PROGRAMMATIC AGREEMENT
AMONG
THE BUREAU OF INDIAN AFFAIRS, PIMA AGENCY,
THE GILA RIVER INDIAN COMMUNITY,
THE TRIBAL HISTORIC PRESERVATION OFFICE, AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
APPROVAL OF HOME SITE LEASES AND ASSOCIATED IMPROVEMENTS AND EASEMENTS ON THE GILA RIVER INDIAN RESERVATION

WHEREAS, the Bureau of Indian Affairs, Western Regional Office (BIA/WRO), Regional Director has delegated authority to the Superintendent of the Pima Agency (BIA/PIMA) to serve as agency official for compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C. 306108); and

WHEREAS, the Superintendent of BIA/PIMA is responsible for the consideration and approval of individual applications for home site leases on the Gila River Indian Reservation and has determined that the construction of new homes and other associated improvements (e.g., water lines, sewer hookups, septic systems, access roads, driveways, etc.) resulting from BIA's approval of home site leases are undertakings with the potential to affect properties eligible for inclusion in the National Register of Historic Places (NRHP); and

WHEREAS, the Gila River Indian Community (GRIC) is a federally recognized Indian tribe, organized under Section 16 of the Indian Reorganization Act of 1934, 25 U.S.C. § 476, which exercises general governmental jurisdiction over all lands of the Gila River Indian Reservation; and

WHEREAS, the GRIC Cultural Resource Management Program (GRIC-CRMP) and the Huhugam Heritage Center are programs operated by and under the governmental jurisdiction of the GRIC; and

WHEREAS, the GRIC Tribal Historic Preservation Officer (THPO) has been certified by the National Park Service and has assumed the duties of the State Historic Preservation Office (SHPO) on tribal lands and shall be consulted in lieu of the SHPO, pursuant to 36 CFR § 800.2 (c)(2)(i)(A) of the Advisory Council on Historic Preservation (ACHP)'s regulations (36 CFR Part 800) implementing Section 106 of the NHPA; and

WHEREAS, BIA/PIMA has consulted with the GRIC, the THPO and the ACHP pursuant to 36 CFR § 800.14(b); and

WHEREAS, the terms "home site(s)", "home site lease(s)", and "home site application(s)" shall be reasonably defined so as to include the following when related to the home site:

leases, easements, or funds for single-family home sites and associated improvements, including, but not limited to, construction of homes, outbuildings, access roads, and utility lines, on contiguous land; and

WHEREAS, the Area of Potential Effects (APE) for each home site lease will be defined as the lease area and any additional areas of potential ground disturbance, including associated utility lines, sewer hookups, septic systems, access roads, driveways, etc., and buffer zones sufficient to ensure the consideration of vehicle traffic and staging areas related to associated improvements. Due to the nature of these undertakings, indirect effects are not anticipated but will be considered on a case by case basis; and

WHEREAS, the Ak-Chin Indian Community, Hopi Tribe, Pascua Yaqui Tribe, Pueblo of Zuni, Salt River Pima-Maricopa Indian Community, and the Tohono O'odham Nation may attach religious or cultural importance to cultural resources and TCPs that may be adversely affected by the undertakings defined herein, have been consulted [pursuant to 36 CFR § 800.2 (c)(2)(ii)(A-F)], and have been invited to be concurring parties in this Programmatic Agreement (Agreement); and

WHEREAS, the public, through notification at meetings of the GRIC Community Council and GRIC Standing Committees, has been informed about and invited to provide input into the development of this Agreement; and

WHEREAS, BIA/PIMA proposes to use the public notification process embodied in the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321-4346) to seek public input and notify the public of the potential effects of home site leases on historic properties as required in 36 CFR Part 800; and

WHEREAS, BIA/PIMA intends to use the provisions of this Agreement to address coordination opportunities between other laws, such as the Archeological Resources Protection Act (ARPA) (16 U.S.C. § 470aa), the American Indian Religious Freedom Act (AIRFA) (42 U.S.C. § 1996), and the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. §§ 3001-3013); and

WHEREAS, for any matter regarding Section 106 compliance not addressed in this Agreement, the provisions of Section 106 of the NHPA and its implementing regulations (36 CFR Part 800) shall apply; and

WHEREAS, no provision of this Agreement will be construed by any of the signatories as abridging or debilitating any sovereign powers of the GRIC; affecting the trust relationship between the Secretary of the Interior (SOI), GRIC, and Indian landowners(s); or interfering with the government-to-government relationship between the United States and the GRIC.

NOW, THEREFORE, BIA/PIMA, GRIC, THPO, and the ACHP agree that the approval of home site leases shall be administered in accordance with the following stipulations in order to satisfy BIA/PIMA's Section 106 responsibilities.

STIPULATIONS

BIA/PIMA shall ensure that the following measures are carried out:

I. Identification and Evaluation of Historic Properties

A. The GRIC-CRMP will complete a cultural resources inventory within the APE for each proposed home site lease to determine if any historic properties, including Traditional Cultural Properties (TCPs), may be affected (Appendix B).

B. The GRIC-CRMP will conduct archaeological testing, as needed, to collect information to determine if a property is eligible for inclusion in the NRHP and/or to determine the nature and distribution of archaeological deposits that contribute to the property's significance (Appendix C).

C. BIA/PIMA shall, in consultation with the GRIC-CRMP, apply the NRHP criteria (36 CFR 63) to potential historic properties identified within the APE that have not been previously evaluated.

D. Except as provided in Stipulations III.A and III.B below, BIA/PIMA will submit inventory reports, including site documentation forms for newly identified properties and determinations of NRHP eligibility, to the THPO for review and comment. If, within 30 days of receipt, THPO objects to any aspect of the report, the BIA/PIMA shall resolve the objection in accordance with Stipulation IX. Any disagreement concerning NRHP eligibility will be resolved in accordance with 36 CFR § 800.4(c).

II. Archaeological Testing and Assessment of Effects

A. Archaeological Testing in NRHP-eligible or -listed Sites.

1. Where proposed home sites are located within the boundaries of a NRHP-eligible or -listed site, the GRIC-CRMP will utilize the treatment plan in Appendix C.

2. The GRIC-CRMP shall produce a Testing Report, to include the results of archaeological testing, its assessment of effects, and proposed measures to avoid, minimize, or mitigate adverse effects to historic properties. BIA/PIMA will submit the testing report to THPO for review and comment. If the tested site is not eligible, or if the testing exhausted the information potential of the site, or the

property will not be adversely affected, BIA/PIMA may include the testing report with its semi-annual submissions pursuant to Stipulation VIII.

B. Prior to the initiation of any archaeological test excavations conducted pursuant to Stipulation I.C. or II.A, BIA/WRO shall issue an ARPA permit to GRIC-CRMP, contingent upon written and continued permission by a majority of the Indian landowners of the allotment (as applicable).

C. Upon completion of any test excavations, the BIA/PIMA shall apply the criteria of adverse effect located at 36 CFR § 800.5(a) to assess the effects of the proposed home construction and associated ground disturbing activities on historic properties. If adverse effects are found, BIA/PIMA and GRIC will consult with the landowner(s) to relocate the proposed home within the lease area, if possible, to avoid or minimize effects to significant archaeological deposits.

III. Findings of No Historic Properties Affected and No Adverse Effect

A. When no historic properties are identified in the APE for a home site lease, or the home and all related ground disturbing activities are relocated to avoid effects to historic properties, BIA/PIMA may make a finding of No Historic Properties Affected.

1. BIA/PIMA may issue authorization to proceed with development contingent on implementing any conditions proposed to ensure that historic properties are protected from damage (Appendix D).

B. Where archaeological testing has been conducted and reveals that historic properties will not be adversely affected by the proposed home site development, BIA/PIMA may make a finding of No Historic Properties Affected or No Adverse Effect (as appropriate).

1. BIA/PIMA may issue authorization to proceed with development contingent on implementing any conditions developed to protect historic properties from damage (Appendix D).

C. Once construction begins, all ground disturbing activities in archeologically sensitive areas will be monitored by a professional archaeologist from the GRIC-CRMP. If cultural resources are discovered, the archeological monitor shall be authorized to halt all activity in the vicinity of the discovery until a procedure for treatment of the discovery is decided by the GRIC (see GRIC-CRMP Monitoring and Discovery Plan, Appendix E).

IV. Findings of Adverse Effect

A. If effects to historic properties cannot be avoided as provided in Stipulation III, BIA/PIMA will make a determination of "Adverse Effect." GRIC-CRMP and BIA/PIMA will consider a range of options for avoiding, minimizing, or mitigating the effects of the home site lease on historic properties, including but not limited to data recovery, design modification to minimize the impacts of construction, monitoring ground disturbing activities, and denial of the application.

B. A treatment plan for cultural resources (Appendix C) has been developed for home site lease undertakings. Treatments may include, but are not necessarily limited to, phased archaeological data recovery, Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation, and ethnohistoric research.

C. BIA/PIMA may issue authorization to proceed with development contingent on implementing any conditions developed to protect historic properties from damage (Appendix D).

V. Archaeological Fieldwork Standards

A. Individuals meeting the Professional Qualifications Standards established by the Secretary of the Interior (SOI) (48 FR 44716) shall conduct or supervise all archaeological work described in this Agreement.

B. Individuals recognized as subject matter experts (according to the SOI's Professional Qualifications Standards) shall provide guidance to the supervisory archaeologist whenever undertakings involve cultural resources in their areas of expertise, e.g.: history, prehistoric archaeology, historic archaeology, architectural history, architecture, and historic architecture.

C. All cultural resource work will be conducted and the results documented in final reports prepared in accordance with the following standards and guidance, as may be amended from time to time:

1. The SOI's Standards and Guidelines for Archaeology and Historic Preservation
2. The ACHP's Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites
3. Pertinent Arizona State Historic Preservation Office guidelines (as deemed applicable by the THPO)
4. National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties
5. GRIC-CRMP Research Design for Surveys (Appendix B)

6. GRIC-CRMP Treatment Plan for Cultural Resources (Appendix C)
7. GRIC-CRMP Monitoring and Discovery Plan (Appendix E)
8. GRIC-CRMP Policy #8: The Treatment of Human Remains and Funerary Objects (Revised March 2015) (Appendix F)
9. GRIC Ordinance No. GR-01-82, Archaeological Licenses (for the Protection of Places and Objects of Sacred, Historical and Scientific Interest on the Gila River Indian Reservation) (1982).

VI. Curation of Archaeological Resources

With exception of human remains or objects that fall under NAGPRA, artifacts and specimens recovered and records made will be curated at the Huhugam Heritage Center in accordance with the requirements of 36 CFR Part 79. In accordance with GRIC policy and procedures, and at their discretion, GRIC will make records and other data resulting from archaeological surveys and excavations available to qualified researchers as required in Section 112 (a)(2) of the NHPA.

VII. Discoveries

If post-review discoveries are encountered, they shall follow the procedures in the GRIC-CRMP Monitoring and Discovery plan (Appendix E). If human remains are discovered, the BIA/WRO shall comply with Section 3 of NAGPRA as follows: upon confirmation of the presence of human remains or funerary objects, the GRIC-CRMP shall immediately stop excavation of the remains and immediately notify the THPO or CRMP Director, who will notify the BIA/PIMA. A professional archeologist shall attend to all procedures specified by GRIC-CRMP Policies and Procedures, Policy #8: The Treatment of Human Remains and Funerary Objects (Appendix F).

VIII. Annual Reporting

BIA/PIMA shall submit reports to THPO on a semi-annual basis (based on fiscal year). Submissions of such reports shall be made on or before March 31 and September 30 each year this Agreement is in effect. Each batch shall include such reports completed during the prior six months.

A. BIA/PIMA shall include a cover letter summarizing field work completed during the reporting period. The cover letter should include a summary table that identifies home site leases included in the submission, archaeological sites identified, determinations of eligibility and effect, actions taken, and any proposed mitigation not yet conducted. This letter also may be submitted to a Tribal consulting party upon request by a designated Tribal representative as described at 36 CFR 800.2(c)(2)(ii)(C).

B. THPO shall have 30 days to provide comments. BIA/PIMA will assume concurrence if responses are not received in 30 days.

C. The schedule for submission of reports may be revised by written agreement between BIA/PIMA and THPO.

IX. Dispute Resolution

Should any signatory object within 30 days to any action(s), report(s), or plan(s) provided for review pursuant to this Agreement, BIA/PIMA shall consult with the objecting signatory within 30 days to resolve the objection. The objection must be identified specifically and the reasons for objection documented. If, with the advice of the GRIC, BIA/PIMA determines that the objection cannot be resolved, it shall forward all documentation relevant to the dispute to ACHP and notify THPO as to the nature of the dispute. Within 30 days of receipt of all pertinent documentation, ACHP shall either:

A. Provide BIA/PIMA with recommendations, which it shall take into consideration in reaching a final decision regarding the dispute. Prior to reaching a final decision on the dispute, BIA/PIMA shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and signatories and provide them with a copy of this written response. BIA/PIMA will then proceed according to its final decision; or

B. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, BIA/PIMA may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, BIA/PIMA shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories to the PA, and provide them and the ACHP with a copy of such written response.

C. All responsibilities and actions described in this Agreement that are not the subject of dispute shall continue to be carried out unchanged.

X. Amendment

If any signatory to this Agreement determines that its terms will not or cannot be carried out or that an amendment to its terms is needed, that party shall immediately notify BIA/PIMA and request an amendment. The parties to this Agreement will consult to consider such amendment in accordance with 36 CFR § 800.14(b).

Modifications, additions, or deletions to the appendices made as a result of continuing consultation among the Consulting Parties do not require this Agreement to be amended.

XI. Termination and Duration

Any signatory to this Agreement may terminate it by providing 30 days written notice to other parties, provided that the parties will consult during that period to seek agreement on amendments or other actions that would avoid termination. In the event of termination, BIA/PIMA will comply with 36 CFR §§ 800.3 - 800.6 for each home site lease application.

This Agreement will remain in effect for 10 years from date of ACHP signature. Prior to that, the signatories will consult to determine whether it should be amended, terminated, or remain in force, after which the Agreement will automatically terminate unless it is amended or the expiration date extended by written agreement of the signatory parties.

XII. Execution of this Agreement

Execution of this Programmatic Agreement and implementation of its terms evidences that the BIA/PIMA has satisfied its Section 106 compliance responsibilities for all individual undertakings within the program.

This Agreement may be executed in two or more counterparts, each of which shall be deemed an original but all of which together shall constitute one and the same instrument. BIA/PIMA will distribute copies of all signed pages to the signatories and concurring parties upon execution.

SIGNATORIES

BUREAU OF INDIAN AFFAIRS

By: _____ Date 6/28/16
Cecilia Martinez-Baker, BIA, Pima Agency Superintendent

GILA RIVER INDIAN COMMUNITY

By: _____ Date 6/8/16
Stephen Roe Lewis, Governor

GRIC TRIBAL HISTORIC PRESERVATION OFFICE

By: _____ Date 6/6/16
Barnaby V. Lewis, Tribal Historic Preservation Officer

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: _____ Date 8/24/16
John M. Fowler, Executive Director

CONCURRING PARTIES

Ak-Chin Indian Community

By:_____ Date _____

Hopi Tribe

By:_____ Date _____

Pascua Yaqui Tribe

By:_____ Date _____

Pueblo of Zuni

By:_____ Date _____

Salt River Pima-Maricopa Indian Community

By:_____ Date _____

Tohono O'odham Nation

By:_____ Date _____

Appendix A

Definitions

Definitions

1. Adverse Effect occurs when an undertaking may alter, directly or indirectly, any of the characteristics that qualify a historic property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (see criteria of adverse effect at 36 CFR § 800.5 (a) (1)).

2. Advisory Council on Historic Preservation (ACHP) is an independent Federal agency established pursuant to Section 201 of NHPA. Under Section 106 of NHPA, the ACHP must be afforded an opportunity to comment on Federal, Federally assisted, or Federally licensed undertakings that may affect historic properties.

3. Archaeological Site means any material remains of past human life or activities in history or prehistory, which are of archaeological interest including, but not be limited to: pottery, basketry, bottles, weapons, projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion or piece of any of the foregoing items that are of human design, manufacture, possession, or use.

4. Area of Potential Effects (APE) means the geographic area(s) within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR § 800.16 (d)). The APE must include all areas of direct, indirect, and reasonably foreseeable cumulative effects including, but not limited to, staging areas, temporary construction easements (TCEs), access roads, utility corridors, etc.

5. Concurring Parties are those interested parties who have signed the Programmatic Agreement (PA) but do not have the rights to amend or terminate the PA. Their signature expressly shows that they are familiar with the terms of the agreement and do not object to it.

6. Consulting Parties have consultative roles in the Section 106 process and include SHPO/THPO; Indian tribes; local governments; applicants for federal assistance, permits, licenses or other approvals; and, any party with a demonstrated legal or economic relation to the undertaking, or concern with the undertaking's effect on historic properties (36 CFR § 800.2 (c)). Consulting parties may be invited to be concurring parties or signatories to a PA.

7. Cultural Resources are prehistoric and historic districts, sites, buildings, structures, objects, cultural landscapes, sacred sites, and traditional cultural properties. Within the broad range of cultural resources are those that have recognized significance because they are eligible for or listed in the National Register of Historic Places (NRHP), which are called historic properties.

8. Cultural Resources Inventory refers to the study of an area to identify the cultural resources that are, or may be, present.

9. Effect on an historic property occurs when an undertaking may alter characteristics of the property that may qualify it for inclusion in or eligibility for the NRHP (36 CFR § 800.16 (i)). An effect may be either negative or positive.

10. Historic Property is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. This term includes artifacts, records, and remains that are related to and located within such properties. Properties that have been determined eligible for inclusion are accorded the same protections as properties listed in the NRHP (36 CFR § 800.16 (l)(1) and (2)).

11. National Register of Historic Places (NRHP) is the official list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture maintained by the Keeper of the NRHP on behalf of the Secretary of Interior (36 CFR Part 60).

12. No Adverse Effect means that the undertaking will not alter any of the characteristics of an historic property that qualify it as NRHP eligible by diminishing its historic integrity (See 36 CFR § 800.5 (b)).

13. No Historic Properties Affected means there are no historic properties in the APE, or there are NRHP eligible historic properties present but the undertaking will have no effect upon them.

14. Signatories or signatory are parties who assume obligations under the PA and become formal signatories. Signatories have the ability to terminate or agree to amend the PA. The term includes invited signatories, but does not include others who sign the agreement as concurring parties.

