INTENSION - EXTENSION: prehistoric origins of architectural formalism and application today

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As an architect/anthropologist, this writer has often struggled to reconcile an architectural discourse on formalism, or variations of such, with the experiences of traditional or primitive people in their physical settings. Over twenty years ago I received a grant from the National Endowment for the Arts to study the "origins of conscious design" among the Pueblo Ancestors of the Southwest, most particularly in the impressive 11th century structures in Chaco Canyon. After considerable work on more anthropological issues as seen in recent archaeological publications and a volume in press, I've finally deciphered the formal basis for these unusual buildings. It motivates the present commentary about the way we think of architecture today.

The Integration of Space and Object in Traditional or Primitive Settings

To understand traditional people's experience of architecture one needs consider the symbolic distinction between *object* and *space*. When groups of traditional people live together for long periods of time, their primary religious means, and the basis for much of their social organization, is ritual. Characteristically, ritual depends upon *objects* for affective or normative content, and *spatial* layouts like thresholds, axes, orientations, homologues to cognitively structure symbolic meaning and organize movement during ceremony. While architecture in the "earliest" traditional settings has both spatial and objective components, the most primary and symbolically powerful spatial structure, the *cosmos*, comes from the larger, natural landscape. Ritual power in built form is subordinate to that from nature. What happens as these kinds of societies, and particularly their landscapes, become territorialized or otherwise taken over by more complex hegemonic entities, is the scale reduction and in effect the objectification of the formal spatial properties of the symbolic landscape.

This false formalization, from an anthropological perspective, became the hallmark of monumental historical architecture. Modern architecture's attempt to disavow this hegemonic fabrication has failed to reestablish any effective role of symbolic space, given the dominant argument whether form should be a more intrinsic (Kahn, Childs) or extrinsic (Venturi, Libeskind) object. Even Eisenman's and Graves sortie into anthropological structuralism of the 1970's failed to see the ritual antecedents of formal elements in relation to symbolic objects, leaving the entire architectural piece at the level of metaphoric object. Today's architectural discourse continues to substitute volume for space in its devotion to object properties.

It is this view of form that visitors bring to the large Chacoan structures, even after some twenty or thirty miles of dirt road in New Mexico. As seen in figure 1, these are big, impressive *objects*, even though much of their hundreds of rooms and three and four story walls no longer stand. The tourist needs no knowledge of some Anasazi socio-cultural reality, but immediately intuits powerful elite groups, controlling territories and resources just like most historical architecture. Yet these are strange objects. Even computer models--attempts to *objectify* for modern consumption--reveal a lack of formal façade, entrance or technically calculated symmetry to the overall plan. Massive back walls do have a monumental effect but have marginal formal relationship to other features or the plan in general.

Figure 1. Back wall of Pueblo Bonito ruins, Chaco Canyon, New Mexico (900-1250 A.D.); as seen by visitors to the Chaco Culture National Historical Park. Because this great house began very early, its straight wall features were added to the front (above in photo) at a later date.

Early on in this research features like the back walls were considered symbolically as a code for linking some of the fourteen or so great houses in the canyon or many other "outliers" across today's Colorado, Utah, Arizona, and even Mexico (Doxtater 1991). In essence, this approach followed Scully's linkage of formal architecture to landscape features in Greek and Minoan cultures (Scully 1962). Although most of the prominent natural features of the Chacoan world are too distant to be seen from its center in the modest canyon, the idea of inter-orienting great houses is a kind of formal architectural *extension*, not unlike what Scully saw in temples and palaces. But to *extend* a Chacoan back wall implies a prejudice of the *objective* over the *spatial*. Even though Greek temples were oriented to mountain peaks, formal properties of the experience are generated by the object, not the natural landscape *per se*.

Adding *intention* to Scully's view of *extension* to the landscape

Over twenty years after the *Earth, Temple and the Gods*, Scully continued the theme among historical Pueblo settings in the U.S. Southwest (1989). In the interim, the Tewa anthropologist, Alfonso Ortiz (1969), had described a formal, ritually powerful, spatial framework of sacred springs, hilltops and mountain peaks in the landscape surrounding the mother Tewa pueblo, San Juan. While Scully eloquently depicted the ceremonial experiences of similar larger frameworks, including the participatory pueblo plazas, no formal aspect of the framework could be clearly associated with any architectural structure or feature thereof. Yet, what was happening with Ortiz, a graduate paper of my own on the Hopi (Doxtater 1979), and Scully was a reversal of Eliadian thinking about the sacred. In more traditional cultures, the landscape was not in fact "profane" in opposition to some "sacred" temple as "center". Rather, as Smith (1972) briefly suggests, in some less "civilized" cultures the surrounding landscape is just as charged with spiritual sacredness as is any ceremonial focus at some center.

During intervening Southwest work I continued to be concerned about how evolving views of landscape frameworks related to ideas in the field of architecture itself, and in particular to Scully's work. Toward this end my last sabbatical focused on Crete. Hypothetically, if one went back far enough in time, the *extension* characteristics of temple to mountain might have been preceded by a formalism of sacred landscape whose relationship

to certain architectural properties could be described as *intension*, i.e. where the latter are derived or secondary to the former.

Using my developing custom software application, Geopatterns, and a common GPS receiver, I discovered a very accurate, early Minoan coincidental relationship between the highest mountains, two caves and the volcano of Thera (Santorini), figure 2. This possibly functioned during the pre-palace or peak sanctuary period as a ritual framework, where the central vertical axis connected to the supreme spiritual power of Thera, mediating between gods and groups formally disposed on the west and east.

