporaneous part of the occupation at Pueblo Grande. In addition, we compare the Pueblo Grande and Grewe results to examine if imbalances between irrigable land and population size possibly set limits to resources, thereby stimulating social inequality. Before moving to a discussion of these topics, we first examine several findings pertaining to structure size and function.

Size and Function

We began by calculating size (square footage) of the floor and considering its distribution. The distribution of house sizes at Pueblo Grande (Figure 5) fit well with Hohokam structures in general. Wilcox and others (1981:158) and Crown (1985:76) found that typical Hohokam dwellings had floor areas greater than 10 m^2, with small structures being much rarer and likely used for a special purpose. In our database, nine cases had floor areas under 10 m^2 (Table 2), and they could be divided into two groups.

The smallest four rooms had all of the largest relative costs among all structures at Pueblo Grande, and none had hearths. Crown (1985) noted that small structures with insubstantial construction—often lacking roof supports and built with unlined hearths—were found on the outskirts of Hohokam settlements. They possibly served as places for the purification of warriors or as women's shelters for puberty, menstruation, or childbirth. Their peripheral location and makeshift construction, however, poorly mirrors the smallest examples in our dataset. Instead, the small structures at Pueblo Grande were (1) built inside HAs, (2) substantially built (as indicated by the high relative cost), and (3) not heated with a hearth. These characteristics fit well with expectations for storerooms (Crown 1985:83; Doyel 1981:27–31; Haury 1976:68).

The five small structures in the second group were all very near 10 m^2 in size (see Table 2). All but one had a hearth—the exception was a Massive-Walled Adobe room in HA-8. It had the next highest relative cost, and we interpret it as having been a large storeroom. We also conclude that the other four examples were small but otherwise typical structures, perhaps providing housing for individuals (Crown 1985:84; Haury 1976:62, 68).

Pueblo Grande Differentials

As a first and general assessment of the wealth distribution at Pueblo Grande, we extracted the total cost for all of the 106 Classic period habitation structures in our database and calculated a Gini coefficient. The Gini index is a standard quantitative measure of inequality (Smith et al. 2018:25). Its values range from zero (perfect equality, all units have the same amount of wealth) to near 1 (complete concentration, one unit has nearly all of the wealth). The Gini score for the Classic period structures at Pueblo Grande was surprisingly low (0.19), signifying a general uniformity of domestic construction costs across the village and a near absence of social differentiation reflected in the house data. The corresponding score for the 22 Sedentary period Type S-1 pithouses in our sample was even smaller (0.12). It emphasized social equality at Pueblo Grande over the long term during the Sedentary and Classic periods. Admittedly taken aback by the difficulty of interpreting those results, we sought further refinement by digging more deeply into the construction data.

Our search for architectural expressions of possible wealth and status differentials at Pueblo Grande continued by plotting the total labor cost for each structure by nine categories of architecture. The categories correspond to a temporal sequence of architectural styles, including Type S-1 pithouses of the Sedentary period; Type S-2, Rock-Lined, and Deep Post-Supported pithouses of the very Early Soho phase; Deep, Adobe-Lined pithouses and Post-Reinforced surface structures of the Early Soho phase; Narrow-Walled Adobe pithouses of the Late Soho phase; Massive-Walled Adobe structures of the Civano phase; and finally, Postclassic dwellings (i.e., Narrow-Walled Adobe and Deep, Adobe-Lined pithouses built during the latest temporal interval at Pueblo Grande).

When we divided the plot of total labor cost for each structure using the median cost for all structures in our sample (309 person-hours),

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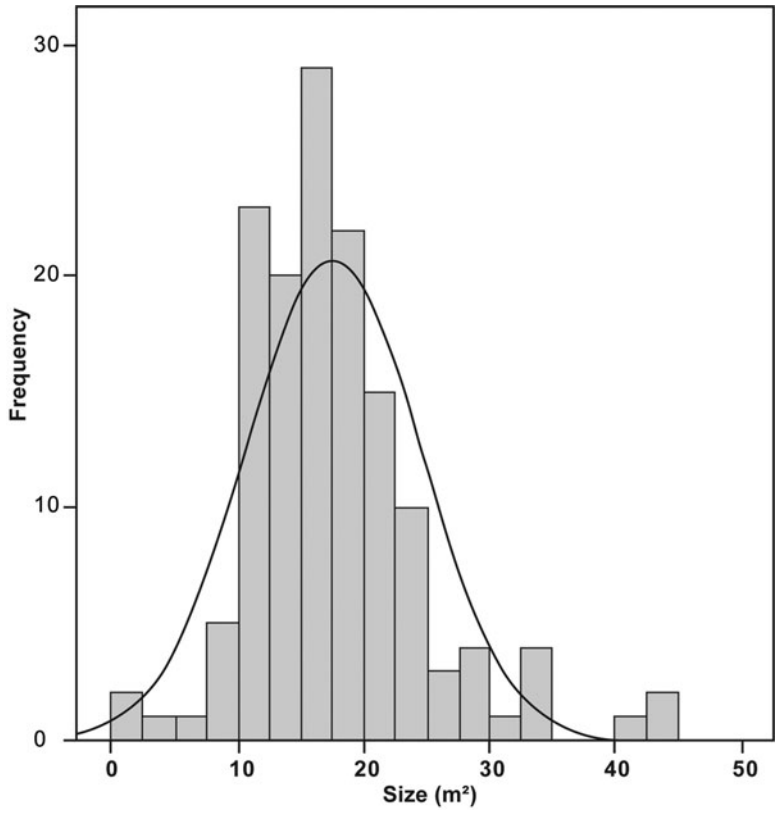

Figure 5. Histogram of structure size.

nearly all of the Sedentary S-1 pithouses fell below the median (Figure 6). The total cost of the examples of all of the other architectural styles also plotted below or near the median, with the exception of the Post-Reinforced and Massive-Walled Adobe cases. The total costs for these two architectural styles were notably more diverse, which is a point we return to below.

Here, we note that the variability in total labor across our entire sample was largely explained by structure size. When we plotted size against the total labor (Figure 7a), a strong positive correlation was clearly apparent (Pearson's $r = 0.821$). About two-thirds of the variation in total labor costs was explained by size alone ($r^2 = 0.675$).

The high diversity in the total labor costs of the Post-Reinforced and Massive-Walled Adobe structures corresponded to several unusually large houses. All of these big Post-Reinforced and Massive-Walled Adobe dwellings were found in HA-6 (see Figure 6). This HA was also distinguished among its peers in the SSI project area as having been one of the longest-inhabited residential groups (established during the Sedentary period), and it was the closest to the village's central precinct and platform mound. It also

Table 2. Small Structures at Pueblo Grande.

Feature	HA	Architectural Style	Size m^2	Relative Cost	Hearth
669.22	5	Massive-walled	1.92	45.17	none
2010	5	Massive-walled	2.30	56.68	none
990	2	Narrow-walled	3.51	27.77	none
904	2	Massive-walled	7.24	32.62	none
558	9	S-1 pithouse	9.57	21.14	present
1230	7	Post-reinforced	9.76	18.35	present
780	6	S-1 pithouse	9.83	21.08	present
616	8	Massive-walled	9.85	26.32	none
3325	6	Narrow-walled	9.90	18.08	present

