The Stone Canyon Reserve
Rancho Vistoso PAD Amendment

OV# _____

December 22, 2022

Property Owner:
Paul & Susan Clifton
12475 N Rancho Vistoso Blvd
Suite 101
Oro Valley, AZ 85755

Prepared for:
Pryce Development
Nathan Grobstein
520.307.5650
nate@prycehomes.com

Prepared By:
The WLB Group, Inc.
4444 E Broadway Blvd
Tucson, AZ 85711
Robert G. Longaker III, PLA, AICP
Liz Madsen
520.881.7480
rlongaker@wlbgroup.com
lmadsen@wlbgroup.com

The WLB Group WLB

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INTRODUCTION

Introduction

This document has been prepared in support of an amendment to the Rancho Vistoso Planned Area Development (RV PAD). The proposed amendment involves two different properties described as follows:

1. Tax parcels 219-19-196C and 219-05-010B, formerly known as the Stone Canyon Resort Site and now being referred to as the North Property for identification purposes in this PAD amendment request. This property consists of 35+/- acres located in Neighborhood 11 of the Rancho Vistoso PAD. It is currently subject to the Resort District of the Rancho Vistoso PAD. The General Plan designates this property as Resort/Golf Course (RGC) and Open Space (OS).

   The request is to amend the RV PAD to change the zoning on this property from Resort District (RV PAD) to Low Density Residential (RV PAD).

2. Tax parcel 219-20-002B, being referred to as the East Property for identification purposes in this PAD amendment request. It consists of 16.5+/- acres located east of and adjacent to the North Property. It is zoned R1-144 and the General Plan designates this property as Resort/Golf Course (RGC).

   The request is to amend the RV PAD to include this property and change the zoning on this property from R1-144 to Low Density Residential (RV PAD).

This requested PAD amendment will allow for a proposed single-family residential community to be developed within Stone Canyon named The Stone Canyon Reserve. The community will consist of a total of 69.9+/- acres, which includes the two properties subject to this requested PAD amendment, as well as Blocks 3 and 4 of the Stone Canyon 8, Blocks 1 – 4 Final Plat (SQ. 20160290013). This property is located immediately south of the North and East Properties and is being referred to as the South Property. The South Property is currently part of the RV PAD and is zoned Low Density Residential (LDR). It does not require rezoning and will be developed in accordance with the existing RV PAD LDR development standards.

Please refer to *Exhibit A: Stone Canyon Reserve Project Boundary* and *Exhibit B: Area Subject to PAD Amendment.*

It should also be mentioned that the subject property was included in a Development Plan (OV12-00-07) for a proposed Ritz Carlton resort hotel. This Development Plan was approved by Oro Valley Town Council on April 18, 2001, and the hotel was never constructed.

PART I – INVENTORY AND ANALYSIS

Inventory and Analysis

1. Existing Land Uses

A. Regional Context

The East Property is located in the Town of Oro Valley in portions of Section 24, Township 11, Range 13 East, Pima County, Arizona. The subject property's tax parcel number is 219-20-002B and it consists of approximately 16.5 acres.

The North Property is located in the Town of Oro Valley in portions of Sections 14 and 23, Township 11, Range 13 East, Pima County, Arizona. The subject property's tax parcel numbers are 219-19-196C and 219-05-010B and together they comprise approximately 35 acres.

Please refer to *Exhibit B: Area Subject to PAD Amendment* and *Exhibit C: Aerial Photograph*.

B. Existing Onsite Land Uses

The subject property is currently vacant. Portions of the property, particularly the East Property, have been previously disturbed and used for the storage of construction materials and installation of a water line.

Please refer to *Exhibit D: Existing Land Uses.*

C. Project Vicinity

i. Existing zoning:

North: R1-36 and RV PAD Golf/Rec, Open Space and Very Low Density Residential (VLDR).

East: R-6 and R1-36 (not part of the RV PAD).

South: RV PAD Low Density Residential (LDR) and Open Space.

West: RV PAD Golf/Rec, Open Space and Medium Density Residential (MDR).

Please refer to *Exhibit E: Existing Zoning.*

ii. Existing land uses:

North: Vacant land and single family residential.

East: Vacant land and single family residential.

South: Vacant land and single family residential.

West: Golf course and single family residential.

iii. Number of stories of existing structures:

The existing single-family residential homes near the subject property are single story.

iv. Pending rezones:

There are no pending rezones around the subject property.

v. Conditionally approved zonings:

None.

vi. Approved Subdivisions and Development Plans:

North: Stone Canyon IV Rancho Vistoso Neighborhood 11 (Lots 276-340), Stone Canyon VIII Rancho Vistoso Neighborhood 12(Lots 486-602).

East: Meritage at Stone Canyon VIII (Lots 603-638).

South: Stone Canyon Vistoso Rancho Vistoso Neighborhood 11 (Lots 331-396).

West: Sone Canyon Golf Course.

vii. Architectural styles used in adjacent properties:

Homes within the platted subdivisions adjacent to the subject property generally incorporate contemporary southwestern architecture consistent with the Stone Canyon Design Guidelines.

2. Environmentally Sensitive Lands Ordinance (ESLO)

According to the Interpretation from the Town of Oro Valley, dated November 9, 2015, the North Property, which is part of Neighborhood 11, is not subject to the provisions of the ESLO since more than 25% of Neighborhood 11 has been developed.

A request for an administrative decision on the East Property has been submitted to the Town of Oro Valley fore view. This request is to determine that ESLO does not apply to the East Property since at least 25% of the property has been previously disturbed for the purposes of roads and infrastructure installation.

3. Topography

A. Describe Topography:

i. Rock outcrops

The site contains rock outcrops which are identified on Exhibit F: Significant Rock Outcrops.

ii. All other significant topographic features

The significant topographic features on the site are essentially associated with the rock outcrops as mentioned above.

Please refer to *Exhibit G: Topography.*

B. Sloped Area Analysis and Hillside Area requirements

The site contains areas with 25% slopes which were originally mapped during the preparation of the Ritz Carlton Development Plan (OV12-00-07). An updated analysis has confirmed that these areas of slope are accurate. A Sloped Area Analysis has been prepared in compliance with Town requirements.

Please refer to *Exhibit H: Sloped Area Analysis.*

C. Sloped Area Analysis shall include the following:

i. Map of Sloped Area Analysis with one foot contour intervals that identifies and maps each slope category listed below:

- 15% to less than 18%.
- 18% to less than 20%.
- 20% to less than 25%.
- 25% to less than 33%.
- 33% or greater.
- Ridgelines (as defined in Section 31: Definitions), with elevation changes of 25 feet or more.
- Rock outcrops and boulders.

ii. Slope Table

Slope Category	Acreage
Total Site Acreage	
15% to less than 18%	.09 Acres
18% to less than 20%	0.3 Acres
20% to less than 25%	0.4 Acres
25% to less than 33%	16.5 Acres
33% or greater	4.5 Acres

4. Cultural/Archaeological/Historic Resources

A. A report from either the Arizona State Museum (ASM), the State Historic Preservation Office (SHPO), a qualified archaeologist working under a State Antiquities Permit, or a professional architect that reviews all of the available information for the site. This report shall:

i. Determine whether the site has been field surveyed for cultural resources.

According to a search of the archaeological records retained at the Arizona State Museum (ASM), 8 survey projects have been conducted within a one-mile radius of the project area between 1978 and 2006 and 43 archaeological sites have been identified. Previous survey work was conducted in support of residential development, cell tower installation, and the installation and maintenance of reservoir, transmission, and telecommunication lines. The entire project area was surveyed in the mid-1980's in support of residential development.

The Arizona State Museum Archaeological Records Search Results Letter recommends, that a qualified archaeological contractor be consulted before any ground disturbance begins. If any human remains or funerary objects are discovered during the construction of this project, all work will stop within the area of the remains and Dr. Tod Pitezel, ASM assistant curator of archaeology (or current position holder) will be contacted immediately.

Please refer to *Appendix A: Archaeological Summary Letter.*

ii. Identify any previously recorded archaeological or historic resources known to exist on the property.

Per the Arizona State Museum, there is one previously recorded archaeological site (AZ BB:148 (ASM)) in the northwest quarter of Section 24, Township 11 South, Range 13 East.

Please refer to *Appendix A: Archaeological Summary Letter.*

In 1999, SWCA Environmental Consultants conducted excavations at the site as part of a combined testing and data recovery effort and features were recovered. Please refer to *Appendix B: Neighborhood 12 Date Recovery Project (SWCA)* for more information.

B. Cultural Resources Survey and Inventory Report prepared by a Cultural Resources Professional as required by Section 27.10.D.3.e.

Please refer to *Appendix B: Neighborhood 12 Date Recovery Project (SWCA)*.

5. Hydrology

A. Off-site watersheds affecting/affected by, the site, upstream and downstream.

Please refer to *Exhibit I: Onsite Hydrology Characteristics,* which identifies the watersheds affecting the subject property.

B. Notate all balanced and critical basins.

Per Town decree, the entire Town is classified as a critical basin.

C. Describe all significant off-site features, natural or man-made with watersheds affected by or affecting the site.

There is a significant natural ridge and hill located immediately north of the subject property containing native desert, large boulders and rock outcrops. As a result, the offsite watersheds affecting the subject property do not extend very far to the north of the subject property. As such, the watersheds are relatively small as are the 100-year stormwater discharges entering the site.

Please refer to *Exhibit I: Onsite Hydrology Characteristics*.

D. Calculate area in acres of upstream off-site watersheds with 100-year discharges greater than 100 cfs.

Please refer to *Exhibit I: Onsite Hydrology Characteristics*.

E. Location and ownership of wells/well sites within 100 feet of site.

According to the Arizona Department of Water Resources, there are no wells located within 100 feet of the subject property.

F. Describe and map characteristics of on-site hydrology including:

Please refer to *Exhibit I: Onsite Hydrology Characteristics.*

i. Approximate 100-year floodplains with discharges equal to or greater than 50 cfs.

The subject property contains three sub-basins with greater than 50 cfs discharge.

ii. Areas of sheet flooding, with average depths

The subject property is not subject to significant sheet flooding based on the generally incised channel characteristics on the site.

iii. Federally mapped floodways and floodplains

The subject property does not contain federally mapped floodways and floodplains as illustrated with the FEMA FIRM Panel 04019C1070L. It is designed as Zone X.

iv. Calculation of all 100-year peak discharges exceeding 50 cfs

Please refer to *Exhibit I: Onsite Hydrology Characteristics.*

G. Qualitatively describe existing drainage conditions along the downstream property boundary.

Surface drainage leaves the southern boundary of the subject property and drains into the South Property. From there it enters four box culverts located beneath Tortolita Mountain Circle and enters a wash located on the east side of Stone Canyon VI Lot 353.

6. Wildlife

A. A letter from an Arizona Game and Fish Department habitat specialist regarding the following:

- Presence of any State listed Threatened or Endangered Species.
- High densities of a given species population or unusually high diversity of species.
- Aquatic or riparian ecosystems.

Please refer to *Appendix C: Game and Fish ERT.*

7. Vegetation

A. Vegetative communities and associations on the site

The subject property is located within the Arizona Upland Subdivision. Leguminous trees, such as Foothills Palo Verde (Parkinsonia microphyllum), Velvet Mesquite (Prosopis velutina), Blue Palo Verde, Saguaro, a variety of Cholla (Cylindropuntia), Prickly Pear (Opuntia), and many shrubs, vines, and grasses make up this community type. Trees and columnar cacti are not restricted to arroyo bottoms, although they are most abundant there.

B. Significant cacti and groups of trees and federally listed threatened or endangered species

There are significant Saguaro cacti, as defined in the April 17, 2018, Administrative Decision – Saguaro Treatment as Significant Vegetation, on the subject property. Please refer to *Exhibit J: Significant Saguaros* for their location.

There are no federally threatened or endangered species on the subject property. While there are some significant individual trees on site, there are no significant groups of trees.

Vegetative densities by approximate percentage of plant cover

The predominant trees on the subject property consist of Velvet Mesquite and Foothill Palo Verde. There are generally individual trees of this type throughout the subject property and few significant clusters of trees.

8. Viewsheds

A. Viewshed Analysis For proposals within the Tangerine Road Corridor Overlay District and/or Oracle Road Scenic Corridor Overlay District

The subject property is not located within either Overlay District.

B. View Preservation Plan For proposals within the Tangerine Road Corridor Overlay District and/or Oracle Road Scenic Corridor Overlay District

Not Applicable.

C. Core Character Vegetation For proposals within the Tangerine Road Corridor Overlay District and/or Oracle Road Scenic Corridor Overlay District.

Not Applicable.

9. Traffic

A. Describe and map all existing and proposed off-site streets between the development and the nearest arterial streets.

Tortolita Mountain Circle is located to the south of the subject property and adjacent to the South Property. Tortolita Mountain Circle connects with Rancho Vistoso Boulevard approximately 4,000 feet from this access point.

B. Describe and map all arterial streets within one mile of the project sites. Indicate the following information:

See Table A: Arterial Streets within One Mile of the Subject Property.

i. Existing and proposed right-of-way widths

Rancho Vistoso Boulevard is a 150-foot right-of-way road containing two travel lanes in each direction, center turn lanes and a center landscaped island.

ii. Do widths conform to Oro Valley minimum requirements

Existing right-of-way width of Rancho Vistoso Boulevard conforms with minimum Oro Valley requirements.

iii. Ownership (public or private)

Rancho Vistoso Boulevard is a public road owned and maintained by the Town of Oro Valley.

iv. Whether or not rights-of-way jog or are continuous

The right-of-way for Rancho Vistoso Boulevard is continuous.

v. Number of travel lanes, theoretical capacity, and design speed for existing streets.

Rancho Vistoso Boulevard contains two travel lanes in each direction, center turn lanes and a center landscaped island. Posted speed limit is 45 mph (design speed is 55 mph). Theoretical capacity is approximately 15,000 to 20,000 vehicles per day.

vi. Present Average Daily Traffic (ADT) for existing streets

The current ADT for Rancho Vistoso Boulevard according to Pima Association of Governments (PAG) data from 2021 is as follows:

Rancho Vistoso Boulevard at Woodburne Avenue: 13,068 ADT

Rancho Vistoso Boulevard at Innovation Park: 7,318 ADT

vii. Describe surface conditions on existing streets providing access to the site

Rancho Vistoso Boulevard is paved with asphalt and pavement condition is good.

viii. Program for completion of roadway and intersection improvements

Rancho Vistoso Boulevard is constructed to its full section and no large-scale improvements are currently planned for the entirety of the road.

ix. Existing and proposed intersections on arterials within 1 mile of the site

The intersection of Tortolita Mountain Circle and Rancho Vistoso Boulevard is located approximately 3,500 feet to the east of the subject property.

x. *Existing bicycle and pedestrian ways adjacent to the site and their connections with arterial streets, parks and schools*

There is a sidewalk along the south side of Tortolita Mountain Circle between the main Stone Canyon entry gate and Rancho Vistoso Boulevard. This sidewalk connects to the existing sidewalk on the west side of Rancho Vistoso Boulevard. Rancho Vistoso Boulevard is a bicycle route and contains 6-foot bicycle lanes on either side of the road.

Table A: Arterial Streets within One Mile of the Subject Property

Existing Arterial Street	Existing ROW Width	Ownership	Capacity*	Design Speed	ADT([PAG)	Surface Material	Travel Lanes
Rancho Vistoso Boulevard	80'	Public	15,000-20,000 ADT	45 mph	13,068 (at Woodburne Ave)	Paved	4 travel lanes and turn lanes

Please refer to *Exhibit K: Transportation*.

10. Recreation/Trails

A. Describe and map all trails, parks and recreation areas within one mile of the site.

The approximately 202-acre Vistoso Trails Nature Preserve is approximately 300 feet south of the subject property at the nearest point. An improved trailhead with parking, walking paths, and a community building is approximately 1,000 feet south of the subject property.

The 62.8-acre Honey Bee Canyon Park is located just under one mile east of the subject property. It is an active recreation facility with parking, trails and ramadas.

The approximately 1,000-acre plus Honey Bee Biological Corridor is within one mile of the subject property. It is a primarily a passive recreation wildlife and habitat conservation area.

Please refer to *Exhibit L: Trails, Parks & Recreation Areas.*

B. Provide a table indicating the size and type of the parks and recreation areas identified.

Table B: Trails, Parks, Recreation within One Mile of the Subject Property			
Recreation Area, Trail or Park	**Acreage**	**Active/passive recreation**	**Amenities**
Vistoso Trails Nature Preserve	202± acres	Both	Improved trailhead with parking, walking paths and a community building
Honey Bee Canyon Park	62.8± acres	Active	Parking, trails and ramadas
Honey Bee Biological Corridor	1,000± acres	Passive	Wildlife and habitat conservation area

11. Schools

A. All existing and proposed public schools within one mile of the site.

There are no proposed and existing schools within 1 mile of the subject property.

B. Describe or map the location of all existing and proposed schools serving the site, if not within a one-mile radius of the site.

The subject property is within the attendance areas for the following schools:

- Painted Sky Elementary School PK-5 at 12620 N Woodburne Ave.
- Innovation Academy K-5 at 825 W Desert Fairways Dr.
- Coronado K-8 at 3401 W Wilds Road.
- Rillito Center PK-12 at 266 E Pastime Road.
- Ironwood Ridge High School 9-12 at 2475 W Naranja Dr.

Please refer to *Exhibit M: Existing Schools.*

12. Water

A. Indicate name, address and contact person for water service provider to the site

The subject property will be served by the Oro Valley Water Utility. The exact nature of offsite improvements will be determined during the subdivision platting process. Contact information for water provider: Mark Moore, Oro Valley Water Utility, 11000 N. La Canada Drive, Oro Valley AZ 85737.

B. If not within a defined water service area, explain how domestic water supply will be provided, and address adequacy for future uses on the site.

Not applicable.

13. Sewers

A. Map location of existing public sewers in relation to the project site

Please refer to *Exhibit N: Existing Sewers.*

14. McHarg Composite Map

Exhibit O: Composite Map offers a graphic representation of a cumulative number of site inventory characteristics. The following is a list of such characteristics.

Topography:

- Hillside Natural Areas.
- Rock outcrops.
- Slopes equal to or greater than 25%.

Hydrology

- 100-year floodplains with discharges equal to or greater than 50 cfs.
- Areas of sheet flooding deeper than one foot.
- Federally mapped floodways and floodplains.

Vegetation

- Areas of medium and high vegetative density.
- Federally listed threatened or endangered species.
- Saguaros of significance.
- Areas where vegetation facilitates soil stabilization.

Wildlife

- Wildlife habitat as identified in Oro Valley Zoning Code Revised Section 27.4.

Viewsheds

- Areas on-site that are highly visible from off-site locations.

PART II- LAND USE PROPOSAL

Land use proposal

1. Project Overview

A. Provide a narrative describing the proposed PAD Amendment, including:

i. Proposed land use, principle and accessory uses, including:

ii. Proposed square footage, height and Floor Area Ratio (FAR)

iii. Conformity with General Plan and the General Plan future land use map.

iv. Any proposed Flexible Development provisions (Section 27.10.D.3.F.2.c) or Conservation Subdivision Design (27.10.3.D.F.2.d) including:

v. When Conservation Subdivision Design is proposed, describe how proposed lot layout is consistent with Conservation Subdivision Design principles

The proposed project consists of a new single family residential community within the overall Stone Canyon community. The proposed community is being called The Stone Canyon Reserve.

As previously mentioned in the introduction section of this document, The Stone Canyon Reserve will consist of a total of 69.9+/- acres, which includes the two properties subject to this requested PAD amendment (the North and East Properties), as well as Blocks 3 and 4 of the Stone Canyon 8, Blocks 1 – 4 Final Plat (SQ. 20160290013). This property is located immediately south of the North and East Properties and is being referred to as the South Property. The South Property is currently part of the RV PAD and is zoned Low Density Residential (LDR). It does not require rezoning and will be developed in accordance with the existing RV PAD LDR development standards.

The Stone Canyon Reserve will include a total of 61 lots in the North (37 lots) and East (24 lots) Properties, which in total consist of 51.5 acres. The density of the North and East Properties is 1.2 dwelling units per acre, which is consistent with the Low Density Residential (0.4 – 1.2 du/ac) land use designation in the Oro Valley General Plan. When including the South Property, which consists of 18.4 acres and 21 lots, the overall density of The Stone Canyon Reserve is 1.1 dwelling units per acre.

The site layout has been designed to respect the following primary natural features of the property: sloped areas, significant rock outcrops, washes and saguaro cacti of significance.

The proposed community will adhere to the existing Low Density Residential development standards in the Ranch Vistoso PAD. All lots are planned for detached single family residences. The minimum lot size per these standards is 1/3 of an acre (14,520 square feet). The lot sizes proposed in the North and East Properties range from 14,545 square feet to 72,344 square feet

with an average lot size of 23,052 square feet. As a matter of interest, the lot sizes in the South Property range from approximately 15,000 square feet to approximately 42,000 square feet.

The recreation area requirement for the proposed community as per the Oro Valley Zoning Code is 42,022 square feet. A 2.3+/--acre recreation area is proposed in the southwestern portion of the North Property. This recreation area is planned to be developed in partnership between the developer of the proposed community and Arcis Golf. It is planned to contain the following elements:

- Clubhouse.
- Pool and spa.
- Three dual purpose courts offering tennis and pickleball.
- Lawn games.
- Seating areas.
- Parking for vehicles and golf carts.

Please refer to *Exhibit P: Tentative Development Plan*.

B. Existing General Plan future land use map designation.

The existing General Plan future land use map designations are as follows:

North Property: Resort/Golf Course (RGC) and Open Space (OS).

East Property: Resort/Golf Course (RGC).

An application for a General Plan amendment is being submitted with this PAD amendment application to request a change in land use designation to Low Density Residential (0.4 – 1.2 du/ac). This land use designation is compatible with the requested PAD amendment.

Please refer to *Exhibit P: Tentative Development Plan*.

C. Proposed land uses, principle and accessory uses.

The proposed land uses for the proposed community consist of single family residential, open space and recreation.

Please refer to *Exhibit P: Tentative Development Plan*.

D. If multiple buildings/structures are proposed, provide a table with the following information:

i. Number of proposed buildings/structures

The proposed community plans for 61 single family residences and one community center building.

ii. Height of proposed buildings/structures

The height of all structures within the proposed community will be a maximum height of 22 feet on one-third of the structure, and a maximum height of 19 feet on the other two-thirds. Two story homes are permitted. Building height will be measured as per the Oro Valley Zoning Code. Architectural appurtenances will be allowed as per the Oro Valley Zoning Code.

iii. Floor Area Ratio (FAR) of proposed buildings/structures

Not applicable.

2. Existing Land Uses

A. Map zoning boundaries and existing land uses on adjacent properties.

Please refer to Exhibit E: Existing Zoning and Exhibit D: Existing Land Uses.

B. Describe the effect of the proposed development on existing land uses on and off-site.

The subject property is currently vacant, and portions of the subject property have been previously disturbed with construction roads and for the installation of a water line. The proposed community will restore the previously areas.

The proposed community has been designed to be compatible with existing off-site land uses. The requested zoning district of Low Density Residential in the Rancho Vistoso PAD is compatible with the adjacent residential development to the east and to the south across Tortolita Mountain Circle. The Stone Canyon Golf Course lies to the west of the subject property and serves as a buffer between the site and development to the west of the golf course. The golf course and open space lie to the north of the subject property, providing a buffer between the subject property and single-family residential lots to the north.

The existing residential community to the east of the proposed community is named Boulder Vista. The site design of the proposed community considered this neighboring community and included the following site design features to respect the privacy of the nearest lots in Boulder Vista.

- Secondary vehicular access point. This access point into the proposed community has been designed to emergency access. This will eliminate daily resident traffic at this access point which is located very close to Lots 618 and 603 in Boulder Vista.
- Lots 603 and 604 in Boulder Vista are easily visible from the proposed community. The area of the proposed community north of these two lots has been designed with additional open space/common area in order to protect privacy of the both the existing and proposed lots.

- Lots 606 and 607 in Boulder Vista are adjacent to the proposed community; however, their visibility is screened by existing rock outcrops and topography that will remain in place.

3. Environmentally Sensitive Lands

As previously stated in Part I.2 the subject property is not subject to the provisions of the ESLO.

4. Topography

A. Describe how the Tentative Development Plan responds to topographic characteristics described in Part 1 – Topography.

The layout for the proposed community closely considered existing topographic characteristics and efforts were made to avoid encroachment into slopes greater than 25%. There are minor areas of encroachment that fall within the "encroachment is permitted without a trade" category in the RV PAD.

Please refer to *Exhibit Q: Preliminary Graded Areas*.

B. Describe and explain any areas of encroachment onto slopes identified in Slope Area Analysis in Part 1 – Topography

As stated above, there are minor areas of encroachment that fall within the "encroachment is permitted without a trade" category in the RV PAD.

Please refer to *Exhibit Q: Preliminary Graded Areas*.

C. Map and describe all "Hillside Conservation" areas.

The Hillside Conservation Areas as required by the Rancho Vistoso PAD and are shown on *Exhibit S: Preliminary Graded Areas*. These areas are characterized by slopes of 25% and greater.

D. Describe, map and state percentage of total site to be disturbed, graded and or/revegetated.

Approximately 28 acres of the North and East Properties will be graded for the development of local streets, lots, utilities and the recreation area. This represents approximately 54% of the 51.5 acres that comprise in the North and East Properties. Precise grading limits and final graded area will be established during the preparation of the Preliminary Plat.

Please refer to *Exhibit Q: Preliminary Graded Areas*.

E. Map the extent of grading on the site.

Please refer to *Exhibit Q: Preliminary Graded Areas*.

5. Cultural/Archaeological/Historic Resources

A. Describe measures to be used for protection of all cultural and historical resources on the site.

The Arizona State Museum Archaeological Records Search Results recommends that a qualified archaeological contractor be consulted before any ground disturbance begins. If any human remains or funerary objects are discovered during the construction of this project, all work will stop within the area of the remains and Dr. Tod Pitezel (or current position holder), ASM assistant curator of archaeology, will be contacted immediately.

Please refer to *Appendix A: Archaeological Summary Letter.*

B. If resources identified in Part 1 – Cultural/Archaeological/Historic Resources are determined to be significant, provide a Treatment Plan in accordance with Section 27.10.D.3.e.v.f.

Per the Arizona State Museum, there is one previously recorded archaeological site (AZ BB:148 (ASM)) in the northwest quarter of Section 24, Township 11 South, Range 13 East.

In 1999, SWCA Environmental Consultants conducted excavations at the site as part of a combined testing and data recovery effort and features were recovered. Please refer to *Appendix B: Neighborhood 12 Date Recovery Project (SWCA)* for more information.

i. Identify any previously recorded archaeological or historic resources known to exist on the property.

Please refer to *Appendix B: Archaeological Summary Letter and Appendix C: Neighborhood 12 Date Recovery Project (SWCA)*

6. Hydrology

A. Describe how the Tentative Development Plan responds to hydrologic characteristics described in Part 1 – Hydrology.

The site layout for the proposed community generally respects the existing wash corridors through the site. Floodplains will be encroached upon in accordance with Town of Oro Valley requirements.

B. Describe and substantiate any encroachment/modification of drainage patterns.

Encroachment and modification of floodplains will be required in the following general locations:

- Local street crossings with on-site washes/associated floodplains.

- Development areas on lots in order to create adequate space for the houses and outdoor living space.
- The reconstruction of the wash that was located in the East Property. This was wash was disturbed during the construction of the water line and during use of the site by others for access and materials storage.

Encroachment will be compliant with the Oro Valley Drainage Criteria Manual.

C. Map potential drainage impacts to off-site land uses upstream and downstream.

There will be no negative impacts to off-site land uses, either upstream or downstream.

D. Describe and map engineering and design features to be used to mitigate drainage and erosion problems.

The development of the proposed community will involve encroachment into 100-year floodplains in compliance with Town of Oro Valley regulations. This encroachment will allow for buildable pads for the construction of houses and outdoor living spaces. Erosion protection will be provided by rock lined slopes at either 2:1 or 1:1.

Culverts will be used in locations where local streets cross drainage areas. The culverts will convey flows beneath the streets. Erosion protection at culvert outlets will be provided by riprap splash pads. Riprap will also be provided at the inlet of culverts to prevent erosion.

E. Describe how the Tentative Development Plan conforms to area plans, basin management plan and Town policies.

The entire Town of Oro Valley is considered a Critical Basin. As such, discharges leaving the site must be reduced by 10% below pre-developed levels via the use of detention. The exact location of basins will be shown on the future Preliminary Plat. Post development drainage on the site will comply with the Oro Valley Drainage Criteria Manual.

7. Vegetation

A. Describe how the Tentative Development Plan responds to vegetative characteristics described in Part 1 – Vegetation, including a discussion of how the vegetation is to be preserved, transplanted or mitigated.

The primary plant on the site that was addressed as part of the site planning for the proposed community is the Saguaro. The Saguaro cacti within the boundaries of the proposed community were examined to determine height, health and number of arms. In compliance with the Administrative Decision Saguaro Treatment as Significant Vegetation (April 17, 2018), healthy Saguaros that are 24 feet tall or greater with a minimum of two arms will be preserved in place.

A Native Plant Preservation Plan will be prepared in accordance with Oro Valley Zoning Code standards during preparation of the Preliminary Plat.

8. Wildlife

A. Describe and map steps to be taken to mitigate destruction of wildlife habitat identified in Part 1 – Wildlife.

The proposed community has been designed such that approximately 52% of the North and East Properties will remain as open space which will maintain wildlife habitat. Also, significant open space areas are located within the proposed community that are adjacent to the golf course to the west, an open space area which supports wildlife as well.

9. Viewsheds

A. Describe and map how the Tentative Development Plan mitigates impacts to:

i. Views and vistas from off-site

As previously mentioned, Lots 603 and 604 in Boulder Vista are easily visible from the proposed community. The area of the proposed community north of these two lots has been designed with additional open space/common area in order to protect privacy of the both the existing and proposed lots.

Also as previously mentioned, Lots 606 and 607 in Boulder Vista are adjacent to the proposed community; however, their visibility is screened by existing rock outcrops and topography that will remain in place.

ii. Areas of high visibility

There are significant portions of the proposed community that are not visible from offsite areas. The most visible areas are located in the East Property and are mentioned above.

iii. Describe and diagram methods for roadway construction in a matter compatible with the natural terrain, and how scarring is to be mitigated at the completion of construction.

The streets within the proposed community have been planned to be located as close as possible to existing natural grades. There are a few areas where the streets encroach on 25% slopes and these areas are shown on *Exhibit Q: Preliminary Graded Areas*. During construction, encroached upon areas will be reconstructed to emulate the natural condition as closely as possible using rock and re-vegetation techniques.

B. Proposal within the Tangerine Road Corridor Overlay District (TRCOD) and/or Oracle Road Scenic Corridor Overlay District (ORSCOD), provide the following additional information:

i. Describe the proposed architecture, including style, materials and color.

Not applicable.

ii. Provide vignettes of proposed architectural style, materials and color.

Not applicable.

10. Traffic

A. Provide a traffic analysis report to include:

i. The proposed internal circulation and access to/from arterial streets, explaining location and rationale for placement.

The proposed community will be served by local streets constructed to the same standard as existing local streets in the rest of Stone Canyon. Please refer to Exhibit R: Street Sections. The local streets will then connect to Tortolita Mountain Circle, a collector road that loops through Stone Canyon and provides access to all the residential subdivisions that lie within it. Tortolita Mountain Circle then connects with Rancho Vistoso Boulevard and provides access to points beyond Stone Canyon.

ii. If off-site road improvements are required, indicate which roads and time frame for improvements.

The North and West Properties depend on the South Property for primary access. In order to facilitate this access, that portion of Tortolita Mountain Circle will be constructed prior to the development of the North and East Properties. The construction of Tortolita Mountain Circle within the South Property will assist in completing this loop collector road by connecting to the portion of Tortolita Mountain Circle lying to the east in Boulder Vista. The temporary cul-de-sac in Boulder Vista will be removed as part of this construction.

iii. Projected ADT for internal circulation system at build out and level of service to all streets. Include a projection of traffic volumes and capacity analysis for intersections

The ADT for the proposed community can be estimated at 10 vehicle trips per day. However, the anticipated demographic of future residents is likely to be empty nesters and retirees. As such, the ADT may be lower. To be conservative, an estimated ADT of 610 can be assumed based on 10 vehicle trips per day and 61 lots. The intersection at Tortolita Mountain Circle south of the South Property and the intersection of Tortolita Mountain Circle and Ranch Vistoso Boulevard were designed to handle the full buildout of Rancho Vistoso and Stone Canyon and can handle the ADT generated by the proposed community.

iv. Impact to existing development abutting off-site streets.

The proposed community will not cause negative impacts to abutting development. As previously mentioned, the secondary vehicular access point into the proposed community has been designed to emergency access. This will eliminate daily resident traffic at this access point which is located very close to Lots 618 and 603 in Boulder Vista. The construction of Tortolita Mountain Circle within the South Property will assist in completing this loop collector road by connecting to the portion of Tortolita Mountain Circle lying to the east in Boulder Vista. This will improve access via the main gate to other areas of Stone Canyon.

v. Capacity analyses for proposed internal and off-site streets, including right of way and pavement widths, geometrics, design speeds and traffic control improvements needed.

The proposed internal local street is the same local street used in other parts of Stone Canyon and has been approved by Oro Valley. This local street is sufficient to handle the traffic generated by the proposed community.

The offsite Tortolita Mountain Circle will be constructed to the same standard as the existing portions of Tortolita Mountain Circle, also previously approved by Oro Valley.

For the purposes of comparison, the RV PAD resort site consists entirely of the 35-acre North Property. It is zoned for a resort hotel. Based on RV PAD density requirements (425 square feet per guest room), it is possible that a resort hotel, if one had been constructed on this site, could have contained 350 rooms. In fact, the Development Plan prepared and approved by the Town of Oro Valley in 2001 for the Ritz Carlton resort hotel contained 248 hotel units, 36 casita units and 20 condominiums for a total of 340 units. Based on ITE Manual estimates of 13 trips per guest room (this includes vehicle trips by guests, employees and service personnel), a resort hotel could generate 4,550 vehicles trip per day. The 610 vehicle trips per day generated by the proposed community is far less than this number. The existing roadway infrastructure in Stone Canyon was planned for full build out based on the existing zoning of the RV PAD. As such, that existing roadway infrastructure can safely and efficiently handle the vehicle trips that will be generated by the proposed community.

vi. A description of improvements required for those streets described in sub-paragraph v. above.

See Section 10.A.ii above.

vii. *The party/agency that the applicant believes to be responsible for making necessary improvements.*

All required road improvements for the proposed community will be made by the developer of the proposed community.

viii. *Evidence that proposed turning movements will meet safety standards in relationship to traffic volumes.*

Local streets for the proposed community will be constructed to the same standards used for existing local streets in Stone Canyon. These standards were reviewed and approved by the Town of Oro Valley and the existing streets provide safe and efficient access and turning movements at traffic volumes similar to what is anticipated from the proposed community.

B. Describe proposed on-street rights-of-way, including typical roadway section, and indicate proposed ownership.

There are two proposed street types within the proposed community. The first is a private local street that will be constructed in the same manner as other local streets in Stone Canyon. It will be located within a 32-foot wide common area and consist of two 12-foot travel lanes with a 12" wide concrete header and 4-foot shoulders.

The other street is a portion of Tortolita Mountain Circle. This street will be a private collector street that will be constructed in the same manner as the existing portions of Tortolita Mountain Circle. It will be located within a 60-foot wide common area and consist of two 14-foot travel lanes with an 18" wide concrete header and 8-foot shoulders.

Please refer to Exhibit R: Street Sections.

C. Describe proposed bicycle and pedestrian pathways within the development and indicate whether they are connected to external pathways, arterial streets, parks and schools.

The majority of Stone Canyon does not contain sidewalks and bicycle paths. Since the community is gated and there is not flow through traffic from outside the community, the traffic volume on the streets is low and speed limits are low. This creates an environment where it is safe for pedestrians and bicyclists share the streets with vehicles. The private streets within Stone Canyon connect to the public roadway system outside of the community.

11. Recreation/Trails

A. Describe how the development will facilitate access to off-site trails identified in Part 1; and how access will be maintained.

Residents of the proposed community will be able to access the off-site trails in the same manner as the other residents of Stone Canyon. Private and public streets will allow future residents to either drive, walk or bicycle to the off-site trails.

B. Describe the proposed ownership of natural and modified open space within the development.

Open space within the development will be private and owned and maintained by the Stone Canyon Community Association.

12. Schools

A. Indicate number of elementary, junior and senior high school students generated by this PAD amendment.

The demographic nature of households of the proposed community is expected to be in line with the nature of existing Stone Canyon households where approximately 80% of those households do not contain school aged children. As such, the number of students generated by the proposed community is anticipated to be low and as a result few students are anticipated to be attending the public schools. Based on US Census data, a typical single family residential unit can be expected to generate 0.21 elementary students, 0.22 middle school students and 0.13 high school students.

B. Indicate remaining capacity within the area schools serving the site.

We are coordinating with Kristin Magdziasz from Amphitheater School District to obtain capacity information and will and will provide upon receipt.

C. Provide a letter from the affected school district(s) indicating that a proposed site can accommodate the educational space requirements for the projected number of residents.

We are coordinating with Kristin Magdziasz from Amphitheater School District (ASD) and will provide correspondence upon receipt. Preliminary indications are that ASD has the capacity to serve the proposed community.

13. Water

A. Indicate additional domestic water demand that this PAD Amendment will generate.

The residents in the Tucson/Oro Valley area are generally conscious of smart and efficient water use and per capita water use is approximately 80 to 90 gallons per capita per day based on information available from the University of Arizona. This level of water usage is anticipated for the future residents of the proposed community. The majority of households in Stone Canyon

contain two occupants and would use 180 to 180 gallons per day per household. Based on a total of 61 lots within the North and East Properties, a total of approximately 9,760 to 10,980 gallons per day would be used.

B. Indicate water service capacity and current demand (percentage of existing capacity) from applicable water company.

Oro Valley Water Utility provided a will serve letter, indicating that the utility company has the capacity to serve the proposed community subject to certain conditions.

Please refer to *Appendix D* for letter.

14. Sewer

A. Describe method for providing sewer service.

The Pima County Regional Wastewater Reclamation Department will provide for collection and treatment of wastewater generated by the proposed community. Sewers within Stone Canyon, including the proposed community, are private and connect into the Pima County public sewer system.

B. If Pima County is responsible, provide letter from Regional Wastewater Reclamation Department addressing capacity and ability to serve site.

Please refer to *Appendix E Capacity Response Letter.*

15. Bufferyards

A. Map buffer yard areas, if required, and describe techniques used to mitigate sound, visibility, exterior lighting and traffic impacts.

Based on Table 27-7 in the Oro Valley Zoning Code, no bufferyards are required for the North Property. The East Property requires no bufferyard along the portions adjacent to the R-6 zoning and a Bufferyard B is required adjacent to the R1-36 zoning on the north side of the East Property. A minimum 40-foot Natural Desert bufferyard will be used in this area to meet the Bufferyard B requirement.

Perimeter Street Frontage Buffer Yards are not required since the streets in the proposed community and in Stone Canyon are private. The area subject to this rezoning/PAD amendment does not front on Tortolita Mountain Circle.

The proposed community has been designed to be sensitive to surrounding properties with regard to sound, visibility, lighting and traffic impacts, described as follows:

Sound: The proposed community consists of single-family residential lots similar to existing adjacent residential development. The sound produced by the proposed community will be

consistent with sound produced by existing development and will not have negative impacts on surrounding property.

Visibility: There are significant portions of the proposed community that are not visible from areas outside of the site. Lots 603, 604, 605, 606, 607, 608, 618, 628 and 629 in Boulder Vista are the lots that are most visible from the proposed community. Care has been taken in the preparation of the Tentative Development Plan to provide physical separation between these existing lots and the proposed. This physical separation will help to mitigate visibility of the proposed homes and protect privacy.

Lighting: The Stone Canyon CC&Rs contain language prohibiting light placed on a lot that is directed or reflected onto any other lot or common area.

Traffic: Traffic generated by the proposed community will be directed to Tortolita Mountain Circle, a collector road that has been designed to handle the traffic generated by the residential local streets in the entirety of Stone Canyon.

B. Provide cross-section illustrations showing proposed treatments to be used adjacent to existing developments and/or streets, to include:

i. Buffer yard width

A 40-foot natural bufferyard will be utilized along the northern portion of the East Property. No other bufferyards are required by the Oro Valley Zoning Code. However, significant natural features of the property, including vegetation, slopes and rock outcrops, will be retained around the entire perimeter of the proposed community.

ii. Height of all structural screening devices, if used

No structural screening devices will be used.

iii. Conceptual landscape heights and types of plants

Proposed plants at mature height will be consistent with existing vegetation. Types of plants introduced will also be consistent with existing vegetation.

iv. Earth berms, if used (maximum slope of 2:1)

No earth berms will be used.

v. Minimum setback requirements that conform to the Zoning Code

Lot setbacks will conform with the Low Density Residential development standards of the RV PAD. They are as follows:

- Front: 25 feet average, minimum 20 feet.

- Side: 8 feet.
- Rear: 25 feet.

Please refer to *Exhibit S: Site Cross Sections.*

Exhibits

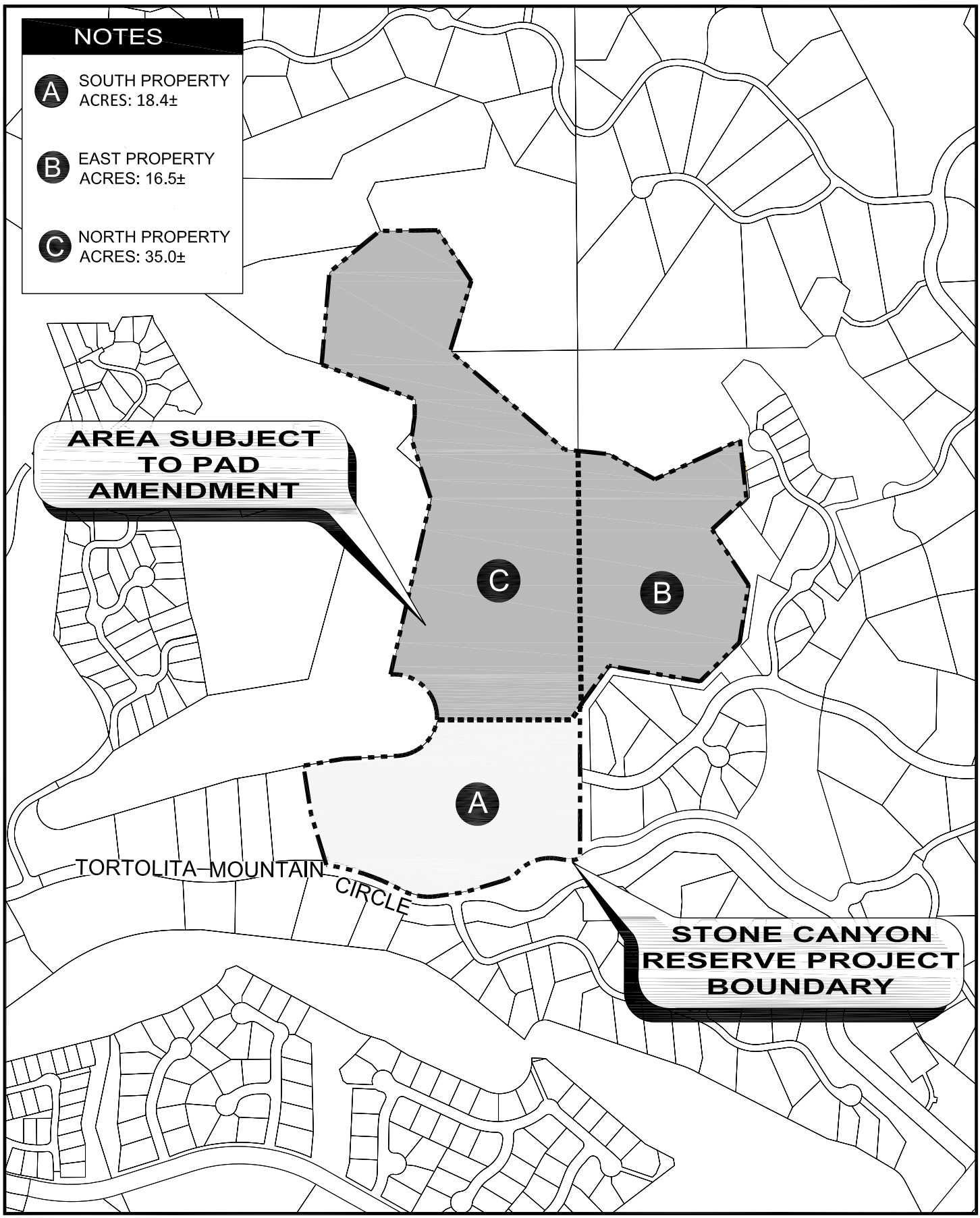

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EXHIBIT A
STONE CANYON RESERVE PROJECT BOUNDARY

0' 600'

The WLB Group Inc. WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

A

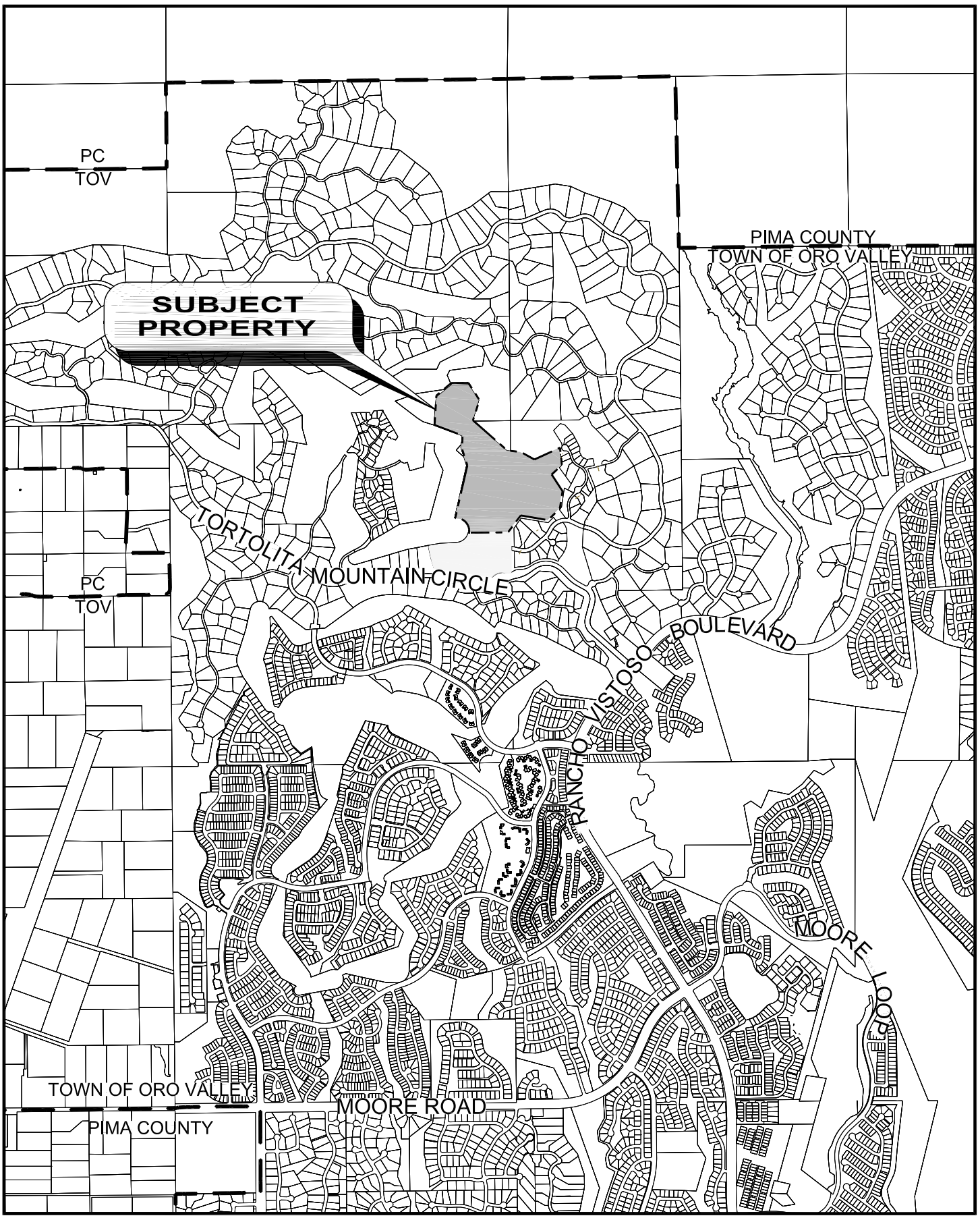

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EXHIBIT B
AREA SUBJECT TO PAD AMENDMENT

0' 2000'

The WLB Group Inc. WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

B

EXHIBIT C
AERIAL PHOTOTGRAPH

Aerial Photo Date = 2021

0' 400'

The WLB Group Inc. WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

C

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EXHIBIT D
EXISTING LAND USES

Aerial Photo Date = 2021

0' 1000'

The WLB Group Inc. WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

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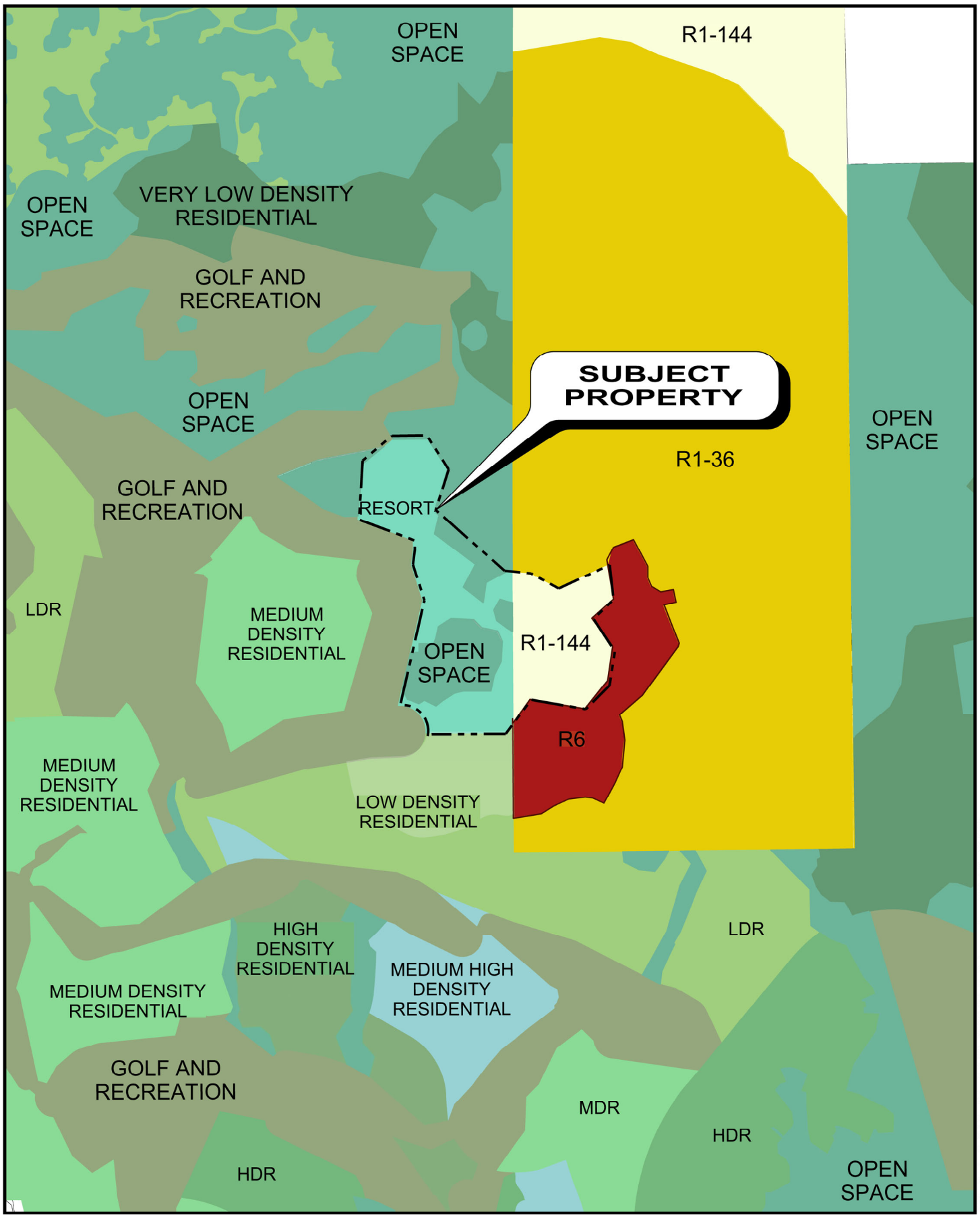

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EXHIBIT E
EXISTING ZONING

Aerial Photo Date = 2021

0' 1000'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

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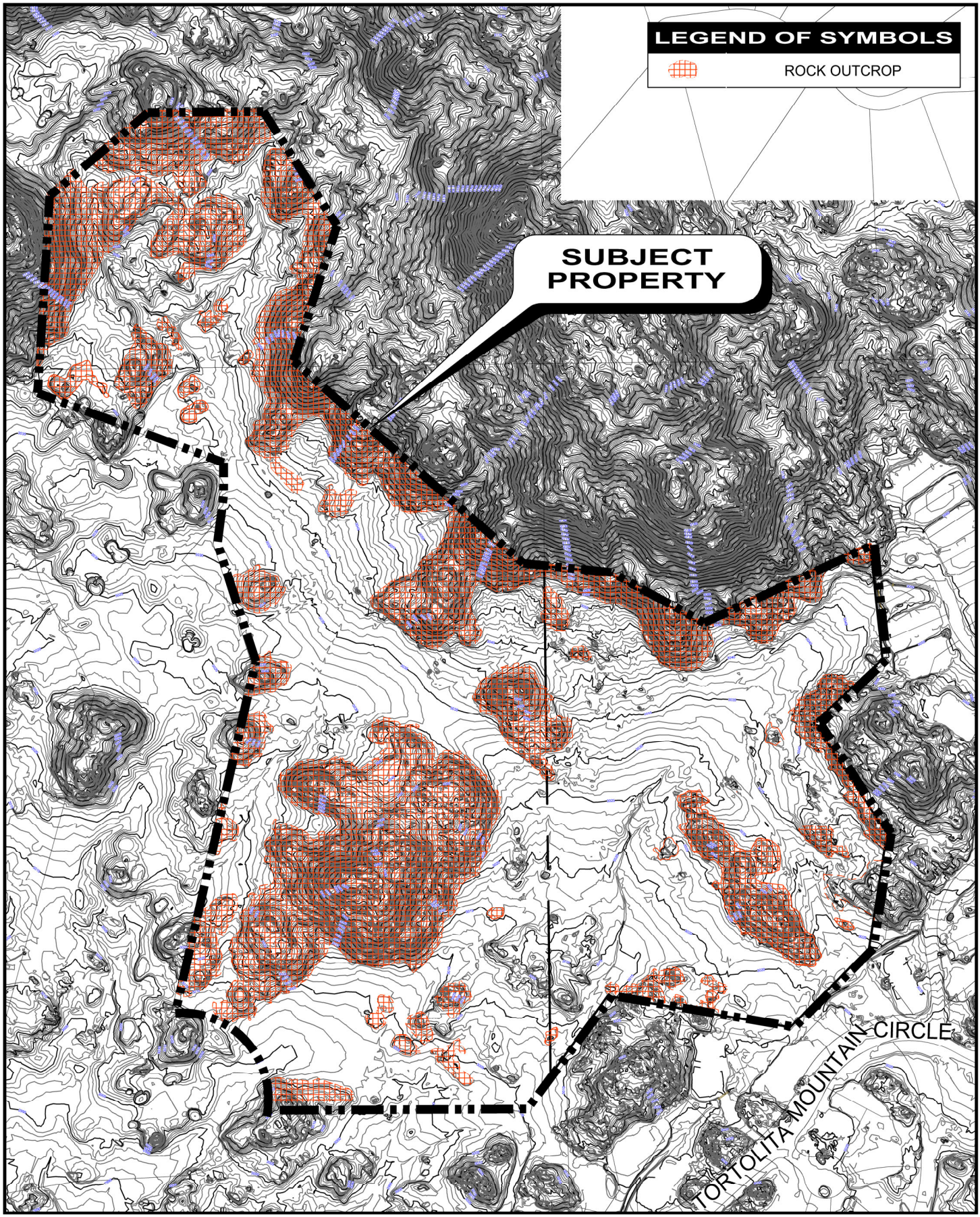

EXHIBIT F
ONSITE ROCK OUTCROPS

Contour Interval = 1 Ft.

0' 300'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

F

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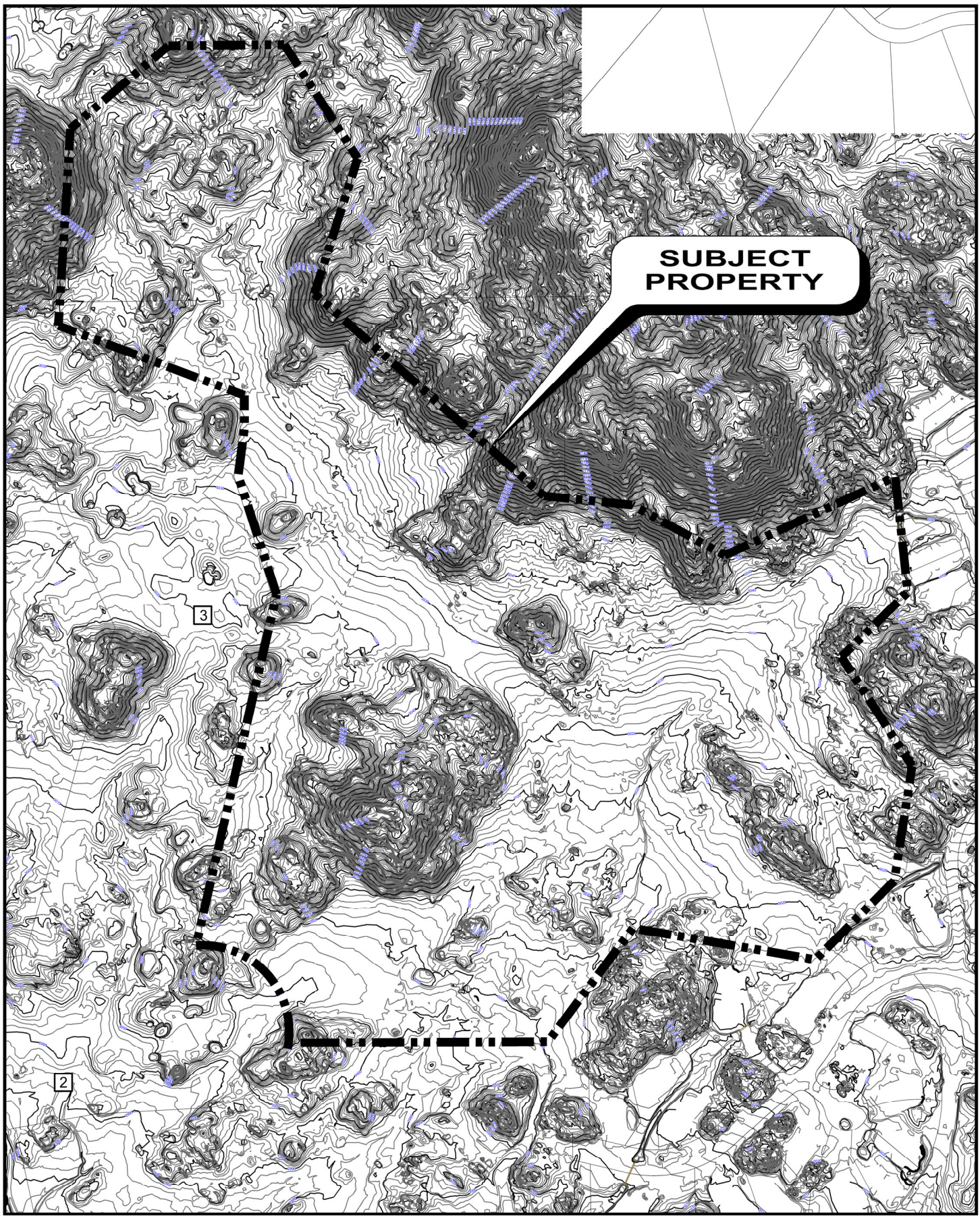

EXHIBIT G
TOPOGRAPHY

Contour Interval = 1 Ft.

0' 300'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

G

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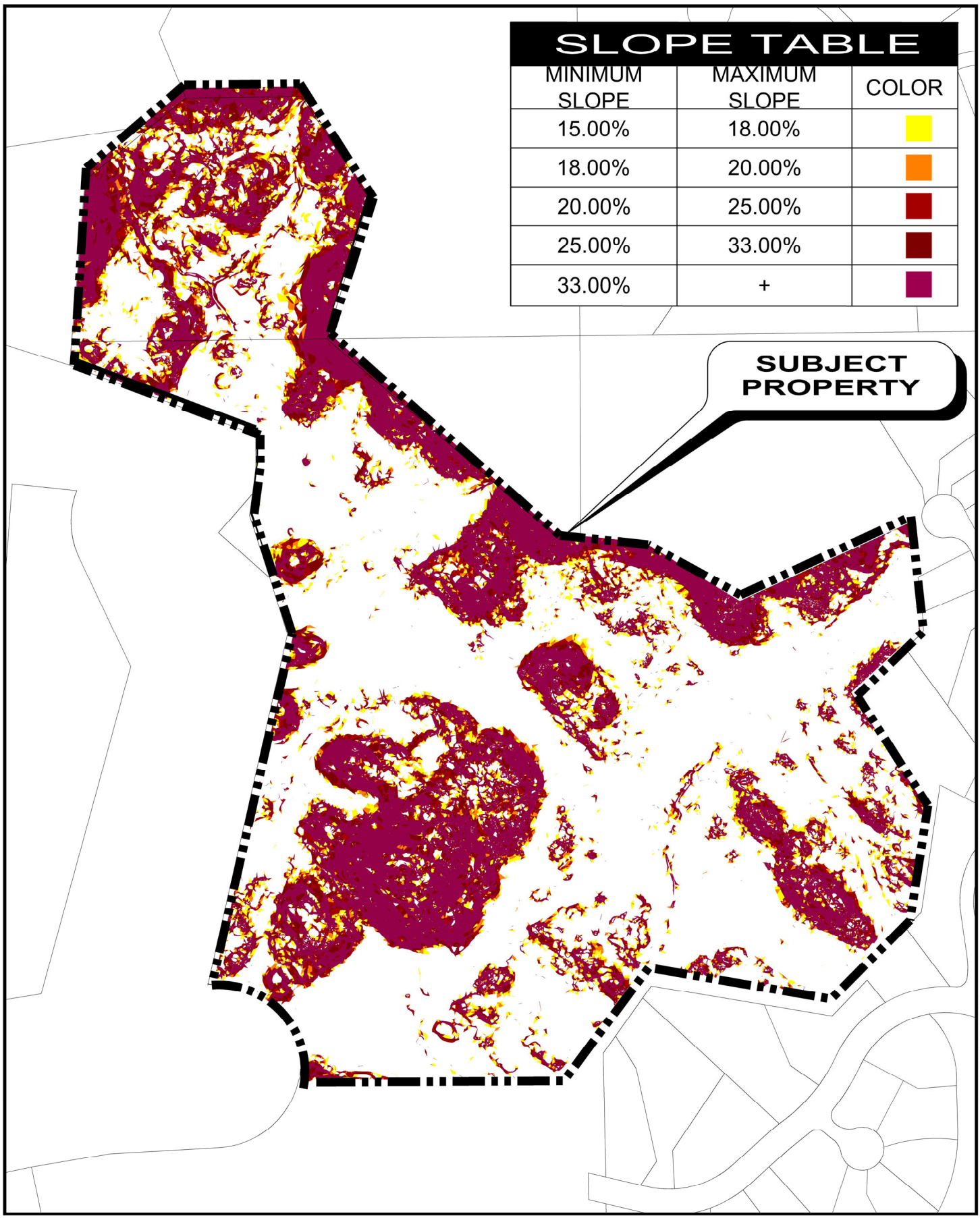

EXHIBIT H
SLOPED AREA ANALYSIS

Contour Interval = 1 Ft.

0' 300'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

H

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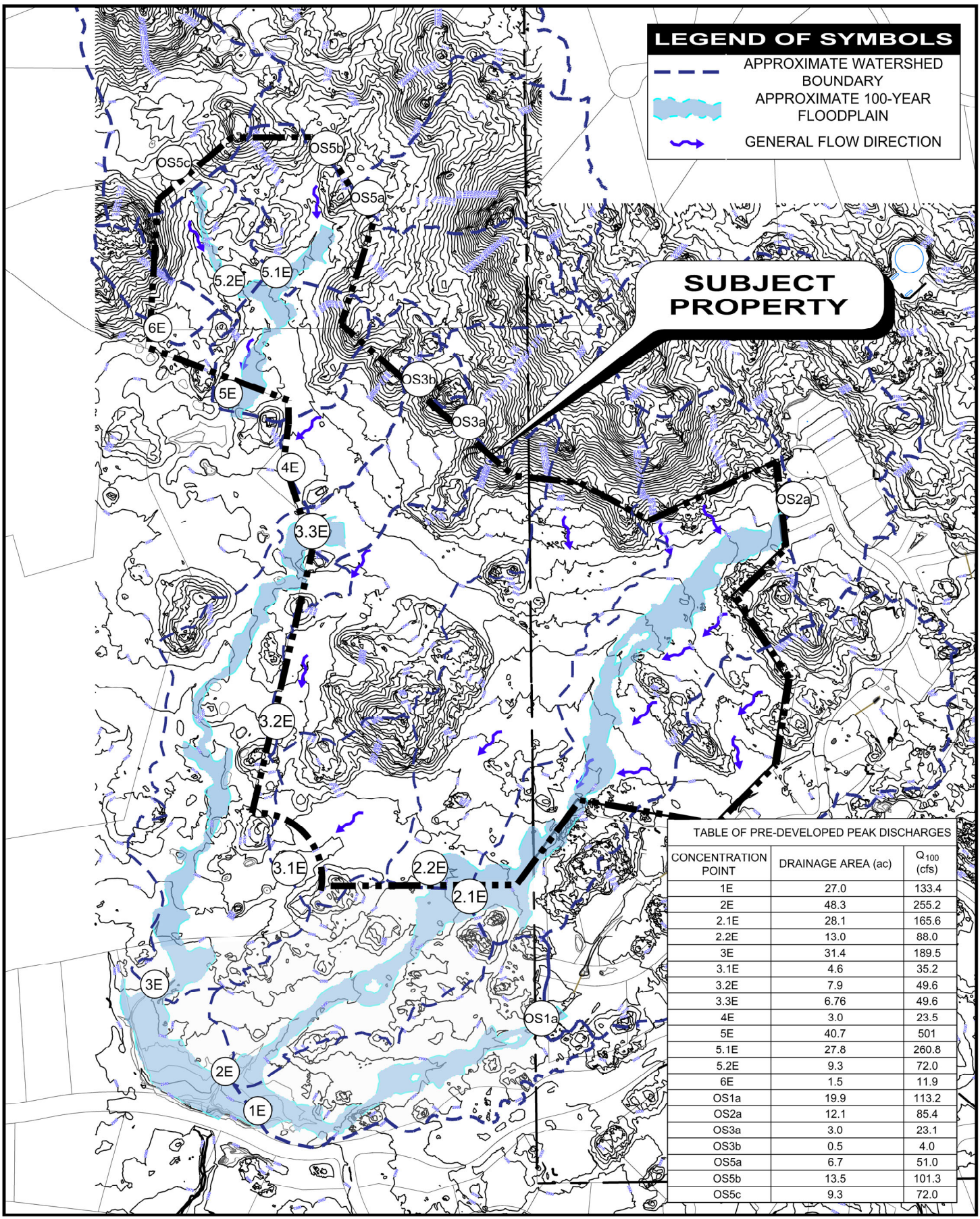

TABLE OF PRE-DEVELOPED PEAK DISCHARGES

CONCENTRATION POINT	DRAINAGE AREA (ac)	Q_{100} (cfs)
1E	27.0	133.4
2E	48.3	255.2
2.1E	28.1	165.6
2.2E	13.0	88.0
3E	31.4	189.5
3.1E	4.6	35.2
3.2E	7.9	49.6
3.3E	6.76	49.6
4E	3.0	23.5
5E	40.7	501
5.1E	27.8	260.8
5.2E	9.3	72.0
6E	1.5	11.9
OS1a	19.9	113.2
OS2a	12.1	85.4
OS3a	3.0	23.1
OS3b	0.5	4.0
OS5a	6.7	51.0
OS5b	13.5	101.3
OS5c	9.3	72.0

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EXHIBIT I
ONSITE HYDROLOGY CHARACTERISTICS

Contour Interval = 1 Ft.