15. Significance is the term used to indicate a historic property's eligibility for the NRHP according to the criteria in 36 CFR § 60.4.

16. State Historic Preservation Officer (SHPO) is the official appointed or designated by the Governor pursuant to Section 101(b)(1) of National Historic Preservation Act (NHPA) to administer the State historic preservation program (36 CFR § 800.16 (v)).

17. Tribal Historic Preservation Officer (THPO) is an individual designated by an Indian tribe to administer the tribal historic preservation program, through appointment by the tribe's chief governing authority or as a tribal ordinance may otherwise provide (NHPA Section 101(d)(2)(B)). A THPO, representing the tribe, may assume the duties of the SHPO, in whole or in part, as certified by the National Park Service (36 CFR § 800.16 (w)). The GRIC's

THPO has been certified by the National Park Service and has assumed the duties of the SHPO on tribal lands.

18. Traditional Cultural Property, as defined in National Register Bulletin 38, is a property that is listed in, or is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that are: (1) rooted in that community's history; and (2) important in maintaining the continuing cultural identity of the community (See National Park Service Bulletin 38).

19. Undertaking is a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency including: (1) those carried out by or on behalf of the agency; (2) those carried out with Federal financial assistance; (3) and, those requiring a Federal permit, license, or approval (36 CFR § 800.16(y)).

Appendix B

GRIC-CRMP Research Design for Surveys

PEDESTRIAN SURVEY

GRIC-CRMP will complete a Class III (i.e., intensive, pedestrian) archaeological survey within proposed home site locations that have not been previously examined for cultural resources, or in cases where cultural resource inventories occurred more than 10 years ago. During the survey, field personnel will walk parallel transacts spaced at 20-meter intervals within the APE. One crew member will walk the outermost transects while carrying a handheld Garmin GPS unit. This practice helps insure uniform and complete survey coverage of the parcel. All cultural remains, depending on their density, will be documented as either an archaeological site or an isolated occurrence (i.e., individual artifacts or low density scatters that do meet the site criteria).

Archaeological sites are defined according to guidelines presented in the ASM Site Recording Manual (1993) and a subsequent update by Fish (1995). Based on these guidelines, a site consists of 30 or more artifacts of a single artifact type within a 15-meter area; 20 or more artifacts of at least two artifact types within a 15-meter area; one or more features in temporal association with artifacts; or two or more temporally associated features with no artifacts. Areas meeting these definitions that are separated by greater than 100 meters of intervening space are recorded as separate sites. Such areas spaced less than 100 meters apart are recorded as loci of the same site. Artifacts or feature distributions that do not meet site definition guidelines are recorded as Isolated Occurrences (IOs).

SITE-RECORDING PROCEDURES

Each identified site is assigned a Gila River (GR) site number and documented in the field. Site documentation involves completing an ASM Site Form along with several GRIC-CRMP forms, including a Feature Log, Artifact Diversity Form, and a Collection Strategy Form. Additionally, the site will be mapped and photographed. Rough estimates for the total counts of all artifact types within a site are noted, and the relevant characteristics of any features or artifact concentrations (e.g., type or use, size, artifact composition, and temporal affiliation) will be recorded. Site locations, features, artifact concentrations, and/or diagnostic artifacts will be mapped using a Garmin unit with WAAS enabled (permitting accuracy to within 3 meters). A digital camera (e.g., Panasonic Lumix DMC-TS10) will be used to take color photographs of the site area and any significant cultural deposits. This level of documentation will provide the information necessary to make a recommendation regarding a site's NRHP-eligibility and also determine the potential adverse effects of home site development.

SURFACE-COLLECTION STRATEGIES

Surface collections will be completed as part of the site recording process due to the future adverse effects of home site development on potential NRHP site-contributing elements. Field crew will utilize three surface-collection strategies during site recording: general, quantitative, and diagnostic. For sites with fewer than 100 artifacts, such as small artifact scatter, field crews will collect all artifacts from the site. If a site contains more than 100 artifacts, then diagnostic artifacts will be collected, and one or more Quantitative Unit (QU) collections will be completed. . QU collections are circular areas that are created using two nails

attached to a 1-m length of string (often called a "dog-leash" sample). The goal of QU collections is to obtain a density controlled sample of artifacts from each site or locus. The resulting units have a 2-m diameter, and encompass 3.14 square meters. Quantitative units will be placed in the areas of highest artifact density identified at the site or locus. Following either general or quantitative collections, "diagnostic" collections will be completed. These collections consist of judgmental grab samples of artifacts with key temporal-data attributes from identified features and loci throughout the site.

EVALUATION OF SIGNIFICANCE

The historical significance of a documented archaeological site is evaluated with respect to its eligibility for the NRHP, per Section 106 of the NHPA and the Arizona State Historic Preservation Act of 1982. In order for a site to be listed in the NRHP, it must be at least 50 years old and meet one of four significance criteria: A) association with events that have made a significant contribution to the broad pattern of our history; B) association with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whole components may lack individual distinction; D) have yielded, or may be likely to yield information important in prehistory and history.

ISOLATED-OCCURRENCES RECORDING

Isolated occurrences are defined as individual artifacts or features and dispersed non-site scatters with less than 30 artifacts that do not meet the ASM definition of a site. These finds could include more than one artifact type. Isolated occurrences will be assigned a unique number that consists of their UTM coordinates, and then described and plotted using a Garmin GPS unit. Most isolated artifacts will not be collected. However, unusual and diagnostic items, such as projectile points, rare ceramic types, and whole Historic period glass bottles, may be collected at the discretion of the crew chief.

TRADITIONAL CULTURAL PROPERTIES

The presence of any Traditional Cultural Properties (TCPs) within the APE will also be evaluated. TCPs are resources that are significant for their association with the cultural practices, identify, beliefs, or traditions of a living community. A TCP is a property that is listed in, or is eligible for inclusion in the National Register, because of its association with cultural practices or beliefs of a living community that are: (1) rooted in that community's history; and (2) important in maintaining the continuing cultural identity of the community (see National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties). Beginning in the mid 1990s the GRIC-CRMP and the GRIC-THPO have actively worked to develop a comprehensive inventory of Akimel O'odham and Pee Posh TCPs (Darling 2004; Rea 1997). These records are maintained by the GRIC-Tribal Historic Preservation Office (GRIC-THPO), and they will be reviewed to determine if any TCPs present.

Works Cited:

Arizona State Museum (ASM)
1993 *Arizona State Museum Archaeological Site Recording Manual.* Arizona State Museum, University of Arizona, Tucson, Arizona.

Darling, J. Andrew
2004 *Traditional Cultural Property Inventory on the Aboriginal Lands of the Akimel O'odham (Pima) and Pee Posh (Maricopa) Tribes: Final Report.* CRMP Technical Report No. 2004-15. Cultural Resource Management Program, Gila River Indian Community, Sacaton, AZ

Fish, P. R.
1995 *Revised Site Definition Policy.* Arizona State Museum, University of Arizona, Tucson, Arizona.

Rea, Amadeo M.
1997 Inventory of Traditional Cultural Properties of the Gila River Indian Community. Non-circulating confidential document. Cultural Resource Management Program/Tribal Historic Preservation Office, Gila River Indian Community, Sacaton, AZ.

Appendix C

GRIC-CRMP Treatment Plan for BIA Home Site Leases

TREATMENT PLAN FOR CULTURAL RESOURCES IN BIA HOME SITE LEASES

The following document is a treatment plan for cultural resources located in home site lease areas on allotted lands within the Gila River Indian Community (GRIC), Pinal and Maricopa Counties, Arizona. In accordance with the federal regulations (36 CFR § 800) governing Section 106 of the National Historic Preservation Act (NHPA; 16 U.S.C. § 470f), the primary objective of this work plan is to evaluate and, if necessary, mitigate the adverse effect of new home construction on cultural resources eligible for inclusion in the National Register of Historic Places (NRHP). Both the evaluation and mitigation process involve generating archaeological data necessary for understanding prehistoric and historic research issues in the middle Gila Valley. The following sections present the relevant research themes and methods that will be employed as part of the treatment plan and per the Programmatic Agreement (PA) among the BIA Pima Agency, the GRIC, the Tribal Historic Preservation Officer, and the Advisory Council on Historic Preservation regarding the approval of Home Site Leases and Associated Improvements and Easements."

RESEARCH THEMES

Archaeological investigations within home sites may yield data useful for addressing a series of research issues that have been developed to guide archaeological investigations for the Pima-Maricopa Irrigation Project (P-MIP). This large project involves excavations throughout much of the GRIC, and data from home site investigations can be employed to complement the P-MIP research. The P-MIP investigations are guided by several over-arching research themes: (1) Structuring the Middle Gila Landscape; (2) Hohokam Organization; and (3) Historic Period (A.D. 1500–1950) occupation. The following sections briefly summarize each of these research themes.

Structuring the Middle Gila Landscape

This research theme is anticipated to be of primary relevance during the home site investigations. This issue addresses the cultural use of the landscape during both the prehistoric Hohokam and historic Akimel O'odham and Pee Posh occupations of the middle Gila Valley. Any study of the organization and use of the landscape must include data on villages and residential settlements (see discussion below). This theme also considers the broader picture of residential settlements as well as the organization of non-site activities in largely unsettled or lightly settled areas in between them (Rice and Ravesloot 2001; Wells et al. 2003, 2004; Loendorf 2012). In an archaeological study of the entire cultural landscape, small camps, work areas, field systems, quarries, and even isolated artifacts are all potential sources of data. Thus, the various village and non-village sites encountered during home site investigations may provide information on how prehistoric and historical groups managed the middle Gila landscape.

Field Houses, Farmsteads, and Subsistence Practices

In the Hohokam settlement hierarchy, two categories of small sites—field house sites and farmsteads—were associated with the tending and harvesting of irrigated agricultural fields (Cable and Mitchell 1988; Crown 1983; Henderson 1989; Kwiatkowski 1988). These site types were important intermediary places between the activities conducted in agricultural fields and the needs of the larger residential sites in the settlement hierarchy such as hamlets, villages, and primary villages (Cable and

Mitchell 1988:400). Field houses and farmsteads were used as locations for tending to ripening crops and for the initial processing of maize (Cable and Doyel 1985). They also served as places where wild plant foods such as mesquite beans, little barley, agave, and amaranth, were harvested and/or collected. Both domestic and wild resources were eventually taken to the larger settlements where they were consumed.

Hohokam field house sites and farmsteads are distinguished from each other with respect to four categories of data: architecture, cemeteries, refuse disposal, and site structure (Crown 1983:11–15). In field house sites the structures are small, usually less than 10 square meters in area, with some field houses measuring less than 2 square meters. There is also considerable variation in the shapes of the structures and placement of doorways and hearths (Cable and Mitchell 1988; Crown 1983). Field houses do not have internal support posts, and hearths are informal arrangements of cobbles or shallow basins containing charcoal stains. Field house sites are associated with sheet middens of very little depth, and lack cemeteries. Field house sites also lack a formal layout; if multiple structures occur it is likely they were not contemporary and therefore were not arranged to fit some plan. It is important to realize also that not all small structures were field houses; small structures could also have been used as purification retreats (for warriors), menstrual huts or sweat lodges (Crown 1983).

Farmstead sites are not much larger than field house sites but differ in several respects. The structures in farmsteads are larger, covering more than 10 square meters in area, and have floor plans similar to house structures in Hohokam villages and hamlets of the same time period. The houses have internal support posts arranged in a regular pattern, and the hearths are clay-lined basins. Cemeteries may be present at some, but not necessarily all, farmsteads. There are deeper accumulations of refuse, either as deposits within pits or as slightly mounded areas. Finally, farmsteads have a formalized site structure with a planned placement of houses, middens, extramural work areas, and cemeteries (Crown 1983:11–15; Mitchell 1989b:257–284).

The distinction between field house sites and farmsteads is posited to stem from variation in the duration of occupation and the size of the social unit using the settlement. Field house sites were short-term camps established in agricultural fields and occupied by a few individuals or a nuclear family for parts of the growing and harvest season (Cable and Mitchell 1988; Crown 1983; Henderson 1989:354). Because irrigated fields were used for long periods of time, these associated camp locations could also be reoccupied a number of seasons in succession. Farmsteads were permanent settlements located near agricultural fields and continuously or nearly continuously occupied by a single household unit for a full year. These posited differences are reflected in the architecture and artifact assemblages associated with such sites (Cable and Mitchell 1988; Crown 1983).

In historical times, the Akimel O'odham and Pee Posh also established temporary camps and structures next to their fields, especially during the harvest. There are also accounts of Akimel O'odham and Pee Posh families living for most of the summer in their fields and returning to more permanent settlements during the winter (Crown 1983). The range of activities that took place in prehistoric field houses and farmsteads does not appear to have been vastly different than those that pertaining to historic field houses and farmsteads. Historic period field-house sites typically had a specialized focus on maize-related subsistence activities (Kwiatkowski 1988), and the same is true of farmsteads (Mitchell 1989a; Mitchell 1989b). In fact, the ethnographically observed procedure of roasting, drying, and shelling corn in field camps was applied by Kwiatkowski (1988) to account for some of the interesting ethnobotanical characteristics of Hohokam field house sites and farmsteads.

Given the above portrait of prehistoric and historical subsistence practices (Mitchell 1989b) large sites do not offer an optimum context for documenting subsistence practices. Rather, the field-house sites and farmsteads provide better locations for documenting regional variability in Hohokam subsistence

practices. Maize, little barley, agave, mesquite, and agricultural weeds, such as amaranths, were procured and passed through these temporary camps and economically specialized settlements before arriving in the granaries and storage vessels of the large villages. Thus, these smaller sites provide better contexts for observing the relative importance of food resources in a particular area than the larger villages (except for the rare instances in which large villages were burned along with their accumulated stores of foods).

Based on the discussion of prehistoric and historic field houses, farmstead, or other limited-activity areas related to agricultural pursuits, we pose the following research questions:

- *Do any structures recorded in the project area conform to the empirical expectations for prehistoric or historic field houses based on the criteria outlined above? Do any of them appear to be part of a larger farmstead?*
- *What role did field houses and activity areas in agricultural fields play in the Hohokam and, later, Akimel O'odham and Pee Posh modification and use of the middle Gila valley landscape?*
- *How do resources processed at field-house sites and farmsteads vary between different areas in the middle Gila valley or Phoenix Basin in general?*
- *Are artifact assemblages at field-house sites and farmsteads less dense, less diverse, and more-highly specialized relative to those recovered from the larger settlements? What types of artifacts and materials are present and/or more prominent in field-house sites and farmsteads compared to the larger settlements?*

Hohokam Organization

This research issue addresses the study of the organization of Hohokam houses and households (G. Rice 2003), public architecture and settlement complexes (Rice and Ravesloot 2003); the craft economy, including ceramics (Simon 2003), obsidian (Darling 2000; Loendorf 2012), and shell artifacts (Bayman 2002a), and the subsistence economy (Gasser and Kwiatkowski 1991a; Gasser and Kwiatkowski 1991b). The production of subsistence resources and craft items most frequently occurred at the household level. Political decisions and certain ceremonial functions, on the other hand, were commonly vested at the level of the settlement. Thus, research on households tends to focus on economic organization, while research on settlements tends to focus on sociopolitical and ideological organization, although there are certainly cases in which these foci overlap. As proposed below, the objectives of the current research are, first, to document the variability in the economic organization among households, and second, to infer the possibility of larger-scale production units consisting of groups of households or entire settlements.

Hohokam Households

Households were the principal economic units of Hohokam society, and they provided the tools, technology, and labor needed to procure food, manufacture crafts, and procure the material needs of its inhabitants (Henderson 2001:51; G. Rice 1987:148; Wilcox et al. 1981). As the minimal units of the Hohokam economy and society, a study of households contributes to an understanding of Hohokam social organization (G. Rice 2003).

The architectural characteristics of Hohokam households differed between the pre-Classic and Classic periods. Households in pre-Classic villages usually occupied several adjacent pit houses whose doors faced onto a common open area (Wilcox et al. 1981), a pattern that Hohokam researchers have

come to refer to as a courtyard group or residential yard. The open space was frequently the most stable feature of the residential yard, and when a succession of houses were torn down and rebuilt there was a strong organizational tendency to place them around the periphery of the open space. Pre-Classic pit houses and open courtyards were replayed in the Classic period by the residential compound, a closed-off and more permanent style of architecture. Though visually different, the Classic period compounds are a direct development from the pre-Classic courtyards in which the spatial arrangement of rooms around a residential yard is retained (Sires 1987).

Ethnographic studies find a consistent and strong relationship between household size and wealth (Netting 1982:641; Wilk and Netting 1984). Wealthy households are larger both with respect to the number of inhabitants (they can include distant relatives and servants) and spatial extent (they have larger buildings and more land). Among the Hohokam, for instance, wealthier households are associated with larger courtyard groups (Henderson 2001). The wealth of households can also be measured by calculating the cost of house construction in terms of effort and material (Craig 2001; Henderson 2001:94–98). Again, at the Grewe site, larger Hohokam households exhibited more-costly building materials, and smaller households exhibited less-costly materials (Craig 2001).

One factor that potentially contributed to differences in the economic success of Hohokam households was the history of settlement in the community. At Grewe, large wealthy households tended to be surrounded by smaller, less-wealthy households. Henderson (2001) suggests that the larger households, which were established early in the occupation, held prime agricultural land within the irrigation system. The surrounding "client" households (Wilk and Rathje 1982:629) provided those larger households with labor to farm the irrigated land. Those smaller client households, however, probably did not hold land within the irrigation systems and probably were only granted usufruct privileges by the main households. This pattern of land tenure and patronage is frequently described in ethnographic studies of households (Wilk and Rathje 1982).

