Enclosure for the Sonoran Desert: Wall or Wickerwork?

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The stark, fluorescent-white sun wraps Southern Arizona with its blazing luminosity. It is one hundred and ten degrees Fahrenheit today. The thick walls of our adobe house do not protect us from such heat, for last night was not cool enough. . . . The air conditioning is broken. Inescapable light, inescapable heat! A relentless question pops into my mind: why are we living in the desert? How can dwellings resist such intensity? If we are to live here, what is the appropriate enclosure for the desert citizen of the twenty-first century? Should we live in caves or in tents?

For many, thick walls[1] are the obvious answer to the arid climate and harsh landscape of the Sonoran desert. This paper begins by analyzing walls as desert enclosures[2]. However, most scholars have overlooked a type of space divider that is derived from the original enclosure of desert nomadic dwellings, "the simple carpet stretched on the structure" (Semper[3]). Hence, the second part of this paper will explore wickerwork[4] as alternative enclosures, in contrast to walls as we know them. Because enclosures have increasingly lost their dual function skin=structure[5] over the last hundred years, comparing wall (bearing or non-bearing) and wickerwork (woven skin) helps to clarify some design principles for desert enclosures. In the Sonoran Desert, a frontier marked by cultural pluralism and architectural eclecticism, this task is particularly challenging.

A threefold perspective — historic, materialistic, schematist— serves to evaluate the relevance of vernacular precedents to contemporary design, to define the nature, function, and power of materials relative to objects and forms, and to deduce principles of design according to needs. This paper adopts Semper's3 and Viollet Le Duc's[6] precepts that a purely technical or a purely formal analysis would be imbalanced[7]. To illustrate this essay, case studies are taken from the work of Southwestern architects who attempt to reinterpret vernacular spirit into contemporary designs: from Predock's Ventana Vista Elementary School, VVES (Fig. 1), Wallach's Arizona Sonoran Desert Museum Restaurant, ASDMR (Fig. 2), both in Tucson, and from Eddie Jones's Cardinal Headquarters, Chandler.

I- ENCLOSURE FOR THE DESERT: THE WALL

For Banham as for many newcomers to the desert, the solid wall of the first sedentary Pueblo settlements is the obvious answer to this climatic harshness. "It seems to be an architecture of cool, thick-walled boxes that can conversely retain the heat that the Sun pours on them all day and give it back to the house in the cold of the night; an architecture that jealously retains the heat of the fireplace in the chilly days of the winter[8]." Banham also notes that in many respects early Modernist villas resemble these original constructions. How does the opaque box fit post-industrial lifestyle? Is it truly Modernist?

A. Origin of the wall

Sonoran architecture is traditionally simple and rustic, as is often the case for regions far away from centers of power. Figure 3 illustrates the evolution of the wall. The three dominant styles imported by Europeans did not significantly modify original naked and nondescript Native Americans structures[9]: simple rectangles of stones, mud, or adobe, with deeply recessed openings. Buildings were hand made with mud adobe[10] until Spaniards introduced formwork to mold the units and iron tools to fabricate stronger fired-adobe bricks. The Anglo arrival marks a shift: the railroad (1880) imported new building materials (redwood from California, cut lumber, wood, and later steel from the East) that replaced the vernacular whitewashed adobe. Anglos ordered building parts from Sears-Roebuck catalogue, a trend that persists in today's Sweets Catalogues.

Beyond their physical nature, enclosures were erected for specific purposes, according to cultural world views. The solid walls of Zuni, Pueblo, and Anazazi shelters were arranged according to spiritual laws, at one with the land. As Spaniards needed protection from Apache attacks, walls evolved into solid fortifications. Mexican barrios' thick walls protected private life, while public life occurred in Plazas and streets. Judging these dwellings primitive, Anglos raised floors, added porches and replaced walls with fences[11] (Fig. 4), enlarged openings, breaking away from traditional

typology. Enclosures became layered double skins, conceived as transition between in and out, hot and cool, light and shade.

Massive, rustic, masonry walls have strong roots in the Southwest, but have evolved according to the main cultures occupying the land. Which of these traditional constructions is relevant to wall designs today? How can we design walls that correspond to available materials and methods without nostalgia for the past? Are we seeking the comfort of thick walls or the efficiency of light assemblies? Are thick walls the best protection against heat and sun? What function does mass serve today?