0' 400'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

I

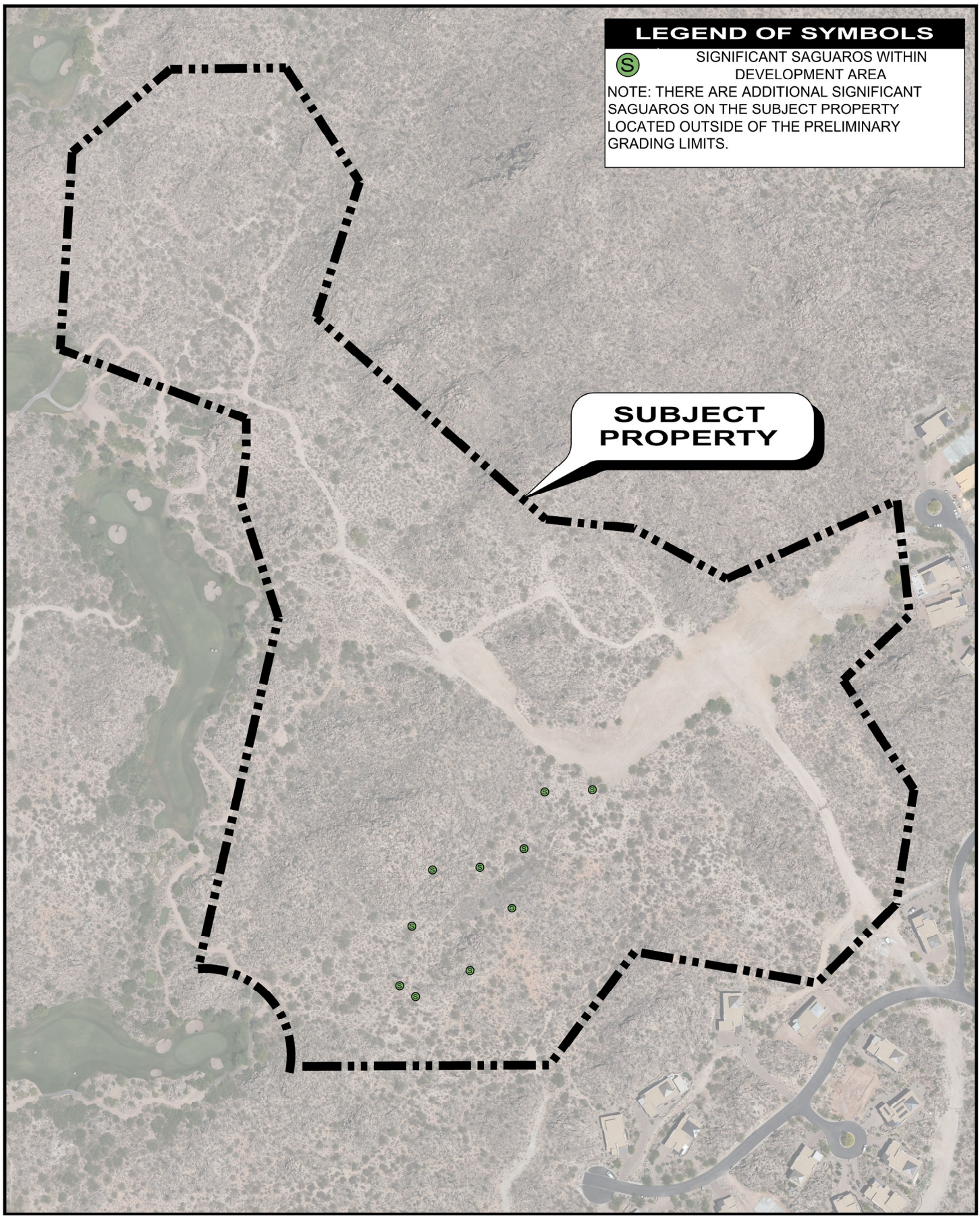

EXHIBIT J
SIGNIFICANT SAGUAROS

Aerial Photo Date = 2021

0' 300'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

J

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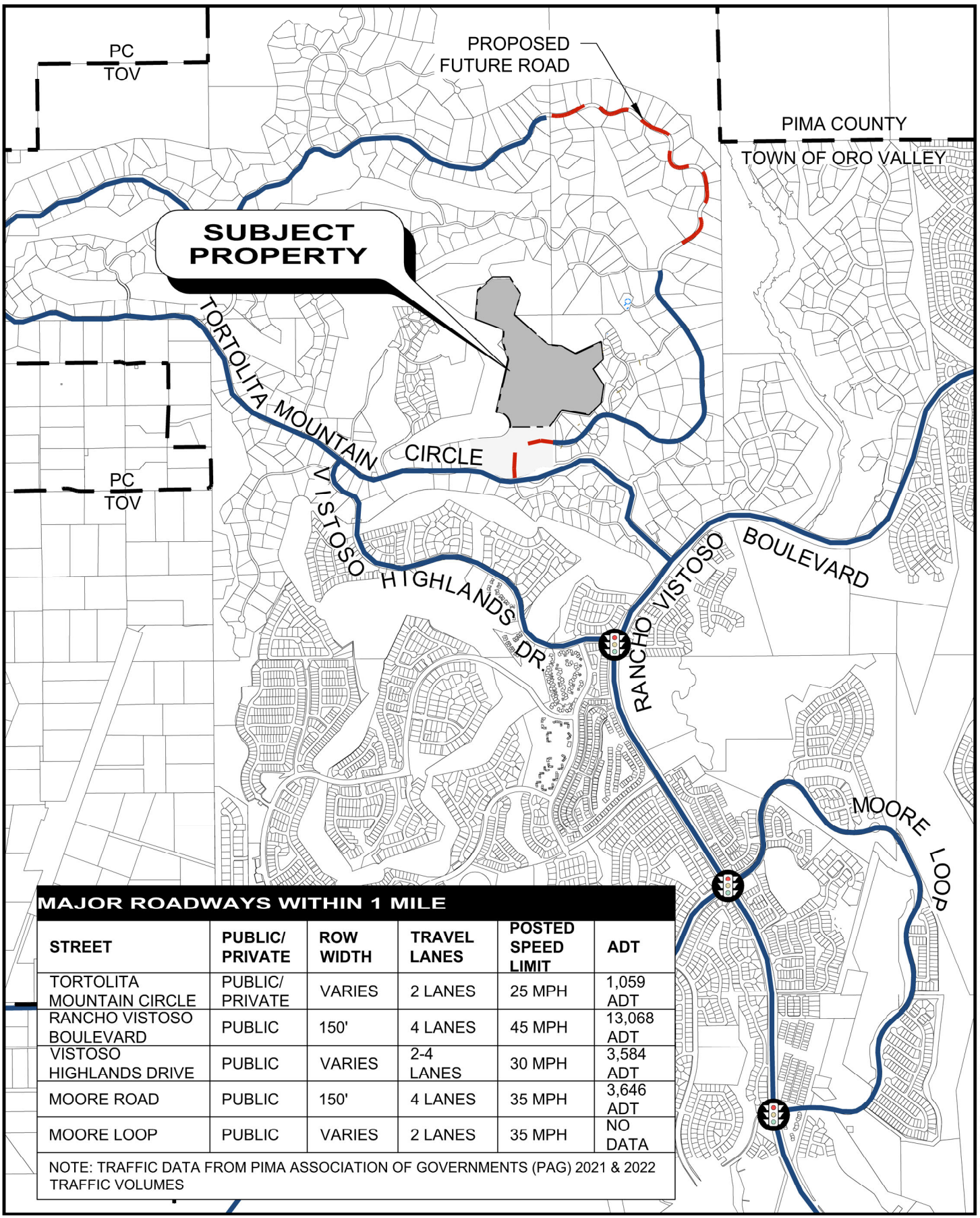

MAJOR ROADWAYS WITHIN 1 MILE

STREET	PUBLIC/ PRIVATE	ROW WIDTH	TRAVEL LANES	POSTED SPEED LIMIT	ADT
TORTOLITA MOUNTAIN CIRCLE	PUBLIC/ PRIVATE	VARIES	2 LANES	25 MPH	1,059 ADT
RANCHO VISTOSO BOULEVARD	PUBLIC	150'	4 LANES	45 MPH	13,068 ADT
VISTOSO HIGHLANDS DRIVE	PUBLIC	VARIES	2-4 LANES	30 MPH	3,584 ADT
MOORE ROAD	PUBLIC	150'	4 LANES	35 MPH	3,646 ADT
MOORE LOOP	PUBLIC	VARIES	2 LANES	35 MPH	NO DATA

NOTE: TRAFFIC DATA FROM PIMA ASSOCIATION OF GOVERNMENTS (PAG) 2021 & 2022 TRAFFIC VOLUMES

EXHIBIT K
TRANSPORTATION

0' 2000'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

K

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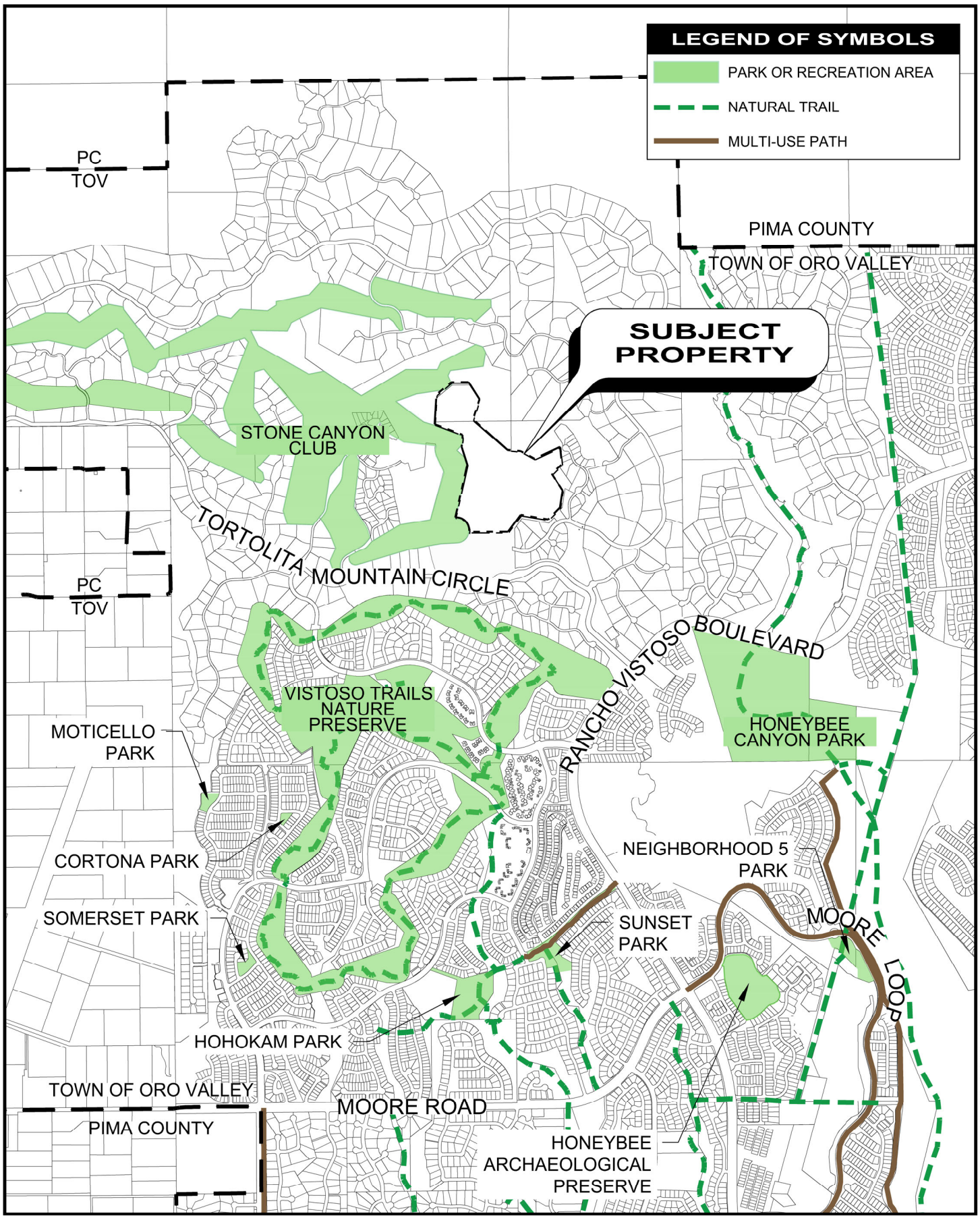

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EXHIBIT L
TRAILS, PARKS AND RECREATION AREAS

0' 2000'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

L

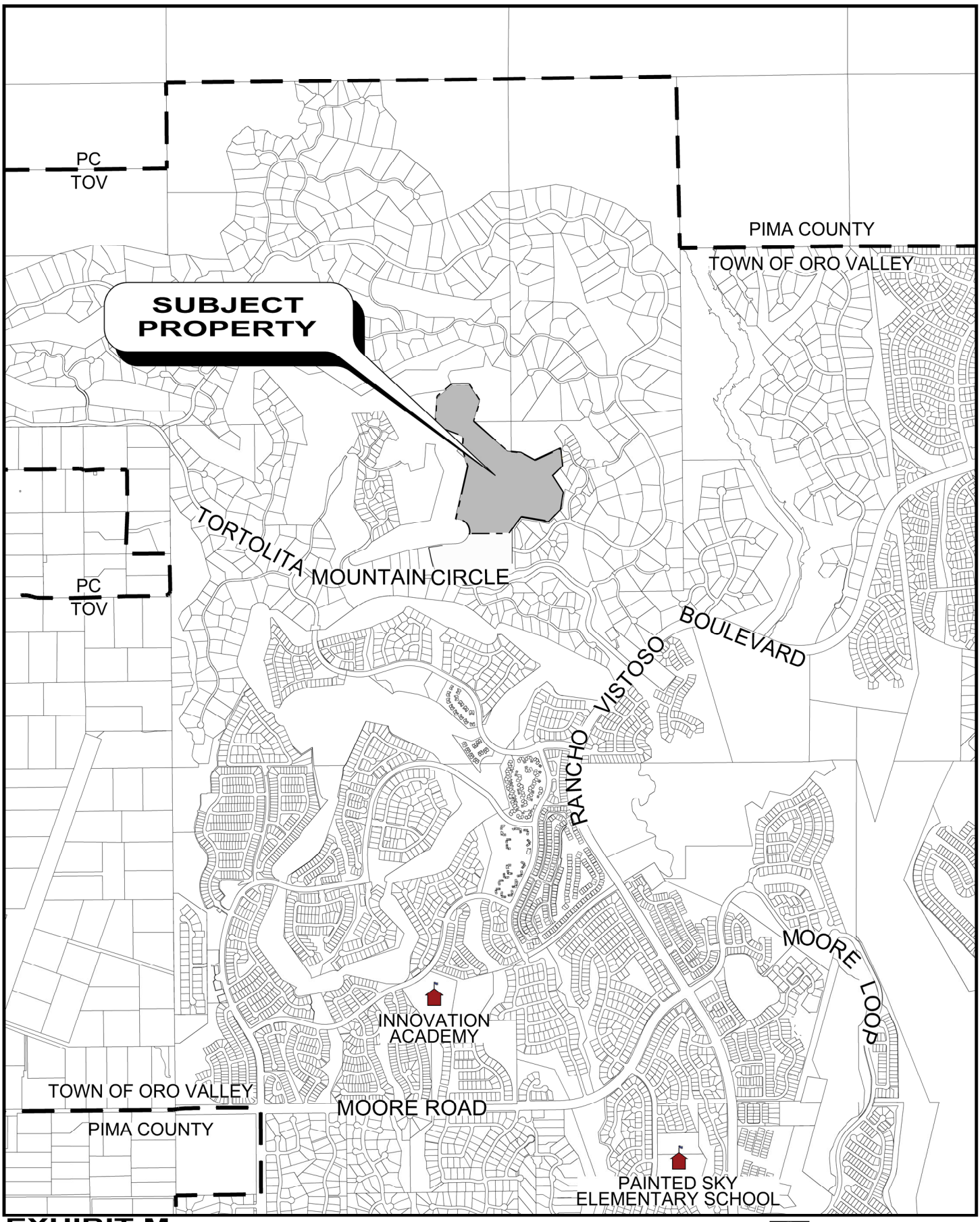

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EXHIBIT M
EXISTING SCHOOLS

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

M

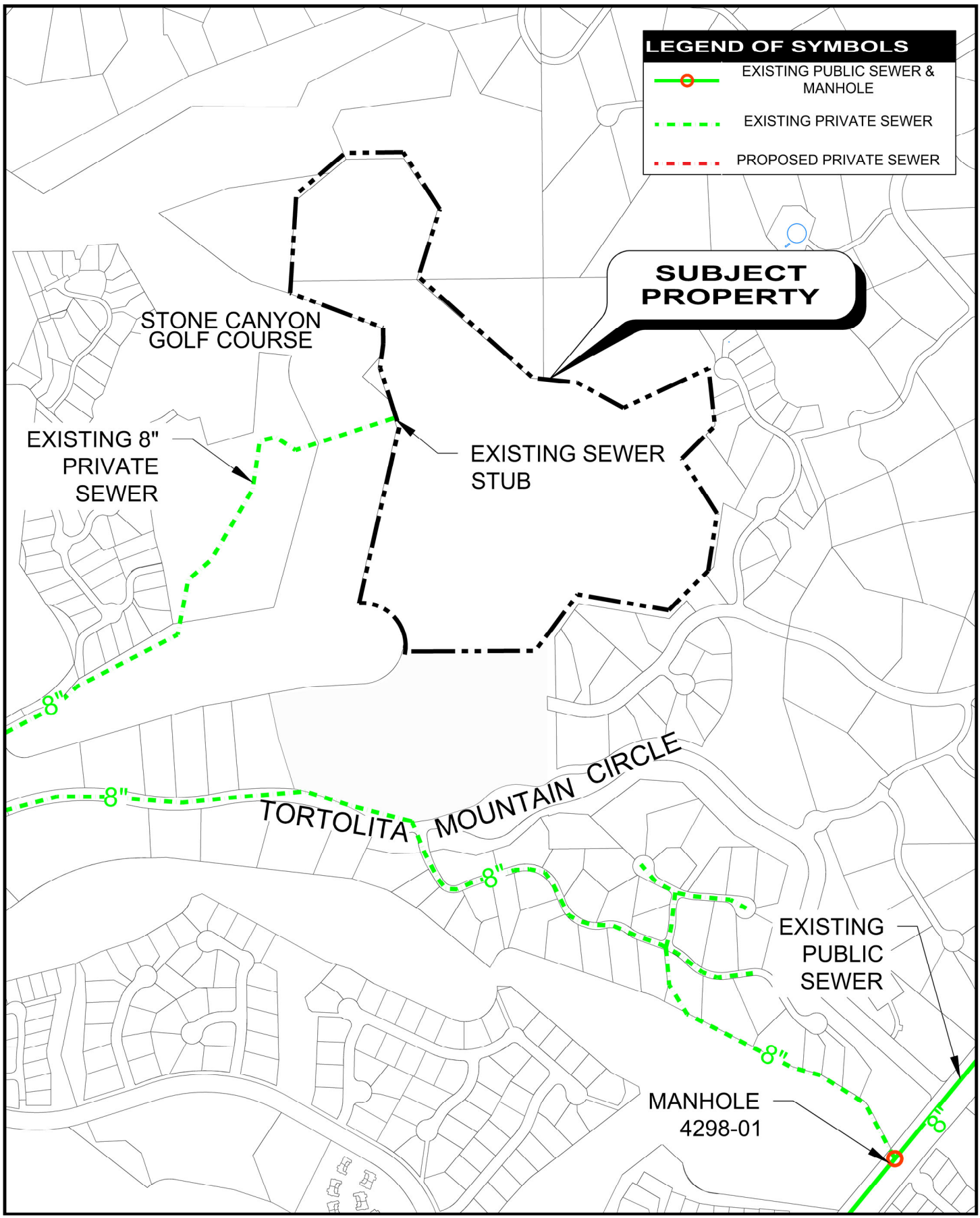

EXHIBIT N
EXISTING SEWERS

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

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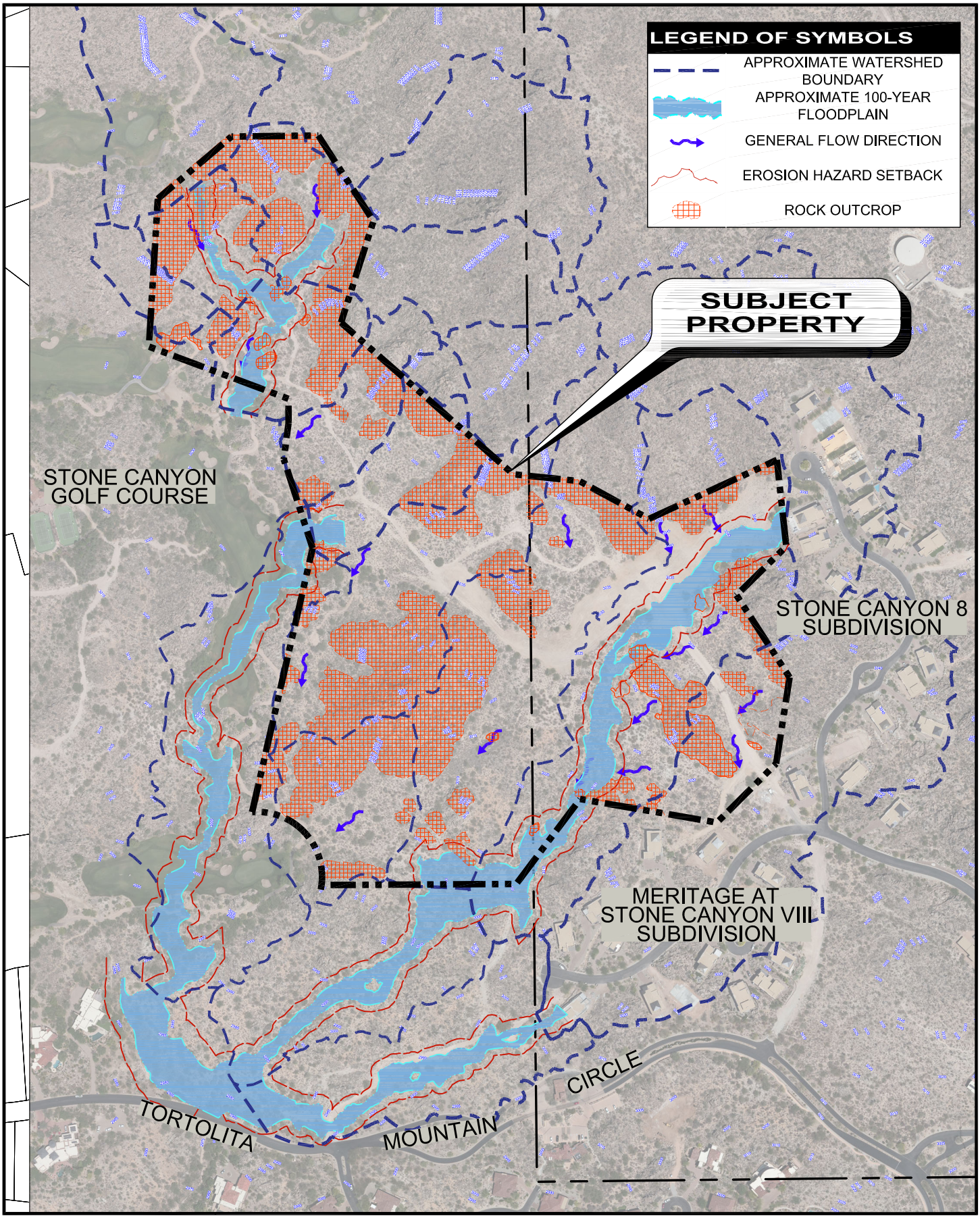

EXHIBIT O
COMPOSITE MAP

Contour Interval = 1 Ft.

0' 400'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

O

LEGEND OF SYMBOLS

- PROPERTY SUBJECT TO PAD AMENDMENT
- PRELIMINARY GRADING LIMITS (28± ACRES OF GRADED AREA)
- PRE DEVELOPMENT 100-YEAR FLOODPLAIN LIMITS
- 25% OR GREATER SLOPE
- RECREATION AREA
- ROCK OUTCROPS
- MAIN ENTRY
- 1 — SOUTH PROPERTY (NOT A PART OF THIS REZONE AND GENERAL PLAN AMENDMENT APPLICATION)
- 2 — EAST PROPERTY
- 3 — NORTH PROPERTY
- 3 — GOLF COURSE HOLE
- S — SAGUAROS TO BE PRESERVED IN PLACE WITHIN THE GRADING LIMITS (PER SECTION 27.6.B.3.B.II.A OF THE ORO VALLEY TOWN CODE).
- LOT SETBACK

630

629

628

618

604

3

POOL, SPA AND OUTDOOR SEATING AREA

PROPOSED CLUB HOUSE 15,000± SF

PROPOSED OUTDOOR PASSIVE AND ACTIVE RECREATION AREA

2

TENNIS/PICKLEBALL COURTS WITH ADDITIONAL PARKING UNDERNEATH

GATED EMERGENCY ACCESS ROAD

TORTOLITA MOUNTAIN CIRCLE

TORTOLITA MOUNTAIN CIRCLE

MAIN GATE

NOTES

1.	TAX PARCEL NUMBERS:	219-19-196C, 219-05-010B, 219-20-002B, 219-04-2330 & 219-04-2340
2.	STONE CANYON RESERVE TOTAL SITE ACREAGE:	69.9± ACRES
	AREA OF THIS REZONE & GP AMENDMENT:	51.5± ACRES
3.	EXISTING ZONING:	
	NORTH PROPERTY:	RV PAD OPEN SPACE (11.2± ACRES) RV PAD RESORT DISTRICT (23.8± ACRES)
	EAST PROPERTY:	R-144 (16.5± ACRES)
	PROPOSED ZONING:	RV PAD LOW DENSITY RESIDENTIAL (51.5± ACRES)
4.	AREAS OUTSIDE OF THE PRELIMINARY GRADING LIMITS WILL BE OPEN SPACE. THE APPROXIMATE ACREAGE OF OPEN SPACE IS 23.5± SUBJECT TO FINAL GRADING LIMITS ESTABLISHED DURING THE PREPARATION OF A FUTURE PRELIMINARY PLAT.	
5.	THE PROPERTY IS SUBJECT TO THE THE STONE CANYON DESIGN GUIDELINES.	
6.	SFR REQUIRED RECREATION AREA:	AN AREA SHALL BE DEVOTED TO AND BE DESIGNATED AS “RECREATIONAL AREA” WHICH EQUALS A RATIO OF ONE (1) ACRE TO EVERY EIGHTY-FIVE (85) DWELLING UNITS. (0.96± ACRES REQUIRED)
	PROVIDED RECREATION AREA:	2.3± ACRES
7.	LOTS:	61 LOTS
	MINIMUM LOT SIZE:	14,520 SF (60' MINIMUM WIDTH)
	AVERAGE LOT SIZE PROVIDED:	23,500 SF
8.	DENSITY:	
	MAXIMUM DENSITY (ALLOWED BY LDR & V&E DESIGNATION):	1.2 UNITS/ACRE
	PROVIDED DENSITY:	1.2 UNITS/ACRE
9.	DEVELOPMENT STANDARDS*:	
	SETBACKS:	
	FRONT:	25' AVERAGE (20' MINIMUM)
	SIDE:	8'
	REAR:	25'

*SEE THE RANCHO VISTOSO PAD FOR OTHER LDR DEVELOPMENT STANDARDS.

EXHIBIT P
TENTATIVE DEVELOPMENT PLAN

12.23.2022

0 100 200

The WLB Group Inc. WLB

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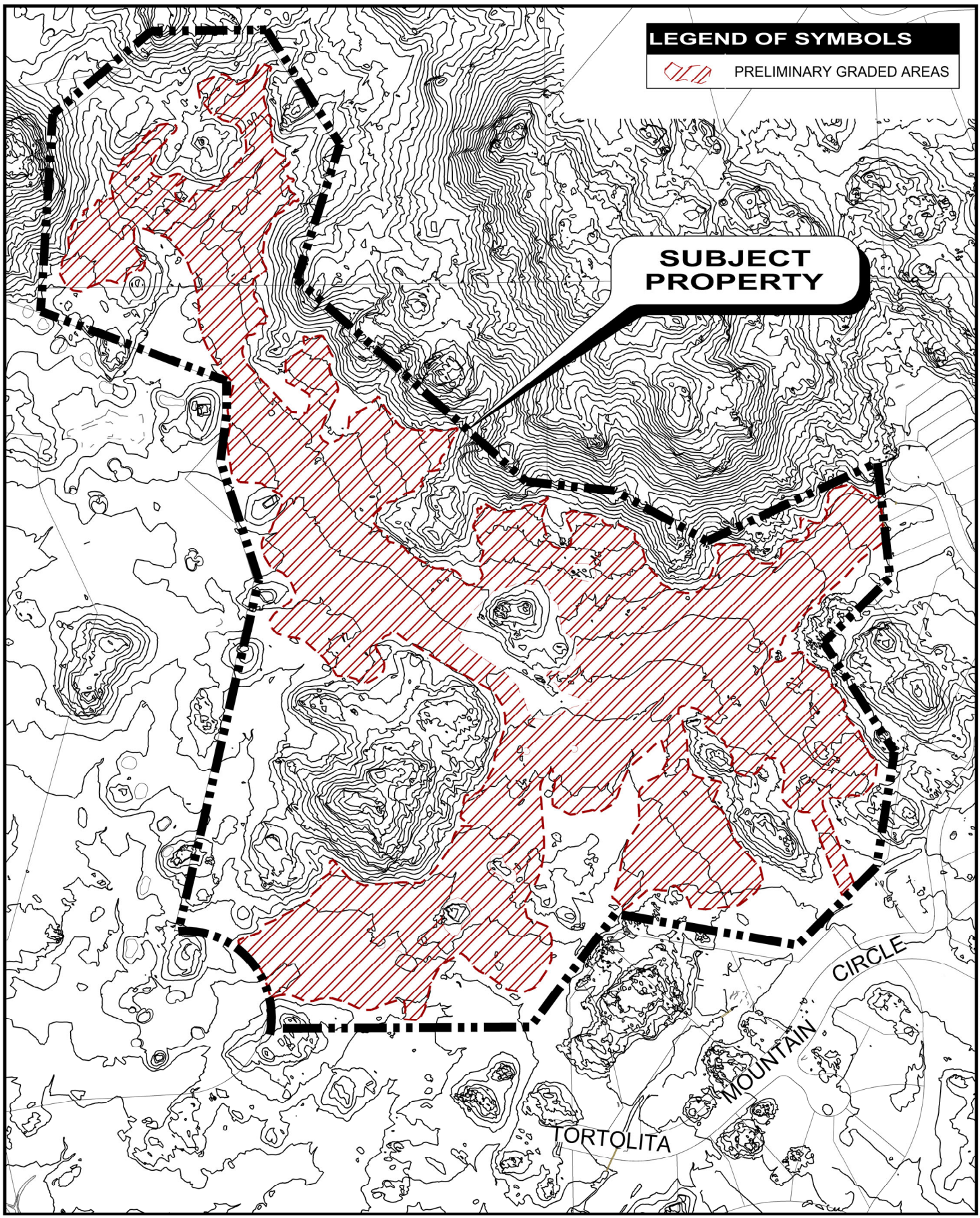

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EXHIBIT Q
PRELIMINARY GRADED AREAS

Contour Interval = 1 Ft.

0' 300'

The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

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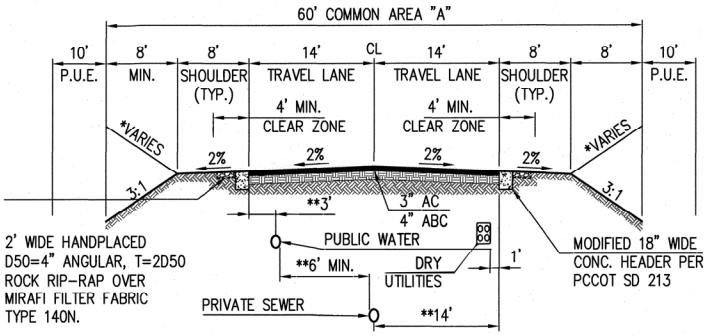
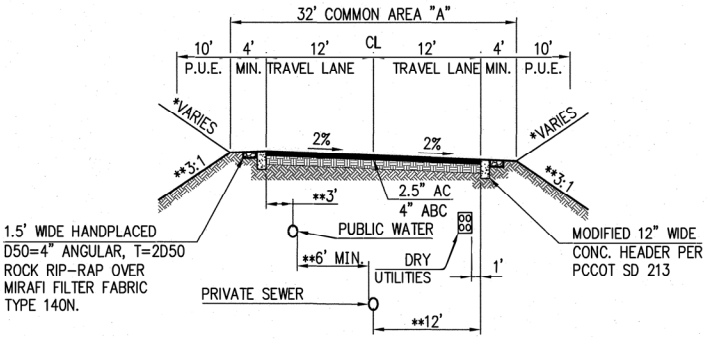


A TYPICAL CROSS SECTION

CROWN SECTION AT TORTOLITA MOUNTAIN CIRCLE
SCALE: NTS

* IN CONSIDERATION OF MINIMIZING DISTURBANCE OF ROCK OUTCROPS, NATIVE BOULDERS, AND SIGNIFICANT VEGETATION, THE SHOULDER MAY BE REDUCED TO 4'. A 4' MINIMUM CLEAR ZONE FROM FACE OF CURB MAY BE UTILIZED ALONG WITH APPROPRIATE BARRIER TREATMENTS WHEN WARRANTED DEPENDING ON FIELD CONDITIONS. THESE AREAS SHALL BE EVALUATED BY THE ENGINEER OF RECORD AND SUBJECT TO APPROVAL BY T.O.V. TOWN ENGINEER PRIOR TO CONSTRUCTION OF REDUCED SHOULDER (TYP).
** UTILITIES LOCATION VARIES, SEE PLAN



B PRIVATE STREET SECTION

SUPERELEVATED SECTION AT PRIVATE STREETS
SCALE: NTS

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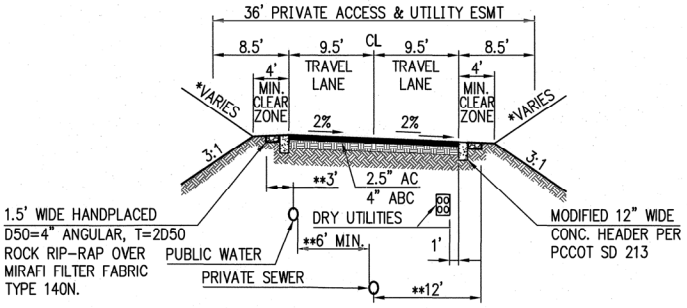
** UTILITIES LOCATION VARIES, SEE PLAN

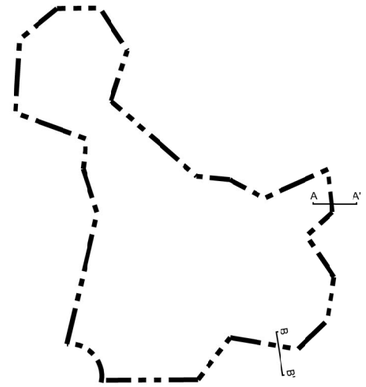


C PRIVATE DRIVE SECTION

SUPERELEVATED SECTION AT PRIVATE DRIVE
SCALE: NTS

* IN CONSIDERATION OF MINIMIZING DISTURBANCE OF ROCK OUTCROPS, NATIVE BOULDERS, AND SIGNIFICANT VEGETATION, THE SHOULDER MAY BE REDUCED TO 4'. A 4' MINIMUM CLEAR ZONE FROM FACE OF CURB MAY BE UTILIZED ALONG WITH APPROPRIATE BARRIER TREATMENTS WHEN WARRANTED DEPENDING ON FIELD CONDITIONS. THESE AREAS SHALL BE EVALUATED BY THE ENGINEER OF RECORD AND SUBJECT TO APPROVAL BY T.O.V. TOWN ENGINEER PRIOR TO CONSTRUCTION OF REDUCED SHOULDER (TYP).
** UTILITIES LOCATION VARIES, SEE PLAN

EXHIBIT R
STREET SECTIONS



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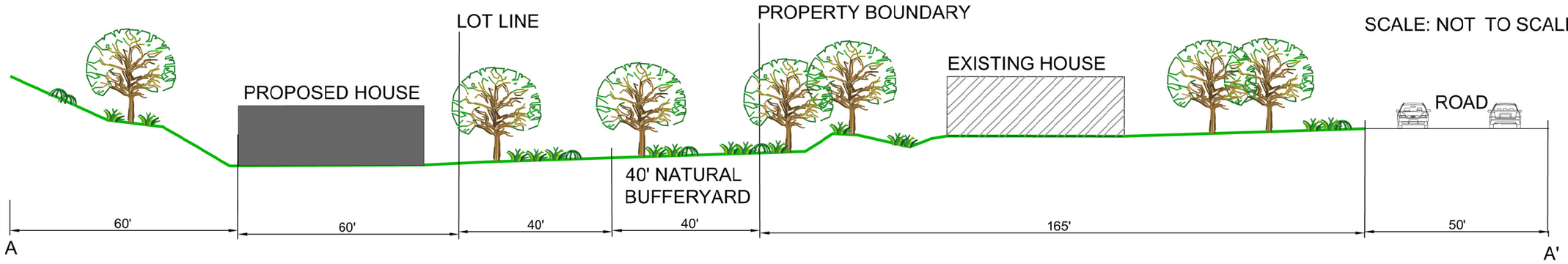

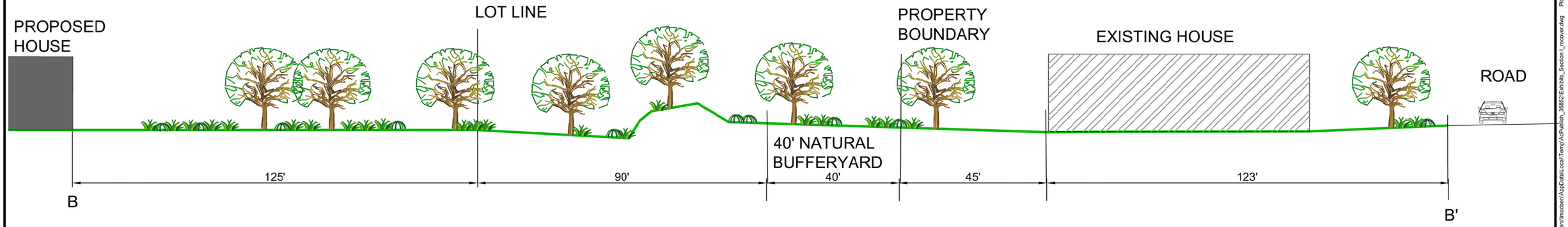

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EXHIBIT S
SITE CROSS SECTIONS

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The WLB Group WLB

STONE CANYON RESERVE - REZONING
WLB No. 185050-HP-02

S

Appendices

Appendix A: Archaeological Summary Letter.

Arizona State Museum
THE UNIVERSITY OF ARIZONA
1013 E. UNIVERSITY BLVD.
TUCSON, AZ 85721

ARCHAEOLOGICAL SUMMARY LETTER

This report documents the results of an archaeological site-records check.
It does not constitute a cultural resources clearance.

Date: 8/8/2016 **Requester Name:** Brian Sabri

Company: The WLB Group **Address:** 4444 E. Broadway Blvd., Tucson, AZ 85711

Phone: 520-881-7480 **Email:** bsabri@wlbgroup.com

Legal Description: T11S, R13E, S24 **Project Area Location:** 219-20-002B

Project Name / Number: 185050-BF-04 Stone Canyon Resort

Project Description: Expansion of existing resort site

Search Results:

According to a search of the archaeological records retained at the Arizona State Museum (ASM), 8 survey projects have been conducted within a one-mile radius of the project area between 1978 and 2006. Previous survey work was conducted in support of residential development, cell tower installation, and the installation and maintenance of reservoir, transmission, and telecommunication lines. The entire project area was surveyed in the mid-1980's in support of residential development (Seymour 1986 [ASM Accession number 1985-221; Craig and Wallace 1987 [ASM Accession number 1986-220]).

Forty-three archaeological sites have been identified within a 1-mile radius of the project area. One archaeological site, AZ BB:9:148(ASM), is crossed by the western portion of the project area (Seymour 1986).

Sites in Project Area:

One has been recorded.

Recommendations:

1. Although the entire APE has been previously surveyed, the work was conducted 30 years ago. It is standard archaeological practice for a property to be re-surveyed if the previous survey was conducted 10 or more years ago, as there is a possibility for unidentified archaeological properties to have since been exposed. ASM recommends, but it is not required by ASM, that a qualified archaeological contractor be consulted before any ground disturbance begins. A list of archaeological contractors is available on the ASM website at: http://www.statemuseum.arizona.edu/crservices/permits/index.shtml.

2. Pursuant to *Arizona Revised Statutes* §41-865 *et seq*., if any human remains or funerary objects are discovered during your project work, all work will stop within the area of the remains and Dr. Todd Pitezel, ASM assistant curator of archaeology, will be contacted immediately at (520) 621-4795.

3. City, county, or municipal governments may have requirements, therefore ASM recommends that the relevant jurisdiction(s) be consulted.

If you have any questions about the results of this records search, please contact me.

Sincerely,

Shannon D. Twilling, M.A.
Research Specialist
Archaeological Permits Office

Arizona State Museum
(520) 621-2096
twilling@email.arizona.edu

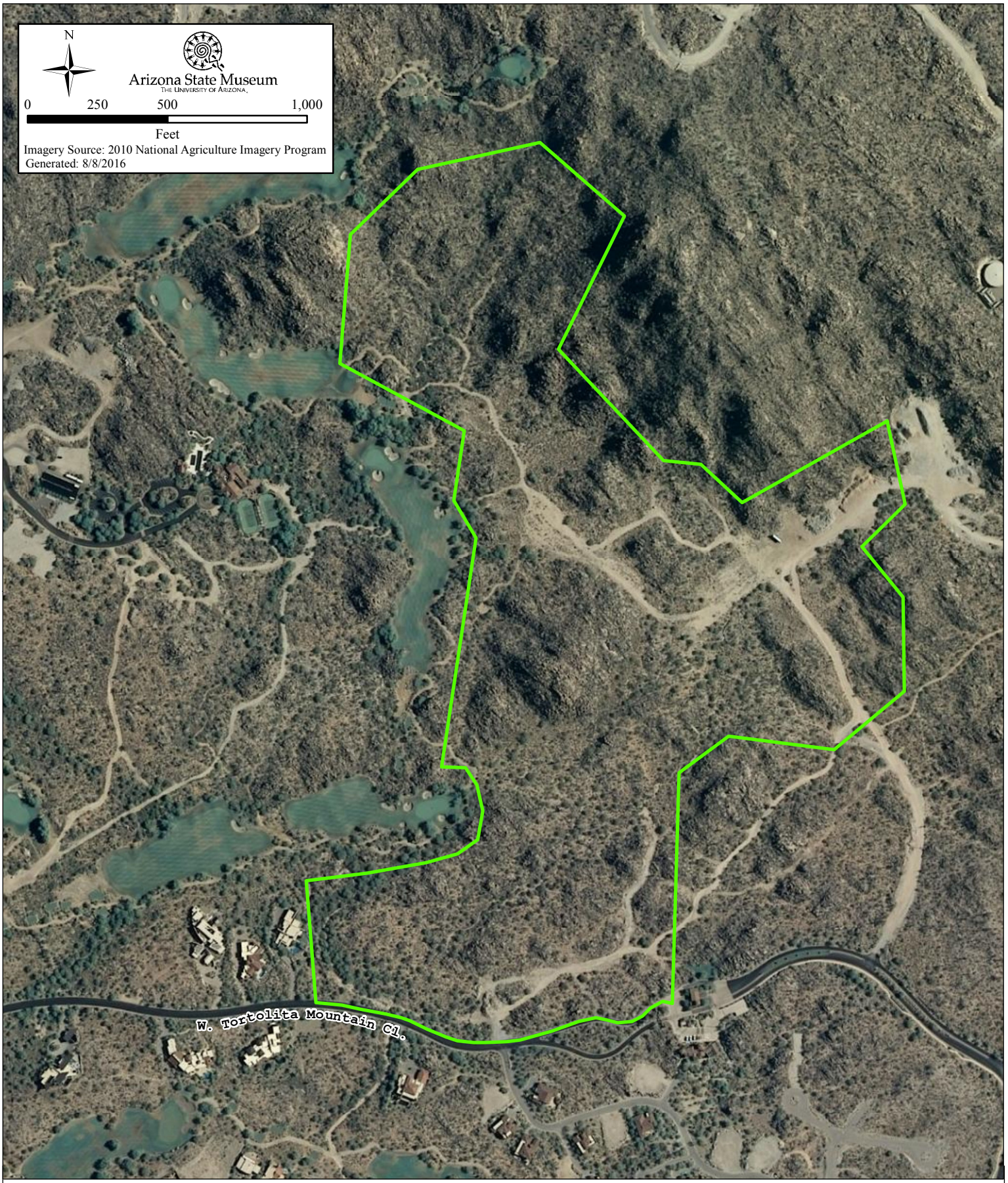
References:

Craig, Douglas B. and Henry D. Wallace

1987 *Prehistoric Settlement in the Canada del Oro Valley, Arizona: The Rancho Vistoso Survey Project.* Anthropological Papers No. 8. Institute for American Research, Tucson.

Seymour, Deni J.

1986 *Archaeological Investigations in the Tortolita Foothills Zone: Results of Limited Data Recovery Program at AZ BB:9:148 and AZ BB:9:149(ASM).* Arizona State Museum, University of Arizona, Tucson.



Company:
The WLB Group

Project:
185050-BF-04
Stone Canyon Resort

Location:
Parcels 219-20-002B

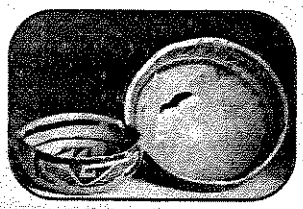
T11S, R13E, S24

Project Area

Location of proposed project area.

Appendix B: Neighborhood 12 Date Recovery Project (SWCA).

THE NEIGHBORHOOD 12 DATA RECOVERY PROJECT: ARCHAEOLOGICAL INVESTIGATIONS AT AZ BB:9:148 (ASM), ORO VALLEY, ARIZONA



Submitted to

VISTOSO PARTNERS

and

THE ATHENS GROUP

Submitted by

SWCA, INC.
Environmental Consultants

Cultural Resource Report No. 00-05

MARCH 2000

THE NEIGHBORHOOD 12 DATA RECOVERY PROJECT: ARCHAEOLOGICAL INVESTIGATIONS AT AZ BB:9:148 (ASM), ORO VALLEY, ARIZONA

Submitted to

VISTOSO PARTNERS
2285 East Rancho Vistoso Boulevard
Tucson, Arizona 85737
(520) 575-1456

and

THE ATHENS GROUP
2425 East Camelback Road, Suite 1025
Phoenix, Arizona 85016
(520) 952-8528

Submitted by

SWCA, INC.
Environmental Consultants
4601 East First Avenue
Tucson, Arizona 85711
(602) 325-9194

edited by

Mary Charlotte Thurtle
Mark L. Chenault

with contributions by

John P. Carpenter	**Joshua S. Edwards**	**Linda M. Gregonis**
Linda Scott Cummings	**India S. Hesse**	**Barbara A. Murphy**
William L. Deaver	**Kathryn Puseman**	**Mary Charlotte Thurtle**

Cultural Resource Report No. 00-05

March 10, 2000

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ABSTRACT

SPONSOR: Vistoso Partners

PROJECT TITLE: Neighborhood 12 Data Recovery

PROJECT DESCRIPTION: The project was undertaken prior to development of the southern portion of the Neighborhood 12 parcel of the Rancho Vistoso property by Vistoso Partners of Tucson and The Athens Group of Phoenix. Treatment of the site is subject to provisions of the Town of Oro Valley Grading Ordinance and the 1987 Planned Area Development for the Rancho Vistoso property.

LOCATION: USGS Quad: Oro Valley, Arizona, 1981 1:24,000.
T10S, R13E, NW 1/4 of Section 24

NUMBER OF NATIONAL REGISTER ELIGIBLE SITES: 1 (AZ BB:9:148 [ASM])

COMMENTS: AZ BB:9:148 (ASM) was a resource procurement and processing and short-term habitation locale that was occupied primarily during the Rincon phase. Numerous feature types were present at the site including five pit structures, two possible ramadas, five boulder-rimmed circles, pits and roasting pits, checkdams, bedrock grinding features, and petroglyphs. The presence of checkdam features at the site suggests the practice of agriculture. However, evidence of cultigens was scarce in the pollen record. Instead, there was abundant evidence of wild floral resources, particularly cacti varieties, suggesting that wild resources procurement and processing was the predominant subsistence activity. In addition to processing foodstuffs, ceramics may have been manufactured at the site, and there is evidence that the site's inhabitants participated either directly or indirectly in a system of long-distance trade.

CHAPTER 1

INTRODUCTION

Mary Charlotte Thurtle

AZ BB:9:148 (ASM) was a Hohokam seasonal or temporary habitation and resource procurement and processing locale located in the northwestern Tucson Basin in the southern half of Neighborhood 12 of the Rancho Vistoso Property within the limits of the Town of Oro Valley, Arizona. Between August 25 and September 22, 1999, SWCA, Inc., Environmental Consultants conducted excavations at the site as a combined testing and data-recovery effort. Eighty-one features were identified during the project, including five pit structures, two possible ramadas, five petroglyph panels, checkdams, roasting pits, and other extramural features. This report describes the investigations at the site, including the results of analyses of the recovered artifacts, botanical samples, and chronometric studies.

The work was performed at the request of Vistoso Partners and the Athens Group, who plan to build a hotel on the property. Mitigative treatment of the site was necessitated by provisions of the Town of Oro Valley Grading Ordinance (Art. 14-104I.4 and 14-105B.10) and the 1987 Planned Area Development for the Rancho Vistoso property. There were no federal permitting requirements for a proposed hotel development within the southern portion of Neighborhood 12, therefore consultation pursuant to Section 106 of the National Historic Preservation Act was not necessary. A burial treatment and repatriation agreement (Memorandum of Agreement A.R.S. 41-865, Case 94-20) among the Tohono O'odham Nation, the Arizona State Museum (ASM), Vistoso Partners, and SWCA covers all of the Rancho Vistoso property including Neighborhood 12, and was applied to the excavations.

AZ BB:9:148 (ASM) is the only site that falls within the potential areas of impact associated with the proposed hotel development and associated planned rights-of-way. At the request of Vistoso Partners, a research design and single-phase plan of work to mitigate adverse impacts to the site was developed by SWCA (Carpenter 1998).

The project was managed by Thomas Motsinger, and Mark Chenault acted as the Principal Investigator. Mary Charlotte Thurtle (Field Director), David P. Doak, Jennifer Hielin, and Galen Tinsley, conducted the field work. Dan Arnit conducted the mechanical excavation, and Lara Mitchell was responsible for the field mapping and subsequent map production. In addition, Dan Arnit, Kathy Arnit, Danniel Dresseaux, John Hayes, Amelia Natoli, Mary Prasciunas, David Sayre, and Greg Whitney volunteered their skills and resources in the field in an effort to recover as much data as possible from the site.

This report is organized into nine chapters. Chapter 1 provides background information on the site that includes brief treatments of the environmental and cultural setting, and previous research conducted on Rancho Vistoso property and at the site. Chapter 2 presents the research design. Chapter 3 describes the site and methods employed. Chapter 4 describes the features found at the site. Chapter 5, 6, 7, and 8 present the result of artifact, macrobotanical, and pollen analyses, and Chapter 9 summaries the findings.

The environmental and cultural setting of AZ BB:9:148 (ASM) has been described in detail by Ahlstrom (1995) and Craig and Lombard (1987). The brief treatment of the environmental setting below draws from their discussions. The Cultural History section of this chapter has been partially excerpted from Ahlstrom's (1995) *Archaeological Treatment Plan for Historic Properties Located on the Rancho Vistoso Property, Town of Oro Valley, Pima county, Arizona*, and Lascaux, Hesse, and Wellman's (1999) *Testing Report and Data Recovery Plan for the Operations Area of the Treatment Plant Locus of Site AZ AA:12:111 (ASM), Pima County, Arizona*.

ENVIRONMENTAL SETTING

Physiography

AZ BB:9:148 (ASM) lies on the southeastern pediment of the Tortolita Mountains and on the north side of the Cañada del Oro Valley (Figure 1.1). This portion of the valley can be thought of as either adjacent to, or an extension of, the northern Tucson Basin. The area includes three major geomorphic units: a bedrock pediment, partially covered by alluvium, at the base of the Tortolita Mountains; alluvial fans extending out from the Tortolita Mountains and forming a bajada surface; and two major washes, Honeybee Canyon flowing from the Tortolita Mountains and the Cañada del Oro, which originates in the Catalina Mountains to the east. The geomorphic surfaces present within the project area include Pleistocene alluvium and Holocene alluvium and colluvium with numerous occurrences of pediment bedrock outcrops (Craig and Lombard 1987:Figure 2.1). Elevation reflects the presence of numerous bedrock outcrops that punctuate the site and the gentle slope of the pediment toward the mountains to the north, and varies from 2990 to 3100 feet above sea level.

Sediments

Four major episodes of valley downcutting and intermittent deposition during the Holocene shaped existing Pleistocene and Pliocene deposits in the present landscape. Soils present in the Rancho Vistoso property are Holocene alluvium and colluvium, and mid-to-late Pleistocene Haplargids. Mid-Pleistocene Haplargids are characterized by clay-rich B horizons and moderate to strongly developed calcic horizons, while late-Pleistocene Haplargid B horizons have little clay accumulation and weakly developed calcium carbonate horizons.

Vegetation

The Rancho Vistoso property is located in the Arizona Upland subdivision of the Sonoran Desert, which is distinguished from the other subdivisions of the Sonoran Desert and from the Mojave Desert primarily by its bimodal rainfall pattern. Summer thundershowers account for 30 to 60 percent and gentle winter rains account for 10 to 40 percent of the annual total precipitation, which averages 25-41 cm. These rainy seasons are separated by the drought-like conditions of the late spring/early summer and early fall (Brown 1994). The project area is mostly characterized by a Saguaro/Palo Verde community (Craig and

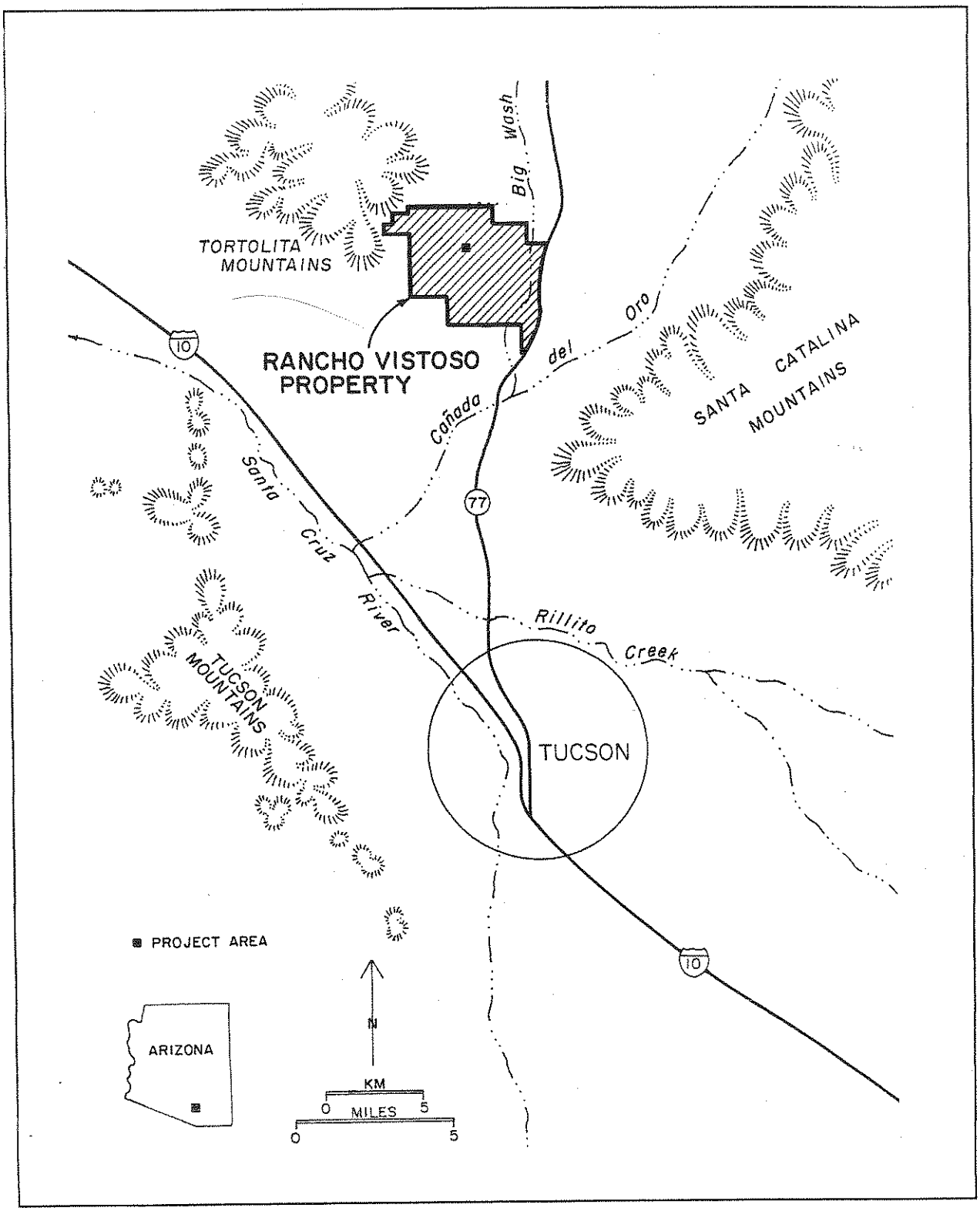


Figure 1.1. Map of the project area.

Lombard 1987:Figure 2.3). Creosote stands are rare, though one large stand was present within the site boundary in Locus 18.

Fauna

Craig and Lombard (1987) report that a variety of species were observed during their survey of the property, including mammals (coyotes, javelina, mule deer, cottontail rabbits, jackrabbits, and rodents), birds (Gambel's quail, cactus wrens, red-tailed hawks, Harris hawks, Gila woodpeckers, mourning doves, road runners, and great-horned owls), and reptiles (western diamondback rattlesnakes, gopher snakes, desert tortoises, Gila monsters, and a variety of lizards). Numerous representatives of these species were noted during the project: coyotes, mule deer, cottontail rabbits, quail, cactus wrens, red-tailed hawks, doves, gopher snakes, desert tortoises, and numerous lizards were observed.

CULTURE HISTORY

The prehistoric Hohokam of central and southern Arizona practiced a Formative lifeway that was dependent on the cultivation of corn and other crops, as well as the exploitation of wild plant and animal resources. Hohokam culture had almost certainly developed out of the local Archaic hunter-gatherer tradition, with considerable influence from Mesoamerican cultures, and it successfully adapted to the arid conditions of the desert Southwest. The Hohokam "core area," where the most distinctive cultural traits appear to have originated, is located in the Phoenix Basin, a region that centers on the lower Salt and middle Gila river valleys. The project area is located within an area occupied by the Tucson Basin Hohokam, one of several peripheral cultural branches that share important traits with the core area but have adapted differentially to their own particular environments (McGuire 1991). The Hohokam are particularly well known for the construction of large-scale public features such as irrigation systems, ballcourts, and platform mounds. The Hohokam developed extensive exchange networks among the peoples of the Southwest and Mesoamerica that involved the import of decorated pottery, turquoise, raw shell, copper bells, and exotic animals, and the export of finished shell ornaments, pottery, and possibly foodstuffs (Crown 1991; Doyel 1991).

The Archaic period in southern Arizona has been divided into Early (7500-5000 B.C.), Middle (5000-2000/1000 B.C.), and Late (2000/1000 B.C.-A.D. 300) sub-periods (Huckell 1984). Hohokam culture history is generally divided into four temporal periods (Figure 1.2): Pioneer (A.D. 300-500), Colonial (A.D. 500-900), Sedentary (A.D. 900-1200), and Classic (A.D. 1200-1450). In the Phoenix Basin, a post-Classic period has recently been proposed and described (Sires 1984; Chenault 1992), but its cultural manifestations have not been identified in the Tucson Basin.

Archaic Period (7500 B.C.- 300 A.D.)

The extinction of large Pleistocene mammals was at least one cause of a shift from a largely hunting economy to the Archaic lifeway, which was based on the collecting of a broad spectrum of wild plant and animal foods. Archaic tool kits include projectile points that were mounted on atlatl darts or on

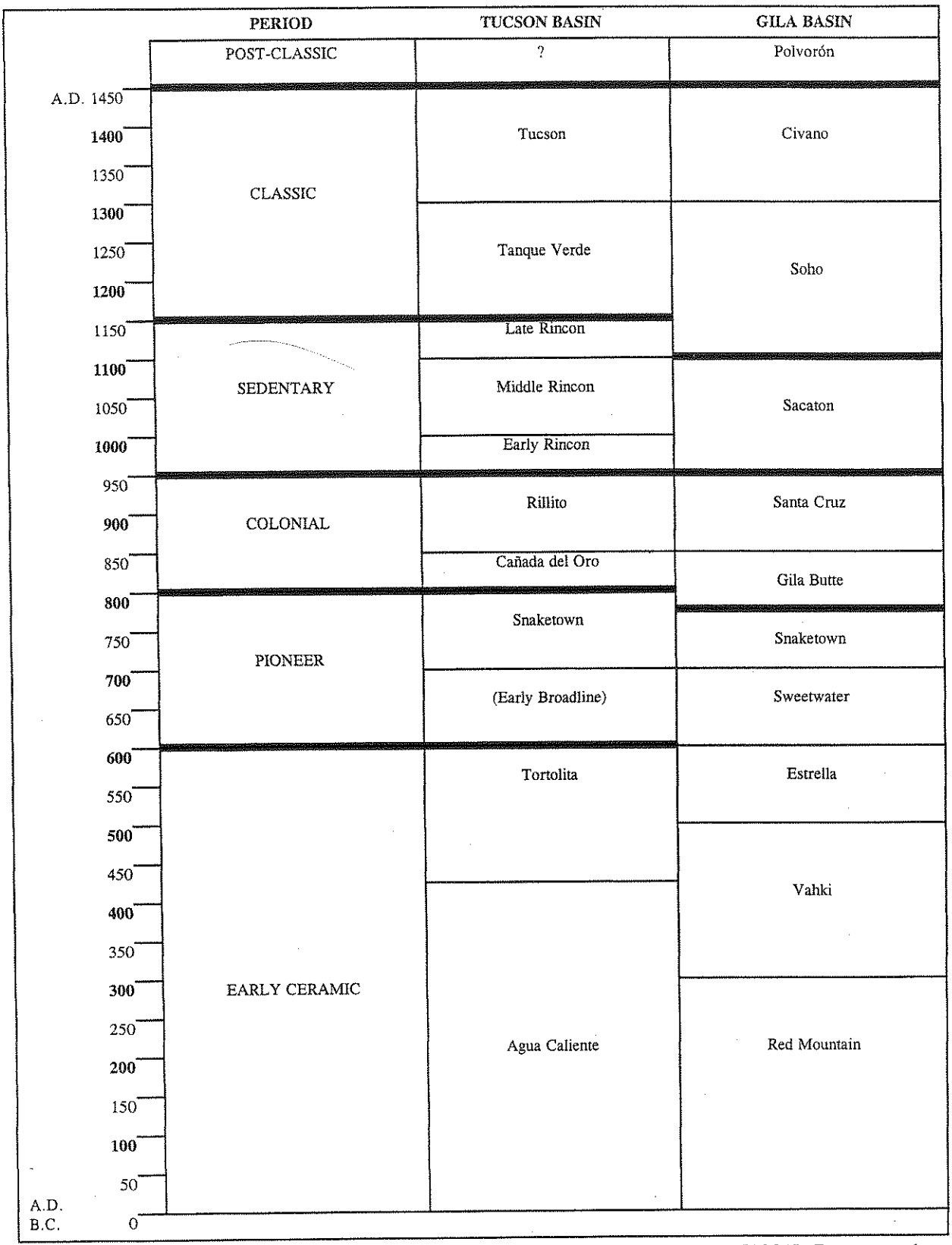


Figure 1.2. Tucson Basin Hohokam cultural sequences (compiled from Dean [1991]; Deaver and Ciolek-Torrello [1995]; Wallace, Heidke and Doelle [1995]).

spears (Slaughter 1992:9), as well as a variety of grinding implements. Fratt (1992a:19) argues that the presence of ground stone tools, combined with their "virtual absence in the preceding Paleoindian period signals a major change in subsistence away from a focus on big-game hunting and plant gathering with little to no processing to more extensive and intensive plant procurement and processing." In the Southwest, critical wild resources are too scattered to support sedentism. Therefore, pre-agricultural Archaic settlement patterns are characterized by mobility. Although it is clear that climatic conditions varied through the Archaic period, none of the available reconstructions of climate change appear to be entirely reliable.

Recent research in the flood plain of the Santa Cruz River has found that during the Late Archaic (3500-1800 B.P.), groups in southeastern Arizona planted corn, built pit structures, and made use of storage pits. All three of these innovations reflect a more sedentary way of life than that practiced by earlier Archaic peoples (Eddy and Cooley 1983:46-47; Doyel 1984; Bronitsky and Merritt 1986:164; Huckell 1990:351). Excavations at both San Pedro (1200-800 B.C.) and Cienega (800 B.C. - A.D. 200) phase sites suggest increasing seditism during this time. Little is known of the San Pedro phase of the Late Archaic but two recent projects have included intensive data recovery at two sites that contain San Pedro phase components: the Valley Farms Site (AZ AA:12:736 [Wellman 1998]) and the Costello King Site (AZ AA:12:503 [Ezzo and Deaver 1998]). At both of these sites the cultural deposits included numerous small pit features and evidence of agriculture but did not include the pit houses found at the Cienega Phase sites discussed below. Although the evidence is limited, it suggests that the population aggregation described by Mabry (1998) began after the San Pedro phase during the Cienega phase.

Cienega Phase sites that have been found along the I-10 corridor, including at the Santa Cruz Bend site (AZ AA:12:746), Los Pozos (AZ AA:12:91), and the Stone Pipe site (AZ BB:13:425), have provided new insight into the lifeways during this period (Mabry and Clark 1994; Mabry 1993, 1994; Swartz 1994). A large pit house village was uncovered at each of these sites along with a specialized architectural feature known as a "big house" at Santa Cruz Bend. The density of pit structures and the presence of a centrally placed "big house" suggests that agriculture and village life were well developed by 400 B.C. (Mabry 1994). Based on the known function of "big houses" elsewhere, Mabry (1994:7) suggests that the structures functioned as "'public buildings' where both ritual and secular gatherings were held to integrate the community."

Pioneer Period (A.D. 600-800)

Some disagreement exists concerning the date of the first Hohokam occupation in southern Arizona. The most recent evidence places Hohokam villages in the Phoenix Basin around A.D. 1 (Dean 1991). The Pioneer period has traditionally been composed of four phases -- Vahki, Estrella, Sweetwater, and Snaketown -- which were developed based on stratigraphic and chronometric evidence from the large village of Snaketown (Gladwin et al. 1937; Haury 1976). Recent excavations in the Phoenix Basin, however, have led to a proposed pre-Vahki, Red Mountain phase that marks the transition from a mobile to a sedentary adaptation. The Pioneer period prior to the Snaketown phase remains ill-defined in the Tucson Basin, although several recent and ongoing investigations along the Santa Cruz River have revealed late preceramic and very early ceramic pit-structure villages that demonstrate an in situ continuum from the Archaic to Hohokam cultures (Doyel 1991:235-236; Mabry and Clark 1994; Swartz 1994). In the

Tucson Basin, the pioneer Period starts around A.D 600., when the cultural attributes of the Hohokam become evident.

Colonial Period (A.D. 800-900)

Hohokam population increased markedly during the Colonial period, as improved irrigation technology in the Phoenix Basin -- and to a limited extent along the Santa Cruz River in the Tucson Basin -- allowed for the reliable cultivation of maize, beans, squash, and cotton. Primary village sites became common along the major drainage systems. Ballcourts were constructed at these large villages throughout southern Arizona (Kelly 1978:5; Wilcox and Sternberg 1983), and the inhumation burial practices that marked the early Pioneer period were largely replaced by cremation burial. Both occurrences suggest significant changes in the cultural and ritual life of the Hohokam on a regional scale (Wilcox 1991:124). The material culture of the Tucson Basin Hohokam began to diverge in significant ways from that of the core area, most notably in ceramic technology. The Tucson Basin Colonial period is divided into two phases, the Cañada del Oro and the Rillito.

Settlement patterns in the Tucson Basin for the Cañada del Oro phase are not well documented, perhaps because evidence remains deeply buried. The Santa Cruz River would have been deeply entrenched during this period, making floodwater farming difficult (Waters 1987:57). After A.D. 800, during the Rillito phase, the floodplain of the river would have been broad and sandy, allowing easy farming (Waters 1987:57-59). This change in the character of the river environment should have caused an equally substantial change in settlement patterns, but archaeological evidence shows only an increase in occupation intensity during this time, resulting in a handful of large villages with ballcourts located adjacent to the floodplain and surrounded by smaller hamlets (Doelle 1988:282). Almost all of these sites were located along the west side of the river, where the slope is more gentle and the soils finer. Farming may have been possible throughout the Colonial period on this side of the river by utilizing waters from the small washes coming off the Sierrita and Tucson Mountains. These conditions may account for the lack of a major settlement pattern disparity between the Cañada del Oro and the Rillito phases (Doelle 1988:283).

Sedentary Period (A.D. 900-1150)

During the Sedentary period, which includes the Early, Middle, and Late Rincon subphases, settlement change included expansion from riverine environments to secondary drainages and bajadas. Ceramics from this period are distinguished by a degeneration in the execution of linework and a generally bolder decorative style. Vessel construction was generally thicker and heavier than in earlier periods, and the distinctive Gila shoulder made its first appearance on the bodies of jars and ollas.

During the Early Rincon phase, settlement patterns and geomorphological conditions remain the same as they were in the Rillito phase in the Tucson Basin. Major changes occurred during the Middle Rincon phase when the river again became entrenched as a discontinuous arroyo and eroded sediment was deposited near Martinez Hill in a delta-fan (Waters 1987:59). Settlement patterns changed from large villages with smaller satellite hamlets to a continuous string of small settlements along the west edge of the

floodplain (Doelle 1988:283). Settlements also appear to shift to the north, toward the more farmable delta deposits (Waters 1987:59). During the Late Rincon phase, headcutting of the discontinuous arroyo continued toward the south, and a cienega environment began to develop in the north (Waters 1987:59). Settlements had shifted to include the east side of the river, and sites with large roasting pits occur on the east side away from the floodplain edge. This suggests that agave cultivation began to take on importance (Doelle 1988:285).

Classic Period (A.D. 1150-1450)

After A.D. 1150 dramatic changes occurred in architectural styles, burial practices, and material culture. The house-in-a-pit style of architecture was replaced by adobe-walled pithouses and, later, by above-ground adobe and masonry structures. These structures were often incorporated in compounds that were surrounded, entirely or in part, by walls that were built, like the house walls, of adobe and stone. Ballcourt construction ceased by the Classic period, but earthen platform mounds, which may have been conceptually derived from similar Mesoamerican structures, began to appear in the larger villages. Possibly due to an increase in warfare (or the threat thereof), the Tucson Basin Hohokam aggregated into larger primary villages located along the major drainages during the Classic period (Doelle and Wallace 1991). By the first part of the Classic period (the Tanque Verde phase), design styles of red-on-brown ceramics became standardized and more rectilinear. In the Tucson phase, the last definable Hohokam phase in the Tucson Basin, Salado polychrome pottery from the Tonto Basin first appeared within the decorated ceramic assemblages.

Settlement continued to shift to the east side of the river in the southern Tucson Basin during the Tanque Verde phase, when the arroyo channel and cienega environment of the Santa Cruz stabilized (Waters 1987:59). Large village sites along the east margin of the floodplain, smaller sites, and seasonal settlements away from the river suggest a greater reliance on non-riverine agriculture. Greater regionalization and integration of environmental diversity characterized this phase (Doelle 1988:285-286). During the Tucson phase, the Tucson Basin saw a significant decline in the use of non-riverine resources and may have seen a decline in population as well (Doelle 1988:283). The Santa Cruz arroyo was filled, and the floodplain again became farmable (Waters 1987:59), though settlements became nucleated into a few large villages (Doelle 1988:283).

LOCAL ARCHAEOLOGICAL BACKGROUND

Among the more significant studies completed within the Rancho Vistoso property are the Institute for American Research's (IAR) Class III survey (Craig and Wallace 1987) and testing of Honeybee Village (Craig 1989) and SWCA's testing at Sleeping Snake Village (report in preparation). IAR also conducted data recovery at four small sites on the Sun City parcel, immediately east of Honey Bee Ridge (Craig 1988). SWCA also completed data-recovery projects at AZ BB:9:166 (ASM), a small Rincon phase site in Neighborhood 5C (Wellman 1995); at the Tortolita phase Triangle Road Site in Neighborhood 5B (Wellman 1997); at AZ BB:9:186(ASM) (report in preparation); and at several small sites in Neighborhoods 11 and 13A (reports in preparation). Like the excavations at AZ BB:9:148 (ASM), these projects were carried out to establish compliance with local cultural-resource ordinances.