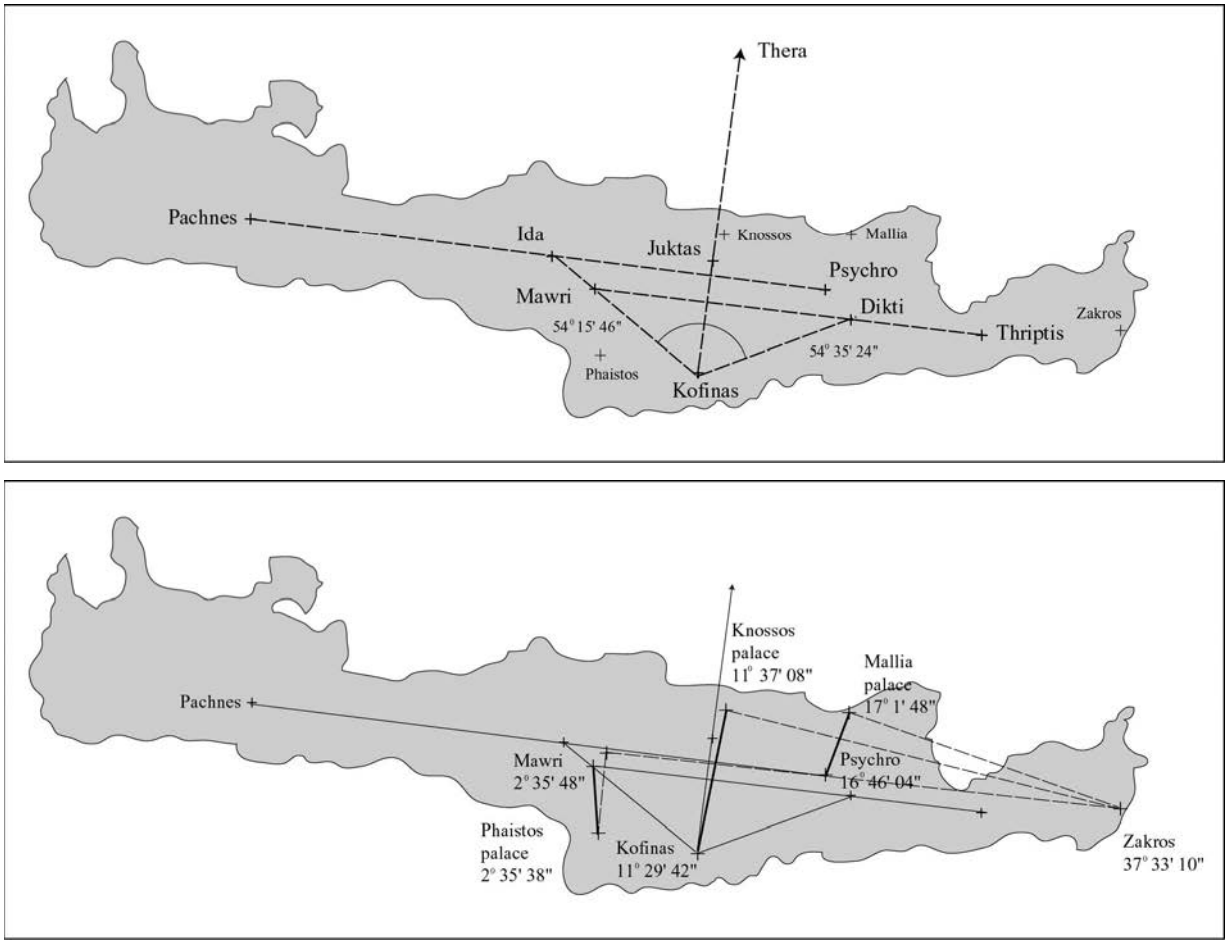


Figure 2. Possible early Minoan landscape framework comprised of wholly coincidental geometry among highest mountains, caves and the volcano at Thera--accuracies of alignments are close to visual acuity of 0.017° (above); orientations of three major palaces to logically formal points of framework (below).

Understanding this pattern now provides the rationale for at least three of the palace orientations (as measured earlier by Shaw 1974). While Scully's application of temple

extension on Crete does seem to work for Phaistos, we can now interpret this point as the intersection of lines from more symbolically significant natural features rather than the phenomenology of the modest horned mountain itself. Scully, like Shaw, could not accurately understand the orientations of either Knossos or Mallia, as now formally revealed in the illustration.

But even if palaces are accurately and logically oriented to the ancient natural framework, this still is more *extension* than *intension*, even though the palace courtyard is oriented or extended rather than any formal layout of the building as in the Greek temple. More important than these orientations, however, is whether courtyards were first located, as a likely founding process of the building, in a symbolic context with landscape geometry. The ancient natural framework appears to have been altered during the palace period, creating two more perfectly formal West-East pairs of alignments, the eastern of which culminates at the small palace of Zakros, figure 3.

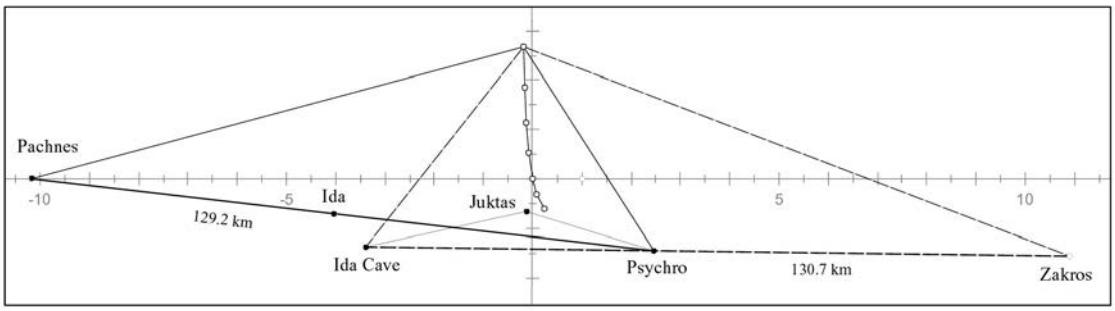


Figure 3. Probable revision of eastern "horizontal" axis during the Minoan palace period by locating Zakros aligned with Ida Cave and Psychro (0.018°); creates two equal length West-East axes; Knossos is located on the curved line expressing equal angles to the two West-East axes (angle to Pachnes-Ida-Psychro is 30.19113°, angle to Ida Cave-Psychro-Zakros is 30.16072°, with a average angular deviation of 0.015°).

Knossos was located on the line from which the angles to the ends of the two West and East axes are equal. The full *intension* process, however, cannot be described in this short paper. Scully was certainly correct in his primary interest in *extension* between the Greek temple and the landscape, but was probably incorrect to apply the same ideas to much earlier architecture on Crete.