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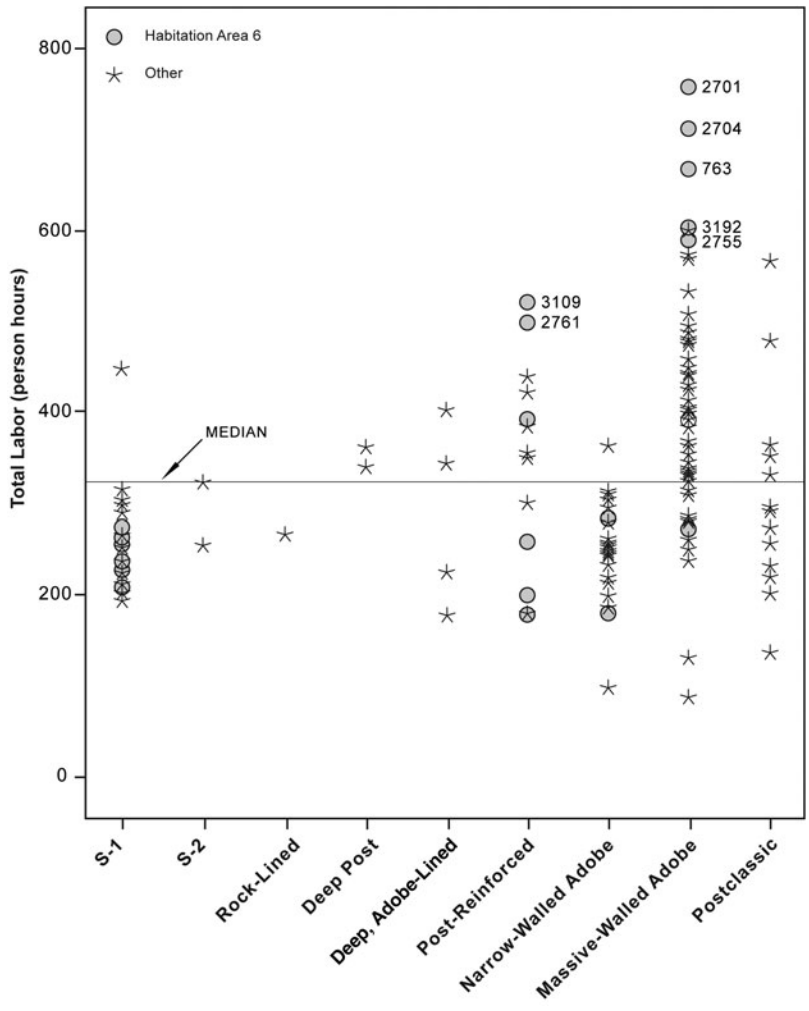

Figure 6. Total labor cost by architectural style (median = 309).

contained Feature 2795—the only example of an especially large, enclosed, and probably unroofed court found in the SSI project area (Figure 8).[2] Such enclosures, albeit much larger in size, were common in the ritually charged space atop the platform mound (Downum and Bostwick 2003).

HA-6's distinction may also have been a long-term one, lasting for 250 years from the Early Soho to the Civano phase. There are no extra-large Narrow-Walled Adobe constructions of the Late Soho phase preserved in HA-6 (see Figure 6), which muddles an otherwise strong pattern of outsized structures in HA-6 over time. We can only speculate that distinctively large narrow-walled cases were built in HA-6 but did not survive in the archaeological record. If so, the HA-6 occupants continuously distinguished themselves from their neighbors via their occupancy of notably larger dwellings for more than two centuries (from the Early Soho–Post-Reinforced, to possibly the Late Soho–Narrow-Walled Adobe, to the Civano–Massive-Walled Adobe).

The next question we asked was whether the architecture in HA-6 or elsewhere was particularly extravagant in its cost per square meter. When we plotted the relative costs for the nine architectural/temporal categories, most of the categories included structures with relative costs that fell only below or near the median

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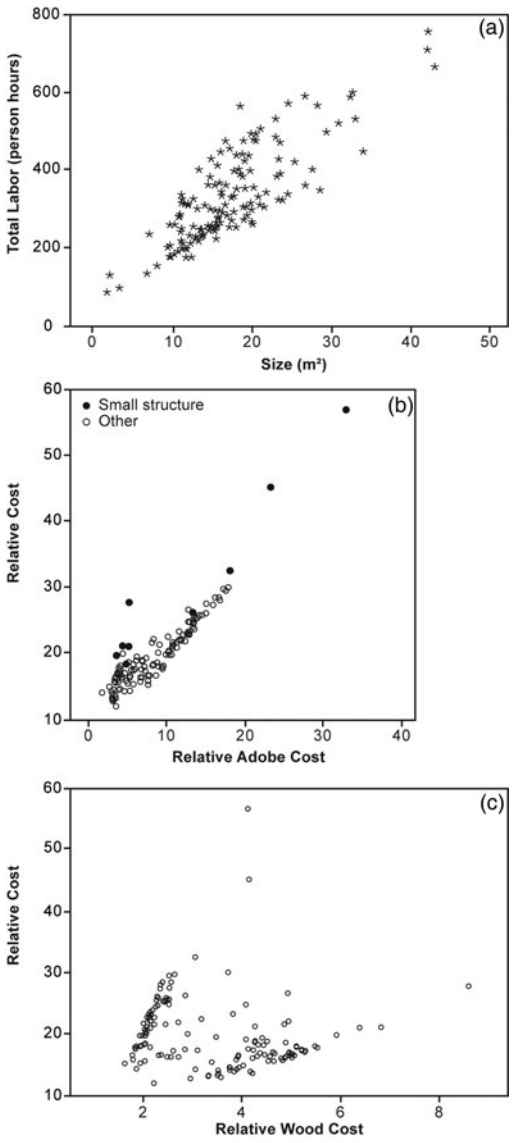

Figure 7. Scatterplots: (a) total labor cost by structure size, (b) relative cost by relative adobe cost, and (c) relative cost by relative wood cost.

value (19.98 person-hours/m^2). Only examples of the Post-Reinforced, Narrow-Walled Adobe (both Late Soho and Postclassic), and the Massive-Walled Adobe structures were characterized by high relative costs (Figure 9). There were two extreme outliers among the Massive-Walled Adobe buildings (Features 2010 and 669.22). Both were in HA-5, and both were extremely small (see below).

As we dissected the variation in relative cost, there were three findings of particular note. They pertained to (1) the underlying factors that contributed to the differences in relative cost, (2) the two extreme outliers and other small rooms at Pueblo Grande, and (3) additional patterning that further distinguished the architecture in HA-6.

Underlying Factors. One factor alone, adobe costs (digging, mixing, and applying the adobe), accounted for nearly all of the variation in relative costs among the various architectural styles. In short, Post-Reinforced, Narrow-Walled Adobe, and Massive-Walled Adobe structures often had higher relative costs because they were constructed with more adobe per square meter than the other architectural styles. A clear linear relationship was exhibited between relative cost and relative adobe (RELADOBE = adobe/m^2; Figure 7b), which was associated with a Pearson's $r^2 = 0.843$. A similar relationship between relative wood costs (RELWOOD = wood/m^2) and relative cost did not exist (Figure 7c).

Small Outliers. The two extreme outliers in Figure 9 were the smallest two structures in our database. Each had floor areas less than 2.5 m^2. These tiny spaces were furnished without a hearth and were almost certainly used as storerooms. They were made with solid adobe walls, and their extreme relative cost values were probably explained by our analytical procedures. All Massive-Walled Adobe structures, regardless of size, were assumed to have had walls that stood 1.8 m high.[3] Based on that assumption, an extreme amount of adobe was used to build the walls relative to the square footage of those tiny rooms.

Returning to the correlation between relative cost and the relative amount of adobe, it was clear that the smallest structures were out of place relative to the larger habitation rooms (see Figure 7b). When we eliminated the nine small structures (see Table 2) from the calculations, a Pearson's $r = 0.938$ ($r^2 = 0.880$) was associated with the distribution. Consequently, when the anomalous small structures were removed, nearly all (88%) of the variation in the person-hours/m^2 across all of the architecture styles was explained by the amount of adobe/m^2.