The survey of the entire Rancho Vistoso property documented 54 archaeological sites (43 then newly recorded and 11 previously recorded), including 2 ballcourt villages, 2 or 3 other Hohokam habitation sites, 26 or 27 artifact scatters with features (identified feature types include roasting pits, rock piles, bedrock grinding slicks, bedrock mortars, and petroglyphs), 18 artifact scatters lacking surface features, 1 lithic quarry, 1 site having an artifact scatter and features as well as a historic component, and 2 historic sites. The project included surface collection of 100 percent of artifacts from many small sites and a sample collection from the larger sites (Craig and Wallace 1987).

Two research efforts in the vicinity of Rancho Vistoso are particularly worthy of note. They include a long-term program of survey and excavation conducted by Pima Community College on the east side of the Tortolita Mountains (including portions of Rancho Vistoso; Hewitt and Stephen 1981), and an extensive study of Hohokam settlement and subsistence conducted by the Arizona State Museum (Fish, Fish, and Madsen 1992) on the south and west sides of the Tortolita Mountains (immediately west of Rancho Vistoso).

PREVIOUS RESEARCH AT THE SITE

There were two previous research efforts at AZ BB:9:148 (ASM). It was originally recorded in 1984 by a crew of archaeologist from the Bureau of Land Management's (BLM) Phoenix District Office (Brunson et al. 1984). Also in 1984, the site was resurveyed, rerecorded, and limited excavations were performed by the Arizona State Museum (Seymour 1985). These limited test excavations indicated that subsurface cultural deposits were present at the site.

The purpose of the 1984 resurvey and limited excavations was to "document site function and determine age of the remains" (Seymour 1985:8). In all, 35 features were recorded within 17 loci that encompassed a 360,000-square-meter-area. Documented were artifact scatters, charcoal-stained sediment, boulder circles, checkdams, bedrock metates, petroglyphs, trails, and bedrock mortars. Testing methods included surface collection units, excavation of test units, and fifty-centimeter-wide exploratory trenches. Excavations were limited to areas that contained concentrations of surface artifacts and were conducted by hand. Radiocarbon and ceramic analyses performed as a part of the project indicated that the site was occupied during the Rincon and early Tanque Verde phases. Researchers concluded that the site "conform[s] well to the criteria for secondary habitation sites" (Seymour 1985). The report of the 1984 effort concentrated on the function of each feature type found at the site and lacked specifics as to the overall total of collection units, test units, and feature or trench excavations that were performed. Therefore, the exact location of some of these previous efforts (test or collection units) could not be confirmed during this project. A summary of previous excavations and collection units, including whether they were relocated during the 1999 fieldwork, is presented in Table 1.1. A list of feature numbers assigned during the current project and corresponding feature name or numbers assigned in 1984 can be found in Appendix A.

Table 1.1. 1984 Excavations at AZ BB:9:148 (ASM)

Locus	Feature	Extent	Relocated	Comment
2	Roasting pit	Test unit excavated, feature not encountered.	No	Feature thought to be to the south, outside of project area.
3	Roasting pit, Feature 1	North half. Several units around feature also excavated.	No	Slab-lined roaster, 1.86 m in diameter, with adjacent waste-rock pile. Rincon or preclassic.
4	Roasting pit and "several" test units*	Whole feature	Yes one roaster and one trench	Feature defined 14 cm below surface. Rock-lined, A.D. 1010-1235 based on radiocarbon dates.
6	Pollen sample collected	From under large sherd.	No	Corn pollen found.
8	Southern Rock Circle	Whole feature?	No	Ash and oxidation in one area. No real depth.
10	Rock Alignments 1 and 3	unknown	No	None.
16	Test Trench	unknown location or dimensions	No	Artifacts in upper 20 cm of fill.

* 12.5 m-south of pit, "several" test units were excavated. Artifacts persisted to 15-20 cm below surface. Rincon phase ceramics and an obsidian projectile point were found.

CHAPTER 2

RESEARCH DESIGN

John P. Carpenter

The research design has been drawn directly from the research themes outlined in Ahlstrom's (1995) archaeological treatment plan for the Rancho Vistoso property, which built on the research questions that Wallace and Craig (1987) had proposed earlier. Ahlstrom articulated 11 research themes that are pertinent to the archaeology of the Rancho Vistoso property as a whole: Settlement Patterns and Settlement Systems (Theme 1); Site and Community Structure (Theme 2); the Sleeping Snake and Honeybee Ballcourts (Theme 3); Socioeconomic Relations (Theme 4); Subsistence, Diet, and Resource Exploitation (Theme 5); the Household Economy (Theme 6); Mortuary Practices (Theme 7); Petroglyphs (Theme 8); Chronology (Theme 9); the Paleoenvironment (Theme 10); and Protohistoric and Historic Periods (Theme 11). Of these, Themes 1, 2, 5, 8, 9, and 10 were thought to be relevant to AZ BB:9:148 (ASM) prior to excavation. After excavation of the site, it became apparent that Theme 7, Mortuary Practices also applied. The pertinent research questions under these themes are discussed below.

SETTLEMENT PATTERNS AND SETTLEMENT SYSTEMS

A "settlement pattern" can be defined as the distribution across a landscape of (more or less) contemporaneous sites. The concept of settlement pattern is often paired with that of "settlement system." A settlement system consists of a description, or interpretation, of the social and economic relations that existed between the occupants of the sites making up a settlement pattern. Another useful concept is that of a "settlement zone," defined with reference to the zone's environmental characteristics and the uses to which it was put by the area's human inhabitants. An important characteristic of the Rancho Vistoso archaeological project is its relatively large spatial scale that allows the investigation of important aspects of growing crops, the exploitation of wild resources, and the production of craft items. A number of general questions can be posed concerning settlement patterns and systems in the Rancho Vistoso project area, and data from AZ BB:9:148 (ASM) will help to address them.

- How many temporally distinct settlement patterns can be identified in the project area? For example, can a separate pattern be identified for each phase of a period (Rincon, Tanque Verde) or for segments of the Rincon phase (early, middle, late)?

- What structures, features, kinds and numbers of artifacts, and so on are present at each of the loci making up the settlement pattern(s)? What functions can be identified for the sites and loci? Can habitation locales be classified as villages, hamlets, farmsteads, or field house sites? Is there support for Wallace's (Wallace and Craig 1987) "interpretation that most small and/or low density artifact scatters were limited activity sites of one sort or another"?

- Is there evidence that the loci were occupied on a purely seasonal basis (Wallace and Craig 1987)?

SUBSISTENCE, DIET, AND RESOURCE EXPLOITATION

AZ BB:9:148 (ASM) was probably at least partly related to the exploitation of wild resources along the southern edge of the Tortolita Mountains. The following questions may be addressed through the excavations.

- What natural resources were exploited? What plants, animals, lithic raw materials, and other resources were used? What foods were eaten?
- "Do the frequencies of metate slicks and mortars in the Rancho Vistoso area indicate the utilization of more wild resources than in other valley locations...What was ground in the metate slicks?" (Craig and Wallace 1987:177).
- What agricultural resources were cultivated in the project area? To what degree was agriculture emphasized relative to wild-resource procurement?
- How were both cultivated and gathered resources processed?
- What was the role of the smaller sites in the local subsistence strategy? Do any of these sites represent seasonal field houses? Are they related to wild-resource procurement and processing or to dry-farming?

SITE AND COMMUNITY STRUCTURE

One major focus of Hohokam research that has emerged within the last 15 years is that of site structure and the internal arrangement of Hohokam villages. All of the habitation sites in the project area --village, hamlet, farmstead, and field house sites--can contribute to the corpus of information on Hohokam site structure. Because AZ BB:9:148 (ASM) includes habitation features, excavation of these features should contribute to the understanding of site and community structure.

- What levels of integration are apparent at smaller habitation sites in the Rancho Vistoso project area?
- Can courtyard groups be identified at the smaller sites in the Rancho Vistoso project area, as are generally found at larger habitation sites?

SOCIOECONOMIC RELATIONS

Recent advances in our ability to identify raw material sources through chemical and visual characterization methods have made it increasingly possible to track prehistoric ceramic items from their place of manufacture to their ultimate place of use and deposition. The presence of exotic and semi-exotic goods such as shell, turquoise, obsidian, and copper offers insights into a community's participation in long-distance socioeconomic networks.

It is likely that information from AZ BB:9:148 (ASM), although limited, will contribute to our understanding of the socioeconomic relationships between sites within the Rancho Vistoso area and their participation in socioeconomic networks.

- What do temper studies indicate concerning where ceramics from the Rancho Vistoso sites were originally manufactured? Were the plain ware ceramics produced locally?
- What does the ceramic evidence indicate about the nature of the relationship between the project area's inhabitants and populations in the Phoenix Basin, the Papaguería, and other areas?
- Where there any exotic materials found at the site that can be sourced?

MORTUARY PRACTICES

The insights that research into mortuary practices can provide for prehistoric social organization, demographics, health and diet, world view, and ceremonialism make it among the most fruitful pursuits in archaeology. AZ BB:9:148 (ASM) was limited in both size and surface indications of features, and mortuary features were not thought likely. However, human remains were found at the site that can help address the questions posed for the Rancho Vistoso project area.

- Are there distinct cremation or inhumation cemeteries at small Rancho Vistoso habitation sites?
- What do the interments indicate regarding the demographic make-up and mean lifespan of the villagers?
- What inferences about mortuary ritual can be drawn from the mortuary remains?

PETROGLYPHS

AZ BB:9:148(ASM) contains five petroglyph panels. Although it is anticipated that all of the outcrops containing glyphs will be preserved, they were recorded through photography and scale drawings in order to mitigate the possible effects of secondary impacts. The glyphs may shed light on the following research questions.

- "What styles and dates can be assigned?" (Craig and Wallace 1987:179).
- "How do the sites compare to others previously recorded in the region (Wallace and Holmlund 1986)?" (1987:179).
- Questions of current interest relate to the integration of rock art into design studies that crosscut other artifactual media such as pottery, baskets, and textiles. Can the Rancho Vistoso corpus of rock art, though small, contribute to these studies?

CHRONOLOGY

Always important in archaeological studies is the issue of assigning contexts to particular time periods. Although the chronometric data from the AZ BB:9:148 (ASM) may be very limited, the following two questions may be at least partially addressed.

- When were the smaller sites in the project area in use?
- According to Wallace (Craig and Wallace 1987:121), at least three things appear to have changed between the early and late Rincon subphases: settlement became more dispersed, there was a decline in the importation of buffware ceramics, and ballcourts were abandoned. Do the Neighborhood 12 loci shed any light on these changes?

THE PALEOENVIRONMENT

Any consideration of past cultural adaptation to the natural environment must begin with an understanding of that environment. Of particular interest in a desert environment is how the availability of water affected settlement locations and cultural development. Following Craig and Wallace (1987:178), we pose the following research questions related to the topic.

- How were the prehistoric environmental conditions different from those of today? Is change discernible through the occupation of the sites?
- How did the sites' occupants adapt to environmental conditions?
- What floral and faunal species were locally available for use as food, raw materials for tools and craft items, firewood, and construction materials?

CHAPTER 3

SITE DESCRIPTION AND FIELD METHODS

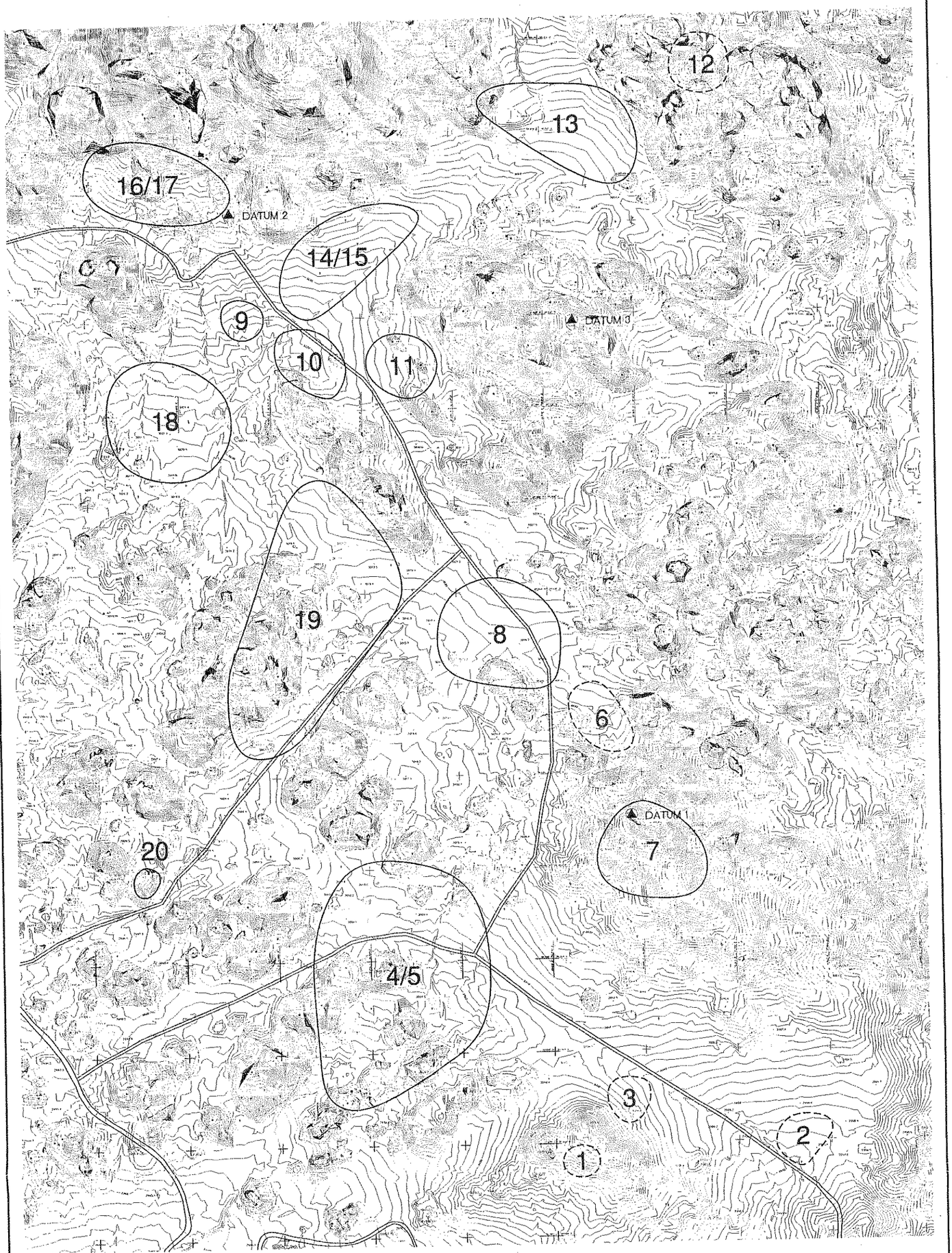
Mary Charlotte Thurtle

AZ BB:9:148 (ASM) was a resource procurement and processing and short-term habitation locale that contained 16 distinct loci. It was located at the southwestern base of the Tortolita Mountains and lies wholly within Township 11 S, Range 13 E, in the NE ¼ of Section 24 in the Town of Oro Valley, Arizona. The center of the site was located at UTM coordinates Zone 12, E 502262.08, N 3591650.06.

The site was initially recorded in 1984 by Bureau of Land Management (BLM) Phoenix District Office archaeologists (Brunson et al. 1984). In 1985, the Arizona State Museum (ASM) was awarded a contract to re-record and conduct limited data recovery at the site (Seymour 1985). At that time, the boundaries were expanded to include 17 loci. The site covered 350,000 square meters (Seymour 1985:9). During the current project three loci were added (Locus 18, 19, and 20) that had not been previously identified, though the size of the site was found to remain the same. Three loci (Locus 1, 2, and 3) that had been previously documented and test excavated in 1985 were not relocated during this project. Locus 1 is believed to be outside the project area (Seymour 1985:Figure 5) and the proposed area of impact. There was no evidence of Locus 2 and 3 remaining on the surface at their mapped locations within the area of impact.

Once detailed surface reconnaissance had been conducted and subsurface investigations of the site began, the need to combine loci to reflect 1999 observations became apparent. Locus 4 and 5, both on the southern end of the site, were found to connect subsurface and were combined. Locus 16 and 17 in the far northwest corner were also combined, as a low density of surface artifacts was present between the two loci. No distinct artifact scatters were observed in the north-central portion of the site. Instead, a low density of artifacts were found scattered throughout this area necessitating the combination of Locus 14 and 15. Figure 3.1 shows the site as it was defined in 1999.

Data collected during both data recovery efforts indicate that the area was occupied during the Rincon and early Tanque Verde phases. Two loci (Locus 8 and 20) also appeared to contain Historic period features: a low rock fence and a possible Historic period petroglyph. Both surface and subsurface features were present at the site. Surface features include boulder-rimmed circles, checkdams, bedrock grinding features, and petroglyphs. Subsurface features include pit structures, roasting pits, other pits, possible ramadas, an inhumation, cremated bone, small middens, and a possible borrow pit. A list of features that comprise each loci is found in Table 3.1. Detailed maps of each locus where work was preformed during the current project are found in Figures 3.2 - 3.10.



N

0 35 70
Meters

CONTOUR INTERVAL 1 FOOT

KEY

LOCUS INCLUDED IN THE NEIGHBORHOOD 12 DATA RECOVERY PROJECT

LOCUS NOT RELOCATED OR WHERE NO FURTHER WORK WAS PERFORMED

DIRT ROAD

NEIGHBORHOOD 12 DATA RECOVERY PROJECT

AZ BB:12:148(ASM)
SITE OVERVIEW

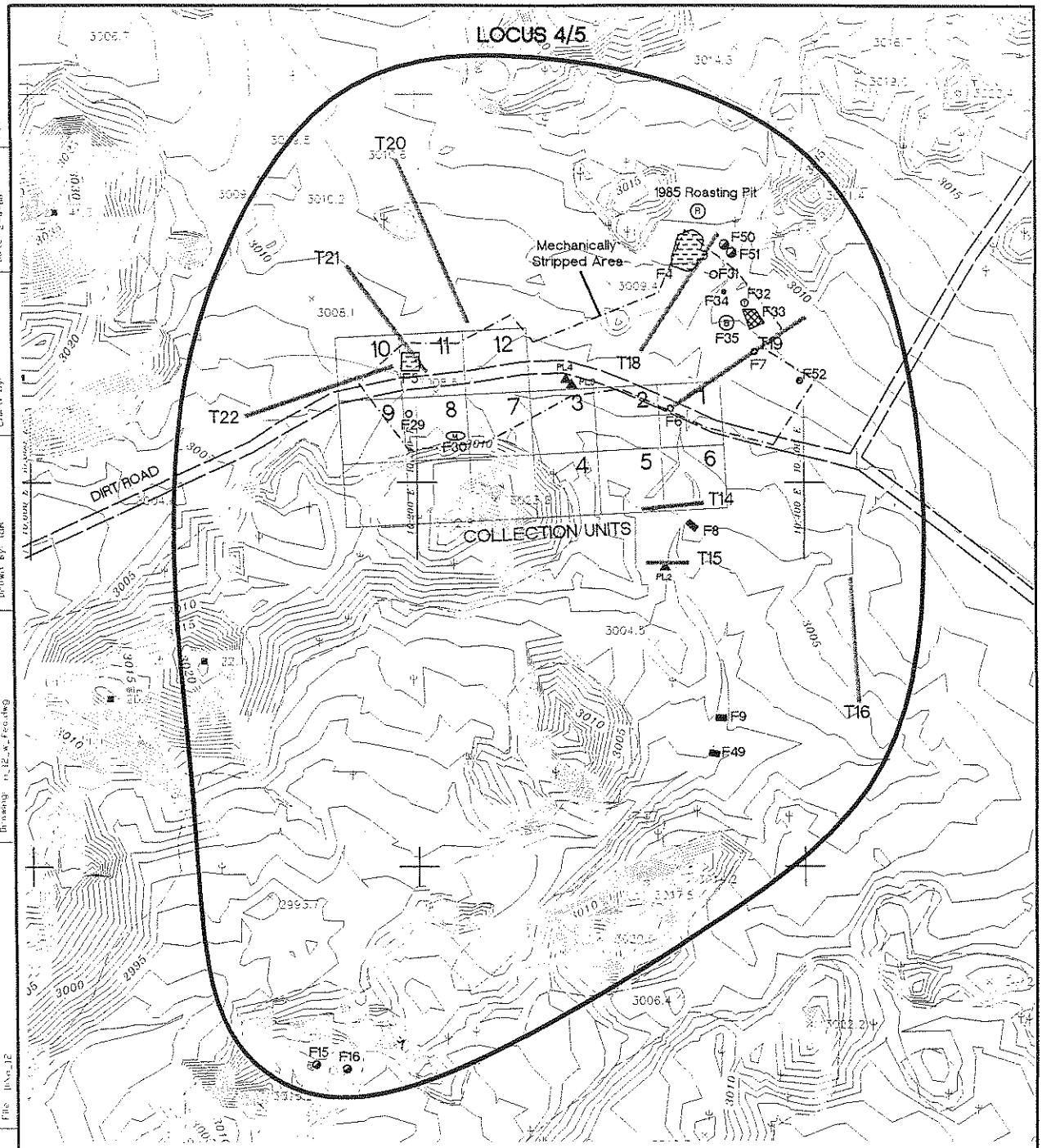
FIGURE 3.1

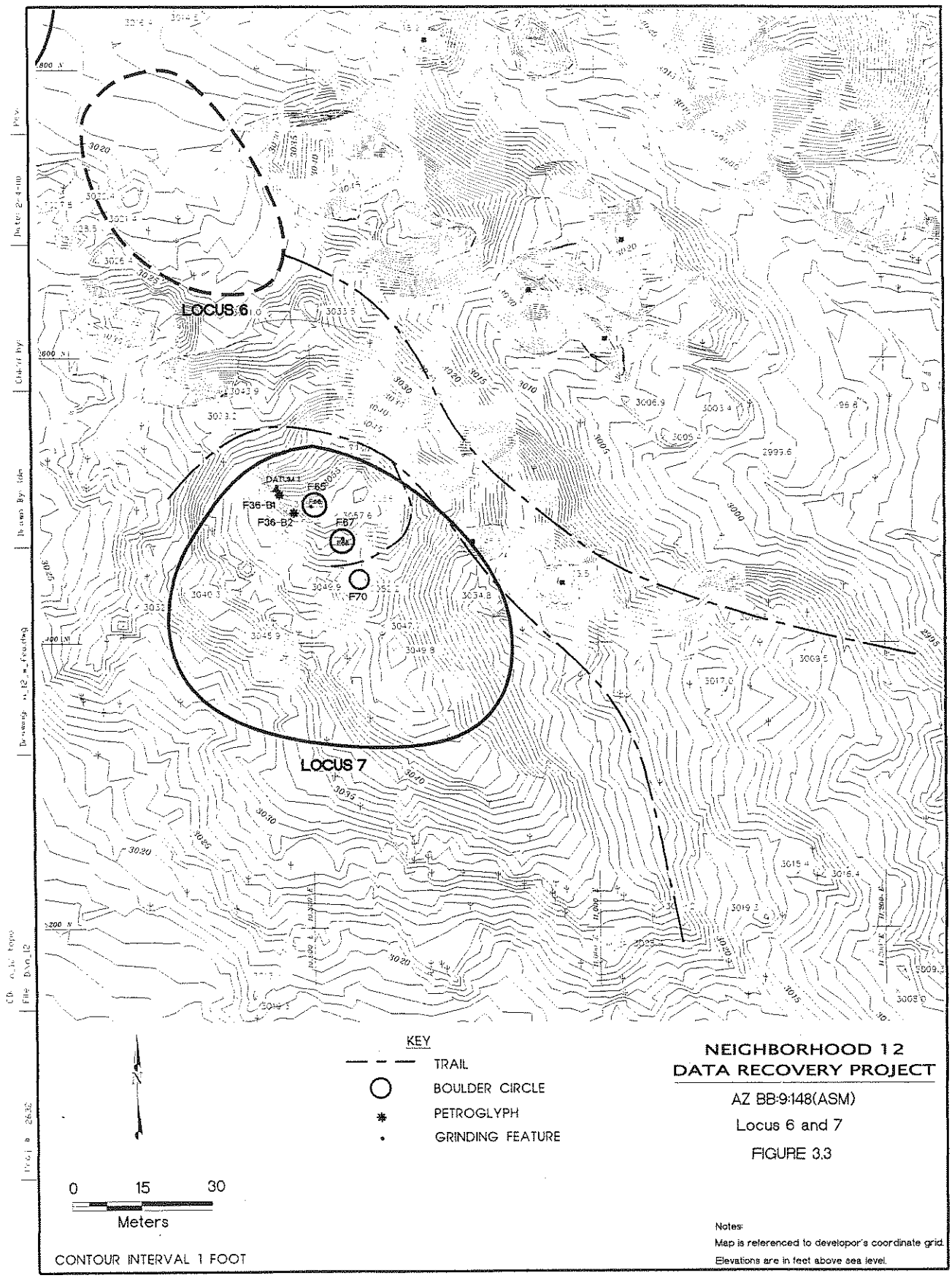
Notes:
Map is referenced to developor's coordinate grid.
Elevations are in feet above sea level.

Table 3.1. Loci and Corresponding Features by Type at AZ BB:9:148 (ASM)

Locus	Location	Area (m^2)	Features
1*	Low ridge top south of project area	421.38	Sherd scatter, roasting pit
2*	Base and top of ridge	901.59	Artifact scatter, possible checkdams, roasting pit, cobble-rimmed circle
3*	Base of hill	687.83	Roasting pit, artifact scatter
4/5	On southern end of the site, both on and at the base of bedrock outcrops	15489.04	Two pit structures, three pits, two bedrock mortars, two bedrock metates or "slicks," three checkdams, a rock-lined hearth, a borrow pit, a ramada, cremated bone, and a midden
6*	In between Locus 7 and 8 between two bedrock outcrops	1419.93	Artifact scatter
7	On top of ridge on the eastern side of the site	3599.21	Three boulder-rimmed circles, two bedrock mortars, two petroglyphs, and a trail system
8	On top and at northern base of low bedrock ridge	4949.32	Two boulder-rimmed circles, two petroglyphs (one possibly historical), seven pits, nine roasting pits, two cultural lenses, a cluster of ground stone, and a primary inhumation
9	Surrounding a low boulder outcrop in the northwestern portion of the site	598.26	Artifact scatter, boulder-rimmed circle (not relocated)
10	At base of low ridge	1600.42	Four checkdams
11	At base of boulder outcrops	1550.76	Surface artifact scatter and petroglyph
12*	Top of hill in the northeast corner of the site	1303.70	Two boulder-rimmed circles (not relocated), artifact scatter
13	In alluvial valley at the north-central portion of the site	4770.40	One structure, a petroglyph panel, two roasting pits, and a cultural lens
14/15	At base of the mountains, northern portion of the site	4077.31	Surface artifact scatter
16/17	At base of the mountains, northwest corner of the site	4125.61	Boulder-rimmed circle, pit, surface artifact scatter
18	Flat alluvial area with small boulder outcrops in the western portion of the site	5287.52	Two pit structures, a possible ramada, five roasting pits, two pits, a small midden, a cultural lens, and a cache of hammer stones
19	On top and at the base of bedrock ridge	13203.58	A bedrock mortar, a bedrock metate or "slick," a pecked bedrock boulder, and a surface artifact scatter
20	On a low bedrock outcrop in the southwest corner of the site	2.0	A rock wall or fence, thought to be historical

* Recorded by Seymour (1985).


LOCUS 4/5
T20
T21
T22
1985 Roasting Pit
Mechanically Stripped Area
T18
T19
T14
T15
T16
F4
F5
F6
F7
F8
F9
F29
F30
F31
F32
F33
F34
F35
F49
F50
F51
F52
10
11
12
9
8
7
3
2
1
4
5
6
DIRT ROAD
COLLECTION UNITS
F15
F16
PL1
PL2
PL3
PL4
KEY
BACKHOE TRENCH
POINT LOCATED ARTIFACT
ROASTING PIT
MIDDEN
PIT
STRUCTURE
POSSIBLE RAMADA
TEST UNIT
CHECK DAM
GRINDING FEATURE
ROCK LINED HEARTH
BORROW PIT
0
12.5
25
Meters
CONTOUR INTERVAL 1 FOOT
NEIGHBORHOOD 12
DATA RECOVERY PROJECT
AZ BB:9:148(ASM)
Locus 4/5
FIGURE 3.2
Notes:
Map is referenced to developor's coordinate grid.
Elevations are in feet above sea level.



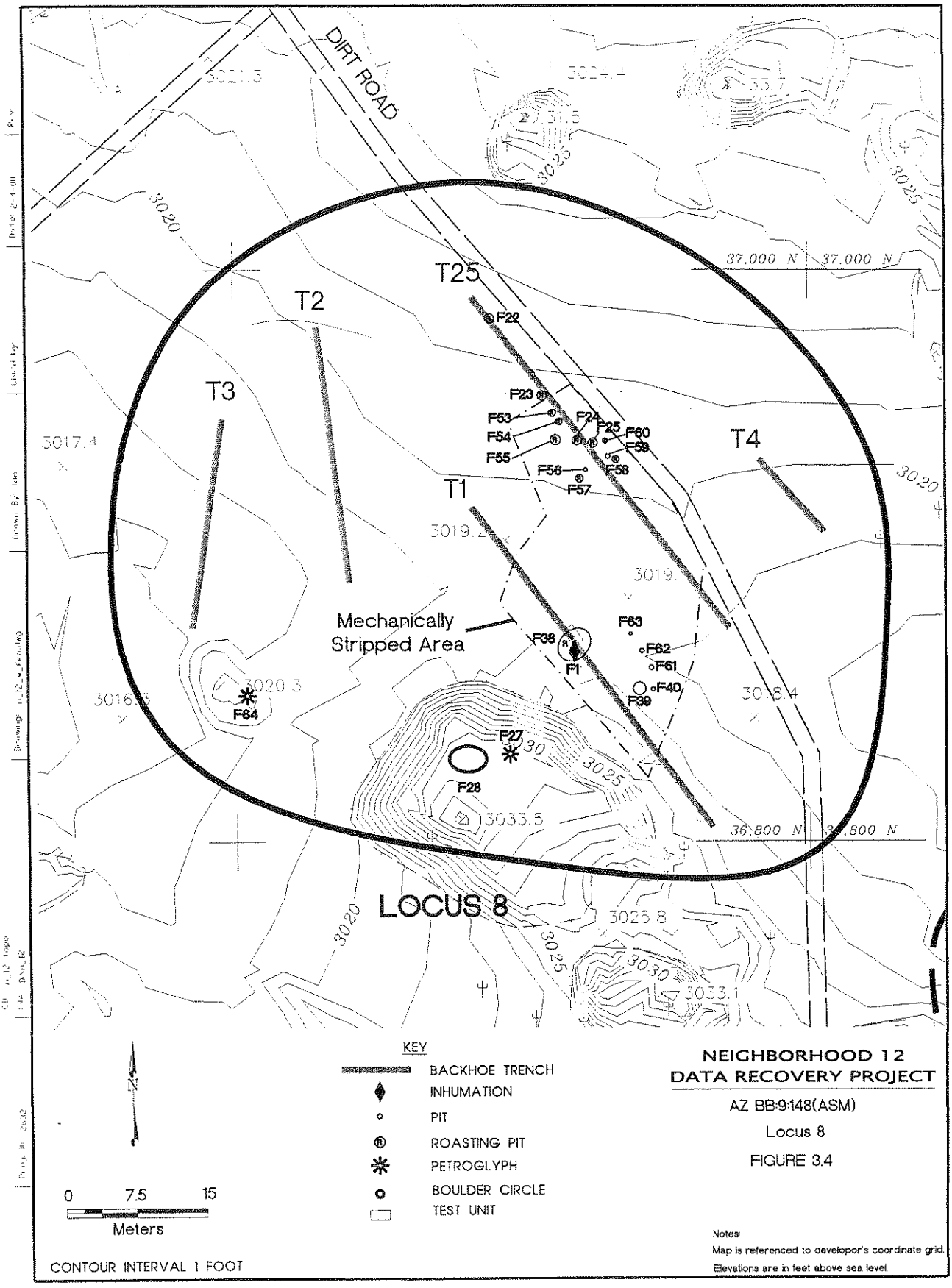
NEIGHBORHOOD 12
DATA RECOVERY PROJECT

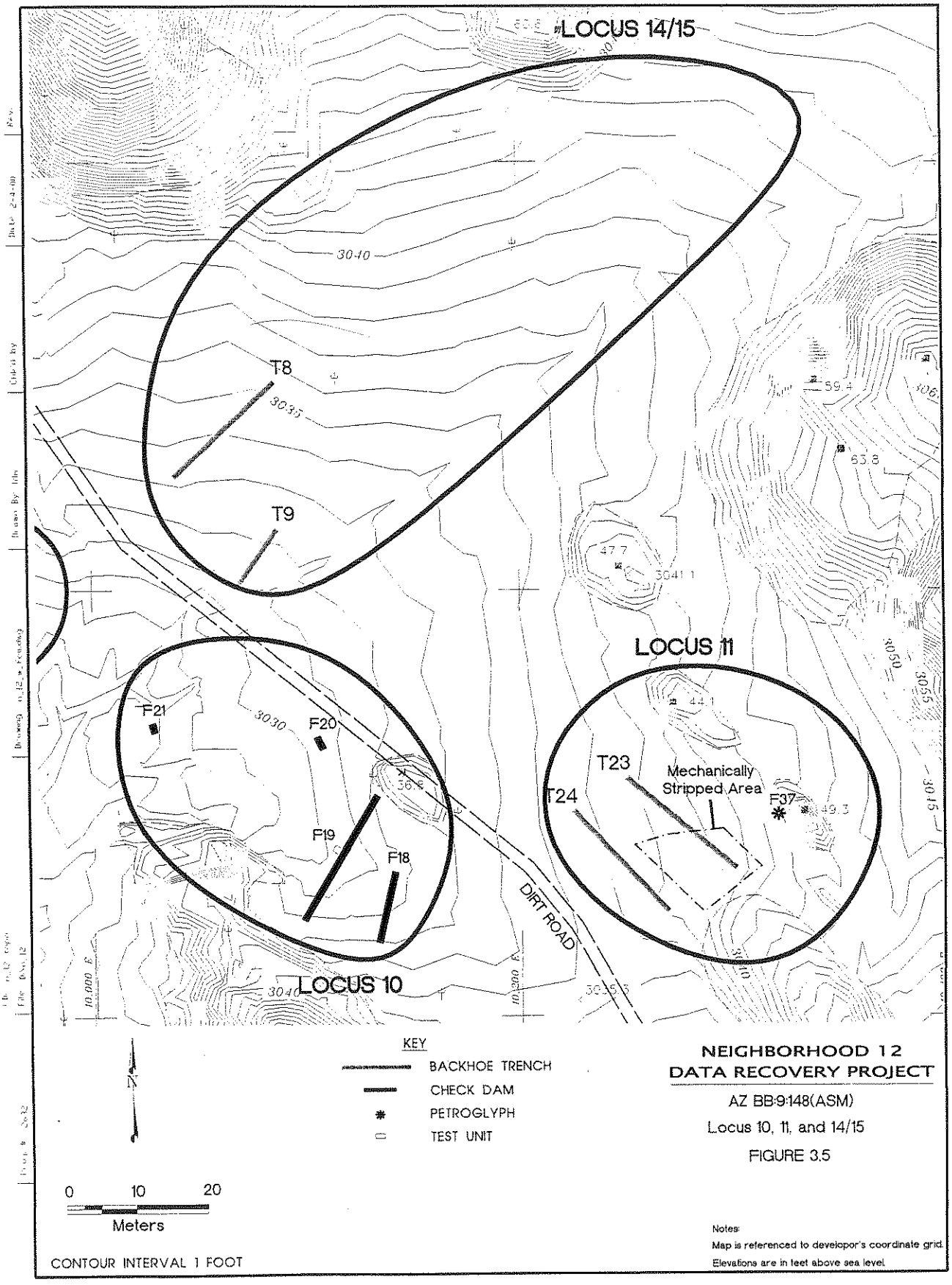
AZ BB:9:148(ASM)

Locus 6 and 7

FIGURE 3.3

Notes:
Map is referenced to developor's coordinate grid.
Elevations are in feet above sea level.


DIRT ROAD
T1
T2
T3
T4
T25
Mechanically Stripped Area
LOCUS 8
37,000 N
36,800 N
F1
F22
F23
F24
F25
F27
F28
F38
F39
F40
F53
F54
F55
F56
F57
F58
F59
F60
F61
F62
F63
F64
3017.4
3019.2
3020.3
3025.8
3033.5
3033.1
KEY
BACKHOE TRENCH
INHUMATION
PIT
ROASTING PIT
PETROGLYPH
BOULDER CIRCLE
TEST UNIT
0 7.5 15
Meters
CONTOUR INTERVAL 1 FOOT
NEIGHBORHOOD 12
DATA RECOVERY PROJECT
AZ BB:9:148(ASM)
Locus 8
FIGURE 3.4
Notes:
Map is referenced to developor's coordinate grid.
Elevations are in feet above sea level.



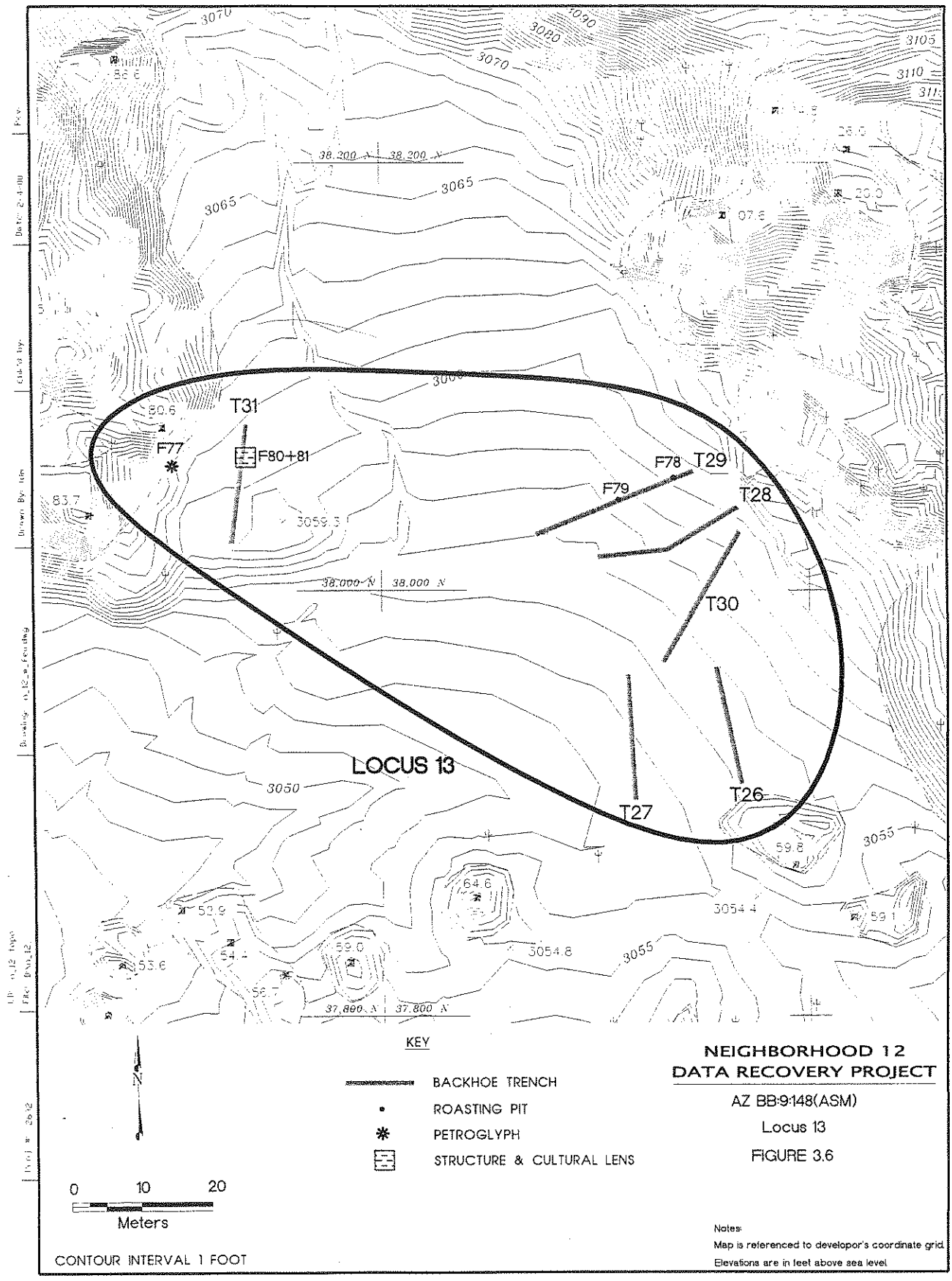
NEIGHBORHOOD 12
DATA RECOVERY PROJECT

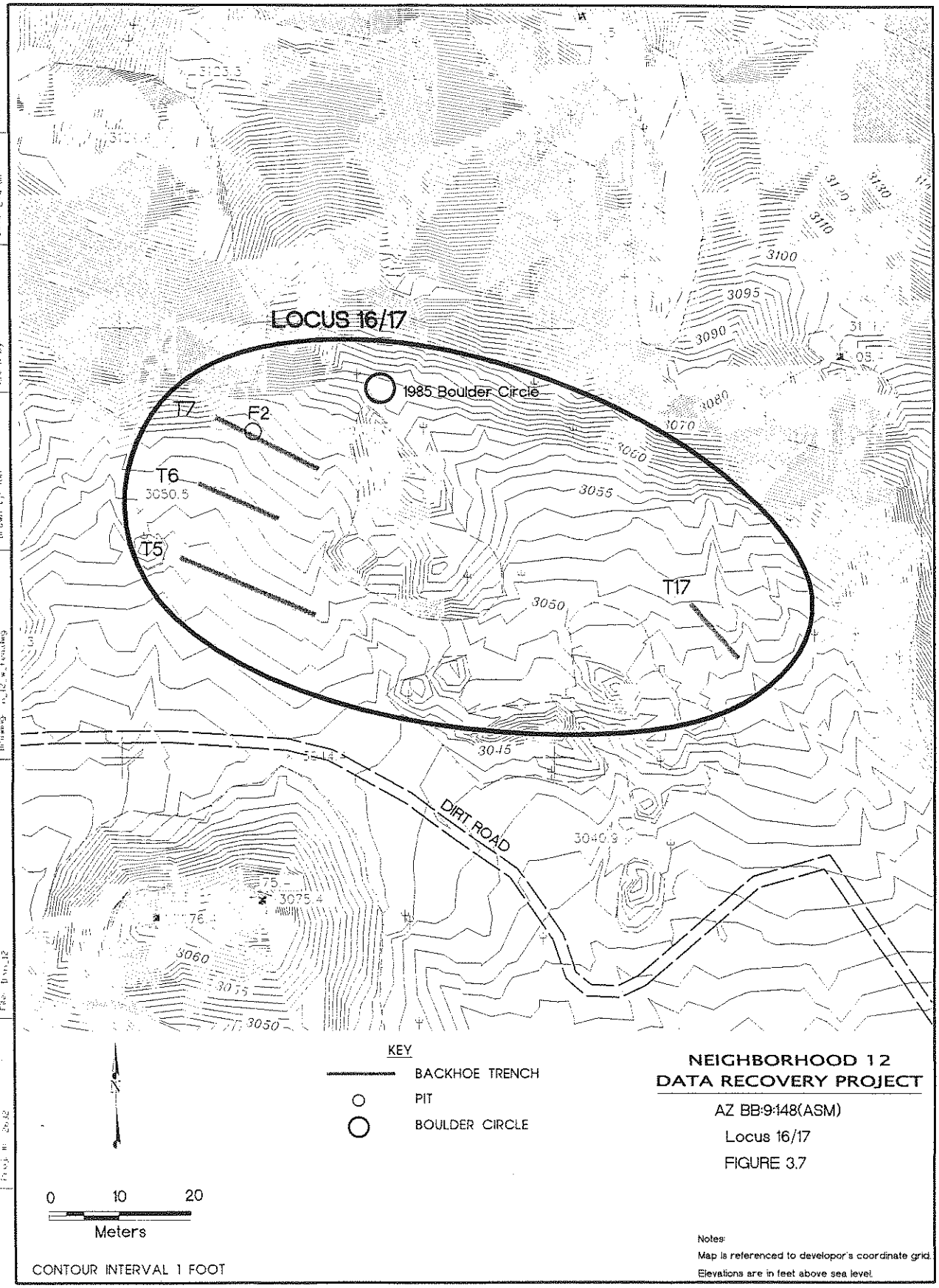
AZ BB:9:148(ASM)

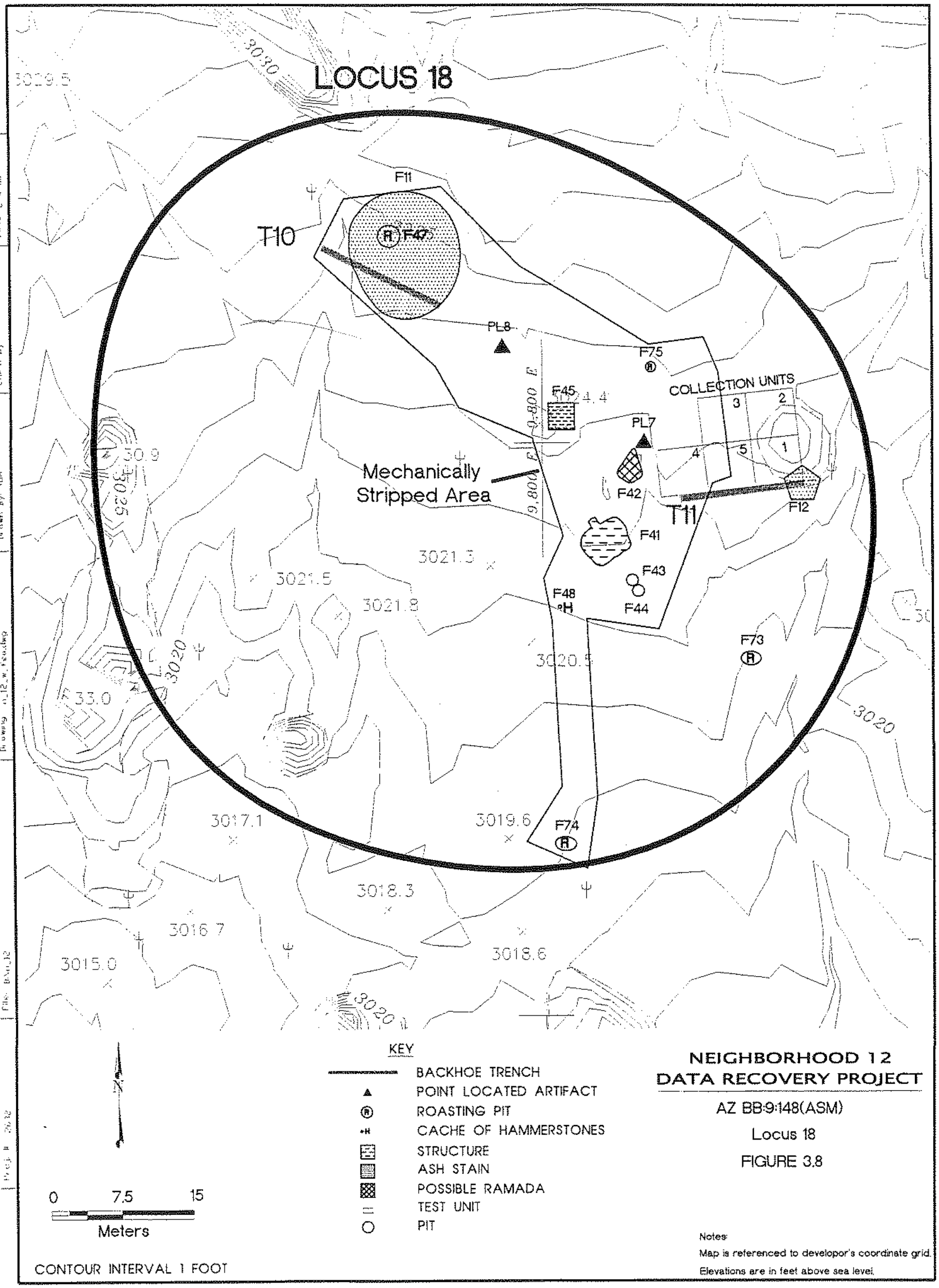
Locus 10, 11, and 14/15

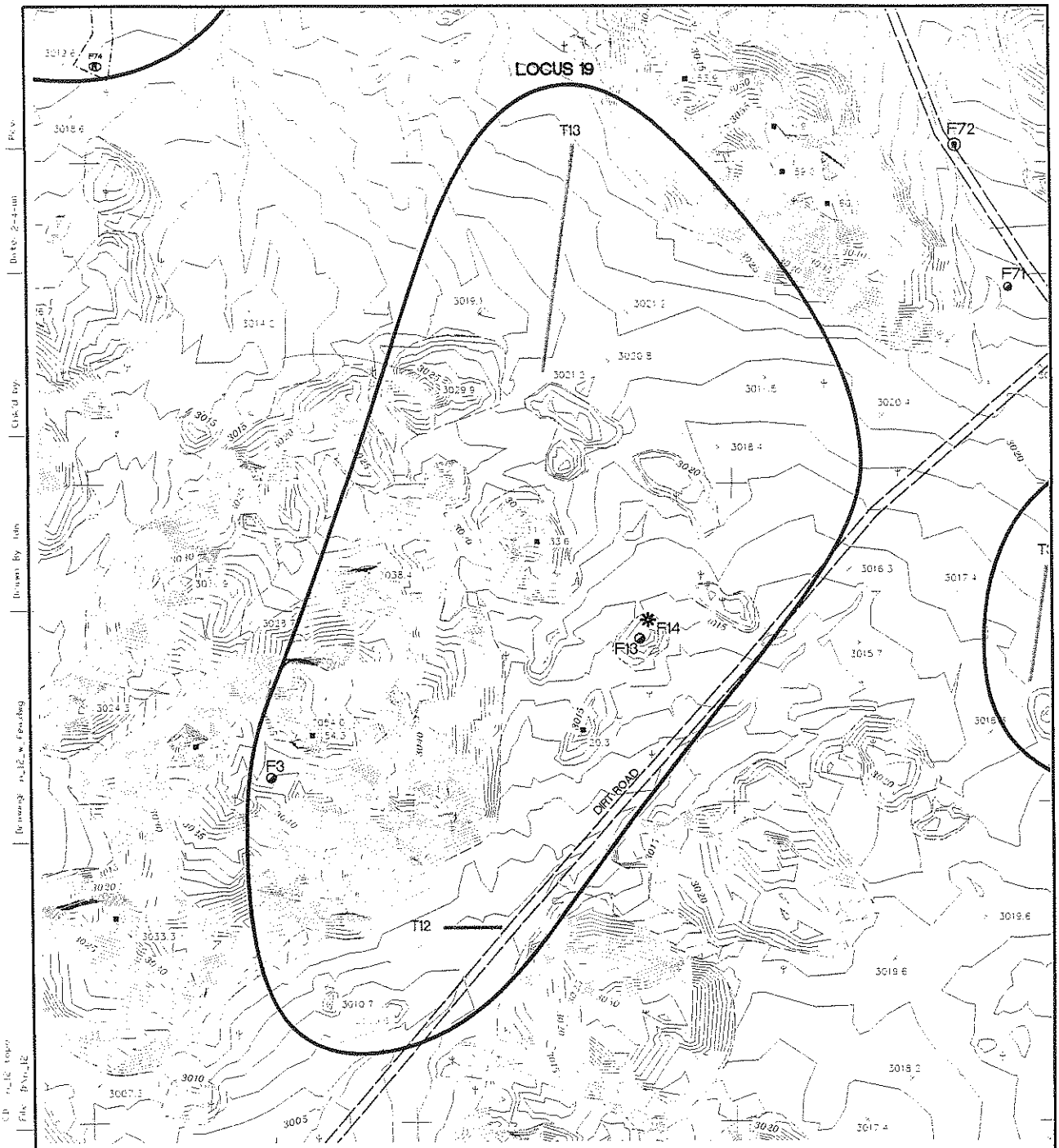
FIGURE 3.5

Notes:
Map is referenced to developer's coordinate grid.
Elevations are in feet above sea level.


T31
F77
F80+81
F78
T29
F79
T28
T30
T27
T26
LOCUS 13
3070
3080
3090
3105
3110
3065
3060
3059.3
3050
3055
3054.4
3054.8
38,200 N
38,000 N
37,800 N
KEY
BACKHOE TRENCH
ROASTING PIT
PETROGLYPH
STRUCTURE & CULTURAL LENS
N
0 10 20
Meters
CONTOUR INTERVAL 1 FOOT
NEIGHBORHOOD 12
DATA RECOVERY PROJECT
AZ BB:9:148(ASM)
Locus 13
FIGURE 3.6
Notes:
Map is referenced to developor's coordinate grid.
Elevations are in feet above sea level.


LOCUS 16/17
1985 Boulder Circle
T7
F2
T6
3050.5
T5
T17
DIRT ROAD
3100
3095
3090
3080
3070
3060
3055
3050
3045
3040.9
3075.4
KEY
BACKHOE TRENCH
PIT
BOULDER CIRCLE
N
0
10
20
Meters
CONTOUR INTERVAL 1 FOOT
NEIGHBORHOOD 12
DATA RECOVERY PROJECT
AZ BB:9:148(ASM)
Locus 16/17
FIGURE 3.7
Notes:
Map is referenced to developor's coordinate grid.
Elevations are in feet above sea level.


LOCUS 18
T10
F11
F47
PL8
F75
COLLECTION UNITS
1
2
3
4
5
F45
PL7
F42
F12
T11
Mechanically
Stripped Area
F41
F43
F44
F48
F73
F74
3029.5
3030
30.9
30.25
33.0
3020
3021.3
3021.5
3021.8
3020.5
3017.1
3019.6
3018.3
3016.7
3018.6
3015.0
9,800 E
9,800 N
N
0
7.5
15
Meters
CONTOUR INTERVAL 1 FOOT
KEY
BACKHOE TRENCH
POINT LOCATED ARTIFACT
ROASTING PIT
CACHE OF HAMMERSTONES
STRUCTURE
ASH STAIN
POSSIBLE RAMADA
TEST UNIT
PIT
NEIGHBORHOOD 12
DATA RECOVERY PROJECT
AZ BB:9:148(ASM)
Locus 18
FIGURE 3.8
Notes:
Map is referenced to developer's coordinate grid.
Elevations are in feet above sea level.



KEY

- BACKHOE TRENCH
- GRINDING FEATURE
- PECKED MARKS
- ROASTING PIT

N

0 15 30

Meters

CONTOUR INTERVAL 1 FOOT

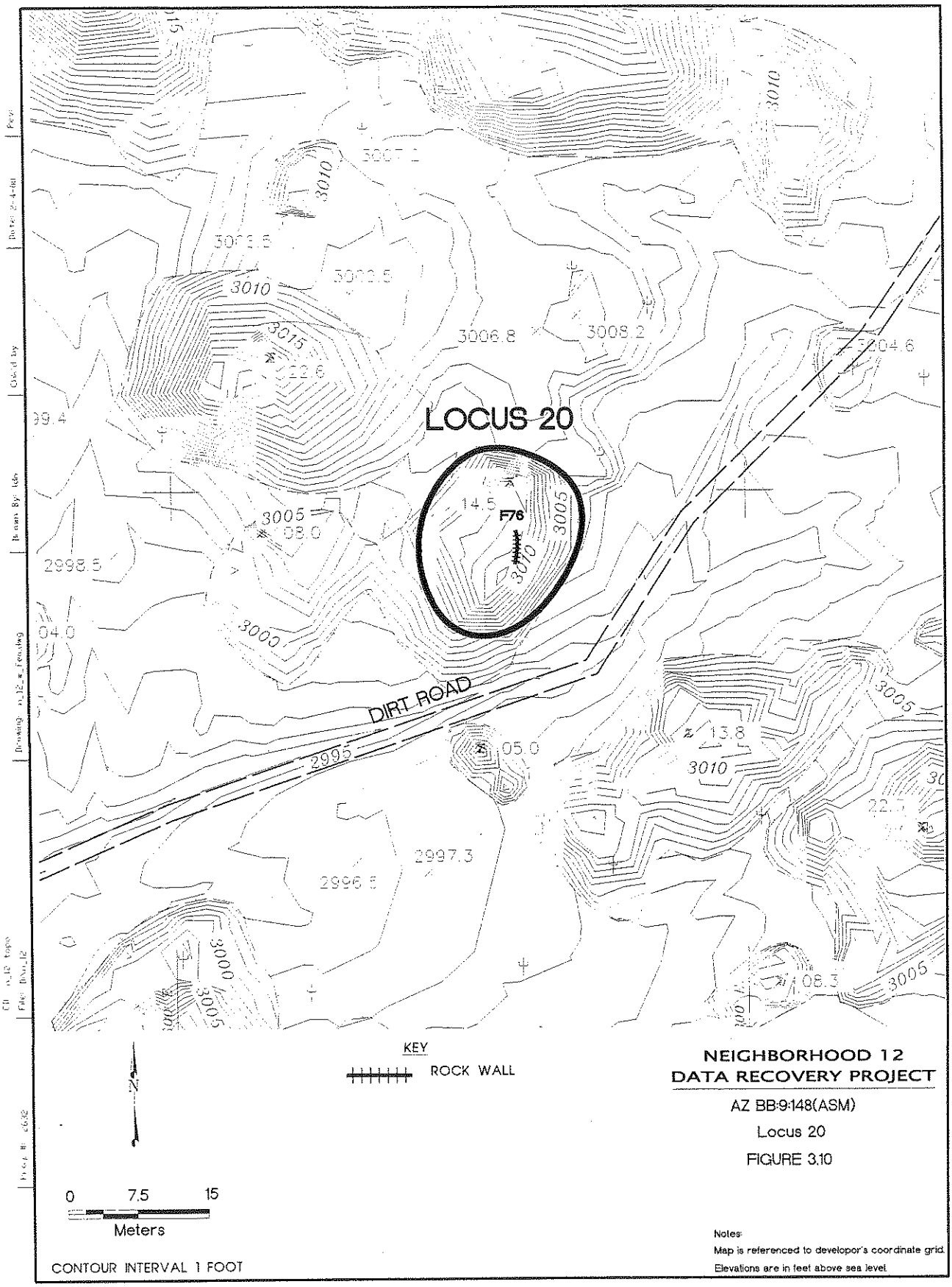
NEIGHBORHOOD 12
DATA RECOVERY PROJECT

AZ BB:9:148(ASM)

Locus 19

FIGURE 3.9

Notes:
Map is referenced to developor's coordinate grid.
Elevations are in feet above sea level.


LOCUS 20
F76
DIRT ROAD
3010
3005
3000
3015
2998.5
2997.3
2996.8
3006.8
3008.2
3004.6
2995
KEY
ROCK WALL
N
0
7.5
15
Meters
CONTOUR INTERVAL 1 FOOT
NEIGHBORHOOD 12
DATA RECOVERY PROJECT
AZ BB:9:148(ASM)
Locus 20
FIGURE 3.10
Notes:
Map is referenced to developor's coordinate grid.
Elevations are in feet above sea level.

DATA RECOVERY FIELD METHODS

This project was developed as a combined testing and data-recovery program that was completed in a single session of fieldwork. Combining the testing and excavation phases into one session eliminated the damage to deposits that is caused by the backfilling and re-excavation of test trenches and reduced the costs related to two separate sessions of fieldwork, analysis, and reporting.

As previous research had concentrated on documenting surface features, data recovery efforts concentrated on features that had not been previously identified or recorded—especially those found subsurface. Additional notes were taken on some of the previously recorded features, particularly the petroglyhps and bedrock grinding features.

Surface Collection

Although surface collection was conducted at the site during previous projects, many dense artifact scatters and diagnostics remained. In order to assess artifact diversity and density, and to provide comparable surface data between the two loci where pit structures were likely to be found, two surface artifact grids were established: one in Locus 4/5, and one in Locus 18. Diagnostic or unusual artifacts found outside these collection units on the surface of the site were point located and collected, though no systematic attempt was made to find surface diagnostics. Also, surface artifacts were collected in a one-meter-wide swath over the location of backhoe trenches.

The surface collection grid in Locus 4/5 was comprised of 12 joining 10 × 10 m units (1200 m^2), and was located at the nose and base of a low bedrock ridge. The surface collection grid in Locus 18 was comprised of five abutting 5 × 5 m units (125 m^2) and was concentrated at the base of a boulder outcrop. Both grid locations represent the extent of high density artifact scatters that were later, during subsurface excavations, found to be middens.

Backhoe Excavations

During initial excavations at the site (testing), extensive backhoe trenching was used to determine the presence and integrity of subsurface cultural deposits. Twenty-nine trenches totaling approximately 632 m in length were excavated (Table 3.2, Figures 3.2, 3.4, 3.5, 3.6, 3.8, 3.7, 3.9). Test trenches were judgementaly placed in areas of relatively high surface artifact density and oriented with the surrounding natural features such as bedrock ridges or outcrops. The placement of trenches focused on areas that had the potential for subsurface deposits (artifacts on surface and Holocene sediments), but where the presence of such deposits were in question. Seven out of the sixteen loci met this criteria. In two instances (BHT 16 and 27), backhoe trenches that were laid out and surface collected but were abandoned prior to excavation; the surrounding trench excavations had proved that there was little or no potential for subsurface deposits in these areas. Areas that were known to contain subsurface deposits, such as those with large ash or charcoal stains, were not trenched. Instead, these areas were reserved for mechanical scraping or blading in order to best preserve the features. Trenches were excavated to a depth sufficient

Table 3.2. Summary of Backhoe Trench Excavations at AZ BB:9:148 (ASM)

BHT No.	Locus	Maximum Depth	Length	Orientation
1	8	1.10 m	42.73 m	143°
2	8	1.17 m	27.51 m	173°
3	8	1.02 m	22.57 m	188°
4	8	0.85 m	10.38 m	139°
5	16/17	1.30 m	20.80 m	292°
6	16/17	1.05 m	12.3 m	296°
7	16/17	1.15 m	16.10 m	296°
8	14/15	0.74 m	19.40 m	50°
9	14/15	0.93 m	9.80 m	44°
10	18	0.90 m	15.20 m	300°
11	18	1.02	15.00 m	266°
12	19	0.35 m	9.20 m	272°
13	19	0.64 m	22.00 m	4°
14	4/5	0.50 m	2.00 m	176°
15	4/5	0.30 m	6.90 m	90°
16*	4/5	-	-	-
17	16/17	0.56 m	10.20 m	39°
18	4/5	1.10 m	24.40 m	37°
19	4/5	1.12 m	26.00 m	38°
20	4/5	0.55 m	28.40 m	337°
21	4/5	1.05 m	21.80 m	323°
22	4/5	0.91 m	25.30 m	76°
23	11	1.31 m	20.14 m	130°
24	11	0.87 m	19.60 m	137°
25	8	1.25 m	44.63 m	324°

Table 3.2, continued. Summary of Backhoe Trench Excavations at AZ BB:9:148 (ASM)

BHT No.	Locus	Maximum Depth	Length	Orientation
26	13	0.71 m	16.80 m	352°
27*	13	-	-	-
28	13	0.95 m	21.70 m	64°
29	13	1.60 m	25.50 m	67°
30	13	0.50 m	22.50 m	30°
31	13	1.40 m	19.00 m	31°

* Surface collected only. Not excavated.

to penetrate through all cultural features and deposits. Most often, this meant that trench depth was determined by the presence of Pleistocene sediments. Trenches were under an average depth of 1.00 m and had a maximum average depth of 1.2 m. Observed artifacts were collected from the backdirt piles of each trench when possible and assigned to the appropriate features. No effort was made to screen the backdirt from backhoe trenches.

Each trench face was thoroughly cleaned ("faced"), using flat-nosed shovels and trowels, and examined for features by at least two archaeologists. After cultural deposits were identified in the backhoe trench, a backhoe equipped with a 7-ft-wide, smooth-edged scraping blade was used to remove the overburden in most areas that had features apparent. This technique, mechanical blading or scraping, was also used to remove overburden in the areas of known cultural deposits. Blading proceeded down through the overburden to the point that either discrete features could be identified or sterile substrate was exposed. In all, 5 areas totaling 2,162.53 m^2 of the site's subsurface was exposed (Table 3.3). As feature outlines were exposed, they were marked with paint to avoid being lost as work progressed.

Table 3.3. Mechanically Scraped Areas, AZ BB:9:148 (ASM)

Locus	Size (m^2)
4/5	644.44
8	432.54
9	251.40
11	115.38
18	946.62

Feature numbers were assigned to those features found in the trenches just after mechanical excavation. Features found during the mechanical blading were assigned numbers prior to excavation or mapping. For this reason, feature numbers do not run consecutively within each locus.

Mapping and Provenience Control

Site mapping was accomplished using a total station. It was used to establish the location of the corners of the trenches and the perimeter of the scraped areas. For each excavated feature, a plan map was drawn by the excavators using two to four nails placed arbitrarily near the feature. The total station would then locate those control nails, resulting in a plan view that was oriented to grid north and that could be placed on the site plan map. Unexcavated features were mapped with a total station, depending on their size and shape, by either shooting in a center point and recording the diameter of the feature or by collecting points along the feature perimeter.

A primary site datum was established on a high point within the site at the edge of the hill in Locus 7. Due to the rockiness of the surface, only a small eight-inch nail was used to mark the location of the datum. Secondary datums were established in order to located features within loci that were blocked from view from the primary datum by vegetation or bedrock hills. The location of each datum is represented in Figure 3.1.

Provenience control on the site was tied into the Rancho Vistoso development grid that had been previously established by the WLB Group, Inc. The coordinates were then converted into UTMs once out of the field. Vertical control was established for each excavated feature by using a string-line level tied to a piece of rebar that was firmly planted in sediment. The top of the rebar was then shot in with the total station and corrected once out of the field to an absolute elevation, expressed in meters above sea level (masl).

Pit Structure Excavation

Five pit structures were discovered during the course of data recovery. Each feature was sampled, though the size of the sample varied depending on the state of preservation and location of the feature. In those features that were clearly defined on the backhoe-scraped surface (Features 4 and 41), a 1 × 2 m unit was excavated from the fill down to floor contact. The purpose of these units was twofold: to determine the depth of the feature floor and to sample and gain a view of the fill sequence. All fill removed from the units was screened through a ¼-inch mesh, and all artifacts collected. After excavation of the units, the fill of the structure was removed by hand to approximately 10 cm above the level of the floor, or when clear roof fall was encountered. This was not screened, though a grab sample of the contents was collected. These two houses were then divided into quarters that served as excavation units, and the roof fall was excavated by hand and screened through ¼-inch mesh. All cultural materials found in the roof fall were collected and bagged by unit and vertical context. Artifacts and samples collected from the floor contact were point-provenienced by placing them to scale on the floor plan drawing of the feature.

Two of the structures (Features 5 and 45) could not be clearly defined on the mechanical bladed surface due to their poor state of preservation. In each case, attempts to further define the features were conducted using either 1 × 2 m or 2 × 2 m units. Details of each excavation can be found under the appropriate feature description. The last pit structure (Feature 80) was discovered on the last day of the project, prohibiting excavation. However, the feature was drawn in profile and plan, and the contents of the hearth were collected as a macrobotanical sample.

Extramural Feature Excavation and Recording

Forty-four extramural, subsurface features were encountered during excavation. Extramural feature types were pits, roasting pits (pits containing fire-cracked rock), a borrow pit, a rock-lined hearth, cultural lenses, middens, an inhumation, and a cluster of ground stone. Five of these features were partially or completely excavated by hand: an inhumation, a large roasting pit, and a small roasting pit in Locus 8, two pits in Locus 18, and a rock-lined hearth in Locus 4/5. Because the total number of features far exceeded expectations, and excavation efforts concentrated on exploring pit structures, extramural feature excavation was necessarily limited. In order to gather data on those features that could not be excavated by hand, 17 features were explored with the backhoe. Features found in the sidewalls of trenches were profiled and sampled. Some of the larger roasting pit features were carefully bisected by the backhoe so that a profile could be drawn and samples collected. During extramural feature description and again during feature excavation, all artifacts found in the feature fill, backdirt, and profile were collected.

In addition to the subsurface features, bedrock grinding features and rock art were recorded, and a checkdam was explored. Bedrock grinding feature variables, such as length, width, depth, shape, amount of ground surface remaining, and size of boulder were noted for each feature. Rock art recording included photography, scale pencil drawings, and the completion of a detailed rock art recording form. A checkdam in Locus 10 was explored using a 1 × 2 m unit that straddled the feature. The unit was excavated to the base of the rocks, and pollen samples were collected.

CHAPTER 4

FEATURE DESCRIPTIONS

Mary Charlotte Thurtle

Eighty-one features were identified or recorded during data recovery at AZ BB:9:148 (ASM). All but two of these features are prehistoric and include five pit structures, two ramadas, an inhumation, five boulder-rimmed circles, five petroglyph panels, and sixty-two surface and subsurface extramural features. The two possible historical features are a dry-laid rock wall and a petroglyph. Features are organized into 16 loci, or use areas. The pit structures and ramadas were found in three of the loci (Locus 4/5, 13, and 18).

This chapter provides descriptions for the features that were excavated or recorded during the current (1999) project at the site. Since boulder-rimmed circles were discussed in detail in Seymour (1985), they will not be described here. Descriptions are organized by feature type, and include brief summaries of the artifact and sample analyses. For more detail of the analyses, please see the appropriate chapter of this report. Horizontal provenience given for each feature is a center point expressed in UTMs, NAD 83 projection. For a complete list of features recorded or mapped during this project, please refer to Appendix A.

PIT STRUCTURES

Five pit structures were encountered during excavation (Features 4, 5, 41, 45, and 80). The pit structures were found in three loci (Locus 4/5, 13, and 18). Two of these features were in Locus 4/5, two were in Locus 18, and one in Locus 13 (see Figures 3.2, 3.6, and 3.8). Feature 4 in Locus 4/5 and Feature 41 in Locus 18 were completely excavated. Archaeomagnetic and flotation samples were collected from the hearth of four of the features. The hearth in the remaining structure, Feature 45 in Locus 18, was in such a poor state of preservation that no archeomagentic samples could be taken.

The description of the structures, as well as specific excavation methods for each, are provided below.

Feature 4

Locus:	4/5
Horizontal Provenience:	E: 502286.58, N: 3591400.02
Size:	6 × 4 m

Feature 4 was a pit structure that was first discovered in Backhoe Trench (BHT) 18 during mechanical trenching. It was located in the northern end of Locus 4/5, just south of a roasting feature that was excavated in 1984. The backhoe trench cut through a portion of the entry, though did not penetrate

the level of the floor. The structure was excavated in its entirety. It was subrectangular, with the long axis oriented north-south. The entry was ramped and located along the eastern wall. The main pit of the structure had a maximum depth of 16 cm below the mechanically scraped surface. Bits of plaster remained on the floor of the structure, particularly in a 2.5 m-radius surrounding the structure's hearth. The floor was severely affected by rodent and root disturbance, and it is unclear if the remainder of the structure's floor had been plastered at one time. All of the post holes were found inside the pit, suggesting a "structure-in-pit" construction (Figure 4.1).