Ancestral Pueblo Frameworks and Their Relation to Architectural Form

Based on recent publications (Doxtater 2002, 2003) and a book currently under review, figure 4 illustrates the largest scale layout of the three major vertical or *axis mundis*

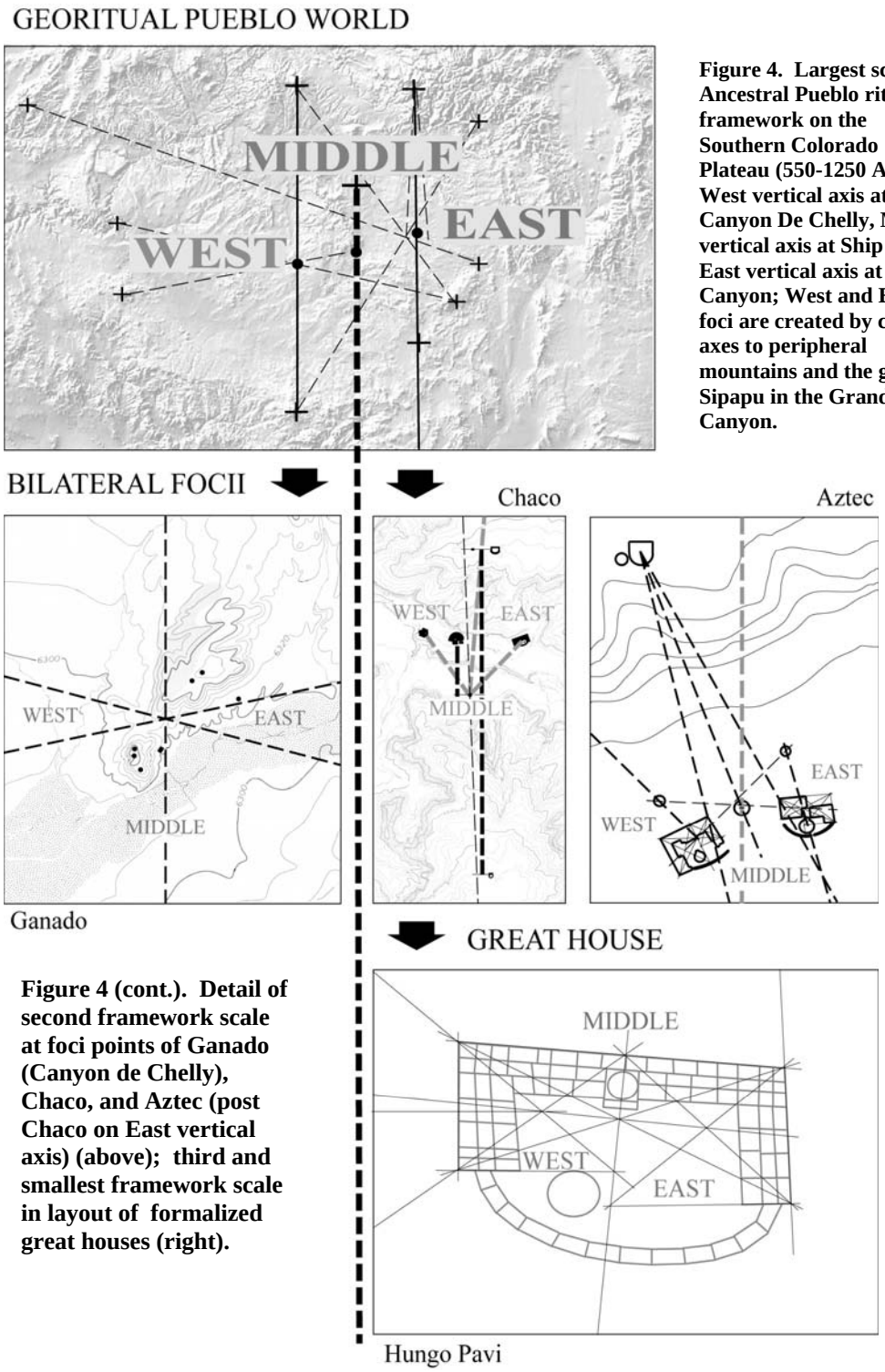


Figure 4. Largest scale Ancestral Pueblo ritual framework on the Southern Colorado Plateau (550-1250 A. D.): West vertical axis at Canyon De Chelly, Middle vertical axis at Ship Rock, East vertical axis at Chaco Canyon; West and East foci are created by cross axes to peripheral mountains and the great Sipapu in the Grand Canyon.

Figure 4 (cont.). Detail of second framework scale at foci points of Ganado (Canyon de Chelly), Chaco, and Aztec (post Chaco on East vertical axis) (above); third and smallest framework scale in layout of formalized great houses (right).

on the plateau. The Chaco Canyon center, created by its meridian relationship to the highest mountain in this part of the plateau, Mount Wilson, was a latter day "Eastern" focus to balance the more ancient "Western" natural intersection point of three long axes at Canyon de Chelly. The two are mediated by the Middle axis and the Ship Rock alignments.

What now can finally be said about the enigmatic architectural properties of the great houses and how might they have been influenced by landscape frameworks? The plan diagrams of figure 5 show the first great house with possible formal features in Chaco Canyon in the early or mid 900's, Hungo Pavi. The orientation of its back wall is oddly off cardinal east-west by over five degrees. Its two wings, while appearing symmetrical are also at odd angles.

We must realize that these priest-builders didn't have the means to sketch plans or much less perspectives. Importantly, the whole idea behind the plateau framework was to socially integrate groups at a time when agriculture had become more permanent, a kind of cultural space to inhibit, perhaps, disruptive territorial competition. Thus while the primary religious purpose of ceremonial sites was to collect sacred power from the landscape, their underlying social purpose could have been exchange with distant social groups.

Much of Hungo Pavi's location and layout elements speak clearly of *intension*. The site is positioned on an axis directly east of Chaco X, the sacred intersection point of two axes from four distant mountains. This line then establishes the first wall of the structure facing Chaco X. The two diagonals of the west half of the developing form *extend* to the two north south great houses of the mini-meridian at the eventual Chaco center itself. Other *extensions* of the plan connect to even more distant points in the framework. These *intension* and *extension* elements are combined to form a dualistic *cosmogram* with three intersection points created by diagonals. This suggests a symbolic *iconic intension*, where the architectural layout replicates the landscape framework, in this case the three intersection points on vertical *axis mundis*. The layout process of the great house itself, with all its religious and social ramifications, was certainly more important than any final building, perceived as formalized object.