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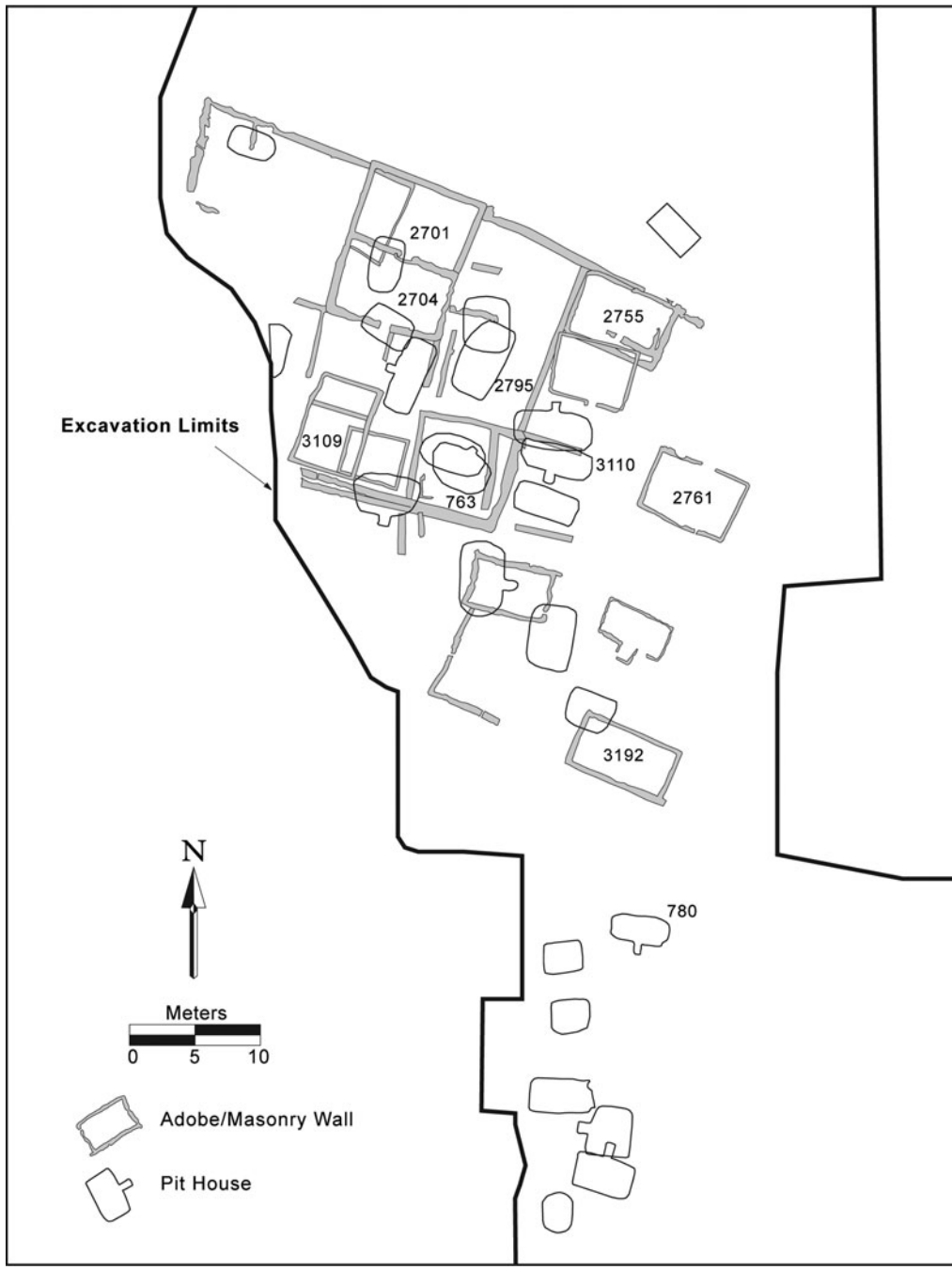

Figure 8. HA-6 at Pueblo Grande.

This result highlights the great expense incurred during the Civano phase when Massive-Walled Adobe structures were built with towering adobe walls surrounding the compound of each HA. At Pueblo Grande, a considerable part of the expense for erecting Massive-Walled Adobe rooms was reduced by the builders when they added immediately available slabs of

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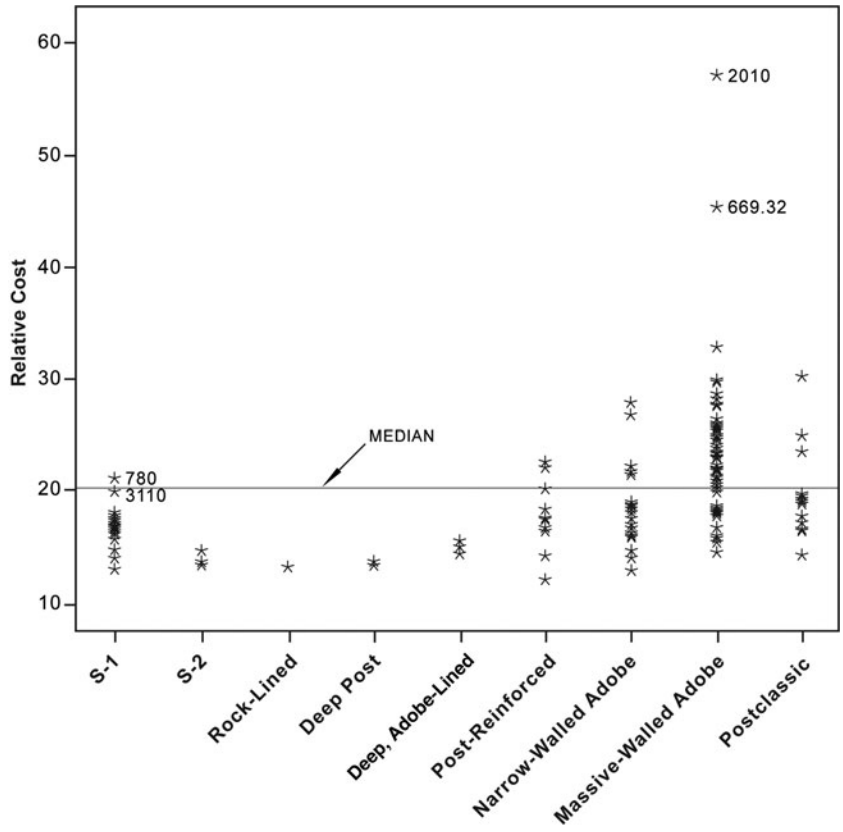

Figure 9. Relative cost by architectural style (median = 19.98).

indurated caliche to make up about 30% of the volume in their walls. Across the Hohokam territory, massive-walled compound rooms and the surrounding compound walls were common during the Civano phase (e.g., Gregory 1987:208), and they were typically made with solid adobe (Wilcox and Shenk 1977). Such construction undoubtedly pushed the relative cost even higher.

Another Distinction for HA-6. The graph in Figure 9 also pointed to a further distinction for HA-6. Among the Sedentary period S-1 pithouses, two structures (Features 780 and 3110) in HA-6 stood out as having unusually large relative costs. Feature 780 was actually located among a group of pit structures situated 15–20 m south of the main area of HA-6 (see Figure 8). It may have been part of a separate Sedentary period residence cluster that did not persist into the Classic period or that became consolidated into HA-6 during the Soho phase. Feature 780 was one of the small structures at Pueblo Grande listed in Table 2. Its high relative cost corresponded, in part, to an especially thick floor plaster that drove up the adobe costs, but it was also attributed to the structure's limited floor area. Like most other S-1 pithouses, Feature 780 utilized two main roof supports and a single primary roof beam. Consequently, the wood costs to build it were similar to those for other, larger pithouses but at a higher cost per m^2.

The high relative cost for constructing Feature 3110, in contrast, could not be explained by a diminutive size. Its 12.8 m^2 of floor space was well within the "normal" range of Hohokam pit dwellings. What distinguished it was an unusually thick plastered floor and post-supported internal benches that covered more than a third of its floor space, mostly in the back of the structure. In this way, Feature 3110

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was unique among all other structures excavated at Pueblo Grande. Internal post-supported furnishings were uncommon at Pueblo Grande. When present, they typically covered only a small percentage of the floor space (the next largest covered 19%).