Fill within the feature consisted of a brown silty sand mottled with charcoal and gray and orange oxidized material. The amount of oxidized material increased as the floor of the feature was approached, indicating that the fill above the floor was burned roof fall. There was no need to designate an arbitrary floor fill level. Instead, approximately 10 cm of fill above the floor was designated as roof fall. There was an extremely light density of artifacts in the fill above the roof fall, and the number and diversity of artifacts increased as the floor of the feature was approached. Thirty-nine point located artifacts or artifact groups were collected from the floor of the feature, either in direct contact with the floor surface or pedestaled up to 2 cm above the floor in the roof fall. Point located items were quite diverse and included flaked stone, ground stone, ceramics, faunal remains, and shell. Included in the flaked stone floor assemblage were numerous pieces of quartz crystal debitage, a small quartz crystal, a hammer stone, a tabular knife, and a Cienega-style projectile point. Ground stone included metate and grinding slab fragments, two manos, two pecking stones, two polishing stones, and two lap stones that were covered in red (hemitite) and white (caliche) pigment. A total of 80 sherds was collected, the vast majority of which (n=64) came from plain ware vessels. A partial plain ware vessel and two ceramic scoops (one with an effigy face handle, and one that appears to have been reworked from a Rincon Red-on-brown jar) were also found. Faunal remains included a bone awl, the long bones of a large mammal, and a desert tortoise carapace. Also found on the floor were two fragments of a chunk of caliche that had been ground, likely for use as pigment. Point-located items are presented in Table 4.1.

Pollen collected from underneath a netherstone fragment on the floor was dominated by High-spine Asteraceae, and also contained Low-spine Asteraceae and four types of cactus pollen: *Mammillaria*-type (hedge hog or pin cushion), *Carnegiea gigantea* (saguaro), *Opuntia* (prickly pear), and *Cylindropuntia* (cholla).

Twenty-four post holes were detected that included two large central main supports. In addition to post holes, internal features consisted of a plastered hearth (Feature 4.01) and a shallow floor pit (Feature 4.02). The hearth was centered on the entry, approximately 80 cm from the eastern wall. It consisted of a 20-cm-deep depression that was also 20 cm in diameter. The plaster on the hearth had been damaged by rodent, root, and insect disturbance, and only the western side and a portion on the eastern wall and collar remained intact. There was no plaster on the base of the feature, though the compact sediment was highly oxidized. An archaeomagnetic sample of the plaster returned a date of A.D. 1005 (1150) 1195, placing the feature within the Sedentary and early Classic periods. The fill within the hearth consisted of a gray brown silty sand that contained a few small chunks of charcoal. The entire contents of the hearth were collected as a flotation sample, which returned charred stems of *Nolina* (bear grass) or *Yucca* flower stalks. A few vitrified pieces of Fabaceae charcoal were also present, suggesting that woody legumes were burned as fuel.

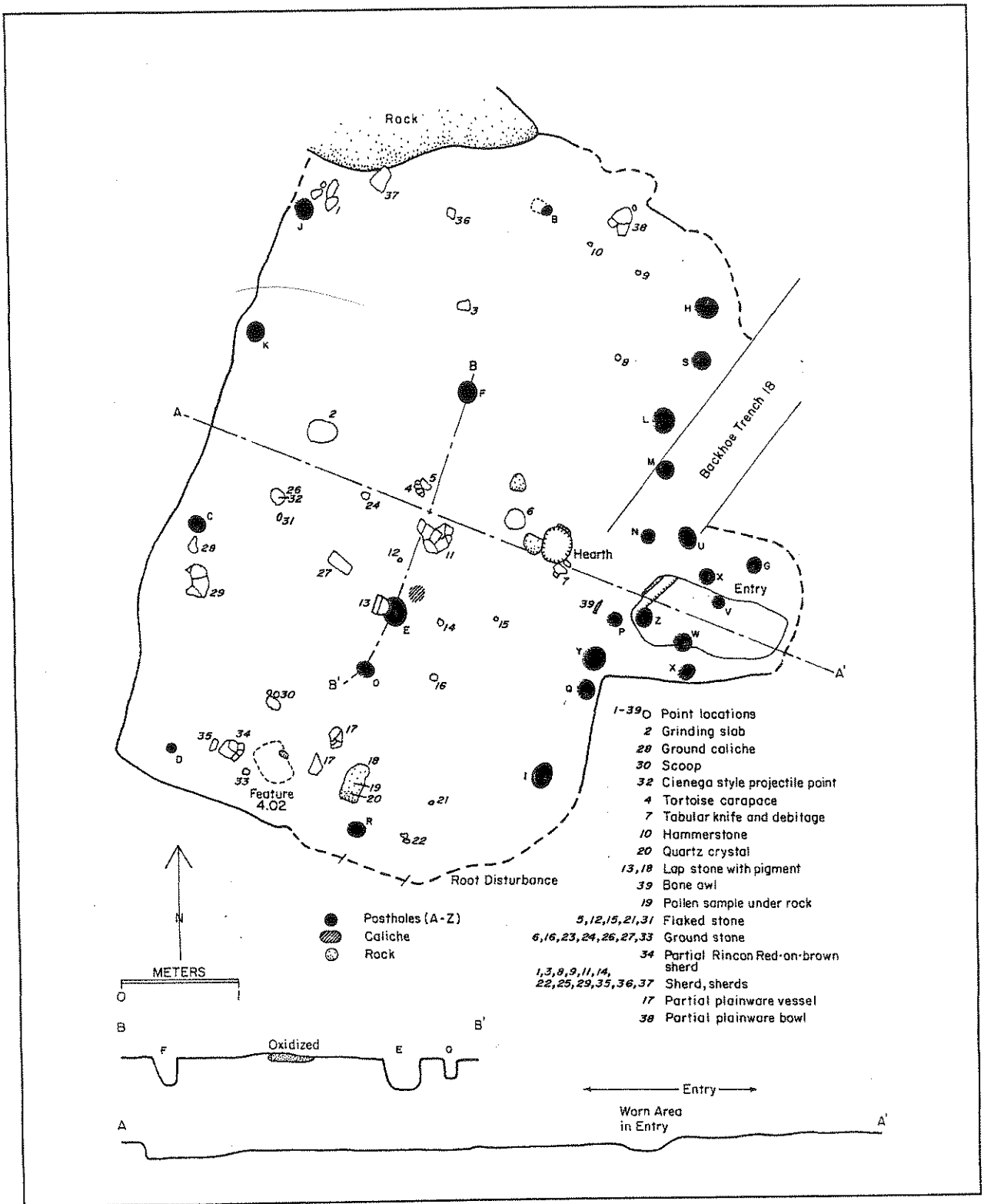


Figure 4.1. Plan and profile of pit structure Feature 4, AZ BB:9:148 (ASM).

Table 4.1. Point Located Floor Artifacts, Feature 4

PL No.	FN No.	Artifact Type	Comment
1	128	ceramic	
2	127	ground stone	grinding slab
3	129 and 130	ceramics	base of a small Rincon Red-on-brown jar
4	153	faunal	tortoise carapace
5	152	flaked stone	debitage
6	149 and 150	ground stone and sample	netherstone fragment and pollen sample taken from underneath
7	151 and 429	flaked stone	tabular knife and debitage
8	154	ceramic	sherd
9	155	ceramic	sherd
10	180	flaked stone	hammer stone
11	157	pollen sample	from floor scrape, southeast ¼
12	165	flaked stone	debitage
13	163	ground stone	small lapstone with red pigment stain
14	166	ceramic	sherd
15	169	flaked stone	debitage
16	170	ground stone	pecking stone
17	167	ceramic	partial plain ware vessel
18	164	ground stone	lap stone with white and red pigment
19	173	sample	pollen sample from the southeast ¼
20	171	stone	small, complete quartz crystal
21	168	flaked stone	debitage
22	172	ceramic	
23	181	ground stone	polishing stone
24	174	ground stone	pecking stone
25	178	ceramic	
26	176	ground stone	bifacial mano

Table 4.1, continued. Point Located Floor Artifacts, Feature 4

PL No.	FN No.	Artifact Type	Comment
27	179	ground stone	mano
28	177	sample	ground caliche
29	175	ceramic	
30	212	ceramic	scoop with human face applied to handle
31	216	flaked stone	debitage
32	217	flaked stone	Cienega-style projectile point
33	213	ground stone	
34	214	ceramic	partial Rincon Red-on-brown bowl
35	215	ceramic	
36	218	ceramic	
37	219	ceramic	partial plain ware jar
38	220	ceramic	partial large plain ware bowl
39	221	faunal	bone awl

The shallow pit Feature 4.02 was found along the southern wall of the feature. It was oval with a sloping base and measured 37 × 17 cm, with the long axis running parallel to the wall of the structure. The maximum depth of the pit was 15 cm. No oxidiation, fire-cracked rock, charcoal, or artifacts were recovered from the fill, suggesting the feature may be nothing more than a large disturbance due to roots or rodents.

The size, shape, and presence of a plastered hearth and floor, indicate that the feature was used as a habitation structure. Artifacts found on the floor of the feature, such as polishing stones and lap stones with pigment, could be part of a pottery-making tool kit. The presence of burned roof fall and the wealth of artifacts found on the floor of the feature indicate that it had catastrophically burned prior to abandonment. There was very little trash fill above the roof fall of the feature, suggesting that there was little secondary reuse of the feature for trash disposal.

Feature 4 is likely part of a resource processing and habitation use area that encompasses the north end of Locus 4/5. Included in this group is a ramada (Feature 33), an extramural stone-lined hearth (Feature 32), a possible puddling pit (Feature 31), two bedrock metates (Feature 50 and 51), a borrow pit

(Feature 35), a large roasting pit that was excavated in 1985, and a small roasting pit (Feature 34). Though dates are not available from the other features, their proximity to each other and similar depth at which they were detected suggest their use was contemporaneous. Both the archaeomagnetic date of the hearth and decorated ceramics found in floor context of the feature indicate that occupation occurred during the Rincon phase of the Sedentary period.

Feature 5

Locus:	4/5
Horizontal Provenience:	E: 502245.77, N: 3591385.81
Size:	Undetermined

Feature 5 was an ill-defined, possible pit structure found in BHT 21 in the southern end of Locus 4/5. The plastered hearth of the feature was found at the base of the trench, approximately 40 cm-below the modern ground surface. What appeared to be the floor of the feature was visible in the northern face of the trench. This floor appeared as a thin band of oxidized sediment that extended to the west from the level of the top of the hearth. The surface surrounding the trench was mechanically stripped, though no clear outline of the feature was visible. Instead, a dark, irregularly shaped stain was visible, primarily on the southern side of the trench. A 1 × 2 m test unit was excavated on the south side of the trench in the area of the darkest fill immediately across from the hearth and abutting the backhoe trench. This unit contained compact and mottled gray-brown sandy silt with charcoal flecks and patches of ash. Plain ware ceramics and flaked stone debitage were also present. The unit was excavated to 10 cm below the stripped surface, revealing what appeared to be a sterile compact surface that had been severely disturbed by roots and rodents, and a possible post hole (Feature 5.02). This surface sloped slightly towards the hearth and may have been the entry to the feature.

The hearth (Feature 5.01) of the feature was slightly oval in shape, measuring 22 × 20 cm. The interior was plastered, though damaged. Root or rodent disturbance was evident, and some of the rim had been removed by the backhoe. Plaster may have lipped onto the floor of the structure, but this too was disturbed during the backhoe excavation. The remaining portion of the hearth had a depth of 6 cm. It had nearly straight sides and a flat base. The fill within the feature consisted of a gray-brown silty sand that was lightly compacted and was collected as a flotation sample. The flotation sample contained a few pieces of charcoal that were too small for identification. The archaeomagnetic sample collected from the hearth failed to return a reliable date.

Feature 41

Locus:	18
Horizontal Provenience:	E: 502128.76, N: 3591718.85
Size:	5.2 × 4.2 m

Feature 41 was a pit structure that was discovered during mechanical stripping of Locus 18. It is located in the southern end of the locus, near a cache of hammer stones (Feature 48) and two pits that

contained fire-cracked rock (Features 43 and 44). The structure appeared to be burned and well preserved on the stripped surface. The archaeologists excavated it in its entirety. It was subrectangular, with the long axis oriented north-south. The entry was ramped and located along the western wall. The main pit of the structure had a maximum depth of 17 cm below the backhoe-stripped surface. The floor of the structure was thinly plastered and in a good state of preservation throughout, the house though some root and insect disturbance was present. The "walls" of the feature consisted of the sterile sediment that surrounded the feature; loosely compacted tan sand with small gravel on the southern half and hard-packed caliche on the northern half of the structure. All the post holes were found on the inside of the pit, suggesting a "structure-in-pit" construction (Figure 4.2).

Fill within the feature consisted of a gray-brown silty sand that was very loosely compacted and contained small pebbles, suggesting that it was deposited through alluvial action. Also, several fist-size pieces of caliche were also present, indicating that the area is periodically inundated by water. Approximately 5-7 cm above the floor of the feature, the fill became mottled with charcoal chunks and flecks, and contained areas of dark stains believed to be decomposed and burned organic material. The upper 10 cm of fill contained few artifacts. Of note found within the upper 2 cm of the fill was a small ground axe (see Chapter 6 for details). The floor of the feature, however, contained over 42 point-located items that included ceramics, flaked stone, shell bracelet fragments, hammer stones, a "doughnut" stone, manos, and a metate fragment. The majority of the ceramics were plain wares that included Gila Plain (n=86), and one Rincon Red-on-brown vessel was also present. A list of all point located items is presented in Table 4.2.

Pollen samples were colleted from underneath a mano (PL 1) that was resting on the floor near the hearth, and from beneath a trough metate fragment (PL 24) in the rear of the house. Both of these samples contained elevated counts of Cheno-am pollen. The sample from under the mano also contained an elevated Poaceae (grass) pollen count, small quantities of *Cylindropuntia* (cholla) and *Mammillaria*-type (barrel cactus) pollen, two *Solanum*-type (wild potato) starch granules, and a small quantity of *Zea mays*-type (corn) starch granules. The sample from under the metate fragment also produced a possible *Rhus* (sumac, skunkbush) pollen grain, *Zea mays* (corn) pollen and *Zea mays*-type starch granules, and small quantities of *Cylindropuntia* (cholla) and *Opuntia* (prickly pear) pollen.

Twenty-three post holes were detected, including two large central supports. A San Pedro Archaic period projectile point was found in one of the post holes (Feature 41-Q). In addition to post holes, there was a plastered hearth (Feature 41.01). The hearth was extremely well preserved, having had a thick coat of plaster (Figure 4.3). It was circular and measured 26 cm in diameter and had a depth of 10 cm. It was bowl shaped, and the rim was elevated approximately 6 cm above the level of the floor forming a gently sloping collar. The entire fill of the hearth was collected as a flotation sample. The sample contained small pieces of conifer (pine or juniper) and mesquite charcoal.

The substantial floor assemblage and the presence of burned roof fall suggest that the structure catastrophically burned. The paucity of artifacts in the upper portion of the fill and the alluvial nature of the sediments suggest that there was no reuse of the structure after abandonment, even for trash disposal. Instead, artifacts likely washed into the depression. The variety of artifact types in the floor assemblage,

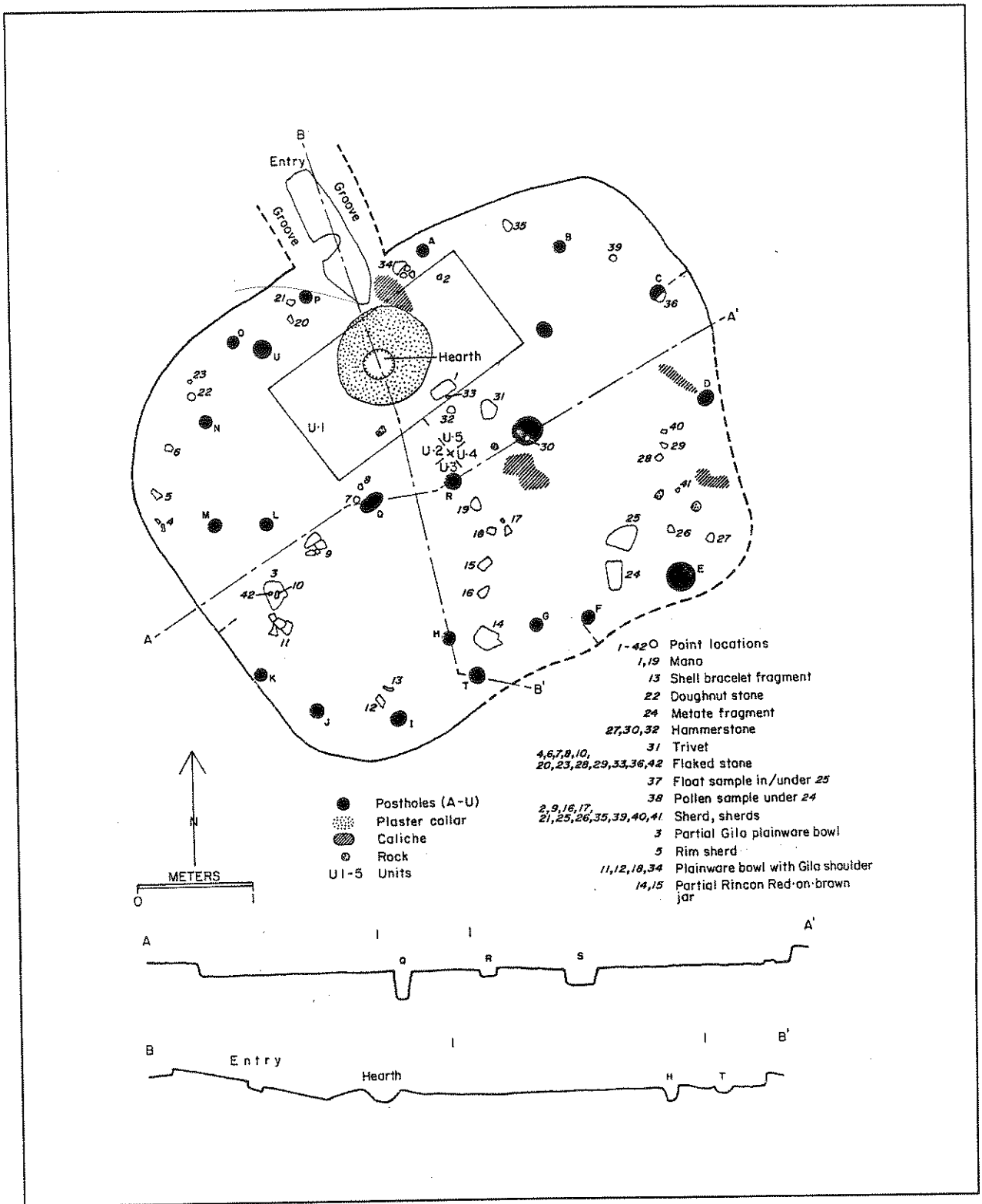


Figure 4.2. Plan and profile of pit structure Feature 41, AZ BB:9:148 (ASM).

Table 4.2. Point Located Floor Artifacts, Feature 41

PL No.	FN No.	Artifact Type	Comment
1	305	ground stone	mano
2	353	ceramic	
3	310	ceramic	partial Gila plain ware bowl
4	333	flaked stone	debitage
5	335	ceramic	
6	354	flaked stone	debitage
7	340	flaked stone	debitage
8	336	flaked stone	use-damaged flake
9	341	ceramic	undetermined portions of at least two jars, one with a rounded Gila shoulder, one with a more rounded shoulder and inclosing upper body; with PL 925
10	312	flaked stone	debitage
11	334	ceramic	thin-walled bowl or cauldron with Gila shoulder, refits with PLs 12, 18, and 34
12	339	ceramic	thin-walled bowl or cauldron with Gila shoulder, refits with PLs 11, 18, and 34
13	313	shell	bracelet fragment, refits with FN 348 found in post hole
14	311	ceramic	partial small (ca 1 quart-sized) Rincon Red-on-brown jar with a rounded, Sedentary phase shoulder, refits with PL 15
15	338	ceramic	small (ca 1 quart-sized) Rincon Red-on-brown jar with a rounded, Sedentary phase shoulder, refits with PL 14
16	337	ceramic	
17	329	ceramic	
18	315	ceramic	thin-walled bowl or cauldron with Gila shoulder, refits with PLs 11, 12, and 34
19	357	ground stone	mano
20	332	flaked stone	debitage
21	331	ceramic	
22	309	ground stone	doughnut
23	316	flaked stone	debitage
24	314	ground stone	trough metate fragment

Table 4.2, continued. Point Located Floor Artifacts, Feature 41

PL No.	FN No.	Artifact Type	Comment
25	307	ceramic	undetermined portions of at least two jars, one with a rounded Gila shoulder, one with a more rounded shoulder and inclosing upper body; with PL 9
26	330	ceramic	
27	363	lithic	hammer stone
28	362	flaked stone	debitage
29	359	flaked stone	debitage
30	358	lithic	hammer stone
31	364	ground stone	trivet stone
32	356	lithic	hammer stone
33	326	flaked stone	debitage
34	308	ceramic	thin-walled bowl or cauldron with Gila shoulder, refits with PLS 11, 12, and 18
35	355	ceramic	
36	361	flaked stone	debitage
37	306	sample	flotation from dark stain on floor
38	317	sample	pollen
39	360	ceramic	
40	351	ceramic	
41	350	ceramic	
42	349	flaked stone	debitage

as well as the size and shape of the structure, suggest that it was used for habitation. The well preserved condition of the hearth, without other evidence of remodeling, suggests that the structure had not been heavily used prior to abandonment.

Feature 45

Locus: 18
Horizontal Provenience: E: 502123.84, N: 3591735.87
Size: Undetermined

Figure 4.3. Close-up of plastered hearth of pit structure Feature 41, AZ BB:9:148 (ASM).

Feature 45 was a possible pit structure that was discovered during mechanical stripping of Locus 18. It first appeared as patches of plaster with a cluster of ceramics and a piece of ground stone in extremely sandy sediment. No sediment stain was present. A 2 x 2 m-unit was excavated in an attempt to determine feature morphology and to expose artifacts. Additional small patches of plaster were revealed, though no other architectural elements were present. The test unit was expanded approximately 1 m on all sides. These exporitory units revealed a somewhat rounded rim of oxidized sediment. Excavated seperately, the oxidized sediment proved to be a hearth (Feature 45.01).

The hearth of the feature contained loose gray-brown sand. One small patch of plaster remained on the sidewall, the majority of the feature having been severely disturbed by rodents, roots, and alluviation. No samples were collected from the hearth due to its disturbed nature.

The fill of the structure consisted of brown silty sand that was extremely loosely compacted. These sediments indicate that the feature was located in what later became a wash channel. Only approximately 10 cm of fill remained on the backhoe-stripped surface. A ceramic disk was recovered from the fill, and a partial plain ware platter, a partial Gila plain ware bowl, Red-on-brown jar sherds, and other plain ware ceramics were recovered from the floor and floor fill of the feature. A flat grinding slab was also recovered.

The presence of plaster and a hearth suggest the feature was a structure. However, the feature could not be defined to the extent where orientation and function could be determined. The disturbed nature of the feature is likely the result of its location in an area that experiences periodically flooding.

Feature 80

Locus:	13
Horizontal Provenience:	E: 502347.75, N: 3591933.01
Size:	2.5 m (short axis)

Feature 80 was discovered on the last day of the project in the side wall and base of BHT 31. It was located in the southwestern portion of Locus 13, on a small terrace above a drainage near petroglyph panel Feature 47. Although it was difficult to ascertain the orientation of the feature, it is believed that the backhoe trench cut through the structure along the short axis, clipping the hearth and entry. The structure was cut into cultural fill and was overlain with cultural fill. We did not expose it in plan view. Therefore, accurate size, shape, and depth estimates could not be made. The structure was deeply buried—the floor of the feature was 1.2 m below modern ground surface. The floor of the feature appeared to have been thinly plastered, and the hearth (Feature 80.01) was also plastered. One post hole was visible in the floor at the base of the trench (Figure 4.4).

Fill of the structure consisted of pinkish brown silty sand with areas containing charcoal flecks, pockets of ash, and charcoal-staining. Very few artifacts were present, and all of the eighteen plain ware sherd collected were from the excavation of the trench, leaving the exact provenience uncertain. Beneath the structure the sediments appeared to be moderately compacted dark brown silty sand with concentrations of charcoal-stained sediment. This lens of cultural material was designated as Feature 81.

The hearth of the structure was 25 cm in diameter and had a depth of 15 cm. The contents of the hearth were collected as a flotation sample, and an archaeomagnetic sample was taken from the plastered margin once contents were removed. The flotation sample contained a charred *Sphaeralcea* (globe mallow) seed, and several uncharred *Celtis* (hackberry) seed fragments. The archaeomagnetic sample return the dates of A.D. 1005 (1100) 1220, and A.D. 1230 (1230) 1270, placing it within the Sedentary or early Classic periods.

The fact that the feature was cut into and covered with cultural fill indicates that the area was reused over a period of time. Since the dimensions of the structure are uncertain, it is difficult to assess if it was used for habitation or storage. The paucity of artifacts in the fill and on the floor of the feature suggest an occupation of short duration or a planned abandonment. The depth at which the feature was found suggests that it was deeply cut, though the amount of overburden may be the result of the feature's location in an area that is quickly aggrading at the base of the Tortolita Mountains.

POSSIBLE RAMADAS

Two possible ramadas, one in Locus 4/5 and one in Locus 18, were found during the course of fieldwork. Both of these features were found adjacent to pit structures, and may have represented the outside activity or use-area associated with the structures. One of these features (Feature 33, Locus 4/5) was mechanically excavated. Data on Feature 33 can be found in Table 4.4 at the end of this chapter. The remaining feature was sampled using a 1 × 2 m-unit and is described below.

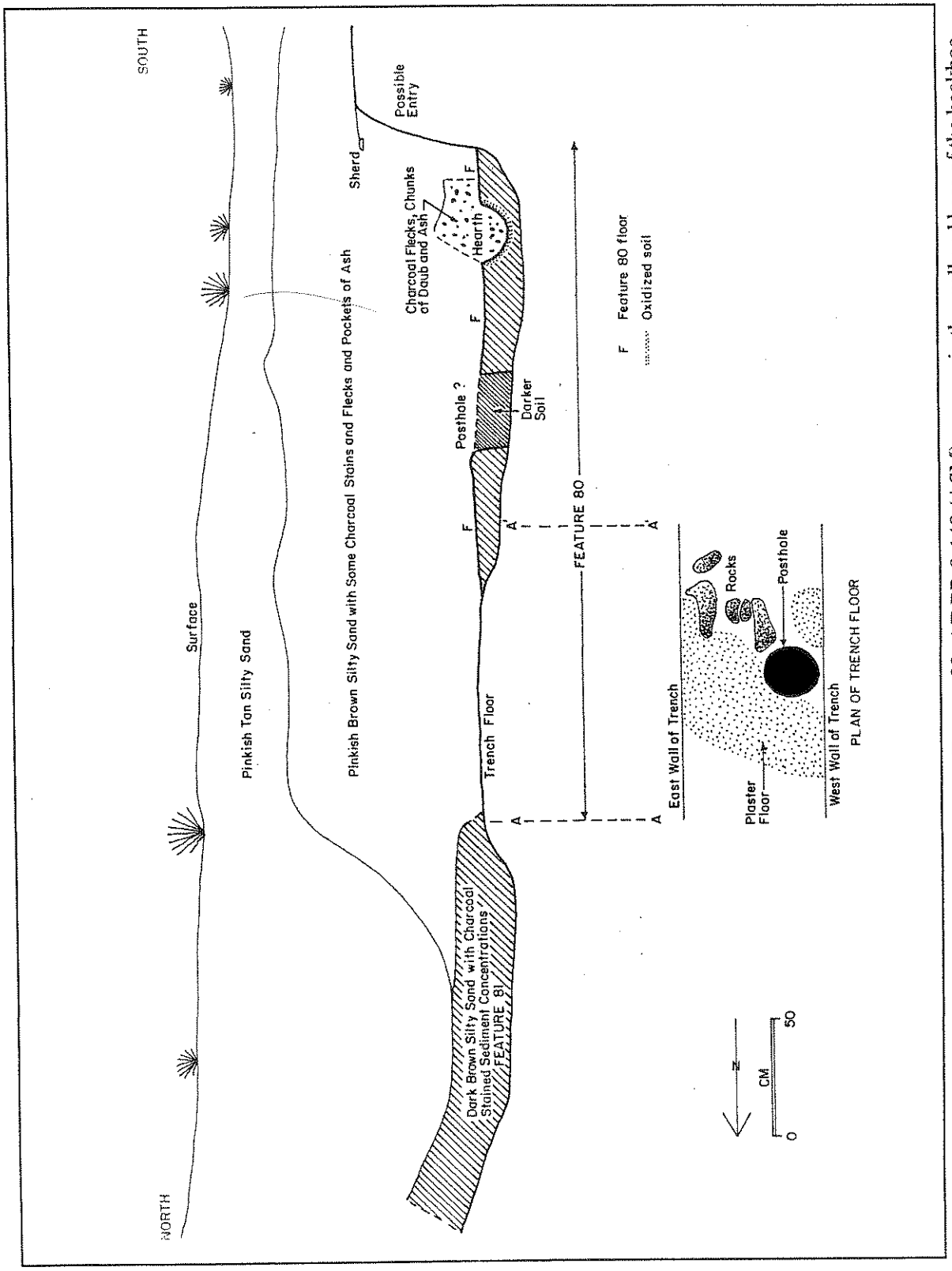


Figure 4.4. Profile and plan view of pit structure Feature 80, AZ BB:9:148 (ASM), as seen in the wall and base of the backhoe trench.

Feature 42

Locus:	18
Horizontal Provenience:	E: 502132.59, N: 3591731.39
Size:	2.5 m (short axis)

Feature 42 was discovered during mechanical stripping of the site in Locus 18. It was located approximately 10 m to the north of pit structure Feature 41. The feature appeared on the stripped surface as a circular stain containing fire-cracked rock and artifacts. A 1 × 2 m-unit was placed on the northeastern edge of the feature and was excavated in two 10 cm-arbitrary levels and one 3 cm-natural level. Fill within the feature was an undifferentiated ashy, gray to brown sandy silt with some small gravels and small pieces of charcoal. The amount of compaction varied from loose to moderate. One Rincon Red-on-brown sherd, 53 plainware ceramics, and a polishing stone were collected from the unit. The size of the ceramics suggest that artifacts found were defacto refuse. No charcoal was present in the last 3 cm of fill excavated. At 23 cm below the stripped surface, a compact light brown sandy silt with abundant gravels was encountered. Plain ware ceramics and FCR were lying flat on this surface which was fairly level throughout the unit. Two subfeatures were cut into this surface: Feature 42.01, a 32 cm-diameter, bowl-shaped, 8 cm-deep pit, and a 16 cm-deep, 15 cm-diameter post hole (Figure 4.5).

The presence of a post hole suggest that the feature once supported a superstructure of some kind. The size and shape of the stain on the backhoe-stripped surface does not fit the pattern of a pit structure. The abundance of artifacts in the fill of the feature suggest that it was trash filled, although the size of the ceramics suggest that they were left undisturbed at or near their original place of deposit.

BURIALS

One primary inhumation (Feature 1) and one scatter of cremated bone that may be human (PL 3) were found during the course of fieldwork. The cremated bone was discovered near a small plain ware vessel in Locus 4/5 during mechanical stipping. It was given a site point-location number, as no "feature" was apparent.

Feature 1

Locus:	8
Horizontal Provenience:	E: 502341.94, N: 3591570.01
Size:	0.4 × 1.2 m

Feature 1 is a single primary inhumation that was discovered during the excavation of BHT 1 in Locus 8. The individual had been covered with stones and boulders, most of which were fire-cracked. One mano and one metate fragment were included with the fire-cracked stones. The burial pit was cut into the cultural fill of a large roasting pit, Feature 38. The stones that covered the individual are thought to have been the original contents of the roasting feature. No distinct pit was visible as the fill surrounding

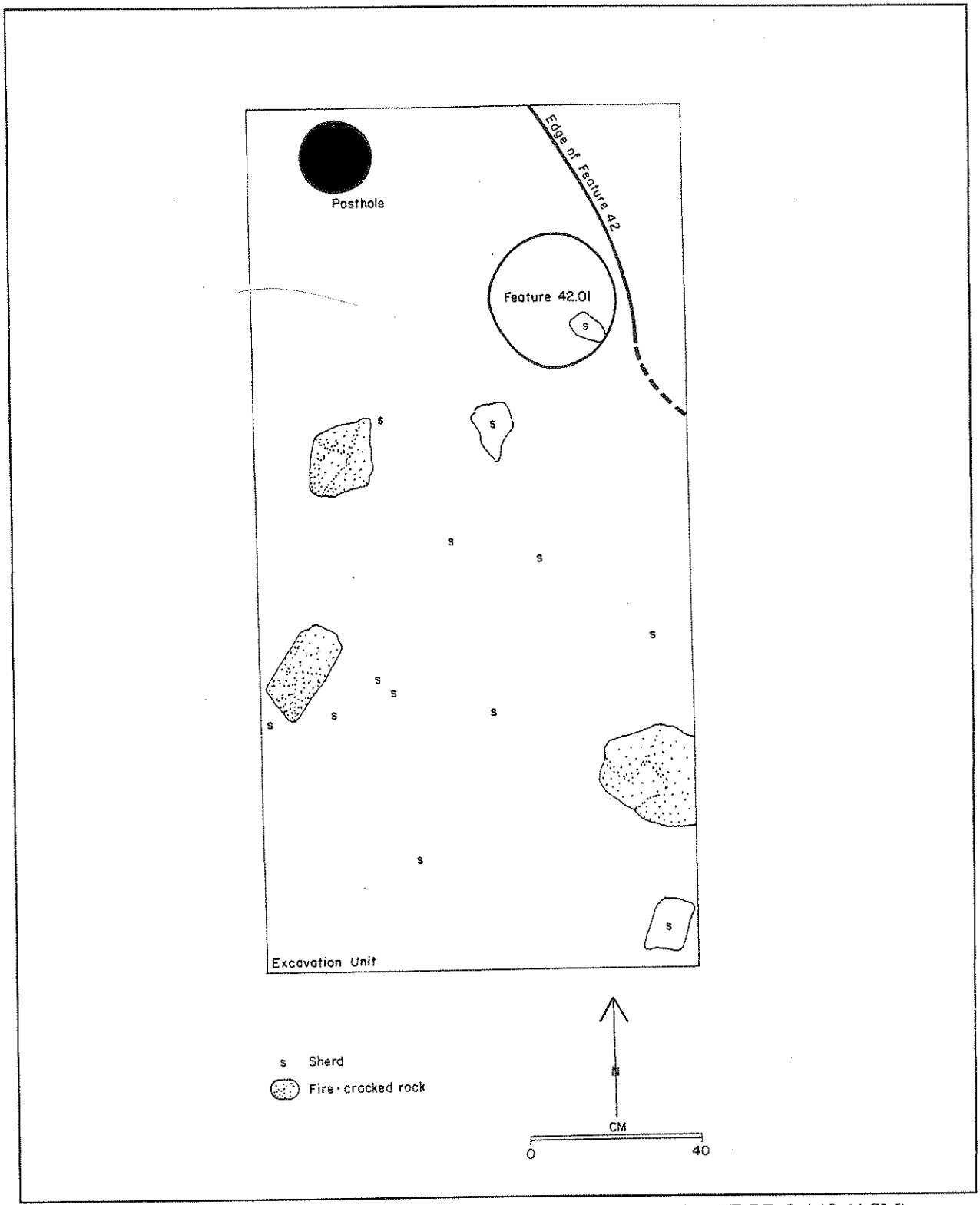


Figure 4.5. Base of the excavated test unit, Feature 42 a possible ramada, AZ BB:9:148 (ASM).

the individual was identical to the fill within the roasting pit. Although there were ceramics in the fill, these are thought also to have been associated with the roasting feature, not the burial. Therefore, there were no burial-associated offerings.

The individual was articulated, though disturbed by rodents and scavengers and by the placement of the boulders. The cranium had been crushed, and many of the digits were missing. The body was lying on its back, fully extended. The positioning of the arms was difficult to distinguish due to the disturbance, though they appear to have been lying next to the individual's sides. The hands were crossed left over right on the individual's pelvis (Figure 4.6).

The individual is thought to be a mature male based on the curvature of the sacrum and robust mandible. He had a fused sacral, indicating that he was an adult. His teeth were extremely worn, and many were missing. Bone loss was evident in the jaw, likely the result of tooth abbesses.

PL 3

Locus:	4/5
Horizontal Provenience:	
Size:	n/a

Several pieces of cremated bone were found during mechanical stripping of Locus 4/5. The bone was scattered in a 50 cm area near pieces of a large Rincon Red-on-brown bowl (PL 4), and approximately 1.5 m from a partial Rincon Red-on-brown jar. Numerous other pieces of plain ware ceramics were scattered in the vicinity. The partial jar did not appear to be in a pit. Instead, it was found upright in sterile sediment. No bone was found inside the jar.

The cremated remains did appear to be from a large mammal, though the fragments were too small to identify as to species. The proximity of the bone to a partial vessel that was found upright suggests that it may be human and that the vessel was used as a cremation urn.

PETROGLYPHS

Five small galleries containing fourteen petroglyphs were found within the site. Three of these galleries (on four boulders) had been previously identified and recorded in 1985 (Seymour 1985). The remaining two (Feature 64 and 77) were found during this project. All petroglyphs were recorded or re-recorded in 1999. They are found in four loci: Locus 7, 8, 11, and 13. Each gallery is described below.

Feature 27

Locus:	8
Horizontal Provenience:	E: 502336.16, N: 3591554.84
Size:	0.375 × 0.30 m

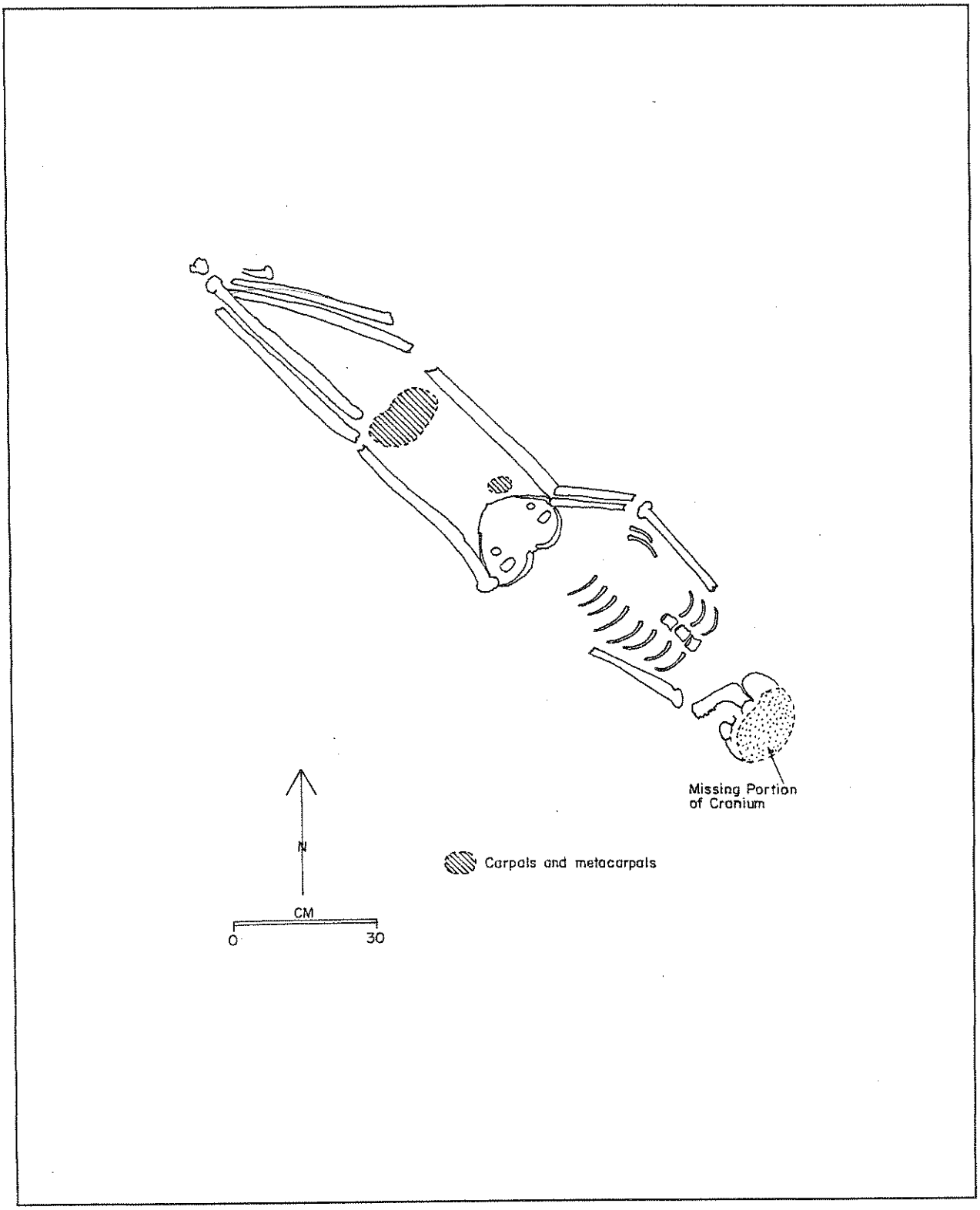


Figure 4.6. Inhumation Feature 1, AZ BB:9:148 (ASM).

Feature 27 is a single petroglyph image on a boulder in Locus 8. The boulder containing the glyph is a dark gray granite that measures 82 × 65 cm and stands 27 cm in height. It is found on top of a low ridge that is covered with similar boulders, and is immediately adjacent to a cleared area or boulder-rimmed circle. The majority of the image is found on a relatively flat surface that faces up, with a portion of the stone and image declining 40 degrees. It is possible that the boulder once stood upright, with the image facing east, and has since fallen over to its current position. If that was the case, it would have been visible from the "entrance" of the boulder-rimmed circle.

The image had been pecked into the moderately patinated surface. It measures 37.5 × 30 cm overall. Although abstract, it appears to be a human-like form, possibly holding a long thin object (snake?) it its hand (Figure 4.7). The lower portion of the image has been damaged by natural spalling of the rock surface.

Feature 36

Locus:	7
Horizontal Provenience:	Boulder 1: E: 502417.45, N: 3591456.93
	Boulder 2: E: 502423.32, N: 3591452.50
Size:	Boulder 1: 0.3 × 0.10 m
	Boulder 2: 0.4 × 0.10 m

Feature 36 is a small gallery of glyphs found on two boulders at the apex of a boulder-strewn hill in Locus 7. The glyphs are on the west and north side of Feature 65, a boulder-rimmed circle or clearing on the top of the hill. Boulder 1 is immediately west of the circle, and approximately 0.7 m west of a bedrock mortar (Feature 66) found within the circle. The boulder is a light gray granite with a lightly patinated surface. It measures 0.9 × 1.0 m and stands approximately 1 m in height. Two glyphs are found on the top surface of the boulder that declines slightly (15-20°) to the north. Three unworked stones were on the flat surface of the stone. The images are difficult to see, likely the result of their exposed location. The first glyph (Glyph 1) is 6 cm in diameter and was created by grinding, forming somewhat of a rake pattern. Whether or not the image is the result of processing or other activities is unclear. Glyph 2 is found 10 cm to the north, and measures 20 cm in length and 10 cm in width. It is an abstract pecked image of a circle with "tails" (Figure 4.8).

Boulder 2 is 4.5 m northwest of Boulder 1 near the crest of the hill. It is found among numerous boulders strewn in the general area. Boulder 2 is a medium gray granite that is lightly patinated. It measures approximately 0.75 × 1.0 m in size, and stands approximately 1 m in height. The surface containing the image faces to the east, or toward the boulder-rimmed circle, and is inclined 35°. The image (Glyph 3) is composed of interlocking circles with tails and had been pecked. It encompasses an area that measures 40 × 10 cm (Figure 4.9).

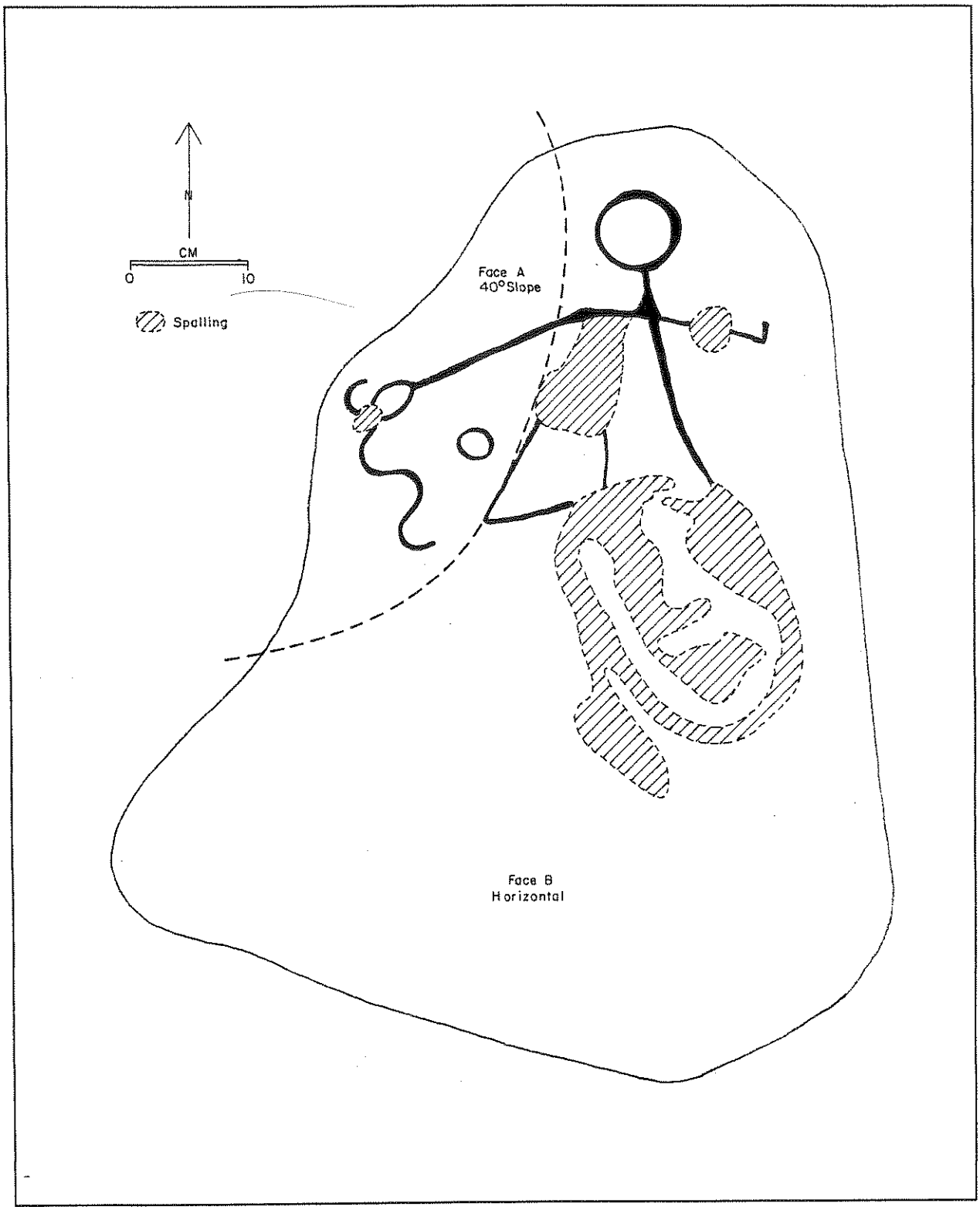


Figure 4.7. Petroglyph Feature 27, Locus 8, AZ BB:9:148 (ASM).

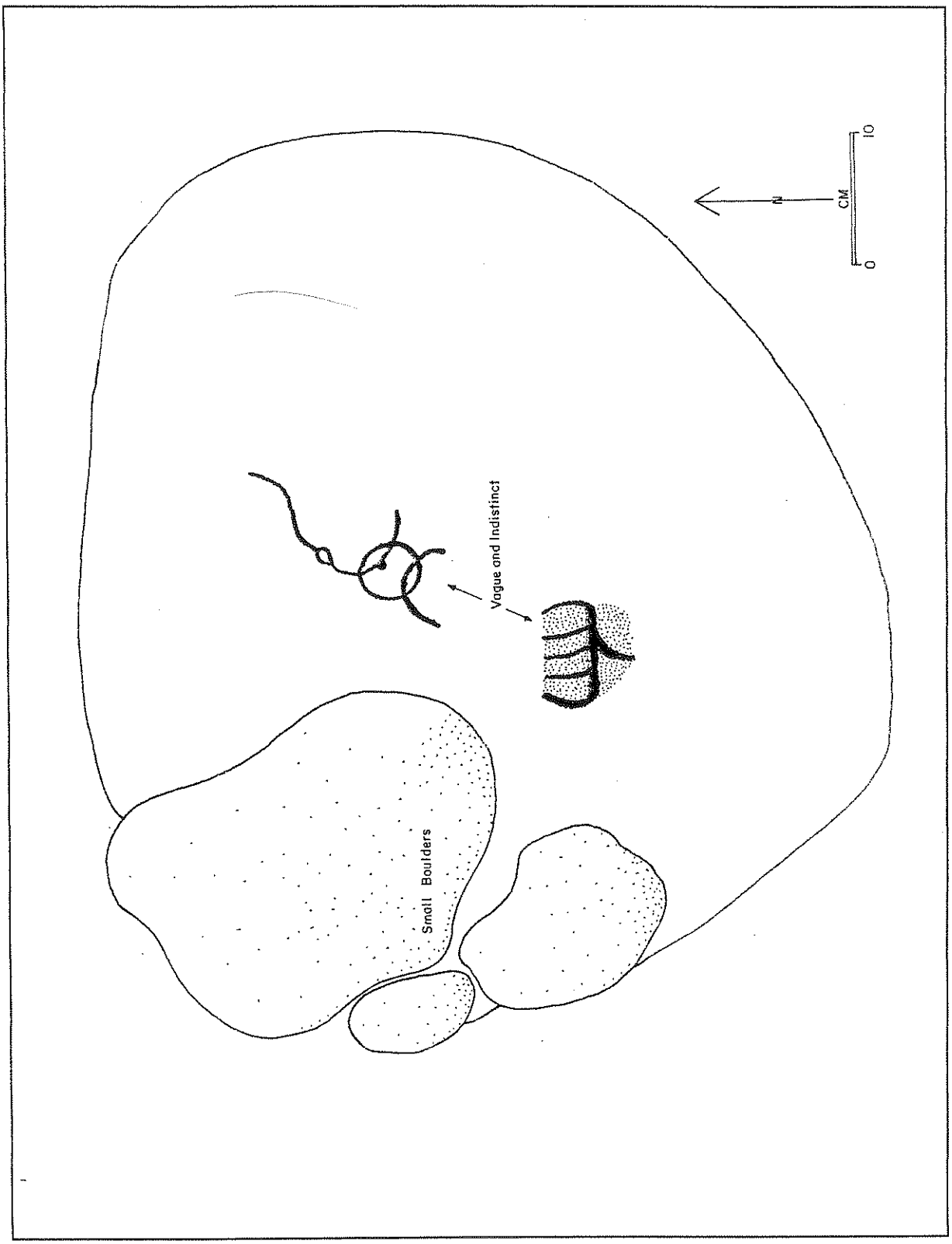


Figure 4.8. Glyphs 1 and 2, Feature 36 AZ BB:9:148 (ASM).

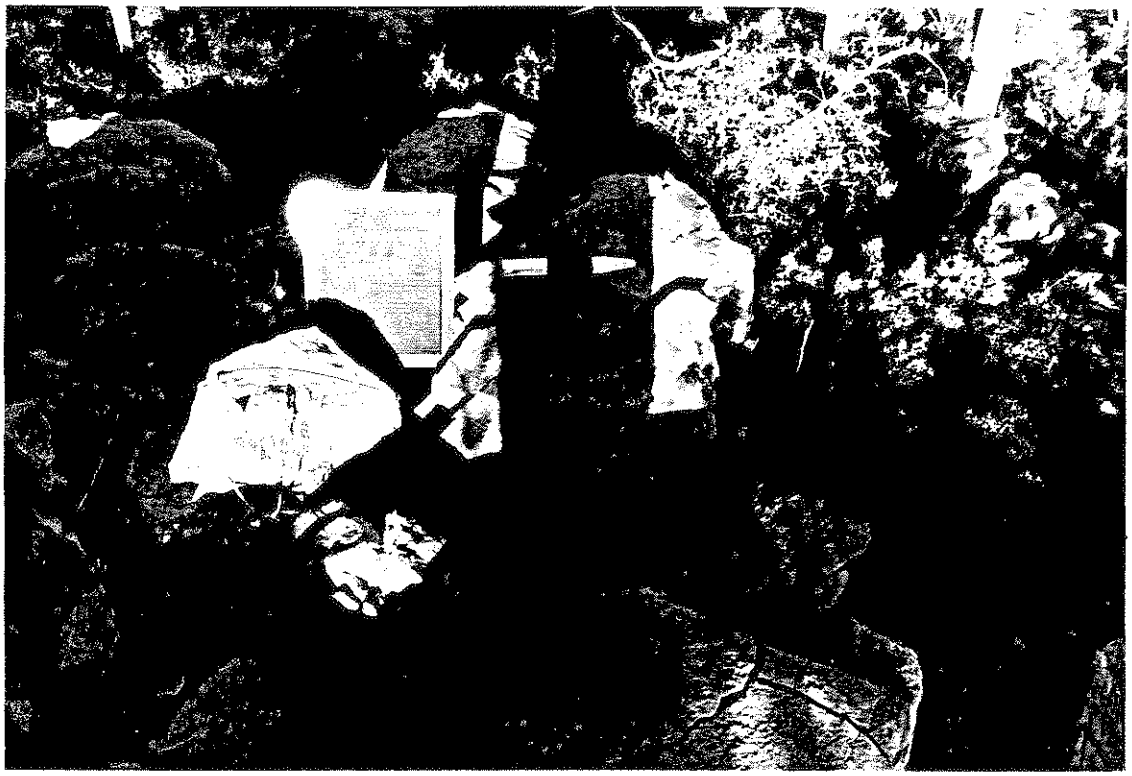


Figure 4.9. Glyph 3, Feature 36, AZ BB:9:148 (ASM).

Feature 37

Locus:	11
Horizontal Provenience:	E: 502281.64, N: 3591761.32
Size:	0.25 × 0.15 m

Feature 37 is two pecked images on a low bedrock outcrop in Locus 11. An artifact scatter was found approximately 10-15 m southwest of the outcrop. No other features were found in this locus. The bedrock outcrop is a dark gray granite that is firmly embedded in surface sediments. The top of the outcrop that contains the images measures 3 × 2.5 m and is inclined approximately 23° to the north. The surface of the stone is quite rough and cracked and has been pitted by rain. Despite this, the pecked images are clearly visible. The first image is a circle within a circle, or bullseye, that is approximately 7.5 cm in diameter. The second image is a fat (2.5 cm in width) squiggle, 13 cm in length (Figure 4.10). The squiggle appears shapeless compared to the bullseye found 10 cm to the south, suggesting that it may have been shaped by natural agents.

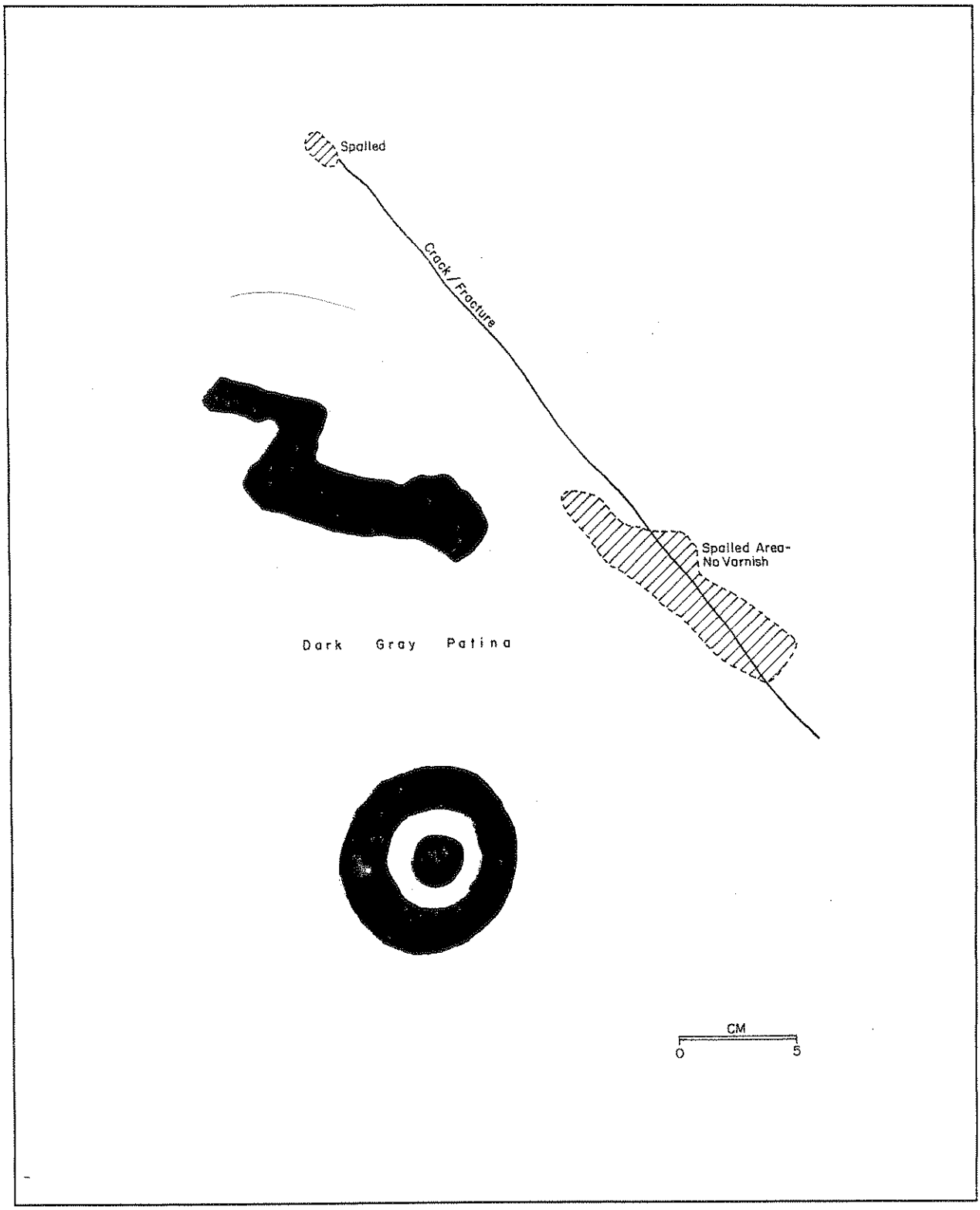


Figure 4.10. Petroglyph Feature 37, AZ BB:9:148 (ASM).

Feature 64

Locus:	8
Horizontal Provenience:	E: 502305.75, N: 3591561.86
Size:	0.40 × 0.30 m

Feature 64 is composed of three to four glyphs pecked into a single boulder in Locus 8. The boulder is situated in a low boulder outcrop on the southwestern end of the locus, approximately 35 m northwest of petroglyph Feature 27 and a boulder-rimmed circle. The boulder is a dark gray to black heavily patinated granite and rests on other similar boulders. It measures 1.0 × 0.45 m and stands 0.35 m in height. The surface containing the images is inclined slightly less than 90°, faces north, and is rough, having been rain-pitted. The images are lightly pecked into the stone. The clearest image is a human-like form that measures 10 cm in height and is approximately 5 cm wide. The shape of the figure, if indeed human, is unlike Native American human forms found in the area, suggesting that it may be Euroamerican and historical. Above the human-like form is another abstract image, encompassing a 10 ×7 cm area, that is composed of one broken or two line glyphs. These lines may be the initials "T.N." or "T.M." The third image is near the top of the stone, 20 cm from the other images, and also appears to be a line (Figure 4.11).

Feature 77

Locus:	13
Horizontal Provenience:	E: 502337.14, N: 3591933.62
Size:	0.7 × 0.5 m

Feature 77 is composed of four pecked images in Locus 13. The feature is located approximately 7 m to the west of pit structure Feature 80, on a rock face that is at the base of the Tortolita Mountains. The face is granitic and mineral stained, a pale reddish-tan color, with patches of gray patination. The surface is somewhat roughened and pitted by weathering and cracking, and some natural spalling has occurred. It is inclined 78° and faces south. The easternmost image is a hard-to-see, human-like form, that has bent legs, a round head, and one arm missing probably due to weathering. It measures 18 × 10 cm. Approximately 20 cm to the west and downslope from the human figure is a circular glyph that measures approximately 5 cm in diameter. The center of the circle has not been pecked. Twenty centimeters to the west is a glyph composed of two concentric circles, or a bullseye. The outer circle measures 15 cm in diameter, the inner circle is 8 cm in diameter. Above the bullseye is a squiggled line, approximately 11 cm in length (Figure 4.12). A small amount of repatination is evident.

BEDROCK GRINDING FEATURES

Nine bedrock grinding features were recorded during the course of fieldwork. They were found in three loci (Locus 4/5, 7, and 19). There are three general types of bedrock grinding features found at AZ BB:9:148 (ASM): mortars, metates, and slicks or slightly ground areas. Table 4.3 summarizes their attributes.

Figure 4.11. Petroglyph Feature 64, AZ BB:9:148 (ASM).

OTHER EXTRAMURAL FEATURES

Fifty-three other extramural features were recorded at AZ BB:9:148 (ASM) during the current project. These features include nineteen roasting pits, fifteen other pits, seven checkdams, four cultural lenses, two middens, a rock lined hearth, a rock wall, a cluster of ground stone, an ash stain, a pecked surface, and a cache of hammer stones. This number does not include the boulder-rimmed circles described by Seymour (1985). Thirty of these features were either partially excavated by hand or mechanically bisected in order to record feature morphology, fill and, in some instances, to sample the contents. Table 4.4 summarizes the attributes of these features and excavation methods.

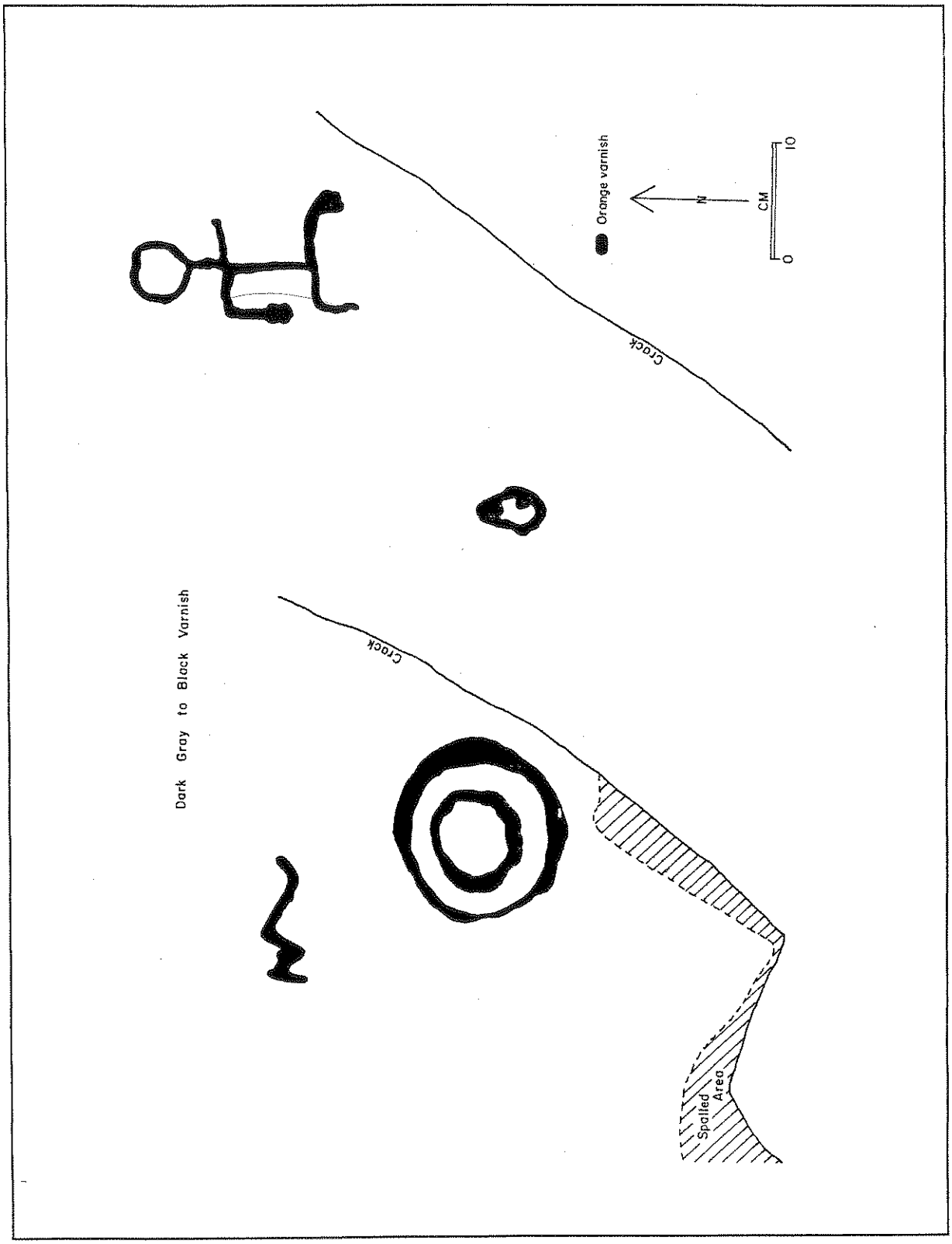


Figure 4.12. Petroglyph Feature 77, AZ BB:9:148 (ASM).

Table 4.3. Summary of Bedrock Grinding Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Type	Dimensions	Description
3	19	mortar	21 × 18 cm, 6 cm deep	Feature 3 is on a relatively flat area on the top of a granitic bedrock hill that is strewn with boulders. Plain ware ceramics were found in association.
13	19	slick	36 × 19 cm, 0.5 cm deep	Feature 13 is a lightly ground area in the center of a patinated granitic boulder that is in a low boulder outcrop. Use surface worn on highs only, utilizing a natural depression in the boulder.
15	4/5	mortar	12 cm dia., 2.5 cm deep	Feature 15 is located on a low granitic bedrock outcrop. The ground surface is completely eroded and mineral stained.
16	4/5	mortar	16 cm dia., 5 cm deep	Feature 16 is located 6 m to the east of Feature 15 on a low granitic bedrock outcrop. The top of the feature is eroded, though the base has an intact use surface. The feature had filled with water at the time of recording.
50	4/5	metate	-	Feature 50 is on a heavily stained boulder located next to Feature 51 and near pit structure Feature 4. Both boulders contain lightly used trough-shaped depressions and were surrounded by vegetation that prohibited measurement.
51	4/5	metate	-	Feature 51 is on a heavily stained boulder located next to Feature 50 and near pit structure Feature 4. Both contain lightly used trough-shaped depressions and were surrounded by vegetation that prohibited measurement.
66	7	mortar	15 cm dia., 8 cm deep	Feature 66 is found within Feature 65, a boulder-rimmed circle at the top of a boulder-strewn hill in Locus 7. The granitic boulder on which Feature 66 is found is well embedded in sediment and sits almost flush with the modern surface. The use surface is slightly patinated.
68	7	mortar	14 cm dia., 5 cm deep	Feature 68 is found within Feature 67, a boulder-rimmed circle near the top of a boulder-strewn hill in Locus 7. The granitic boulder on which Feature 68 is found is fairly level and embedded in sediment. The use surface is cracked and mineral stained.
71	-	slick	-	Lightly ground oval-shaped area on boulder found near the road between Locus 8 and 10.

Table 4.4. Summary of Excavated Extramural Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Feature Type	Dimensions	Description
2	16/17	rock-filled pit	2 m long, 25 cm thick	This feature was found in the sidewall and base of BHT 7. It consisted of a shallow depression fill with stones and plain ware ceramics that originated approximately 25 cm below modern ground surface.
6	4/5	pit	1.25 m long, 15 cm thick	Feature 6 was found in the northwest face of BHT 19. It appeared as a thin band of ash that contained plain ware ceramics. Possible clean out debris.
7	4/5	ash stain	indeterminate	Found in the base of BHT 19. A large, irregularly shaped ash stain. No artifacts in association. Possible clean out debris.
8	4/5	checkdam	1.87 m in length	This feature was explored by the backhoe and found to have been constructed in at least two courses.
9	4/5	checkdam	1.72 m in length	
11	18	cultural lens	12.58 × 10.67 m, 25-35 cm thick	A dark, charcoal-stained, ashy deposit first seen in BHT 10. It originated just below modern ground surface and was 25-35 cm thick. It is believed to be the clean-out debris from a large roasting pit, Feature 47, that was underneath the lens.
12	18	midden	indeterminate	An ill-defined ash and charcoal area visible on the surface and in the base and east end of BHT 11 that contained numerous plain ware ceramics.
14	19	pecked surface	-	On a boulder immediately northeast of the boulder that contains petroglyph Feature 13. The boulder has shallow peck marks, though no clear design element is visible.
18	10	checkdam	12.3 × 1.37 m, 44 cm thick	This long checkdam was explored by a 1 × 2 m unit, which straddled the feature near its center. The unit was excavated in 10 cm levels to the base of a single course of stones, and pollen samples were collected from the up slope half of the unit. The sample did not provide additional information on feature function as it contained the pollen expected pollen for an open air context. One plain ware ceramic was collected from the fill of the unit. This feature had been previously recorded in 1985 as Locus 10, Feature 2.
19	10	checkdam	20.68 m in length	
20	10	checkdam	1.98 m in length	
21	10	checkdam	1.43 m in length	

Table 4.4, continued. Summary of Excavated Extramural Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Feature Type	Dimensions	Description
22	8	cultural lens	1.37 m long, 0.32 m thick	Cultural lens of ashy, charcoal-stained sediment with one piece of FCR found in the sidewall of BHT 25. Possible clean-out debris from nearby roasting pit.
23	8	roasting pit	indeterminate	This feature was discovered during the excavation of BHT 25, and the majority of the feature slumped into the trench before measurements could be taken. It was filled with ash and large, caliche covered stones.
24	8	roasting pit	0.75 m long, 14 cm deep	This feature was found in the west sidewall of BHT 25. It was filled with FCR and ashy-gray sediment.
25	8	ground stone cluster	1.6 m long, 0.35 cm thick	A cluster of ground stone in an area containing numerous roasting pits. First discovered during trenching of BHT 25. The feature was found to extend to the west during mechanical blading.
26	8	ash-filled pit	0.9 m long, 15 cm deep	Ash-stained sediments in two segments in west sidewall of trench. Possible clean-out debris from nearby roasting pits.
29	4/5	pit	1.02 m diameter	A circular depression filled with cultural sediments and containing plain ware ceramics that was visible on the mechanically stripped surface.
30	4/5	midden	3.0 × 1.85 m, 35 cm thick	Midden deposit at the base of bedrock outcrop near Feature 5. The feature was mechanically excavated and a grab sample collected. Ceramics collected include four Rincon Red-on-brown and one Rincon or Tanque Verde Red-on-brown sherds.
31	4/5	pit	1.18 × 1.06 m	The feature appeared as an oval area with dark and highly compacted fill on the mechanically stripped surface. Bands of lighter sediment that had a high clay content swirled throughout the feature. The feature was located near the entrance of pit structure Feature 4 and may have served as a storage pit or was used to process clay or daub.
32	4/5	rock-lined hearth	0.88 × 0.54 m, 7 cm deep	This feature was excavated by hand. A portion of the western half of the feature was likely removed during mechanical stripping, and the feature had been disturbed by rodents. Due to its disturbed nature, no samples were collected. The feature consisted of a pit ringed with 10 stones that contained one large central stone at its side and base. The central stone sloped to the south. The sides of the feature were oxidized. The fill consisted of a coarse reddish sand that was loosely compacted and contained one plain ware ceramic and flaked stone debitage.