Given the cultural context of the project area, we posit the following research questions about household organization, size, and wealth:

- *Did wealthy Hohokam households tend to have larger residential yards and more total room space?*
- *Is there any relationship between stable pre-Classic period courtyard groups and the locations where Classic period compounds were subsequently constructed?*
- *Is the chronological order of occupation within the settlement correlated with wealth and household size? That is, did the first houses established in a village tend to become those with the greatest wealth?*
- *Do wealthy "patron" households constitute the nucleus around which client households were clustered? If so, did the client households in these clusters tend to be involved in craft production or farming in areas outside the irrigation system (upland xerophytic cropping, ak-chin farming)? Did some such clusters evolve into multi-household units specializing in the production of crafts?*
- *How do stable courtyards compare and contrast with those that were occupied for shorter periods of time? Is this pattern stability and ephemeral construction associated with wealth, leadership positions, location in settlements, or the type of settlement?*
- *Is there a relationship between household wealth and proximity to plaza areas or other public facilities within Hohokam villages?*

Hohokam Settlement Complexes and Public Architecture

During the Hohokam occupation of the Salt-Gila Basin, community-like organizations were expressed at several levels in a nested settlement system that served different economic and sociopolitical purposes. One important expression of the Hohokam community was the *settlement complex*, which occurs at a scale between the individual settlement and the regional settlement system (Gregory and Nials 1985; G. Rice 2000; Wilcox and Sternberg 1983). A settlement complex is defined as consisting of a central place or site with public architecture and a set of surrounding residential settlements without public architecture. The two better-known forms of Hohokam public architecture include ball courts and platform mounds. Though other important forms of public architecture include big rooms, large central plazas, and capped trash mounds. Central plazas, in particular, have been identified as perhaps the most important public facility at Hohokam village sites (e.g. Wallace 2004).

Settlement complexes were the building blocks of the prehistoric Hohokam social order and have many of the properties associated with segmentary states and tribes (G. Rice 2000; Sahlins 1968). For instance, the cohesiveness of the social segments was based on the ideological commitment expressed through the activities at the ball courts or platform mounds, rather than ties based on economic redistribution or control exercised by a class of elites. By the Classic period, elite members of the society did reside at many of the centers with platform mounds, but they exercised their authority with respect to ideological matters (Downum and Bostwick 2003; Elson and Abbott 2000). This type of segmentary organization is distinctly a non-western European type of organization, and ethnographers faced with describing complexity based on ideological authority have had difficulty accepting it as a form of political authority (Shapiro 1956).

Hohokam settlement complexes were potentially additive, meaning that several complexes could share the use of the same territory while maintaining separate public facilities. For example, up to five ball courts have been reported at the site of Villa Buena (GR-1057), and the site of Las Colinas in the Phoenix Basin had at least five (and perhaps eight) platform mounds. It is not clear that all of these courts or platforms were necessarily in use at the same time, but the potential exists that each center was a composite of several community complexes. If settlement complexes were indeed additive, then they were also in turn associations of lower-order segments. This interpretation is supported from the number of council chambers or big-rooms found in excavated ball court or platform mound centers (G. Rice 1995, 1998; Rice et al. 1998). In Compound B at Casa Grande, for instance, there are at least six big-rooms in the compound with the two platform mounds.

Import to our discussion is the fact that the number of settlement complexes declined over time, as evidenced by the reduction in public architecture from the pre-Classic to Classic period. For example, during the pre-Classic period, 25 ball court features were distributed in 14 centers along four canal systems in the middle Gila River Valley. By the Classic period, public architecture in the region was reduced to six platform mounds in six centers located on three canal systems. The reduction in the numbers of centers and of public architecture over time was the consequence of several different processes. Some reduction occurred as a consequence of abandonment of settlements in certain settings such as the eastern bajada of the Sacaton Mountains (Neily et al. 2000). Reduction also occurred as a consequence of the consolidation of canals, which required restructuring the distribution of residential settlements and led to the amalgamation of previously small complexes into a few larger complexes (Rice and Ravesloot 2002). And finally, there was a reduction in the number of centers through the extension of the hegemony of the center places (Rice and Ravesloot 2002).

Given this cultural context, we posit the following research questions about settlement complexes and public architecture:

- *What are variables that promoted the continuous use of certain villages as a center place?*
- *Is there a relationship between population density and the number of ballcourts and platform mounds?*
- *Did the organization of domestic or social units change over time at Hohokam villages. If so, was this a response to an influx of migrants or other factors (e.g., conflict)?*

Timing and Tempo of Hohokam Architectural Change

Traditional models of Hohokam architectural change (e.g., Doyel 1974, 1991; Gregory 1987; Sires 1987) posit that both compounds and massive-walled platform mounds in the Phoenix Basin first appeared early in the Soho phase, ca. A.D. 1150–1300. However, recent research indicates that the timing and tempo of Classic period architectural development followed an alternative trajectory. This research is based on data from sites in the lower Salt River Valley such as Pueblo Grande (e.g., Abbott et al. 1994; Abbott and Foster 2003), Grand Canal Ruins (Mitchell 1989a), and Tres Pueblos (Craig 1995); and at sites in the Tonto Basin (e.g., Craig and Clark 1994). In this revised model, architecture in early Soho phase (around A.D. 1150–1250/75) settlements is characterized by thin-walled adobe structures without compound enclosures or massive-walled platform mounds (Craig 1995).

It is argued that compounds and massive-walled platform mounds were not built until the late Soho phase (between around A.D. 1250/1275 and 1300/1325), prior to the appearance of Gila Polychrome pottery around A.D. 1300/1325. These early compounds tended to encompass isolated or detached rooms, but a shift to more contiguous rooms within compounds occurred in the Civano phase (A.D. 1300/1325–1450) coterminous with the appearance of Gila Polychrome. Thus, these architectural changes probably "took place rapidly and in tandem throughout the Phoenix Basin" (Craig 1995:169), rather than gradually as hypothesized in the traditional model.

Relatively few researchers have considered the possibility that some structural changes occurred in response to environmental factors, including the availability of construction materials (e.g., wood) that may have become locally depleted over time (Loendorf 2012). Instead, diachronic changes in construction techniques have generally been attributed to either migration of different ethnic groups or the diffusion ideas from elsewhere. Furthermore, these possible explanations (i.e., environmental response, migration, and diffusion) are not mutually exclusive, and it probable that more than one of the factors accounts for the diachronic changes in Hohokam construction techniques.

Tracking changes in construction techniques requires tight chronological control for the features in question. Stratigraphic relationships represent the first line of evidence in reconstructing sequences. Multiple chronometric dates (e.g., radiocarbon, archaeomagnetic) from architectural features in different portions of the Hohokam region also are critical to establishing independent baseline data. Another chronological control method involves seriating architectural features and pits based on the proportions of buff ware, red ware, and Salado polychrome ceramics, as well as the percentage of phyllite-tempered plain ware pottery (Abbott et al. 1994; Abbott and Foster 2003:29). Finally, another relevant trend is the transformation of space devoted for storage and other purposes over time (Abbott and Foster 2003; Doyel 1991).

The following research questions are related to issues associated with architectural changes that occurred over time in the Hohokam region:

- *Is there temporal patterning among the structure types identified during the excavations?*
- *What are the proportions of buff ware, red ware, and phyllite tempered pottery in the feature assemblages? Do these ratios or other ratios indicate temporal differentiation among features?*
- *Is there patterning in the construction and location of storage facilities? How does this patterning compare to contemporaneous sites in the Hohokam region?*
- *Are architectural types at the site consistent with a rapid change in construction techniques or is there evidence for gradual changes?*
- *How do construction techniques in the project area compare and contrast with other portions of the Hohokam region, especially those along the Lower Salt River in the Phoenix Basin?*

Hohokam Craft Economy

Another important component for understanding Hohokam organization and village life concerns craft production and crafting traditions. The investigation of sites within the project area is anticipated to generate datasets that can be used to study the organization of economic activities and crafting among the prehistoric Hohokam populations. Although Hohokam people manufactured a variety of commodities, our research will focus on the three most prominent Hohokam craft items known to have been manufactured in the middle Gila River valley: ceramic pottery, obsidian, and shell ornaments. The discussion below and associated research questions have been excerpted from thematic statements by Simon (2003), Darling (2000), and Bayman (2002a), as well as papers by Eiselt and Darling (2008), Eiselt and Woodson (2002), Loendorf 2012, and Loendorf et al. 2013.

Ceramic Vessels

The middle Gila River valley functioned as a core region of pottery production for much of the Hohokam sequence (Abbott 2000, 2009, 2010; Abbott et al. 2001; Beck and Neff 2007; Haury 1976; Rafferty 1982; Wallace 2001; Walsh-Anduze 1993). Potters in this area specialized in the production of schist-tempered pottery using both buff and brown colored pastes. The buffware industry represents a unique approach to alluvial clay pottery production involving the of alluvial clays high in caliche and salt – which contributed the characteristic buff color to the clay when fired – and the use of crushed mica schist which was mined, heat-treated and transported for use in ceramics.

Raw-material characterization studies of Hohokam ceramic artifacts provide powerful and effective tools for inferring ceramic provenance, which can in turn yield insights about production loci and distribution ranges. Ceramic provenance studies have led to two major findings. The first is that pottery production was highly concentrated at sites along the middle Gila and lower Salt Rivers (Abbott et al. 2007b, 2009). As such pottery consumers throughout the Salt-Gila basin were largely dependent on these manufacturing centers for most of their ceramic needs (Abbott 2000, 2009; Abbott et al. 2001). The second is that an institutionalized system of commerce conditioned the flow of pottery to consumer villages throughout the Phoenix basin (Abbott et al. 2001). This mode of production probably might have been facilitated by periodic market assemblies that were held during communal ballcourt events (Abbott

2000, 2009; Abbott et al. 2001; Abbott et al. 2007a; Doyel 1981; Haury 1976:78). The concentration of ceramic production, like the ballcourt system, reached its peak during the middle Sedentary Period, a short seventy-year interval when hundreds of thousands if not millions of vessels were produced along the middle Gila River (Abbott 2009, 2010). What remains to be seen, however, is how pottery production in the middle Gila region was organized and, in particular, which or how many villages specialized in the manufacture of pottery.

The following research questions are based on issues associated with Hohokam ceramic production:

- *Is there any evidence that the prehistoric residents of the project area participated in the production of ceramic vessels?*
- *Which technologies were used in the production process? Are kilns evident in the vicinity? What does the gathered evidence suggest about production tools and acquisition of raw materials?*
- *How was ceramic production organized in this project area? Is community-level or household-level specialization evident? What was the scale of production output (Costin 1991) per household or community?*
- *Can evidence for local versus imported pottery be inferred from the ceramic materials based on raw-material characterization evidence? If so, what does this evidence imply regarding the scale of local production versus importation among the Hohokam communities in the project area?*
- *What does the evidence suggests about pottery provisioning and exchange systems in the Salt and Gila River Valleys? Does the accumulated evidence support Abbott's model for market system development during the middle Sedentary period? What does it suggest about provisioning before and after that time span?*

Obsidian

Like ceramics, obsidian is an ideal material for the archaeological study of prehistoric socioeconomic interaction and exchange systems (Darling 2000; Loendorf 2012; Loendorf and Fertelmes 2012). This is because obsidian is a desirable, but not ubiquitous, raw material for tool production, and has physical properties that are appropriate for archaeological measurement. Obsidian is not readily available in the middle Gila River Valley. However, the material can be found all four sides of the project area, thereby facilitating the examination of socioeconomic relationships both in the study area and with areas to the north, south, east, and west (Darling 2000; Loendorf 2012; Loendorf et al. 2004). In addition, obsidian chemistry allows for the sourcing of obsidian from contexts in the middle Gila River back to its original source location. During the last three decades, geoarchaeological investigations in Arizona have chemically characterized a larger number of sources and hundreds of artifacts that were utilized by the Hohokam and their descendants (Bayman 1995; Bayman and Shackley 1999; Loendorf et al. 2013; Loendorf and Fertelmes 2012; Mitchell and Shackley 1995; G. Rice et al. 1998; Shackley 1988, 1995, 2005). These studies have identified a number of interesting patterns and led to competing inferences about prehistoric and historic period procurement practices.

Hohokam obsidian procurement has been characterized as "opportunistic" or in conjunction with the acquisition of other resources such as salt, shell, or minerals from outside the core area. Mitchell and Shackley (1995), for instance, argue it seems particularly likely that the collection of Sauceda obsidian was related to shell expeditions by the Hohokam. At the same time, though, substantial variation occurs in obsidian utilization between different portions of the Hohokam region. For example, Government

Mountain obsidian is common at pre-Classic sites along the Salt River in the Phoenix basin, but this material is rare along the middle Gila River (Loendorf et al. 2013). It appears instead that direction of the source has a greater effect than absolute distance, suggesting that prehistoric peoples in the lower Salt and middle Gila River maintained different trade contacts for some materials.

Given the favorable qualities of obsidian for geographic provenance research, as well as its relation to intra- and inter-regional studies of socioeconomic interaction and exchange systems, the following research questions are presented:

- *By what mechanisms was obsidian acquired by the Hohokam? For example, was obsidian transported through down-the-line exchange, trading partners, and/or direct procurement?*
- *How does obsidian source utilization vary through time, and what are the implications of this variation?*
- *Is variation in the density and diversity of obsidian associated with the arrival of migrants to the Hohokam region who maintained ties with ancestral areas?*
- *Was obsidian imported as a raw material and/or as finished products?*

Vesicular Basalt

Vesicular basalt is an extrusive igneous rock preferred by the Hohokam and their descendants for the manufacture of grinding stones, such as manos and metates (Bostwick and Burton 1993; Stone 1994). Preference for the volcanic stone is inferred by its ubiquity in archaeological contexts when compared to its natural occurrence. For instance, vesicular basalt accounts for 79 percent (n=43/56) of the excavated ground-stone sample at the site of Grand Canal in the lower Salt River valley (Mitchell 1989a), and 76 percent (n=111/146) of the recovered assemblage (n=146) at the village of Upper Santan in the middle Gila Valley (Fertelmes 2014). Yet, vesicular basalt suitable for groundstone tool production is rare or absent in the lower Salt and middle Gila River channels, and does not occur in the majority of the bedrock outcrops in the region (Drosendahl 1989; Kokalis 1971; Reynolds and Bartlett 2002; Richard et al. 2000). Basaltic material of suitable size for ground-stone tool production is found at only a dozen or so geologically discrete locations within the Hohokam core territory, including select portions of the Phoenix, McDowell, and Santan Mountain ranges, Lone Butte, and several outcrops near the modern town of Florence.

For three decades, Hohokam scholars have attempted to determine the primary means by which the Hohokam transferred vesicular basalt from quarry and production locales to habitation sites. The principal analytical method employed in these studies has been geographic provenance analysis (i.e., sourcing), which seeks to identify the spatial origin of ground-stone artifacts through an evaluation of their physical or geochemical composition and subsequently interpret any meaningful patterns among the resultant provenance dataset. However, until recently, sourcing studies have been limited by inefficient and unreliable compositional analysis methods, thereby preventing a comprehensive evaluation of different hypothesis regarding vesicular basalt movements in the Hohokam cultural sphere. Presently, the GRIC-CRMP, as part of P-MIP, has advanced the efficacy of portable EDXRF for vesicular basalt provenance research (Fertelmes 2014; Fertelmes and Loendorf 2012). This analytical technique will be used to determine the geographic origin of vesicular basalt recovered during the planned investigations.

Specific research questions that can be address using vesicular basalt provenance data from sites in the current study area are:

- *By what means was vesicular basalt acquired by Hohokam households? For example, was the stone procured directly from the nearest available outcrop, transported through down-the-line exchange, nonlocal trade partners, marketplaces and/or local elites who controlled access to the material?*
- *How does vesicular basalt source area utilization vary through time, and what are the implications of this variation?*
- *Was vesicular basalt imported as a raw material and/or as finished products?*
- *Is there evidence for the specialized production of groundstone tools? Were manos and metates manufactured at different locations?*
- *Did Hohokam households acquire vesicular basalt from outcrops in the lower Salt or middle Gila River Valleys? What does source preference at this site say about Hohokam social organization and economic interactions?*

Marine Shell

Most archaeologists assume that marine shell circulated among pre-Classic Hohokam and other Southwestern communities through "down-the-line" trade or direct procurement by expeditions to the Gulf of California or both (Bayman 2002a; Brand 1938; Colton 1941; Hayden 1972; Tower 1947). However, debate concerning the social and ecological factors that governed the production of marine shell ornaments during the pre-Classic, including the organization of production, have not been fully resolved. Some scholars suggest that pre-Classic period Hohokam marine shell ornaments were manufactured by resident communities in the Papaguería, who then exchanged their products for agricultural produce from the Hohokam as a risk-buffering strategy (Doelle 1980; McGuire 1985). Other archaeologists argue that evidence of high-intensity production on house floors at some pre-Classic period Hohokam sites indicates household-based economic specialization (e.g., A. Howard 1993). Others still (e.g., McGuire 1985; McGuire and Howard 1987) suggest that pre-Classic production of shell ornaments in the Phoenix Basin was concentrated at select sites like Snaketown and was controlled by Hohokam elites. Thus, there is still uncertainty about the organization of marine shell ornament production and exchange.

The following research questions are associated with the production of shell jewelry during the pre-Classic period:

- *Is there evidence for the production of shell items in the project area, and were these items imported finished products?*
- *If marine shell items were made locally, is there evidence for craft specialization in the production of these ornaments and what was the organization of production?*
- *Does evidence exist for craft specialization in marine shell ornament production? If so, what was the organization of production?*
- *Did degrees of morphological and stylistic standardization of certain ornaments (e.g., Glycymeris bracelets) vary during the Hohokam chronological sequence?*

During the Classic period, compelling evidence suggests that shell-ornament production and consumption was increasingly concentrated at Hohokam platform mound sites in the Phoenix Basin (e.g., Bayman 1996, 2002b; McGuire and Howard 1987). Although these goods were concentrated at platform mound settlements, they also were widely distributed in domestic contexts in these settlements (Bayman 1995, 1996, 2002a, 2002b). Some researchers have argued that this pattern involved some level of elite intervention in the craft economy and the production and redistribution of socially valuable ornaments (e.g., Fish and Fish 2000; Teague 1984). Bayman (2002a) subsumes this hypothesis under the "Political Economy Model," which examines craft goods with an eye toward their social and political functions rather than focusing on their adaptive role in ensuring economic access to sufficient calories in marginal ecological settings (e.g., Bayman 1995). Applications of this model in the Hohokam region follows the assumption that shell ornament production and/or circulation was controlled as a mechanism for establishing and maintaining elite authority (e.g., Bayman 1996, 2002b; McGuire and Howard 1987; Neitzel 1991).

More recent considerations of Hohokam Classic period shell production argue that most high-value ornaments were not directly controlled by elites in the manner prescribed by neoevolutionary theory (e.g., Bayman 1995, 1996, 2002a). That is, no evidence has been detected for "attached specialization" in the Hohokam region. Moreover, while several archaeologists claim that marine shell bracelets were increasingly standardized and less elaborate by the Classic period (e.g., Neitzel 1991:188–189), this conclusion is not yet supported by detailed and systematic analysis of empirical data. It is possible instead that the relevance of shell ornaments to Hohokam political power may have contributed to the social or ideological contexts in which they were acquired, worked, and used (Bayman 2002a). The production of marine shell ornaments in the vicinity of platform mounds illustrates the important role of ritual for imbuing the mound loci with ideological meaning and for mobilizing production of shell goods without the need for direct elite intervention (Spielmann 2002).