Comparisons to Grewe

The Grewe analysis showed previously that pithouse size, total cost, and elaborateness of construction distinguished some Preclassic courtyard groups from others within that village, and those differences persisted over time. On that basis, the emergence of status differentiation and wealthy households within the Grewe community became apparent in the architectural details (Craig 2001c, 2007). We next sought to determine how the Sedentary period architecture at Grewe and Pueblo Grande were similar to or different from each other.

The boxplots in Figure 10, as well as the coefficients of variation in Table 3, show that the variability in the total cost, size, and relative cost were all greater among the Grewe pithouses than those at Pueblo Grande. These findings correspond to the Gini index calculations presented above as well as to a wide gap in Gini scores for house size reported by Pailes (2018:Figure 6.3) between the Salt River and Gila River valleys during the Sedentary period. The Gini values for the Salt River settlements were all below approximately 0.20, and above approximately 0.25 for the Gila River communities. All of the evidence together shows that some Grewe pithouses were large and others were small. Some domestic structures were expensive, and others were much less so. And some were built lavishly or made more durable when others were not, signifying a degree of social differentiation within the Grewe community. The variation at Pueblo Grande was less heterogeneous, implying less social differentiation expressed by the architectural dissimilarities. When measured against the Grewe architecture, Pueblo Grande house size and total labor costs were uniformly greater,

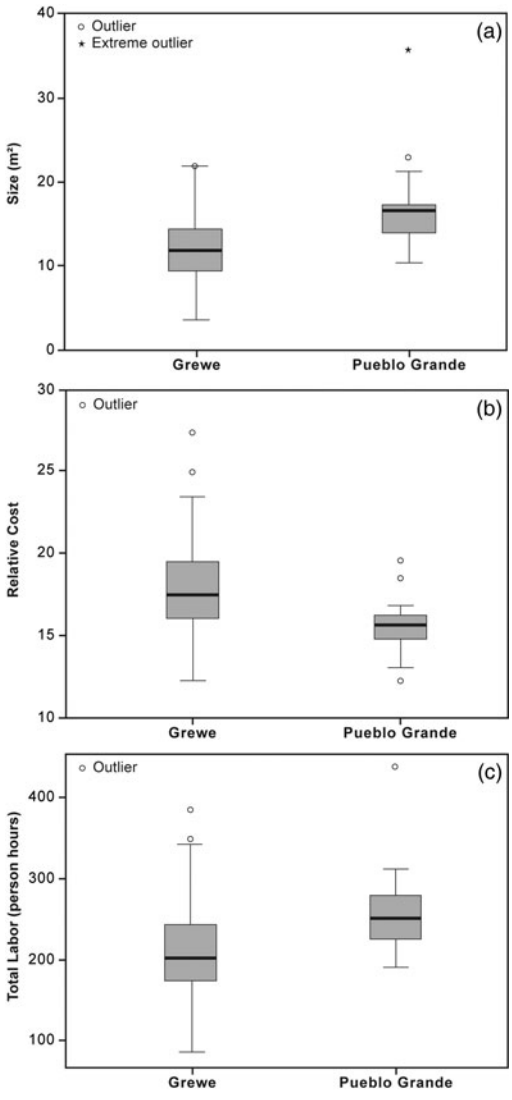

Figure 10. Boxplots comparing Grewe and Pueblo Grande: (a) structure size, (b) relative cost, and (c) total labor.

Table 3. Comparison of Grewe to Pueblo Grande.

Site	Mean	Std. Dev.	CV	t	df	Prob.
Total Cost (person-hours)						
Pueblo Grande[a]	264.5	51.6	19.5	3.77	152	0.000
Grewe	211.3	55.4	26.2			
Size (m^2)						
Pueblo Grande[a]	16.7	5.2	31.1	4.83	152	0.000
Grewe	12.2	4.0	32.8			
Relative Cost (person-hours/m^2)						
Pueblo Grande[a]	15.8	1.7	10.8	4.82	152	0.000
Grewe	17.3	2.6	15.0			

[a]includes Type S-1 pithouses only.

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implying the Sedentary period households at Pueblo Grande were typically wealthier than their Gila River neighbors.

The high relative costs at Grewe (see Figure 10b) are partly associated with the "small-structure" effect described above. But they also reflect the elaborateness of many of the pithouses, including both small and large structures. Most of the small structures with high relative costs had plastered floors and benches or platforms that covered at least half of the floor. Benches and platforms were common in large structures as well, particularly habitation structures associated with the two long-lived courtyards discussed previously (Craig 2001b: Figure 6.28). In general, raised floor features were far more common at Grewe than at Pueblo Grande. Almost a third of the houses at Grewe had benches or platforms that covered at least 35% of the floor, whereas the only pithouse at Pueblo Grande with a bench or platform covering that much area was Feature 3110 (see above).

Theoretical Fit

The architectural differences during the Sedentary period between Pueblo Grande and Grewe were clear and unequivocal, but they seem at odds with theoretical expectations. The model examined here claims that where access to productive land is made scarce by population growth, the stage is set for the emergence of social inequality (Bogaard et al. 2018:203; Flannery and Marcus 2012; Goody 1976:97; Kohler and Higgins 2016:691; Kohler et al. 2017; Smith et al. 2018:10). As it turns out, however, theory and Hohokam architecture fit neatly together.

The prime mover for the inequality model is increases in population levels, which at Pueblo Grande were experienced during several waves of immigration, including the first one at the end of the Sedentary period. These influxes presumably were a constant strain on social institutions and economic arrangements, which may have included access to irrigated farmland. The pressure of unequal access to a vital resource may have established the conditions for social inequality. The model, however, raises the question of why we do not see inequality more clearly in the architectural variation at Pueblo Grande. An important new study by Christopher Caseldine (2020) of the Salt River hydraulic infrastructure helps us to understand.

One of Caseldine's (2020) principal findings is that water scarcity was not a major limiting factor for agricultural production along the Salt River during the Sedentary period. The supply of water was almost never insufficient to irrigate all of the planted fields. Inequalities, therefore, were probably relatively few. Interestingly, the masterful balance between water demand and supply along the Salt River was unachievable along the Gila River, where the stream flows were just one-third of the Salt River discharges, and the narrow terraces made productive land an unevenly dispersed and insufficient resource. Hunt's (2007) simulation of maize production predicted that water shortages regularly plagued the Gila farmers (see also Zhu et al. 2018:743–744). Consequently, unlike the Salt River valley, architectural expressions of inequality were salient along the Gila River valley. Consequently, our comparative results now make sense. During the Sedentary period, wealth (large and costly houses) was common at Pueblo Grande and wealth differentials were customary at Grewe.

Discussion

Our methods were designed for application across all of the Pueblo Grande structures, allowing comparisons of the construction costs of different house styles, and, consequently, tracking the architectural labor costs over time. Moreover, we expect these methods will, with only minor adjustments (e.g., distance to obtain building materials), be applicable across the Hohokam culture area and elsewhere. As exemplified by our anlaysis of Grewe and Pueblo Grande, the Pueblo Grande dataset may serve as a baseline for comparison with future architectural databases from new excavation projects or from extant archival collections. Indeed, the abundance of high-quality evidence from Pueblo Grande will serve as a measuring stick against which even small datasets can be usefully assessed as being more or less like Pueblo Grande.