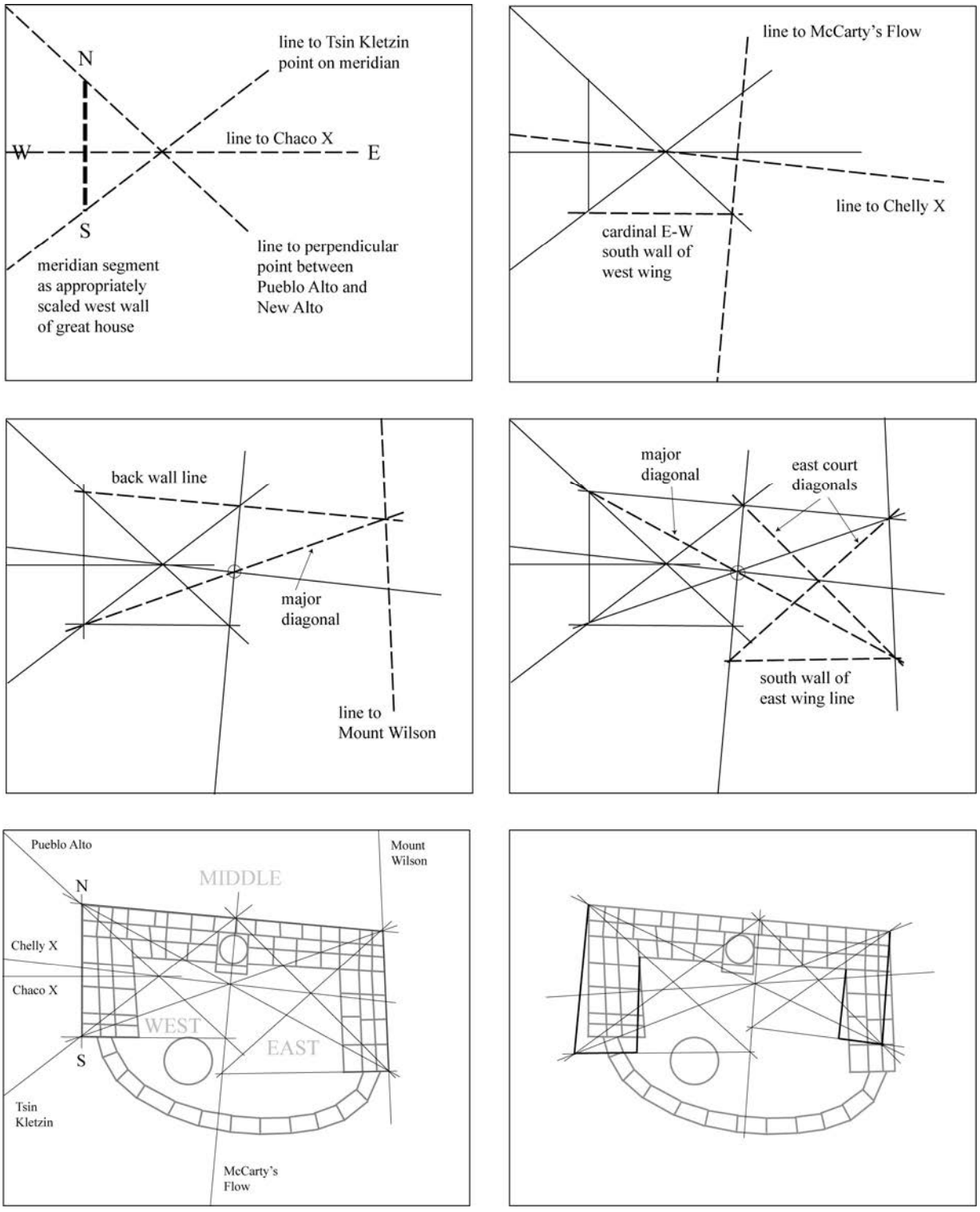


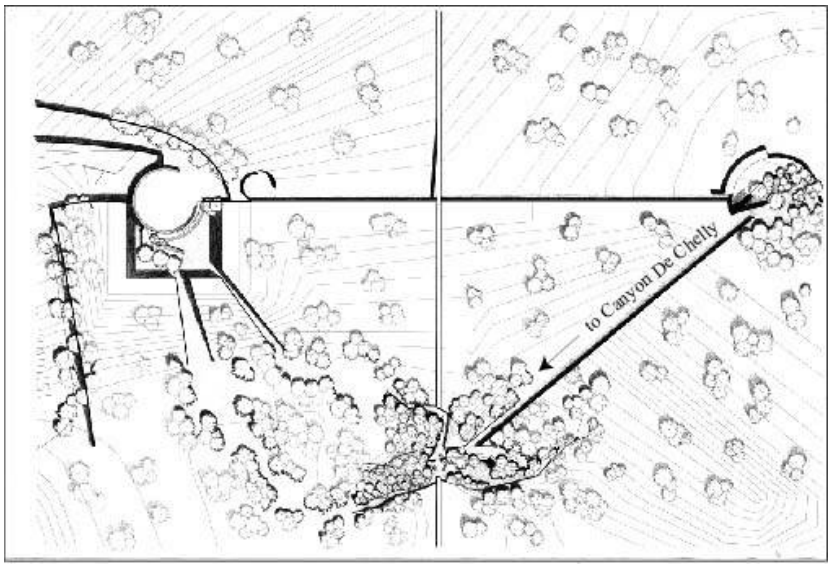
Figure 5. Hypothetical layout process for first formalized Chacoan great house; *intension* geometry creates the location of site and perpendicular west wall, based on *a priori* landscape frameworks; *extension* alignments to distant natural and built sites also inform key geometric features of layout; both *intension* and *extension* elements are coordinated with remaining formal properties to create three aligned diagonal intersection points as cosmogram of large scale plateau framework. Arbitrary variation of east and west wings (lower right) creates non-alignment of diagonal intersection points.

How then, might this understanding of how early landscape based formalism influenced very traditional architecture be used to create more commonly perceived and appreciated built form today?