Considering the above models of Classic period marine shell production and distribution, the following research questions can be posed:

- *During the Classic period, is evidence for shell ornament production and consumption concentrated at certain project area sites?*
- *Is the most robust and extensive evidence for production and consumption of shell artifacts found in structures and activity areas located closest to the platform mound or not?*
- *Did Hohokam elites sponsor or oversee production of marine shell ornaments during the Classic period?*

Hohokam Subsistence Economy

Variation in Hohokam subsistence practices is thought to result from differences in regional soil conditions, domestic crop availability, personal preferences, specialization associated with exchange practices, proximity to water sources, the local availability of natural resources, ethnic differences, and site formation processes (Gasser and Kwiatkowski 1991a; 1991b). Research suggests that regional variation may play a greater role than temporal changes in subsistence practices (Gasser and Kwiatkowski 1991a; 1991b). Examination of resource utilization in a wide variety of geographically and temporally distinct middle Gila settings, coupled with an understanding of the distribution of modern resources on these landforms, is necessary to better understand the nature of variability in Hohokam subsistence practices. These data are also necessary to patterns identified for Middle Gila populations to resource utilization practices identified in other portions of the Hohokam region.

The following questions are based on questions regarding Hohokam subsistence practices:

- *What subsistence resources were the site residents dependent upon?*
- *Is there evidence that the project area residents utilized upland resources, such as agave or other crops?*
- *What types of animal resources were utilized? Is there evidence for the acquisition of non-locally available game species?*

Historic Period

These research issues include spatial and temporal patterning in O'odham and Pee Posh material culture, vernacular architecture, and social organization. The underlying research interest tying all of these themes is to understand interactions among the Akimel O'odham, Pee Posh, and Euro-American cultures. The following sections provide a brief discussion of these research issues.

The Archaeology of O'odham Material Culture

Studies of the material culture of the Akimel O'odham and Pee Posh are limited in scope and typically have previously largely been site specific (see for example McKenna 1984; Ravesloot et al. 1992; Rice et al. 1983). Archaeological excavations undertaken in the GRIC offer a major contribution to our understanding of Akimel O'odham material culture. The presence of very late Hohokam and Protohistoric deposits also contribute to understanding early expressions of O'odham culture in the GRIC. Given that Tohono O'odham populations and other people from the south immigrated to the GRIC, further insights with regard to distinguishing regional differences in pottery production, house form, agricultural practices, metal-use, and consumption of commercial products are also be possible. These analyses will complement classic ethnographic studies of material culture from other areas including the Tepehuan and Pima Bajo (Pennington 1969; Pennington 1980); as well as the material culture studies reported in Russell (1908) and Fontana et al. (1962) on Papago pottery.

The following questions are associated with aspects of Akimel O'odham and Pee Posh material culture:

- *Did the Historic period site residents manufacture their own goods, or were they fully dependant of the manufactured items?*
- *Is there evidence that Historic period indigenous goods, which were made elsewhere were brought to the project area?*

Late Historic Period Vernacular Dwellings

Eiselt (2002) developed a research context for the study of historic period vernacular dwellings on the GRIC, which we adapt here for investigating any such structures within the APE. The ultimate goal of this ongoing research is to chart the evolution of the household complex and relate this to changes in economy and social organization. One of the underlying assumptions of this research, then, is that domestic activities reveal at least some of the temporal, spatial, and social principles that organize cultural systems. Since archaeological remains provide an indirect measure of past activities, analysis of the

household complex should likewise reveal some of the practices that created and maintained these cultural systems. Results will provide a comprehensive understanding of archaeological site structure and how this relates to the proximate social and ecological context of the habitation. This information is related to a more general study of O'odham-Pee Posh economy through the spatial analysis of features and artifacts representing the daily practices of household occupants. Below we discuss various research components related to this overarching theme.

Ethnographic, historical, and archaeological research has identified four different construction techniques used by the Akimel O'odham and Pee Posh for core buildings in the late Historic period (Eiselt 2002). These forms include: the domed *ki* (e.g., roundhouse); the *jacal* (e.g., waddle and daub); the adobe brick house; and the sandwich house. In general, there is a shift in the use of these techniques for core building construction at the end of the nineteenth century, from domed (i.e., ki) to quadrilateral (i.e., *jacal* and adobe) structures, and again in the early twentieth century with the adoption of the sandwich house (McKenna 1984). However, the pace and degree of this change varied according to a number of social and geographic factors. Therefore, as part of the broader effort to understand the rate and scope of architectural changes across the GRIC, a primary goal of the current investigations was to document core building construction techniques. Methods of construction, as well as structure size and design, can be inferred from these attributes to identify which attributes are associated, which of these attributes or suites of attributes vary, and which are relatively consistent (geographically or temporally). Site chronology will be investigated using written records, allotment records, early historic maps, and resident testimonies, as well as archaeological dating methods including artifact seriation, mean date formulas for historic artifacts, and other chronometric techniques where these are applicable.

A number of studies have also demonstrated that the household complex was made up of a core building and several other structures each having different specifications and uses (Garrett and Russell 1983; McKenna 1984; Rice et al. 1983). Auxiliary structures may include a ramada, a storage shed, a storage hut, a storage platform, a brush kitchen, and a menstrual or birthing hut. Importantly, the construction, use, and association of these various elements were dynamic and flexible. McKenna (1984) has developed a general model to account for the temporal and spatial variability observed in the Akimel O'odham household complex. They posit four different household plans, and suggest that each plan reflects the degree to which the family has been acculturated into the Euro-American commercial economy. This model is based on the premise that people organize their space analogous to the organization of their culture, particularly with respect to political and social realms (Bourdieu 1977; Kent 1990). In order to gain insight on the acceptance and resistance of Euro-American culture by the Akimel O'odham, this study made attempts to relocate the structural components of historical household complexes. When structural remains were lacking, identification of possible structure types was derived from the nature and distribution of artifacts and features.

Another important focus will be site activities, especially if evidence of seasonal occupations can be detected (Ravesloot 1992). Activity areas are an important component of the household complex even though they may occur outside structural boundaries. The identification of activity areas is based on the presence of artifact clusters. Contextual and artifact-based analyses can provide the information on structural changes in the organization of site activities as they relate to broader patterns of commercial consumerism, indigenous trade and exchange, the social and functional uses of objects and their values, and the organization of labor at the household complex. Furthermore, information pertaining to extramural cooking practices and food consumption practices can also be gleaned through site-level artifact analyses. Specific dietary activities will be investigated through an analysis of archaeobotanical and zooarchaeological remains as well as use-wear analysis of cooking vessels. Food acquisition patterns will be examined through analysis of hunting equipment, agricultural and other plant gathering tools, and commercial products.

Another important component of research on historic period vernacular structures concerns site activities and the social identities of the site occupants. Most archaeological studies of historic households utilize resident testimony and archival documents to identify site occupants. Such evidence also provides demographic data relevant to interpreting the site. This information can be compared to archaeological materials in order to develop descriptive models that relate site patterning to the nature of the resident group and its size. For example, research at Nolic on the Papago Indian Reservation (Doelle 1983) shows that increased architectural specialization (e.g., the quantity and quality of structures used for special purposes within a given household complex) is an expression of the energy invested in the domestic space. Historic documents suggest that there may be differences in the designs and layouts of O'odham and Pee Posh houses.

Based on this understanding of historical households in the middle Gila River Valley, pertinent research questions include the following:

- *What types of core structures and construction techniques are present at sites in the project area?*
- *What types of auxiliary structures and construction techniques are present at sites in the project area?*
- *What is the configuration of core and auxiliary structures? Is there evidence that this configuration changes over time in the project area?*
- *What types of activities were undertaken at core households and historical site components?*
- *Do historical site activities represent a permanent or seasonal residence? If the latter, what is the season or seasons during which the structure was occupied?*
- *Do variances in construction techniques and style have any relation to social identities of individual families or lineages?*

Social Organization

The General Allotment Act of 1887, or the Dawes Act, introduced the practice of dividing Indian land by the U.S. government into individually owned parcels (allotments) with the intention of legally and economically assimilating Native Americans into Euroamerican society through citizenship, allotment in severalty (private property), and the eventual abolishment of the reservation system (Greenwald 2002). Over a seven-year period, from 1914–1921, a total of 4,869 allotments totaling 96,000 acres were assigned within the GRIC. The majority of individuals were assigned two allotments including ten acres of irrigable land and ten acres that were non-irrigable. Allotment selection was conducted according to families, so that individuals of the same family would select contiguous allotments in the same location they had occupied previously. Thus, the arrangement of features along canals in irrigated areas can be related to specific family histories. In addition, the history of public buildings, including trading posts, churches, and meeting houses, which were located in unallotted land, can also be addressed.

The following questions are related to allotment history and social organization:

- *When did Historic period habitation within the specific location begin?*
- *In what ways was the settlement of the location associated with the development of the Pima agency?*

- *How did imposition of the allotment system affect Historic period settlement in the project area?*

RESEARCH METHODS

Fieldwork Strategies

All fieldwork initiated under the PA will be restricted to the Area of Potential Effects (APE) for home site development, which is defined as the perimeter of the house pad plus a 7-foot wide buffer around the pad. Although it is understood that the installation of utilities (water, sewer, gas, power, telecommunications) to the home site also may have an adverse effect on the cultural site, the procedure for mitigating those effects is addressed separately from the home construction itself in accordance with a Programmatic Agreement Regarding Essential Services Construction in Underground Utility Corridors.

CRMP will employ a phased (Phase I and Phase II) fieldwork strategy during cultural resources investigations within proposed home site locations. Following Arizona State Historic Preservation Office (SHPO) guidelines (Bilsbarrow 2003), Phase I investigations can be conceived as including three different components: Identification Testing (unknown location and information potential), Eligibility Testing (unknown information potential), and Data Testing (Phase I Data Recovery). The results of test investigations are used to help assess the adverse effect of a proposed undertaking and also is necessary to guide the direction of subsequent mitigation efforts during Phase II Data Recovery. A brief synopsis of each different component of the data recovery program is presented below.

Identification Testing

Identification testing is used to determine whether buried cultural deposits are present within a defined area (Bilsbarrow 2003). This type of testing is most often used in situations when cultural deposits are suspected in a project area based on other lines of evidence such as historical records, but surficial evidence is lacking (e.g., the location of structures or canals depicted on historically-produced maps). Identification testing can also be used to help define the extent of known site boundaries when surface obstructions are present (e.g., vegetation or erosion). The results of Identification Testing are generally used to make an informed decision about the NRHP eligibility status of any identified subsurface feature or collection of features.

Eligibility Testing

Eligibility testing is employed to determine if a site is eligible for the NRHP when the data collected through archival research and pedestrian survey is insufficient to make a NRHP eligibility recommendation (Billsbarrow 2003). This type of testing typically involves investigating a small percentage of the site area (roughly 2-3 percent) to determine the nature, scope, and integrity of cultural deposits. The results of Eligibility Testing are then used to assess the data potential of cultural deposits within a site and, by extension, make an informed decision about a site's eligibility status. In most cases, however, because all excavations are restricted to the home site APE, these investigations are of insufficient scope to determine if a given cultural property is eligible for the NRHP.

Data Testing

Data testing (or Phase I Data Recovery) is undertaken at sites that have been previously recommended to be eligible for the NRHP or are listed on the NRHP. Like eligibility testing, data testing involves investigating a small percentage (more than roughly 3 percent) of a site to determine the nature, scope, and integrity of cultural deposits. However, the goal of data testing is to identify important data contexts within a site that may be adversely affected by a proposed undertaking (Bilsbarrow 2003). As such, a larger fraction of the site area than used in eligibility testing is typically investigated during this type of testing. The results of data testing are used to assess the adverse effect of a proposed undertaking and also to help guide the direction of subsequent mitigation efforts (Phase II Data Recovery).

Phase II Data Recovery

Phase II efforts are focused on significant cultural features identified during test investigations. The significance of identified cultural remains is evaluated per their relevance for addressing a series of research issues (see above) developed to guide archaeological investigations within the GRIC, including the P-MIP investigations. P-MIP involves excavations throughout much of the GRIC, and use of these data as comparative materials allows a much wider range of issues to be addressed than would be possible using only data recovered during small excavations at individual home sites. The data from the home site investigations compliment P-MIP research and provide information in an area where P-MIP excavations are lacking. This facilitates understanding both diachronic as well as synchronic variation in archaeological data from the middle Gila River region.

Fieldwork Methods

The field methods for cultural resources Identification, NRHP-Eligibility, and Phase I Data Testing are similar in that they generally involve site mapping, standing structure documentation, limited surface artifact collections, and probing the subsurface for cultural deposits through the use of mechanically-excavated trenches. If needed, the findings of Identification and Eligibility Testing will serve as Phase I Data Testing results, and will be used to develop an appropriate Phase II Data Recovery plan. Phase II Data Recovery is designed to mitigate the adverse effects of an undertaking through intensive recovery of information from significant cultural features identified during the testing phase. Field methods typically employed during Phase II efforts include horizontal stripping, controlled feature excavation, and the collection of extensive environmental samples. The field methods employed during both Phase I and Phase II investigations are discussed in the following sections.

Site Mapping

A reference system based on Cartesian principles for mapping and recording provenience will be employed to document the location of sites, cultural features and deposits, and investigative units. All field mapping will be conducted using a *Topcon* total station. This methodology facilitates the incorporation of locational data into an electronic cartographic database that can be downloaded and copied daily. Furthermore, maps will be produced and updated as the fieldwork progresses, with field crews regularly reviewing working maps in order to identify any inaccuracies.

Standing Structure Documentation

Any standing structures and buildings on a home site lease will be evaluated as to their significance and potential NRHP eligibility. If such structures exist, they will be subjected to basic architectural documentation and historical research for each property. The structures will be recorded in accordance with standards for the Arizona Historic Property Inventory Form. This form helps to identify which properties are NRHP eligible, and provide recommendations for what type of additional documentation will be required for each facility. If any structures are deemed to be of NRHP eligible, then a comprehensive architectural and historical documentation will be completed for each structure. Mitigation can be achieved by documenting the resources according to the standards of the Historic American Buildings Survey (HABS) and those of the Arizona SHPO.

Surface Collections

In most cases, surface collection efforts consist of recovering all diagnostic artifacts and grab-sampling nondiagnostic artifacts from within the home site footprint. Systematic surface collections may also be completed within the APE if historical structures or other surface features are known to occur in the project area. If such features are present, then a 10-m by 10-m collection unit will be placed over each feature, and all artifacts within these units will be collected or recorded. In some cases, additional 10-m by 10-m units may also be placed so that a grid of collection units extends for at least 10 meters in all directions from the feature. Collection units are numbered and mapped with reference to the site.

Mechanical Trenching

Mechanical backhoe trenching is the primary method used to determine if intact subsurface features or deposits are present within home site locations. Although the technique is destructive, its ability to rapidly identify features not visible on the surface can be weighed against the damage it causes. Furthermore, because trenches are narrow, only the smallest of features are potentially destroyed. For larger features, such as residential houses or trash-filled pits, trenches affect only a small fraction of the total feature, and with the location and depth of the feature identified, the remainder of the feature can be excavated using controlled excavation techniques.

Trenching at home sites within a known archaeological site will include the excavation of at least three to five trenches, each 15 meters or 20 meters long. Typically, these trenches will be oriented from north to south and spaced at regular intervals across the house foot print. Where appropriate, an additional 10-meter long trench may be excavated to test the location for the septic system. This testing strategy results in the investigation of 10- to 15-percent sample of the footprint of the house pad and septic system. In situations where historically mapped canals occur in the APE, at least one 20- to 80- meter long trench was placed at a right angle and centered on the long axis of the projected alignment.

All mechanical trenches will be 61 centimeters wide and no more than 1.5 meters deep. Trenches less than 1.5 meters (5 ft) in depth are considered safe for fieldwork if examination by the competent person on site provided no indication of a potential cave-in. If it is necessary to excavate a trench to a depth greater than five feet in order to explore a cultural feature, the trench will be stepped outward, or the trench will be braced according to Occupational Safety and Health Administration (OSHA) standards (29 CFR 1926).

During trench excavation, two CRMP archaeologists will closely monitor the progress. One archaeologist will focus on the trench itself, remaining vigilant for evidence of cultural features, deposits, or other subsurface phenomena that may require backhoe excavation to cease. If such features are

encountered, shovels, trowels and brushes will be used to determine the extent of the feature in the trench, and once the feature has been passed, the trench will again be excavated to the appropriate depth. The second archaeologist will sift through the backdirt piles with a rake looking for evidence of artifacts. Unless artifacts are clearly associated with a subsurface feature detected in the trench profile, they will be collected in bulk from each trench. In the event human remains are encountered, all procedures regarding the discovery and treatment of human remains as specified in CRMP Policy No. 8 will be followed.

Once excavated, the trench walls will be scraped with shovels and trowels to remove loose dirt, and the exposed profiles will be examined for evidence of features and artifact deposits. A Trench Excavation Record Form, which includes a sketch map of a trench wall and a description of the local stratigraphy (i.e. composition, texture, and color), will be completed. If no features are encountered, then a five-meter representative segment of one trench wall will be recorded to show geological strata and soil development in the APE. If a cultural feature is identified in a trench, then it will be numbered on a Feature Log, tagged in the trench wall, photo documented, and recorded on a Feature Profile Form. The Feature Profile Form consists of a scaled profile drawing and a description of the cultural fill and any associated artifacts. When the same feature appears in the opposing wall, the location of the feature will be recorded in both walls so that the orientation of the feature can be determined.

Horizontal Stripping

Once the locations of subsurface features have been identified through mechanical trenching, the overlying fill will be removed in order to fully expose and define features in plan prior to mapping or excavating. The step will be performed using a backhoe equipped with a wide and straight-edged "stripping" bucket. Shovel scraping by hand may be used in some instances to expose features situated immediately below the ground surface (Historic period adobe structures). The size of a Stripping Unit (SU) will vary depending on the number and kinds of anticipated and discovered subsurface features, but a single unit will not generally exceed 100 square meters. An archaeological monitor will observe the stripping and remain vigilant for evidence of cultural features, deposits, or other subsurface phenomena that may require backhoe excavation to cease. Additionally, the exposed areas will frequently be swept using gas-powered blowers, so that color and textural differences are easily identified. Outlines of observable features will be marked on the ground with nails and flagging tape. Artifacts found during the excavation of an SU will be hand-collected and bagged as a bulk unit, except in cases when they can be confidently associated with an identified feature.