Our analysis showed that most of the overall construction cost for each of the Pueblo Grande

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houses was accounted for by structure size, as measured by the square footage of the floor space. To some readers, this result might imply that the analytical effort to measure house size alone would be sufficient to capture the significant cost differentials among Hohokam domestic structures. By this logic, a simple square-footage calculation of floor length by floor width is all that is needed. In addition, the concerted effort spent to make the detailed measurements used to calculate adobe, wood, and building costs would be superfluous for many future studies. We think, however, that this reasoning would be a mistake. It is because we made the measurements that we can be quite confident that the Pueblo Grande architecture was largely undifferentiated by elaborate relative costs. We also do not expect the architecture across the Hohokam culture area to necessarily conform to the Pueblo Grande cases. Indeed, at Grewe, the relative expenditures for constructing pithouses were diverse, and most structures had higher relative costs than at Pueblo Grande. It was the diversity and the high relative costs at Grewe that were partly related to status-based differentials. At Grewe, structure size alone leaves out much of what is important about construction costs.

What we found at Pueblo Grande among the domestic architecture, which had not been noticed in its entirety before, were architectural differences probably associated with wealth and status differentiation across the residence groups. One habitation area—HA-6—was exceptional in several ways. It stood out from its peers for 300 years, from its inception in the Sedentary period through the end of the Late Classic period. Two of its Sedentary pithouses were distinguished by extreme costs per square meter. Both had thickly plastered floors, and one was built with raised benches covering one-third of the internal space—an extravagance not seen in any other structure excavated at Pueblo Grande. Two exceptionally large Post-Reinforced structures were built during the Early Soho phase. Five extra-large Massive-Walled Adobe rooms dominated HA-6 in the Late Classic period along with a unique walled, unroofed, open-air court. The five largest houses in our sample, which required roughly 50%–90% more labor to build than the typical house, were all located in HA-6. These exceptionally large houses were probably associated with larger households, with more people and larger potential labor pools at their disposal (Abbott and Foster 2003:41). HA-6 also contained a large, walled-in, unroofed courtyard (Feature 2795), which required almost as much labor to build as the typical house. Consequently, access to domestic labor appears to have been a key source of differentiation between households at Pueblo Grande. HA-6 was one of the longest-inhabited residence units in the SSI project area, and it was the habitation area closest to the village's central precinct and platform mound. Each of these unusual occurrences on its own might raise a passing interest, but their congregation in just one residence group is a clear sign that the households of HA-6 continuously benefited from the form of social inequality that architectural distinctions reflect (see also Foster et al. 1996:32).

One of the advantages of a labor-based approach for measuring household inequality is using a common unit of comparison applicable to different generations of house builders. Consequently, we can document the extent to which households living in HA-6 were able to maintain their position at or near the top of the social hierarchy for centuries. Such persistence is a hallmark of institutionalized inequality (Price and Feinman 2010:2). It is also evidence for the intergenerational transmission of wealth (Bowles et al. 2010). In most instances, however, the wealth was not in the architecture. The architecture was not passed down from one generation to the next, with the possible exception of Massive-Walled Adobe rooms, which were more durable and likely had longer use-lives than other architectural styles (Abbott and Foster 2003:41–45). The primary form of material wealth transmitted across generations was probably land that came with household membership, including both residential property and agricultural fields (Craig 2010). Like many Hohokam villages, Pueblo Grande was internally structured, with habitation areas arranged in a semicircular plan around a central plaza and platform mound (Abbott and Foster 2003:25). The larger, more labor-intensive houses in HA-6 suggest that the residence unit may have been part of a high-status residential district bordering the platform

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mound complex (Foster et al. 1996:41). Further assuming that more people lived in these exceptionally large houses than in the typical house, the residents of HA-6 may have had access to larger and better tracts of arable land, given that studies of intensive agricultural societies have consistently shown a strong correlation between the size of a household and the size of its land holdings (Douglass and Gonlin 2012:13–15; Netting 1982, 1993:85–87).

At both Pueblo Grande and Grewe, high-status households were distinguished architecturally by larger and, in some instances, more elaborate houses. They were also distinguished by where they lived—near the communal cooking area and ball court in the case of Grewe, and adjacent to the platform mound complex in the case of Pueblo Grande. The proximity of these households to public areas for ceremonial expression lends support to the idea that ritual participation played a key role in the emergence and persistence of inequality (Blanton 1995:121–123; Mills 2000:8–9; Vésteinsson et al. 2019). Nearby households presumably had greater admittance to the facilities and exercised greater control over their use. They were likely also among the main sponsors and beneficiaries of any ritual events that took place under their watch. In some instances, high-status households may have even been involved in planning and performing the events, as indicated by the presence of a large, walled-in courtyard in HA-6 that was well-suited for rituals and ceremonies, similar to courtyards on the platform mound (Downum and Bostwick 2003:194). Importantly, these ritual spaces represent public arenas where inequality and status are frequently negotiated and confirmed (Vésteinsson et al. 2019:188).

Our comparison of the Sedentary period architecture at Pueblo Grande and Grewe also proved useful for examining a model for the emergence of social inequality in middle-range societies. The model stipulates that population growth can upset the human/resources ratio, leading to scarcities of vital resources. In turn, should differential access to essential assets develop, advantages could accrue to only some community members, leading to the emergence of social differentiation. Just as the model would predict, the Pueblo Grande residents, who enjoyed an abundant water supply, lived in relatively large homes without much distinction among themselves. In contrast, the people of Grewe likely felt the pressure of population increase on the supply of water and irrigable land, which led to wealth dissimilarities manifest in the highly variable sizes, total costs, and relative costs of their abodes.

Conclusion

Studies of middle-range societies, such as the Phoenix Basin Hohokam, offer the opportunity to investigate the origins and evolution of institutionalized inequality. In particular, the size and elaborateness of construction of domestic architecture can reflect differences in household status.

For this article, we had a threefold purpose. First, we recognized that exploring the development of inequality requires an ability to detect it in the archaeological record in as many ways and in as many cultural contexts as possible. Despite the social and economic complexities in Hohokam society, signs of permanent inequality are rare, and they are the subject of considerable debate. Spurred by previous success with the architectural variation in Preclassic pithouses at Grewe, we developed methods to measure the construction costs of various styles of Hohokam domestic buildings based on archival data. We believe our flexible approach, which can include various kinds of house construction, can be easily adapted and applied to case studies from across the Hohokam territory and possibly beyond.

Second, we analyzed the construction costs for domestic architecture at Pueblo Grande and Grewe. Our analysis showed evidence for institutional inequality in the architectural remains in HA-6 as compared to the other residence groups at Pueblo Grande. The data suggested that the conditions that promoted inequality may have been related to the advantages enjoyed by well-established and long-lived residential groups over newcomers. These included land tenure and the well-established social networks with which to mobilize labor. Wealth in land and its intergenerational transmission are keys to persistent inequality in societies practicing intensive agriculture. In addition, the spatial associations between high-status households and ritual

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facilities (i.e., the ball court at Grewe, the platform mound at Pueblo Grande) signal that control over public functions may have been a path to political advancement for Hohokam leaders and their families.

Third, we examined a model about the emergence of social inequality in premodern agricultural societies, and its fit to the Hohokam case. A comparison of the Sedentary period architecture at Pueblo Grande and Grewe proved to match theoretical expectations quite well, thereby supporting the model and illustrating the utility of our approach for measuring architectural construction costs for studying household wealth and social inequality.

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Data Availability Statement. The SSI Pueblo Grande materials are curated at the Pueblo Grande Museum in Phoenix, Arizona. A file of the architectural data recorded for this study will be made available on request.

Notes

1. Regarding the dating of the Civano phase in Table 1, the start date is controversial. Many researchers accept the first arrival of Gila Polychrome pottery in the Phoenix Basin as a start date of AD 1300 (e.g., Doyel 1981; Sires 1987:173–175). Others, including ourselves, take the rapid adoption of Massive-Walled Adobe surface structures surrounded by compound walls to fix the start date at AD 1275 (Abbott and Foster 2003). The difference, however, is immaterial for our discussion here.