Table 4.4, continued. Summary of Excavated Extramural Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Feature Type	Dimensions	Description
33	4/5	possible ramada	3.6 × 2.37 m	Feature 33 is immediately adjacent to Feature 32, a rock-lined hearth found outside the entrance to pit structure Feature 4. The feature was discovered during mechanical stipping. It consists of a somewhat subrectangular area of cultural sediment that had one associated burned post. Two large unworked boulders embedded in sediment were found on the northwest and northeast sides of the feature. One Sacaton Red-on-buff and 54 plain ware ceramics were collected from the stripped surface of the feature.
34	4/5	roasting pit	0.67 m diameter	A small pit filled with FCR. FCR ranges from 17 cm to 6 cm in length.
35	4/5	trash-filled pit	2.68 × 2.0 m, 15 cm deep	Oval trash-filled pit that was mechanically excavated, and a grab sample of plain ware ceramic artifacts collected. The feature was bowl shaped, and had a depth of approximately 15 cm from the level of detection. The feature may have functioned as a borrow pit that was later filled with trash.
38	8	roasting pit	3.10 × 3.0 m, 17 cm deep	The feature appeared on the mechanically stripped surface as a nearly circular charcoal stain with ash and abundant artifacts that surrounded Feature 1, the inhumation that was excavated in BHT 1. A 1 × 2 m-unit was excavated to determine pit morphology and function. Fill within the unit consisted of a dark brown silty sand with charcoal chunks and flecks, ceramics, ground stone, flaked stone, faunal bone, and approximately 20 pieces of FCR. One Rincon Redware was recovered. Faunal bone included the remains of rabbits, a small mammal, and a desert tortoise. Only the tortoise carapace fragment exhibited the possible effects of cooking. The unit was excavated to bedrock, which was extremely friable. Contents of the feature suggest that it was used as a roasting pit, which was later reused as a grave.
39	8	pit	1.37 m diameter	An oval depression filled with cultural sediments that was visible on the mechanically stripped surface.
40	8	pit	0.46 m diameter	An oval depression filled with cultural sediments that was visible on the mechanically stripped surface.

Table 4.4, continued. Summary of Excavated Extramural Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Feature Type	Dimensions	Description
43	18	rock pile/pit with stones	1.5 m diameter	The feature appeared on the mechanically stripped surface as a collection of approximately 18 caliche-covered and friable pieces of granite, some of which appeared to have been thermally altered. The feature was bisected north-south, and the west half was excavated. No artifacts, ash stain, or dark sediment was present, and the fill of the feature was identical to that of the surrounding matrix, a tan silty sand. The feature may have been a pit filled with stones, or a rock pile. An almost identical feature (Feature 44) was less than 1 m to the east.
44	18	rock pile/pit with stones	-	The feature appeared on the mechanically stripped surface as a collection of stones, possibly in a pit. An almost identical feature (Feature 43) was less than 1 m to the east. The feature may have been a pit filled with stones, or a rock pile.
47	18	large roasting pit (horno)	2.4 × 2.3 m, 1.06 m deep	Feature 11, a large area of clean-out debris, covered this feature. Once the-clean out was removed, a nearly circular pit filled with FCR was visible on the mechanically stripped surface. This was bisected by the backhoe, profiled, and a flotation sample collected. This sample contained charred pieces of tissue that were too vitrified for identification, as well as *Cercidium* (palo verde), *Prosopis (mesquite)*, and unidentifiable vitrified charcoal. Paloverde and mesquite appear to have been burned as fuel in this feature. The fill within the pit consisted of heavily charcoal-stained sediment with charcoal flecks and ash that surrounded densely packed FCR. FCR within the pit ranged from fist-size to approximately 40 cm in length.
48	18	cache of hammer stones	0.38 × 0.34 m, 8 cm deep	This feature consisted of three hammer stones cached in a shallow depression near pit structure Feature 41. The fill of the pit was identical to the matrix, a loose tan silty sand with some gravel. The depth of the depression as recorded equals the height of the ground stone.
49	4/5	checkdam	1.61 m in length	
52	4/5	roasting pit	0.94 m diameter	Area of dark sediments with FCR exposed on the mechanically stripped surface.
53	8	roasting pit	0.76 m diameter	Area of dark sediments with FCR exposed on the mechanically stripped surface.
54	8	roasting pit	0.73 m diameter	Area of dark sediments with FCR exposed on the mechanically stripped surface.

Table 4.4, continued. Summary of Excavated Extramural Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Feature Type	Dimensions	Description
55	8	roasting pit	0.54 m diameter	Area of dark sediments with FCR exposed on the mechanically stripped surface.
56	8	pit	0.42 m diameter	An oval depression filled with cultural sediments that was visible on the mechanically stripped surface.
57	8	roasting pit	0.84 m diameter	Area of dark sediments with FCR exposed on the mechanically stripped surface.
58	8	roasting pit	0.90 m diameter, 20 cm deep	Area of dark sediments with FCR exposed on the mechanically stripped surface. The feature was bisected north-south, and the east half was excavated by hand. The feature's fill consisted of fairly compacted gray sand that contained ash. A light to moderate oxidation was on the sides and base of the pit. Two plain ware ceramics, a basin metate, and flaked stone debitage were recovered from the fill.
59	8	pit	0.47 m diameter	An oval depression filled with cultural sediments that was visible on the mechanically stripped surface.
60	8	roasting pit	0.50 m diameter	Area of dark sediments with FCR exposed on the mechanically stripped surface. This feature originated approximately 20 cm above the rest of the features found in Locus 8.
61	8	pit	0.50 m diameter	A circular depression filled with cultural sediments that was visible on the mechanically stripped surface.
62	8	pit	0.56 m diameter	A circular depression filled with cultural sediments that was visible on the mechanically stripped surface.
63	8	pit	0.36 m diameter	A circular depression filled with cultural sediments that was visible on the mechanically stripped surface.
69	7	trail system	-	A series of trails at the base and sides of the hill in Locus 7.
72	-	roasting pit (horno)	1.80 m diameter, 0.86 m deep	This feature was slightly exposed in the road between Locus 8 and Locus 10. Mechanical blading revealed a nearly circular pit filled with FCR. This was bisected by the backhoe, profiled, and a flotation sample collected. Feature fill consisted of dark gray sandy silt with heavy ash content, and patches of slightly to moderately oxidized sediment. Approximately 50% of the fill consisted of FCR. Fill near the base of the feature was collected and floated as a macrofloral sample. This sample contained several pieces of charred tissue that were too vitrified for identification. Acacia, paloverde, and mesquite wood appear to have been burned as fuel in this roasting pit.

Table 4.4, continued. Summary of Excavated Extramural Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Feature Type	Dimensions	Description
73	18	roasting pit	2.15 × 1.45 m	This feature appeared on the modern ground surface as an assemblage of large stones, one of which was fire-cracked. All stones are embedded in the sediment.
74	18	roasting pit	1.15 × 0.75 m	Area of dark sediments with FCR exposed on the mechanically stripped surface.
75	18	roasting pit	1.10 × 0.65 m, 35 cm deep	This feature appeared as an area of dark sediment with FCR on the mechanically stripped surface. The feature was bisected by the backhoe, which revealed that the feature rested upon a thick band of caliche. Plain ware ceramics were present in the fill.
76	20	rock wall	1.86 × 0.70 m, 70 cm in height	This feature consists of nine granite stones arranged between two large boulders on top of a boulder outcrop to form a small section of "wall." The rocks range in size from 41 cm long to 72 cm long. This feature aligns with the barbed wire fence on the section line and may represent the continuation of the fence over the rocky slope.
78	13	roasting pit	0.60 m diameter, 0.30 m deep	This feature was visible in the north face of BHT 29. A portion of the feature collapsed into the trench before it could be recorded due to the extremely loose compaction of the feature fill. The fill consisted of gray silt with ash and approximately 12 pieces FCR. A small basin metate and a grinding slab were recovered from the feature.
79	13	roasting pit	2.1 × 0.57 m, 20 cm deep	This feature was visible in the north face and base of BHT 29. The feature consisted of a long and shallow pit that had an oxidized margin and contained two large pieces of FCR.
81	13	cultural lens	4 m in length, thickness unknown	This feature appeared as a band of dark brown silty sand with charcoal beneath the floor of pit structure Feature 80 in BHT 31. It was visible in both faces and the base of the trench.

CHAPTER 5

CERAMICS FROM AZ BB:9:148 (ASM)

Linda M. Gregonis

Ceramics recovered during the excavation of AZ BB:9:148 (ASM) consisted primarily of Sedentary period wares and types. Table 5.1 is a summary of the pottery found, listing the number of sherds and estimated minimum number of vessels, as well as the percentages of various types and wares within the assemblage. Eight percent of the sherds recovered were pieces of decorated wares—red-on-brown, red-on-buff, or red ware sherds; these sherds made up 29.5% of the estimated minimum number of vessels in the assemblage. The distribution varies from locus to locus at the site, with excavation of some loci and features revealing no decorated sherds (see Table 5.2; Appendix B). The lack of decorated pottery in those loci is probably a sampling error, but could indicate a difference in time period or use of those areas.

Table 5.1. Summary of Pottery Types, Numbers of Sherds, and Minimum Number of Vessels Represented

	Sherds		Minimum number of Vessels	
Pottery Type	*Number*	*Percentage of Assemblage*	*Number*	*Percentage of Assemblage*
Rillito or Rincon Red-on-brown	1	.1	1	1.5
Rincon Red-on-brown	70	6.0	12	19.0
Rincon or Tanque Verde Red-on-brown	4	.4	2	3.0
Uncategorized red-on-brown	10	1.0	—	—
Sacaton Red-on-buff	3	.3	2	3.0
Uncategorized red-on-buff	1	.1	1	1.5
Rincon Red	1	.1	1	1.5
Plain ware?	8	.7	—	—
Plain ware	798	70.8	33	51.5
Gila Plain	231	20.5	12	19.0
Total number of sherds	**1127**	**100**	**64**	**100**

ANALYTIC METHODS

Sherds were sorted according to type, and information was recorded on size, provenience, type, temper, surface finish, vessel part, shape, and rim shape (if applicable). The information was then put into a computerized data base. I also attempted to determine the minimum number of vessels present at the site. Except for determining the minimum number of vessels, the categories used follow those developed by Henry Wallace and James Heidke at the Center for Desert Archaeology (see, e.g., Bernard-Shaw 1990:255-77) and used by me for other projects in southern Arizona (e.g., Gregonis 1996b).

Table 5.2. Distribution of Pottery Types across the Site, by Locus or Feature
(shaded cells indicate time diagnostic sherds)

Provenience	Rillito or Rincon Red-on-brown	Rincon Red-on-brown	Rincon or Tanque Verde Red-on-brown	Red-on-brown	Sacaton Red-on-buff	Red-on-buff	Rincon Red	Plain?	Plain	Gila Plain	Total no. of sherds
Locus 4/5, miscellaneous collection units and trenches	0	26	0	3	0	0	0	0	145	18	192
Locus 4/5, Feature 4	0	14	0	1	0	0	0	0	64	1	80
Locus 4/5 Feature 5	0	0	0	0	0	0	0	0	9	0	9
Locus 4/5 Feature 29	0	0	0	0	0	0	0	0	2	0	2
Locus 4/5 Feature 30	0	4	1	0	0	0	0	0	92	6	103
Locus 4/5 Feature 32	0	0	0	0	0	0	0	0	1	5	6
Locus 4/5 Feature 33	0	0	0	0	1	0	0	0	54	0	55
Locus 4/5 Feature 35	0	0	0	0	0	0	0	0	20	0	20
Locus 8, surface and test trenches	0	1	0	1	0	0	0	0	15	7	24
Locus 8 Feature 38	0	0	0	0	0	0	1	0	74	0	75
Locus 8, Feature 58	0	0	0	0	0	0	0	0	2	0	2
Locus 10, Feature 18	0	0	0	0	0	0	0	0	1	0	1
Locus 11 test trenches and backhoe scraping	0	0	0	0	0	0	0	0	6	6	12
Locus 13, trenches and surface collection	0	1	3	0	2	0	0	0	69	10	85
Locus 13, Feature 80	0	0	0	0	0	0	0	0	7	12	19
Locus 14/15, Trench 8	0	0	0	0	0	0	0	0	4	0	4
Locus 16/17, surface collections and back hoe trenches	1	1	0	1	0	1	0	0	13	5	22
Locus 18, Collection units and trenches	0	2	0	1	0	0	0	0	64	39	105
Locus 18, Feature 12	0	0	0	0	0	0	0	0	4	0	4
Locus 18, Feature 41	0	21	0	0	0	0	0	0	50	36	107
Locus 18, Feature 42	0	0	0	1	0	0	0	0	43	23	67
Locus 18, Feature 45	0	0	0	2	0	0	0	0	53	59	114
Locus 18, Feature 75	0	0	0	0	0	0	0	0	2	4	6
Locus 19 test trenches and surface collection	0	0	0	0	0	0	0	8	4	0	12
Grand total	**1**	**70**	**4**	**10**	**3**	**1**	**1**	**8**	**798**	**231**	**1127**

Determination of minimum number of vessels was based on SWCA's work at the Gibbon Springs site (Gregonis 1996b), a Tanque Verde phase site in the northeastern Tucson Basin.

Sherds were sorted by size in respect to provenience and this information was recorded for the computerized data base. Division by size is intended to provide a general indication of disturbance of a particular provenience. Size categories used were less than 5 cm^2 (quarter-sized and smaller), 5 to 16 cm^2, 16 to 49 cm^2, and 49 to 100 cm^2. A higher percentage of small sherds (16 cm^2 and smaller) were expected to indicate a greater amount of disturbance than a high percentage of large sherds (16 cm^2 and larger) from

a given provenience. Size was determined using a template developed by the Center for Desert Archaeology (Henry Wallace, personal communication 1991).

Provenience was recorded in conjunction with the field number assigned to the sherds. For interpretive purposes, the sherds were grouped by feature, subfeature, collection unit, or trench number, and, where appropriate, by depositional context (i.e., fill, roof fall, or floor).

When possible, established southwestern ceramic types were assigned to the ceramics, except for plain wares, which are defined by temper type and surface finish. Table 5.3 provides brief descriptions of the pottery types found at the sites.

Gross temper categories were established by examining sherd cross sections with a 10-power hand lens. Categories that I used to group the tempers, which all appear to be sands, were quartz-feldspar; quartz-feldspar-volcanic; quartz-feldspar-mica; quartz-feldspar-mica-volcanic; granitic; granitic-volcanic; micaceous granitic; and schist. In one instance, the temper category could not be determined. Identification of temper as granitic is based on finding particles of quartz, feldspar, and mica fused in the matrix. Given the geology of the area, granitic fragments undoubtedly include both igneous and metamorphic materials. Volcanic fragments looked like rhyolite or andesite, common materials in the basin and range province.

Surface finish was determined by the presence or absence of polishing (sometimes patterned), the subjective level of hand smoothing or polish, the presence of wiping, the presence or absence of a micaceous sheen, and the presence or absence of a slip. Hand smoothing refers to a finish that is smoothed to the point where finger and other marks cannot be seen, but where a sherd has a matte finish with no discernable polishing marks or sheen. A wiped surface is one where small particles of clay are raised on the surface, giving it a gritty feel, or where the surface has fine scratch marks in it that were made by a rag or brush being wiped across the surface. If sherds or recognizable vessels had more than one type of surface finish, the combined types of finish (e.g., hand smoothed and polished) were noted. In a few instances, the surfaces were too eroded to determine the original surface finish.

Vessel part refers to body, rim, shoulder, or base. Vessel shape refers to bowls, platters, scoops, cauldrons (wide-mouthed vessels with straight, insloping upper bodies), and jars. Cases where the shapes could not be determined were recorded as "indeterminate." Rim shape refers to the finished lips of vessels. Finish shapes include round, beveled round, square, beveled square, tapered, and beveled taper, all shapes that can be found in Rincon phase contexts.

Minimum number of vessels was determined by counting the number of partially reconstructable vessels and comparing that number with the different vessel forms by type found in each feature or other unique recovery contexts (e.g., point locations, different loci).

Table 5.3. Brief Descriptions of Pottery Types and Wares Used in This Report

Pottery Type	Description	Source
Rillito or Rincon Red-on-brown	Sherds or vessels with characteristics of both Rillito and Rincon Red-on-brown; probably transitional in type and time.	Kelly 1978
Rincon Red-on-brown	Brown to orange brown paste usually with granitic or granitic-volcanic sand temper; paste color tends to be less "muddy" than Rillito Red-on-brown; thicker-walled than Rillito Red-on-brown; paint sometimes thick, boldly or sloppily applied; interior of bowls may be smudged; vessels may have white to cream slip in addition to paint; designs range from curvilinear to rectilinear scrolls; parallel and squiggly lines; some slightly flare-rimmed bowls have paired trailing lines; layout includes quartering, offset quartering, banding, panels, plaiting; jars with Gila shoulder, hemispherical bowls, scoops.	Kelly 1978
Uncategorized red-on-brown	Tucson Basin-like brown ware with red paint; sherds too small or design nondiagnostic to time period	
Rincon Red	Coarse, granular paste with granitic or granitic-volcanic temper; clear, bright red, often thick slip flakes when weathered; sometime slipped only on interior surface; bowls are the most common form.	Kelly 1978
Sacaton Red-on-buff	Characterized by bright, light buff slip over a pink paste typically with vugs and granitic or schist and granitic temper, hematite paint in bold life form or curvilinear to rectilinear geometric designs laid out in panels, bands, or quartering; jars often have short, sharply outcurved necks and sharply recurved shoulders set on a shallow base; bowl forms can be deep flare-rimmed, hemispherical, or shallow (platter-like); jars decorated exterior from shoulder to neck base; scoops, tripod vessels and other forms also occur; bowls decorated on interior, sometimes with grouped or isolated trailing lines exterior.	Haury 1965
Uncategorized red-on-buff	Characterized by red paint and often a white slip on a buff, vuggy, pink to pink-orange paste, typical of Gila Basin Hohokam wares, but not typable.	
Plain ware	Brown ware paste; temper ranges from granitic, to granitic-volcanic, to micaceous granitic; surface finish polished or hand smoothed; surface color variable. Some plain ware could be typed as Gila Plain, Gila Variety because it has patterned polish or micaceous sheen and a micaceous granitic temper, but the temper does not appear to be different from other, presumably local temper other than in the amount of added(?) mica.	
Plain ware ?	Undecorated sherds that may be an undecorated portion of a red-on-brown vessel.	
Gila Plain, Gila Variety, all periods	Characterized by micaceous sheen and patterned polish (striations)on exterior; surface has high levels of muscovite mica, and paste may or may not have added schist; thin vessel walls predominate (5 mm or less); forms include large storage jars, hemispherical and flare-rimmed bowls, scoops, "seed" jars.	Haury 1965, 1976

RESULTS

Size and Depositional Context

Following ideas discussed by Wallace et al. (1992) in their work on the Rye Creek Project, and using methods developed during analysis of ceramics from La Ciudad de Los Hornos (Gregonis 1993), I used relative percentages of sherd sizes to determine depositional context for features at AZ BB:9:148.

(For an in-depth discussion of the correlation between sherd size and depositional context, see Wallace et al. 1992.) Results were lumped into two categories: de facto refuse and secondary refuse. None of the contexts fell into the third category—transformed secondary refuse—that I normally use in these analyses. Trench and surface collection contexts were not evaluated.

De facto ceramic refuse consists of vessels that were left undisturbed at or near their original place of deposition (Gregonis 1993:282). De facto refuse has been defined as locations where sherds that are 16 cm^2 or larger make up 30% or more of the sherds from that provenience. This follows Neilsen's (1991) finding that sherds tend to retain certain size distributions after initial breakage (see also Pyszczyk 1984; Wallace et al. 1992:7-9). Secondary refuse is thought to represent "activities in which pieces of broken vessels were moved or disturbed a limited number of times" (Gregonis 1993:282), such as trash fill in a midden. Contexts with 15 to 30% of sherds that were 16 cm^2 in size or greater are considered to be secondary refuse. Transformed secondary refuse includes proveniences with post-depositional mixing of materials, whether through human or nonhuman action (Gregonis 1993:181). Proveniences with less than 15% large sherds (over 16 cm^2) are considered to be transformed secondary contexts.

As shown in Table 5.4, most of the excavated features appear to have had de facto depositional contexts. Such depositional interpretations are also supported by the presence in several features of partially or completely reconstructable vessels (see Table 5.5 for descriptions). The sizes of sherds found and the presence of reconstructable vessels indicate that once abandoned, the features were not reused to any great extent. In this regard, the depositional sequence for Feature 4 is fairly clear—partially reconstructable or reconstructable vessels and large sherds were found in the roof fall and floor levels of the feature. The sherds found in Feature 41 may tell a different story. There, large sherds were common, and many were found, but the vessels seemed more fragmentary—as if only portions of the pots were originally deposited in the house. It is possible that the house was used as a primary dumping spot for nearly whole vessels, but I suspect that the fragmented nature of the vessels is illusory. A house fire or sudden collapse might have smashed pots and spread the sherds in such a way that it appears that none of the pots had been whole. Most of the vessel fragments found in Feature 41 were thin-walled vessels that could have been made by one individual. The remnants of one, small Rincon Red-on-brown jar, found at two loci on the house's floor indicates that the event leading to abandonment scattered at least some of the vessels (see Figure 5.1).

The Assemblage

As a whole, the assemblage resembles those from other Sedentary phase sites in the northern part of the Tucson Basin. The majority of the sherds contained quartz-feldspar, granitic, or micaceous-granitic sand temper, probably indicative of local production (see Table 5.6). A sand sample recovered from the site contained quartz, feldspar, mica, and granitic material. About 20% of the sherds contained volcanic sands in addition to other particles.

Table 5.4. Sherd Size by Feature and Indicated Depositional Context

Provenience	< 5cm²	5-16 cm²	16-49cm²	49-100cm²	>100 cm²	No. of sherds	Depositional Context
Feature 4 fill	15 (47%)	12 (37.5%)	4 (12.5%)	1 (3%)	—	32	secondary
Feature 4 roof fall	20 (43%)	12 (26%)	6 (13%)	5 (11%)	3 (7%)	46	de facto
Feature 4, floor fill	1 (10%)	1 (10%)	2 (20%)	2 (20%)	4 (40%)	10	de facto
Feature 4 floor	1 (3%)	4 (11%)	16 (42%)	7 (18%)	10 (26%)	38	de facto
Feature 5 surface and fill	11 (50%)	4 (18%)	7 (32%)	—	—	22	de facto
Feature 30 fill	19 (13%)	57 (41%)	42 (30%)	14 (10%)	8 (6%)	140	de facto
Feature 32 fill	7 (44%)	6 (37.5%)	2 (12.5%)	1 (6%)	—	16	secondary
Feature 33 fill	8 (11%)	22 (30%)	29 (40%)	12 (16%)	2 (3%)	73	de facto
Feature 35 fill	8 (24.2%)	13 (39.4%)	8 (24.2%)	2 (6.1%)	2 (6.1%)	33	de facto
Feature 38 fill	112 (52.3%)	67 (31.3%)	31 (14.4%)	4 (2%)	—	214	secondary
Feature 41 fill	8 (17%)	9 (19%)	21 (44%)	6 (12%)	4 (8%)	48	de facto
Feature 41 floor	9 (11%)	15 (19%)	26 (32%)	18 (22%)	13 (16%)	81	de facto
Feature 42 and 42.01	17 (17%)	28 (29%)	40 (41%)	8 (8%)	5 (5%)	98	de facto
Feature 45	27 (18%)	36 (24.2%)	57 (38.3%)	18 (12.1%)	11 (7.4%)	149	de facto
Feature 58	7 (70%)	1 (10%)	2 (20%)	—	—	10	secondary
Feature 80 fill	3 (14%)	5 (23%)	10 (45%)	3 (14%)	1(4%)	22	de facto

Surface finish on the pots varied from hand smoothed to polished (see Table 5.7). The surface of a few of the sherds (all found on the ground's surface) was too eroded to determine the original type of finish. As expected for the time period represented, the majority of the sherds (72%) showed no evidence of smudging.

Nearly equal numbers of bowls and bowl forms and jars and jar forms were found at the site. Table 5.8 lists the shapes found by sherd count. The vessel shapes—jars with Gila shoulders, cauldron-like vessels, platter bowls, scoops, and hemispherical bowls—are typical of the Sedentary period, as are the rim finish shapes of the vessels (see Table 5.9).

One vessel found in the floor fill of Feature 4 is a scoop or shallow bowl reworked from either a cauldron-like shape or a Gila shouldered Rincon Red-on-brown jar (Figure 5.2). This scoop may have been part of the pottery making kit found in the house. Also recovered from Feature 4 was a plain ware scoop with an human effigy head attached to it (Figure 5.3). It was found in the roof fall of the feature. Table 5.5 provides a more complete description of these vessels and others found in Feature 4 and elsewhere on the site.

In addition to the reworked Rincon Red-on-brown cauldron or jar, several worked sherds were recovered from the site, including unperforated disks with chipped or ground edges, perforated disks with ground edges (Figure 5.4), sherds that had been reworked into plates, and probable repair holes. They are described in Table 5.10.

Table 5.5. Descriptions of Partially Reconstructable Vessels

Provenience	Type	Description	No. of sherds
Locus 4/5 Feature 4 roof fall southwest quarter	Plain ware	½ to 2/3 of a scoop with an human face applied to it; granitic temper; hand smoothed surface with round rim finish; scoop is shallow (2 cm high); and oval, 8.5 cm at its widest; 6-mm-thick vessel walls; head on one end is 2 cm by 1.5 cm, with a pinched-out nose, but no eyes, mouth, or other features (FN 212), Figure 5.3.	5
Locus 4/5 Feature 4 roof fall southwest quarter	Rincon Red-on-brown	Ca. 1/3 of a medium-sized bowl, probably subhemispherical in shape; 6- to 7-mm-thick vessel walls, about 8.5 cm high, diameter not determined; paint on interior and rim is so badly faded that design cannot be distinguished; quartz, feldspar, volcanic temper; hand smoothed finish; paste has orangy cast similar to that found in vessels from middle Santa Cruz (could be a result of house burning–oxidation) (FN 214).	6
Locus4/5 Feature 4 northeast quarter	Plain ware	One-eighth to 1/4 of a medium to large suprahemispherical bowl with slightly constricted mouth; quartz, feldspar, mica temper; polished exterior surface; interior weathered; has beveled round rim; resembles early Classic period style (FN 220)	5
Locus 4/5 Feature 4, roof fall northwest quarter	Plain ware	Less than 1/4 of a large, heavy-walled (8-12-mm thick) jar; 2.5 cm high straight neck with a round rim finish; vessel opening is relatively small; vessel is low-shouldered; quartz, feldspar temper; polished surface (FN 219).	1
Locus 4/5 Feature 4, floor fill, northwest quarter	Rincon Red-on-brown	About ½ to 3/4 of a large Rincon Red-on-brown jar or cauldron with Gila shoulder; vessel has been reworked into a scoop-like shape; base, shoulder, and "rim" represented; if cauldron, vessel had round rim finish; if not, then new "rim" has been reworked into a round shape; most edges are clearly ground; remnant of design includes curvilinear scrolls and squiggle or zig-zag line; granitic temper; polished surface has been blackened (FN 128). (Figure 5.2).	7
Locus 4/5 Feature 4 floor southeast quarter, Point Location 17	Plain ware	Undetermined amount of plain ware vessel with granitic, volcanic temper, polished surface, and smudged interior (FN 167).	4
Locus 4/5 Feature 30 backhoe scraping	Plain ware	About half of a small, suprahemispherical bowl (ca. 1 pint); with shoulder and slightly outcurved rim; 4- to 6-mm-thick vessel walls; hands smoothed and polished exterior; beveled round rim; granitic temper; probably Rincon phase (FN 116).	8
Locus 4/5 Feature 30 fill	Plain ware	Ca. 1/3 of a small jar (pint sized); one edge worn smooth from weathering or use (most likely weathering); ca. 11.5 cm high, 8 cm diameter opening, 11 cm diameter widest point; straight neck is 1 cm high and has a tapered rim; quartz, feldspar, volcanic temper; polished surface (FN 413).	1
Locus 4/5 Feature 33 fill	plain ware	Less than 1/3 of a large jar with a 4-cm-high straight neck; 7- to 12-mm thick vessel walls (thickest at rim); granitic temper; hand-smoothed surface; round rim finish; could be Classic period vessel (FN 145).	21
Locus 4/5, Feature 4 Point Location 3	Rincon Red-on-brown	Base of a small Rincon Red-on-brown jar (ca. pint to quart size); bottom is worn; 11 cm interior diameter with slight shoulder; 7- to 8-mm-thick vessel walls; has slight shoulder; granitic, volcanic temper; hand smoothed surface; about 1/3 of vessel is represented (FN 130)	5

Table 5.5, continued. Descriptions of Partially Reconstructable Vessels

Provenience	Type	Description	No. of sherds
Locus 18, Feature 41 fill	Plain ware	Ca. 1/4 to 1/3 of a small (1 quart-sized), globular jar; well shaped with fire clouds on exterior; polished exterior with roughly finished interior; quartz, feldspar, volcanic temper, 1.5 cm, slightly everted rim has tapered finish; 4- to 5-mm-thick vessel walls (FN 259)	4
Locus 18, Feature 41 floor, Point locations 9, 25	Gila Plain	Undetermined portions of at least two jars, one with a rounded Gila shoulder, one with a more rounded shoulder and inclosing upper body; all are blackened, though there is no apparent sooting; all are well-made; micaceous granitic temper and a surface with micaceous sheen; 5- to 6-mm-thick vessel walls; no rims recovered (FN 307)	18
Locus 18, Feature 41 floor Point Locations 11, 12, 18, 34	Gila Plain	Undetermined amount of large, thin-walled bowl or cauldron with Gila shoulder; micaceous granitic temper; surface has micaceous sheen; round rim finish; vessel walls are 5 mm thick; other dimensions not determined (FNs 308, 315, 334, 339)	8
Locus 18, Feature 41 floor Point Location 3	Gila Plain	Ca. 1/3 of a large, hemispherical bowl; 7-mm-thick vessel walls; micaceous granitic temper; round rim finish; surface has micaceous sheen; may have had organic material in it when house burned as part of interior is oxidized and part blackened; ca. 32 cm diameter, 12.3 cm high; base is worn (FN 310).	3
Locus 18, Feature 41, floor Point Locations 14 and 15	Rincon Red-on-brown	Ca. 3/4 of a small (ca. 1 quart-sized) jar with a rounded, Sedentary phase shoulder; slightly everted neck is 1.5 cm high and has a round finish; paneled design descends at 45 degree angle from just below base of neck to about 1 inch above shoulder, consists of panels of parallel squiggles and interlocking curvilinear scrolls or triangles; vessel has granitic temper and polished surface, is 15 to 16 cm high with 6 to 8-mm-thick walls; base is slightly worn (FNs 311 and 338) Figure 5.1.	21
Locus 18, Feature 45 fill	Plain ware	Less than ¼ of a large, hemispherical bowl; smudged and nicely polished interior; exterior also polished; granitic temper; square rim finish; dimensions could not be determined (FN 273).	9
Locus 18, Feature 45 fill	Gila Plain	Pieces from two large bowls, probably hemispherical in shape; smudged interiors, 4- to 6-mm-thick walls; one with beveled round rim finish, one with square finish; micaceous granitic temper; surface has micaceous sheen (FN 278).	3
Locus 18, Point Location 7	Gila Plain	Undetermined amount of medium to large jar with short (1.5-cm-high), slightly everted neck with round rim finish; nicely fire-clouded body; micaceous granitic temper; patterned polish (FN 371).	15

Two figurine fragments were found in Locus 4/5 (FN 246). Both represent torsos of some type, but they are too fragmentary to determine whether they were human or animal forms. One piece is 2.5 cm long, 3 cm wide at the widest part, and 1.5 cm wide at the narrowest part. It is 1.5 cm in diameter. The second piece is a 2-cm-high, 2-cm-wide, 1-cm-thick cylinder, most likely part of a human figurine.

Figure 5.1. Rincon Red-on-brown jar from pit structure Feature 41, AZ BB:9:148 (ASM) (actual size), with a detail of the lower design band.

Table 5.6. Summary of Gross Temper Types by Pottery Type or Ware

	Gross Temper Type									
Pottery Type	*Quartz, feldspar*	*Quartz, feldspar volcanic*	*Quartz, feldspar, mica*	*Quartz, feldspar, mica, volcanic*	*Granitic*	*Granitic, volcanic*	*Micaceous granitic*	*Schist*	*Indeterminate*	**No. of Sherds**
Rillito or Rincon Red-on-brown	—	—	—	—	—	1	—	—	—	**1**
Rincon Red-on-brown	—	7	—	—	48	15	—	—	—	**70**
Rincon or Tanque Verde Red-on-brown	—	3	—	—	—	1	—	—	—	**4**
Uncategorized red-on-brown	4	—	—	—	1	4	1	—	—	**10**
Sacaton Red-on-buff	1	—	—	—	—	—	—	1	1	**3**
Uncategorized red-on-buff	—	—	—	—	—	—	—	1	—	**1**
Rincon Red	—	—	1	—	—	—	—	—	—	**1**
Gila Plain	—	—	13	—	1	—	217	—	—	**231**
Plain ware	161	31	43	1	365	149	48	—	—	**798**
Plain ware?	—	—	—	—	—	7	1	—	—	**8**
Total number of sherds	**166**	**41**	**57**	**1**	**415**	**177**	**267**	**2**	**1**	**1127**

Table 5.7. Surface Finish of Sherds

Pottery Type	**Hand smoothed**	**Hand smoothed, polished**	**Hand smoothed, slipped**	**Polished**	**Patterned polish**	**Micaceous sheen**	**Wiped**	**Eroded**	**Total no. of sherds**
Rillito or Rincon Red-on-brown	-	-	-	1	-	-	-	-	1
Rincon Red-on-brown	14	-	-	56	-	-	-	-	70
Rincon or Tanque Verde Red-on-brown	-	-	-	4	-	-	-	-	4
Uncategorized red-on-brown	1	-	1	8	-	-	-	-	10
Sacaton Red-on-buff	1	-	2	-	-	-	-	-	3
Uncategorized red-on-buff	1	-	-	-	-	-	-	-	1
Rincon Red	-	-	1	-	-	-	-	-	1
Plain ware?	-	-	-	-	-	-	-	8	8
Plain ware	397	97	-	257	6	21	1	19	798
Gila Plain	-	-	-	-	55	176	-	-	231
Total number of sherds	**414**	**97**	**4**	**326**	**61**	**197**	**1**	**27**	**1127**

SUMMARY

The ceramic assemblage from BB:9:148 is similar to those found at other Sedentary period sites in the northern Tucson Basin (see Gregonis 1996a; Craig and Wallace 1987; Heidke 1990; Rooney Ranch collection at Pima College, Sleeping Snake collections at ASM and SWCA). Vessels at the site included cauldron-like bowls, Gila-shouldered jars, platter bowls, scoops, and hemispherical bowls, including one with a human effigy head. Worked sherds collected included unperforated disks, perforated disks, and probable repair holes—holes drilled near the edge of a sherd.

Table 5.8. Vessel Shapes

		Vessel Shape									
Pottery type	**Vessel part**	*Bowl*	*Cauldron*	*Platter*	*Platter or bowl*	*Scoop or shallow bowl*	*Effigy scoop*	*Jar*	*Seed jar*	*Indeterminate*	No. of Sherds
Rillito or Rincon Red-on-brown	body	-	-	-	-	-	-	-	-	1	1
Rincon Red-on-brown	rim	11	2	1	-	-	-	4	-	-	18
	shoulder	-	-	-	-	-	-	3	-	-	3
	shoulder-base	-	2	-	-	-	-	-	-	-	2
	base	-	1	-	-	-	-	-	-	-	1
	body	20	2	-	3	-	-	20	-	1	46
Rincon or Tanque Verde Red-on-brown	body	-	-	-	-	-	-	1	-	3	4
Unclassified red-on-brown	rim	1	-	-	-	-	-	-	-	-	1
	Gila shoulder	-	-	-	-	-	-	-	-	1	1
	body-shoulder	-	-	-	-	-	-	2	-	-	2
	body	1	-	-	-	-	-	-	-	5	6
Sacaton Red-on-buff	rim	-	-	-	-	-	-	1	-	-	1
	body	-	-	-	-	-	-	1	-	1	2
Unclassified red-on-buff	body	-	-	-	-	-	-	-	-	1	1
Rincon Red	rim	1	-	-	-	-	-	-	-	-	1
Plain ware?	rim	-	-	-	-	-	-	1	-	-	1
	body	-	-	-	-	-	-	-	-	7	7
Gila Plain	rim	13	-	-	-	-	-	12	-	1	26
	shoulder	-	-	-	-	-	-	1	-	1	2
	Gila shoulder	5	-	-	-	-	-	2	-	2	9
	shoulder	-	-	-	-	-	-	2	-	1	3
	body	48	-	-	-	-	-	17	-	126	191
Plain ware	rim	40	-	3	-	1	5	37	1	2	89
	Gila shoulder	-	-	-	-	-	-	2	-	6	8
	shoulder	-	-	-	-	-	-	5	-	2	7
	shoulder-base	5	-	-	-	-	-	-	-	-	5
	body	22	-	-	-	-	-	39	-	628	689
Total number of sherds		**167**	**7**	**4**	**3**	**1**	**5**	**150**	**1**	**789**	**1127**

As a whole, the assemblage seems to represent common household activities, although the depositional context in one house, Feature 41, seemed odd. There, large pieces of pottery were scattered across the floor and in the fill. Though the pieces represented several vessels, none of the vessels could be completely reconstructed. Rather than being a special type of deposit, however, I think that the pieces became scattered as a result of a catastrophic event that caused the immediate abandonment of the structure—perhaps a fire that led to roof and wall collapse. This event caused vessels to be splattered across the feature, and perhaps outside of it, if any of the vessels represented were on the roof. The feature was not reused after the event, except perhaps to retrieve some larger sherds, thus leaving partial vessels in situ.

Table 5.9. Rim Finish Shapes

		Rim Finish							
Pottery Type	**Vessel Shape**	*Round*	*Beveled round*	*Square*	*Beveled square*	*Tapered*	*Beveled taper*	*Undetermined*	**Total no. sherds**
Rincon Red-on-brown	bowl	6	-	5	-	-	-	-	11
	cauldron	2	-	-	-	-	-	-	2
	platter	1	-	-	-	-	-	-	1
	jar	2	-	-	-	2	-	-	4
Unclassified red-on-brown	bowl	1	-	-	-	-	-	-	1
Sacaton Red-on-buff	jar	-	-	-	-	1	-	-	1
Rincon Red	bowl	-	-	1	-	-	-	-	1
Plain ware?	jar	-	-	-	-	-	-	1	1
Gila Plain	bowl	7	2	4	-	-	-	-	13
	jar	3	7	-	-	-	-	-	10
	indeterminate	-		1	-	-	-	-	1
Plain ware	bowl	20	11	5	3	1	-	-	40
	platter	-	-	3	-	-	-	-	3
	scoop or shallow bowl	1	-	-	-	-	-	-	1
	effigy scoop	5	-	-	-	-	-	-	5
	jar	22	9	1	-	2	3	-	37
	seed jar	1	-	-	-	-	-	-	1
	indeterminate	2	-	-	-	-	-	-	2
Total number of sherds		**73**	**29**	**20**	**3**	**6**	**3**	**1**	**135**

Feature 4, which contained pottery making tools, also included an odd, cauldron-shaped vessel remade into a scoop. This might have been part of the pottery making kit.

It is probably not unusual that no decorated pottery could be found in several of the features and loci. The site appears to have been a resource processing area or small hamlet or farmstead. Decorated wares were found primarily in house structures, leaving the utilitarian wares to be used in the roasting pits and other features.

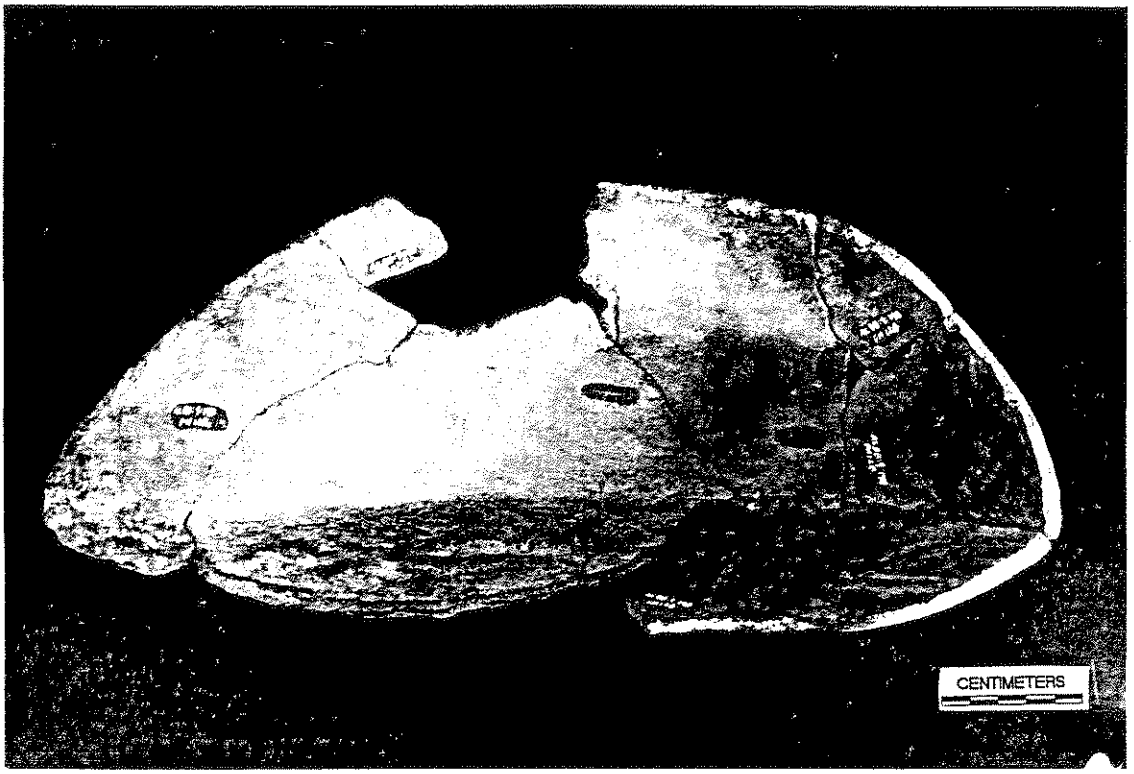


Figure 5.2. Scoop or reworked shallow bowl recovered from pit structure Feature 4, AZ BB:9:148 (ASM).

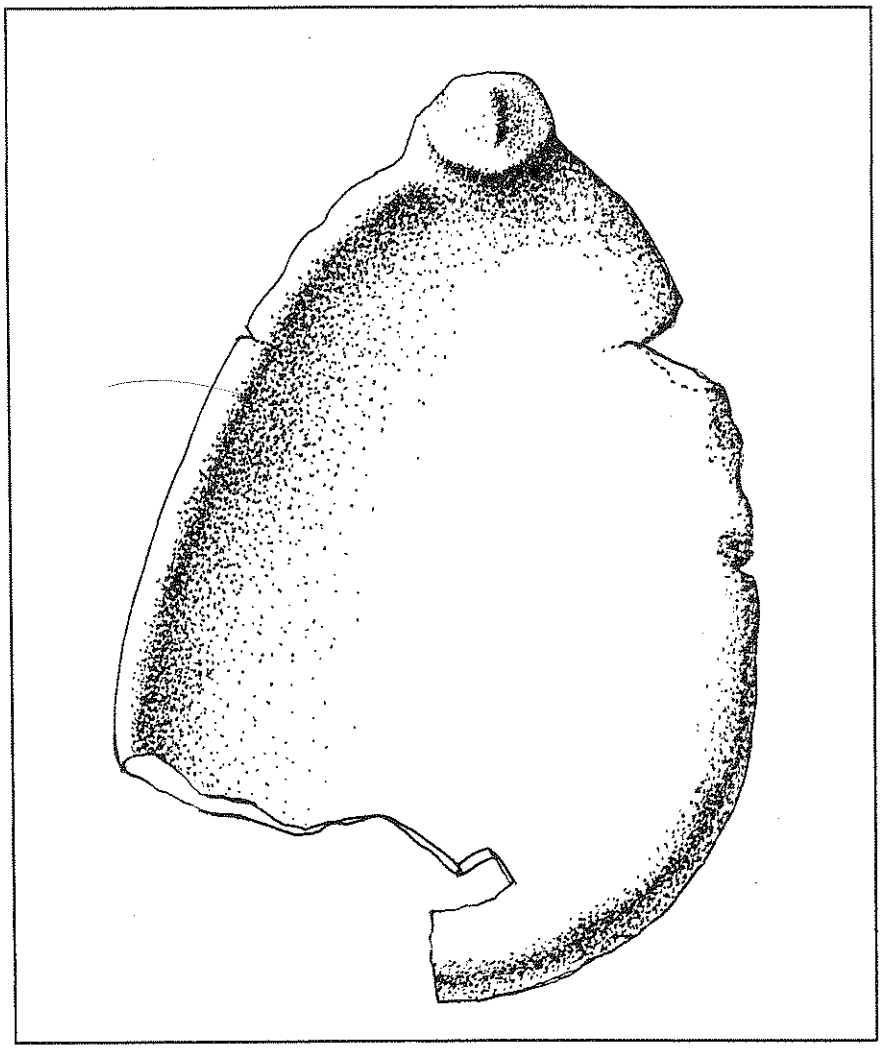


Figure 5.3. Scoop with effigy head from pit structure Feature 4, AZ BB:9:148 (ASM) (actual size).

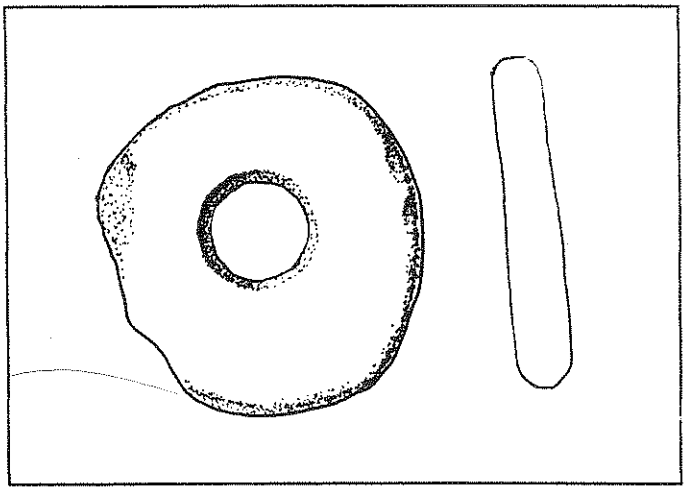


Figure 5.4. Perforated disk with large center hole found on the surface in Locus 4/5, AZ BB:9:148 (ASM) (actual size).

Table 5.10. Worked Sherds (excluding Rincon Red-on-brown scoop described in Table 5.5)

Provenience	Type	Description	No. of sherds
Locus 4/5 Point Location 3	Plain ware	Sherd from a granitic-tempered vessel of indeterminate shape made into a large dish; about 1/3 represented (broken fragments are 6 cm diameter); edges have been ground. (FN 130)	2
Locus 4/5 surface	Gila Plain	Perforated disk made from a vessel of indeterminate shape; micaceous granitic temper; large center hole is 1.3 to 1.4 cm diameter and slightly off center; hole was ground in from both surfaces; disk is 4.5 cm diameter and 6 mm thick, with ground edges. (FN 2)	1
Locus 4/5 Backhoe scrape	Plain ware	Unperforated disk with chipped edges made from a vessel of indeterminate shape with quartz-feldspar-volcanic temper; disk is 3 cm diameter and 6 mm thick. (FN 406)	1
Locus 4/5 Feature 4 fill NW	Plain ware	Ca. 3/4 of an unperforated disk with ground edges made from a vessel of indeterminate shape with granitic-volcanic temper; 5.5 cm diameter, 8 cm thick. (FN 124)	1
L 4/5 Feature 5	Plain ware	Unperforated disk with ground edges (some chipped areas along one side), made from a granitic tempered vessel; 5.5 cm diameter, 6 mm thick. (FN 254)	1
Locus 4/5 Feature 30 backhoe	Plain ware	Bowl rim sherd with incompletely drilled hole 1 cm below rim. Hole is 6 mm diameter on outer edge, 3 mm inside. (FN 116)	1
Locus 4/5, Feature 30 fill	Plain ware	Corner of a large plate made from a granitic tempered vessel of indeterminate size; plate was probably square or rectangular; 5-mm-thick piece is 15.5 by 16 cm in size, with two ground edges that had been chipped to shape. (FN 414)	1
Locus 4/5 Feature 32 fill	plain ware	Ca. 2/3 of an unperforated disk with well-ground edges; 5.2 cm diameter, 6 mm thick. (FN 411)	1
Locus 16/17 Trench 5	Gila Plain	Ca. 3/4 of a chipped disk, made from a micaceous granitic vessel of indeterminate shape; sherd is 5.3 cm diameter, 6 mm thick. (FN 30)	1
Locus 18, Feature 45 fill	plain ware	Disk with chipped edges made from a granitic-tempered vessel of indeterminate shape; 4.5 by 4 cm diameter with squared-off corners; 6-mm-thick walls. (FN 270)	1
Locus 18, Feature 41 fill SE	Gila plain	Large sherd (12 × 10 cm) from vessel of indeterminate shape, micaceous granitic temper; with 4-mm-diameter drilled hole on one edge; hole was drilled from one side. (FN 295)	1
Locus 18, Feature 45 fill	Gila plain	Bowl rim sherd with drilled hole 1.3 cm below rim; hole is 3 mm diameter. (FN 271)	1

CHAPTER 6

FLAKED AND GROUND STONE ANALYSES

India S. Hesse

This chapter presents the detailed analyses of flaked and ground stone artifacts recovered during the Neighborhood 12 Data Recovery Project.

FLAKED STONE

Six hundred sixteen flaked stone artifacts were recovered from AZ BB:9:148 (ASM) as a result of data recovery efforts. Analytical methods employed in this study are described below, followed by the results of the analysis.

Methods

The analysis of the flaked stone assemblage from Neighborhood 12 was exploratory in nature and attempted to answer basic questions regarding prehistoric lithic manufacturing strategies, patterns of lithic raw material exploitation, use of activity areas, and site subsistence activities. The analytical approach undertaken here was multi-dimensional in nature. In addition to provenience information, all debitage and tools were classified according to 18 possible variables or observations: technological category, morphological type, raw material, platform presence/absence, number of dorsal scars (debitage only), platform type, termination type (debitage and flake tools), break type, portion, percentage of cortex, size (metric attributes on tools, cores and hammerstones–length, width, and thickness), size grade, weight (tools, cores and hammerstones), haft type (hafted tools), base shape (bifaces), notch location (projectile points), presence of reworking (tools), and narrative comments. Microscopic use-wear analyses, a technique fraught with accuracy problems (Young and Bamforth 1990), could not confidently be conducted within the scope of this study. It should therefore be noted that inferences about tool use were made based primarily on macroscopic morphological and technological characteristics. Such an approach provides the kind of information needed, not only to thoroughly describe the artifact and address the research goals, but also to ensure replicability and facilitate comparisons between this and other assemblages.

A number of specific attributes related to the above variables were recorded for each lithic artifact in the course of this analysis. Most of these attributes are self explanatory and will not be discussed in detail here. Detailed recording of these attributes provided a means of characterizing the variability within the collection. All artifacts were coded directly into a Microsoft Access computer database to reduce transcription error. The coding format for flaked stone artifact analysis employed here can be found in Appendix C. It is based in part—with regionally specific modifications—on a coding form developed by Daniel Amick for use at Yucca Mountain, Nevada (Buck et al. 1994).

Results

Of the 616 flaked stone artifacts recovered from both surface and excavated contexts at the site, there were 548 pieces of unmodified chipped-stone flaking debris, 32 tools, 15 cores, and 21 hammerstones. The dominant raw materials in use at the site were a variety of quartzites, as well as rhyolite and quartz crystal. There is evidence for the reduction of and production of flakes from quartzite, rhyolite and quartz crystal cores on site. Lithic artifacts were recovered from surface, backhoe, and excavated feature contexts at the site. The two pithouse structures (Features 4 and 41) contained 32% of the debitage and 59% of the tools. Feature 4 contained a larger and slightly more diverse flaked stone assemblage than Feature 41 (Table 6.1).

Table 6.1 Artifact Category by Context

	Feature 4	Feature 41	Other Features	Surface Collection Units	General Surface Loci	Backhoe Trenches	TOTAL
Core	2	4	1	4	4	-	**15**
CSFD	136	39	76	177	108	12	**548**
Hammer	1	4	5	9	2	-	**21**
Tool	10	9	3	6	4	-	**32**
TOTAL	**149**	**56**	**85**	**196**	**118**	**12**	**616**

Debitage

Five hundred forty-eight pieces of debitage were recovered from the site, representing wide use of locally available raw materials (Table 6.2). Quartzite was the most frequently used raw material at the site, representing 52% (n=284) of the debitage assemblage. Twenty-one percent (n=113) of the flaking debris assemblage was rhyolite. Quartz crystal represented 18% (n=98) of the assemblage. Chert (n=27), basalt (n=17), slate (n=6), chalcedony (n=1), obsidian (n=1) and milky quartz (n=1) made up the remaining 9% of the flaking debris. All of the raw material types, except obsidian, can be found in or around the Tucson Basin—in the Tortolita, Santa Catalina and Rincon Mountains as well as in the Tucson Mountains. The nearest source of obsidian, however, is the Picketpost Mountains near Superior, Arizona, where they are available in the form of Apache tears (Shackley 1995). In the debitage assemblage, three raw materials are represented by only a single flake each. These include obsidian, milky quartz, and chalcedony.

The majority of the debitage (73%, n=400) measured between 0.5 and 3.5 cm in maximum dimension, represented by size grades G1 through G3 (Table 6.3, Figure 6.1). Cortical and non-cortical flakes are similarly represented. Fifty-one percent (n=280) of the debitage is non-cortical and 49% (n=270) is cortical. Secondary and tertiary flakes are also similarly represented. The abundance of cortical flakes and debitage of all stages and sizes indicates that unworked or minimally reduced cores of quartzite, rhyolite and quartz crystal were reduced on site. Small-size debitage is always present in high

Table 6.2. Flake Type by Raw Material Type

	blade	cortex/no platform	biface edge-bite flake	no cortex/ no platform	percussion bft flake	pressure bft flake	primary flake	secondary flake	shatter	tertiary flake	unifacial retouch flake	TOTAL
basalt	-	-	-	2	-	-	2	5	2	5	1	17
chalcedony	-	-	-	-	-	-	-	-	-	1	-	1
chert	-	1	-	3	1	-	1	6	4	10	1	27
obsidian	-	-	-	-	-	-	1	-	-	-	-	1
milky quartz	-	-	-	1	-	-	-	-	-	-	-	1
quartz crystal	-	3	-	13	-	-	2	5	50	25	-	98
quartzite	1	20	-	18	-	1	44	95	28	76	1	284
rhyolite	-	6	1	24	-	-	13	40	3	26	-	113
slate	-	1	-	1	-	-	2	-	-	2	-	6
TOTAL	**1**	**31**	**1**	**62**	**1**	**1**	**65**	**151**	**87**	**145**	**3**	**548**

Table 6.3. Debitage Raw Material Type by Size Grade

	G0	G1	G2	G3	G4	G5	G6	G7	TOTAL
basalt	-	4	3	4	3	2	1	-	17
chalcedony	-	-	1	-	-	-	-	-	1
chert	-	4	10	6	5	1	1	-	27
obsidian	-	1	-	-	-	-	-	-	1
quartz	-	-	1	-	-	-	-	-	1
quartz crystal	7	66	15	7	2	-	1	-	98
quartzite	1	45	82	60	42	30	17	7	284
rhyolite	-	22	41	24	12	11	2	1	113
slate	2	3	1	-	-	-	-	-	6
TOTAL	**10**	**145**	**154**	**101**	**64**	**44**	**22**	**8**	**548**

frequencies in all types of lithic reduction. The unimodal curve further supports the suggestion that core reduction rather than biface production took place on site (cf. Ahler 1989; Patterson 1990).

Sixty-seven percent of the flakes (n=365) were platform-remnant-bearing. The remaining 33% (n=183) of the flakes did not retain a platform. Only three flakes indicating possible bifacial reduction were present in the assemblage, representing three different raw materials: quartzite, rhyolite and chert. The remaining flakes retained platforms indicative of expedient core reduction and flake production. Forty-eight percent (n=256) of the flakes have either cortical or flat platforms. Only 7% of the debitage (n=38) have prepared—either reduced or faceted—platforms. The high quantity of flakes with no platforms, cortical platforms, and featureless platforms indicates that hard-hammer and soft-hammer percussion were the dominant methods of reduction on site, and that cores were reduced without preparation of striking platforms.

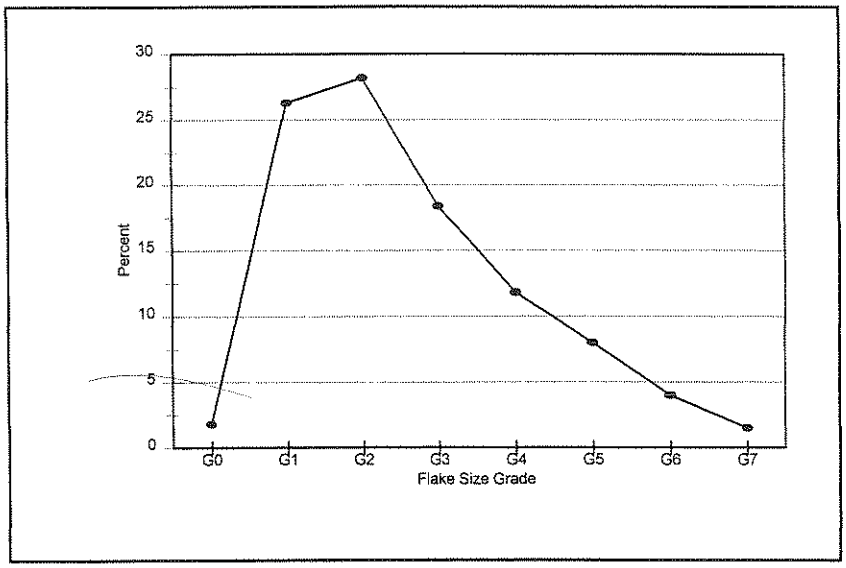


Figure 6.1. Flake size distribution by size grade.

Only three flakes are confidently indicative of biface reduction or maintenance. Two biface thinning flakes (one a percussion flake and one a pressure flake, and one biface edge-bite flake) were recovered. Three different raw material types are represented—quartzite, rhyolite and chert—indicating maintenance of three different bifaces. Three unifacial resharpening flakes of quartzite, chert, and basalt indicate the maintenance of at least three unifacially retouched tools. Edge-modified chert and quartzite flakes were recovered on site (see Table 6.4).

Of the 548 pieces of debitage in the assemblage, 32% (n=175) were recovered from excavated contexts within the two pithouse features, Feature 4 and Feature 41 (Table 6.5). The remaining 68% (n=373) were recovered from surface or backhoe-trench contexts, or from thirteen excavated non-structure features. Feature 41 contained only 22% (n=39) of the structure-associated debitage, whereas Feature 4 contained 78% (n=136) of debitage from this context. Ninety-eight percent (n=96) of all quartz crystal debitage was located within Feature 4. In addition, the only six slate flakes in the assemblage were located within Feature 4. Feature 4 was a specific locale where quartz crystal reduction (from an unknown initial quantity of crystal cores) and slate tool production took place (see discussion of tabular knives below). No quartz crystal tools were identified in the collection. If quartz tools were manufactured, or flakes used on site, these were either not recovered or these items may have been carried away from the site. Limited secondary and tertiary reduction of rhyolite, quartzite, and chert also took place within the feature. The assemblage from Feature 41 indicates that fewer and more limited lithic reduction-related activities took place there. Only 39 flakes of quartzite, rhyolite, and basalt were present.

Table 6.4. Platform Type by Flake Type

	angle	cortical	crushed	faceted	flat	linear	N/A	punctiform	reduced	TOTAL
blade	-	-	-	-	1	-	-	-	-	**1**
cortex/no platform	-	-	-	-	-	-	31	-	-	**31**
edge-bite flake	-	-	-	1	-	-	-	-	-	**1**
no cortex/no platform	-	-	-	-	-	-	62	-	-	**62**
percussion bft flake	-	-	-	1	-	-	-	-	-	**1**
pressure bft flake	-	-	-	1	-	-	-	-	-	**1**
primary flake	5	24	1	1	20	8	-	4	2	**65**
secondary flake	4	93	1	4	36	7	1	2	3	**151**
shatter	-	-	-	-	-	-	87	-	-	**87**
tertiary flake	7	-	2	15	79	24	2	6	10	**145**
unifacial retouch flake	-	-	-	-	3	-	-	-	-	**3**
TOTAL	**16**	**117**	**4**	**23**	**139**	**39**	**183**	**12**	**15**	**548**

Table 6.5. CSFD Raw Material by Feature

	Chert	Quartz Crystal	Quartzite	Rhyolite	Slate	Basalt	TOTAL
4	2	93	12	16	-	-	**123**
4-F	-	2	-	-	-	-	**2**
4-I	-	-	1	-	-	-	**1**
4-M	-	-	-	1	-	-	**1**
4.01	-	1	1	-	6	-	**8**
4.11	-	-	1	-	-	-	**1**
Sub-Total	2	96	15	17	6	0	**136**
41	-	-	30	6	-	1	**37**
41-C	-	-	-	-	-	1	**1**
41-T	-	-	1	-	-	-	**1**
Sub-Total	0	0	31	6	0	2	**39**
TOTAL	**2**	**96**	**46**	**23**	**6**	**2**	**175**

Cores

Thirteen cores and two tested pieces (with less than 4 flake removals) were recovered from the site (Table 6.6). Quartzite and rhyolite were the preferred raw materials for core reduction and flake production. Combined, these two raw material types represent 87% (n=13) of the core sample. Cores

Table 6.6. Core Type by Raw Material

	basalt	chert	quartzite	rhyolite	TOTAL
bidirectional core	-	-	1	1	2
core fragment	1	-	-	1	2
multidirectional core	-	-	2	2	4
tested piece	-	-	2	-	2
unidirectional core	-	1	2	2	5
TOTAL	**1**	**1**	**7**	**6**	**15**

were reduced in a variety of ways, including bidirectional, multidirectional, and unidirectional flake removals. No formal reduction strategy or additional labor investment was employed that would maximize raw-material usage. This pattern is consistent with that of a primarily sedentary, agricultural community with easy access to raw materials.

Tools

Thirty-two tools were recovered at AZ:BB:9:148 (ASM) as a result of data recovery efforts, including 17 flake tools, 7 core tools, 2 flaked stone tabular knives, 3 Archaic projectile points and 3 Ceramic period projectile points (Figure 6.2). Six raw material types are represented—chert, obsidian, quartzite, rhyolite, slate, and an indeterminate volcanic material. Again, quartzite and rhyolite were the favored raw material types for tool production (Table 6.7). Combined, these two raw materials were used in 62% (n=20) of the tool sample. Further, the seven core tools were made of either quartzite or rhyolite, and likely represent activities such as chopping, pounding, or heavy duty cutting.

Nineteen (59%) tools were found in excavated context within the two pithouse structures and their sub-features or postholes (Table 6.8). The remaining 41% of the tool sample was recovered from other non-structure features or from surface or backhoe contexts across the site. The excavated tools were distributed evenly between the two features. Ten tools were recovered in Feature 4, and nine were recovered in Feature 41. Although a slightly greater number and variety of flaked tools were recovered in Feature 4 compared to Feature 41, there were distinct similarities between the assemblages of the two features. Each contained at least one Ceramic period projectile point as well as one Late Archaic period point. A Cienega point was recovered from Feature 4, and Feature 41-Q, a posthole, contained a San Pedro point.

Different material types appear to have been chosen for the production of different kinds of tools. Whereas chert, rhyolite, quartzite, and volcanic materials were used in the production of the flaked tools, slate was used only in the production of tabular knives. The cleavage pattern of slate lends itself well to tabular tool production. Similarly, all of the Ceramic period points were made of obsidian, and all of the Archaic period points were made of white or red fine-grained chert not seen elsewhere in the assemblage.

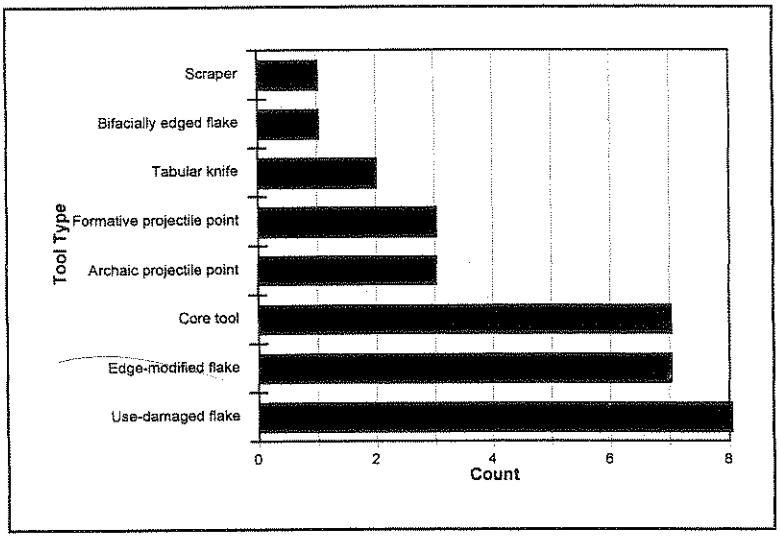


Figure 6.2. Tool Type distribution at AZ BB:9:148 (ASM).

Table 6.7. Tool Type by Raw Material

	chert	obsidian	quartzite	rhyolite	slate	unknown volcanic	TOTAL
Flake tools:							
edge-modified flake	1	-	2	3	-	1	7
use-damaged flake	1	-	3	4	-	-	8
discoidal scraper w/notch	-	-	-	1	-	-	1
bifacially edged flake	1	-	-	-	-	-	1
Projectile points:							
Cienega point	1	-	-	-	-	-	1
Cortaro point	1	-	-	-	-	-	1
San Pedro point	1	-	-	-	-	-	1
Ceramic period point	-	3	-	-	-	-	3
Other:							
core tool	-	-	5	2	-	-	7
tabular knife	-	-	-	-	2	-	2
TOTAL	**6**	**3**	**10**	**10**	**2**	**1**	**32**

Table 6.8. Tool Type by Feature

Feature	Cienega Point	Core Tool	Discoidal Scraper W/notch	Edge-modified Flake	Ceramic Period Point	San Pedro Point	Tabular Knife	Use-damaged Flake	Total
4	1	1	1	1	2	-	2	1	**9**
4.5	-	-	-	1	-	-	-	-	**1**
41	-	2	-	1	1	-	-	4	**8**
41-Q	-	-	-	-	-	1	-	-	**1**
TOTAL	**1**	**3**	**1**	**3**	**3**	**1**	**2**	**5**	**19**

Flake tools were created with either intentional unifacial retouch (n=8), no retouch (use-damage only, n=8), or intentional, non-invasive bifacial retouch (n=1). One of the unifacially retouched flake tools was a patterned discoidal scraper with a notch, indicating possible activities such as shaft shaping or wood and bone working in addition to hide or fiber processing.

The two tabular knives were made on flake blanks of purple-gray slate. One of them exhibits possible minimal, non-invasive unifacial edging or use damage. The other tool retains no evidence of retouch but exhibits scalar scarring in a concave, notch-like area on the tool margin. The presence of these two tools on site lends support to the idea that agave processing activities took place. Both tools were recovered in Feature 4.

Six projectile points were recovered, including five from excavated contexts within the two structures and one from general surface context at Locus 13 (Table 6.9). Two Ceramic period points were recovered from Feature 4 (FNs 208, 421), and one was recovered from Feature 41 (FN 294). All three were small, triangular, corner-notched points made of obsidian (Figure 6.3). The point from Feature 41 was complete and unbroken and manufactured from a greenish, black-banded obsidian (Figure 6.3a). The two points from Feature 4 were broken, one as a result of an impact fracture that removed the tip (Figure 6.3b). The other broken point lacks a base and retains cortex on one surface (Figure 6.3c). The bending break that removed the base is potentially characteristic of either use or manufacture-related damage.

Interestingly, three Archaic period points were recovered at the site, one from surface context and two from sub-surface context in association with Ceramic period structures. A Late Archaic San Pedro point was recovered from Feature 41 (Figure 6.3d), and a Late Archaic Cienega point was recovered from Feature 4 (Figure 6.3e). A third Middle to Late Archaic Cortaro-style projectile point was also recovered from the surface of the site (Figure 6.3f). The San Pedro point was complete and made of a fine-grained white chert. The Cienega point was refit from two pieces and is missing the base as a result of a snap fracture. It was also manufactured from white chert. The Cortaro-style point is nearly complete and is made of a red chert. It is generally triangular in form, with a slightly concave base. The tip was removed as a result of an impact fracture. During manufacture, some of the flake removals terminated at the center line in hinge and step fractures, creating a slightly diamond-shaped cross section. These features are characteristic of the Cortaro type, as defined by Roth and Huckell (1992). Although the overall dimensions of the point are small, it is within the range of measurements observed on other Cortaro points

Table 6.9. Projectile Point Summary

Type	Prov	Raw Material	Portion	L (cm)	W (cm)	T (cm)	Wgt (g)	Base shape	Notch type	Rework	Comment
Small triangular side-notched FN 208	Feat. 4 pit structure	obsidian	tip	1.64	0.74	0.40	0.60	unknown	not present	no	base broken by bending fracture just below notches
Small triangular side-notched FN 421	Feat. 4 pit structure	obsidian	nearly complete	1.55	1.21	0.24	0.20	straight	side	no	impact flute
Small triangular side-notched FN 294	Feat. 41 pit structure	obsidian	complete	1.72	1.21	0.24	0.20	straight	side	no	greenish banded obsidian
Cortaro-style FN 379	surface, Locus 13	red chert	nearly complete	2.24	1.72	0.74	2.70	slightly concave	N/A	possible	impact flute; diamond-shaped cross section
Cienega FN 217	Feat. 4 pit structure	white chert	nearly complete	3.30	2.26	0.36	2.40	unknown	corner	no	base snapped off; Cienega long sub-type
San Pedro FN 342	Feature 41Q, post hole	white chert	complete	3.93	1.88	0.55	0.45	straight	side	no	

from the Tucson Basin (Roth and Huckell 1992). In addition, it is estimated that approximately 0.8 cm of the tip of this specimen was lost as a result of the impact damage.