Intension-Extension as the Basis for Recent Student Projects

Certainly one cannot argue that we should return to formalized sacred landscapes, based as they were on powerful religious conceptions of contact with spirits. What we can explore, however, are possibilities of less powerfully charged, but still effective symbolic meanings of features in our contemporary urban or natural landscape. These can provide the basis of *intension* geometry to locate and lay out certain architectures. The Geopatterns application is essential for this exploration.

The first of my studio projects of this kind, in the Fall of 2004, created hypothetical visitor centers for the Chaco Phenomenon, as it is called, somewhere along I-40 between Holbrook, Arizona, and Gallup, New Mexico. A travel grant was generously provided by the National Park Service. One of the student projects became the basis for a presentation and paper by the author at the *Seeing the Past* conference sponsored by the Stanford Archaeology Center (http://traumwerk.stanford.edu: 3455/31/146). Ray Clammon's project, figure 6, actually was located, by *intension*, on the vertical, *axis mundi* of the aboriginal West center of Canyon De Chelly (as it crosses I-40 about 70 miles south of the canyon focus). The sequence of visitor experience itself *iconically intends* as a cosmogram much of the overall layout of the plateau framework, including Chaco Canyon.



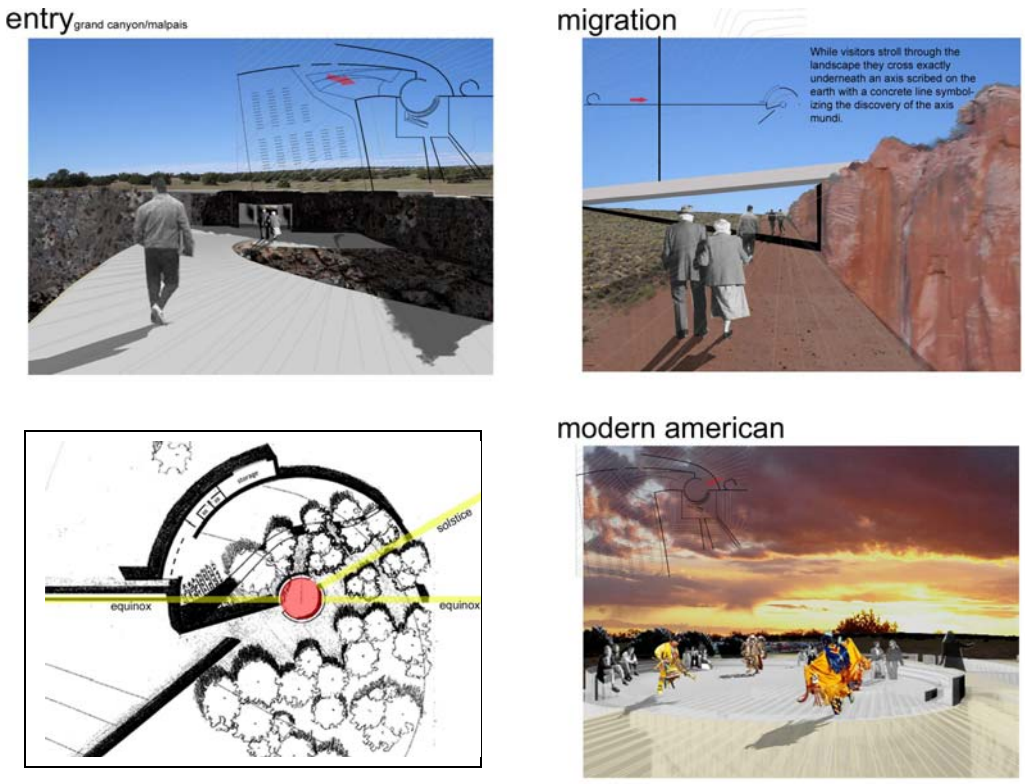


Figure 6. A Chaco Interpretative Center on I-40 by Ray Clammons; site is located by *intension* on the actual ancient *axis mundi* between two north and south mountains and Canyon De Chelly (primary axis of the site crossed twice by visitors); site layout is a cosmogram of the Anasazi plateau framework including the great sipapu in the Grand Canyon (place of emergence), Canyon De Chelly, and Chaco Canyon.

This past Fall Semester, we continued the exploration, where each student developed her or his program, initiating a set of geometrically interesting points on the large-scale real and symbolic landscape. Four projects are summarized below, with the entire set available on the class website (www.capla.arizona.edu/451studio/). Melissa Mortensen, a Japanese-American, found geometry generated by the locations of internment camps for Japanese during the Second World War, mostly in the Western States. She created an *intention* location for an interpretation center coincidentally near a tourist route in scenic southeast Utah, see figure 7. One of her precedents was Libeskind's Jewish Museum in Berlin, involving much smaller scale elements of *extension* and even *intension*, though ultimately somewhat unrealized in terms of any visitor's understanding of the building's formal properties.