2. Feature 2795 was not included in our analysis because it probably was not roofed. As a wall-enclosed, rectangular construction with a prepared floor but without postholes for roof supports, it was distinguished from the irregularly shaped, open plazas commonly found inside Civano phase compounds (e.g., Foster et al. 1996). Bounded by the structures around them, the Civano phase plazas were the spatially organized equivalents to the Preclassic courtyards (Sires 1987). There are no known Preclassic analogs for the Civano phase courts.

3. This and other constants pertaining to architectural building costs are discussed in the supplemental materials published with our previous article (Abbott et al. 2019).

References Cited

Abbott, David R.
2000 *Ceramics and Community Organization among the Hohokam*. University of Arizona Press, Tucson.
2003 The Politics of Decline in Canal System 2. In *Centuries of Decline during the Hohokam Classic Period at Pueblo Grande*, edited by David R. Abbott, pp. 201–228. University of Arizona Press, Tucson.
2009 Extensive and Long-term Specialization: Hohokam Ceramic Production in the Phoenix Basin, Arizona. *American Antiquity* 74:531–557.
2010 The Rise and Demise of Marketplace Exchange among the Prehistoric Hohokam of Arizona. In *Archaeological Approaches to Market Exchange in Pre-Capitalist Societies*, edited by Christopher P. Garraty and Barbara L. Stark, pp. 61–84. University Press of Colorado, Boulder.

Abbott, David R., Douglas B. Craig, Hannah Zanotto, Veronica Judd, and Brent Kober
2019 Calculating Hohokam Domestic Architecture Building Costs to Test an Environmental Model of Architectural Changes. *American Antiquity* 84:317–335. DOI:10.1017/aaq.2018.94.

Abbott, David R., and Michael S. Foster
2003 Site Structure, Chronology, and Population. In *Centuries of Decline during the Hohokam Classic Period at Pueblo Grande*, edited by David R. Abbott, pp. 24–47. University of Arizona Press, Tucson.

Abbott, David R., Douglas R. Mitchell, and Jamie A. Merewether
1994 Chronology. In *The Pueblo Grande Project*, Vol. 2, edited by Douglas R. Mitchell, pp. 157–254. Publication in Archaeology No. 20. Soil Systems, Phoenix, Arizona.

Abbott, David R., Alexa M. Smith, and Emiliano Gallaga
2007 Ballcourts and Ceramics: The Case for Hohokam Marketplaces in the Arizona Desert. *American Antiquity* 72:461–484.

Abrams, Elliot M.
1989 Architecture and Energy: An Evolutionary Perspective. In *Archaeological Method and Theory Volume 1*, edited by Michael B. Schiffer, pp. 47–87. University of Arizona Press, Tucson.

Adams, Robert McCormick
1966 *The Evolution of Urban Society*. Aldine Press, Chicago.

Ames, Kenneth M.
2007 The Archaeology of Rank. In *Handbook of Archaeological Theories*, edited by R. Alexander Bentley, Herbert D. G. Maschner, and Christopher Chippindale, pp. 487–514. Altamira Press, Lanham, Maryland.

Bayman, James M.
2001 The Hohokam of Southwest North America. *Journal of World Prehistory* 15:257–311.

Bayman, James M., and Alan P. Sullivan
2008 Property, Identity, and Macroeconomy in the Prehistoric Southwest. *American Anthropologist* 110:6–20.

Blanton, Robert, E.
1994 *Houses and Households: A Comparative Study*. Plenum, New York.

1995 The Cultural Foundations of Inequality in Households. In *Foundations of Social Inequality*, edited by T. Douglas Price and Gary M. Feinman, pp. 105–128. Plenum Press, New York.

Bogaard, Amy M., Amy Styring, Jade Whitlam, Mattia Fochesato, and Samuel Bowles
2018 Farming, Inequality, and Urbanization: A Comparative Analysis of Late Prehistoric Northern Mesopotamia and Southwestern Germany. In *Ten Thousand Years of Inequality: The Archaeology of Wealth Differences*, edited by Timothy A. Kohler and Michael E. Smith, pp. 201–229. University of Arizona Press, Tucson.

Borgerhoff Mulder, Monique, Samuel Bowels, Tom Hertz, Adrian Bell, Jan Beise, Greg Clark, Ila Fazzio, Michael Gurven, Kim Hill, Paul L. Hooper, William Irons, Hillard Kaplan, Donna Leonetti, Bobbi Low, Frank Marlowe, Richard McElreath, Suresh Naidu, David Nolan, Patrizio Piraino, Rob Quinlan, Eric Schniter, Rebecca Sear, Mary Shenk, Eric Alden Smith, Christopher von Rueden, and Polly Wiesner
2009 Intergenerational Wealth Transmission and the Dynamics of Inequality in Small-Scale Societies. *Science* 326:682–688.

Bostwick, Todd W.
1994 Trash Mounds. In *Archaeology of the Pueblo Grande Platform Mound and Surrounding Features*, Vol. 2, edited by Todd W. Bostwick and Christian E. Downum, pp. 1–47. Anthropological Papers No. 1. Pueblo Grande Museum, Phoenix, Arizona.

Bowles, Samuel, Eric A. Smith, and Monique B. Mulder
2010 The Emergence and Persistence of Inequality in Premodern Societies. *Current Anthropology* 51:7–17.

Cancian, Frank
1976 Social Stratification. *Annual Review of Anthropology* 5:227–248.

Caseldine, Christopher R.
2020 Hohokam Irrigation Longevity and Agricultural Success in the Lower Salt River Valley, Arizona. PhD dissertation, School of Human Evolution and Social Change, Arizona State University, Tempe.

Childe, V. Gordon
1951 *Man Makes Himself*. New American Library, New York.

Cook, Sherburne F.
1972 *Prehistoric Demography*. Modular Publications 16. Addison-Wesley, Reading, Massachusetts.

Craig, Douglas B.
2001a Domestic Architecture. In *The Grewe Archaeological Research Project*, Vol. 1, edited by Douglas B. Craig, pp. 63–108. Anthropological Papers No. 99-1. Northland Research, Tempe, Arizona.
2001b The Demographic Implications of Architectural Change at Grewe. In *The Grewe Archaeological Research Project*, Vol. 3, edited by Douglas B. Craig, pp. 37–50. Anthropological Papers No. 99-1. Northland Research, Tempe, Arizona.
2001c Domestic Architecture and Household Wealth at Grewe. In *The Grewe Archaeological Research Project*, Vol. 3, edited by Douglas B. Craig, pp. 115–130. Anthropological Papers No. 99-1. Northland Research, Tempe, Arizona.
2004 Beyond Snaketown: Household Inequality and Political Power in Early Hohokam Society. PhD dissertation, Department of Anthropology, University of Arizona, Tucson.
2007 Courtyard Groups and the Emergence of House Estates in Early Hohokam Society. In *The Durable House: House Society Models in Archaeology*, edited by Robin A. Beck, pp. 446–463. Occasional Paper No. 35. Center for Archaeological Investigations, Southern Illinois University, Carbondale.
2010 Modeling Leadership Strategies in Hohokam Society. *Journal of Arizona Archaeology* 1:71–88.

Craig, Douglas B., and T. Kathleen Henderson
2007 Houses, Households, and Household Organization. In *The Hohokam Millennium*, edited by Suzanne K. Fish and Paul R. Fish, pp. 31–37. School for Advanced Research, Santa Fe, New Mexico.

Crown, Patricia A.
1985 Morphology and Function of Hohokam Small Structures. *Kiva* 50:75–94.

Doelle, William H.
1995 Tonto Basin Demography in Regional Perspective. In *The Roosevelt Community Development Study, New Perspectives on Tonto Basin Prehistory*, edited by Mark D. Elson, Miriam T. Stark, and David A. Gregory, pp. 201–226. Anthropological Papers No. 15. Center for Desert Archaeology, Tucson, Arizona.