The presence of at least two of the Archaic projectile points in association with a Ceramic period occupation indicates that the artifacts were collected and curated by the Hohokam. The points may have held symbolic significance for the occupants of the site.

Hammerstones

Twenty-one hammerstones were recovered (Table 6.10). Only 24% (n=5) of these were recovered in excavated context from the two structures. One was recovered from Feature 4, and four were recovered from Feature 41. This is interesting to note due to the more limited lithic reduction that took place in Feature 41 compared to Feature 4. Basalt, quartzite, and rhyolite cobbles and cores were used as hammerstones. Quartzite was the preferred material for use as a hammerstone, representing 81% of the hammerstone assemblage. Cobbles of quartzite could have been procured nearby in the streambed of the Cañada del Oro and transported to the site. Cobble and core-type hammers of quartzite are similarly represented.

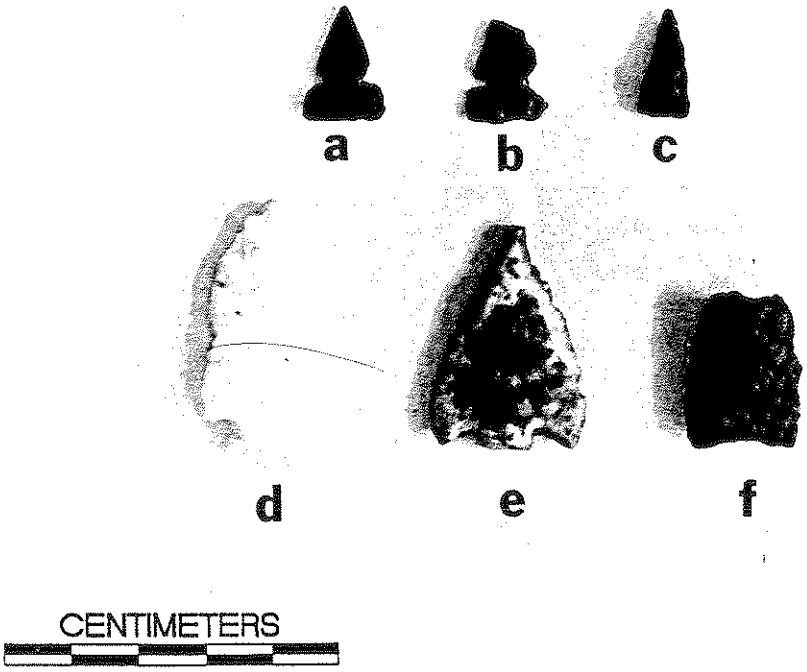


Figure 6.3. Projectile points from AZ BB:9:148 (ASM): a-c) Ceramic period projectile points; d) Late Archaic San Pedro point; e) Late Archaic Cienega point; f) Middle to Late Archaic Corarostyle point.

Table 6.10. Hammerstones by Raw Material

	basalt	quartzite	rhyolite	TOTAL
cobble hammer	1	7	-	**8**
core hammer	-	8	2	**10**
hammer fragment	-	2	1	**3**
TOTAL	**1**	**17**	**3**	**21**

Summary and Conclusions

The debitage and cores from the site indicate that a generalized, freehand, unprepared core-reduction strategy was practiced by the site's occupants. Flakes appear to have been removed from cores without preparation of striking platforms, and with no pattern or orientation to the removals. Similarly, flakes were more often used unaltered, and minimal investment was expended towards retouching flakes into tools. Good quality lithic raw materials were available in the general vicinity of the site. Locally available quartzites were chosen most often for cores for producing flakes and for use as hammers. A variety of activities are indicated, including flake and tool production and maintenance, processing of various resources—possibly including materials such as hide, wood, agave and other plant materials, and

collection and curation of pre-Ceramic projectile points for unknown uses. The size and diversity of the assemblage is characteristic of a fairly non-intensive occupation of short duration.

GROUND STONE ANALYSIS

Fifty-one ground stone artifacts, artifacts that were used to grind various substances or were shaped by abrasion and used for a variety of tasks, were recovered from AZ BB:9:148 (ASM).

Methods

The analysis of ground stone artifacts from site AZ BB:9:148 (ASM) was guided by three main research goals. One of the goals was to provide a detailed description of each ground stone artifact recovered from the site in order to facilitate intersite comparisons. Second, information about the kinds of resources processed and the range of activities conducted on site was gathered. Finally, patterns of raw material use and ground stone manufacturing technology were explored. In order to obtain information relevant to these goals, the ground stone analytical system recorded twenty-one variables in addition to provenience information: category (handstone, netherstone, etc.), type (mano, metate, pounder, palette, etc.), sub-type (basin, trough, flat, grooved, etc.), number of hands (for manos), morphology, presence of intentional shaping (yes/no), raw material type, raw material texture, evidence of burning, evidence of manufacture strategy (flaking, pecking, grinding), number of different uses, type of secondary use (if applicable), number of used surfaces, degree of surface wear (light, moderate, heavy), presence of grips or grooves (handstones), artifact condition (complete, nearly complete, fragment), size (length, width, thickness, and depth measured to the nearest tenth of a centimeter), weight (grams), reworking, residues adhering and narrative comments. This analytical system uses similar regional-specific terminology and variables and is based on systems for ground stone analysis developed by Adams (1997) and Fratt (1992b).

Ground stone artifact types were determined based on morphological characteristics. Artifacts were measured to the nearest tenth of a gram on a triple beam Ohaus balance whenever possible. Artifacts exceeding the maximum capacity of that scale (2610.0 grams) were measured in pounds on a bathroom scale with ¼ pound accuracy. Therefore, for artifacts exceeding 2610.0 grams, conversions were rounded to the nearest 100 grams. Dimensional measurements were made with either calipers or a metric tape.

Results

Fifty-one ground stone artifacts were recovered from both surface and excavated contexts at the site. Manos and other handstones (n=26) and metates and other netherstones (n=20) comprise 90% of the assemblage. A three-quarter grooved axe, a stone ring/doughnut, a caliche pigment source, and two natural shapes make up the remaining 10% of the assemblage. A variety of both labor-intensive shaped items as well as expedient unshaped items are present in the ground stone assemblage (Table 6.11).

Table 6.11. Summary of the Ground Stone Assemblage at Site AZ BB:9:148 (ASM)

		Feature 4	Feature 41	Roasting Pit Features	All Other Features	General Backhoe or Surface	Total
HANDSTONES:	handstone/mano	-	-	-	-	1	**1**
	mano	2	2	3	3	4	**14**
	pecking stone	2	-	1	-	-	**3**
	polishing stone	2	-	-	1	-	**3**
	tabular tool	-	-	-	-	2	**2**
	indeterminate	-	-	-	-	3	**3**
NETHERSTONES:							
	metate	1	2	5	3	1	**12**
	grinding slab	1	-	2	1	-	**4**
	lapstone	2	-	-	-	-	**2**
	indeterminate	2	-	-	-	-	**2**
Composite Tools:							
	axe	-	1	-	-	-	**1**
SHAPED ITEMS:							
	ring/doughnut	-	1	-	-	-	**1**
	pigment source	1	-	-	-	-	**1**
	natural shape	1	1	-	-	-	**2**
	Total	**14**	**7**	**11**	**8**	**11**	**51**

Twenty-seven percent of the artifacts (n=14) were recovered from excavated context within Feature 4—a pit structure, 14 % (n=7) were recovered from Feature 41—also a pit structure, 16 % (n=8) were recovered from four roasting pit features (Features 38, 55, 58 and 78), 21 % (n=11) were recovered from all contexts within six other non-structure features (Features 25, 35, 39, 40, 42, and 45) and 22 % (n=11) were recovered from backhoe trenching or scraping, or general surface collection contexts across the site (Table 6.12).

Table 6.12. Ground stone sub-type by type and feature (where applicable).

Feature	Type	3/4 Groove	Basin	Bifacial	Trough	Concave	Flat	Floor/ Nutting	Ring/ Doughnut	Trivet	Indet	Total
4	grinding slab	-	-	-	-	-	1	-	-	-	-	1
	lapstone	-	-	-	-	-	2	-	-	-	-	2
	mano	-	-	1	1	-	-	-	-	-	-	2
	metate	-	-	-	-	-	-	-	-	-	1	1
41	axe	1	-	-	-	-	-	-	-	-	-	1
	ring/doughnut	-	-	-	-	-	-	-	1	-	-	1
	mano	-	1	-	1	-	-	-	-	-	-	2
	metate	-	-	-	2	-	-	-	-	-	-	2
	natural shape	-	-	-	-	-	-	-	-	1	-	1
Roasting Pits	mano	-	-	1	-	-	1	-	-	-	1	3
	metate	-	2	-	-	-	1	-	-	-	-	3
	grinding slab	-	-	-	-	-	2	-	-	-	-	2
All other contexts	handstone	-	-	-	-	-	1	-	-	-	-	1
	mano	-	-	2	3	1	-	-	-	-	1	7
	metate	-	3	-	2	-	1	-	-	-	-	6
	grinding slab	-	-	-	-	-	1	-	-	-	-	1
	polishing stone	-	-	-	-	-	-	1	-	-	-	1
	indeterminate	-	-	-	-	1	-	-	-	-	2	3
	Total	**1**	**6**	**4**	**9**	**2**	**10**	**1**	**1**	**1**	**5**	**40**

A wide variety of predominately volcanic raw materials were used in the production of the ground stone assemblage (Table 6.13). Twelve distinct varieties of raw material were identified through visual inspection. Granites and vesicular basalts were most often used. Granites represent 41% of the ground stone assemblage (n=21) and vesicular basalts represent 24% (n=12). The remaining 35% of the assemblage (n=18) consists of andesite, dacite, non-vesicular basalt, schist, slate, quartzite, chert, caliche, and indeterminate raw materials.

Table 6.13. Raw Material Type by Ground Stone Artifact Type

	Andesite	Dacite	Basalt	Vesicular Basalt	Vesicular Phenocrystic Basalt	Granite	Granite Aplite	Gneissic Granite	Fine-grained Schist	Slate	Quartzite	Chert	Caliche	Indet	Total
axe	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
ring/ doughnut	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
grinding slab	1	-	-	-	-	2	-	-	-	-	1	-	-	-	4
lapstone	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
handstone	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
mano	-	-	1	3	1	5	-	3	1	-	-	-	-	-	14
metate	1	1	-	1	2	7	-	-	-	-	-	-	-	-	12
pecking stone	-	-	-	-	-	-	1	-	-	-	2	-	-	-	3
polishing stone	-	-	-	-	-	1	-	-	-	-	2	-	-	-	3
tabular tool	-	-	-	-	-	-	-	-	-	1	1	-	-	-	2
pigment source	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
natural shape	-	-	-	-	-	-	-	-	-	-	1	1	-	-	2
indet.	-	-	-	1	3	1	-	-	-	-	-	-	-	-	5
Total	**2**	**1**	**2**	**6**	**6**	**16**	**2**	**3**	**1**	**1**	**7**	**1**	**1**	**2**	**51**

Overall, the ground stone assemblage was in good condition. Sixty-three percent (n=32) of the ground stone artifacts were either complete or nearly complete, and 37% (n=19) were fragmentary (Table 6.14). Sixty percent (n=12) of the netherstones, however, were fragmentary, whereas only 27% (n=7) of the handstones were fragmentary. All of the composite tools and shaped items (n=5) were complete. All artifacts, regardless of condition, were weighed and measured (Table 6.15).

Handstones

Twenty-six handstones were recovered from site AZ BB:9:148 (ASM), representing 51% of the total assemblage. Fifty-four percent (n=14) of the artifacts in the handstone assemblage were manos, 12% (n=3) were pecking stones, 12% (n=3) were polishing stones, 8% (n=2) were tabular tools, one artifact (4%) was a generalized handstone/probable mano fragment, and the final 12% (n=3) were too fragmentary to be identified. Handstones are the hand held portion of the grinding tool kit, used in conjunction with a netherstone or alone. Manos are generally associated with processing plant foods and pigments. Tabular

Table 6.14. Condition of Ground Stone Artifacts

	Complete	Nearly Complete	Fragment	Total
Handstones	16	3	7	**26**
Netherstones	7	1	12	**20**
Composite Tool (axe)	1	-	-	**1**
Shaped Items	4	-	-	**4**
Total	**28**	**4**	**19**	**51**

Table 6.15. Measurements of Complete and Nearly Complete Ground Stone Artifacts

FN	PL	Feature	Category	Type	Sub Type	Condition	Length (cm)	Width (cm)	Thick* (cm)	Depth (cm)	Weight (g)
93	-	-	handstone	handstone/mano	flat	complete	9.38	8.53	8.35	-	968.5
96	-	-	handstone	mano	bifacial	complete	12.80	11.20	3.73	-	864.0
146	-	-	handstone	mano	trough	nearly complete	17.40	8.66	4.25	-	891.0
133	5	-	handstone	mano	trough	complete	18.60	8.02	3.04	-	778.2
202	-	40	handstone	mano	concave	complete	12.02	10.62	6.05	-	1282.6
127	2	4	netherstone	grinding slab	flat	complete	27.00	21.00	4.00	-	4800
392	-	78	netherstone	grinding slab	flat	complete	34.00	26.00	3.00	-	6300
177	28	4	shaped item	pigment source	caliche	complete	15.00	9.00	7.00	-	584.3
181	23	4	handstone	polishing stone	pebble	complete	3.88	3.42	2.35	-	48.3
123	-	4	handstone	polishing stone	pebble	complete	4.18	3.87	3.45	-	78.4
206	-	4	shaped item	natural shape	pebble	complete	2.59	1.96	1.63	-	10.9
164	18	4	netherstone	lapstone	flat	complete	21.00	17.00	3.20	-	1927.9
163	13	4	netherstone	lapstone	flat	complete	19.00	17.00	2.74	-	1324.0
203	-	39	handstone	mano	bifacial	complete	12.48	9.85	4.45	-	1023.7
305	1	41	handstone	mano	trough	complete	21.10	10.04	4.27	-	1502.6
357	19	41	handstone	mano	basin	nearly complete	9.10	6.73	6.31	-	644.9
370	-	42	handstone	polishing stone	floor/nutting stone	complete	10.00	9.00	4.20	-	767.7
309	22	41	shaped item	ring/doughnut	ring	complete	6.96	6.37	3.33	-	164.1
296	-	41	composite tool	axe	3/4 groove	complete	7.35	2.74	2.80	-	87.6
240	-	38	handstone	mano	flat	complete	11.01	10.84	3.80	-	729.0
135	-	35	handstone	mano	trough	complete	21.00	8.96	3.50	-	1000.0
391	-	78	handstone	pecking stone	cobble	complete	7.07	5.51	4.26	-	244.6
418	-	38	netherstone	grinding slab	flat	complete	21.00	15.00	5.00	-	3500
279	2	45	netherstone	grinding slab	flat	complete	34.00	26.00	4.00	-	6400
393	-	78	netherstone	metate	basin	nearly complete	33.00	25.00	7.00	3.00	11400
364	31	41	shaped item	natural shape	trivet	complete	23.00	18.00	4.04	-	3300
174	24	4	handstone	pecking stone	cobble	complete	7.52	6.62	4.29	-	309.5
120	-	-	handstone	tabular tool	edge and surface	nearly complete	16.72	8.98	0.80	-	209.0
170	16	4	handstone	pecking stone	cobble	complete	7.57	6.10	3.82	-	264.2
176	26	4	handstone	mano	bifacial	complete	13.72	10.10	2.94	-	812.4
179	27	4	handstone	mano	trough	complete	22.00	9.30	3.30	-	1036.9
150	6	4	netherstone	indeterminate	indeterminate	complete	21.00	16.00	10.00	-	3900

* Refers to minimum thickness of artifact at use-surface.

tools are often associated with agave production, although wood, bone, or hide working are possible alternate uses (Adams 1994).

Feature 4

Six handstones were recovered from Feature 4, including 2 manos, 2 polishing stones, and 2 pecking stones. One mano was an oval bifacial mano made of gneissic granite with heavy wear on both surfaces and was probably used with a flat/concave metate. The other mano was a two-handed rectangular trough mano made of basalt with moderate surface wear. The pecking stones and polishing stones were natural, unshaped cobbles and pebbles of quartzite with one or multiple light-use surfaces. These are probably associated with shaping or processing of a variety of other materials, including stone, wood, bone, and ceramic items.

Feature 41

Only two handstones, both manos, were recovered from Feature 41. One mano was a two-handed, loaf-shaped trough mano made of vesicular phenocrystic basalt. This specimen exhibited heavy wear. The second mano was oval and had been used with a basin metate. It was made of granite and exhibited heavy wear. This mano was also burned.

Roasting Pit Features

Four handstones, three manos and a pecking stone, were recovered from two of the four roasting pits. Three manos were recovered from Feature 38, a roasting pit reused as a burial feature. Feature 38 yielded a bifacial granite mano with evidence of burning and heavy wear, a circular mano with moderate surface wear, also made of granite and used with a flat metate, and finally, an indeterminate granite mano with heavy wear and burning. The pecking stone was an unshaped, granite aplite cobble with moderate wear recovered from Feature 78.

All Other Contexts

Fourteen handstones were recovered from the remainder of the site, including seven manos, one polishing stone, two tabular tools, one generalized handstone/mano, and three indeterminate handstone fragments.

Of the seven manos, three were recovered from backhoe fill, one was recovered from surface context, and Features 35, 39, and 40 yielded one mano each. Of the three manos recovered from backhoe contexts, one was bifacial and made of gneissic granite, and two were two-handed, loaf-shaped trough manos made of vesicular basalt. The surface-recovered mano was made of fine-grained schist. This specimen was too fragmentary to classify according to sub-type. The mano from Feature 35 was a two-

handed, loaf-shaped trough mano made of vesicular basalt with heavy wear. The mano from Feature 39 was an oval bifacial mano made of gneissic granite with heavy wear. Finally, the mano from Feature 40 was a complete, one-handed, circular granite mano with moderate surface wear. This mano was probably used against a concave grinding surface.

The polishing stone was recovered from Feature 42. This granite artifact was circular in form and shaped by pecking and grinding. It had two opposing use surfaces displaying heavy surface wear and a central pecked area. It is similar to artifacts described as floor polishers or nutting stones.

One tabular tool was recovered from surface context and one from backhoe fill. The surface-recovered tool was made of slate with moderate wear. The second tabular tool was made of quartzite and exhibited heavy wear. Both were shaped by grinding.

The four remaining artifacts include one handstone/mano fragment and three indeterminate handstone fragments. Two were recovered from surface context and two from backhoe fill context. None of these artifacts could confidently be classified by sub-type. The handstone/mano fragment may have been used with a flat metate, and one of the indeterminate fragments may have been used with a concave metate. Three raw materials were represented, including granite aplite, vesicular basalt, and vesicular phenocrystic basalt.

Netherstones

Twenty netherstones were recovered from site AZ BB:9:148 (ASM), representing 39% of the ground stone assemblage. Sixty percent of the netherstones (n=12) were metates or identifiable metate fragments, 20% (n=4) were grinding slabs, 10% (n=2) were lapstones, and 10% (n=2) were indeterminate netherstone fragments. Netherstones are the bottom, stationary stone upon which substances are processed. Metates are generally associated with food processing. Grinding slabs and lapstones may be associated with both food and pigment processing.

Feature 4

Six netherstones were recovered from Feature 4, including one metate, one grinding slab, two lapstones, and two indeterminate netherstones. The metate was too fragmentary to identify by sub-type. It was made of vesicular phenocrystic basalt and exhibited moderate surface wear. The grinding slab was a flat, unshaped cobble of granite with light surface wear and evidence of burning. The two lapstones were both flat, unshaped slabs of an indeterminate raw material. Raw material could not confidently be determined because the artifacts were not washed. They exhibited light surface wear and both had residues adhering. One (PL 13) retained a red pigment stain. The other lapstone (PL 18) retained two superimposed residues: a red pigment stain and a white, possibly caliche stain (see discussion of ground caliche artifact below).

Feature 41

Only two netherstones were recovered from Feature 41. Both artifacts were trough metates. One was a closed-end trough metate made of vesicular basalt and exhibiting heavy surface wear. The other was a trough metate made of vesicular phenocrystic basalt with moderate surface wear.

Roasting Pit Features

Seven netherstones, including five metates and two grinding slabs, were recovered from the four roasting pit features, Features 38, 55, 58, and 78. Three metates were recovered from Feature 55 and one metate was recovered from Features 58 and one from Feature 78. Of the three Feature 55 metates, two were trough and one was a fragmentary flat metate. The flat metate was made of granite with moderate surface wear. One of the trough metates was made of granite and one of dacite. The granite metate was rectangular in form with heavy wear and evidence of burning. The dacite metate exhibited moderate surface wear. This specimen was also burned. Both of the metates recovered from Features 58 and 78 were shaped, basin metates made of granite. Both were burned with heavy surface wear.

Two grinding slabs were recovered from Features 78 and 38. The Feature 78 grinding slab was made of granite with moderate surface wear and no intentional shaping. The Feature 38 grinding slab was a quartzite cobble with limited shaping in the form of flaking and pecking, with light surface wear and possible light pigment adhering. Neither artifact retained evidence of burning.

All Other Contexts

Five netherstones were recovered from the remainder of the site, including four metates and one grinding slab. One basin metate with heavy surface wear but very minimal shaping was recovered from general backhoe fill. All of the remaining three metates were recovered from Feature 25, a cluster of ground stone in the midst of several roasting pits. Two granite basin metates and one andesite flat metate were recovered from Feature 25. One of the granite basin metates was oval, shaped by pecking and grinding, and exhibited burning and heavy surface wear. The other was rectangular and exhibited no intentional shaping other than the heavily ground surface. This specimen was not burned. The flat metate was an andesite cobble with a heavily ground surface but no intentional shaping.

One flat grinding slab was recovered from Feature 45. This artifact was a large unshaped andesite cobble with moderate surface wear.

Composite Tools

Composite tools are tools that are hafted onto wooden handles in order to be used as designed. One composite tool was present in the assemblage from AZ BB:9:148 (ASM). This artifact was a small three-quarter grooved, wedge-shaped axe head made of basalt (Figure 6.4a). It was recovered from one of the pit structures (Feature 41). The axe blade was sharp and the artifact unbroken. The poll, or head, of the axe was shaped by pecking. This tiny artifact measured only 7.35 cm in length. The small size of

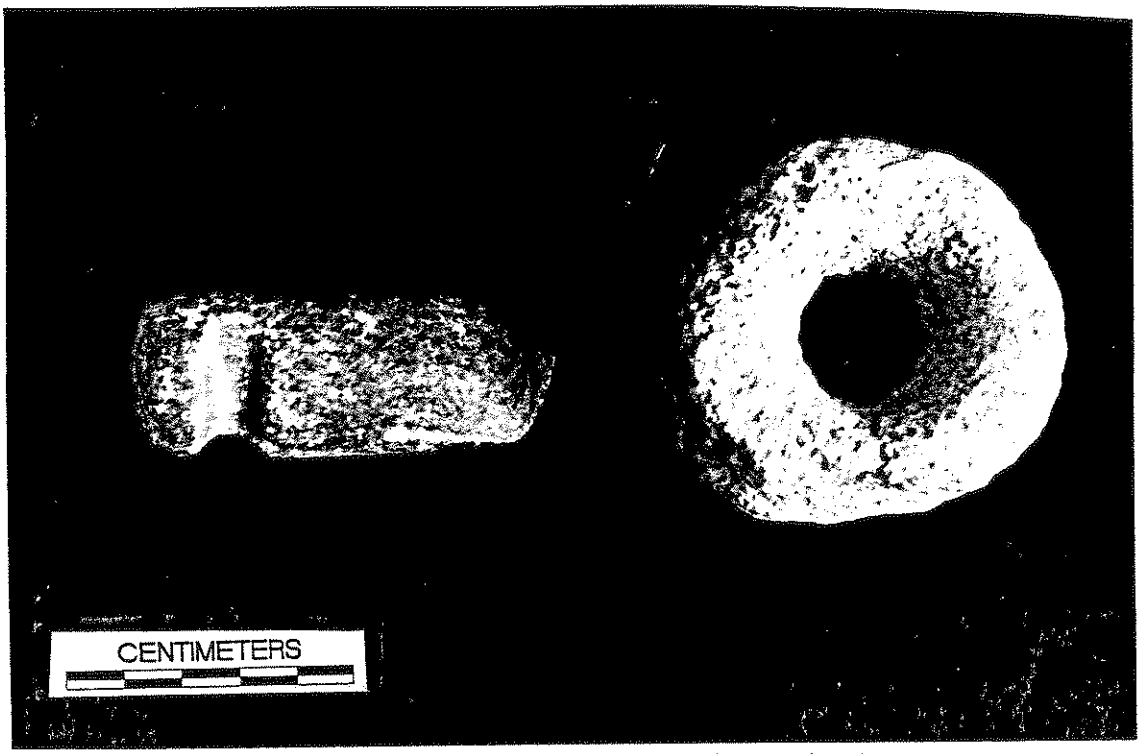


Figure 6.4. left) Three-quarter grooved axe; right) ground stone doughnut.

the axe indicates that it was not likely used for cutting wood, manufacturing other ground stone objects, or other heavy duty uses commonly associated with larger axes.

Shaped Items

Four shaped items were recovered at the site, representing 8% of the total ground stone assemblage. The shaped item assemblage included one stone ring or doughnut, two naturally shaped items, and a nodule of pigment.

The stone doughnut was recovered from the floor of Feature 41 (Figure 6.4b). It was made of vesicular basalt and had been shaped by pecking and grinding. The artifact is roughly circular and complete. The maximum diameter is 6.96 cm. The hole measures 2.35 cm in diameter. The function of this class of artifact is uncertain. Haury (1976:290) suggests that stone rings were possibly used for shelling corn, as weights on digging sticks, or as a component in a hoop-and-pole game. Interestingly, Adams (1997:20) notes a distinct context in which stone doughnuts are found in association with axes and axe-shaping tools in a structure at Point of Pines Pueblo. The Neighborhood 12 stone doughnut was recovered from the same pit structure which yielded the axe described above. The axe, however, was recovered from feature fill. The exact relationship between these two artifacts remains unclear.

Two natural shapes were recovered, one in each of the two pit structures. Natural shapes are interpreted as unaltered stones collected for their useful or interesting shape or look. They exhibit no intentional modification or use surfaces, but some wear may be present from handling or placement of other objects upon them. The natural shape from Feature 4 was a small, unaltered pebble of bright red chert. It is similar to pebbles which were used as polishing stones, but this specimen has no identifiable wear pattern. Chert is not available in the Tortolita Mountains. The artifact from Feature 41 was a flat, unaltered cobble of quartzite exhibiting light wear on the high surfaces, presumably from use as a trivet or for supporting other materials.

The final shaped item was a large nodule of caliche with a single, heavily ground surface recovered on the floor of Feature 4. This artifact is interpreted as a source of ground caliche for use as pigment or other unknown uses. This interpretation is supported by the presence of a lapstone from the floor of the same pit structure with residue of caliche adhering to the grinding surface.

Summary and Conclusions

The ground stone tools recovered from site AZ BB:9:148 (ASM) indicate that food processing was the primary activity associated with use of the ground stone tool kit. Manos and metates alone comprise 51% (n=26) of the assemblage. The presence of grinding slabs and tabular tools further indicates the importance of plant food processing on site. Besides food processing, the ground stone tools indicated that pigment processing and ceramic manufacture took place. Wood working and ground stone tool shaping are other possible activities.

The distribution of artifacts associated with particular activities indicates that pigment processing and ceramic polishing took place in Feature 4. Food-production-associated artifacts were recovered from both pithouses, although 50% (n=6) of the metates in the assemblage were recovered from two non-pit structure features, Feature 25 and Feature 55. This association is undoubtedly related to the reuse of ground stone as thermal rock. The axe and stone doughnut, both of uncertain function, were both from Feature 41. The small size of the axe leads to speculation that it may have functioned as a child's toy, or a ceremonial item, rather than as a wood or stone working tool.

The inhabitants at site AZ BB:9:148 (ASM) used expedient, unaltered pebbles and cobbles as well as formally shaped ground stone items. The lack of ground stone manufacturing debris indicates that the shaped ground stone artifacts were processed off site. The size and diversity of the ground stone assemblage is indicative of a small sedentary community with a fairly short occupation duration.

CHAPTER 7

POLLEN AND MACROFLORAL ANALYSIS

Kathryn Puseman, Linda Scott Cummings, and Laura Ruggiero
Paleo Research Laboratories

INTRODUCTION

Samples from features at Site AZ BB:9:148 (ASM) in the northern portion of the Tucson Basin in southern Arizona were examined for pollen and macrofloral remains. This site is believed to have been occupied by the Hohokam during the Rincon Phase, A.D. 950-1150, based on ceramic data. Excavations concentrated on six main areas at the site. Pollen and macrofloral analyses are used to provide information concerning plant resources available to and possibly utilized by the Hohokam occupants of the site.

METHODS

Pollen

A chemical extraction technique based on flotation is the standard preparation technique used in this laboratory for the removal of pollen from the large volume of sand, silt, and clay with which they are mixed. This particular process was developed for extraction of pollen from soils where preservation has been less than ideal and pollen density is low.

Hydrochloric acid (10%) was used to remove calcium carbonates present in the soil, after which the samples were screened through 150-micron mesh. The samples were rinsed until neutral by adding water, letting the samples stand for 2 hours, then pouring off the supernatant. A small quantity of sodium hexametaphosphate was added to each sample once it reached neutrality, then the beaker was again filled with water and allowed to stand for 2 hours. The samples were again rinsed until neutral, filling the beakers only with water. This step was added to remove clay prior to heavy liquid separation. At this time, the samples were dried then pulverized. Sodium polytungstate (density 2.1) was used for the flotation process. The samples were mixed with sodium polytungstate and centrifuged at 2000 rpm for 5 minutes to separate organic from inorganic remains. The supernatant containing pollen and organic remains was then decanted. Sodium polytungstate was again added to the inorganic fraction to repeat the separation process. The supernatant was decanted into the same tube as the supernatant from the first separation. This supernatant was then centrifuged at 2000 rpm for 5 minutes to allow any silica remaining to be separated from the organics. Following this, the supernatant was decanted into a 50 ml conical tube and diluted with distilled water. These samples were centrifuged at 3000 rpm to concentrate the organic fraction in the bottom of the tube. After rinsing the pollen-rich organic fraction obtained by this separation, all samples received a short (10-15 minute) treatment in hot hydrofluoric acid to remove any remaining inorganic particles. The samples were then acetylated for 3 minutes to remove any extraneous organic matter.

A light microscope was used to count the pollen to a total of 200 pollen grains at a magnification of 400-600x. Pollen preservation in these samples varied from good to poor. Comparative reference material collected at the Intermountain Herbarium at Utah State University and the University of Colorado Herbarium was used to identify the pollen to the family, genus, and species level, where possible.

Pollen aggregates were recorded during identification of the pollen. Aggregates are clumps of a single type of pollen, and may be interpreted as representing pollen dispersal over short distances, or the introduction of portions of the plant represented into an archaeological setting. Aggregates were included in the pollen counts as single grains, as is customary. The presence of aggregates is noted by an "A" next to the pollen frequency on the pollen diagram. A plus (+) on the pollen diagram indicates that the pollen type was observed outside the regular count while scanning the remainder of the microscope slide. Pollen diagrams are produced using Tilia, which was developed by Dr. Eric Grimm of the Illinois State Museum. Pollen concentrations are calculated in Tilia using the quantity of sample processed, the quantity of exotics (spores) added to the sample, the quantity of exotics counted, and the total pollen counted.

Indeterminate pollen includes pollen grains that are folded, mutilated, and otherwise distorted beyond recognition. These grains are included in the total pollen count, as they are part of the pollen record.

Flotation

The macrofloral samples were floated by personnel at SWCA, Inc., and the light fractions were submitted to Paleo Research for analysis. At Paleo Research, the light fractions were weighed, then passed through a series of graduated screens (US Standard Sieves with 2 mm, 1 mm, 0.5 mm, and 0.25 mm openings) to separate charcoal debris and to initially sort the seeds. The contents of each screen were then examined. Charcoal pieces larger than 2 mm in diameter were separated from the rest of the light fraction and the total charcoal weighed. Samples of these charcoal pieces were broken to expose a fresh cross-section and examined under a binocular microscope at magnifications up to 140X. The weights of each charcoal type within the representative sample also were recorded. The remaining light fraction in the 2 mm, 1 mm, and 0.5 mm sieves was scanned under a binocular stereo microscope at a magnification of 10x, with some identifications requiring magnifications of up to 70x. The material that passed through the 0.25 mm screen was not examined. Remains were recorded as charred and/or uncharred, and whole and/or fragments. The term "seed" is used to represent seeds, achenes, caryopses, and other disseminules. Estimates of frequencies were calculated from the sort of a portion of the total volume floated and are noted in the macrofloral table with an asterisk (*). Macrofloral remains were identified using manuals (Martin and Barkley 1973; Musil 1978; Schopmeyer 1974) and by comparison with modern and archaeological references.

Samples from archaeological sites commonly contain both charred and uncharred remains. Many ethnobotanists use the basic rule that unless there is a specific reason to believe otherwise, only charred remains will be considered prehistoric (Minnis 1981:147). Minnis (1981:147) states that it is "improbable that many prehistoric seeds survive uncharred through common archaeological time spans." Few seeds live longer than a century, and most live for a much shorter period of time (Harrington 1972; Justice and Bass 1978; Quick 1961). It is presumed that once seeds have died, decomposing organisms act to decay

the seeds. Sites in caves, water-logged areas, and in very arid areas, however, may contain uncharred prehistoric remains. Interpretation of uncharred seeds to represent presence in the prehistoric record is considered on a sample-by-sample basis. Extraordinary conditions for preservation are required.

ETHNOBOTANICAL REVIEW

It is a commonly accepted practice in archaeological studies to reference ethnological (historic) plant uses as indicators of possible or even probable plant uses in prehistoric times. It gives evidence of the exploitation, in historic times, of numerous plants, both by broad categories, such as greens, seeds, roots, tubers, etc., and by specific example, i.e., seeds parched and ground into meal that was formed into cakes and fried in grease. Repetitive evidence of the exploitation of resources indicates a widespread utilization and strengthens the possibility that the same or similar resources were used in prehistoric times. Ethnographic sources outside the study area have been consulted to permit a more exhaustive review of potential uses for each plant. Ethnographic sources do document that with some plants the historic use was developed and carried from the past. A plant with medicinal qualities very likely was discovered in prehistoric times and the usage persisted into historic times. There is, however, likely to have been a loss of knowledge concerning the utilization of plant resources as cultures moved from subsistence to agricultural economies and/or were introduced to European foods during the historic period. The ethnobotanic literature serves only as a guide indicating that the potential for utilization existed in prehistoric times–not as conclusive evidence that the resources were used. Pollen and macrofloral remains, when compared with the material culture (artifacts and features) recovered by the archaeologists, become indicators of use. Plants represented by pollen and charred macrofloral remains will be discussed in the following paragraphs in order to provide an ethnobotanic background for discussing the remains.

Native Plants

Apiaceae (Parsley Family)

Members of the Apiaceae family are annual or perennial herbaceous plants with commonly hollow stems. Several members of this family are noted to have been used. The roots, stems, and leaves of these plants may be used for food, seasoning, and medicine. *Cymopterus* produces an edible root that has been widely used by native groups on the Plains. The roots may be eaten raw or cooked. Hopi children are noted to have eaten the sweet roots of *C. newberryi* (corkwing, wafer parsnip) in the spring. The parsnip-like root of *C. purpurascens* (gamote) is noted to have been much used by southwestern Indians. *Daucus pusillus* is a relative of the cultivated carrot. The Navajo are reported to have eaten the roots both raw and cooked. The young stems of *Heracleum lanatum* (cowparsnip) may be peeled and eaten raw, but are best when cooked. The cooked roots are noted to taste like rutabaga. The plants were eaten by Indian groups, and the Apache used the root as a medicinal resource. The root is reported to be somewhat of a stimulant and carminative and has been used in treating epilepsy. *Lomatium* (biscuitroot, Indianroot) have large edible roots that were eaten raw, roasted, or ground into a flour. *Osmorhiza* (sweet cicely, sweetroot) roots are anise-flavored and have been used as a seasoning. The tuberous roots of *Perideridia* (yampa, wild caraway) are noted to have a nutty flavor and to have been used by Indians as food. Roots may be cooked or dried and ground into a flour. The small seeds were used as a seasoning, or they may be parched and

ground into a flour. *Sium* (waterparsnip) has been used medicinally as a diuretic, antiscorbutic, and aperitive. The roots and leaves are both reported to have been eaten (Colton 1974:305; French 1971:385-412; Kearney and Peebles 1960:606-620; Kirk 1975:117-125, 270-271; Whiting 1939:86).

Cactaceae (Cactus Family)

Many members of the cactus (Cactaceae) family were important food resources. Cactus fruits, buds, and stems provided some essential nutrients not available in most native foods (Gasser 1981:224). The archaeobotanic record indicates that the Hohokam consumed several cactus fruits, especially saguaro (*Carnegiea gigantea*), hedgehog cactus (*Echinocereus*), and prickly pear (*Opuntia*). "Cacti tend to grow better on well-drained soils and prefer the south-facing slopes of mountain bajadas" (Gasser and Kwiatkowski 1991:432).

Carnegiea gigantea (Saguaro)

Saguaro (*Carnegiea gigantea*) is a tall, massive, ribbed cactus with stout, straight spines. This cactus is noted to have been an important resource in prehistoric Hohokam subsistence (Bohrer 1970; Gasser and Kwiatkowski 1991:433). The saguaro also was important in Pima (Akimel O'odham) and Papago (Tohono O'odham) subsistence, providing both food and shelter. The fruit matures in June and July and was eaten fresh, or boiled into syrup and/or preserves (Castetter and Bell 1942:59-60). The syrup was mixed with water to make an intoxicating beverage as part of a religious ceremony to bring the rains (Crosswhite 1980). The seeds contain vitamin C and were dried, roasted, and ground into a meal. A type of butter also was made from the seeds. Saguaro commonly is found in warm climates on well-drained soil in Arizona, Sonora, and locally in southeastern California (Curtin 1984:54; Kearney and Peebles 1960:569). The most common occurrence of saguaro seeds in Hohokam sites is found in Snaketown on the Gila River where 88 percent of the macrofloral samples contained saguaro seeds (Bohrer 1970; Gasser and Kwiatkowski 1991:433).

Mammillaria-Type Cactus

The *Mammillaria*-type group of cacti include such genera as *Coryphantha*, *Echinocactus*, *Echinocereus* (hedgehog cactus, strawberry cactus), *Ferocactus* (barrel cactus), and *Mammillaria* (pincushion cactus). The pollen from this group of cactus is morphologically indistinct from one another. These cacti provided edible seeds, fruits, and stems.

Echinocereus (hedgehog cactus, strawberry cactus) are small, cylindrical plants with juicy, edible fruits. The fruits have large spine clusters that readily detach when mature. Fruits were eaten raw after the spines were rubbed off, and are reported to taste very much like strawberries. *Echinocereus* fruits were important food resources for the Hohokam and later Pima (O'odham) peoples. *E. enneacanthus* (pitahaya) flowers were used to treat intestinal worms and to poison fish. *Echinocereus* may be found in Colorado, western Kansas, Oklahoma, Texas, New Mexico, Arizona, Utah, California, and northern Mexico.

Echinocereus plants flower from February to May, depending on the species and elevation (Kearney and Peebles 1960:570-571; Krochmal and Krochmal 1978:92; McDougall 1973:320; Shields 1984:92).

Ferocactus (barrel cactus) are large, ribbed, cylindric cacti with fleshy fruits. The stem, buds, flowers, fruit, and seeds of *F. wislizenii* are noted to have been eaten. The liquid from the stem also can be drunk as an emergency source of liquid, although the stems of other species of barrel cactus can be toxic. *Ferocactus* are found in Texas, New Mexico, Arizona, Nevada, Utah, southern California, Baja California, and northern Sonora (Desert Botanical Garden 1992:9; Kearney and Peebles 1960:573).

Mammillaria (fishhook cactus, pincushion cactus) are small or low cacti with crossing spiral rows of nipple-like tubercles. *M microcarpa* produces small, spineless red fruits that were eaten fresh. The Pima (Akimel O'odham) are noted to have boiled the plant and placed the warm solution in the ear for earaches and suppurating ears. *Mammillaria* may be found in Texas, New Mexico, Arizona, Nevada, Utah, southern California, and Sonora (Kearney and Peebles 1960:576-578; Moerman 1986:283). *Mammillaria* resembles *Echinocactus* (ball cactus) both in form and in having small seeds. Ethnographic accounts for the use of *Echinocactus* include reference to the use of the fruit, stems, and seeds for food. The small black seeds, when parched and ground, are noted as making good bread or mush. These plants grow in Texas, New Mexico, Arizona, Utah, southern California, and northwest Sonora (Bye 1972; Castetter 1935; Kearney and Peebles 1960:572-573; Palmer 1871).

Opuntia (Prickly Pear Cactus, Cholla Cactus)

The *Opuntia* group consists of both flat-jointed species (prickly pear cactus) and cylindric-jointed species (cholla). *Cylindropuntia* is an antiquated term for cholla cactus, which has been applied in palynology to distinguish cholla cactus from prickly pear cactus. Cholla flower buds were an important wild food staple. They are comparable to other flower bud vegetables such as broccoli. The buds were collected during the spring and roasted, and the cooked buds may be dried for future use. These buds are noted to be an excellent source of calcium. The fruits and younger stems (joints) also were eaten after the spines had been removed. The process of removing the spines from the fruit usually involved rubbing it with a branch, then rolling it in the sand. The young cholla stems often were placed on a fire to burn off the spines and partially cook the stems. The stems could then be baked in a pit. The core of the *Opuntia bigelovii* (teddybear cholla) root was boiled into a diuretic tea. *Opuntia fulgida* (jumping cholla) produces a gum that hardens into black, dry nodules. These gum nodules also were eaten. The Seri Indians are noted to have placed cholla stems over graves to keep coyotes away. Cholla is found in the western United States in Kansas, Oklahoma, Texas, New Mexico, Arizona, Colorado, Utah, Nevada, and California (Felger and Moser 1991:266-271; Greenhouse et al. 1981; Kearney and Peebles 1960:581-586; Manning 1962:15).

All species of prickly pear produce edible fruit. The fruits were eaten raw, stewed, or dried for winter use. Dried fruits could be ground into a meal. Young stems or pads were peeled and eaten raw, or roasted. Peeled stems also can be used as a dressing on wounds. The seeds were eaten in soups, or dried, parched, and ground into a meal to be used in gruel or cakes (Beaglehole 1937:70; Nequatewa 1943:18-9; Robbins et al. 1916:62; Whiting 1939:85-6). Prickly pear plants are found throughout the western United States on arid, rocky, or sandy soils (Kirk 1975:50-52; Muenscher 1987:317).

Cheno-ams

Cheno-ams refer to a group representing the Chenopodiaceae (goosefoot) family and the genus *Amaranthus* (amaranth, pigweed). These plants are weedy annuals or perennials, often growing in disturbed areas such as cultivated fields and site vicinities. Gasser (1982:222) notes that Cheno-ams appear to have been important enough to the Hohokam to be considered a staple. Cheno-ams found in the Hohokam area include a variety of plants such as *Amaranthus* (amaranth, pigweed), *Atriplex* (saltbush), *Chenopodium* (goosefoot), *Monolepsis* (poverty weed, patata), and *Suaeda* (seepweed). These plants are noted to have been used as food and for processing other foods. Plants were exploited for both their greens (cooked as potherbs) and seeds. The seeds were eaten raw or ground and sometimes mixed with cornmeal to make a variety of mushes and cakes. The seeds usually are noted to have been parched prior to grinding. The greens are most tender when young, in the spring, but may be used at any time. The greens may be harvested and cooked either alone or with other foods. Historic groups often gathered Cheno-am greens in large quantities and sometimes dried them for future use. Cheno-am greens are noted to have been one of the main articles of Piman subsistence. Various parts of the Cheno-am plants are noted to have been gathered from early spring through the fall (Castetter and Bell 1942:61; Curtin 1984:47-71; Kearney and Peebles 1960:251, 255, 263, and 265). *Amaranthus* leaves were an important source of iron. *Amaranthus* poultices were used to reduce swellings and to soothe aching teeth. A leaf tea was used to stop bleeding, and to treat dysentery, ulcers, diarrhea, mouth sores, sore throats, and hoarseness. *Atriplex* meal was used to make a salty pinole. *Atriplex* leaves and young shoots also have a salty taste and were cooked as greens or added to meat and other vegetables for its salty flavor. The leaves also were boiled in water, then strained and fried in grease. Leaves were rubbed in water to produce a lather for washing clothes and baskets. The Hopi used ashes of *A. canescens* as a substitute for baking powder. *Atriplex* ashes also were used to color cornmeal and to make hominy. The wood was a source of firewood. *Atriplex* are annual or perennial, herbaceous or shrubby plants found in arid, alkaline, or saline soil (Curtin 1984:66-69; Kearney and Peebles 1960:225; Kirk 1975:59; Whiting 1939:18, 22, 73). *Chenopodium* (goosefoot) leaves are rich in vitamin C and were eaten to treat stomachaches and to prevent scurvy. Leaf poultices were applied to burns, and a tea made from the whole plant was used to treat diarrhea (Angier 1986:33-35; Foster and Duke 1990:216; Harris 1982:58; Krochmal and Krochmal 1978:34-35, 66-67; Moore 1990:12). *Monolepsis* (patata) are slightly succulent herbs found in moist, often saline, ground throughout the West (Kearney and Peebles 1960:254; Kirk 1975:59). *Suaeda* (seepweed) greens are noted to have been collected in April with cholla buds, dried, and stored for later use with the buds. Greens were packed around cholla buds when they were roasted. The seeds also were ground into meal and frequently mixed with cornmeal. The Hopi applied the dried leaves to sores (Greenhouse et al. 1981:238; Kearney and Peebles 1960:263).

Poaceae (Grass Family)

Members of the Poaceae (grass) family have been widely used as a food resource (Colton 1974:338, 365; Cushing 1920:219,253-4; Whiting 1939:65). The seeds could be eaten raw, but were usually parched and ground into a flour that could be combined with other flours and ground meal to make breads and mushes. Young shoots and leaves may have been cooked as greens. Grass also is reported to have been used as a floor covering (Chamberlin 1964:372). Various grasses were used in the manufacture or decoration of pahos (prayer sticks) (Whiting 1939:65-66). "Charred grass grains are regularly found

in Hohokam sites, ... (and) are often common enough to be interpreted as food regularly used by the Hohokam" (Gasser and Kwiatkowski 1991:439). Grass seeds ripen from spring to fall, depending on the species, providing a long-term available resource.

Portulaca (Purslane)

Portulaca (purslane) is a salt-tolerant, weedy annual or perennial with fleshy leaves and small black seeds. The whole plant may be cooked and seasoned like spinach or added raw to salads, but the young leaves and stems are best. The leaves and stems are rich in iron, and contain vitamins A and C, calcium, and phosphorous. The leaves also have a high water content and can be eaten raw to quench thirst. Young stems may be used to thicken soup. The starchy seeds were parched and ground into a meal or flour that was used in a variety of breads, mushes, and cakes. Harrington (1967:87-89) notes that Southwest people dried large quantities of purslane by spreading young stems out in the sun on roof tops. Dried stems could be boiled and reconstituted as a potherb. This plant typically grows on dry soil in full sunlight and flowers between July and October (Clary 1983:56; Kearney and Peebles 1960:290; Kirk 1975:46; Niethammer 1974:121; Peterson 1977:72). The seeds are expected to be available for harvest by early August and may be available until November.

Rhus (Sumac, Skunkbush)

Rhus (sumac) shrubs have thin-fleshed, sweet, acidic berries that were used by several Native American groups. *R. trilobata* (skunkbush, squawbush) berries were eaten both green and when ripe, either raw or cooked. Berries sometimes were ground into cakes that were sun-dried for future use. The red, sticky berries also were dried whole and stored. *R. trilobata* and *R. typhina* (staghorn sumac) berries were used to make a drink similar to lemonade. Skunkbush berries contain tannin and were used as a mordant in dying wool and in preparation of body paint. The berries yielded a light orange-brown dye. Stems and twigs were used to weave baskets and construct cradleboards. Roots were used with pinyon pine for a consumptive. The buds also were used medicinally and as a deodorant or perfume. *R. trilobata* and *R. cismontana* (sumac) leaves were dried and smoked, either with tobacco or alone. Skunkbush wood also was used to make ceremonial equipment and prayer-sticks. *Rhus* shrubs often are common in chaparral, and may be found on mesas, slopes, and in canyons (Angell 1981:56; Bryan and Young 1978:67; Harrington 1967:261; Kearney and Peebles 1960:522-524; Robbins et al. 1916:47; Stevenson 1915:81; Whiting 1939:84).

Solanaceae (Potato Family)

Members of the Solanaceae (nightshade) family, including *Physalis* (tomatillo, ground cherry), *Solanum*, and others were exploited for food. *Physalis* was domesticated in Mexico and naturalized in eastern North America. Berries were eaten both raw and cooked. Berries taste best when fully ripe and may be made into preserves and pies, and boiled berries are frequently used in sauces such as chile verde and green chile. Some species are commercially grown for their berries, while others are common weeds of cultivated lands. Ground cherries are annual or perennial herbs found in moist to medium dry, open

ground (Kearney and Peebles 1960:753-754; Kirk 1975). The berries and roots of *Solanum* also are edible (Robbins et al. 1916:59,70-3; Stevenson 1916:70; Whiting 1939:90). Both *S. fendleri* and *S. jamesii* (wild potato) are related to the cultivated potato and have similar, though much smaller, tubers. The tiny tubers, often no larger than peas, may be boiled and served with moistened "potato clay." "Potato clay" is "a nickeliferous talc readily decomposing with dilute acid" (Rodgers n.d. in Whiting 1939:90). This salty clay is used to take away the bitter taste of the potato. *S. jamesii*) is noted to have been allowed to grow as a weed in otherwise carefully tended agricultural plots (Whiting 1939:16). *S. fendleri* is found in rich soil in open pine forests at an elevation of 6,000 to 9,000 feet in New Mexico and Arizona. *S. jamesii* is found in the mountains of Colorado, Utah, Arizona, New Mexico, and Texas, mostly in coniferous forests (Kearney and Peebles 1960:758; Kirk 1975:240-242).

Sphaeralcea (Globemallow)

Sphaeralcea (globemallow) is a weedy annual that thrives in disturbed ground. This plant was used widely for medicinal purposes. Hopi people used it to treat diarrhea, bowel trouble in babies, broken bones, and as an emetic. *S. coccinea* was used in a variety of ways. Crushed leaves were made into a poultice for skin inflammations and for sore, blistered feet. Fresh leaves and flowers were chewed or dried and made into a tea to treat sore throats, hoarseness, and minor stomachaches. The Pima (Akimel O'odham) used *Sphaeralcea* as a cure for sore eyes, and used a leaf decoction as a remedy for diarrhea. The stems may be chewed like chewing gum. *Sphaeralcea* tea has been used as a hair rinse, and a strong tea will curl hair if it is not washed out. Globemallow is noted to be common at certain Hohokam archaeological sites, and "where globemallow and other weedy taxa occur often, they may contribute to a 'signature' of localized plant use" (Gasser and Kwiatkowski 1991:438). Several of the species flower in spring and again after summer rains, and they may be found growing along roadsides and in fields (Curtin 1984:80; Moerman 1986:465-466; Moore 1982:167-168; Shields 1984:53).

Cultigens

Zea mays (Maize, Corn)

Zea mays (maize, corn) is an important New World cultigen, originating from a wild grass called teosinte. Maize has long been a staple of the Southwest inhabitants (Stevenson 1915:73). Gasser and Kwiatkowski (1991:423) note that most Hohokam appear to have "tried to raise as much maize as possible, despite variability in ecological setting and water availability." The Hohokam raised several varieties of maize that were drought and insect resistant (Gasser 1982:218). Innumerable ways of preparing maize exist. Green corn was eaten fresh, and mature ears were eaten roasted or wrapped in corn husks and boiled. The kernels may be parched, soaked in water with juniper ash, and boiled to make hominy. Dried kernels often were ground into a meal that was used as a multi-purpose flour. Cornmeal may be colored with *Atriplex* ashes. Black corn is used as a dye for basketry and textiles and as a body paint. Maize may be husked immediately upon harvesting. Clean husks are saved for smoking and other uses, such as wrapping food. The Pima (Akimel O'odham) and Papago (Tohono O'odham) harvested corn by pulling up the entire stalk after it was dry and piling them at the edges of the fields. Women and children removed unhusked ears from the stalks and then threw them into piles, which were ultimately carried to the dwelling

in burden baskets. Unhusked ears of corn were frequently roasted by piling up corn and mesquite brush and setting this pile on fire. The fire burned much of the husk away and the ears were pulled from the fire and dried on top of the house. The roasted, unhusked corn then was stored for later use. Corn also was sometimes shelled prior to storage. Ears also may be allowed to dry on the roof, and ristras of maize may be hung inside from the roof (Castetter and Bell 1942:180-189; Cushing 1920:264-7; Gasser 1982:218; Robbins et al. 1916:83-93; Stevenson 1916;73-6; Whiting 1939:67-70).

Charcoal

Charcoal recovered from archaeological samples most often represents use of that type of wood as fuel; however, several trees and shrubs had utilitarian and medicinal uses as well. The presence of charcoal indicates that the trees and/or shrubs represented were present at the time of occupation. If these resources were present and collected as fuel, it also is possible that they were exploited for other purposes as well. The following paragraphs discuss uses of trees and shrubs represented only by charcoal in the macrofloral record.

Nolina (Beargrass)/Yucca (Yucca, Soapweed)

Charred stem fragments were recovered that have a vascular bundle arrangement like that of *Nolina* and *Yucca*.

Nolina (Beargrass, Sacahuista)

Nolina (beargrass, sacahuista) plants have a large, woody caudex and numerous long, clustered, narrow leaves. Bell and Castetter (1941:60) note that "the leaves were extensively employed by Indians of the Southwest in the manufacture of coarse forms of basketry." Papago (Tohono O'odham) and Pueblo groups are reported to have organized collecting trips in the foothills and mountains to collect beargrass leaves. The leaves were carried home and dried in the sun or used while still green and pliable. The caudex and young shoots also were prepared as food in the same way that the corresponding parts of yucca and agave were used. *Nolina* does not grow on the flat mesas or sandy flats, but is confined to exposed locations on rocky slopes above 1000 m in rolling rangeland and foothills from western Texas to Arizona and northern Mexico (Bell and Castetter 1941:60-63; Ebeling 1986:474; Kearney and Peebles 1960:189; Kirk 1975:281).

Yucca (Yucca, Soapweed)

Yucca (yucca, soapweed) was an important resource for native peoples in the Southwest. Buds, flowers, and flower stalks were eaten raw or boiled, and the flower stalks were roasted like agave. *Y. baccata* (banana yucca) produces a fleshy fruit that was eaten raw or roasted, and fruits also were dried and ground into a meal or stored for future use. A fermented beverage also was made from the fruits. Young *Y. glauca* seed pods are slightly sweet and were boiled and eaten. Yucca seeds also were used as

food. Yucca roots contain saponin, and peeled roots were pounded with cold water to produce suds that were used for washing. Stevenson (1915:83) notes that yucca suds were used by all Indians of the Southwest for washing hair and cleaning wool garments and blankets. Fiber from yucca leaves was used to make cloth, sandals, baskets, mats, and rope. Leaves also were used to make brushes for painting pottery and decorating a variety of objects (Bell and Castetter 1941; Bryan and Young 1978:13; Kearney and Peebles 1960:185; Stevenson 1915:72-73, 78-79, 82-83).

Acacia (Acacia)

Acacia (acacia, catclaw) are shrubs or small trees of the southwest United States. The *Acacia* often have thorny, slender branches with ferny, evergreen leaves. Several species of *Acacia* are found in Arizona, including *A. Greggii* (catclaw acacia, devil's-claw), *A. constricta* (white-thorn, mescat acacia), *A. angustissima* (white-ball acacia), *A. Farnesiana* (sweet acacia, huisache), *A. millefolia*, and *A. vernicosa*. *A. greggii* is a common, often abundant, large shrub or small tree with sharp, strong, flattened, hooked spines that cover the branches. These spines are the reason for its common names of catclaw and devil's claw. The brown pods ripen in the fall and can remain on the branches for long periods of time. Native groups in Arizona ground the dried pods into a meal that was used to make mush, cakes, and in a variety of other ways. The Pima and Papago (O'odham) are noted to have eaten the seeds as pinole. The wood is strong, durable, and valued as firewood because the long-burning wood would remain an intense bed of coals after most wood was reduced to ashes. Catclaw acacia often forms thickets along streams and washes (Kearney and Peebles 1960:397-398; Kirk 1975:249:250; Peattie 1980:545; Petrides and Petrides 1992:119). *A. constricta* (white-thorn, mescat acacia) is noted to be abundant over large areas in southeast Arizona, often in shallow caliche soil on dry slopes and mesas. *A. angustissima* (white-ball acacia) has several varieties and is widely distributed throughout the state. This acacia is often cultivated for its feathery foliage and round heads of cream-colored flowers. It is found on dry rocky slopes, usually in chaparral. *A. Farnesiana* (sweet acacia, huisache) also is cultivated as an ornamental, often extensively, because of its fragrant flowers (Kearney and Peebles 1960:398-399).

Cercidium (Paloverde)

Cercidium (paloverde) are large shrubs or small trees found on dry, rocky hillsides and mesas (*C. microphyllum* - littleleaf paloverde) or along washes and floodplains (*C. floridum* - blue paloverde). During the summer, fall, and winter, *Cercidium* has no leaves, and the bark performs photosynthesis the way the leaves would. In the spring, however, the tree is full of small leaves and many yellow flowers. The Pima (Akimel O'odham) and Papago (Tohono O'odham) are noted to have eaten the pods fresh when soft and immature, cooked whole, or ground with the seeds into flour. The pod or seed meal was sometimes mixed with mesquite meal. *Cercidium* wood is soft and brittle, burns quickly, and leaves few coals (Curtin 1984:90; Kearney and Peebles 1960:407; Peattie 1980:576).

Prosopis (Mesquite)

Prosopis (mesquite) is a xerophytic shrub or small tree and was very important to many Southwest tribes. Gasser and Kwiatkowski (1991:436) note that "mesquite pods undoubtedly were a wild plant staple of many Hohokam" (Doelle 1976; Gasser 1982). Gasser (1982:226) notes that "mesquite pod fragments and seeds are commonly the second or third most common plant remains in Hohokam flotation samples." The pods are sweet and were eaten fresh, boiled, or fermented to make a mild alcoholic drink. The pods also were dried and ground into flour. *P. pubescens* (screwpod mesquite, tornillo) pods have an even sweeter taste, and the Pima (Akimel O'odham) are noted to have cooked *P. pubescens* pods in a pit covered with earth and left for three to four days. The cooked pods were then dried in the sun and stored. Dried pods were ground into a flour and used to make pinole, which was a staple for these people (Kearney and Peebles 1960:402; Peattie 1980:569). Papago (Tohono O'odham) houses were noted to be made from mesquite wood. They played a game of "kickball" using balls of mesquite wood. Pottery paddles and cradleboards also were made from mesquite wood. The gum was applied to sores and wounds, used as an adhesive and sealant, or boiled in water to make candy, pottery paint, or hair dye. The bark was used for tanning and dying. Mesquite wood burns slowly, with an intense heat, and burns down to a long-lasting bed of coals (Curtin 1984:93-95; Kearney and Peebles 1960:402; Peattie 1980:561-563).

DISCUSSION

Site AZ BB:9:148 (ASM) is located on the southeastern side of the Tortolita Mountains and on the north side of the Canada del Oro Valley, approximately 10-15 miles north of Tucson, Arizona. This area contains shallow soils and numerous bedrock outcrops. Local vegetation is characterized by a Saguaro/Palo Verde community. Vegetation is dominated by foothill paloverde (*Cercidium microphyllum*), saguaro (*Carnegia gigantea*), and mesquite (*Prosopis*), with ironwood (*Olneya tesota*), brittlebush (*Encelia farinosa*), white bursage (*Ambrosia dumosa*), white thorn acacia (*Acacia constricta*), catclaw acacia (*Acacia Greggii*), hackberry (*Celtis*), barrel cacti (*Ferocactus*), ocotillo (*Fouquieria splendens*), cholla and prickly pear cactus (*Opuntia*), creosotebush (*Larrea tridentata*), and grasses (Poaceae) also present. A riparian community is noted along Honeybee Wash east of the site.

The site represents a Hohokam occupation during the Rincon Phase between A.D. 950-1150, based on interpretations from ceramic artifacts. A total of 20 loci were present at the site; however, data recovery efforts concentrated on six main areas. Pollen and macrofloral samples were analyzed from these areas.

Feature 4 is a large, subrectangular pit structure found in Locus 4/5 near the southern end of the site. This pit structure may have been used for ceramic manufacture and is noted to have burned catastrophically. Pollen Sample 149 was examined from fill beneath a netherstone (PL 6) on the floor near a plastered hearth in the eastern portion of the structure (Table 7.1). This sample was dominated by High-spine Asteraceae pollen (Figure 7.1, Table 7.2), probably representing local plants. A moderately small

Table 7.1. Provenience Data for Samples from Site AZ BB:9:148 (ASM)

Sample No.	Locus No.	Feature No.	Depth (cmbd)	Provenience/ Description	Analysis
149	4/5	4	39.49	Fill beneath a mano (PL 6) on floor near plastered hearth in eastern portion of subrectangular pit structure	Pollen
224	4/5	4.01	0.77-0.96	Entire fill from plastered hearth in eastern portion of subrectangular pit structure	Macrofloral
258	4/5	5.01	0.41-0.47	Entire fill from plastered hearth in pit structure Feature 5	Macrofloral
365	8	58		Fill from base of small roasting pit	Macrofloral
373		72		Fill near base of large roasting pit (horno) found between Locus 8 and Locus 10	Macrofloral
107	10	18	20-25 cmbs	Fill underneath the upslope side of a stone in a long checkdam	Pollen
286	18	41	0.40-0.46	Fill beneath a mano (PL 1) on floor adjacent to the collared hearth in northwest quadrant of pit structure	Pollen
317	18	41	0.43	Fill beneath a trough metate fragment (PL 24) on floor in northeastern quadrant of pit structure, near eastern wall	Pollen
352	18	41.01	0.44-0.53	Entire fill from collared hearth in western half of pit structure	Macrofloral
376	18	47		Fill from large roasting pit (horno)	Macrofloral
385	13	79		Fill from roasting pit in sidewall of backhoe trench	Macrofloral
408	13	80.1		Fill from plastered hearth of pit structure Feature 80	Macrofloral

quantity of Low-spine Asteraceae pollen probably reflects local bursage at the time of occupation. Recovery of small quantities of *Pinus* and *Artemisia* pollen probably reflect long-distance transport from pine and sagebrush growing in the mountains. Four types of cactus are represented in this sample, including *Mammillaria*-type (*Echinocereus*, *Ferocactus*, and perhaps others), *Carnegiea gigantea* (saguaro), *Opuntia* (prickly pear cactus), and *Cylindropuntia* (cholla). Quantities of both cholla and saguaro cactus pollen were elevated, suggesting that these cacti were processed. It is also possible that other cacti, including *Echinocereus/Ferocactus/Mammillaria* and prickly pear cactus were processed in this area, possibly with this mano. No other pollen types recovered in this sample suggest economic activity. Recovery of a small quantity of Asteraceae tissue fragments during the scan of this sample represent deteriorated plant tissue from a member of the sunflower family. Collection of the sample from the floor beneath a mano incorporates pollen from activities in this portion of the structure and possibly using this mano. Pollen concentration was high, at over 40,000 pollen per cc of sediment, suggesting that either this

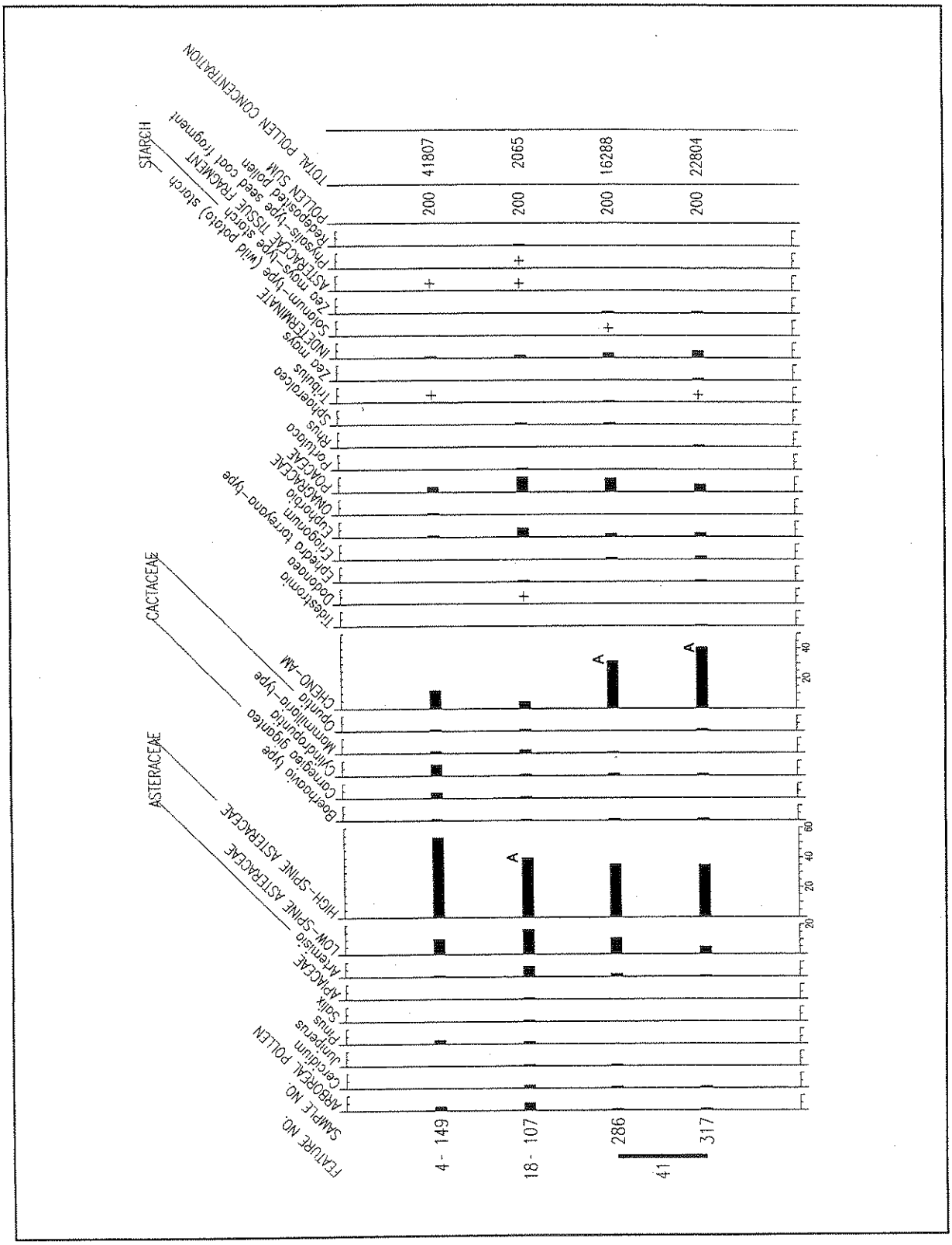


Figure 7.1. Pollen diagram for AZ BB:9:148 (ASM).

Table 7.2. Pollen Types Observed in Samples from AZ:BB:9:148(ASM)

Scientific Name	Common Name
ARBOREAL POLLEN:	
Cercidium	Paloverde
Juniperus	Juniper
Pinus	Pine
Salix	Willow
NON-ARBOREAL POLLEN:	
Apiaceae	Parsley/carrot family
Asteraceae:	Sunflower family
Artemisia	Sagebrush
Low-spine	Includes ragweed, cocklebur, etc.
High-spine	Includes aster, rabbitbrush, snakeweed, sunflower, etc.
Boerhaavia	Spiderling
Cactaceae:	Cactus family
Carnegiea gigantea	Saguaro
Cylindropuntia	Cholla cactus
Mammillaria-type	Hedgehog, pincushion cactus
Opuntia	Prickly pear cactus
Cheno-am	Includes amaranth and pigweed family
Tidestromia	Tidestromia
Dodonaea	Hopbush
Ephedra torreyena-type	Mormon tea
Eriogonum	Wild buckwheat
Euphorbia	Spurge
Onagraceae	Evening primrose family
Poaceae	Grass family
Portulaca	Purslane
Rhus	Sumac, Skunkbush, Poison ivy
Sphaeralcea	Globemallow

Table 7.2, continued. Pollen Types Observed in Samples from AZ:BB:9:148(ASM)

Scientific Name	Common Name
Tribulus	Puncture vine
Zea mays	Maize, corn
Indeterminate	
STARCHES:	
Solanum-type (wild potato) starch	Wild potato tubers
Zea-type Starch	Maize
OTHER:	
Asteraceae tissue fragment	Plant tissue fragment from the sunflower family
Physalis-type seed coat fragment	Ground cherry-type seed coat fragment
Redeposited pollen	Pollen released from bedrock

was a protected location providing excellent preservation conditions for pollen or that there is a problem with pollen contamination. Only a very small quantity of introduced *Tribulus* pollen was noted during the scan of this sample, indicating that contamination probably is a very minor issue. In general, pollen recovered from this sample exhibited some sort of degradation and does not appear to be modern.

Macrofloral Sample 224 represents the entire fill from Feature 4.01, the plastered hearth in the eastern portion of pit structure Feature 4. The charcoal record consisted mainly of charred stems with a vascular bundle arrangement like that of *Nolina* and *Yucca* caudex and flower stalks (Tables 7.3 and 7.4). Beargrass or yucca may have been utilized in the structure. A few pieces of vitrified Fabaceae charcoal also were present and suggest that one of the woody legumes was burned as fuel. Vitrified material has a shiny, glassy appearance due to fusion by heat. No other charred remains were present in this sample that suggest plant processing activities. Uncharred *Opuntia* seeds and numerous rootlets represent modern plants at the site. Non-floral remains include insect chitin, a small amount of rock/gravel, sand, and a few worm casts.