Feature Excavation

Once mechanical trenching and horizontal stripping is completed, emphasis will be placed on investigating a sample of cultural features, such as houses, canals, and trash pits that may contain data significant to the cultural history of the middle Gila River valley. Feature excavation may also be employed to mitigate disturbance to mortuary contexts within the APE. In general, a sampling strategy will be employed that seeks to fully excavate 25 percent of the extramural features, 50 percent of the houses, and 100 percent of the mortuary features. The percentages of excavated houses and extramural features may be adjusted upward, however, for areas found to be particularly relevant for addressing specific research questions. The following sections summarize the excavation strategy for each type of cultural feature.

Canal and Reservoir Features

Once a canal segment or reservoir is located during Phase I and the necessary data have been recovered for accurately measuring the size of the water feature, it takes only a small amount of additional effort to fully sample its contents in fulfillment of Phase II Data Recovery. Sherds observed in the canal or reservoir profile will be collected for dating, and sediment samples (2–4 L) will be collected to provide material for up to six types of analyses: pollen, ostracode, mollusks, macrofossil (flotation), sedimentology (particle-size data), and chronology (luminescence, radiocarbon). The sediment samples will be taken from the center of the profile and will not necessarily include every stratum observed in the canal. Other samples might be taken from other contexts (e.g., canal berm, outside edge of feature along possible prehistoric field surface) if they are found to be intact in the project area. Small plant parts and seeds recovered from flotation samples might be submitted for AMS radiocarbon dating. If a stratum is present with coarse-textured sediments, especially sands with quartz and feldspars, an attempt will be made to collect a sediment sample to submit for optically stimulated luminescence (OSL) dating.

In some instances, artifact samples will be recovered from canals and reservoirs using screened excavations. The goal of this effort is to obtain a sample of 100 sherds to assist in dating the feature. Excavation units will be either 1.0-meter by 1.0-meter or 1.0-meter by 2.0-meter in plan, but the subsurface shape of the unit will conform to the limits of the water feature. Feature fill will be excavated in cultural or natural stratigraphic layers as determined from the profiles exposed in the trenches. All materials will be screened through a ¼-inch mesh. The artifacts from each stratigraphic unit will be bagged separately and assigned unique specimen numbers. Additional flotation and pollen samples may also be taken from the select strata within the excavation unit.

Structural Features

A multipart excavation strategy is employed in the excavation of structural features. First, a trench is usually excavated across a house feature in order to identify feature extents, record internal stratigraphic units, and to determine the depth of the floor. For subsurface features, this task may have been completed as part of Phase I mechanical trenching. For surface features, such as Historic period adobe structures, this trench is typically excavated by hand along an axis that bisects the room after the outline of the house is identified in plan view (i.e., following removal of overburden). A second smaller trench may (but not always) be excavated perpendicular to the first down to the floor level in order to locate the edges of the floor at four different points.

Second, a one-meter by one-meter control unit is excavated by hand in all identified structures. While it is our goal to fully excavate 50 percent of the structural features in the APE, we also want to have a controlled, excavated sample of fill from all structures. This sample will facilitate a quantitative comparison of fill and floor artifacts from all houses in the project area. The control unit will be excavated after the outline of the house has been identified in plan view (i.e., following removal of overburden and/or trenching). Each unit will be dug in 10-centimeter levels, but the levels will be linked with each primary structure fill stratum (e.g., upper erosional fill, roof/wall fall, floor fill) if possible. The fill will be screened through ¼-inch mesh, and all artifacts will be collected.

Third, the structure area is partitioned into quadrants and the fill within each quadrant that is unrelated to the use of room is removed in bulk without screening to a depth of five centimeter above the floor (as inferred from the test unit and hand trench). The non-screened excavation of the strata above roof fall can be accomplished with the use of a backhoe or by hand excavation. Artifacts from this fill are grab-sampled and bagged with reference to each quadrant. However, if there is evidence of a roof assemblage in the control units, and it is possible to excavate that assemblage as part of a stratum distinct from the floor

stratum, then all of the roof material will be screened. Flotation and pollen samples may also be collected from this cultural fill at the description of the Project Manager.

Fourth, the fill within five centimeter of the floor, which can consist of undifferentiated structure fill, roof fall, and wall fall deposits, will be excavated carefully by hand using trowels and shovels and screened with ¼-inch mesh. To the extent possible, artifacts that are found in-situ on or near the floor are left in place, or "pedestaled" and their precise locations is recorded on the plan view map of the floor. Some artifacts, especially small sherds and flakes, will invariably be dislodged from their location in the process of excavation and removed along with the associated soil to the screen. The screening assures that all artifacts larger than the mesh size are recovered; without screening, the recovery of small artifacts depends too greatly on the individual skills of the excavators in "pedestaling" artifacts and recovering small objects from the excavated dirt in the dustpan or bucket. All recovered artifacts and samples collected from the floor fill are referenced to their respective quadrant.

Finally, the entire floor assemblage is documented as a single unit, and all major artifacts in direct association with the floor are mapped, numbered, and bagged separately. Any floor features identified during the excavation of the structure are assigned a secondary feature number and then documented and in some cases completely excavated. If there are pits on the floor, every effort is made to record the contents within the pit as different from the floor-associated artifacts outside the edge of the pit. Pollen and flotation samples are collected from sealed contexts on the floor and also generally subfeature units. Detailed notes and drawings of the feature and its associate subfeatures, including a plan view and cross section, are completed. This approach to floor excavation makes it possible to analyze differences in room function, storage practices, craft activities conducted inside rooms, and maintenance behavior.

Extramural Pits

Small- and medium-sized pit features will be bisected and one half will be excavated; the other half of the feature will remain undisturbed while it is used for stratigraphic analysis. Following this, the remaining half of the pit feature may be excavated. Large features such as trash middens or borrow pits will be sampled using controlled test units (usually 1.0-m by 1.0-m). Ideally, larger extramural features are excavated in cultural or natural layers, but when this was not possible, they will be excavated in arbitrary 10 or 20-centimeter levels. The excavated contents of pit features will be screened with ¼-inch mesh and all artifacts will be recovered. The contents of trash deposits (which include features typed as trash mounds, middens, and nonthermal pits with a medium to high artifact density) will be excavated using nested ¼-inch and ⅛-inch mesh screens to improve the recovery of faunal samples. Flotation and pollen samples will also be collected from excavated pits. Lastly, A Pit Feature Excavation Form is filled out for excavated pit features. This form includes detailed notes on the fill, a plan view, and cross section.

Artifact and Sample Recovery

Material culture, including indigenous and non-indigenous artifacts, will be collected from each stripping and feature excavation unit. Flotation and pollen samples will also be taken from habitation structures (floor and floor feature contexts) and associated pits and features. In appropriate circumstances, additional samples (i.e., sediment, organic, biological) may be collected from feature contexts inferred to be useful for addressing research issues relevant to the cultural history of the GRIC, or from contexts that would otherwise be lost. For example, sediment samples are usually procured from canal contexts because these they can be used for at least six kinds of analyses (pollen, microinvertebrate, phytolith, sedimentological, macrobotanical, and chronological) necessary for reconstructing canal properties, history, and dynamics (Adams et al. 2002). Flotation and pollen samples may be also taken from

habitation structures (floor and floor feature contexts) and associated pits and features to help discern past subsistence strategies. Sampled contexts were chosen at the discretion of the Project Director, who seek to target certain contexts that tend to retain the greatest integrity for biological, botanical, or chronometric samples.

Human Remains Discovery

Human remains (Human Remains and Isolated Human Remains) and Funerary Objects encountered during archaeological fieldwork will be treated with respect and dignity at all times throughout the processes of discovery, excavation, and documentation. When human burials are initially encountered, work will be stopped in that specific location and the field supervisor in charge will immediately notify the CRMP Project Manager, who in turn will notify the GRIC-THPO. If there is any possibility that the discovered human remains might be of recent origin, such as a homicide victim, or there is indication that looting has occurred, the discovery will also be reported to the Gila River Police Department.

One CRMP Human Remains Discovery Form (HRDF) will be completed for each Human Remains Discovery (HRD). This form will record the type of burial, the condition and exposure of the remains, the number of persons, and whether accompanying Funerary Objects are present. The location of the HRDs will be noted on either a site or project map. The CRMP Project Manager, utilizing the information contained in the HRDF, will submit daily summary email notifications to the CRMP Director, Senior Project Manager, Field Supervisor, and the Bioarchaeologist, as well as the GRIC-THPO by the end of the business day.

The collection, excavation, or recovery of Human Remains will not begin until after O'odham Traditional Religious Practitioner(s) have the opportunity to conduct traditional religious activities, and authorization to proceed is communicated from the GRIC-THPO. After authorization is received, every effort will be made to completely and rapidly recover all Human Remains, particularly if the Human Remains and/or associated Funerary Objects are exposed and vulnerable to detection and disturbance. Human Remains and associated Funerary Objects that cannot be fully and respectfully documented, excavated, and/or recovered during the same day of their discovery, will be secured and protected. If the excavation lasts longer than one day, then the Human Remains will be protected by covering the Human Remains and any associated Funerary Objects with muslin and dirt and cordoning off the immediate area around the remains.

The excavation of buried Human Remains will be completed by CRMP field crew members under the supervision of Dr. Teresa Rodrigues, CRMP Project Manager and bioarchaeologist. For inhumations, skeletal material will be exposed by hand excavation, and fill that could include remains will be screened through ⅛-inch mesh. Human Remains contained within cremation urns will not be separated in the field, and every attempt will be made to keep all Human Remains and Funerary Objects together. Detailed information on each excavated burial, including a plan view and cross section, will be recorded on a Cremation Excavation Form or Inhumation Excavation Form. In cases with poor preservation, skeletal metrics will also be documented during field investigations. No photographs will be taken of any Human Remains at any point of the recovery or documentation process.

All recovered human remains will be wrapped in unbleached cotton muslin and then placed in a labeled bag with relevant provenience information (site number, feature and/or HRD number, and specimen number). If Human Remains and associated Funerary Objects are contained in a vessel, the vessel will be wrapped intact in cotton muslin and then placed in a labeled paper bag. Human Remains and associated Funerary Objects from each burial will be placed in a labeled cardboard box and clearly marked with a completed HRD label. Remains and Funerary Objects will be escorted to the secure

CRMP Bioarchaeology Laboratory on a daily basis. Documentation of remains and Funerary Objects will be completed by CRMP bioarchaeologists in less than 90 days.

Ethnographic and Ethnohistoric Research

In addition to the archaeological excavations, historic properties will also be investigated through the collection of oral histories from local residents who are familiar with the project area. Oral history interviews and the site excavation will be conducted concurrently in the event that the newly acquired information is helpful in guiding the excavations or clarifying encountered features and cultural deposits. Available historical records, including maps, journals, letters, official documents, and previous ethnographic works (e.g., Russell 1908; Spier 1933), will also be reviewed for relevant information. The emphasis of this research will be placed on developing the linking arguments that connect the archaeological and historical information to research objectives and their data requirements.

ANALYSIS OF ARTIFACTS AND ENVIRONMENTAL SAMPLES

GRIC-CRMP will undertake laboratory analyses and documentation of cultural remains that are recovered during the project. The GRIC-CRMP Excavation Laboratory Manual details the procedures for handling and processing of artifacts for analysis (Oliver 1999). The analysis of artifacts and environmental samples will be guided by a set of nine P-MIP research documents dealing with material culture analysis. These include documents on ceramic artifacts (Simon 2003, Newman and Eiselt 2003), stone artifacts (Rice and Loendorf 2000; Loendorf and Rice 2004), shell artifacts (Bayman 2002a), chronology (Eiselt and Wells 2003), faunal remains (Greenspan 2003), botanical and pollen samples (Adams 2002; Adams et al. 2002), irrigation canals (Woodson 2003), physical anthropology (Regan 2001), and mortuary practices (Rodrigues and Loendorf 2003). Excerpts from those documents are included in this chapter to provide a framework of the proposed analysis.

Ceramic Analysis

Sherds are the most abundant material artifact class recovered from post-Archaic sites in the middle Gila River Valley. The ceramics collections include buff, red, and plain wares, as well as small proportions of intrusive wares traded in from other regions. The Hohokam buff wares are outstanding examples of ancient artistic and technological traditions. Equally important, ceramic data can be used to aid the interpretation of past social organizations, at the level of the individual and household, scaling up to the larger community. Ceramics are made through an additive technology and are physical expressions of artistic and technological traditions (Shepard 1976; P. Rice 1987, 1996a, 1996b); accordingly, ceramics provide crucial physical evidence of the spatial and temporal extent of social and economic networks.

The GRIC-CRMP has developed a Ceramic Research Design that takes a regional perspective in considering patterns of ceramic production and distribution across the study area, at both large and small settlements, rather than a site-by-site view (Simon 2003). Within this regional perspective, many questions regarding the overall organization and role of ceramic production and distribution can be examined throughout the Hohokam temporal sequence along the middle Gila River, and the nuances of ceramic productive and distributional patterns expressed at the settlement or household level can be examined in detail within the larger view. The Ceramic Research Design (Simon 2003) takes an integrated approach by relating the production, use, and distribution of pottery within spatial and temporal settlement patterns; the compositional, stylistic, and performance characteristics of the ceramics are

analyzed to address these questions (see Simon 1988, 1998; Simon and Redman 1990). Study of the various aspects of ceramic production and distribution can yield abundant information about the daily activities of past communities, as well as aspects of the people's social, political, economic, and religious lives.

Themes that are emphasized in the ceramic studies include a regional approach to cultural continuity and change as expressed in ceramic production and distribution, multi-cultural influences, and productive specialization and standardization (P. Rice 1996a, 1996b; Stark 1995), as well as technological and stylistic diversity. These themes are examined throughout the Hohokam developmental sequence to document the shifting nature of ceramic production and distribution. Topics of special interest include 1) identifying prehistoric and historic ceramic production loci; 2) documenting local and regional ceramic exchange networks; 3) developing and testing local chronologies; and 4) examination of evidence for the Prehistoric/Historic Transition with emphasis on examining aspects of technological and stylistic continuity and change in ceramic production. Results of the study will increase understanding of the technological developments of the various wares, stylistic traditions, vessel use (performance characteristics), production and distribution networks, community development and social boundaries.

The Ceramic Analysis Procedures Manual (Newman and Eiselt 2003) will assist in the laboratory documentation of the ceramic collections and includes detailed analysis procedures, typological definitions, and diagnostic descriptions. The scope and size of the anticipated ceramic collections makes it imperative that a nested, multi-stage approach to ceramic sampling and analysis be implemented. This ensures effective and efficient analysis of the collections and subsequent data handling. The first stages of analysis are based on readily observable traits, while the latter stages requiring more time and resources, and are conducted on selected samples. The bulk collections provide the baseline distributional data and the sampled collections provide details of technological, stylistic, and compositional studies.

Stages of Analysis

The project will use the analysis forms and data definitions that are presented in the Ceramic Analysis Procedures Manual (Newman and Eiselt 2003). For the current project, the staged analyses originally outlined by Newman and Eiselt (2003) are modified such that Stage 2 (morphological analysis) and Stage 3 (temper analysis) are now combined into one stage (Stage 2). GRIC-CRMP analysts will conduct the Stage 1 and 2 analyses and whole vessel and special ceramic analyses, supervised by the GRIC-CRMP Laboratory Director and GRIC-CRMP Project Manager.

During the Stage 1 bulk ceramic and decorated typology analysis, all of the fragmentary potsherds will be counted and classified by ceramic ware and type. The majority of ceramic artifacts recovered from sites on the GRIC consist of sherds from locally made plain ware, red ware, or buff ware vessels (called "bulk sherds"). Any other, low-frequency ceramic artifacts—referred to as "ceramic specials"—are not included in the Stage 1 rough sort. Ceramic special consist whole vessels, intrusive vessels or potsherds originating outside the Phoenix Basin, and various non-vessel ceramic artifacts, such as figurines, worked sherds, and unfired coils of clay. These latter items are set aside for later stage of analysis (see below). The bulk sherds will first be grouped by general ware category and weighed. Vessel part, form, and special features of sherds will be noted. No attempt will be made to separate plain or red wares according to variety during this stage of analysis, but smudged plain and redwares will be identified. Historic ceramics are recognized based on the presence of folded rims and organic temper, sherd thickness, ceramic form, and design elements. Pieces such as body sherds, undecorated sherds, or small sherds that are relatively thin but that are lacking organic temper, folded rims, or O'odham designs are coded as Prehistoric/Historic.

Decorated sherds are further segregated during Stage 1 according to the traditional Hohokam and O'odham pottery types and varieties (Gladwin et al. 1937, Haury 1945, 1976; Fontana et al. 1962). The more recent, refined buff ware seriation developed by Wallace (2001, 2004) and the refined Salado polychrome seriation (Lyons 2004) will be applied during Stage 2 (see below). The Stage 1 data will provide the basic inventory of the collection for use in seriation and the generation of frequency and density data for various spatial units within the study area. The rough sort information also will be used to select samples for the Stage 2 detailed analysis.

Stage 2 focuses on a detailed examination of ceramic morphology and technological attributes including body form, rim style, temper type, paste color, sherd thickness, rim orifice diameter, surface treatment, and paint color. For this analysis, we will analyze a selected sub-sample of the bulk sherd counts that measure larger than five square centimeters. Profiles will be drawn for selected diagnostic sherds (rims, necks, shoulders) that were large enough to orient properly and produce a partial vessel profile. Conjoining vessel fragments are fitted together and analyzed as a single unit. These data provide information on vessel morphology, use or function, and the frequency and distribution various ceramic forms. A more comprehensive examination was conducted separately for whole and reconstructible vessels including burial-associated ceramics.

A component of the Stage 2 analysis sample will be to analyze Hohokam red-on-buff vessels and large sherds using the stylistic motifs that have been identified by Wallace (2001, 2004; see also Lack 2014) in his refined buff ware seriation. Implementation of the stylistic analysis requires being able to observe large portions of the decorated field, and it is not possible to apply to very small sherds. For this reason it is reserved for use on sherds that are greater than 9 square centimeters and on the complete or nearly complete decorated vessels. In addition, an attempt will be made to apply the refined Salado polychrome seriation (Lyons 2004) during Stage 2.

