BOUNDER MAPPING

- We mapped the boulders with a major axis equal or greater to 5 feet that were exposed at the ground surface within the footprint of the Museum Building
- The major (maximum), medium (middle) and minor (minimum) axes were measured to the nearest 0.5 feet for each boulder
- We estimated the approximate degree of burial for each mapped boulder
- Boulder locations were mapped in the field using high-resolution aerial photo base map
- The reported minimum and maximum boulder dimension represents the exposed portion of each boulder
- Boulders are subangular, so we estimated the volume of boulders by taking the average of their rectilinear and ellipsoidal geometries
- We estimated the weight of the boulders by multiplying the volume by 2.7 g/cm3 (the average density of granitic rock of which most of the boulders on the fan are composed)

Rock Types

Metamorphic boulder

Granitic boulder

Slightly/not buried boulder

Partially buried boulder

Mostly buried boulder

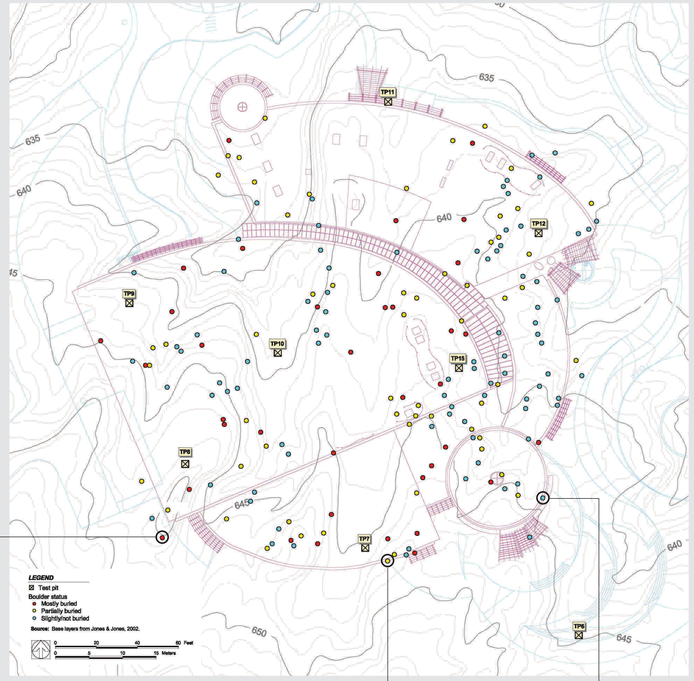


Exhibit 10 Plan map showing location of 5-foot and larger boulders within the footprint of the Museum Building on topographic base

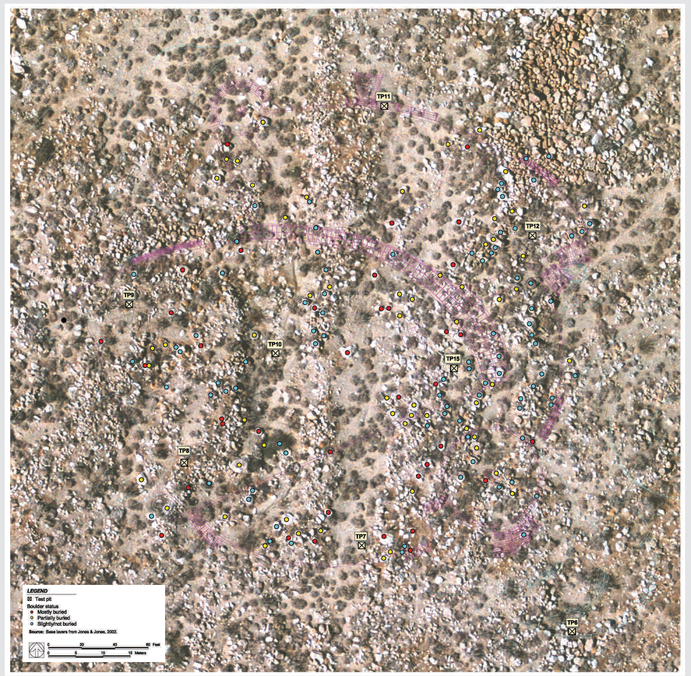


Exhibit 11 Plan map showing location of 5-foot and larger boulders within the footprint of the Museum Building on aerial photo base

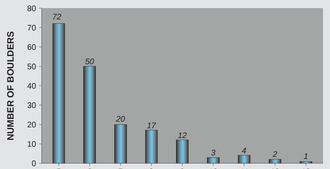
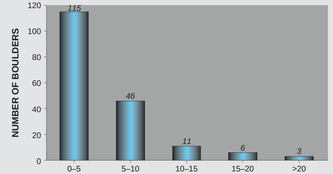


Exhibit 12 Distribution of boulder major axis lengths within the footprint of the Museum building



*Intermediate boulder shape defined as average of rectilinear and ellipsoidal shapes.

Exhibit 13 Distribution of boulder weights within the footprint of the Museum Building

BOULDER STATISTICS

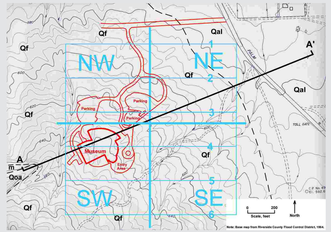


Exhibit 14 Index map showing transect lines used in boulder statistical analysis

To aid in construction planning, we performed a statistical analysis of boulder sizes for the entire site using a high-resolution aerial photograph of the project area. This analysis complimented the boulder-mapping program undertaken in the area of the Museum Building by extending our local information on the boulder distribution to the entire project area.

Maximum and minimum block axes (as viewed from above) were measured along six parallel east-west trending transects spaced 250 feet (76 m) apart. All boulders 2 feet or larger in major dimension were measured along these transects. Exhibit 14 shows the locations of these transects, numbered 1 to 6, relative to the proposed Museum facilities.

The results of this study indicate a peak in the boulder distribution at a major axis length of 5 feet, with diminishing numbers for both larger and smaller boulder sizes. It is likely that the drop-off in boulder frequency below 5 feet is an artifact of the analytical method. For partially and mostly buried boulders, the maximum dimension may be larger than measured.

The boulder size distribution mapped in the Museum Building is comparable to that estimated for the Southwest quadrant using statistical methods (Exhibit 15). The spike in 10-foot boulders in the statistical analysis reflects the alignment of Transect 6 with a pod of 10-foot boulders in the extreme southwestern corner of the site. In this case, translation of the transect line a short distance to the north would have eliminated the spike, resulting in a pattern even closer to that determined in the field mapping exercise.

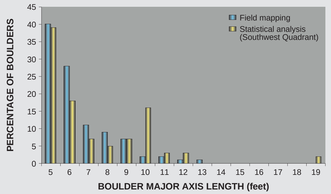


Exhibit 15 Comparison of boulder size dimensions estimated by statistical analysis with the mapped distribution in within the footprint of the Museum Building

REFERENCES

California Department of Conservation, Division of Mines and Geology, 1966: Geologic Map of California, Santa Ana Sheet, map scale 1:250,000 (Sixth printing, 1992).

Jones & Jones website, project summaries page: http://www.jonesandjones.com/projects/index.html

Traveling Online website, copyright © 1999 Gar Benedick: http://www.travelingonline.com/pdesert/

Waters, M.R., 1983. "Late Holocene Lacustrine Chronology and Archaeology of Ancient Lake Cahuilla, California," Quaternary Research, Vol. 19, p. 373-387.