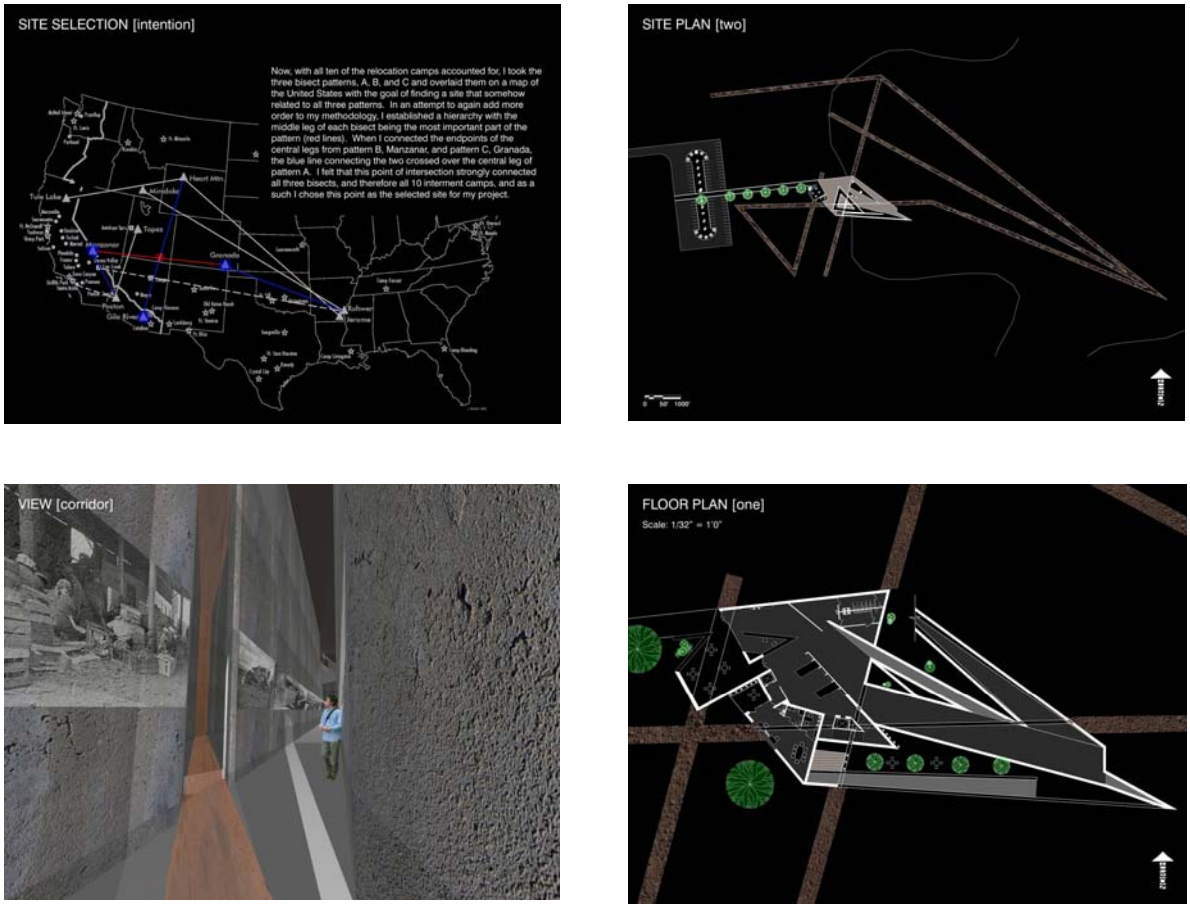


Figure 7. Japanese-American Museum by Melissa Mortensen: World War II detention camp locations in the West create *intension* geometry that locates the site and creates key interpretative points in visitor sequence as integrated with site scale/architectural reproduction of large-scale landscape pattern.

Emily Starace, having recently returned from a semester abroad in Mexico, discovered that the lines between the highest mountain in the U.S. and the second highest in Mexico, and the highest in Mexico and the second highest in the U.S. intersected a short driving distance south of the border in Northern Sonora. She used this point in *intention* to position her *American Retreat for Peace* locale, *"El Jecotal"* taken after a local ranch name in this high grassland landscape. As seen in the plan of figure 8, once the accurate point of intersection founds the site, the formalities of built form express not only this most symbolically significant point, but also semantically integrate other functions or experiences as well.

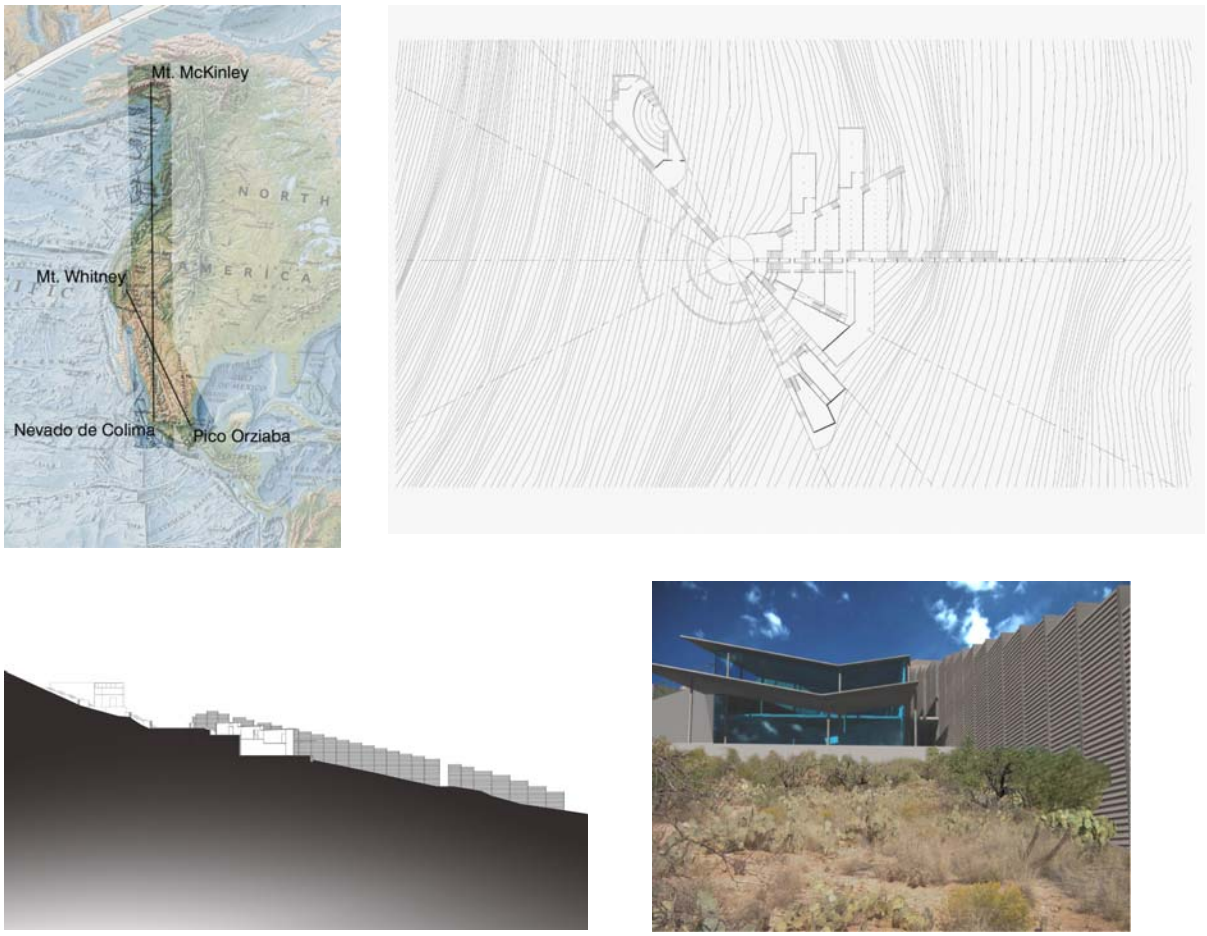


Figure 8. El Jecotal, America's Retreat for Peace by Emily Starace: the site is located by *intension* via the intersection point of two axes between the two highest mountains in Mexico and the United States; participants arrive through a symbolic steel "border" wall; features on the visible landscape aligned to the two large scale axes are sited from the upper ceremonial area associated with peace discourse and social interaction.