Another component of Stage 2 analysis sample is the characterization of temper type. Temper analysis will enable us to examine broad trends in pottery manufacturing techniques and exchange including the detection of plain wares originating in the Salt River Valley to the north, the Agua Fria or Verde drainages to the northeast, or the Patayan region to the west (Abbott 1994, 2000; Miksa et al. 2004). Temper types that will be classified include fine paste and categories of sand, phyllite, and micaceous schist with sand. Sand temper was obtained from multiple washes, the provenance of which has been established petrographically as 15 separate sand petrofacies zones along the middle Gila River (Miksa 2001; Miksa and Castro-Reino 2001; Miksa et al. 2004). Micaceous schist for temper has more restricted distributions which are confined to the foothills and mountains scattered throughout the valley and elsewhere. The primary temper constituent of Middle Gila River buffware is crushed micaceous schist rock obtained from the Pinal Schist Formation, a Proterozoic metamorphic bedrock that appears in several prominent locations along the middle Gila River including Gila Butte, the Santan Mountains (Miksa 2001; Miksa and Castro-Reino 2001; Schaller 1994), the Picacho Mountains (Madsen 1993:63; Miksa 2001), Pima Butte (Miksa 2001; Walsh-Anduze 1993), Sacaton Butte (Miksa 2001), the Estrella Mountains (Melchiorre 1993), and along Queen Creek (Miksa 2001).

As part of the latter avenues of analysis, we propose to collect samples of Unit III and Unit II raw clays within the project area. Briefly, Unit II refers to a buried soil surface that accumulated along the middle Gila River valley between roughly 3300 cal B.C. and cal A.D. 70 (Waters and Ravesloot 2000:52; see also Waters 2001). Unit III soils, also known as the Orchard Paleosol, accumulated between about A.D. 100 and A.D. 1500, thus encompassing the Hohokam sequence (Waters and Ravesloot 2000:52–54). Local clays used to make Hohokam pottery likely derived from Unit III, and it is possible that some Hohokam pottery clays were also mined from Unit II deposits. These clay samples will be used as control samples and comparative data for studying the identifying clay sources and evaluating the properties and attributes (e.g., firing color, plasticity) of Hohokam pottery clays. This work will complement earlier

studies of pottery clays from sites along the Gila River used to make buff ware ceramics (Beck 2006; Beck et al. 2012).

Whole and reconstructible vessels will be analyzed as a separate task. This part of the analysis carries over the vessel form, ceramic ware/type designations, and temper categories from the prior analysis stages, but it emphasizes recording of key information regarding complete vessels. Each vessel is measured at diagnostic points (Shepard 1976, P. Rice 1987), so that a full suite of vessel dimensions and ratios may be calculated. The total count of sherds and the weight is noted. Profiles are accurately drawn to scale for individual vessels; accurate partial or complete profiles are completed through the use of contour gauges and scaled measurements for those that have not been physically reconstructed. All visible surface designs are drawn or photographed to scale in order to illustrate the layout of elements and motifs on the vessel. Use-wear is recorded for interior and exterior surfaces.

The analysis of "ceramic specials" is designed to tabulate and describe unusual ceramic pieces that are found in small numbers in the ceramic collections, but are important indicators of special use or the reworked pieces. Such special ceramic artifacts may include the following categories: disks, spindle whorls, beads, and balls; figurines, effigies; censers, pipes; unfired clay, or fired pieces or coils of clay; gaming pieces, pinch pots, and intrusive ceramics. This analysis provides the detailed typological assignments of the intrusive (i.e., non-local) decorated ceramics of the collection; wares and types other than the Hohokam and Salado decorated series. In particular, decorated wares with origins on the Colorado Plateau are of interest for ceramic cross-dating purposes and also as indicators of inter-regional interactions.

Analytical Queries

The counts generated by the different analytical stages will be entered into the project database and can be used in a number of different analytical inquiries. Although it is not possible to anticipate all of the kinds of inquiries that are likely in the course of the project, quantitative analyses may include use of the following data sets.

Ceramic Frequency Analysis

The results of the Stage 1 Bulk Ceramic and Decorative Typology Analysis will be used to generate frequency and density data for various spatial units within the study area. The distribution of major ceramic classes provides a broad scale indicator for the nature of the collections and how these are distributed across the study area. Also, these frequency data will be crucial for identifying possible ceramic production locations based on high densities and fall-off curves for surrounding areas. The surface collections have predictive value providing an overview of the occupation of the site areas, but the excavated deposits provide more detail and can indicate the intensity of ceramic production and consumption along with the occupation duration.

Decorated Ceramic Frequency Analysis

Ceramic typological assignments and frequencies will be instrumental in identifying temporal components based on diagnostic Hohokam wares, Salado polychrome wares, and intrusive decorated wares that are assignable to various periods and phases in the Hohokam chronology. This part of the analysis builds upon the Hohokam ceramic typology first defined by Haury (1945, 1976), Gladwin et al. (1937) and later refinements (e.g., Wallace, 2001, 2004). The typological analysis identifies the locally

produced Hohokam decorated wares for use in seriation and phase assignments and also draws upon the tabulation of the temporally sensitive intrusive wares (categorized in the Special Ceramics Analysis). As noted above, an attempt will be made in Stage 2 analysis to apply the refined red-on-buff ware seriation (Lack 2014; Wallace 2001, 2004) and refined Salado polychrome seriation (Lyons 2004). The typological analysis also establishes the means to investigate ceramic patterns and variation in the early Formative and late Proto-Historic/Historic contexts. Independent dating provides important verification of such contexts for temporal placements and it will facilitate confident identification of these potentially diagnostic ceramics.

Quantitative Evaluation of Ceramic Production

It is widely recognized that the middle Gila River is the likely source of most Hohokam Buff Wares and possibly other wares as well, yet little is known about the nature and extent of production on the GRIC beyond those few contexts documented at Snaketown (Haury 1976; Gladwin et al. 1937). Gila River pottery also may have manufactured Salado polychrome vessels, as indicated by Crown (1994:30–31, 191) who concluded that the pottery was produced in many locales in the Southwest including the Gila River area. Evidence for ceramic production from the project area will be examined to understand the nature and scope of production, including the role of standardization of ceramic pastes and vessel forms.

The Stage 2 Ceramic Morphological Analysis and the Stage 4 Whole Vessel Analysis will contribute relevant data regarding the diversity of vessel forms and sizes for different wares and paste groups. Morphological analysis examines the proportional rules for different vessel forms and the performance, or the vessel group's suitability is investigated for utilitarian and ritual purposes; i.e., food preparation, serving, dry/wet storage, or communal/ritual use (Hally 1986; Skibo 1992). The distributions of these vessel groups can provide the contextual information of domestic, productive, or ritual use.

Field evidence will be examined to identify activity areas with associated tools, materials, and features for pottery making (see Haury 1976; Ravesloot and Lascaux 1993; Woodson 2002). Production activity areas may be extra-mural, in courtyards, or plaza areas, as well as within residences. Features may include mixing pits, working areas scattered with materials and tools, and firing features. Materials may include raw clay, temper, mixed paste, pigments (such as iron oxide, i.e., hematite). Pottery tools were highly curated items, but occasionally these were left in place. Although pottery paddles made of wood are rare in the archaeological record, stone artifacts commonly are present. These include anvils (stone or fired ceramic), rubbing stones, polishing stones, palette stones, and manos and metates for grinding clay, temper, and pigment.

Ceramic Distribution

The Ceramic Research Design facilitates the identification of distributional trends in ceramic data and also examines diversity in local and regional patterns. In addition to classification (useful for seriation and temporal control), there is an emphasis on the study of technological and stylistic traditions for assessing cultural continuity and change during the prehistoric and historic periods. This phase of the research integrates the results of previous analytical phases into an examination of the frequency and distributions of ceramics throughout the study area. The social and economic landscape is a product of the interaction among individuals and communities. These interactions are enacted within the confines of environmental and physiographic space. How such patterns of social interaction may have remained consistent or changed over time is a major focus of the investigations. Ceramic technological and aesthetic styles changed over time in response to these and other influences and, therefore, provide

relevant information for assessing changes in landscape use and social interactions through time and across space in the study area.

There is a long history of pottery making and use on the middle Gila River providing a unique and exceptional opportunity to study long term growth and change in this essential craft and economic activity. Ceramics were critical parts of household activities (storage, water, cooking, serving), as well as important media for the expression of ideological symbolism (iconography) and aesthetics. As visible, portable art, pottery was used in public feasting, rituals, and also as grave accompaniments, and it is best understood as an integral part of Native American life in aspects of subsistence, ritual, and social interaction. The analysis of compositional, stylistic, and performance aspects of the ceramics will facilitate examination of the production, use, and distribution of these abundant artifacts.

Summary of Ceramics Research Design

The GRIC Ceramic Research Design (Simon 2003; Newman and Eiselt 2003) incorporates traditional typological classification for purposes of ceramic seriation, but also seeks to apply the refined buff ware seriation (Lack 2014; Wallace 2001, 2004) and Salado polychrome seriation (Lyons 2004) and to refine the diagnostic criteria for late Protohistoric and Historic wares. It includes a versatile suite of analyses that records diagnostic attributes, physical properties, and compositional characteristics. Efforts will be made to characterize the provenance of temper materials through application of the sand petrofacies model (Miksa 2001; Miksa and Castro-Reino 2001; Miksa et al. 2004). The resulting data will facilitate the detailed examination the temporal-spatial framework and related technological and social developments. It is through a balanced and integrated approach that we may address issues of community, cultural development, and social, political, economic, and religious processes to gain a more holistic understanding of these past cultures.

Lithic Artifact Analysis

The analysis of stone artifacts recovered from archaeological sites will conform to the methods described in Rice and Loendorf (2000). These artifacts include all culturally modified objects made of stone irrespective of the type of technology employed in making the artifact. Flaked stone, pecked stone, ground stone, and carved stone artifacts are all included, and are analyzed as part of Stage 1. Projectile points (Loendorf and Rice 2004) and obsidian artifacts (Darling 2000; Loendorf and Fertelmes 2012) will also receive a second stage of analysis.

Archaeological investigations undertaken in Southern Arizona over the last 100 years have generally included at least some consideration, mostly descriptive, of lithic assemblages. Hohokam lithic technology is an expedient one, in which reduction strategies appear to have largely consisted of the non-systematic removal of flakes from cores. After cores were reduced, flakes with appropriate cutting edges for the task at hand were selected, used, and discarded when dull, rather than rejuvenated by retouch. Retouched artifacts, other than projectile points or point performs, are uncommon in Hohokam and Akimel O'odham assemblages.

Lithic analysis is a fundamental tool for the interpretation of past human behavior. Lithics are extremely durable and in some cases provide the only evidence of past human activities, particularly at preceramic sites. Even when lithics are not the sole evidence, they provide important data not otherwise available from other lines of evidence. Stage 1 analysis of flaked- and ground-stone artifacts will be conducted by GRIC-CRMP analysts, supervised by Chris Loendorf (GRIC-CRMP Senior Project Manager). Loendorf will also conduct the Stage 2 analysis and reporting of the flaked-stone assemblage.

During Stage 1 analysis, stone artifacts will be divided into three categories (flaked stone artifacts, grinding implements, and Fine Goods) and an assessment of artifact type will be made. Next, the material type is identified. The final step is to record the size of the artifact. Once the artifact and material type classifications have been made, counts are recorded of the artifacts by provenience and recovery units. Four size categories are used for flaked stone: less than 1.5 cm, 1.5–2.49 cm, 2.5–3.49 cm, and greater than 3.49 cm.

Second stage analyses deal with specific research problems associated with particular categories of artifacts, such as projectile points (Loendorf and Rice 2004), as well as obsidian and vesicular basalt artifacts. A sample of obsidian artifacts will be submitted for geochemical sourcing (Darling 2000; Loendorf and Fertelmes 2012). This will be done as part of an ongoing study that combines macroscopic and chemical studies to examine general patterns of prehistoric and historic procurement and dist in the area encompassed by the GRIC (Loendorf 2012). Similarly, a sample of vesicular basalt groundstone artifacts will be subject to geochemical sourcing analyses. The provenance data will be used to address a number of research issues concerning the organization of groundstone production and distribution practices during the Hohokam cultural sequence (Fertelmes 2014).

Marine Shell Analysis

Marine shell ornaments are a hallmark of the Hohokam archaeological record. The P-MIP research design for marine shell artifacts (Bayman 2002a) outlines key themes and questions to guide their study and interpretation. Marine shell ornaments are ideal for examining the economic organization and social and political roles of Hohokam craft economies. Marine shell artifacts can be geographically sourced, artifactual evidence of on-site manufacture can be readily detected, and their distributions can be described and interpreted. Studying patterns of shell trade and circulation provides Southwestern archaeologists with an opportunity to examine the social, political, and ritual roles of an important high-value good in Hohokam society (Bayman 2002a, 2002b). Marine shell artifacts will be analyzed at a basic stage by Joshua Wackett (GRIC-CRMP Laboratory Technician).

Previous research indicates that Hohokam shell ornaments were manufactured with marine shell from the Gulf of California (Sonora, Mexico) and the Pacific Coast of California. Shell from freshwater streams, *cienegas* (marshes), and even irrigation canals were also used by the Hohokam. The largest supply of naturally-available marine shell, however, is the Gulf of California, over 200 km to the south and west of Phoenix, Arizona (Bayman 2002a, 2002b).

Non-Indigenous Historic Artifact Analysis

Artifacts recovered from historic sites will be coded according to origin, function, relative value, gender association, and whether they are related to production or consumption. Historic documents and ethnographies show that artifacts found at archaeological sites were either made locally, other indigenous groups (especially the Tohono O'odham) made them, or they represent commercial products. Items originating in these places likely were valued and used in different ways. Historic artifacts will be classified according to their origin so that an assessment can be made as to the proportion of the assemblage that can be attributed to local manufacture, and commercial production. This analysis will provide a basic outline of how O'odham and Pee Posh material culture relates to the regional economic system. The differential value of artifact classes will be examined through an analysis of the ways in which they were used, or reused, and their spatial relationships. This should be especially instructive for commercial products, the uses of which do not always coincide with their intended function. Artifacts will

be classified according to primary and secondary uses and their distributions (associations) in order to explore relative differences in object values. Highly valued objects should show evidence of reuse or use in specialized contexts. These will be compared to the object's origin in the regional economy.

Chronological Analysis

Chronology is a primary concern for ongoing archaeological research on the GRIC. The P-MIP thematic statement for chronological analysis (Eiselt and Wells 2003) frames a number of prehistoric and historic research questions pertaining to chronology and change over time. Chronological studies attempt to solve two basic problems. The first is to order events of different types by means of absolute and relative dating methods. The second is to resolve the issue of contemporaneity so that events or phenomena that occur during similar times can be segregated and analyzed separately. The nature and duration of occupations is a third issue related directly to site and settlement histories. Methods commonly used to address these issues include 1) stratigraphy and spatial relationships, 2) artifact cross-dating, 3) artifact seriation, and 4) absolute dating.

Relative dating methods, notably ceramic seriation and stratigraphic analyses, provide a basic tool for building chronologies, especially at the level of the individual site or local area. Both methods are of considerable importance in identifying the succession of households within a site, and relating the use of extramural features (ovens, trash-filled pits), cemeteries, and households to each other. Ceramic seriation of both undecorated and decorated wares will be undertaken to develop chronological sequences within sites, and to some extent among closely related sites. As noted above, an attempt will be made during Stage 2 of the ceramic analysis to apply the refined red-on-buff ware seriation (Wallace 2001, 2004) and refined Salado polychrome seriation (Lyons 2004). Ceramic cross-dating provides an alternate means of anchoring Hohokam phases to an absolute chronology. This technique depends on recovering decorated ceramic wares in Hohokam contexts that were traded from the central mountains and Colorado Plateau, where the use of dendrochronology has made it possible to date ceramic types with far greater precision than is possible with radiocarbon dates (Dean 1991).

Two absolute dating techniques may be used during the current research efforts: radiocarbon and luminescence (both optically stimulated luminescence and thermoluminescence) dating. Dean (1991) made considerable progress in tying the phase sequence to an absolute chronology by conducting a meta-analysis of a large number of radiocarbon and archaeomagnetic dates. This effort should continue to be addressed through the acquisition of additional absolute dates using radiocarbon and thermoluminescence analytical techniques (Eiselt and Wells 2003).

Use of thermoluminescence (TL) and optically stimulated luminescence (OSL) dating of sherds provides a way of avoiding calibration-related problem of radiocarbon dating (Eiselt and Wells 2003), and for dating features that fall in the Protohistoric period (the radiocarbon method is not sufficiently sensitive for periods falling in the seventeenth century and later). For instance, two TL dates from a historic Akimel O'odham habitation at the Sweetwater site (Woodson 2002:132–133, 241–242) on the Middle Gila yielded ages of A.D. 1836 ± 49 and A.D. 1808 ± 21, which corresponded well with an 1832 mint date on a Mexican coin and other cultural materials associated with the site. A third TL date of A.D. 1658 ± 66 was much earlier, and could represent a curated artifact. The Sweetwater study also included a Classic-period ceramic production area that yielded a TL date of A.D. 1456 ± 53. Luminescence dating may prove to be a useful tool for dealing with the time range following the end of the Hohokam tradition (post A.D. 1500), particular in addressing the post-Classic phenomena described by some researchers as the Polvorón Phase.

Faunal Analysis

The analysis of faunal remains will use the methods and research issues as discussed by Greenspan (2003). The research questions guiding zooarchaeological investigations associated with P-MIP may be subsumed under three major themes: 1) subsistence and mobility strategies, 2) social organization and community structure, and 3) paleoenvironmental reconstruction. In the current research study, the faunal analysis will focus generally on the first two themes. For subsistence strategies, faunal analysis will attempt to address the following research questions:

- *What animals are represented in the project area sites?*
- *How were those animals used?*
- *What habitats and environments were people at the project area sites exploiting?*
- *Are there seasonal differences in animal exploitation?*
- *Can changes in hunting patterns be related to cultural modification of local habitats?*
- *Classic period resource depression and the exploitation of riverine fauna; is there evidence for over-hunting and protein deficiency in the project area sites?*

Research questions that will be addressed under the theme of "social organization and community structure" include:

- *Are certain animal foods associated with feasting?*
- *Were certain animals being used for ritual purposes?*
- *What can the faunal remains tell us about trade and other long-distance interactions?*

After initial cataloging of archaeofaunal remains, a faunal analyst (this will likely be Andrea Gregory, with Archaeological Consulting Services, Ltd.) will conduct a rough sort that involves separating specimens into gross taxonomic categories, including large mammal, small mammal, birds, fish, and reptiles/amphibians. Within each category, specimens will be separated into those that are unlikely to be further identifiable, and those that are potentially identifiable to a lower taxonomic level. Potentially identifiable specimens will then be sorted by anatomical element. Specimens in each category will be counted, and the number of burned specimens in each category will be counted.