Feature 5.01 is the plastered hearth of pit structure 5 in Locus 4/5 that was discovered during trenching. Macrofloral Sample 258 represents the entire fill of the hearth. The few pieces of charcoal in this sample were too small for identification. An uncharred Asteraceae seed fragment and rootlets from modern plants were the only other floral remains to be recovered. Numerous worm casts suggest some disturbance through bioturbation in this area.

Table 7.3. Macrofloral Remains from Site AZ BB:9:148 (ASM)

Sample No.	Feature No.	Identification	Part	Charred		Uncharred		Weights/ Comments
				Whole	Frag	Whole	Frag	
224	4.01	Liters Floated		-	-	-	-	7.00 L
		Light Fraction Weight		-	-	-	-	43.09 g
		FLORAL REMAINS:		-	-	-	-	
		Opuntia	Seed	-	-	-	10	
		Rootlets		-	-	-	X	Numerous
		CHARCOAL/WOOD:		-	-	-	-	
		Total charcoal $\geq$ 2 mm		-	-	-	-	0.34 g
		Fabaceae - vitrified	Charcoal	-	3	-	-	0.03 g
		Nolina/Yucca stem	Charcoal	-	28	-	-	0.27 g
		NON-FLORAL REMAINS:		-	-	-	-	
		Insect		-	-	1	-	
		Insect	Chitin	-	-	-	6	
		Rock/Gravel		-	-	-	X	Few
		Sand		-	-	-	X	Abundant
		Worm casts		-	-	X	-	Few
258	5.01	Liters Floated		-	-	-	-	1.50 L
		Light Fraction Weight		-	-	-	-	9.10 g
		FLORAL REMAINS:		-	-	-	-	
		Asteraceae	Seed	-	-	-	1	
		Rootlets		-	-	-	X	Moderate
		CHARCOAL/WOOD:		-	-	-	-	
		Total charcoal $\geq$ 0.5 mm		-	-	-	-	0.01 g
		Unidentifiable - small	Charcoal	-	X	-	-	0.01 g
		NON-FLORAL REMAINS:		-	-	-	-	
		Sand		-	-	-	X	Moderate
		Worm casts		-	-	X	-	Numerous
365	58	Liters Floated		-	-	-	-	2.00 L
		Light Fraction Weight		-	-	-	-	4.39 g
		FLORAL REMAINS:		-	-	-	-	
		cf. Poaceae	Caryopsis	-	1	-	-	
		Encelia	Seed	-	-	-	1	
		Rootlets		-	-	-	X	Numerous

Table 7.3, continued. Macrofloral Remains from Site AZ BB:9:148 (ASM)

Sample No.	Feature No.	Identification	Part	Charred		Uncharred		Weights/ Comments
				Whole	Frag	Whole	Frag	
365	58	CHARCOAL/WOOD:		-	-	-	-	
		Total charcoal ≥ 1 mm		-	-	-	-	<0.01 g
		Fabaceae	Charcoal	-	1	-	-	<0.01 g
		Acacia	Charcoal	-	1	-	-	<0.01 g
		NON-FLORAL REMAINS:		-	-	-	-	
		Insect	Chitin	-	-	-	33	
		Rock/Gravel		-	-	-	X	Few
		Worm casts		-	-	X	-	Numerous
373	72	Liters Floated		-	-	-	-	2.50 L
		Light Fraction Weight		-	-	-	-	16.79 g
		FLORAL REMAINS:		-	-	-	-	
		Vitrified tissue ≥ 2 mm	Charcoal	-	20	-	-	0.31 g
		Vitrified tissue < 2 mm	Charcoal	-	X	-	-	Moderate
		Cactaceae	Seed	-	-	-	34	
		Ferocactus	Seed	-	-	-	8	
		Opuntia	Seed	-	-	-	4	
		Encelia	Seed	-	-	326*	745*	
		Poaceae	Inflores.	-	-	-	1	
		Unidentified A	Seed	-	-	-	7	
		Unidentified B	Seed	-	-	-	26	
		Rootlets		-	-	-	X	Numerous
		CHARCOAL/WOOD:		-	-	-	-	
		Total charcoal ≥ 2 mm		-	-	-	-	0.76 g
		Acacia	Charcoal	-	26	-	-	0.42 g
		Cercidium	Charcoal	-	3	-	-	0.05 g
		Prosopis	Charcoal	-	1	-	-	0.01 g
		NON-FLORAL REMAINS:		-	-	-	-	
		Insect	Chitin	-	-	-	16	
		Rock/Gravel		-	-	-	X	Few
		Worm casts		-	-	-	X	Numerous
352	41.01	Liters Floated		-	-	-	-	2.40 L
		Light Fraction Weight		-	-	-	-	7.58 g
		FLORAL REMAINS:		-	-	-	-	
		Rootlets		-	-	-	X	Moderate
		CHARCOAL/WOOD:		-	-	-	-	

Table 7.3, continued. Macrofloral Remains from Site AZ BB:9:148 (ASM)

Sample No.	Feature No.	Identification	Part	Charred		Uncharred		Weights/ Comments
				Whole	Frag	Whole	Frag	
		Total charcoal $\geq$ 0.5 mm		-	-	-	-	<0.01 g
		Conifer	Charcoal	-	1	-	-	<0.01 g
		Prosopis	Charcoal	-	1	-	-	<0.01 g
		Unidentifiable - small	Charcoal	-	5	-	-	<0.01 g
		NON-FLORAL REMAINS:		-	-	-	-	
		Rock/Gravel		-	-	-	X	Few
		Sand		-	-	-	X	Moderate
		Worm casts		-	-	X	-	Few
376	47	Liters Floated		-	-	-	-	2.25 L
		Light Fraction Weight		-	-	-	-	5.88 gters Floated
		FLORAL REMAINS:		-	-	-	-	
		Vitrified tissue		-	8	-	-	
		Rootlets		-	-	-	X	
		CHARCOAL/WOOD:		-	-	-	-	
		Total charcoal $\geq$ 1 mm		-	-	-	-	
		Cercidium	Charcoal	-	2	-	-	
		Prosopis	Charcoal	-	6	-	-	
		Unidentifiable - vitrified	Charcoal	-	9	-	-	
		NON-FLORAL REMAINS:		-	-	-	-	
		Insect	Chitin	-	-	-	10	
		Rock/Gravel		-	-	-	X	
		Worm casts		-	-	X	-	
385	79	Liters Floated		-	-	-	-	1.00 L
		Light Fraction Weight		-	-	-	-	2.40 g
		FLORAL REMAINS:		-	-	-	-	
		Monocot	Stem	-	5	-	-	
		Poaceae	Awn	-	1	-	-	
		Cactaceae	Seed	-	-	-	1	
		Rootlets		-	-	-	X	Numerous

Table 7.3, continued. Macrofloral Remains from Site AZ BB:9:148 (ASM)

Sample No.	Feature No.	Identification	Part	Charred		Uncharred		Weights/ Comments
				Whole	Frag	Whole	Frag	
		CHARCOAL/WOOD:		-	-	-	-	
		Total charcoal ≥ 1 mm		-	-	-	-	
		Fabaceae	Charcoal	-	1	-	-	<0.01 g
		NON-FLORAL REMAINS:		-	-	-	-	
		Insect	Chitin	-	-	-	3	
		Rock/Gravel		-	-	-	X	Few
408	80.01	Liters Floated		-	-	-	-	1.50 L
		Light Fraction Weight		-	-	-	-	3.06 g
		FLORAL REMAINS:		-	-	-	-	
		cf. *Sphaeralcea*	Seed	-	1	-	-	
		Celtis	Seed	-	-	-	1	
		Rootlets		-	-	-	X	Moderate
		CHARCOAL/WOOD:		-	-	-	-	
		Total charcoal ≥ 1 mm		-	-	-	-	
		Prosopis	Charcoal	-	5	-	-	0.01 g
		Unidentifiable - small	Charcoal	-	X	-	-	<0.01 g

X=Presence noted in sample, g=grams-

Feature 58 is a small roasting pit in Locus 8 that measured 90 cm in diameter and 20 cm in depth. Some fire-cracked rock was noted sitting on the uppermost part of the fill. Macrofloral Sample 365 was recovered from fill at the base of the feature and contained one charred probable Poaceae caryopsis fragment. Grass seeds might have spilled while being parched prior to being ground into a flour, or seeds might have been charred through use of grasses as tinder or in a buffering vegetation layer when processing other foods. An uncharred *Encelia* seed fragment and rootlets represent modern plants. Charcoal in this sample was very small and consisted of a piece of *Acacia* and a piece of Fabaceae charcoal not identifiable to genus. Local members of the legume family appear to have been burned as fuel. The sample also contained uncharred insect chitin fragments, a small amount of rock/gravel, and numerous worm casts.

Table 7.4. Index of Macrofloral Remains Recovered from AZ BB:9:148 (ASM)

Scientific Name	Common Name
Floral Remains:	
Asteraceae	Sunflower family (Composite family)
Encelia	Brittlebush
Cactaceae	Cactus family
Ferocactus	Barrel cactus, Visnaga
Opuntia	Prickly pear cactus, Cholla
Celtis	Hackberry
Poaceae	Grass family
Sphaeralcea	Globemallow
Charcoal/Wood:	
Conifer	Cone-bearing, gymnospermous trees and shrubs, mostly evergreens, including the pine, spruce, fir, juniper, cedar, yew, and cypress
Fabaceae	Pea or Bean family (Legume family)
Acacia	Acacia
Cercidium	Palo Verde
Prosopis	Mesquite
Nolina/Yucca	Beargrass/Yucca

Feature 72 is a large roasting pit (horno) measuring 1.80 meters in diameter and 86 cm in depth. This feature was found exposed in the road between Locus 8 and Locus 10. Feature fill was very dark and ashy and contained numerous pieces of fire-cracked rock. Fill near the base of the feature was collected and floated as macrofloral Sample 373. This sample contained several pieces of charred tissue that were too vitrified for identification. This material might represent charcoal or other charred plant tissue. Numerous uncharred seeds and rootlets represent components of the modern vegetation community. The charcoal record was dominated by *Acacia*, with smaller amounts of *Cercidium* and *Prosopis* charcoal present. Acacia, paloverde, and mesquite wood appear to have been burned as fuel in this roasting pit. Uncharred insect chitin fragments, a small amount of rock/gravel, and numerous worm casts also were present.

Feature 18 is one in a series of long checkdams located at the base of a hill in Locus 10. This feature measured 12.3 meters long and 1.37 meters wide, and was composed of one course of stones placed

side-by-side. Pollen Sample 385 was recovered from fill underneath the upslope side of one of the stones, approximately 20-25 cm below the modern ground surface. This sample was dominated by High-spine Asteraceae pollen accompanied by a few small aggregates, probably reflecting local vegetation. It exhibited the largest quantity of Low-spine Asteraceae pollen noted at this site, suggesting that bursage was moderately abundant in this area. Recovery of small quantities of *Cercidium*, *Juniperus*, *Pinus*, and *Salix* pollen reflect local and long distance transport of pollen from trees. Recovery of a greater variety of pollen in this sample is probably the result of sampling an open area that received pollen rain from surrounding vegetation unhindered by walls. Recovery of a small quantity of Apiaceae pollen might represent growth of a member of the umbel family on the checkdam. Members of this family tend to grow in places where water is more available and often were exploited as food. Cactaceae pollen is present in this sample, possibly reflecting local growth of these plants. Recovery of *Carnegiea gigantea* (saguaro), *Cylindropuntia*, *Mammillaria*-type and *Opuntia* pollen suggests that saguaro, cholla, barrel cacti (and others), and prickly pear cactus grew very close to the checkdam and probably dropped their blossoms here. Cheno-am pollen is present in a very small quantity, probably reflecting sparse growth of members of the Cheno-am group in this area. *Euphorbia* pollen is most abundant in this sample, suggesting that spurge might have grown as a weed on or near the checkdam. The Poaceae pollen frequency is elevated, suggesting that grasses were abundant. A single *Portulaca* pollen grain was recovered, suggesting that purslane grew in the checkdam, possibly as a weed. Even if purslane grew as a weed on the checkdam, it was available for exploitation by the occupants of this site. Recovery of a small quantity of *Sphaeralcea* pollen from the checkdam suggests that globemallow also was present as a weed. Non-pollen items recovered from this sample include Asteraceae tissue fragments, which are expected if the local vegetation included members of the sunflower family, and two fragments of *Physalis*-type seed coats. The latter suggest growth of ground cherries at the checkdam. Pollen concentration was low in this sample, about 2,000 pollen per cc of sediment, which is consistent with an open location subject to a variety of conditions that result in degradation of pollen.

Locus 18 is located to the west of Locus 10. Feature 41 is a burned pit structure with a plastered floor in Locus 18. Pollen Sample 286 was recovered from fill beneath a formal mano (PL 1) found on the floor adjacent to the collared hearth (Feature 41.01) in the northwest quadrant of the pit structure. This sample was collected from this area in the hope that it would reflect pollen on the floor resulting from economic activity within the structure. The pollen record from this portion of the floor reflected a very large quantity of Cheno-am pollen accompanied by a few small aggregates, which might reflect grinding Cheno-am seeds. The Poaceae pollen frequency also was elevated, suggesting the possibility that grass seeds were processed or that grass mats were used. Small quantities of *Cylindropuntia* and *Mammillaria*-type pollen probably reflect processing cholla and barrel-type cactus in the structure. Two *Solanum*-type (wild potato) starch granules were observed during the scan of this sample. These starches exhibit eccentric hila with the "X" located towards the narrower end of the starch grain. Thus far, no starches with similar morphology have been observed in plants expected in the desert Southwest. A small quantity of *Zea mays*-type starch granules also was noted in this sample, suggesting that maize might have been processed. Both the wild potato-type and maize-type starches exhibited some signs of deterioration suggesting that they are not the result of contamination at the time of sampling or processing. Total pollen concentration in this sample was moderately high at approximately 16,000 pollen per cc of sediment. This sample exhibited the most evidence of pollen contamination with a larger quantity of introduced *Tribulus* pollen than other samples. Still, the contamination appears to be minor.

A trough metate fragment (PL 24) was found on the floor in the northeastern quadrant of pit structure Feature 41, near the eastern wall. Pollen Sample 317 was examined from fill beneath this metate fragment and yielded a pollen record similar to that recovered beneath the mano (Sample 286). A possible *Rhus* pollen grain recovered from this sample was very degraded. *Rhus* grows in the chaparral communities and on slopes and mesas, and in ravines and canyons in Arizona (Kearney and Peebles 1960:522-524). Recovery of this pollen type might represent exploitation of sumac/skunkbush berries or use of the pliable stems to make basketry. The Cheno-am frequency was very high and accompanied by numerous aggregates, suggesting again that Cheno-am seeds were ground. The Poaceae pollen frequency was depressed, not indicating specific economic activity. *Zea mays* pollen was recovered in this sample, yielding the best evidence for processing maize at this site. In addition, a small quantity of *Zea mays*-type starch granules was noted, indicating the presence of maize kernels and/or ground maize. Recovery of small quantities of *Cylindropuntia* and *Opuntia* pollen from this location might be associated with processing cholla and prickly pear cactus. Total pollen concentration in this sample was moderately high at approximately 22,000 pollen per cc of sediment. This sample also yielded evidence of some contamination in the form of *Tribulus* pollen, representing an introduced plant. Contamination appears to be very minor.

Macrofloral Sample 352 represents the entire fill from Feature 41.01, the collared hearth. This sample contained very small pieces of conifer, *Prosopis*, and unidentifiable charcoal, suggesting that conifer wood, such as pine or juniper, and mesquite wood were burned as fuel and/or used as building materials. A moderate amount of uncharred rootlets from modern plants, a small amount of rock/gravel, sand, and a few worm casts were the only other remains recovered.

Feature 47 is a highly oxidized, large roasting pit (horno) found in Locus 18, approximately 35 meters from pit structure Feature 41. This feature measured 2.4 meters in diameter and 1.06 meters in depth. Clean-out debris was noted to cover the feature and the area surrounding it in a 15 meter radius. Feature fill contained fire-cracked rock, charcoal, and oxidized sediment. Macrofloral Sample 376 was collected from fill in the center of the feature, approximately 25-30 cm above the feature base. This sample contained charred pieces of tissue that were too vitrified for identification, as well as *Cercidium*, *Prosopis*, and unidentifiable vitrified charcoal. Paloverde and mesquite appear to have been burned as fuel in this feature. The sample also contained uncharred rootlets from modern plants, insect chitin fragments, a small amount of rock/gravel, and worm casts.

Macrofloral Samples 385 and 408 were collected from the fill of features in Locus 13 near the north end of the site. Feature 79 is a roasting pit found in the sidewall of a trench and was never fully excavated. This pit measured 2.1 meters in length and 57 cm in maximum depth. Charcoal flecks and a moderate amount of ash were noted in the feature fill. Sample 385 was recovered from the pit in the sidewall of the trench. This sample contained charred monocot stem fragments and a charred Poaceae awn fragment. These remains may represent use of grasses, possibly as tinder or in a buffering vegetation layer when processing other foods. One small piece of Fabaceae charcoal suggests that wood from a local member of the legume family was burned as fuel. An uncharred Cactaceae seed fragment and numerous rootlets represent modern plants. Non-floral remains include a few insect chitin fragments and a small amount of rock/gravel.

Feature 80.1 is the plastered hearth of a non-excavated pit structure (Feature 80) found in the sidewall of a trench. The floor of the structure was noted at 1.15 meters below the modern ground surface, suggesting that it may be older than other features at the site. Ceramics recovered from the fill of the trench near the base of the pit structure indicate that it dates to the Ceramic period. Sample 408 was taken from the fill of the hearth as it was exposed in the trench wall. This sample contained a charred probable *Sphaeralcea* seed fragment, suggesting that globemallow seeds may have been processed in the hearth. Seeds also may have been charred through use of the plant as a medicinal resource or for other purposes. An uncharred modern *Celtis* seed fragments and rootlets also were present. Small pieces of *Prosopis* charcoal suggest that mesquite wood was burned as fuel in the hearth. Other pieces of charcoal were too small for identification.

SUMMARY AND CONCLUSIONS

Pollen analysis of samples from Hohokam Site AZ BB:9:148 (ASM) in southern Arizona yielded several pollen types suggestive of plant processing activities. Cheno-am seeds appear to have been ground in Feature 41, probably using both the mano and metate under which samples were collected. Recovery of a variety of cacti pollen in these samples leaves a suspicious record of possible economic activity. In the absence of sufficient samples to provide a more complete record of economic activity at this site, it is difficult to interpret the significance of these pollen types. It is tempting to interpret processing saguaro cactus in Feature 4 and barrel-type, cholla and prickly pear cactus in both Features 4 and 41. It is possible, however, that examination of additional samples from this site would indicate that these cacti appear regularly as part of the background pollen. This is considered unlikely because all of these cacti pollen are transported by insects rather than the wind, meaning that they should not be present as part of the general background pollen. Recovery of most these cacti pollen from all four of the samples examined makes interpretation of specific use of cacti difficult. Recovery of elevated Poaceae pollen frequencies in the checkdam and one of the Feature 41 floor samples indicates that grasses grew well in the area of the checkdam and that they might have been processed in Feature 41, a structure. Maize was present only in the pollen record and only in the sample collected beneath the metate in Feature 41. Maize starch granules were noted in both samples examined from Feature 41, but were absent in the other two pollen samples, which is consistent with the pollen evidence for maize noted in Feature 41. Wild potato-type starch granules also were recovered from Feature 41, suggesting that wild potato might have been processed in this structure. Recovery of a small quantity of *Rhus* pollen from the floor of Feature 41 might represent use of sumac/skunkbush berries or perhaps the pliable stems for use in basketry. Recovery of Apiaceae and *Portulaca* pollen in the checkdam sample indicates that a member of the umbel family and purslane were available for exploitation by the occupants of this site.

The macrofloral record yielded very few charred remains other than charcoal. Charred *Nolina/Yucca* stem fragments from the hearth (Feature 4.01) in pit structure Feature 4 may represent use of beargrass or yucca in this structure. Grass seeds might have been processed in roasting pit Feature 58 or grasses used as tinder or for processing other foods. Grasses also appear to have been utilized in roasting pit Feature 79. A charred probable *Sphaeralcea* seed fragment in hearth Feature 80.1 may represent processing of globemallow seeds or use of the plant for other purposes. Charcoal in these features was dominated by local members of the legume family, including acacia, mesquite, and paloverde.

One piece of conifer charcoal was noted from Feature 41.01, suggesting that a conifer such as pine or juniper was burned as fuel or used in construction of the pit structure's superstructure.

The pollen record indicates that this site appears to have been used for plant processing. The pollen record is consistent with both repetitive, seasonal occupation and with year-round occupation. Plants exploited include both native and cultivated resources. Saguaro flowers during the spring, and fruits mature during June and July. Maize most often pollinates during the summer, maturing during the late summer or fall, unless two crops are planted. Therefore, pollen analysis is consistent with occupation of Feature 41 during at least the spring. Although maize pollen can be transported on harvested maize, recovery of maize pollen is often interpreted to represent agriculture at the site, meaning that people probably occupied the site while they grew maize between spring and early fall. The abundance of economic information contained in the pollen record makes scant recovery of charred macrofloral remains more puzzling. Unfortunately, no poppy seeds or other type of control were added to the flotation samples prior to flotation at SWCA, and only the light fractions were submitted for analysis. Potential problems with the float process cannot be evaluated. The record of sparse charred remains might be the result of loss of macrofloral remains during the flotation process or charred remains might be present in the heavy fractions that were not submitted to Paleo Research for analysis. Screen sizes used in flotation were not specified, but they might have been too large, allowing small seeds such as charred Cheno-ams to pass through and be discarded. We recommend future flotation be conducted at Paleo Research to maximize recovery of macrofloral remains, or at the very least, addition of poppy seeds to every flotation sample as a control to allow evaluation of the float process and submission of both the light and heavy fractions for analysis. Flotation of a larger volume of fill from certain features also might result in recovery of a greater number of charred macrofloral remains.

CHAPTER 8

OTHER ARTIFACT ANALYSES

Joshua S. Edwards and Mary Charlotte Thurtle

This chapter presents the descriptive analyses of faunal remains, shell, and other stone artifacts found during the course of fieldwork at AZ BB:9:148 (ASM).

VERTEBRATE FAUNAL REMAINS

A total of 213 animal bones were collected from the surface and cultural deposits during the Neighborhood 12 Data Recovery Project (Table 8.1). This section presents a descriptive analysis of the faunal assemblage, and is divided into two subsections. The first subsection describes the terminology and methods employed in the analysis. The second subsection is a descriptive summary of the faunal material found in features at the site.

Table 8.1. Frequencies of Bones Recovered from Each Feature, AZ BB:9:148 (ASM)

Feature	Count
4	132
5	4
5.01	2
38	21
41	39
41.01	1
41-P	2
79	1
80	2
80.1	3
surface	6
Total	**213**

Methods And Terminology

The data recorded for each analyzed bone specimen included provenience (horizontal unit, vertical unit, level, and feature), taxa, bone element, side (right, left, axial, indeterminate), condition (complete or portion), origin of fragmentation (recent, post-depositional, pre-depositional), portion (shaft, proximal end, distal end, indeterminate), epiphyses (proximal, distal, indeterminate), and count. Bones were also examined for evidence of burning, weathering, rodent or carnivore gnawing, calcium carbonate buildup, and cultural modification, both incidental modifications (e.g., cut marks) and intentional modifications into tools or ornaments.

Every bone and bone fragment was analyzed and included in the total counts, with a few exceptions. The exceptions were loose teeth that appeared to have derived from an associated jaw. These were excluded from the total counts in order to minimize the over representation of those species that were represented largely by jaw bones. However, if no associated jaw was present within the provenience in question (i.e., the excavated level), then loose teeth were counted as individual specimens. Additionally, no specific or generic level identifications of complete rodent phalanges, vertebrae, or ribs were preformed due to the difficulty in making such identifications. Family level identifications were made when it was not possible to make specific or generic level identifications.

To provide some level of identification for fragmented specimens, phalanges, ribs, and vertebrae, the categories of small, medium, and large mammal or bird were used. Small mammal refers to mammals equal in size or smaller than those belonging to the genus *Lepus* (jackrabbit), and includes most rodents, as well as lagomorphs (*Sylvilagus sp.* [cottontail rabbits] and *Lepus sp.*). Medium mammals are those greater in size than *Lepus sp.* up to the body-size of *Canis* (dog, coyote). Large mammals are larger than *Canis*. Small bird refers to sparrow-sized birds. Medium bird refers to birds larger than sparrows up to the size of Corvids (crows and ravens). Large bird refers to birds larger than Corvids. Artiodactyla refers to likely specimens of *Odocoileus* (deer), *Antilocapra americana* (pronghorn antelope), or Ovis (mountain/domestic sheep) not reliably identified with more precision. These categories are convenient groups for assigning bone that cannot be identified more precisely.

Number of identified specimens (NISP) and minimum number of individuals (MNI) are the units of quantification used in this report. MNI is the minimum number of complete individual animals necessary to account for the observed specimens. NISP is the actual number of specimens that have been identified to the taxonomic level of species.

Descriptive Summary

Excavations at AZ BB:9:148 yielded 213 faunal bones (Table 8.2). The most numerous species identified was desert tortoise (*Gopherus agassizi*) (NISP = 107), although the elements were all carapace fragments that probably derived from one or two individuals. Only 13% of the assemblage exhibited burning and 2.8% exhibited weathering. The following is a more detailed presentation of individual feature assemblages.

Table 8.2. Taxonomic Frequencies for AZ BB:9:148 (ASM)

Taxon	Count
Unidentified remains	19
Small mammal (Rodent-sized)	3
Small mammal (Rabbit-sized)	41
Medium mammal (Dog-sized)	5
Large mammal (Ungulate-sized)	22
Medium animal	1
cf. Deer/Antelope	2
Cottontail	5
Jackrabbit	6
Cottontail/Prairie dog	1
Desert Tortoise	107
Small bird	1
Total	**213**

Feature 4

Feature 4 yielded 133 bones and tortoise carapace fragments, including those from deer or antelope, jackrabbit, small bird, and desert tortoise (Table 8.3). Six of these bones were highly fragmented (i.e., less than ¼ their original size). Two bones were calcined and seventeen were charred. The 97 tortoise carapace fragments found in contact with the floor, as well the nine in the fill of Feature 4, exhibited browning from cooking or staining. The cause of the discoloration is indefinite at this time. The two large mammal bones found in contact with the floor of Feature 4 exhibited browning, probably from cooking. One of the long-bone shaft-fragments found in contact with the floor was worked into an awl. Subfeature 4.01, the hearth of the pit structure, contained a small bird carpometacarpus that exhibited dry cracking.

Table 8.3. Feature 4, Taxonomic Abundances and Element Representation

Vertical Provenience	Taxon	Element	Count	MNI
Feature Fill	Unidentified remains	Unidentified	14	
	Small mammal	Long bone shaft fragments	3	
		Unidentified	2	
	Medium mammal	Long bone shaft fragments	1	
	Medium animal	Long bone shaft fragments	1	
	cf. Deer/ Antelope	Incisor	1	1
	Jackrabbit	Radius	1	1
		Innominate	1	
	Desert Tortoise	Carapace	9	1
Floor Contact	Large mammal	Long bone shaft fragments worked into an awl	2	1
	Desert Tortoise	Carapace	97	1
Feature 4.01	Small bird	Carpometacarpus	1	1
		Total	**133**	

Feature 5

Five bones were recovered from Feature 5 (Table 8.4). The medium-mammal long-bone fragment found in the fill of Feature 5 exhibited root etching and dry cracking and was highly fragmented (< ¼ complete). The remaining prairie dog innominate was ¼ to ½ complete and exhibited dry cracking. No burning was evident on any of the bones. Subfeature 5.01 contained two unburned, unweathered, rodent-sized bone fragments.

Feature 38

The fill of Feature 38 yielded 21 bones. Table 8.5 presents the taxonomic abundances for this feature. Much of the total assemblage (n=6) was considerably fragmented (< ½ complete), yet only the tortoise carapace fragment exhibited the possible effects of cooking. Sixteen bones exhibited dry cracking and three exhibited both dry cracking and root etching.

Table 8.4. Feature 5, Taxonomic Abundances and Element Representation

Feature	Vertical Provenience	Taxon	Element	Count	MNI
5	Feature Fill	Prairie Dog	Innominate	1	1
	Floor Fill	Medium mammal	Long bone shaft fragments	3	
5.01	Feature Fill	Small mammal	Indeterminate	2	
			Total	**6**	

Table 8.5. Feature 38, Taxonomic Abundances and Element Representation by Vertical Provenience

Vertical Provenience	Taxon	Element	Count	MNI
Feature Fill	Small mammal	Maxilla	1	
		Long bone shaft fragments	10	
		Indeterminate	3	
	Cottontail	Humerus	1	1
		Ulna	1	
		Femur	1	
		Tibia	1	
	Jackrabbit	Scapula	1	1
		Molar/Premolar	1	
	Desert Tortoise	Turtle carapace	1	1
		Total	**21**	

Feature 41

The fill of Feature 41 yielded 39 bones. An additional 3 bones were recovered from associated subfeatures for a total of 42 bones. Table 8.6 presents the taxonomic abundances for Feature 41 and its associated subfeatures. Thirty-four bones exhibited burning.

Table 8.6. Feature 41, Taxonomic Abundances and Element Representation by Vertical Provenience

Feature	Vertical Provenience	Taxon	Element	Count	MNI
41	Feature Fill	Small mammal	Long bone shaft fragments	19	
			Indeterminate	2	
		Large mammal	Long bone shaft fragments	16	
		Cottontail	Tibia	1	1
		Jackrabbit	Calcaneus	1	1
41.01		Small mammal	Long bone shaft fragment	1	
41-P		Unidentified	Indeterminate	1	
		Jackrabbit	Long bone shaft fragment	1	1
			Total	**42**	

One long bone shaft fragment from a small mammal was recovered from the fill of subfeature 41.01. This bone exhibited neither burning nor weathering. The highly fragmented (< ¼ complete) jackrabbit bone from the fill of Subfeature 41-P was unburned but dry cracked. The remaining unidentified fragmentary material was also unburned and exhibited dry cracking.

Feature 79

The fill of Feature 79 contained one jackrabbit femur shaft fragment that exhibited root etching.

Feature 80

One bone was recovered from Feature 80 and three bones were recovered from Subfeature 80.1 (Table 8.7). The highly fragmented small-mammal bone did not exhibit weathering or burning. The carpometacarpus of a small bird found in the fill of Feature 80 exhibited dry cracking. No burning was evident on any of the bones. Two of the three unidentified bone fragments recovered from the fill of Subfeature 80.1 exhibited calcination and one was browned from the effects of cooking.

Table 8.7. Feature 80, Taxonomic Abundances and Element Representation

Feature	Taxon	Element	Count
80	Small mammal	Indeterminate	1
80.1	Unidentified	Indeterminate	3
		Total	**4**

Non-Feature Material

Five calcined bones were recovered from the modern surface. Three long-bone shaft fragments from a large mammal were recovered from the surface of Locus 8, and one long-bone shaft fragment was recovered from the surface of Locus 16/17. Lastly, A partially charred first or second phalanx from a deer or antelope was found within Collection Unit 2 in Locus 18.

SHELL

Three pieces of shell were recovered during the Neighborhood 12 Data Recovery project. These pieces represent all the shell that was found during the course of fieldwork. All of the pieces are marine in origin with two of them being modified fragments. The two modified fragments co-join to form the partial remains of a shell bracelet. Two specie, *Glycymeris gigantea* and *Laevicardium elatum*, are represented in the assemblage. Table 8.8 summarizes the provenience and attributes of each piece of collected shell.

Table 8.8. Summary of Shell Artifacts, AZ BB:9:148 (ASM)

Feature No.	Feature Type	FN	Artifact	Species	Count
4	pit structure	161	unworked fragment	*Laevicardium elatum*	1
41	pit structure	313	Shell bracelet fragment	*Glycymeris gigantea*	1
41-I	post hole	348	Shell bracelet fragment	*Glycymeris gigantea*	1

A small unworked fragment of *Laevicardium elatum* was recovered from the roof fall of Feature 4, a pit structure in Locus 4/5. The fragment is thoroughly burned and discolored brown and black. The broken edges of the fragment display the same amount of discoloration as the rest of the artifact, indicating that it was broken prior to being burned.

Two fragments of the same *Glycymeris gigantea* shell bracelet were recovered from the floor and post hole of Feature 41, a pit structure in Locus 18. Both fragments are also discolored from having been burned. The umbo of the shell is unchanged and at maximum measures 1.9 cm thick. The band is heavy measuring from 7.3 mm to 13.4 mm, gradually increasing in size as the umbo is approached. The interior, a portion of the exterior, and the underside of the bracelet have been ground smooth.

OTHER STONE ARTIFACTS

Three stone beads and a quartz crystal were recovered from the site. Two of the beads were discovered during flotation of the contents of the hearth (Feature 80.01) from pit structure Feature 80 in Locus 13. The other bead was found in the roof fall of Feature 4, a pit structure in Locus 4/5. The quartz crystal was found in floor contact, also in pit structure Feature 4. Table 8.9 summarizes the attributes of the artifacts.

Table 8.9. Summary of Stone Bead Artifacts, AZ BB:9:148 (ASM)

Feature No.	Feature Type	FN	Material Type	Size	Count
4	pit structure	204	Turquoise	7.1 mm dia., 1.1 to 1.4 mm thick	1
4	pit structure	171	Quartz Crystal	10.8 mm in length, 6.1 mm in width	1
80.01	hearth in pit structure	427	Dark gray fine grained stone	2.7 and 2.8 mm in dia., 0.8 and 0.3 to 0.4 mm thick	2

The turquoise bead found in the roof fall of pit structure Feature 4 measures 7.1 mm in diameter, and varies between 1.1 to 1.4 mm thick. The center hole of the bead is quite small, measuring 1.5 mm in diameter. The top and bottom of the bead have been ground flat, forming a disk shape.

The two small beads recovered from the fill of the hearth (Feature 80.01) of the pit structure Feature 80 measure 2.7 and 2.8 mm in diameter, and are 0.8 and 0.3 to 0.4 mm thick respectively. The center holes of the beads both measure 0.8 mm in diameter. Both are also disk shaped.

The quartz crystal recovered from the floor of pit structure Feature 4 measures 10.8 mm in length and is 6.1 mm in width. No flake scars are evident and it appears to be unworked. Numerous crystal flakes were found on the floor of the structure, though without evidence of flaking it is difficult to assess if this item is associated debris from a flaking episode or an unrelated curated object.

CHAPTER 9

SUMMARY AND CONCLUSIONS

Mary Charlotte Thurtle

Eight interrelated research themes that were originally presented in Ahlstrom (1995) were identified as pertaining to the data recovery efforts at AZ BB:9:148 (ASM). These research themes address questions regarding (1) settlement patterns and settlement systems, (2) subsistence, diet, and resource exploitation, (3) site and community structure, (4) socioeconomic relations, (5) mortuary practices, (6) petroglyphs, (7) chronology, and (8) paleoenvironment. Data related to each of these research themes have been presented throughout this report and are summarized below.

SETTLEMENT PATTERNS AND SETTLEMENT SYSTEMS

The abundant checkdams, bedrock grinding features, and resource processing (roasting pit) features at AZ BB:9:148 (ASM) indicate that the primary use of the bajada environment at the base of the Tortilita Mountains during the Rincon and possibly early Tanque Verde phases was as a resource procurement and processing locale. The presence of pit structures and variety of artifact types (flaked stone, ceramics, ground stone, shell ornaments, stone beads, etc.) indicate that habitation also occurred in at least three loci (Locus 4/5, 13, and 18) within the site. The relatively low density of artifacts and shallow depth to the midden features suggests that habitation was limited to a temporary or seasonal basis, or was of a relatively short duration.

Two village sites are found in the area: Sleeping Snake Village (AZ BB:9:104) located 0.5 km to the southwest, and Honey Bee Village (AZ BB:9:88) located approximately 1.5 km to the southeast. Both of these villages were large enough to support public architecture in the form of ball courts, and both were occupied during the Late Rincon phase Craig (1989:53) states that most evidence supports a predominate Late Rincon occupation for Honey Bee. Craig (1988:57) also states that surface evidence from both Sleeping Snake and Honey Bee indicate a sharp increase in occupational intensity during the Late Rincon phase. Undoubtedly, the wildlife and plants found on the bajada at AZ BB:9:148 would have been valuable resources to the occupants of these villages. Continued studies in the Rancho Vistoso area, particularly the excavation of the nearby Sleeping Snake Village, will help to determine the relationship between the small, temporary habitation and resource processing locales to the larger villages in the area.

SUBSISTENCE, DIET, AND RESOURCE EXPLOITATION

Evidence for subsistence and diet was found in the pollen, macrobotanical, and faunal records. Possible *Zea mays* (corn) pollen recovered from the sediment below a broken vessel found on the surface in Locus 6 in 1984 suggests that agriculture was practiced in the area. Seymour (1985:62) states:

> One large (126 microns) *Ceralia*-type grain is probably *Zea*...According to Fish [1983a], one grain is sufficient to indicate that corn may have been grown nearby. The same sample produced one grain of *Kallstroemia* sp. (Mexican or Arizona poppy). Fish (1983a:57; 1983b:79) finds increased amounts of this annual around agricultural features due to the locally greater availability of moisture.

Seymour (1985:63) also recognizes that the pollen may have been transported to the area in the vessel, and suggests the checkdams at Locus 2 or 10 as a possible source. One pollen sample from the current project, collected from underneath a mano on the floor of a pit structure (Feature 41), contained corn pollen. Though the number of analyzed pollen samples is limited (four in 1985 and four in 1999), there is not enough evidence at this time to suggest that agriculture was the primary resource procurement activity at the site. Instead, there is abundant evidence in the pollen record to suggest that wild foods, such as cacti varieties and grasses, were harvested and processed locally. Elevated Poaceae (grass) pollen frequencies were found in an excavated checkdam feature (Feature 18) and on the floor of the pit structure Feature 41, as well as a variety of cacti pollen (saguaro, prickly pear, and cholla) in all four analyzed pollen samples associated with the current project. There was also evidence of use of Cheno-am, wild potato, and High-spine Asteraceae. Although it is possible that corn was grown in the area, the pollen record indicates that wild-resource exploitation was the predominate subsistence related activity.

The macrobotanical record provides us with few new data on the subsistence practices and diet of the sites occupants, as few charred remains other than charcoal were found. A charred globemallow seed was recovered from the hearth of pit structure Feature 80, suggesting that the seeds may have been processed in the structure. A grass seed and grass stems were recovered from roasting pit Features 58 and 79. The grasses may have been used to line the pit or as tinder, and may not reflect the material that was being processed in the feature. Lastly, charred bear grass or yucca fragments were recovered from the hearth of pit structure Feature 4, indicating their use in the structure. The macrobotanical record does indicate that mesquite, palo verde, and acacia were burned as fuel in the hearths of the pit structures and in the roasting features. Interestingly, one piece of conifer (pine or juniper) charcoal was found in the macrobotanical sample collected from the hearth of pit structure Feature 41, suggesting this non-local species was burned as fuel or used in construction of the pit structure's superstructure.

The faunal assemblage indicates that a variety of animals were utilized at the site. Faunal species recovered from feature context include deer or antelope, jackrabbit, cottontail, prairie dog, and desert tortoise, as well as other fragmented pieces of small, medium, and large mammals, and a small bird. Only one of the pieces was worked into a bone awl. The remainder of the assemblage was in varying degrees of fragmentation, and some of it showed signs of having been burned or cooked. Perhaps the most intriguing of the faunal remains are the tortoise carapace fragments that were recovered from two separate contexts; the floor of pit structure Feature 4 and the fill of roasting Feature 38. Tortoise remains found in the pit structure exhibited browning and staining, and the tortoise remains found in the roasting feature exhibited evidence of having been burned or cooked.

SITE AND COMMUNITY STRUCTURE

Five pit structures, two possible ramadas, and 70 extramural prehistoric features were identified at AZ BB:9:148 (ASM). Prehistoric features were clustered in 15 loci, five of which contained subsurface cultural deposits. Pit structures were found in three loci (Locus 4/5, 13, and 18), and one locus (Locus 8) that contained subsurface features appears to have been a resource processing and probable storage locale. This discussion will concentrate on the loci that contained subsurface cultural features, particularly pit structures. The remaining loci contain bedrock grinding features, surface artifact scatters, checkdams, petroglyphs, and other surface features suggesting that use of these areas was limited to agricultural, horticultural, or limited activity resource procurement and processing or ceremonial pursuits. In addition to the features mentioned above, five boulder-rimmed circles were present at the site. The morphology of these features and their distribution across the site is discussed by Seymour (1985), and will not be addressed here other than to note that boulder-rimmed circles were not found in loci that contained pit structures. In general, boulder-rimmed circles were found in rocky terrain unsuitable for pit structure construction. The presence of boulder-rimmed circles in areas that also contained resource processing features (bedrock grinding features and roasting pits) but lacking in habitation features suggest they functioned as short-term-use structures, most likely for habitation while procuring and processing resources found in the immediate area. Therefore, feature patterning found within the loci containing pit structures may be applicable to those that contain boulder-rimmed circles.

No superposition of features were present at the site, suggesting the occupation of each locus was of a relatively short duration. While archaeomagnetic samples returned broad date ranges placing all the structures within the Sedentary and early Classic periods, there was nothing in the organization of the site itself to indicate that use of the structures was contemporaneous within each loci. Two pit structures were found in both Locus 4/5 and 18. These loci exhibit similar feature patterning that centered on the pit structures, with associated use areas consisting of ramadas, roasting pit features, and pits.

Locus 4/5, on the southern end of the site, was composed of two pit structures, a ramada, and seventeen extramural features. Extramural features include three roasting pits, two pits, a borrow pit, a midden, four bedrock grinding features, and three checkdams. The checkdams and two bedrock mortars were found in the central portion and southern end of the locus. With the exception of surface features, all but five extramural features were clustered around pit structure Feature 4. This household group was composed of the east-facing pit structure (Feature 4) and the ramada (Feature 33) that were located approximately 10 m east of the entrance to the structure. The two features were separated by a drainage, which has two bedrock rock metates immediately adjacent. A large, irregularly shaped pit was found to the south of the ramada that has been interpreted as having been a borrow pit that was later filled with trash. A small open-air use area was found in between the structure and ramada. The use area was comprised of a pit, a roasting pit, and a rock-lined hearth. A large roasting pit that was excavated in 1985 was approximately 10 m north of the pit structure.

Locus 13 was located at the mouth of a drainage at the north end of the site. Features found within trenches in this locus were a pit structure and two roasting pits. In addition, one petroglyph panel was present. As this area was not mechanically stripped, it is possible that additional extramural subsurface features are present.

Locus 18, in the northwest portion of the site, was composed of two pit structures, a possible ramada, and eight extramural features. Extramural features included three roasting pits, one large roasting pit or horno, a cache of hammer stones, and two pits filled with stones. The ramada (Feature 42) was situated between the two pit structures. The entrance to pit structure Feature 41 faced west, and the other pit structure (Feature 45) was so disturbed that its orientation could not be determined. Not knowing the orientation of Feature 45, it is difficult to assess which pit structure (or both) the ramada was associated with. Behind Feature 41 were two pits that contained stones, the function of which are unknown. To the south of the entry a cache of three hammer stones was found. Feature 45 did not appear to have any extramural features in close proximity. The large roasting pit (horno) and surrounding clean-out debris were found on the extreme northwest corner of the locus.

These patterns reflect a lack of integrated, extended household space that can be seen in larger, more permanent Hohokam habitation sites. With the exception of one ramada being associated with one pit structure, none of the architectural features were clearly related in space.

SOCIOECONOMIC RELATIONS

There was some evidence to suggest that ceramics were manufactured in the household group that encompasses pit structure Feature 4 in Locus 4/5. On the floor of the structure itself, pottery making tools were found that included two polishing stones, two lap stones that were utilized to grind pigment, and numerous pieces of broken plain ware ceramics. In addition, a cauldron-shaped vessel reworked into a scoop that may have been part of the pottery making kit (Gregonis Chapter 5) and a lump of caliche which had been heavily ground on one side indicating its use as a pigment were present. Abundant ceramic debris was found adjacent to this pit structure and in the surrounding extramural features. A sand sample was collected from the drainage in front of the pit structure for visual analysis in an effort to determine if it had been used as temper in the ceramics recovered at the site. The sand was found to contain quartz, feldspar, mica, and granitic material. Approximately 56% of the ceramics recovered from the site contained these particles and not volcanic or other materials. This temper type is ubiquitous in the region. While the temper in the ceramics found at the site does suggest local manufacture of ceramics it does not conclude that sand from the drainage, which is lacking in distinctive particles, was used in pottery manufacture.

Exotic artifacts recovered from the site include a turquoise bead, two small fine-grained black stone beads, and fragments from a shell bracelet. In addition, three obsidian projectile points were recovered, though sourcing studies were not undertaken on these artifacts. The genera of shell recovered from the site are available in the Gulf of California. From these artifacts we know that the people who utilized AZ BB:9:148 (ASM) were involved indirectly or directly in trade with the people of northern Mexico and possibly with groups in other areas.

MORTUARY PRACTICES

A single primary inhumation and a scatter of cremated bone that may be human were recovered from the site. The inhumation consisted of an articulated individual that had been placed within a large roasting feature and covered with fire-cracked rock and ground stone. The placement of the stones on the

body had crushed the skull and ribs, and the burial had been further disturbed by rodents and scavengers. The body was lying on its back, fully extended, legs crossed left over right. The interred individual is thought to be an adult male based on the curvature of the sacrum, robust mandible, and fused sacral. There were no associated burial offerings. The burial was found in an area of the site that contained numerous roasting and storage pit features, a petroglyph, and a boulder-rimmed circle.

The cremated bone was found in Locus 4/5 at the southern end of the site, in an area void of other features between two pit structures. Adjacent to the cremated bone were a partial Rincon Red-on-brown jar and a partial Rincon Red-on-brown bowl. Although no bone was found in these vessels, it is possible that one, particularly the jar, was used as a cremation urn.

There was nothing to suggest that the inhumation and possible cremation are of different time periods, as Rincon Red-on-brown ceramics were found in the roasting pit feature that contained the inhumation as well as adjacent to the cremated bone. Instead other reasons for the difference in treatment must be considered, such as social status and circumstance of the individuals' death.

PETROGLYPHS

Five petroglyph galleries (features) that contained twelve glyphs were identified at the site. The elements found at these locales were both representational and abstract. Using the design element classification system developed by Ferg and revised by Wallace (Wallace 1989 as cited in Thiel 1995:Figure 2.3), Table 9.1 presents the elements found at the site.

Seymour (1985) noted that artifacts found in association with the glyphs indicate that they all date to the Rincon phase. However, two new petroglyph panels were recorded at the site during the current project, one of which may be historical in age. The anthropormorphic form found in Feature 64 was unlike human forms of the Hohokam petroglyph style. The figure was full bodied, with round circles on either side of the torso where the arms would be, and may have the scrawled initials "T.M." or "T. N." above it (see Figure 4.12). This was in contrast to the two other anthropormorphic figures at the site (one clearly anthrophomorphic and the other probably anthropormorphic though indistinct due to surface spalling of the rock) that have open circle for heads and a stick-figure bodies. The possible historical glyph has not repatinated and has a fresh-looking appearance. Other glyphs found at the site appear less distinct and more weathered, and some but not all display some repatination. However, assigning a style and age to an image is always problematic because it is subjective, must take into account regional and site specific variables, and often does not allow for individual creativity. With such a small sample size for comparison, it cannot be done with certainty.

Also problematic is assigning a meaning or interpretation to the art. Seymour (1985) also had difficulty in identifying the pecked image of Feature 27. She states, "At first glance this carving appears to be a figure; however, the petroglyph may be a representation of part of the site—the lines representing trails and the circles characterizing features" (Seymour 1985:44). Perhaps if the site was solely a surface manifestation this would be true. Excavation of the site has provided additional features and altered the internal patterning. Likely, this glyph is a human figure that has been severely affected by natural surface spalling of the rock.

Table 9.1. Petroglyph Design Elements by Gallery (Feature) at AZ BB:9:148 (ASM)

	Features				
	27	**36**	**37**	**64**	**77**
Representational					
Anthropomorph	-	-	-	1	1
possible Anthropomorph	1?	-	-	-	-
Abstract					
Bull's eye	-	-	1	-	-
Concentric circle (2 rings)	-	-	-	-	1
Complex abstract	1?	-	-	-	-
Curvelinear meander	-	-	1	1	1
Linked circles with tails	-	2	-	-	-
Oval form	-	-	-	-	1
Possible initials	-	-	-	1	-
Rake	-	1	-	-	-
Totals	1	2	2	3	4

CHRONOLOGY

Chronological evidence from the site includes three archaeomagnetic dates and ceramic evidence. Archaeomagnetic samples were recovered from the hearths of four pit structures at the site. Unfortunately, one of these samples was not sufficiently magnetized to return a viable date. Sample AZ BB:9:148 (ASM)-2ua taken from the hearth of pit structure Feature 4 in Locus 4/5 returned a date of A.D. 1005 (1150) 1195, placing it firmly within the Sedentary period. The presence of Rincon Red-on-brown ceramics on the floor of the structure further supports a Rincon phase occupation of the structure. Sample BB:9:148 (ASM)-3ua taken from the hearth of pit structure Feature 41 returned a fairly broad date range of A.D. 1005 (1025,1175) 1320. The presence of Rincon Red-on-brown ceramics on the floor of the feature indicates that occupation of the structure was likely during the earlier part of the archaeomagnetic range. Lastly, Sample BB:9:148 (ASM)-4ua from the hearth of pit structure Feature 80 returned a date of A.D. 1005 (1100, 1250) 1270, placing it within both the Sedentary and Classic periods. Only non-temporally diagnostic plain ware ceramics were recovered from this feature. See Appendix D for full report of archaeomagnetic analysis.

PALEOENVIRONMENT

Pollen, macrobotancial, and faunal analyses reveal a prehistoric environment that is not that much different from today's environment. The pollen and macrobotanical record suggest an Arizona Upland community with mesquite and palo verde trees, acacia, hackberry, saguaro, barrel, prickly pear and pincushion cacti, globe mallow, and numerous grasses. Tree species could have provided wood for fuel and construction material, as well as food products in the form of seeds, pods, or berries. Cacti appear to have been primary diet sources. Grasses could have been used as tinder, in construction, in mats and baskets, as food and medicine, and for lining pits.

CONCLUSIONS

AZ BB:9:148 (ASM) was a resource procurement and processing and short-term or seasonal habitation locale that was occupied primarily during the Rincon phase. Numerous feature types were present at the site including five pit structures, two possible ramadas, five boulder-rimmed circles, pits and roasting pits, checkdams, bedrock grinding features, and petroglyphs. The presence of checkdam features at the site suggests the practice of agriculture. However, evidence of cultigens was scarce in the pollen record. Instead, there was abundant evidence of wild floral resources, particularly cacti varieties, suggesting that wild resources procurement and processing was the predominant subsistence activity. In addition to processing foodstuffs, ceramics may have been manufactured at the site, and there is evidence that the site's inhabitants participated either directly or indirectly in a system of long-distance trade.

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APPENDIX A

FEATURE TABLE

Following is Table A.1 listing the features documented during the Neighborhood 12 Data Recovery Project. It is arranged in numerical order. As numbers were assigned to features during mechanical trenching, and then later as features were excavated or recorded, they do not run in consecutive order within each loci. Also provided in the table is the corresponding designation of each feature to that originally given in 1985 (Seymour 1985).

Table A.1. Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Previous Number	Feature Type	Size	Easting	Northing	Description
1	8	-	inhumation	0.4 × 1.2 m	502341.94	3591570.01	Primary inhumation found in BHT 1.
2	16/17	-	pit	2 m	502080.87	3591900.95	Rock filled pit found in BHT 7. Not clearly defined. Plain ware ceramics in association
3	19	-	bedrock mortar	21 × 18 cm, 6 cm deep	502157.12	3591554.52	-
4	4/5	-	structure	6 × 4 m	502286.58	3591400.02	Catastrophically burned pit structure.
5	4/5	-	structure	indet.	502245.77	3591385.81	Pit structure in BHT, never fully defined. Entry excavated. Hearth sampled.
6	4/5	-	pit	1.2 m	502284.89	3591378.43	Pit with charcoal-stained sediment and ceramics in side wall of trench.
7	4/5	-	pit	indet.	502298.26	3591387.39	Area of dark sediment in base of trench with no real depth. The feature was likely a pit that was removed during backhoe trenching..
8	4/5	-	checkdam	1.87 m in length	502288.16	3591359.92	Feature explored by backhoe and found to have been constructed in at least two courses. Feature also present subsurface on either side of the small drainage.
9	4/5	-	checkdam	1.72 m in length	502292.64400	3591329.36900	In drainage south of Feature 8.
10	-	-	void	-	-	-	Void
11	18	-	cultural lens	12.58 × 10.67 m	502110.46	3591754.29	Dark charcoal-stained, ashy deposit first seen in BHT 10. Clean out debris from roasting pit Feature 47.
12	18	-	midden	3.0 × 0.5 m	502145.07	3591723.51	Ashy midden deposit in the end of BHT 11 at the base of bedrock outcrop.
13	19	-	bedrock slick	0.36 × 0.19 m	502227.56	3591581.01	Very lightly worn area on large boulder in center of bedrock outcrop.

Table A.1, continued. Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Previous Number	Feature Type	Size	Easting	Northing	Description
14	19	-	pecked surface	indet.	502228.31	3591581.67	Boulder that has been pecked. No clear design element visible. Possible use surface for lithic reduction or food preparation.
15	4/5	mortar, Locus 5	bedrock mortar	0.12 × 0.12 × 0.25 m	502228.38	3591274.50	Bowl-shaped bedrock mortar. Ground surface is completely eroded and mineral stained. On bedrock outcrop near Feature 16, mortar.
16	4/5	mortar, Locus 5	bedrock mortar	0.16 × 0.16 × 0.05 m	502233.29	3591273.81	Top of the Feature is eroded; base of the feature has an intact ground surface.
17	-	-	void	-	-	-	Void
18	10	Rock Alignment 2	checkdam	10.4 m in length	502225.56	3591748.17	Single course checkdam.
19	10	Rock alignment 3	checkdam	20.68 m in length	502217.13	3591751.93	Tested in 1985.
20	10	Rock Alignment 1	checkdam	1.98 m in length	502216.29	3591773.47	-
21	10	-	checkdam	1.43 m in length	502192.60	3591773.89	-
22	8	-	cultural lens	1.37 × 0.32 m	502333.18	3591605.32	Cultural lens of ashy, charcoal-stained sediment with one piece of FCR. Possible clean-out debris from nearby roasting pit.
23	8	-	roasting pit	indet.	502338.45	35915973.90	Discovered during trenching; most of the feature had slumped before measurements could be taken. The feature consisted of large, subangular, caliche covered cobbles.
24	8	-	roasting pit	0.75 × 0.14 m	502342.24	3591593.02	A pit filled with FCR and ashy-gray sediment.
25	8	-	gs cluster	1.60 × 0.35 m	502343.71	3591592.51	Cluster of ground stone in area containing numerous roasting pits.
26	8	-	cultural lens	0.90 × 0.45 m	502352.48	3591579.93	Ash-stained sediments in two segments in sidewall of trench. Possible clean-out debris from nearby roasting pits.

Table A.1, continued. Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Previous Number	Feature Type	Size	Easting	Northing	Description
27	8	Petroglyph, Locus 8	petroglyph	0.6 × 0.4 m	502336.16	3591554.84	The glyph has both abstract and represational qualities. The glyph looks like a person holding a long, thin, object in his or her hand. The object may be a snake.
28	8	Circle 2, Locus 8	boulder circle	4.2 × 4.5 m	502332.25	3591553.09	-
29	4/5	-	pit	1.02 m dia.	502243.77	3591377.61	Pit with dark cultural sediments near Feature 5, structure.
30	4/5	-	midden	3.0 × 1.85 m	502251.08	3591374.13	Midden deposit at base of bedrock outcrop near Feature 5. Excavated by backhoe, grab sample collected.
31	4/5	-	pit	1.18 × 1.06 m	-	-	Oval-shaped area of dark fill, highly compacted. Visible on the backhoe scraped surface. Band of light-colored clay throughout. Possible storage pit, or may have been used to process clay.
32	4/5	-	rock lined hearth	0.88 × 0.54 × 0.07 m	502296.71	3591394.96	Pit ringed with 10 stones, with one large central stone at the base. Disturbed by backhoe during excavations.
33	4/5	-	structure	3.60 × 2.37 m	502298.08	3591392.71	Possible ramada area evidence by burned posts, dark area of cultural fill, subrectangular in shape.
34	4/5	-	roasting pit	0.67 m dia.	502293.48	3591396.78	Small pit filled with FCR.
35	4/5	-	borrow pit	2.68 m × 2.0m × 0.15	502293.88	3591391.90	Oval-shaped trash-filled pit, likely a borrow pit with secondary disposal use.
36, Boulder 1	7	-	petroglyph	0.3 × 0.1 m	502417.45	3591456.93	Two petroglyph panels compose this gallery in Locus 7.
36, Boulder 2	7	-	petroglyph	0.4 × 0.1 m	502423.32	3591452.50	-
37	11	-	petroglyph	20 cm dia.	502281.64	3591761.32	Concentric circles pecked into bedrock outcrop.
38	8	-	roasting pit	0.58 m dia.	502341.67	3591570.86	Large roasting pit reused as a grave. Contained Feature 1, inhumation.

Table A.1, continued. Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Previous Number	Feature Type	Size	Easting	Northing	Description
39	8	-	pit	1.37 m dia.	502348.92	3591566.05	Circular area filled with dark sediments.
40	8	-	pit	0.46 m dia.	502350.36	3591565.97	Circular area filled with dark sediments.
41	18	-	structure	5.2 × 4.2	502128.76	3591718.85	Subrectangular structure-in-pit.
42	18	-	ramada	3.88 × 3.03	502132.59	3591731.39	Possible ramada feature near Feature 42. Filled with trash, one post hole evident. May also be a trash-filled borrow pit.
43	18	-	pit	1.25 m dia.	502132.55	3591718.01	Pit filled with stones, some of which may have been thermally altered. No evidence of oxidation, charcoal, or other burning debris.
44	18	-	pit	1.25 m dia.	502133.17	3591716.88	Pit immediately adjacent to 44, and almost identical in morphology and contents.
45	18	-	ramada	indet.	502123.84	3591735.87	A severely bioturbated hearth and surface area that likely represents a pit structure that had not been burned. Found in low-energy channel sands.
46	-	-	-	-	-	-	Void
47	18	-	roasting pit	2.4 × 2.3 m	502106.94	3591754.47	Large horno or roasting pit found under Feature 10, cultural lens.
48	18	-	cache	0.38 × 0.34 × 0.08 m	502124.79	3591715.17	Three hammerstones cached in a small, indistinct pit. No cultural sediments evident.
49	4/5	-	checkdam	1.61 m in length	502293.12	3591323.74	-
50	4/5	-	bedrock metate	-	502293.50	3591404.16	Unable to measure due to vegetation.
51	4/5	-	bedrock metate	-	502294.63	3591402.88	Unable to measure due to vegetation.
52	4/5	-	roasting pit	0.94	502305.38	3591382.83	-
53	8	-	roasting pit	0.76 m dia.	502339.75	3591595.49	-

Table A.1, continued. Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Previous Number	Feature Type	Size	Easting	Northing	Description
54	8	-	roasting pit	0.73 m dia.	502340.48	3591594.56	-
55	8	-	roasting pit	54 cm dia.	502340.13	3591592.64	-
56	8	-	pit	0.42 m dia.	502343.32	3591589.45	-
57	8	-	roasting pit	0.84 m dia.	502342.66	3591588.51	-
58	8	-	roasting pit	0.90 m dia. × 0.2 m depth	502346.56	3591590.54	Filled with gray sandy sediment, no FCR. Light to moderate oxidation on the base and walls of the pit. Two pieces of FCR and one piece of thermally altered ground stone on the backhoe scraped surface of the feature.
59	8	-	pit	0.47 m dia.	502345.71	3591590.86	-
60	8	-	roasting pit	0.50 m dia.	502345.45	3591592.52	Pedestalled in the road. Not excavated.
61	8	-	pit	0.50 m dia.	502350.19	3591568.28	-
62	8	-	pit	0.56 m dia.	502349.22	3591570.09	-
63	8	-	pit	0.36 m dia.	502348.02	3591571.90	-
64	8	-	petroglyph	0.4 × 0.3 m	502305.75	3591561.86	Indistinct images lightly pecked into a boulder in a boulder outcrop. Images do not appear to be affiliated with Native Americans. Instead, they appear to be like a brand. Possibly historical.
65	7	Circle 1, Locus 7	boulder circle	2.7 × 6 m	502427.70	3591454.25	Large boulder circle with petroglyph gallery (Feature 36) containing two images, and a bedrock mortar (Feature 66) near the center of the feature.
66	7	Mortar within Circle 1	bedrock mortar	0.15 m dia. × 0.08 m deep	502426.93	3591453.91	Circular bedrock mortar on buried flat-lying rock slab in the middle of boulder circle Feature 65.
67	7	Circle 3, Locus 7	boulder circle	4.0 × 3.0 m	502433.48	3591446.52	-

Table A.1, continued. Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Previous Number	Feature Type	Size	Easting	Northing	Description
68	7	Mortar in Circle 3	bedrock mortar	0.14 m dia. × 0.05 m deep	502433.57	3591447.03	Circular with sloping sides in a bedrock granitic boulder within Feature 67, boulder circle.
69	7	Trails, Locus 7	trail system	-	-	-	-
70	7	-	boulder circle	4.07 m diameter	502437.07	3591438.28	-
71		-	bedrock slick		502297.73	3591648.08	Lightly ground, oval-shaped bedrock grinding slick near road in between Locus 8 and 10.
72		-	roasting pit	1.86 m dia. × 0.86 m deep	502288.01	3591674.91	Roasting pit that was barely visible on bladed road surface.
73	18	-	roasting pit	2.15 m × 1.45 m	502144.98	3591709.66	Surface assemblage of large rocks, one is extremely fire-cracked.
74	18	-	roasting pit	1.15 × 0.75 m	502125.25	3591689.91	Exposed by backhoe during scraping. Pit containing charcoal-stained sediment and FCR.
75	18	-	roasting pit	1.10 m dia.	502134.61	3591740.71	Pit filled with FCR that was dug down into bed of caliche.
76	20	-	rock wall	1.86 × 0.70 × 0.70 m	502098.82	3591421.80	Rock wall, most likely historical as it follows the fence line.
77	13	-	petroglyph	0.7 × 0.5 m	502337.14	3591933.62	Petroglyph panel on nearly vertical rock face. Four possible elements present, one a human-like form..
78	13	-	roasting pit	0.60 m dia. × 0.30 m deep	502408.57	3591931.68	Two metates, a small basin and a small flat milling stone, were pulled from the top of the features. Other FCR present.
79	13	-	roasting pit	2.1 m × 0.57 m, 0.02 m in height	502400.70	3591928.50	Long, shallow pit with moderate oxidation.

Table A.1, continued. Features, AZ BB:9:148 (ASM)

Feature No.	Locus	Previous Number	Feature Type	Size	Easting	Northing	Description
80	13	-	structure	indet.	502347.75	3591933.01	Pit house (or house-in-pit) found in BHT 31 on last day of the project. Flotation and archaeomagnetic samples collected from the hearth which was visible in the wall of the trench.
81	13	-	cultural lens	indet.	502341.75	3591933.01	Cultural fill beneath the floor of structure Feature 80.