Douglass, John G., and Nancy Gonlin
2012 The Household as Analytical Unit: Case Studies from the Americas. In *Ancient Households of the Americas: Conceptualizing What Households Do*, edited by John G. Douglass and Nancy Gonlin, pp. 1–44. University Press of Colorado, Boulder.

Downum, Christian E., and Todd W. Bostwick
2003 The Platform Mound. In *Centuries of Decline during the Hohokam Classic Period at Pueblo Grande*, edited by David R. Abbott, pp. 166–200. University of Arizona Press, Tucson.

Doyel, David E.
1974 *Excavations in the Escalante Ruin Group, Southern Arizona*. Arizona State Museum Archaeological Series 37. University of Arizona, Tucson.
1981 *Late Hohokam Prehistory in Southern Arizona*. Contributions to Archaeology No. 2. Gila Press, Scottsdale, Arizona.
1991 Hohokam Exchange and Interaction. In *Chaco and Hohokam: Prehistoric Regional Systems in the American Southwest*, edited by Patricia A. Crown and W. James Judge, pp. 225–252. School of American Research, Santa Fe, New Mexico.

Drennan, Robert. D., Christian E. Peterson, and Jake R. Fox
2010 Degrees and Kinds of Inequality. In *Pathways to Power: New Perspectives on the Emergence of Social Inequality*, edited by T. Douglas Price and Gary M. Feinman, pp. 45–47. Springer, New York.

Elson, Mark D.
1998 *Expanding the View of Hohokam Platform Mounds: An Ethnographic Perspective*. University of Arizona Press, Tucson.

Ensor, Bradley E.
2013 *The Archaeology of Kinship: Advancing Interpretation and Contributions to Theory*. University of Arizona Press, Tucson.

Erasmus, Charles J.
1965 Monument Building: Some Field Experiments. *Southwestern Journal of Anthropology* 21:277–301.

Feinman, Gary M., and Jill Neitzel
1984 Too Many Types: An Overview of Sedentary Prestate Societies in the Americas. In *Advances in*

https://doi.org/10.1017/aaq.2020.101 Published online by Cambridge University Press

Archaeological Method and Theory, Vol. 7, edited by Michael B. Schiffer, pp. 39–102. Academic Press, New York.

Fish, Suzanne K., and Paul R. Fish
1994 Multisite Communities as Measures of Hohokam Aggregation. In *The Ancient Southwest Community: Models and Methods for the Study of Prehistoric Social Organization*, edited by Wirt H. Wills and Robert D. Leonard, pp. 119–130. University of New Mexico Press, Albuquerque.

Fish, Suzanne K., and Paul R. Fish
2000 The Institutional Contexts of Hohokam Complexity and Inequality. In *Alternative Leadership Strategies in the Prehispanic Southwest*, edited by Barbara Mills, pp. 154–167. University of Arizona Press, Tucson.

Flannery, Kent, and Joyce Marcus
2012 *The Creation of Inequality: How Our Prehistoric Ancestors Set the Stage for Monarchy, Slavery, and Empire*. Harvard University Press, Cambridge, Massachusetts.

Foster, Michael S.
1995 *The Pueblo Grande Museum Expansion Data Recovery Project*. Technical Report No. 95-17. Soil Systems, Phoenix, Arizona.

Foster, Michael S., Douglas R. Mitchell, Cory D. Breternitz, and Christine K. Robinson
1996 Late Classic Period Hohokam Households: A Preliminary View from Pueblo Grande. In *People Who Lived in Big Houses: Archaeological Perspectives on Large Domestic Structures*, edited by Gary Coupland and E. B. Banning, pp. 27–45. Monographs in World Archaeology No. 27. Prehistory Press, Madison, Wisconsin.

Goody, Jack
1976 *Production and Reproduction: A Comparative Study of the Domestic Domain*. Cambridge University Press, Cambridge.
1990 *The Oriental, the Ancient, and the Primitive: Systems of Marriage and the Family in the Pre-Industrial Societies of Eurasia*. Cambridge University Press, Cambridge.

Gregory, David A.
1987 The Morphology of Platform Mounds and the Structures of Classic Period Hohokam Sites. In *The Hohokam Village: Site Structure and Organization*, edited by David E. Doyel, pp. 183–210. Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Glenwood Springs, Colorado.
1991 Form and Variation in Hohokam Settlement Patterns. In *Prehistoric Regional Systems in the American Southwest*, edited by Patricia A. Crown and W. James Judge, pp. 159–194. School of American Research Press, Santa Fe, New Mexico.

Gregory, David Amos, and Fred L. Nials
1985 Observations Concerning the Distribution of Classic Period Platform Mounds. In *Proceedings of the 1983 Hohokam Symposium, Part 1*, edited by Alfred E. Dittert Jr. and Donald E. Dove, pp. 373–388. Occasional Paper No. 2. Arizona Archaeological Society, Phoenix, Arizona.

Hassan, Fekri A.
1981 *Demographic Archaeology*. Academic Press, New York.

Haury, Emil W.
1976 *The Hohokam: Desert Farmers and Craftsmen*. University of Arizona Press, Tucson.
1991 Afterword. In *The Hohokam: Ancient People of the Desert*, edited by David G. Noble, pp. 69–73. School of American Research, Santa Fe, New Mexico.

Hayden, Brian
1995 Pathways to Power: Principles for Creating Socioeconomic Inequalities. In *Foundations of Social Inequality*, edited by T. Douglas Price and Gary M. Feinman, pp. 15–86. Plenum Press, New York.

Hayden, Brian, and Aubrey Cannon
1982 The Corporate Group as an Archaeological Unit. *Journal of Anthropological Archaeology* 1:132–358.

Henderson, T. Kathleen
2001 Chronology. In *The Grewe Archaeological Research Project*, Vol. 1, edited by Douglas B. Craig, pp. 163–208. Anthropological Papers No. 99-1. Northland Research, Tempe, Arizona.

Henderson, T. Kathleen, and Tiffany C. Clark
2004 Changing Perspectives: Considerations of Past Agricultural Use of the Salt River Floodplain. In *Hohokam Farming on the Salt River Floodplain: Refining Models and Analytical Methods*, edited by T. Kathleen Henderson, pp. 167–186. Anthropological Papers No. 43. Center for Desert Archaeology, Tucson, Arizona.

Howard, Jerry B.
1991 System Reconstruction: The Evolution of an Irrigation System. In *The Operation and Evolution of an Irrigation System: The East Papago Canal Study*, edited by Jerry B. Howard and Gary Huckleberry, pp. 5.1–5.33. Publications in Archaeology No. 18. Soil Systems, Phoenix, Arizona.
2014 *Hohokam Irrigation Communities: A Study of Internal Structure, External Relationships, and Sociopolitical Complexity*. Digital Publications in Archaeology No. 2. Arizona Museum of Natural History, Mesa, Arizona.

Hunt, Robert C.
2007 Hohokam Maize Production Simulations: 071, 072. Manuscript on file, Department of Anthropology, Brandeis University, Waltham, Massachusetts.

Hunt, Robert C., David Guillet, David R. Abbott, James Bayman, Paul Fish, Suzanne Fish, Keith Kintigh, and James A. Neely
2005 Plausible Ethnographic Analogies for the Social Organization of Hohokam Canal Irrigation. *American Antiquity* 70:433–456.

Johnson, Allen, and Timothy Earle
1987 *The Evolution of Human Societies from Foraging Groups to Agrarian States*. Stanford University Press, Redwood City, California.

Kohler, Timothy A., and Rebecca Higgins
2016 Quantifying Household Inequality in Early Pueblo Villages. *Current Anthropology* 57:690–697.

Kohler, Timothy A., Michael E. Smith, Amy Bogaard, Gary M. Feinman, Christian E. Peterson, Alleen Betzenhauser, Mathew Pailes, Elizabeth C. Stone, Anna Marie Prentiss, Timothy J. Dennehy, Laura J. Ellyson, Linda M. Nicholas, Ronald K. Faulseit, Amy Styring, Jade Whitlam, Mattia Fochesato, Thomas A. Foor, and Samuel Bowles
2017 Greater Post-Neolithic Wealth Disparities in Eurasia Than in North America and Mesoamerica. *Nature* 551:619–622.