As an exchange student from Madrid, Juan Bustelo became fascinated with the archaeological record of the Hohokom and other related cultures that had inhabited the Tucson basin for thousands of years. He found that the major ceremonial sites of the classical period, roughly during the Chaco period (to the northeast), were accurately and statistically intentionally aligned, curiously with an approximately equally spaced gap, i.e. where some interim site should have been. His scheme of figure 9, is based on the location (by *intension*) of his interpretative center at that point in the alignment gap. Intersecting with this apparent social linkage between Hohokom ceremonial sites, Juan created a more purely religious axis between the highest mountain in the Tucson area to the northeast, and the highest feature of a prominent range to the southwest.

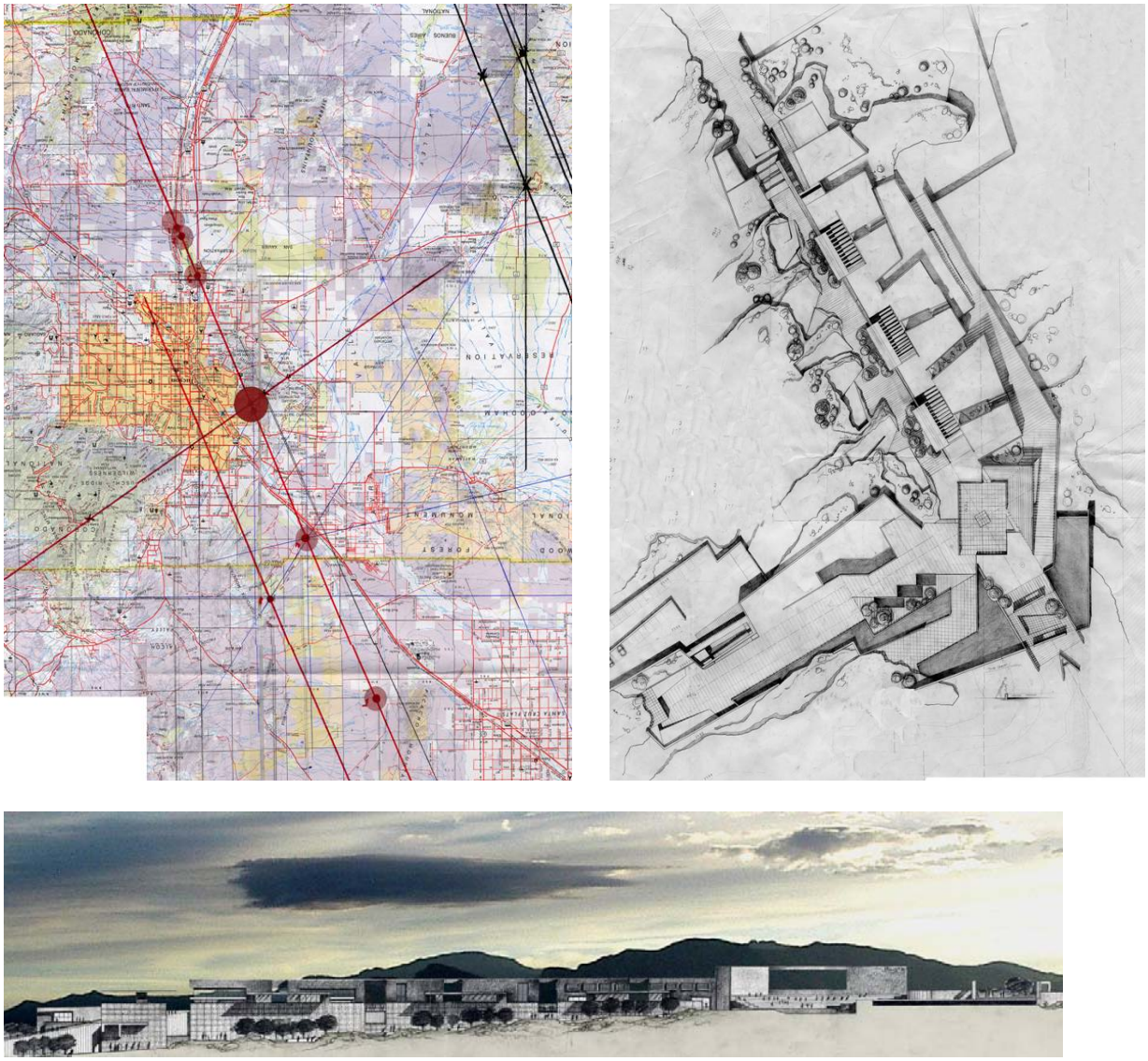


Figure 9. Hohokom Interpretative Center by Juan Bustelo: location of site on the west edge of Tucson, Arizona determined by intension (part of prehistoric alignment of ceremonial sites); layout and visitor sequence reproduces large-scale Hohokom organization in the Santa Cruz river valley.

Moving beyond the Southwest, Ann White, a former resident of Florida, began her programming by finding maps of all the major hurricanes to make landfall in Florida. She found a point where two such paths had intersected, making it perhaps the most devastated point on the peninsula. While relying more on available geophysical data than Geopatterns, she used the idea of *intension* to position a hurricane interpretative center--in an agricultural field only a half an hour or so by car south of Miami. Not only is the actual scale of the real events associated with the visitor experience, but the idea of the

intersecting paths also receives expression in a smaller scale homologue or iconic *intension* layout.