The identifiable specimens will be identified to the lowest possible taxonomic level, using comparative collections and written references. Paired elements will be sided, and fragmentary specimens will be described with respect to element portion present. Degree of epiphyseal fusion will be noted, as well as any other characteristics that might aid in determining the animal's age. Indicators of the animal's sex will also be noted. Cultural modifications will be noted, including burning, butcher marks, other cut marks, or polish. Non-cultural modifications will also be noted, including gnawing by rodents or carnivores, weathering, or mineralization. Any pathological conditions will be noted. All of these observations will be entered either on computer coding sheets or directly into a computer database.

The basic measure of abundance that will be used in analysis of faunal remains is the Number of Identified Specimens (NISP). This basic measure can then be used to calculate various percentages, indices, and statistics. Minimum Number of Individuals (MNI) will also be calculated for large assemblages.

A great deal has been written about the relationship of sample size and diversity in archaeological assemblages, and how statistical comparison of assemblages of very different sizes may be measuring differences in sample size rather than differences in assemblage composition (e.g., Jones et al. 1983; Cruz-Uribe 1988; Leonard and Jones 1989; Shott 1989; Meltzer et al. 1992) . As Szuter (1991:60–70) points out, the size of an assemblage is a factor over which the archaeologist rarely has control, and small assemblages can still provide useful information.

The size and type of archaeological unit yielding the faunal assemblage is a factor that is at least as important, if not more so, than sample size, and is one that can be controlled for in analysis and interpretation. When comparing assemblages, quantifying specimens in terms of NISP per cubic meter of fill, or NISP per house pit, or NISP per roasting pit, or NISP per unit time, is far more informative than simply comparing NISP between sites or between components at a site.

Changes in jack rabbit and cottontail frequencies will be important signifiers of agricultural intensity, while fish NISP and weight will be indices of the importance of riparian resources in the diet. Frequencies of ritual fauna will be compared among sites.

Comparisons of element frequencies for large mammals, as noted above, will allow us to determine whether game was hunted nearby or distant from the riverine sites. The burning data are particularly important in assessing the degree to which for rodent bone recovered from middens is from natural deaths or reflects human consumption. Experimental analyses have documented that roasting of rodents chars the distal limb elements. James (1994) was able to use this fact to argue that rodent bone recovered from pit houses at Pueblo Grande was likely not from human consumption (no burning), while at least some of the bone from the middens did reflect the use of rodents as a dietary resource.

In addition to frequency and element data, size of fish bone will be measured. James' (1994) analysis of fish sizes at Pueblo Grande documented a possible decrease in size of fish from the pre-Classic to Classic. Decreasing size of fauna generally signifies procurement pressure on the resource.

Archaeobotanical Analysis

Plant remains preserved in archaeological sites (including seeds, pollen, and charred wood and other plant parts) have contributed significantly to an understanding of ancient subsistence centered on wild-plant gathering and agricultural efforts, as well as non-subsistence insights (Adams 2002; Adams et al. 2002). Previous syntheses of the archaeobotanical record have placed the Middle Gila River in a broad perspective within Sonoran Desert lands associated with the Hohokam (Bohrer 1991; Fish and Nabhan 1991; Gasser 1976; Gasser and Kwiatkowski 1991a; Miksicek 1988). These syntheses are based on a large number of archaeobotanical analyses over the past 20 years, especially as part of the contract archaeology era. Some key research objectives of archaeobotanical study that are pertinent to the investigations include:

- *Identifying wild plants and cultigens used in the project area.*
- *Examining variability across space and through time.*
- *Examining the role(s) of food exchange/trade/group interaction.*
- *Determining the level of use of upland resources.*
- *Examining the seasonality of household/site occupation.*

The proposed investigations are expected to recover large plant parts (macrofossils), and smaller plant parts such as seeds and pollen (microfossils). Some of the macrofossils will be collected as macrobotanical samples during excavation. The remaining macrofossils and small plant parts will be recovered as the light fraction in flotation samples. Only a subset of the total number of flotation samples recovered during the archaeological investigations will be selected for flotation and subsequent analysis of the archaeobotanical remains. The sample selected for flotation and analysis will be chosen by the project investigators based on their opinion on which contexts can best address the research themes and questions outlined above.

The light fraction of flotation samples and macrobotanical samples collected during excavation will be analyzed by an archaeobotanist (likely Dr. Karen Adams, an independent consultant). Small samples will be completely analyzed for seeds and other reproductive parts. Larger samples will first be sorted through a series of graduated screens with variable mesh sizes, and all particle sizes larger than 0.5 mm will be completely examined. Also, any fragments of charred wood with a cross-section surface broad enough to view anatomical details will be analyzed. All items will be identified at magnifications ranging from 8x to 50x using a Zeiss binocular microscope, and in comparison to an extensive modern collection of regional plant materials backed by herbarium specimens deposited in the University of Arizona herbarium (ARIZ). The criteria that will be employed for indentifying most plant taxa and parts have been previously reported (Adams 1994). Ubiquities and seed concentration indices of economic plant species (both food and fuel items), of wild and domesticated food resources, and of riparian and terrestrial resources will be calculated to address the research issues discussed above.

Pollen samples from each site will be selected from contexts that will help to address the research issues discussed above and in Chapter 2. The samples will be analyzed by a palynologist (this will likely be either Bruce Phillips, with EcoPlan Associates Inc., or John G. Jones, with Archaeological Consulting Services, Ltd.). The pollen samples will be processed using standard techniques. Percentages of 200-grain counts and ubiquities will be calculated for riparian and terrestrial resources, cheno-ams, and agricultural weeds. Pollen aggregates will be recorded in the analysis. Pollen concentration values, are estimates of the quantity of fossil pollen preserved in each cubic centimeter of sediment, also will be calculated in the analysis. Degraded grains also will be tracked in the analysis.

Canal and Reservoir Analysis

Three general types of analyses will be conducted for canals and reservoirs: geoarchaeological, chronological, and ecological analyses (Woodson 2003; Woodson and Huckleberry 2002). Canals are subject to the same physical laws that govern streamflow and sediment transport and deposition in natural watercourses. Consequently, principles of open channel hydraulics, sedimentology, stratigraphy, and geomorphology can be applied to relict canals and canal systems in an effort to better understand their history (J. Howard 1993; Huckleberry 1991). Stratigraphy and sedimentology are fundamental to studying the relative chronology of canal deposits and the characteristics and formation of canal deposits, respectively. Laboratory particle-size analysis will be used to characterize sediment components (sands, silts, clays) from many of the sampled canals. This is an important step because alluvial sediment textures are directly related to water velocity, which must be known to calculate canal discharge. Hydraulic analysis of relict canals permits the reconstruction of water velocity and discharge, two important parameters for understanding irrigation capacity and channel stability (Busch et al. 1976; Howard and Huckleberry 1991; Ortloff et al. 1985).

Chronological analyses include the use of absolute dating of canal materials, and the collection of artifact samples to obtain relative age estimates. Radiocarbon samples, especially when taken from lenses of burned weeds and fragments of annuals in the canal fill, can be used as a basis for estimating the age of

particular canal. Optically stimulated luminescence (OSL) dating of canal fill sediments may prove to be very useful (see Nials and Henderson 2004). Coarse-textured sediments, especially sands with quartz and feldspars, appear to be best suited for this relatively new canal dating technique. Archaeomagnetic samples are less likely to be submitted, except when they will be used in conjunction with other dating methods. Temporal control for canals most commonly will be based on ceramics recovered from canal fill.

An important part of reconstructing the ecology of canals is the analysis of biological organisms preserved in canal sediments—pollen, macrofossils, ostracodes, and mollusks. These plants (pollen, macrofossil) and micro-invertebrates (ostracodes, mollusks) become deposited into canal sediments during canal operation and after their abandonment. Pollen and micro-invertebrates reflect certain operational and environmental characteristics. These analyses provide important information that is essential to addressing some of the proposed research questions. Manuel Palacios-Fest (ostracodes, mollusks), Susan Smith or Bruce Phillips (pollen), and Karen Adams (macrofossil) will conduct the proposed analyses.

Bioarchaeology

The term "bioarchaeology" is now generally used in reference to the documentation of human remains, associated funerary objects, and other aspects of burial treatment (Rodrigues and Loendorf 2003). Bioarchaeolgical documentation of human remains and associated funerary objects encountered within home site lease areas and easements will comply with the stipulations of the NAGPRA Plan of Action. Accordingly, human remains will be treated with respect and dignity at all times throughout the reburial process. Physical documentation will follow methods outlined in Standards for Data Collection from Human Skeletal Remains (Buikstra and Ubelaker 1994). Osteological information that will be gathered includes age and sex determinations, metrics, non-metrics, and pathologies of both the skeleton and the dentition. Additional data are recorded on the color, degree of warping, fracture patterns, and total weight of the cremated remains.

CURATION

In accordance with the Programmatic Agreement, all materials recovered and records generated during the testing program will be curated at the Huhugam Heritage Center, a 40,000-square-foot repository, museum, and archive. This facility is designed for the long-term conservation of the GRIC archaeological and ethnographic collections and the Central Arizona Project collections for the Bureau of Reclamation, Department of the Interior. The materials and records will be curated in accordance with standards set forth in 36 C.F.R. Part 79, where applicable. Consideration will also be given to any claims or conditions recognized as a result of consultation with affected Native American groups according to the provisions of the Native American Graves Protection and Repatriation Act (NAGPRA). All material to be returned or otherwise repatriated will be treated with dignity and respect at all times in accordance with the GRIC-CRMP Policy No. 8.

TESTING AND DATA RECOVERY REPORTS

Preparation of the testing and data recovery reports will be completed following the end of the fieldwork. At a minimum, the final report will include the following sections:

- Introduction, including the location of the project area, the environmental and cultural setting, and a history of the project.
- The project's research design and methods.
- Results of the investigations and a description of the site(s).

- Individual sections detailing the results of the ceramic, lithic, animal bone and shell analysis.
- An assessment of the analytical results as they pertain to the research questions.
- References cited in the text.
- Appendixes containing data tables and supplementary information

Reports shall be submitted in batches to BIA/PIMA on a semi-annual basis (based on fiscal year). Submissions of such reports shall be made on or before March 31 and September 30 each year this agreement is in effect. Each batch shall include such reports completed during the prior six months. Upon receipt of comments from the agency, GRIC-CRMP will make appropriate revisions and produce and submit a draft final report BIA, Pima Agency will submit a copy of the draft final report to the GRIC-THPO for review and comment.

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Appendix D

NHPA Home Site Lease and Associated Easement Stipulation(s)

GILA RIVER INDIAN COMMUNITY
POST OFFICE BOX 2140, SACATON, AZ 85147

CULTURAL RESOURCE MANAGEMENT PROGRAM

(520) 562-7150
(520) 562-7165
Fax: (520) 562-7193

NHPA Attachment For BIA Home Site Lease and Associated Improvements and Easements

Cultural Resource Stipulations for Bureau of Indian Affairs-Pima Agency

BIA Home Site No. _____ Date: _____

Easement No. _____

☐ No Historic Properties Affected
☐ No Adverse Effect
☐ Adverse Effect

If No Adverse Effect or Adverse Effect is marked above, this means the Gila River Indian Community-Cultural Resource Management Program (GRIC-CRMP) records indicate that a cultural resource or a cultural resource issue may be present within the existing lease unit/easement. The lease/easement may be approved with the stipulation that the following conditions are followed:

1. In the unlikely event that archaeological artifacts or subsurface features are exposed during house or utility service line contruction, all ground distrubance should cease in the immediate area of discovery pending notification and further evaluation by the GRIC-CRMP.
2. The requisite Archaeological NRHP Eligiblility Testing, Data Testing and/or Data Recovery is conducted in accordance with the *Programmatic Agreement Regarding the Approval of Home Site Leases and Associated Improvements and Easements.*
3. Upon completion of Testing and/or Data Recovery, additional Archaeological Monitoring may be required during construction activities in the home site or easement. The Monitoring will be conducted in accordance with the *Programmatic Agreement Regarding the Approval of Home Site Leases and Associated Improvements and Easements.*

Additional cultural resource consultation can be arranged with GRIC-CRMP as needed. The GRIC-CRMP can be contacted at (520) 562-7150.

_____ Concur: _____
Director, GRIC-CRMP Tribal Historic Preservation Officer, GRIC

Appendix E

Archaeological Monitoring and Discovery Plan

ARCHAEOLOGICAL MONITORING AND DISCOVERY PLAN

This archaeological monitoring and discovery plan is provided for Gila River Indian Community (GRIC) Cultural Resource Management Program's (CRMP) proposed monitoring of ground disturbing activities associated with the construction of home sites and associated improvements on tribal and private (i.e., allotted) land within the GRIC. GRIC-CRMP conducts archaeological monitoring to identify and document cultural resources that are inadvertently encountered during construction or other activities that may adversely impact known or previously unidentified. In particular, a monitor helps identify and avoid burials and assures proper handling of any human remains disturbed during excavations. GRIC-CRMP currently holds a permit to conduct archaeological investigations on GRIC tribal and federal landholdings.

GENERAL MONITORING PROCEDURES

The primary duty of the archaeological monitor is to observe all ground-disturbing construction activities associated with home site improvements in the event that buried archaeological resources become exposed (i.e., in the event of an unanticipated discovery). In the event of a discovery, the monitor will follow procedures outlined in the following Discovery Plan. Secondary duties may include monitoring traffic so as to prevent accidental impacts to the sites outside of the planned construction area, as well as the installation of temporary fencing where deemed necessary. Artifacts on the surface within the boundaries of known sites do not qualify as new discoveries.

An archaeological monitor will be present while all subsurface disturbances are occurring at NRHP eligible properties. At all times the monitor will wear a hard hat, safety vest, and other safety equipment as required. The monitor will watch for any indication that a cultural feature has been disturbed by the machinery. The monitor will pay close attention for any changes in artifact density, soil color, the presence of charcoal, ash, burned daub, or any other suggestion that a feature could be present. The monitor will sample diagnostic artifacts, and closely examine all excavations for any features. Construction will not be halted if only artifacts are found. However, if there is any indication that human burial might be present, then construction must be halted in that immediate location. If the feature is not a burial, the monitor will mark the location and allow construction to proceed.

A *Monitoring Form* will be used to track information for the project and site files, and a location map will also be completed for each monitoring project. The log will include the amount of time spent at each location, the construction supervisor, sites inspected, a narrative of the day's activities, and any other pertinent information. The monitor is responsible for maintaining all documentation that will be used to provide relevant information for the final monitoring report. This report will be prepared at the conclusion of construction and it will summarize monitoring procedures and results.

DISCOVERY PLAN

This discovery plan documents the procedures to be implemented in the event that a cultural resource (i.e., *discovery*) is encountered during monitoring. *Discoveries* include archaeological resources such as buried artifacts, features, and human remains. Examples of cultural remains include artifacts (e.g., lithics, ceramics, or shell), non-human bone, human bone, soil discoloration, and architectural remains. Cultural materials that are younger than 50 years old will not be considered to be discoveries.

Dependent upon land jurisdiction, discoveries of human remains will be treated according to the appropriate State and Federal regulations (A.R.S.§41-844; A.R.S.§41-865; or the Native American Graves Protection and Repatriation Act [NAGPRA]) or Tribal policy. Human remains discoveries are addressed in another section below. Discoveries of other, non-human remains archaeological resources will be evaluated as to whether the resource has the potential to contribute important information regarding the prehistory or history of the area. In the event that the evaluation determines that the resource cannot yield significant information, and there are no human remains present, and the appropriate agencies concur with this conclusion, then no further work will be required. If it is determined that the resource will yield significant information, then the resource will either be avoided or adverse impacts to the resource will be mitigated by procedures agreed upon by the consulting agencies.

Procedures in the Event of a Discovery (Non-Human Remains)

The procedures for handling discoveries (other than human remains and grave goods) identified during construction are detailed below:

- When a discovery is encountered, all construction activity in the immediate vicinity will cease. As soon as possible, all other ground activity within 30 meters (100 feet) of the discovery will also stop.
- All traffic through the construction area where the discovery has been made must halt. Only traffic necessary to remove vehicles and equipment within the area will be allowed to continue.
- During verification and evaluation of the discovery, the GRIC-CRMP archaeologist will have the authority to probe and shovel-skim to the extent necessary to determine whether the remains qualify as a discovery. If the archaeologist determines that the find qualifies as a discovery, then a buffer area of at least 5 meters (20 feet) surrounding the discovery will be established. If the find does not qualify as a discovery, then construction may resume.
- Sufficient data should be collected to evaluate the potential significance of the discovery. The integrity of the discovery will be assessed and the research potential will be evaluated within the context of local history and prehistory.
- If a discovery has been determined to be significant, then the following issues must be discussed: confirmation of the nature and scope of treatment to be completed prior to issuance of a notice-to-proceed for the rest of the construction project; determination of a schedule for the completion of archaeological work; determination of the nature and scope of any protective measures required once construction resumes; and determination of the nature and scope of any post-construction treatment that may be required.
- Features that are exposed during construction and which have been determined to be eligible may require intensive data recovery investigations before construction can resume. Data recovery will address research issues while expediting the resumption of construction activities. Construction activities should only cease at the location of the eligible discovery. Procedures for the treatment of eligible, non-human remains discoveries shall follow methods outlined in the following data recovery plan.

Procedures in the Event of a Human Remains Discovery

If Native American human remains or funerary objects are discovered during the monitoring project, they will be treated in accordance with GRIC-CRMP Policy Number 8, *The Treatment and of*

Human Remains and Funerary Objects; on file at GRIC-CRMP. When human remains are initially encountered, work will be stopped in that specific location. The field supervisor in charge will immediately notify the Project Manager who in turn will notify the GRIC-THPO Cultural Resource Specialist and the GRIC-CRMP Director. All human burials identified within the APE will be fully recovered and documented following the guidelines specified in the Policy. Human remains and associated funerary objects will be treated with respect and dignity at all times throughout the processes of discovery, excavation, and documentation.