Kramer, Carol
1979 An Archaeological View of a Contemporary Kurdish Village: Domestic Architecture, Household Size and Wealth. In *Ethnoarchaeology: Implications*

of Ethnography for Archaeology, edited by Carol Kramer, pp. 139–163. Columbia University Press, New York.

Mabry, Jonathan B.
1996 The Ethnology of Local Irrigation. In *Canals and Communities: Small-Scale Irrigation Systems*, edited by Jonathan B. Mabry, pp. 3–30. University of Arizona Press, Tucson.

Marshall, John T.
2001 Appendix J: Hohokam Regional Ballcourt Data. In *The Grewe Archaeological Research Project*, Vol. 1, edited by Douglas B. Craig, pp. 571–586. Anthropological Papers No. 99-1. Northland Research, Tempe, Arizona.

McGuire, Randal H.
1992 *A Marxist Archaeology*. Academic Press, San Diego.

McGuire, Randal H., and Robert M. Netting
1982 Leveling Peasants? The Maintenance of Equality in a Swiss Alpine Community. *American Ethnologist* 9:269–290.

McIntosh, Susan K.
1999 Pathways to Complexity: An African Perspective. In *Beyond Chiefdoms: Pathways to Complexity in Africa*, edited by Susan K. McIntosh, pp. 1–30. Cambridge University Press, Cambridge.

Mills, Barbara J.
2000 Alternative Models, Alternative Strategies: Leadership in the Prehispanic Southwest. In *Alternative Leadership Strategies in the Prehispanic Southwest*, edited by Barbara J. Mills, pp. 1–18. University of Arizona Press, Tucson.

Mitchell, Douglas R.
1994 Architecture Feature Descriptions. In *The Pueblo Grande Project*, Vol. 2, edited by Douglas R. Mitchell, pp. 33–84. Publications in Archaeology No. 20. Soil Systems, Phoenix, Arizona.

Narroll, Raoul
1962 Floor Area and Settlement Pattern. *American Antiquity* 27:587–589.

Netting, Robert M.
1982 Some Truths on Household Size and Wealth. *American Behavioral Scientist* 25:641–662.
1993 *Smallholders, Householders: Farms, Families, and the Ecology of Intensive, Sustainable Agriculture*. Stanford University Press, Redwood City, California.

Netting, Robert M., Richard R. Wilk, and E. Jean Arnold
1984 Introduction. In *Households: Comparative and Historical Studies of the Domestic Group*, edited by Robert M. Netting, Richard R. Wilk, and E. Jean Arnold, pp. xiii–xxxviii. University of California Press, Berkeley.

Pailes, Matthew
2018 Steady Inequality in Changing Times: An Examination of Regional Patterns in Hohokam Structure Data. In *Ten Thousand Years of Inequality: The Archaeology of Wealth Differences*, edited by Timothy A. Kohler and Michael E. Smith, pp. 155–179. University of Arizona Press, Tucson.

Plog, Stephen, and Carrie Heitman
2010 Hierarchy and Social Inequality in the Ancient Southwest, A.D. 800–1200. *PNAS* 107:19619–19626.

Price, T. Douglas, and Gary M. Feinman (editors)
1995 *Foundations of Social Inequality*. Plenum Press, New York.

Price, T. Douglas, and Gary M. Feinman
2010 Social Inequality and the Evolution of Human Social Organization. In *Pathways to Power: New Perspectives on the Emergence of Social Inequality*, edited by T. Douglas Price and Gary M. Feinman, pp. 1–14. Springer, New York.
2010 *Pathways to Power: New Perspectives on the Emergence of Social Inequality*, Springer, New York.

Rapoport, Amos
1969 *House Form and Culture*. Prentice-Hall, Englewood Cliffs, New Jersey.

Shenk, Mary K., Monique Borgerhoff Mulder, Jan Beise, Gregory Clark, William Irons, Donna Leonetti, Bobbi S. Low, Samuel Bowles, Tom Hertz, Adrian Bell, and Patrizio Piraino
2010 Intergenerational Wealth Transmission among Agriculturalists. *Current Anthropology* 51:65–83.

Sires, Earl W.
1987 Hohokam Architectural Variability and Site Structure during the Sedentary-Classic Transition. In *The Hohokam Village: Site Structure and Organization*, edited by David E. Doyel, pp. 171–182. Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Glenwood Springs, Colorado.

Smith, Michael E., Timothy A. Kohler, and Gary M. Feinman
2018 Studying Inequality's Deep Past. In *Ten Thousand Years of Inequality: The Archaeology of Wealth Differences*, edited by Timothy A. Kohler and Michael E. Smith, pp. 3–38. University of Arizona Press, Tucson.

Vésteinsson, Orri, Michelle Hegmon, Jette Arenborg, Glen Rice, and Will G. Russell
2019 Dimensions of Inequality. Comparing the North Atlantic and the US Southwest. *Journal of Anthropological Archaeology* 54:172–191.

Wallace, Henry D.
2007 Hohokam Beginnings. In *The Hohokam Millennium*, edited by Suzanne K. Fish and Paul R. Fish, pp. 11–21. School of American Research Press, Santa Fe, New Mexico.

Wilcox, David R.
1987 *Frank Midvale's Investigation of the Site of La Ciudad*. Anthropological Field Studies No. 19. Arizona State University, Tempe.
1991 Hohokam Social Complexity. In *Prehistoric Regional Systems in the American Southwest*, edited by Patricia A. Crown and W. James Judge, pp. 253–276. School of American Research Press, Santa Fe, New Mexico.
1999 A Peregrine View of Macroregional Systems in the North American Southwest, A.D. 750–1250. In *Great Towns and Regional Polities in the Prehistoric American Southwest and Southeast*, edited by Jill E. Neitzel, pp. 115–142. University of New Mexico Press, Albuquerque.

Wilcox, David R., Thomas R. McGuire, and Charles Sternberg
1981 *Snaketown Revisited: A Partial Cultural Resource Survey of the Proposed Hohokam-Pima National Monument*. Arizona State Museum Archaeological Series No. 155. University of Arizona, Tucson.

Wilcox, David R., and Lynette O. Shenk
1977 *The Architecture of Casa Grande and Its Interpretation*. Arizona State Museum Archaeological Series No. 115. University of Arizona, Tucson.

Wilcox, David R., and Charles Sternberg
1983 *Hohokam Ballcourts and Their Interpretation*.

Arizona State Museum Archaeological Series No. 160. University of Arizona, Tucson.

Wilk, Richard R.
1983 Little House in the Jungle: The Causes of Variation in House Size among Modern Kechi Maya. *Journal of Anthropological Archaeology* 2:99–116.
1990 The Built Environment and Consumer Decisions. In *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study*, edited by Susan Kent, pp. 34–42. Cambridge University Press, Cambridge.
1991 *Household Ecology: Economic Change and Domestic Life among the Kekchi Maya in Belize*. University of Arizona Press, Tucson.

Wilk, Richard R., and William L. Rathje
1982 Household Archaeology. In *Archaeology of the Household: Building a Prehistory of Domestic Life*, edited by Richard R. Wilk and William L. Rathje, pp. 617–640. American Behavioral Scientist Vol. 25, No. 6. SAGE, Beverly Hills, California.

Wolf, Eric
1966 *Peasants*. Prentice-Hall, Upper Saddle River, New Jersey.

Zhu, Tianduowa, Kyle C. Woodson, and Maurits W. Ertsen
2018 Reconstructing Ancient Hohokam Irrigation Systems in the Middle Gila River Valley, Arizona, United States of America. *Human Ecology* 46:735–746.

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