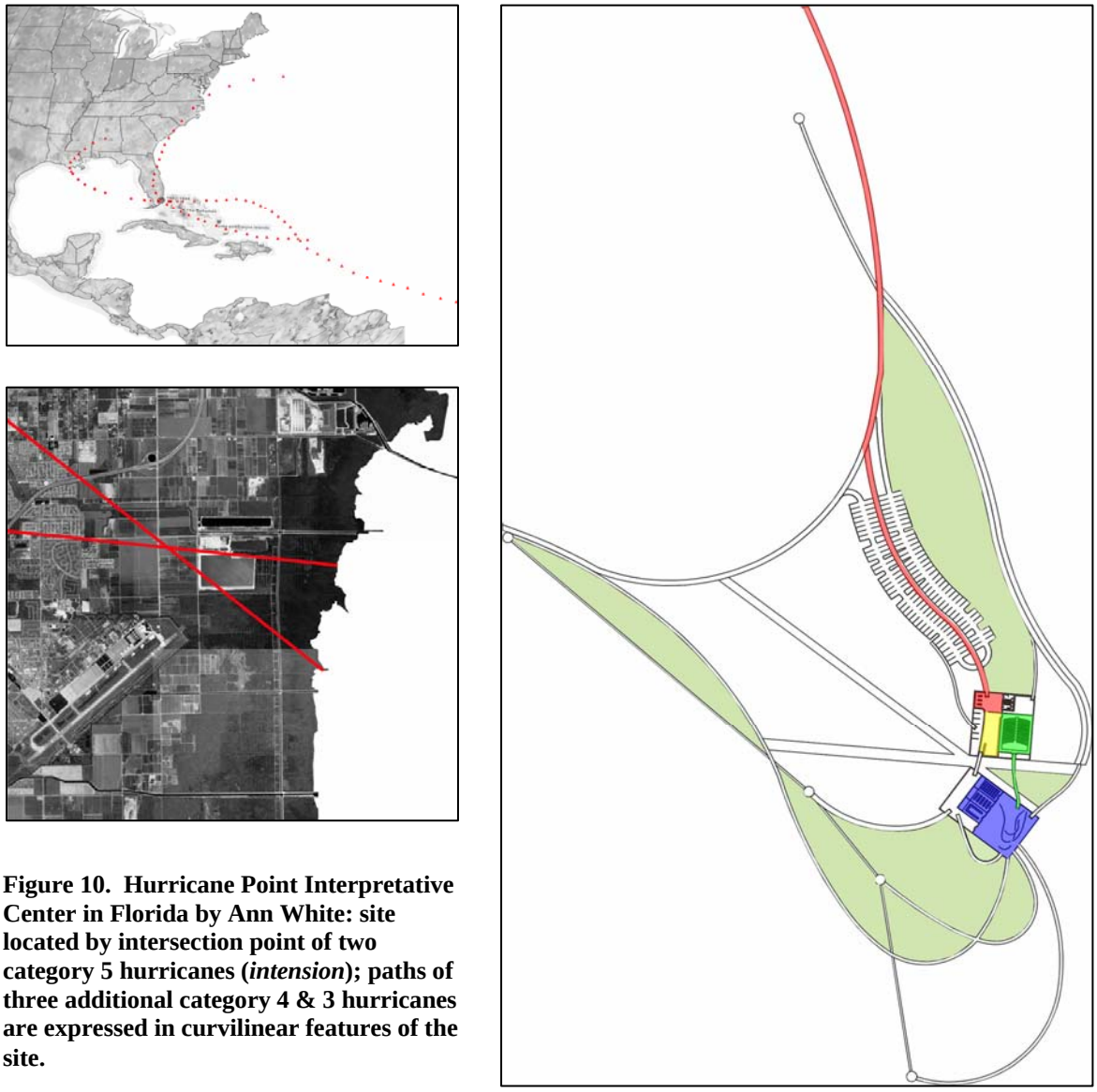


Figure 10. Hurricane Point Interpretative Center in Florida by Ann White: site located by intersection point of two category 5 hurricanes (*intension*); paths of three additional category 4 & 3 hurricanes are expressed in curvilinear features of the site.

Even excellent students have some difficulty moving beyond their learned propensities to design architecture as self-contained objects, whatever the formal or de-constructed basis of the form. The most successful of the four projects above, in this regard, is the Chacoan visitor's center on I-10, and to some degree the Hohokom facility. This is probably because of the necessity for spatial sequence to actually mirror the prehistoric plateau or Tucson basin framework. In other situations, where distant points and geometry were not previously known and culturally elaborated, how does the architect make this structure

cognitively understood, integrating at the same time the obviously vital experiences and spaces of the interior of the architecture itself? Furthermore, and perhaps more fundamental are the politics of some initial establishment of the inherent social contract necessary to integrate and even subordinate architectural components with elements of urban or natural landscape, typically in a more shared or public domain.

REFERENCES CITED

DOXTATER, DENNIS. 1978. "The Hopi Ritual Landscape**",** in *Megaliths to Medicine Wheels: Proceedings of the 11th Annual Chacmool Archaeology Conference*. Calgary: University of Calgary Press.

DOXTATER, DENNIS. 1991. "Reflections of the Anasazi Cosmos", in *Social Space: Human Spatial Behavior in Dwellings and Settlements*. Edited by Gron, O., Engelstad, E., & Lindblom, I, pp. 155-184. Odense: Odense University Press.

DOXTATER, DENNIS. 2002. A hypothetical layout of Chaco Canyon via large-scale alignments between most significant natural features". *Kiva*, Vol. 68-1, Fall.

DOXTATER, DENNIS. 2003. Parallel Universes on the Colorado Plateau: Indications of Chacoan Integration of an Earlier Anasazi Focus at Canyon de Chelly. *Journal of the Southwest*, Vol. 45, Numbers 1 & 2, Spring/Summer.

ORTIZ, A. 1969. *The Tewa World: Space, time, being and becoming in a Pueblo society*. Chicago, University of Chicago Press.

SCULLY, V. 1962. *The Earth, the Temple, and the Gods: Greek Sacred Architecture*. New Haven: Yale University Press.

SCULLY, V. 1989. *Pueblo: mountain, village, dance.* Chicago:University of Chicago Press.

SMITH, JONATHAN. 1972. The Wobbling Pivot. *Journal of Religion* 52, April; pg. 134 - 149.

SHAW, J. 1974. The Orientation of the Minoan Palaces. *Estratto da Antichita Cretesi* Vol I: 47-59. Universita di Catania-Istituto di Archeologia.