APPENDIX B

DISTRIBUTION OF POTTERY BY PROVENIENCE

Table B.1. Distribution of Pottery by Provenience

Provenience	Vessel shape	Rillito or Rincon Red-on-brown	Rincon Red-on-brown	Rincon or Tanque Verde Red-on-brown	Red-on-brown	Rincon Red	Sacaton Red-on-buff	Red-on-buff	Plain ware?	Plain ware	Gila Plain	Total no. of sherds
Locus 4/5 surface	indeterminate	—	—	—	—	—	—	—	—	—	2	2
Locus 4/5 Backhoe scrape	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 Trench 14	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 Trench 16	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 trench 18 surf	indeterminate	—	—	—	—	—	—	—	—	6	—	6
Locus 4/5 trench 18	jar	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 Trench 19 surf	bowl	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 Trench 19 surf	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 Trench 19	indeterminate	—	—	—	—	—	—	—	—	3	—	3
Locus 4/5 Trench 20	indeterminate	—	—	—	—	—	—	—	—	1	2	3
Locus 4/5 Trench 21	indeterminate	—	—	—	1	—	—	—	—	1	—	2
Locus 4/5 Point location 3	jar	—	5	—	—	—	—	—	—	—	—	5
Locus 4/5 Point location 3	bowl	—	—	—	—	—	—	—	—	7	—	7
Locus 4/5 Point location 3	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 Point location 4 fill	bowl	—	20	—	—	—	—	—	—	3	—	23
Locus 4/5 Point location 5 fill	indeterminate	—	—	—	—	—	—	—	—	8	—	8
Locus 4/5 collection unit 1	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 collection unit 2	jar	—	—	—	—	—	—	—	—	1	1	2
Locus 4/5 collection unit 2	seed jar	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 collection unit 2	indeterminate	—	—	—	—	—	—	—	—	11	2	13
Locus 4/5 collection unit 3	indeterminate	—	—	—	—	—	—	—	—	6	—	6
Locus 4/5 collection unit 4	indeterminate	—	—	—	2	—	—	—	—	6	—	8
Locus 4/5 collection unit 5	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 collection unit 6	indeterminate	—	—	—	—	—	—	—	—	4	1	5
Locus 4/5 collection unit 7	bowl	—	—	—	—	—	—	—	—	—	2	2
Locus 4/5 collection unit 7	jar	—	1	—	—	—	—	—	—	—	2	3
Locus 4/5 collection unit 7	indeterminate	—	—	—	—	—	—	—	—	8	6	14
Locus 4/5 collection unit 8	bowl	—	—	—	—	—	—	—	—	3	—	3
Locus 4/5 collection unit 8	jar	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 collection unit 8	indeterminate	—	—	—	—	—	—	—	—	22	—	22
Locus 4/5 collection unit 9	indeterminate	—	—	—	—	—	—	—	—	4	—	4
Locus 4/5 collection unit 10	bowl	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 collection unit 10	indeterminate	—	—	—	—	—	—	—	—	9	—	9
Locus 4/5 collection unit 11	bowl	—	—	—	—	—	—	—	—	3	—	3
Locus 4/5 collection unit 11	jar	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 collection unit 11	indeterminate	—	—	—	—	—	—	—	—	22	—	22
Locus 4/5, miscellaneous collection units and trenches		—	*26*	—	*3*	—	—	—	—	*145*	*18*	*192*
Locus 4/5, Feature 4 backhoe	indeterminate	—	—	—	—	—	—	—	—	4	—	4

Table B.1, continued. Distribution of Pottery by Provenience

Provenience	Vessel shape	Rillito or Rincon Red-on-brown	Rincon Red-on-brown	Rincon or Tanque Verde Red-on-brown	Red-on-brown	Rincon Red	Sacaton Red-on-buff	Red-on-buff	Plain ware?	Plain ware	Gila Plain	Total no. of sherds
Locus 4/5 F 4 fill	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 Feature 4 fill NW	bowl	—	—	—	1	—	—	—	—	—	—	1
Locus 4/5 Feature 4 fill NW	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 Feature 4 rooffall NE	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5, Feature 4 rooffall NW	jar	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5,Feature 4,rooffl, NW	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 Feature 4 rooffall SE	indeterminate	—	—	—	—	—	—	—	—	3	1	4
Locus 4/5, Feature 4 rooffall SW	bowl	—	6	—	—	—	—	—	—	1	—	7
Locus 4/5, Feature 4roof fall SW	effigy scoop	—	—	—	—	—	—	—	—	5	—	5
Locus 4/5, Feature 4 roof fall SW	indeterminate	—	—	—	—	—	—	—	—	3	—	3
Locus 4/5, Feature 4 NE 1/4	bowl	—	—	—	—	—	—	—	—	5	—	5
Locus 4/5 Feature 4 floor fill NW	cauldron	—	7	—	—	—	—	—	—	—	—	7
Locus 4/5 Feature 4floor fill NW Point location 3	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5, Feature 4 entry fill	indeterminate	—	—	—	—	—	—	—	—	3	—	3
Locus 4/5, Feature 4 floor SW	bowl	—	1	—	—	—	—	—	—	—	—	1
Locus 4/5, Feature 4 floor SW	jar	—	—	—	—	—	—	—	—	4	—	4
Locus 4/5 Feature 4 floor NE Point location 8	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 Feature 4 floor NE Point Location 9	bowl	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 Feature 4 floor SE Point location 11	indeterminate	—	—	—	—	—	—	—	—	19	—	19
Locus 4/5 Feature 4 floor SE Point location 17	indeterminate	—	—	—	—	—	—	—	—	5	—	5
Locus 4/5, Feature 4 floor SE	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5, Feature 4 totals		—	*14*	—	*1*	—	—	—	—	*64*	*1*	*80*
Locus 4/5, Feature 5 fill	indeterminate	—	—	—	—	—	—	—	—	7	—	7
Locus 4/5, Feature 5 floor fill	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 Feature 5 totals		—	—	—	—	—	—	—	—	*9*	—	*9*
Locus 4/5 F29 fill	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 Feature 29 totals		—	—	—	—	—	—	—	—	*2*	—	*2*
Locus 4/5 F30 backhoe	bowl	—	—	—	—	—	—	—	—	16	—	16
Locus 4/5 F30 backhoe	scoop or shallow bowl	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 F30 backhoe	platter	—	1	—	—	—	—	—	—	—	—	1
Locus 4/5 F30 backhoe	platter/bowl	—	3	—	—	—	—	—	—	—	—	3
Locus 4/5 F30 backhoe	jar	—	—	1	—	—	—	—	—	4	—	5
Locus 4/5 F30 backhoe	indeterminate	—	—	—	—	—	—	—	—	69	6	75
Locus 4/5 Feature 30	jar	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5, F30 fill	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 Feature 30 totals		—	*4*	*1*	—	—	—	—	—	*92*	*6*	*103*
Locus 4/5 F32 fill	indeterminate	—	—	—	—	—	—	—	—	1	5	6
Locus 4/5 Feature 32 totals		—	—	—	—	—	—	—	—	*1*	*5*	*6*

Table B.1, continued. Distribution of Pottery by Provenience

Provenience	Vessel shape	Rillito or Rincon Red-on-brown	Rincon Red-on-brown	Rincon or Tanque Verde Red-on-brown	Red-on-brown	Rincon Red	Sacaton Red-on-buff	Red-on-buff	Plain ware?	Plain ware	Gila Plain	Total no. of sherds
Locus 4/5 F33 fill	jar	—	—	—	—	—	1	—	—	26	—	27
Locus 4/5 F33 fill	indeterminate	—	—	—	—	—	—	—	—	28	—	28
Locus 4/5 Feature 33		—	—	—	—	—	*1*	—	—	*54*	—	*55*
Locus 4/5 F35 fill	bowl	—	—	—	—	—	—	—	—	1	—	1
Locus 4/5 F35 fill	jar	—	—	—	—	—	—	—	—	2	—	2
Locus 4/5 F35 fill	indeterminate	—	—	—	—	—	—	—	—	17	—	17
Locus 4/5 Feature 35 totals		—	—	—	—	—	—	—	—	*20*	—	*20*
Locus 8 surface	indeterminate	—	—	—	—	—	—	—	—	3	—	3
Locus 8 surface tr 1	bowl	—	1	—	—	—	—	—	—	1	—	2
Locus 8 surface tr 1	jar	—	—	—	—	—	—	—	—	1	1	2
Locus 8 surface tr 1	indeterminate	—	—	—	1	—	—	—	—	10	6	17
Locus 8 trench 3 surf	not analyzed	—	—	—	—	—	—	—	—	—	—	0
Locus 8 Trench 4	not analyzed	—	—	—	—	—	—	—	—	—	—	0
Locus 8, surface and test trenches		—	*1*	—	*1*	—	—	—	—	*15*	*7*	*24*
Locus 8, F38 fill	bowl	—	—	—	—	1	—	—	—	1	—	2
Locus 8, F38 fill	jar	—	—	—	—	—	—	—	—	4	—	4
Locus 8, F38 fill	indeterminate	—	—	—	—	—	—	—	—	69	—	69
Locus 8 Feature 38 totals		—	—	—	—	*1*	—	—	—	*74*	—	*75*
Locus 8 Feature 58 fill E ½	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 8, Feature 58 totals		—	—	—	—	—	—	—	—	*2*	—	*2*
Locus 10 F18 fill	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 10, Feature 18 totals		—	—	—	—	—	—	—	—	*1*	—	*1*
Locus 11 Trench 23	indeterminate	—	—	—	—	—	—	—	—	5	3	8
Locus 11 Trench 24	indeterminate	—	—	—	—	—	—	—	—	1	1	2
Locus 11 backhoe	jar	—	—	—	—	—	—	—	—	—	2	2
Locus 11 test trenches and backhoe scraping		—	—	—	—	—	—	—	—	*6*	*6*	*12*
Locus 13 surface	indeterminate	—	—	—	—	—	1	—	—	1	1	3
Locus 13 fill	bowl	—	1	—	—	—	—	—	—	3	—	4
Locus 13 fill	jar	—	—	—	—	—	—	—	—	1	1	2
Locus 13 fill	indeterminate	—	—	3	—	—	—	—	—	41	6	50
Locus 13 Trench 29 fill	jar	—	—	—	—	—	1	—	—	1	—	2
Locus 13 Trench 29 fill	indeterminate	—	—	—	—	—	—	—	—	3	1	4
Locus 13 Trench 30, surf	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 13 trench 30	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 13 trench 31	jar	—	—	—	—	—	—	—	—	3	—	3
Locus 13 trench 31	bowl	—	—	—	—	—	—	—	—	6	—	6
Locus 13 trench 31	indeterminate	—	—	—	—	—	—	—	—	6	1	7
Locus 13, trenches and surface collection		—	*1*	*3*	—	—	*2*	—	—	*69*	*10*	*85*
Locus 13, F80 fill	bowl	—	—	—	—	—	—	—	—	—	1	1

Table B.1, continued. Distribution of Pottery by Provenience

Provenience	Vessel shape	Rillito or Rincon Red-on-brown	Rincon Red-on-brown	Rincon or Tanque Verde Red-on-brown	Red-on-brown	Sacaton Rincon Red	Sacaton Red-on-buff	Red-on-buff	Plain ware?	Plain ware	Gila Plain	Total no. of sherds
Locus 13, F80 fill	jar	—	—	—	—	—	—	—	—	1	1	2
Locus 13, F80 fill	indeterminate	—	—	—	—	—	—	—	—	6	10	16
Locus 13, Feature 80 totals		—	—	—	—	—	—	—	—	*7*	*12*	*19*
Locus 14/15 Trench 8	jar	—	—	—	—	—	—	—	—	3	—	3
Locus 14/15 Trench 8	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 14/15, Trench 8 totals		—	—	—	—	—	—	—	—	*4*	—	*4*
Locus 16/17 surface	bowl	—	1	—	—	—	—	—	—	—	—	1
Locus 16/17 Trench 17	indeterminate	—	—	—	—	—	—	—	—	4	—	4
Locus 16/17 Trench 5	indeterminate	1	—	—	—	—	—	—	—	2	3	6
Locus 16/17 Trench 6	indeterminate	—	—	—	1	—	—	1	—	3	—	5
Locus 16/17 Trench 7	indeterminate	—	—	—	—	—	—	—	—	4	2	6
Locus 16/17, surface collections and back hoe trenches		*1*	*1*	—	*1*	—	—	*1*	—	*13*	*5*	*22*
Locus 18 collection unit 1	bowl	—	1	—	—	—	—	—	—	—	—	1
Locus 18 collection unit 1	indeterminate	—	—	—	—	—	—	—	—	15	5	20
Locus 18 collection unit 2	indeterminate	—	1	—	—	—	—	—	—	15	—	16
Locus 18 collection unit 3	indeterminate	—	—	—	1	—	—	—	—	8	7	16
Locus 18 collection unit 4	indeterminate	—	—	—	—	—	—	—	—	7	—	7
Locus 18 collection unit 5	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 18, PL7	jar	—	—	—	—	—	—	—	—	—	15	15
Locus 18 backhoe scrape	jar	—	—	—	—	—	—	—	—	5	—	5
Locus 18 backhoe scrape	indeterminate	—	—	—	—	—	—	—	—	2	10	12
Locus 18 Trench 10	jar	—	—	—	—	—	—	—	—	—	2	2
Locus 18 Trench 10	indeterminate	—	—	—	—	—	—	—	—	3	—	3
Locus 18 Trench 11	indeterminate	—	—	—	—	—	—	—	—	6	—	6
Locus 18, Collection units and trenches		—	*2*	—	*1*	—	—	—	—	*63*	*39*	*105*
Locus 18 F12 fill	indeterminate	—	—	—	—	—	—	—	—	4	—	4
Locus 18, Feature 12 totals		—	—	—	—	—	—	—	—	*4*	—	*4*
Locus 18, Feature 41 rooffall	indeterminate	—	—	—	—	—	—	—	—	7	—	7
Locus 18, Feature 41 rooffall NE	indeterminate	—	—	—	—	—	—	—	—	3	—	3
Locus 18, Feature 41 rooffall SE	bowl	—	—	—	—	—	—	—	—	—	1	1
Locus 18, Feature 41 rooffall SE	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 18, Feature 41rooffl SW	jar	—	—	—	—	—	—	—	—	1	—	1
Locus 18, Feature 41rooffl SW	indeterminate	—	—	—	—	—	—	—	—	8	—	8
Locus 18, Feature 41-S	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 18, Feature 41 fill	jar	—	—	—	—	—	—	—	—	5	—	5
Locus 18, Feature 41 fill	indeterminate	—	—	—	—	—	—	—	—	14	—	14
Locus 18, Feature 41 fill SE	indeterminate	—	—	—	—	—	—	—	—	1	3	4
Locus 18, Feature 41 floor	bowl	—	—	—	—	—	—	—	—	—	1	1

Table B.1, continued. Distribution of Pottery by Provenience

Provenience	Vessel shape	Rillito or Rincon Red-on-brown	Rincon Red-on-brown	Rincon or Tanque Verde Red-on-brown	Red-on-brown	Rincon Red	Sacaton Red-on-buff	Red-on-buff	Plain ware?	Plain ware	Gila Plain	Total no. of sherds
Locus 18, Feature 41 floor	jar	—	—	—	—	—	—	—	—	1	—	1
Locus 18, Feature 41 floor	indeterminate	—	—	—	—	—	—	—	—	2	1	3
Locus 18, Feature 41 floor Point location 3	bowl	—	—	—	—	—	—	—	—	—	3	3
Locus 18, Feature 41 floor PL9	indeterminate	—	—	—	—	—	—	—	—	—	6	6
Locus 18, Feature 41 floor Point location 11	bowl	—	—	—	—	—	—	—	—	3	2	5
Locus 18, Feature 41 floor Point location 14	jar	—	16	—	—	—	—	—	—	—	—	16
Locus 18, Feature 41 floor Point location 15	jar	—	5	—	—	—	—	—	—	—	—	5
Locus 18, Feature 41 floor Point location 16	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 18, Feature 41 floor Point location 17	bowl	—	—	—	—	—	—	—	—	—	2	2
Locus 18, Feature 41 floor Point location 18	bowl	—	—	—	—	—	—	—	—	—	1	1
Locus 18, Feature 41 floor Point location 25	indeterminate	—	—	—	—	—	—	—	—	—	4	4
Locus 18, Feature 41 floor Point location 25	jar?	—	—	—	—	—	—	—	—	—	2	2
Locus 18, Feature 41 floor Point location 25	jar	—	—	—	—	—	—	—	—	—	4	4
Locus 18, Feature 41 floor Point location 26	indeterminate	—	—	—	—	—	—	—	—	1	—	1
Locus 18, Feature 41 floor Point location 34	bowl	—	—	—	—	—	—	—	—	—	4	4
Locus 18, Feature 41 floor Point location 35	indeterminate	—	—	—	—	—	—	—	—	—	1	1
Locus 18, Feature 41 Floor Point location 39	indeterminate	—	—	—	—	—	—	—	—	—	1	1
Locus 18, Feature 41 totals		—	*21*	—	—	—	—	—	—	*50*	*36*	*107*
Locus 18, Feature 42 fill	bowl	—	—	—	1	—	—	—	—	1	—	2
Locus 18, Feature 42 fill	jar	—	—	—	—	—	—	—	—	3	—	3
Locus 18, Feature 42 fill	indeterminate	—	—	—	—	—	—	—	—	28	10	38
Locus 18, Feature 42 floor fill	indeterminate	—	—	—	—	—	—	—	—	4	—	4
Locus 18, Feature 42 floor	jar	—	—	—	—	—	—	—	—	2	—	2
Locus 18, Feature 42 floor	indeterminate	—	—	—	—	—	—	—	—	5	10	15
Locus 18, Feature 42.01 pit fill	jar	—	—	—	—	—	—	—	—	—	3	3
Locus 18, Feature 42		—	—	—	*1*	—	—	—	—	*43*	*23*	*67*
Locus 18, Feature 45 fill	bowl	—	—	—	—	—	—	—	—	9	49	58
Locus 18, Feature 45 fill	jar	—	—	—	—	—	—	—	—	7	—	7
Locus 18, Feature 45 fill	platter	—	—	—	—	—	—	—	—	3	—	3
Locus 18, Feature 45 fill	indeterminate	—	—	—	—	—	—	—	—	30	8	38
Locus 18, Feature 45 floor fill	jar	—	—	—	2	—	—	—	—	—	—	2
Locus 18, Feature 45 floor fill	indeterminate	—	—	—	—	—	—	—	—	4	—	4
Locus 18, Feature 45 floor	indeterminate	—	—	—	—	—	—	—	—	—	2	2
Locus 18, Feature 45 totals		—	—	—	2	—	—	—	—	*53*	*59*	*114*
Locus 18, F75 fill	jar	—	—	—	—	—	—	—	—	1	—	1
Locus 18, F75 fill	indeterminate	—	—	—	—	—	—	—	—	1	4	5
Locus 18, Feature 75 totals		—	—	—	—	—	—	—	—	*2*	*4*	*6*
Locus 19 Trench 12	indeterminate	—	—	—	—	—	—	—	—	2	—	2
Locus 19 Trench 13	indeterminate	—	—	—	—	—	—	—	—	1	—	1

Table B.1, continued. Distribution of Pottery by Provenience

Provenience	Vessel shape	Rillito or Rincon Red-on-brown	Rincon Red-on-brown	Rincon or Tanque Verde Red-on-brown	Red-on-brown	Rincon Red	Sacaton Red-on-buff	Red-on-buff	Plain ware?	Plain ware	Gila Plain	Total no. of sherds
Locus 19 near F 3	jar	—	—	—	—	—	—	—	1	—	—	1
Locus 19 near F 3	indeterminate	—	—	—	—	—	—	—	7	1	—	8
Locus 19 test trenches and surface collection		—	—	—	—	—	—	—	*8*	*4*	—	*12*
Feature 46 S ½, fill	jar	—	—	—	—	—	—	—	—	1	—	1
Feature 46 total		—	—	—	—	—	—	—	—	*1*	—	*1*
	Grand total	**1**	**70**	**4**	**10**	**1**	**3**	**1**	**8**	**798**	**231**	**1127**

APPENDIX C

CODING FORMAT FOR LITHIC ARTIFACT ANALYSIS

Coding Format for Lithic Artifact Analysis

FN: Field/Bag Number

PL: Point Location Number

SITE: Site Number (ASM unless otherwise specified)

FEA: Feature Number

FEA TYPE: Feature Type

LEVEL: Level Number

CATEGORY: Artifact Category:
- CSFD (chipped stone flaking debris)
- Tool
- Core
- Hammerstone

TYPE: Morphological Type:

For Debitage and Shatter:
- Primary Flake (>50% cortex)
- Secondary Flake (<50% cortex)
- Tertiary Flake (non-cortical)
- Percussion Biface Thinning Flake
- Pressure Biface Removal Flake
- Unifacial Retouch Flake
- No Cortex/No Platform Flake
- Cortex/No Platform Flake
- Bipolar Flake
- Shatter
- Blade

For Modified Flake Tools:
- Edge-Modified Flake (informal; unifacial)
- Use-Damaged Flake (no intentional retouch)
- Scraper (formal: endscraper, sidescraper)
- Drill
- Graver
- Tabular Knife

For Bifaces:
- Early Stage Biface

Middle Stage Biface
Preform/Knife (Late Stage Biface)
Bifacially Edged Flake

For Projectile Points:
Clovis
Jay
Pinto
Chiricahua
Elko
Cortaro
San Pedro
Cienega
Formative (small triangular, side-notched, or serrated)
Unknown

For Cores:
Tested Piece (cores w/ <4 flake scars)
Unidirectional Core
Bidirectional Core
Multidirectional Core
Bifacial Core
Bipolar Core

For Hammerstones:
Cobble Hammer
Core Hammer
Hammer Fragment

RMAT:Lithic Raw Material Type:
Obsidian
Chalcedony (translucent)
Chert
Basalt
Rhyolite
Quartz
Quartzite
Quartz crystal
Slate

PRB?: Platform Remnant Bearing?
Yes
No

DORSCARS: Number of Dorsal Flake Scars from previous removals (debitage only)

PLATYPE: Platform Type:
- Cortical
- Flat
- Angle
- Faceted
- Punctiform
- Linear
- Reduced
- Crushed
- Flaked Off
- N/A

TERMIN: Termination Type (debitage and flake tools only):
- Normal
- Hinge
- Snap
- Feather
- Compound
- Step
- Flaked Off
- Outre Passe
- N/A

BREAKTYPE: Fracture Type:
- Thermal Shock
- Crenated
- Impact Flute
- Impact Burination
- Snap - transverse breaks that are flat and featureless
- Hinge
- Step
- Radial
- Bend - transverse break w/hinge or lip features
- Crushed
- Compound
- Perverse - twisting fracture plane oriented diagonal to long axis of piece
- N/A

PORTION: Portion Remaining:
- Complete
- Nearly Complete
- Distal
- Proximal
- Medial
- Edge

CTX%:Percentage Cortex:

0 = None
1 = 1-24%
2 = 25-49%
3 = 50-74%
4 = 75-100%

LENGTH: Tools and cores only. Length measured to nearest tenth of a centimeter. Length refers to the distance between the proximal and distal margins.

WIDTH: Tools and cores only. Width measured to nearest tenth of a centimeter. Width refers to the distance between the lateral margins.

THICK: Tools and cores only. Thickness measured to nearest tenth of a centimeter. Thickness refers to the maximum distance between opposite faces.

SIZE GRADE: Debitage only. Size Grade measured using size chart of concentric circles:

G0 ≤ 0.5 cm
G1 = 0.5 to 1.5 cm
G2 = 1.5 to 2.5 cm
G3 = 2.5 to 3.5 cm
G4 = 3.5 to 4.5 cm
G5 = 4.5 to 5.5 cm
G6 = 5.5 to 6.5 cm
G7 = 6.5 to 7.5 cm
G8 = 7.5 to 8.5 cm
G9 ≥8.5 cm

WEIGHT: Tools and cores only. Weight measured to nearest tenth of a gram using a triple-beam balance scale.

HAFTYPE: Haft Type (For Bifaces and Projectile Points):

Stemmed
Notched
Straight

BASE: Base Shape (For Bifaces and Projectile Points):

Straight
Slightly Concave
Markedly Concave
Slightly Convex
Markedly Convex

NOTCHLOC: Notch Location (For Notched Projectile Points)
- Side
- Corner
- Base
- Base and Side

REWORKED: Evidence for Reworking (Tools only)
- Yes
- No

COMMENTS: Narrative

APPENDIX D

ARCHAEOMAGNIETIC ANALYSIS

ARCHAEOMAGNETIC SAMPLING, ANALYSIS, AND DATING AT AZ BB:9:148 (ASM)

William L. Deaver and Barbara A. Murphy

This report summarizes the collection and analysis of four archaeomagnetic dating samples from prehistoric structures unearthed during archaeological explorations at AZ BB:9:148 (ASM) (site latitude: 32.46° N; site longitude: 249.03° E; local magnetic declination: 12.5° E) in Neighborhood 12 of the Rancho Vistoso development. Based on associated archaeological evidence (Table D. 1), three of these prehistoric structures are attributed to the Rincon phase (A.D. 950-1150) of the Tucson Basin Hohokam cultural sequence. The other context can only be ascribed to some time within the Hohokam cultural sequence in the Tucson Basin (A.D. 650-1450). Three of the four samples yielded archaeomagnetic results sufficiently precise to allow dating of the archaeological contexts. The calendrical dates obtained suggest occupations in the range from A.D. 1005-1320 (Table D.1). Statistical comparisons of the three datable samples suggest that all three contexts may have been contemporaneous, at least at the level of resolution of the archaeomagnetic data.

Table D.1. Archaeological Context and Dates for Archaeomagnetic Samples, AZ BB:9:148 (ASM)

Sample	Provenience	Archaeological Age	Estimated Date	Archaeomagnetic Date
-1ua	Pit Structure F5, hearth (5.01)	Rincon	A.D. 950-1150	no date, poor sample
-2ua	Pit Structure F4, hearth (4.01)	Rincon	A.D. 950-1150	A.D. 1005 (1150) 1195
-3ua	Pit Structure F41, hearth (41.01)	Rincon	A.D. 950-1150	A.D. 1005 (1025, 1175) 1320
-4ua	Pit Structure F80, hearth (80.01)	unplaced Hohokam	A.D. 650-1450	A.D. 1005 (1100, 1250) 1270

BASIS OF ARCHAEOMAGNETIC DATING

Two fundamental principles underlie archaeomagnetic dating. The first principle is that many rocks, soils, and sediments contain ferromagnetic minerals that, under certain conditions, will acquire a magnetic remanence parallel to the prevailing magnetic field. Most commonly, this occurs when sediments and soils at archaeological sites were heated to relatively high temperatures, such as occurred with the use of hearths and cooking pits, or during the destruction of a structure by fire (for more information on this

and other processes, see Aitken 1974; Butler 1992; Eighmy and Howard 1991; Eighmy and Sternberg 1990; Irving 1964; McElhinny 1973; Sternberg 1982, 1990; Tarling 1983). The magnetic remanence is acquired upon cooling, and once established, the remanence is stable and enduring. The second principle is that the direction and strength of the prevailing magnetic field is constantly changing, a phenomenon referred to as *secular variation*. Although the direction and strength of the magnetic field change, archaeomagnetic studies in the southwestern United States have concentrated on documenting directional secular variation. Changes in the magnetic field direction are typically monitored by shifts in the apparent location of the magnetic north pole. Change in the apparent location of the magnetic north pole is commonly referred to as *polar drift* or *polar wander*. Because of polar wander, each archaeomagnetic remanence is an observation of the apparent location of the magnetic north pole at a specific point in time.

We refer to the moment that the remanence is acquired as the *archaeomagnetic event*. To have meaning in archaeological analyses, we must associate the archaeomagnetic event with a specific archaeological event. In the case of hearths and cooking pits that were probably reused, we assume that the recorded remanence represents the last heating-and-cooling cycle associated with that feature. When firepits or hearths are associated with structures, we assume that the last use and abandonment of the hearth corresponds to the abandonment of the structure. In the case of samples collected from walls and floors heated during the burning of structures, the archaeomagnetic event is clearly equivalent to the destruction event. In most situations the archaeomagnetic event probably corresponds to an archaeological abandonment event, but at the most unresolved level, the archaeomagnetic event represents some archaeological event that occurred sometime within the life of the archaeological feature.

METHODS

An archaeomagnetic sample consists of a set of individually oriented and measured specimens obtained from baked archaeological sediments. We follow standard sampling procedures as described by Eighmy (1990), and apply experimental procedures well established at the Paleomagnetic Laboratory, Department of Geosciences, University of Arizona.

Typically, 12 specimens are collected from baked sediments or soil representing the same archaeomagnetic event. Occasionally, more or fewer samples are collected, depending on the situation. Generally six specimens is the minimum number necessary to obtain an acceptable estimation of the magnetic remanence of a material. Each specimen is carefully isolated from the remaining matrix, and surrounded by an aluminum mold. The mold is leveled on a ring of modeling clay and filled with plaster encasing each specimen. This procedure preserves the integrity of the specimens, and allows us to control for the orientations of the molds. The azimuth of the mold surrounding each specimen is always measured relative to magnetic north using a Brunton compass. The axis along which the azimuth is measured, the sample number, and the specimen designation are etched into the plaster on top of the specimen. Weather permitting, the azimuth is also measured using a sun compass. When corrected for the geographic location, time of year, and time of day, the sun azimuth provides the orientation of the specimen relative to true north. The difference between the magnetic and sun azimuths is the *local magnetic declination* at the time of sampling. We average the individual differences between the sun and magnetic azimuths to obtain an *average magnetic declination* for the sampling sites. We have opted for this procedure because we do not always obtain a sun azimuth for each specimen. The local magnetic declination is determined

by taking the average difference between the sun and magnetic azimuths for all samples from the archaeological site.

After collection, the samples are returned to the laboratory and stored in a magnetically shielded room with an average field intensity < 200 mT (milliTesla). All measurements are made with a cryogenic magnetometer. Initially, we measure the natural remanent magnetization (NRM) of each specimen, and then compute preliminary sample averages to evaluate the cohesiveness of the NRM. Our experience has been that samples characterized by large scatters of individual specimen directions rarely improve during further analysis, and probably represent materials that have a weak and unreliable remanence (Sternberg 1982). Even if we recover a measurable archaeomagnetic remanence, the poor precision makes archaeomagnetic dating useless. It is our policy that samples with very large confidence intervals (for example $\alpha 95 \geq 9°$) at NRM are not analyzed beyond the NRM stage. Any additional restrictions as to the precision of the samples are at the discretion of the client.

The magnetic profiles of archaeomagnetic samples from the Southwest are fairly consistent. Experimental evidence indicates that magnetite or titanomagnetite is the primary carrier of the remanence (Sternberg 1982:34–37). The archaeomagnetic signal that we are interested in is often overlain by a weaker, secondary component acquired during the several hundred years of burial after magnetization. Alternating field (AF) demagnetization is a useful and appropriate means of removing the secondary magnetization (Sternberg 1990:20). All specimens are demagnetized at peak AF strengths of 2.5, 5.0, 7.5, 10, 15, 20, 30, 40, 50, 60, 70, and 80 mT. This series of measurements provides a broad spectrum of data for evaluating the magnetic profile of each specimen.

The results of AF demagnetization are analyzed by principal components analysis (Kirschvink 1980) to obtain the declination and inclination of the remanence for each specimen. No fewer than four demagnetization steps are used, and only specimens with minimum angular deviations less than 5.0° are considered reliable, and are used for computing the sample means. Specimens that exhibit angular deviations in excess of 5.0° do not possess an inherently consistent remanence. These specimens are not considered "outliers," because this latter term is usually applied to specimens that exhibit discordant directions of remanence; rather, samples with angular deviations greater than 5.0° are considered unreliable records, and are excluded from further analysis.

After evaluating the AF demagnetization results, a stereographic projection of the specimen directions is made. This is done to evaluate visually the coherence of the magnetic directions. Typically, these graphs show a consistent cluster of specimen directions. Occasionally, however, there are one or more specimens that exhibit apparently anomalous directions. These are considered possible "outliers." We review the field notes and experimental data to determine if these specimens differ in any physical or magnetic characteristics from the remaining specimens. When there is corroborating physical or experimental evidence that these suspected outliers are different from the other specimens, the outliers are excluded from the sample mean. In some cases there is no physical or experimental evidence, but the direction is clearly discordant. In these cases, the possible outlier is statistically compared to the cluster of other directions. If this direction is different at the 0.05 significance level, it is considered a statistical outlier, and is excluded from the sample mean.

Sample means are obtained by averaging the individual specimen directions using statistical methods based on the Fisherian distribution of points on a sphere. Use of these methods is long established in paleomagnetic studies (Fisher 1953; Irving 1964; McElhinny 1973). By convention, a virtual geomagnetic pole (VGP) is computed for each sample mean direction (Shuey et al. 1970). The resulting VGP is a standardized measure that facilitates comparison of data from across a relatively large region.

ARCHAEOMAGNETIC DATING

The objective of the experimental process is to isolate the best possible estimate of the magnetic remanence. The objective of archaeomagnetic dating is to assign a temporal value to this remanence. Because of polar wander, each archaeomagnetically determined VGP has a temporal moment that we refer to as T. It is the value of T that we try to ascertain through archaeomagnetic dating. We make a distinction between two types of archaeomagnetic dating: calendrical dating and relative dating. The primary difference between calendrical and relative dating is not in the analytical methods, but in the referents. The objective in calendrical dating is to determine when events occurred according to the modern Christian calendar by reference to a master polar wander curve that has been independently calibrated. The objective in relative dating is to determine when archaeological events occurred relative to other archaeomagnetically documented archaeological events. These two forms of dating are similar, but each addresses different kinds of chronological questions, and each is capable of achieving different levels of chronological resolution. Relative dating is the more straightforward and more refined method. If the researcher's goal is to associate the age of an archaeomagnetic event with a cultural chronology, or to differentiate between contemporaneous and noncontemporaneous events, or to order archaeological events, relative dating is the most-appropriate choice. If a researcher's goal is to determine when an archaeological event occurred in years A.D. or B.C., then the calendrical approach is more appropriate.

CALENDRICAL DATING

Calendrical dating is a pattern-matching technique similar to dendrochronological dating, and is not a radiometric technique such as radiocarbon dating (Sternberg 1990). Therefore, determining the age of an archaeomagnetic event of unknown age requires first having a master reconstruction of the pattern of ancient polar wander that is calibrated in years A.D. or B.C. The polar wander path, or "master dating curve" as it is often called, is constructed from archaeological contexts where the age of the archaeomagnetic events can be estimated by independently derived dates. In the Southwest, these independent dates are produced by dendrochronology, radiocarbon assays, or cross-dated ceramic associations.

We used the SWCV590 dating curve developed by the Archaeometric Laboratory at Colorado State University (Eighmy 1991) to date the archaeomagnetic samples. This curve is constructed using Sternberg's (1982:59–64; see also Sternberg and McGuire 1990) moving-window method with 40-year windows advanced by 25-year intervals. Although this is not the only dating curve that has been developed, it is the curve most widely used. Consequently, we maintain its use to foster comparability with the archaeomagnetic dates presented by Colorado State University. Although a more recent dating curve,

SWCV595, is available (Labelle and Eighmy 1995, Table D. 2), this new curve is not appreciable different than its predecessors.

We have adopted a format for the presentation of the calendrical dates that is similar to that for modern radiocarbon calibrations: A.D. 950 (1000) 1050. This date consists of a 95 percent confidence interval surrounding a *best-fit* date. We apply the mathematical dating procedure established by Sternberg (1982:104–105; also Sternberg and McGuire 1990) to obtain the 95 percent confidence interval. This procedure applies the statistical methods of McFadden and Lowes (1981) for the comparison of paleomagnetic directions. The statistics are all interpreted at 0.05 significance, and the dates associated with the master VGPs are applied to the VGP of unknown age following the guidelines suggested by Sternberg.

The best-fit date is intended as a measure of the central tendency of the 95 percent confidence date. Because the ancient pattern of polar wander appears as a squiggly line on the surface of the earth, sample VGPs rarely intercept the polar wander curve, but rather tend to cluster around this curve. Although the best-fit date is not the interception of the measured value with the polar wander curve, it does represent the point along the polar wander curve to which the sample VGP is most similar. Our objective in presenting the best-fit date is to present information about the inherent structure of the 95 percent confidence date range.

We obtain the best-fit date by calculating the angular distance between the sample VGP and the master VGPs comprising the dating curve; we refer to this statistic as *angle*. The best-fit date is that segment of the master dating curve for which angle takes on the minimum value. Typically in evaluating the values for angle, we encounter one of two situations. The first type is what we refer to as the "unimodal situation." Within each 95 percent confidence date, there is one minimum value, with all other values becoming progressively larger on either side of this minimum. Interpreting these is straightforward; the value of the best-fit date is the midpoint of the age window associated with the master VGP at this minimum value. The second type is what we refer to as the "bimodal situation." The plot of the angles exhibits two major troughs of differing magnitudes. These troughs result because the curve loops back on itself. When archaeomagnetic dates span these loops, we often encounter the bimodal situation. One minimum value represents the best fit on the early side of the loop, and the other represents the best fit on the late side of the loop. As an example, given a 95 percent date range of A.D 930–1350, the best-fit dates may be A.D. 1025 and 1300. These are the smallest values obtained on either side of A.D. 1150, which represents the apex of the A.D. 1000–1200 loop (see Labelle and Eighmy 1995). Occasionally there are other minor troughs as well, but we are only interested in the minimum values on either side of the loops. The best-fit date represents the central tendency of the 95 percent confidence date, and we include it to illustrate that the 95 percent confidence dates are not necessarily symmetrical.

Calendrical dating, as it is currently implemented, has three limitations for resolving the age of archaeomagnetic events. The first and most-common limitation is that multiple, mutually exclusive, date options may be assigned to a single archaeomagnetic VGP. We cannot distinguish archaeomagnetically which date option is most correct. It is the responsibility of the archaeologists to evaluate these date options against other lines of evidence to determine the most probable date. The second limitation is that the resolution of archaeomagnetic dates is not directly proportional to the uncertainty of the sample VGP. Rather, the resolution is dependent upon the period of time to which the unknown sample dates, the

precision of the dating curve, and the distance of the sample VGP from the curve (Sternberg et al. 1990). Increasing the number of specimens to provide for a more-accurate and more-precise estimation of the VGP for a critical context will not result in a more-precise archaeomagnetic date using this mathematical dating method. A third limitation is that often seemingly strong and reliable archaeomagnetic determinations do not date. In recent years we have observed that this phenomenon tends to occur with samples expected to date to the periods circa A.D. 800 and circa A.D. 1100. Although the moving-window method used to generate the polar wander curve has the desirable effect of reducing errors associated with independently dating archaeomagnetic events, it also has the undesirable effect of smoothing some of the real variation in the polar wander path. In the case of the A.D. 800 and A.D. 1100 loops, the effect is to reduce the magnitude of these loops. Precisely measured samples that fall along these loops may not date because the polar wander curve underestimates the course of polar wander.

RELATIVE DATING

In relative dating we apply many of the same methods and procedures used in calendrical dating, but the referents are different. The location of each VGP_i is taken as a proxy for the age, T_i, of the associated archaeological event. For a set of VGPs (VGP_1, VGP_2, . . . VGP_n), there is an equivalent set of temporal moments (T_1, T_2, . . . T_n). Thus, the spatial relationships among the VGPs are equivalent to the temporal relationships among the associated archaeological events. We can then evaluate hypotheses such as $T_1 = T_2$ by evaluating the equivalent hypothesis that $VGP_1 = VGP_2$..

ASSESSING CONTEMPORANEITY OF ARCHAEOMAGNETIC EVENTS

The goal of the analysis is to evaluate the hypothesis that $T_i = T_j$, and thus identify contemporaneous events. An apparently simple solution would be to evaluate the calendrical dates to determine if the date ranges for any set of samples overlap. If the estimated calendrical dates overlapped, then there would seem to be some probability that the archaeomagnetic events were contemporary. Many archaeomagnetic events with overlapping calendrical dates, however, can be shown empirically to be temporally discrete (see Deaver 1988:114). In the example cited, two samples from the site of Las Colinas were obtained from hearths in two pit structures that were dated to the Sacaton phase on the basis of associated ceramics. The interpreted archaeomagnetic dates for one sample was A.D. 900–1070 and for the other sample was A.D. 860–1030. Based on the archaeological age and the overlap of the archaeomagnetic dates, it seemed that these two structures were possibly contemporary. The results of the pairwise comparison of the mean VGPs, however, indicated that the VGPs were different ($p > 0.999$), and thus the archaeomagnetic events were not contemporaneous. This example illustrates the typical situation in archaeological and archaeomagnetic dating, where at each level of inference the resolution of the dating information becomes more refined. This seemingly contradictory situation arises because we can measure the location of the ancient VGP more precisely than we can estimate when the VGP was in that particular location. The most-direct way of assessing whether or not any two archaeomagnetic events could have occurred at the same time is to statistically compare the calculated VGPs.

To do this, we apply the statistical methods of McFadden and Lowes (1981). These are the same methods used to compare a VGP of unknown age with the archaeomagnetic dating curve. In this situation, however, we use these methods to evaluate the similarity or dissimilarity between any two archaeomagnetically determined VGPs. We perform a series of pairwise comparisons between VGPs in preselected data sets. The null hypothesis is that the two archaeomagnetic VGPs being compared are the same ($VGP_1 = VGP_2$). If the computed probability for the F-statistic is greater than 0.95, we reject the null hypothesis and conclude that $VGP_1 \neq VGP_2$. It follows then that $T_1 \neq T_2$. Alternatively, if the computed probability for the F-statistic is equal to or less than 0.95, we must accept the null hypothesis, and conclude that the difference between the VGPs is due to chance alone, and thusly $T_1 \approx T_2$.. The ages of the two events are not necessarily equal, but they cannot be differentiated at the desired level of significance.

Whenever the temporal span represented by $VGP_1 \ldots VGP_n$ is sufficiently large, so that the pattern of polar wander loops back on itself, we will derive spurious comparisons, because archaeomagnetic events of dissimilar age will have similar VGPs. Consequently, it is helpful to create separate data sets for the analysis. Subsets should be selected on the basis of the expected or measured age of the archaeological event and the general character of polar wander, as depicted in the SWCV590 curve. Generally, these comparisons can be performed for three periods: A.D. 600–800, A.D. 800–1100, and A.D. 1100–1800. Within these periods, the overall direction of polar wander appears to be unidirectional.

SEQUENCING THE ARCHAEOLOGICAL EVENTS

Another aspect of relative dating is to arrange the archaeological events into a presumed sequence based on the archaeomagnetic data. As noted above for the contemporaneity evaluation, this exercise requires prior knowledge that the archaeological events occurred during periods of time for which the pattern of secular variation was essentially linear, and this method can be applied for the periods A.D. 600–800, A.D. 800–1100, and A.D.1100–1800. Analyses of archaeomagnetic data from central and southern Arizona has shown that these three periods roughly correlate with: (1) the Hohokam Pioneer period; (2) the Colonial and Sedentary periods; and (3) the Hohokam Classic, the Hohokam Postclassic, the Protohistoric, and the Historic periods (Deaver 1989; Eighmy and McGuire 1988).

If it is possible to subset the data into analytical units that correspond to these cultural periods, then we may take the relative order of the VGPs as a representation of the relative sequence of the archaeomagnetic events. This exercise involves three steps. The first step is to evaluate the distribution of the VGPs to determine the likelihood that secular variation (time) is a major factor responsible for shaping the scatter of points. Providing that the first evaluation has concluded that secular variation is a major factor influencing the distribution of VGPs, the second step is to approximate the major axis of the distribution. This axis generally corresponds to the overall path of secular variation, although it will be depicted as a straight rather than a meandering line. The third step is to assign the individual VGPs a unique location along this line. The relative sequence of the archaeological events is directly proportional to the position of the VGPs relative to the major axis.

The methods of Engebretson and Beck (1978) are used to evaluate the shape of the archaeomagnetic data set. To satisfy the first requirement that secular variation is a major component of

the distribution, Engebretson and Beck's eccentricity statistic is computed for the VGP distribution. This statistic measures the elongation of the data set. We assume that the distribution of VGPs will approximate a circular distribution when the distribution of VGPs reflects little more than random errors in estimating the ancient pole location, and an ellipse when the distribution of VGPs reflects a detectable contribution from secular variation. The eccentricity statistic varies from 0 when the data are circular to 1 when they are linear. Thus, VGP data sets with eccentricities near 1 are strongly elliptical and those with an eccentricity near 0 are strongly circular. If the data set is strongly elliptical, the semi-major axis of the distribution is calculated. For each VGP in the data set a reference point along this axis is found that minimizes the distance between the VGP and the line. The order of these reference points provides the relative order of the VGPs. The chronological order for these data can be determined based on the direction of secular variation for the segment of the archaeomagnetic dating curve with which they are associated, or can be determined from known stratigraphic sequences.

The relative sequence established from this analysis is intended solely as a general model for evaluating the chronological tendencies of these data. Because the VGPs are measured with varying degrees of precision, the actual order of the means may not always reflect the real chronological order of the archaeological events. This occurs most often when the VGPs in question are not significantly different locations. In these situations the VGP locations essentially represent two sample means of the same population, and the differences in the values (or locations) are simply due to sampling errors. This is, of course, not strictly true because there can be real differences in the ages of features that are relatively small when compared to the imprecision of the archaeomagnetic records. Conversely, however, when two archaeomagnetic poles are judged to be significantly different locations, then the predicted order between the means should reflect differences in the ages of the associated archaeological events, provided that the archaeomagnetic samples are accurately representing the location of the ambient magnetic pole at the time the materials were magnetized.

RESULTS AND CONCLUSIONS

Final archaeomagnetic data for all samples are presented in Table D.2. Three samples had sufficiently precise archaeomagnetic remanences ($\alpha 95 < 9.0°$) that they could be archaeomagnetically dated. Sample 1 was too imprecise to provide any reliable dating interpretations. This sample is excluded from all dating analyses and discussions. Calendrical archaeomagnetic dates for the remaining three samples are presented in Table D.1, and the results of the pairwise statistical comparisons among these samples is summarized in Table D.3.

The results of the pairwise comparisons (Table D.3) indicate that there are no strong differences in the archaeomagnetic poles obtained from the three samples. This means that any real differences in ages of these features that may exist are not detectable given the precision of these data. Because of the lack of differences in the archaeomagnetic pole locations, any inferred ordering among the events is meaningless. Features 41 and 80 may be relatively contemporaneous with Feature 4, and therefore, attributable to the Rincon phase. It is highly improbable that Features 41 and 80 are earlier than Feature 4. The locations of the archaeomagnetic pole during the Pioneer and Colonial periods is distinct from the locations of the pole during the Sedentary period. It is possible, however, that Features 41 and 80 could postdate Feature 4. After A.D. 1100-1150 the archaeomagnetic dating curve loops back over the earlier

Table D.2. Archaeomagnetic Data, AZ BB:9:148 (ASM)

Samp. No.	n	Inclination	Declination	Intensity	α95	k	Latitude	Longitude	dm	dp
-1ua	8	55.53	359.46	501E-05G	9.4	35.9	86.91	239.96	13.38	9.56
-2ua	11	57.34	342.35	1.40E-04G	4.3	112.42	74.59	184.85	6.32	4.62
-3ua	12	58.27	349.29	1.65E-04G	1.7	629.27	79.15	198.84	2.56	1.89
-4ua	10	58.13	346.66	1.64E-04G	2.1	545.04	77.45	193.17	3.06	2.26

Table D.3. Results of Statistical Comparisons

Context	Sample Number	Result	Context	Sample Number	Probability	Angle
F 4	AZ BB:9:148 (ASM)-2ua	not different than:	F 41	AZ BB:9:148 (ASM)-3ua	0.9458	5.53
			F 80	AZ BB:9:148 (ASM)-4ua	0.6822	3.49
F 41	AZ BB:9:148 (ASM)-3ua	not different than:	F 80	AZ BB:9:148 (ASM)-4ua	0.7086	2.05

segment. Because of this it is difficult to archaeomagnetically separate archaeological events that occurred during the Sedentary (A.D. 950-1150) and Classic (A.D. 1150-1450) periods without additional corroborating chronological information.

Appendix C: Game and Fish ERT.

Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:
SC

Project Description:
Single Fam

Project Type:
Development Within Municipalities (Urban Growth), Residential single dwelling and associated infrastructure, New construction

Contact Person:
Elizabeth Madsen

Organization:
The WLB Group

On Behalf Of:
CITY

Project ID:
HGIS-17846

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

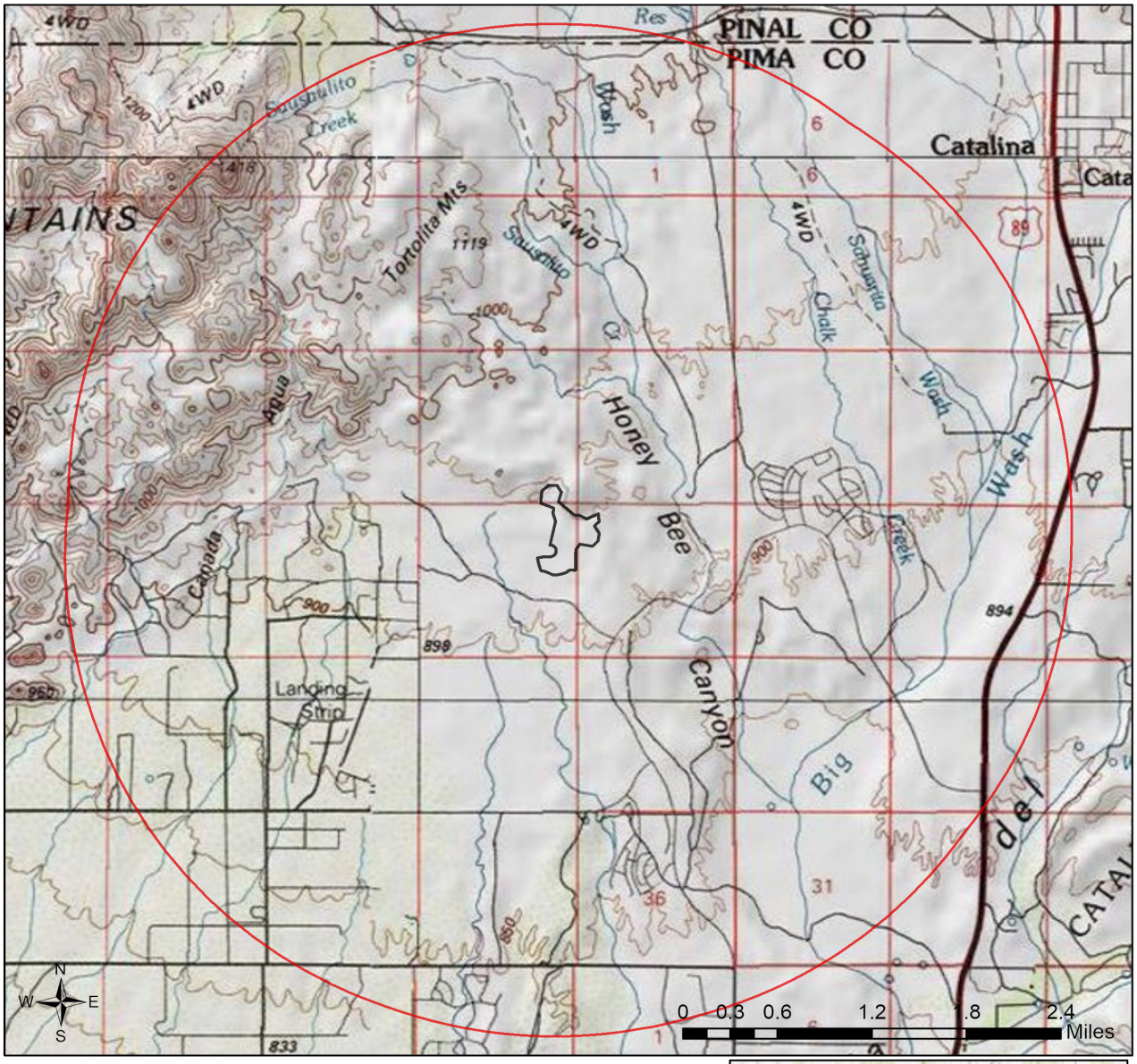
Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:
   Project Evaluation Program, Habitat Branch
   Arizona Game and Fish Department
   5000 West Carefree Highway
   Phoenix, Arizona 85086-5000
   Phone Number: (623) 236-7600
   Fax Number: (623) 236-7366
   Or
   PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

SC

USA Topo Basemap With Locator Map



Buffered Project Boundary

Project Boundary

Project Size (acres): 4.80

Lat/Long (DD): 32.4634 / -110.9774

County(s): Pima

AGFD Region(s): Tucson

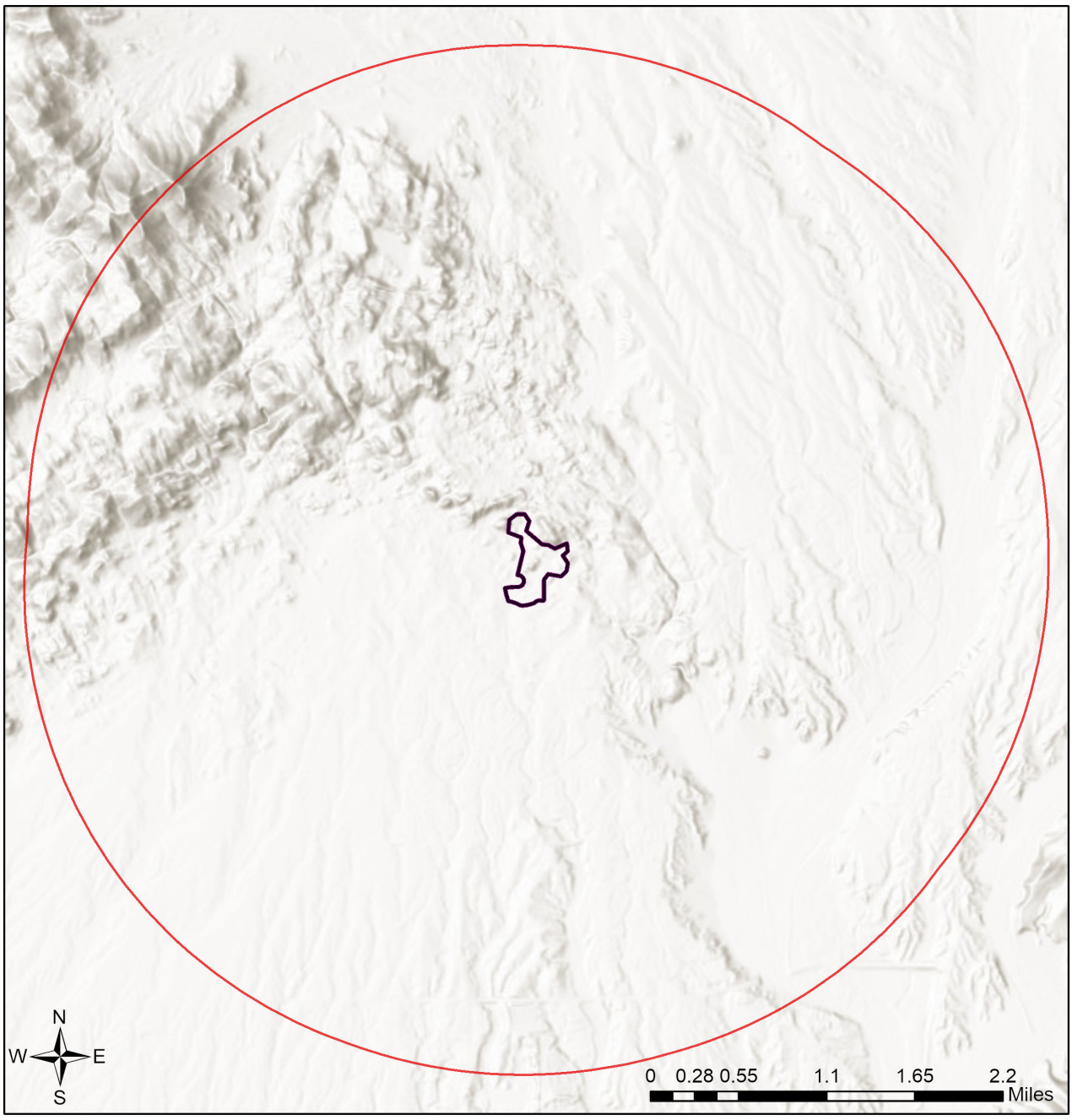
Township/Range(s): T11S, R13E

USGS Quad(s): ORO VALLEY

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

SC

Web Map As Submitted By User



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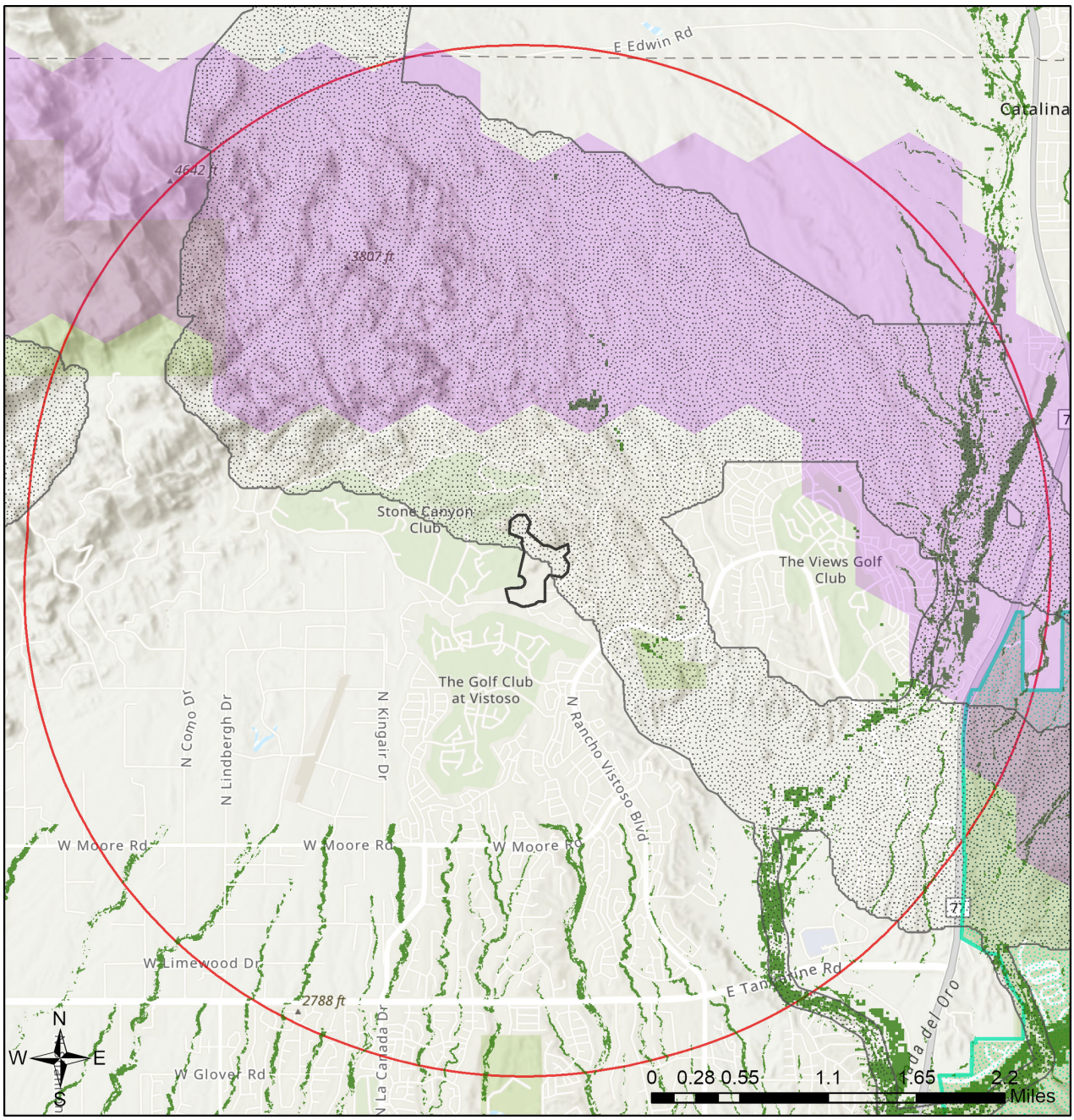
Important Areas



- Buffered Project Boundary
- Project Boundary
- Important Bird Areas
- Critical Habitat
- Pinal County Riparian
- Important Connectivity Zones
- Wildlife Connectivity

Project Size (acres): 4.80

Lat/Long (DD): 32.4634 / -110.9774

County(s): Pima

AGFD Region(s): Tucson

Township/Range(s): T11S, R13E

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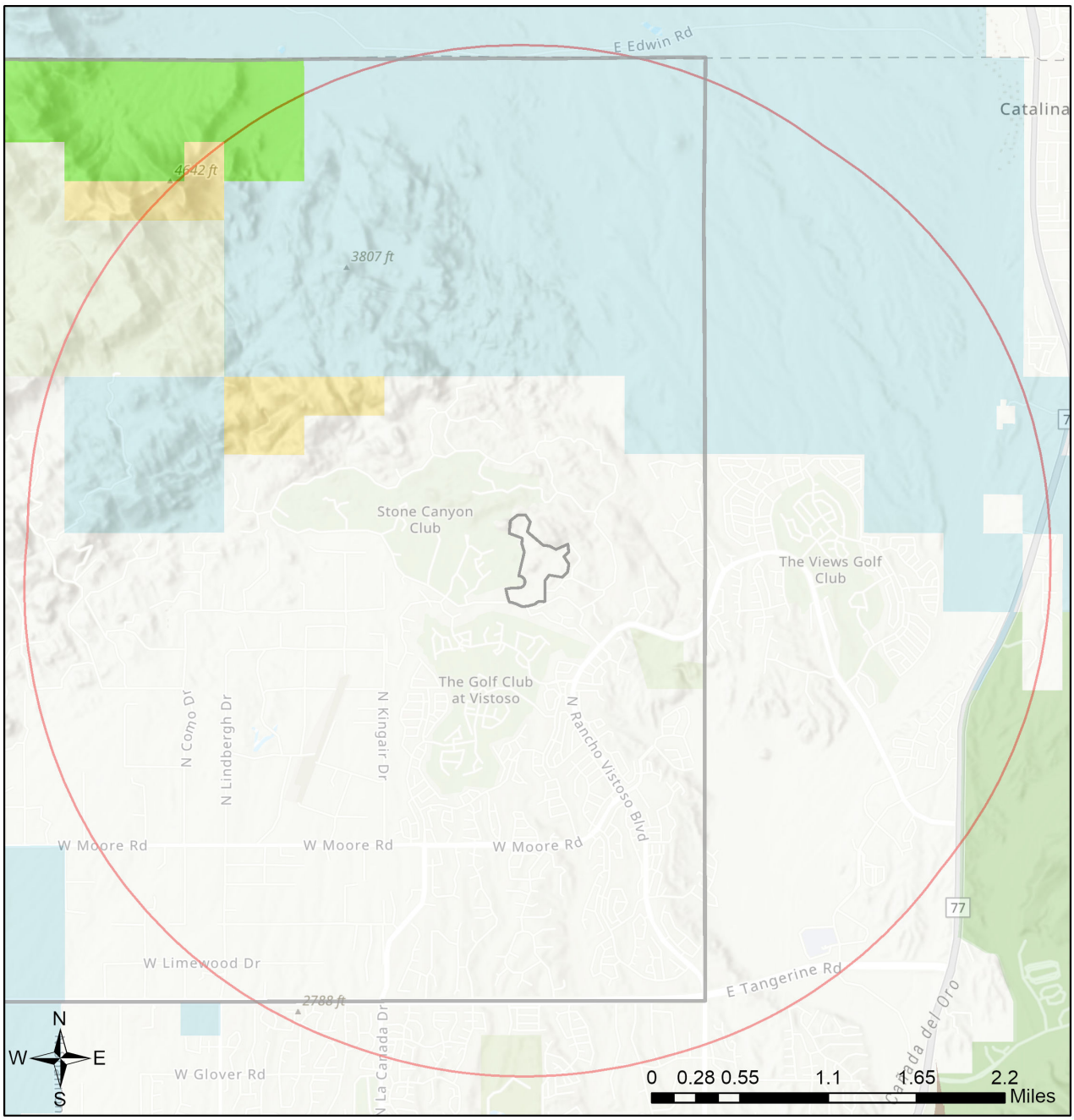
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

SC

Township/Ranges and Land Ownership



- Buffered Project Boundary
- Project Boundary
- AZ Game & Fish Dept.
- BLM
- BOR
- Indian Res.
- Military
- Mixed/Other
- National Park/Mon.
- Private
- State & Regional Parks
- State Trust
- US Forest Service
- Wildlife Area/Refuge
- Township/Ranges

Project Size (acres): 4.80

Lat/Long (DD): 32.4634 / -110.9774

County(s): Pima

AGFD Region(s): Tucson

Township/Range(s): T11S, R13E

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Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Special Status Species Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Abutilon parishii	Pima Indian Mallow	SC	S	S	SR	
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	PT	S	S		1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Lepus alleni	Antelope Jackrabbit					1B
Lithobates yavapaiensis	Lowland Leopard Frog	SC	S	S		1A

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Special Areas Documented that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Tucson - Tortolita - Santa Catalina Mountains AZ Missing Linkage Design Extension	Pima County Wildlife Movement Area - Landscape					
Tucson - Tortolita - Santa Catalina Mountains Linkage Design	Wildlife Connectivity					

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Aix sponsa	Wood Duck					1B
Ammospermophilus harrisii	Harris' Antelope Squirrel					1B
Anthus spragueii	Sprague's Pipit	SC				1A
Antrostomus ridgwayi	Buff-collared Nightjar		S			1B
Aquila chrysaetos	Golden Eagle	BGA		S		1B
Aspidoscelis stictogramma	Giant Spotted Whiptail	SC	S			1B
Aspidoscelis xanthonota	Red-backed Whiptail	SC	S			1B
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Botaurus lentiginosus	American Bittern					1B
Calypte costae	Costa's Hummingbird					1C
Chilomeniscus stramineus	Variable Sandsnake					1B
Colaptes chrysoides	Gilded Flicker			S		1B
Coluber bilineatus	Sonoran Whipsnake					1B
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Crotalus tigris	Tiger Rattlesnake					1B
Cynanthus latirostris	Broad-billed Hummingbird		S			1B
Dipodomys spectabilis	Banner-tailed Kangaroo Rat			S		1B
Euderma maculatum	Spotted Bat	SC	S	S		1B

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	PT	S	S		1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A
Haliaeetus leucocephalus	Bald Eagle	SC, BGA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Hypsiglena sp. nov.	Hooded Nightsnake					1B
Incilius alvarius	Sonoran Desert Toad					1B
Kinosternon sonoriense sonoriense	Desert Mud Turtle			S		1B
Lasiurus blossevillii	Western Red Bat		S			1B
Lasiurus xanthinus	Western Yellow Bat		S			1B
Leopardus pardalis	Ocelot	LE				1A
Leptonycteris yerbabuenae	Lesser Long-nosed Bat	SC				1A
Lepus alleni	Antelope Jackrabbit					1B
Macrotus californicus	California Leaf-nosed Bat	SC		S		1B
Melanerpes uropygialis	Gila Woodpecker					1B
Meleagris gallopavo mexicana	Gould's Turkey		S			1B
Melospiza lincolnii	Lincoln's Sparrow					1B
Melozone aberti	Abert's Towhee		S			1B
Micrathene whitneyi	Elf Owl					1C
Micruroides euryxanthus	Sonoran Coralsnake					1B
Myiarchus tyrannulus	Brown-crested Flycatcher					1C
Myotis occultus	Arizona Myotis	SC		S		1B
Myotis velifer	Cave Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Oreoscoptes montanus	Sage Thrasher					1C
Oreothlypis luciae	Lucy's Warbler					1C
Panthera onca	Jaguar	LE				1A
Peucaea carpalis	Rufous-winged Sparrow					1B
Phrynosoma solare	Regal Horned Lizard					1B
Phyllorhynchus browni	Saddled Leaf-nosed Snake					1B
Progne subis hesperia	Desert Purple Martin			S		1B
Setophaga petechia	Yellow Warbler					1B
Sonorella papagorum	Black Mountain Talussnail					1B
Sphyrapicus nuchalis	Red-naped Sapsucker					1C
Spizella breweri	Brewer's Sparrow					1C
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Thomomys umbrinus intermedius	Southern Pocket Gopher					1B
Troglodytes pacificus	Pacific Wren					1B
Vireo bellii arizonae	Arizona Bell's Vireo					1B
Vulpes macrotis	Kit Fox	No Status				1B

Species of Economic and Recreation Importance Predicted that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Odocoileus hemionus	Mule Deer					
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Zenaida asiatica	White-winged Dove					
Zenaida macroura	Mourning Dove					

Project Type: Development Within Municipalities (Urban Growth), Residential single dwelling and associated infrastructure, New construction

Project Type Recommendations:
Fence recommendations will be dependent upon the goals of the fence project and the wildlife species expected to be impacted by the project. General guidelines for ensuring wildlife-friendly fences include: barbless wire on the top and bottom with the maximum fence height 42", minimum height for bottom 16". Modifications to this design may be considered for fencing anticipated to be routinely encountered by elk, bighorn sheep or pronghorn (e.g., Pronghorn fencing would require 18" minimum height on the bottom). Please refer to the Department's Fencing Guidelines located on Wildlife Friendly Guidelines page, which is part of the Wildlife Planning button at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/.

During the planning stages of your project, please consider the local or regional needs of wildlife in regards to movement, connectivity, and access to habitat needs. Loss of this permeability prevents wildlife from accessing resources, finding mates, reduces gene flow, prevents wildlife from re-colonizing areas where local extirpations may have occurred, and ultimately prevents wildlife from contributing to ecosystem functions, such as pollination, seed dispersal, control of prey numbers, and resistance to invasive species. In many cases, streams and washes provide natural movement corridors for wildlife and should be maintained in their natural state. Uplands also support a large diversity of species, and should be contained within important wildlife movement corridors. In addition, maintaining biodiversity and ecosystem functions can be facilitated through improving designs of structures, fences, roadways, and culverts to promote passage for a variety of wildlife. Guidelines for many of these can be found at: https://www.azgfd.com/wildlife/planning/wildlifeguidelines/.

Consider impacts of outdoor lighting on wildlife and develop measures or alternatives that can be taken to increase human safety while minimizing potential impacts to wildlife. Conduct wildlife surveys to determine species within project area, and evaluate proposed activities based on species biology and natural history to determine if artificial lighting may disrupt behavior patterns or habitat use. Use only the minimum amount of light needed for safety. Narrow spectrum bulbs should be used as often as possible to lower the range of species affected by lighting. All lighting should be shielded, canted, or cut to ensure that light reaches only areas needing illumination.

Minimize the potential introduction or spread of exotic invasive species, including aquatic and terrestrial plants, animals, insects and pathogens. Precautions should be taken to wash and/or decontaminate all equipment utilized in the project activities before entering and leaving the site. See the Arizona Department of Agriculture website for a list of prohibited and restricted noxious weeds at https://www.invasivespeciesinfo.gov/unitedstates/az.shtml and the Arizona Native Plant Society https://aznps.com/invas for recommendations on how to control. To view a list of documented invasive species or to report invasive species in or near your project area visit iMapInvasives - a national cloud-based application for tracking and managing invasive species at https://imap.natureserve.org/imap/services/page/map.html.

- To build a list: zoom to your area of interest, use the identify/measure tool to draw a polygon around your area of interest, and select “See What’s Here” for a list of reported species. To export the list, you must have an account and be logged in. You can then use the export tool to draw a boundary and export the records in a csv file.

The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

Based on the project type entered, coordination with State Historic Preservation Office may be required (https://azstateparks.com/).

Trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herpetofauna (snakes, lizards, tortoise) from entering ditches.

Based on the project type entered, coordination with Arizona Department of Water Resources may be required (https://new.azwater.gov/).

Based on the project type entered, coordination with U.S. Army Corps of Engineers may be required (http://www.usace.army.mil/)

Based on the project type entered, coordination with County Flood Control district(s) may be required.

Vegetation restoration projects (including treatments of invasive or exotic species) should have a completed site-evaluation plan (identifying environmental conditions necessary to re-establish native vegetation), a revegetation plan (species, density, method of establishment), a short and long-term monitoring plan, including adaptive management guidelines to address needs for replacement vegetation.

Project Location and/or Species Recommendations:
Analysis indicates that your project is located in the vicinity of an identified ***wildlife habitat linkage corridor***. The **Arizona Missing Linkages** represent ideal connections within or between intact blocks or core habitats. The blocks are currently disconnected or isolated and the linkages should be examined for improving permeability, or are currently intact and in need of preservation and/or enhancement. The reports provide recommendations for opportunities to preserve or enhance permeability. Project planning and implementation efforts should focus on maintaining and improving opportunities for wildlife permeability. For information pertaining to the linkage assessment and wildlife species that may be affected, please refer to: https://www.azgfd.com/wildlife/planning/habitatconnectivity/identifying-corridors/. Please contact the Project Evaluation Program (pep@azgfd.gov) for specific project recommendations.

HDMS records indicate that one or more native plants listed on the **Arizona Native Plant Law and Antiquities Act** have been documented within the vicinity of your project area. Please contact:
Arizona Department of Agriculture
1688 W Adams St.
Phoenix, AZ 85007
Phone: 602.542.4373
https://agriculture.az.gov/sites/default/files/Native%20Plant%20Rules%20-%20AZ%20Dept%20of%20Ag.pdf starts on page 44

Analysis indicates that your project is located in the vicinity of an identified ***wildlife habitat connectivity feature***. The **County-level Stakeholder Assessments** contain five categories of data (Barrier/Development, Wildlife Crossing Area, Wildlife Movement Area- Diffuse, Wildlife movement Area- Landscape, Wildlife Movement Area- Riparian/Washes) that provide a context of select anthropogenic barriers, and potential connectivity. The reports provide recommendations for opportunities to preserve or enhance permeability. Project planning and implementation efforts should focus on maintaining and improving opportunities for wildlife permeability. For information pertaining to the linkage assessment and wildlife species that may be affected, please refer to: https://www.azgfd.com/wildlife/planning/habitatconnectivity/identifying-corridors/.
Please contact the Project Evaluation Program (pep@azgfd.gov) for specific project recommendations.

HDMS records indicate that one or more **Listed, Proposed, or Candidate** species or **Critical Habitat** (Designated or Proposed) have been documented in the vicinity of your project. The Endangered Species Act (ESA) gives the US Fish and Wildlife Service (USFWS) regulatory authority over all federally listed species. Please contact USFWS Ecological Services Offices at https://www.fws.gov/office/arizona-ecological-services or:

Phoenix Main Office
9828 North 31st Avenue #C3
Phoenix, AZ 85051-2517
Phone: 602-242-0210
Fax: 602-242-2513

Tucson Sub-Office
201 N. Bonita Suite 141
Tucson, AZ 85745
Phone: 520-670-6144
Fax: 520-670-6155

Flagstaff Sub-Office
SW Forest Science Complex
2500 S. Pine Knoll Dr.
Flagstaff, AZ 86001
Phone: 928-556-2157
Fax: 928-556-2121

HDMS records indicate that **Sonoran Desert Tortoise** have been documented within the vicinity of your project area. Please review the Tortoise Handling Guidelines found at: https://www.azgfd.com/wildlife/nongamemanagement/tortoise/

Appendix D: Oro Valley Water Utility Will Serve Letter.

Oro Valley Water Utility

July 22, 2016
The WLB Group
4444 E. Broadway
Tucson, AZ 85711-3508

Subject: WATER AVAILABILITY Parcels:
219-20-002B
219-04-2330
219-04-2340
219-05-010B
219-19-196C

To Whom it May concern:

The Town of Oro Valley Water Utility currently has water service available to the above property under the following conditions:

- A Water Plan is submitted by the applicant and approved by the Water Utility
- A Line Extension Agreement is executed by the applicant.
- All construction is in accordance with the approved Water Plan and the new facilities are accepted by the Water Utility in accordance with the requirements of the Line Extension Agreement.
- Payment of all water development impact fees, meter fees and other required fees and charges. (A water meter for residential and/or commercial use cannot be sold until after the issuance of an approved building permit.)
- Full replacement of the HDPE water main installed per WLB plan number OV19-00-03A-W on these parcels and beyond if necessary.

WATER SUPPLY

The Town of Oro Valley Water Utility has been designated by the State of Arizona, Department of Water Resources, as having an Assured Water Supply (AWS No. 2003-001 Decision and Order No. 26-400765). This development lies within the boundary of the Oro Valley Water Utility's planned water service area. Once the property is platted, it will be noted on the plat(s) for these properties that the

property meets the State requirement of an Assured Water Supply because it will be served by Oro Valley Water Utility.

WATER SERVICE

The developer shall be required to submit a Water Plan identifying water system improvements. These include but are not limited to:

- Water Use
- Fire Flow Requirements
- Offsite/ Onsite Water Facilities
- Loops and Proposed Connection Points to Existing Water System
- Easements/Common Areas

Once a Water Plan is submitted, it will be determined if the proposed plan can meet the water requirements of the proposed development. The developer shall be fiscally and financially responsible for all water system improvements and modifying/enhancing the existing water system to meet those needs. It is recommended that the applicant contact the Water Utility to discuss the construction of water system improvements prior to submitting a Water Plan for the property.

This letter and the comments herein regarding water availability are valid for a period of one year only through July 22, 2017. Issuance of this letter is not to be construed as approval of a Water Plan and/or acceptance of any construction for water service.

If you have any questions or would like more details regarding any construction improvements that may be required in a Water Plan, please call me at 229-5017.

Sincerely,

Mark Moore

Mark Moore
New Development Coordinator

cc: Phillip C. Saletta, P.E. Water Utility Director

Appendix E: Pima County Wastewater Capacity.

PIMA COUNTY
WASTEWATER RECLAMATION
201 NORTH STONE AVENUE
TUCSON, ARIZONA 85701-1207

JACKSON JENKINS
DIRECTOR

PH: (520) 724-6500
FAX: (520) 724-9635

December 14, 2022

Linda Thompson
The WLB Group, Inc.
4444 E. Broadway
Tucson, AZ 85711

Capacity Response No. P22WC00358 Type II

RE: **Stone Canyon Reserve, Parcels 21904227C, 219042330, 219042340, 21905010B, 21919196C, 21920002B**
Estimated Flow 17,064 gpd (ADWF)

Greetings:

The above referenced project is tributary to the Tres Rios Water Reclamation Facility via the Canada del Oro Interceptor.

Capacity is currently available for a project this size in the public sewer G-89-038, downstream from manhole 6024-03.

This letter is not a reservation or commitment of treatment or conveyance capacity for this project. It is not an approval of point and method of connection. It is an analysis of the system as of this date. Allocation of capacity is made by the Type III Capacity Response.

If you need further information, please feel free to contact me at (520) 724-6488.

Reviewed by: Mirela Hromatka, Planner Sr.