DATA RECOVERY PLAN OF WORK

In the event that cultural features are discovered during construction, all cultural features or deposits will be profiled, and all artifacts found in-situ in the trench walls will be collected and analyzed, in order to better evaluate the discovery in within their historic context. If the consulting agencies determine that the discovery requires no further action, construction may resume immediately. If the consulting agencies determine that the discovery requires further investigation, the feature(s) will be archaeologically investigated per feature-specific procedures as described in the "Fieldwork Methods" section within the *Treatment Plan for Cultural Resources in BIA Home Site Leases* (Appendix C)

PROCESSING OF MATERIALS

At the end of the fieldwork, project materials (excluding human remains) will be transported to the GRIC-CRMP office for processing, and all project records will be photocopied. GRIC-CRMP will undertake laboratory analyses of cultural remains that are recovered during monitoring projects as prescribed in the section entitled "Analysis of Artifacts and Environmental Samples" within the *Treatment Plan for Cultural Resources in BIA Home Site Leases* (Appendix C). Also, as noted above, the treatment of any human remains and funerary objects that are discovered during monitoring will be treated in accordance with GRIC-CRMP Policy Number 8.

REPORT PREPARATION AND DATA DISSEMINATION

A short, end-of-fieldwork report will be prepared upon completion of any data recovery fieldwork. If any aspects of the fieldwork deviated from the methods described in this data recovery plan, then these deviations will be described and justified in the end-of-fieldwork report. Work will also begin on a draft report. The reports will include an introduction, culture historical background, methods, results, and conclusions (see "Testing and Data Recovery Reports" within *Treatment Plan for Cultural Resources in BIA Home Site Leases* [Appendix C]). In addition, recommendations will be made regarding findings of Adverse Effect or No Adverse Effect.

Reports shall be submitted in batches to BIA/PIMA on a semi-annual basis (based on fiscal year). Submissions of such reports shall be made on or before March 31 and September 30 each year this agreement is in effect. Each batch shall include such reports completed during the prior six months. Upon receipt of comments from the agency, GRIC-CRMP will make appropriate revisions and produce and submit a draft final report BIA, Pima Agency will submit a copy of the draft final report to the GRIC-THPO for review and comment.

CURATION

At the close of the project, all artifacts, documents, and other project materials will be curated temporarily at the GRIC-CRMP. GRIC-CRMP will provide the client with a catalog of all materials curated, including accession numbers, if requested. The final disposition of project materials will be at the Huhugam Heritage Center (HHC) on the GRIC. The HHC is 40,000-square-foot repository, museum, and archive. This facility is designed for the long-term conservation of the GRIC archaeological and ethnographic collections and the Central Arizona Project collections for the Bureau of Reclamation, Department of the Interior. The materials and records will be curated in accordance with standards set forth in 36 C.F.R. Part 79, where applicable. Consideration will also be given to any claims or conditions recognized as a result of consultation with affected Native American groups according to the provisions of the Native American Graves Protection and Repatriation Act (NAGPRA). All material to be returned or otherwise repatriated will be treated with dignity and respect at all times in accordance with the GRIC-CRMP Policy No. 8.

Appendix F

GRIC-CRMP Policy #8:

The Treatment of Human Remains and Funerary Objects (Revised May 2015)

The Treatment of Human Remains and Funerary Objects.

The following Cultural Resource Management Program (CRMP) procedures specify treatment, documentation and disposition of Hohokam and Historic O'odham Human Remains, and Funerary Objects that are encountered during archaeological investigations or discovered inadvertently on Gila River Indian Community (GRIC) lands.

Definitions

"Human Remains" are the physical remains of human beings deceased in excess of 50 years, in contexts indicative of interment or other disposition during funerary processes or in other contexts exhibiting dispositional integrity. These include the following:

a. more than one substantially intact bone or alternatively, accumulation of fragmented bones that are likely to be human, in close association with one another;

b. any other instance of Human Remains in contexts consistent with known prehistoric or historic patterns of disposition of Human Remains after death.

"Funerary Objects" means any objects discovered in proximity to Human Remains and thought to have been deposited with the Human Remains at the time of interment.

"Inhumation" the skeletal remains of one or more individuals intentionally placed within a burial feature, which may include associated funerary objects.

"Cremation" the burned and calcined skeletal remains of one or more individuals that were incinerated after death: objects may be incinerated with the individual(s) or added afterwards.

"Isolated Human Remains" fragments of burned, calcined bone (includes dentition) and unburned Human Remains from non-burial contexts such as structure fill, pit feature fill, trash deposits and the site surface. In some cases isolated remains have been eroded or otherwise disturbed, leaving fragmentary Human Remains exposed on the ground surface.

"Historic" nonaboriginal occupation by Euro-American groups beginning with the Spanish Colonial Period (1687–1821) continuing with the Mexican Period (1821–1853) and the American Period (1853–present). The Historic period is typically defined as ending in 1950, with the post-World War II era providing a division between "historic" and "recent" times.

"Inadvertent discovery" the unanticipated encounter or detection of human remains.

All Human Remains and Potential Human Remains are to be treated with respect and dignity at all times. This includes:

1. avoidance of any unnecessary disturbance and avoidance of unnecessary handling of Human Remains and Funerary Objects,

2. avoidance of separation of Human Remains from their associated Funerary Objects,
3. avoidance of physical modifications of Human Remains and associated Funerary Objects, and
4. under all circumstances escort (transport) of Human Remains will be minimized.

No persons associated with the GRIC-CRMP will be required to be involved in any aspect of excavation, documentation, or processing of any Human Remains and associated Funerary Objects if they feel uncomfortable in doing so. *No person will be required to explain the reason for his or her noninvolvement in part of or the whole burial recovery or Human Remains collection process.*

Native American Graves Protection and Repatriation Act (NAGPRA)

Inadvertent discoveries of Human Remains that are not discovered in the course of CRMP archaeological investigations will be investigated by the CRMP. The CRMP upon confirmation of the presence of Human Remains shall comply with the Grave Protection Provision, Section 3 of NAGPRA by; following the notification protocol outlined in CRMP Policy #8. The Cultural Resource Specialist will notify the Tribal Historic Preservation Officer or the CRMP Director who will in turn notify the Bureau of Indian Affairs Pima Agency Superintendent. All procedures specified by the CRMP Policy #8 in the treatment and disposition of Human Remains and Funerary Objects will be followed.

Human Remains that are not Hohokam or Historic O'odham

If it is determined that Human Remains represent a cultural tradition other than Hohokam or Historic O'odham the Cultural Resource Specialist upon notification of such determination will initiate independent consultation with potential claimants to develop an agreement regarding treatment and disposition of remains. All procedures specified by the CRMP Policy #8 will be implemented in the treatment and disposition of Human Remains and Funerary Objects.

Discovery of Ground Surface Human Remains

- If ground-surface Human Remains are encountered during a survey, either within a defined archaeological site or as an isolated occurrence, the remains will not be disturbed, moved, or photographed, and no surface collections of artifacts or other material will be made in the immediate vicinity. **If the discovered remains cannot be positively identified as human in the field, they will be treated as if they are.**

- All field crewmembers, including backhoe operators will be informed of the location of surface Human Remains so as to avoid driving or walking over the Human Remains.

- One CRMP Human Remains Discovery Form (HRDF) will be completed for each Human Remains Discovery (HRD). The type of probable burial represented, the condition and exposure of the remains, the number of persons, and whether accompanying Funerary Objects are present will be entered on this form. The location of the Human Remains will be noted on either a site or project map. CRMP HRDFs will be kept on file in the CRMP Bioarchaeology Laboratory and in project specific documentation files. HRDFs are confidential documents. These forms will not be included in any public or professional publications having an unrestricted distribution, and will be used only for future planning and cultural resource management.

- The Field Supervisor (or Crew Chief) will inform the Project Manager, who will in turn immediately notify the **Cultural Resource Specialist** (520-562-7188). If the **Cultural Resource**

Specialist cannot be contacted, then the Tribal Historic Preservation Officer (520-610-0128) and the **CRMP Director** or his delegate in his absence should be notified (520-562-7151/520-562-7150).

- Project Managers, utilizing the information contained in the HRDFs, will circulate daily summary email notifications regarding the HRD. These notification emails will be sent to the CRMP Director, the Cultural Resource Specialist, the Tribal Historic Preservation Office (THPO), the Senior PM, the Field Supervisor, and the Bioarchaeologist by the end of the business day.

- If there is a possibility that the discovered Human Remains might be of recent origin, such as a homicide victim, or there is indication that pot-hunting has occurred the Field Supervisor will immediately inform the Project Manager, who will report the discovery to the **Gila River Police Department** (520-562-4511) and the **Cultural Resource Specialist** or **Tribal Historic Preservation Officer**.

Discovery of Buried Human Remains during Monitoring, Testing or Data Recovery.

- The reporting responsibilities outlined above will be followed if Human Remains are discovered during Monitoring, Testing, Data Recovery or any ground disturbing activities.

- Human Remains that are discovered during trench monitoring, site testing projects or data recovery and that cannot be protected in place will be secured at all times until they are removed to ensure that no other damage, or vandalism and desecration occur. The type of protection that is necessary will depend on the extent of exposure of the Human Remains either along a trench or near the surface and the location of the Human Remains near a populated area. If the identified Human Remains are near the surface and mostly exposed, and/or if the Human Remains are identified in or near a residential or business area, the Human Remains should be protected both from disturbance and unauthorized view until they are removed. This protection minimally will include covering the Human Remains with muslin and dirt and cordoning off the immediate area around the remains by whatever means available.

- O'odham Traditional Religious Practitioner(s) shall have the opportunity to conduct traditional religious activities prior to excavation of the Human Remains, which will follow initial notification to the Cultural Resource Specialist.

- O'odham Traditional Religious Practitioner(s) shall have the opportunity to be present during excavation, recovery from backfill dirt and/or collection of isolated occurrences of Human remains.

- Do not begin any excavation, recovery or collection of Human Remains from backfill dirt until authorization is communicated from the Cultural Resource Specialist or Tribal Historic Preservation Officer.

- *Every attempt will be made* to completely remove all Human Remains on the day that they are identified, particularly if the Human Remains and/or associated Funerary Objects are exposed and vulnerable to detection and disturbance. **Once the excavation of the burial has been started, sufficient personnel and field time must be allocated to complete the removal of the Human Remains by the end of the field day.**

- Human Remains and associated Funerary Objects that cannot be fully and respectfully documented, excavated and/or recovered during the same day of their discovery will be secured and protected overnight and be removed no later than the following day. Exceptions for postponing the immediate excavation of identified Human Remains will be allowed only after consultation with the Project Manager, CRMP Director or Senior Project Manager and the Cultural Resource Specialist or Tribal Historic Preservation Officer. Exceptions will be granted if the remains are only minimally exposed and can be covered so that they are secure and undetectable overnight, if substantial deposits that cover the Human Remains require more time and effort to excavate than a single day, and/or if Human Remains are discovered late in the field day, preventing their complete removal by the end of the field day.

- Every attempt will be made to keep all associated Human Remains, soil containing bone fragments, and Funerary Objects together at all times and distinctly labeled as a specific feature. If more than one burial (cremation or inhumation) is associated with the same feature, each burial will be assigned a distinct HRD and Feature number.

- Human Remains contained within cremation urns will not be separated in the field, and every attempt will be made to keep all Human Remains and Funerary Objects together, even if the container is broken. For inhumations, all fill within burial pits will be screened using 1/8 inch mesh to ensure complete recovery of all remains. For cremations, all pit fill will be screened using 1/8 inch mesh, and pit fill containing fragmented Human Remains will be completely collected. If distinct clusters of cremated Human Remains are identified, each cluster will be assigned a distinct HRD and Feature number and completely collected.

- Any artifact or remains that *can* be associated with a particular burial, but which cannot be determined in the field due to disturbance or its recovery from backfill dirt, will be treated as part of that burial to ensure that all Human Remains and associated Funerary Objects are collected. All of this material will be separately provenienced and labeled as being "possibly associated" and kept together with that particular burial assemblage.

Treatment and Disposition of Human Remains

- All Human Remains from both inhumations and cremations will be wrapped in unbleached cotton muslin and then placed in a labeled bag with relevant provenience information (site number, feature and/or HRD number, and specimen number). If Human Remains and associated Funerary materials are contained in a vessel, the vessel will be wrapped intact in cotton muslin and then placed in a labeled *paper* bag. Human Remains and associated Funerary Objects from each burial will be placed in a labeled *cardboard* box and clearly marked with a completed HRD label. If it is determined that the remains are not human, then the box will be labeled FAUNAL preceding the HRD number.

- All Human Remains and Funerary Objects will be escorted directly from the discovery site or project area to the GRIC-CRMP Bioarchaeology Laboratory for temporary housing on the day of recovery. The Bioarchaeologist or Laboratory Supervisor will receive the Human Remains at the Bioarchaeology Laboratory where they will be checked-in and secured.

- All materials associated with a burial will be physically housed together in the CRMP Bioarchaeology Laboratory. If previously undetected burial material, e.g. fragments of Human Remains from screened back-dirt, is subsequently recovered from the same feature, this material will be provenienced accordingly, and then housed together with the previously recovered material.

- Within 90 Days following their arrival at the Bioarchaeology Laboratory or upon completion of documentation, the Bioarchaeologist will notify the Cultural Resource Specialist and Tribal Historic Preservation Officer who will schedule the escort of Human Remains and/or associated Funerary Objects to the GRIC Repository for temporary housing. If CRMP is unable to complete documentation within the 90 Day time period, the Bioarchaeologist will notify the Cultural Resource Specialist and Tribal Historic Preservation Officer in order to discuss these special circumstances and to make further arrangements.

Isolated Occurrences of Fragmentary Skeletal Human Remains

All procedures specified in CRMP Policy #8 will be implemented in the treatment of isolated occurrences of fragmentary human remains. The following guidelines are exceptions that apply only to subsurface discoveries of fragmentary human remains;

- One HRDF will be completed for each isolated occurrence. An excavation test unit may unearth multiple skeletal bone fragments during the course of the test unit excavation. In that instance the HRDF will indicate the presence of "multiple" fragments of Human Remains,

- Due to the difficulty of determining how many individuals are represented by isolated fragments each discrete discovery of an isolated fragment(s) will be considered a separate individual. Each isolated occurrence will be individually wrapped in unbleached muslin and placed in a labeled paper bag, which is placed in a cardboard box cushioned with cotton batting,

- When multiple fragments are discovered side by side or in close proximity to each other, they will be wrapped together and considered one individual. When additional discoveries are made each bone fragment will be wrapped in unbleached muslin and placed in a paper bag. The bag containing the bone fragment will be united with the original bone fragment that was collected from the same locale in the CRMP Bioarchaeology Laboratory. The box label will clearly indicate non-burial units such as test unit, feature unit, trench number or any other circumstance of the discovery locale.

Documentation of Human Remains and Funerary Objects

The CRMP is ultimately accountable for the treatment and disposition of Human Remains and therefore must complete the appropriate documentation to satisfy this accountability. Documentation will comply with the provisions of the issued Archaeological Resource Protection Act permit. This documentation is not intended to satisfy scientific data requirements. In order to obtain consistency during the documentation process, the guidelines provided in Standards for Data Collection from Human Skeletal Remains (Buikstra and Ubelaker 1994) and the Arizona State University Dental Anthropology System (Turner et al. 1991) are followed. Standardized documentation procedures ensure that the number of individuals present are correctly identified, that individuals are housed with the appropriate Funerary Objects, that the affiliation of individuals is correctly identified, and individuals are correctly verified during the NAGPRA process,

Documentation includes both inventory of Human Remains and associated Funerary Objects. Detail must be sufficient to identify individual items and specific contexts from which they were removed, and to document the condition of all individual items. Human Remains documentation will follow the guidelines in the Arizona State Museum field inventory and documentation package. This will include bone by bone

inventory, information on age and sex with documentation on the methods of assessment used, and morphometric data appropriate to basic documentation efforts.

Documentation of Funerary Objects will include standard information on material, form, style, dimensions, and description of each object or group of objects. This documentation must include an explicit statement of which objects were associated with which individual sets of Human Remains.

- **The destructive treatment of all burial materials is prohibited.** The documentation of Human Remains is limited to non-destructive techniques. The following provisions clarify the intent of this prohibition.

  a. Washing of Human Remains and Funerary Objects is prohibited. Human Remains and only the exterior of cremation vessels can be wiped with a dry cloth or gently spritzed with water to reveal painted decoration patterns. Visual observations and measurements can be made at this time and the burial material can be inventoried.

  b. No pollen or flotation samples may be removed from the burial pit fill dirt or cremation vessel fill.

  c. Burial vessels cannot be reconstructed using tape or glue.

  d. No photographs of Human Remains and Funerary Objects may be taken. Drawings of Human Remains and Funerary Objects can be made and can be used in publications unless the Tribal Historic Preservation Officer determines that they are of a sensitive nature.

  e. Human Remains and Funerary Objects will be placed in cardboard, paper or other non-synthetic materials (no plastics or synthetic materials will be used).

- All documentation and non-destructive examination of Human Remains and associated Funerary Objects must take place in the Bioarchaeology Laboratory.

- All documentation will be completed within 90 days from the first day of temporary housing in the Bioarchaeology Laboratory.

- The GRIC Repository will serve as the repository for temporary housing of Human Remains and associated Funerary Objects subsequent to documentation by the Bioarchaeologist.

- After documentation, the Human Remains and associated Funerary Objects will be escorted to the GRIC Repository by Tribal Historic Preservation Office Personnel for temporary housing pending reburial.

CRMP Human Remains Discovery Forms and Protocol

One HRDF must be submitted for every incident of Human Remains encountered. HRDFs will be submitted on the day of discovery. One HRDF must be filled out for each individual burial or isolated occurrence that is encountered. The Bioarchaeologist must be notified of any further actions involving the remains, so that the paperwork can be updated accordingly.

- It is the Field Supervisor 's responsibility to notify the Project Manager.

- It is the Bioarchaeologist's responsibility to log, track, and distribute accepted copies of the form to Field Supervisor or Crew Chief. In the absence of the Bioarchaeologist, the Laboratory Supervisor is responsible for submittal the original HRDF to the Bioarchaeology Laboratory.

REFERENCES CITED:

Buikstra, J. E., and D. H. Ubelaker
1994 *Standards for Data Collection from Human Skeletal Remains*. Arkansas Archeological Survey Research Series No. 44. Fayetteville.

Turner II, C. G., C. R. Nichol, and G. Scott
1991 Scoring Procedures for Key Morphological Traits of the Permanent Dentition: The Arizona State University Dental Anthropology System. In *Advances in Dental Anthropology*, edited by M. A. Kelley and C. Spencer Larsen, pp. 13-31. Wiley-Liss, New York.