B- Materials of the wall

While today's multiplicity of available materials increases choices, few resist well this arid climate. Wood cracks and checks with daily temperature fluctuations and low humidity. Metals expand and buckle; their hot and reflective surfaces glare. Concrete has thermal mass but skilled labor is rare. Codes restrict the use of adobe for it has poor structural resistance and weathering capacity. Many industrial products attempt to look like adobe, such as heavily textured concrete masonry units (CMU) — slump, split, HMU, etc. — mixed with pigments and aggregates from the Santa Cruz Valley that give them earth colors. There are a few skilled Mexican masons left here, despite the 80's exodus to Nevada. However, new products fail to offer adobe's good thermal properties — mass and heat exchange.—

A limited budget dictated Predock's choice of CMU and Dryvett, the use of common construction techniques and standard detailing. "Off the shelf" materials, easy to assemble, belong to main stream production and escape the marginality of adobe or earth whose high material and labor costs often render inappropriate. To offset CMUs' poor insulation value, Predock lays sheets of interior rigid insulation between Z-channels, finished with gypsum board. These walls are in fact double skins made of separate components, each having its own purpose.

Wallach uses heavily textured, free standing stone walls perpendicular to the perimeter of the restaurant (Fig. 6.) But this stone is a veneer anchored to CMU. It contrasts with interior scored CMU units, smooth stuccoed, and tiled interior surfaces. As designer/builder, Wallach controlled the cost of stones by using by-products from a road construction site, which offset this labor intensive construction technique.

The harsh desert calls for strong, heavily textured, highly tactile materials. Predock chose split faced units, because "the splitting reveals the aggregates, which relate imminently to the desert. The rugged texture also recalls the scales of lizard backs, particularly where they spike out of the building." The use of flush tinted mortar joints precludes the reading of individual units to form continuous, uneven, and abstract surfaces. These coarse and rough planes contrast with sensuous surfaces of smooth trowelled stucco (Dryvet), reminiscent of clay (Fig. 5.) Wallach's walls have the richness of stones' varying textures, colors, and pigments distinguished from smooth concrete floors and others polished planes.

Inexpensive materials gain richness through color. While Predock chooses earth colors as a neutral background for "the colors of life that children bring to school (clothing and so on), like the landscapes of Arizona," Wallach contrasts natural stones with strong stucco or tile colors, creating intense visual experiences. Walls absorb heat and affirm their presence through their temperature.

C- Structure of the wall

But what of authenticity, of congruence of form and structural behavior? Over the last century, steel and reinforced concrete skeletons have freed the opaque box from its load-bearing walls, have transformed enclosures into systems where skin and structures can be separate; masonry has seen limited success. Modernists have celebrated the facade libre, marking the beginning of an increasing autonomy of the wall[12]. Worldwide techniques of construction favor light assemblies, diverging from and isolating the Sonoran tradition of rustic, massive, bearing wall structures.

Some of Predock's walls communicate their structural behavior. Whereas vertical bearing walls are made of CMU, non-bearing walls are slanted metal studs finished with stucco (Fig. 5.) The skin reveals its structural behavior, yet it is still treated as an opaque box. Elsewhere, heavy steel beams support flying parapet walls that are sculptural surfaces erected with little concern for the bearing nature of masonry.

Wallach differentiates structural elements from space enclosure by expressing the autonomy of steel columns and beams that spring up from the composite walls (Fig. 7) and by stretching panes of glass between free-standing stone planes. Cantilevers over washes let horizontal planes flow beneath them, clearly indicating that stones are non-bearing. Glazing and infill surfaces intersect, collide, or meet those heavy masses. Walls are here used as free standing space dividers whose texture and solidity serves as transition to the roughness of the desert landscape. Through a selective use of massive walls, Wallach manifests a modern enclosure, avoiding simulation.

If the wall no longer acts as a bearing element made of compressive materials, does it still have a symbolic value that explains its continued use? Non-structural building skins have permitted the evolution of windows into curtain walls, inviting light inside, creating spatial continuity, transforming opaque walls into transparent enclosures. Do we seek the exaltation of light or the shade of dark Pueblo interiors? What is the significance of opaque boxes?

D- Raison d'être of the wall

Semper suggests that monumental architecture is an almost

unquestioned heritage of recent civilizations[13], becoming protective, representative, and imposing. From what are we protecting ourselves? Is the wall merely an icon?

"A big blank wall is complete architecture. It mediates sky and earth. It does not need to have a cornice, string courses, or banding that might be important in other climates where you look to articulation to create an intensity" (Predock[14]) The mute blank wall "mystifies the desert," as a piece of minimal art. Heavy, compact, bold masses and plain surfaces stand out in the desert, while ornate and elaborate buildings often seem out of place. For Predock, the wall is an abstract expression of permanence. He designs an Architecture of Resistance [to the loss of stable references], that Frampton defines as "a dialectic between Culture and Civilization, the resistant nature of Place-Form, and the opposing complementarity of visual and tactile perception[15]." Wallach's overhangs and deeply recessed glazing provides adequate shading, while allowing the desert to flow within. He modulates light using the contrast between opacity and transparency as a source of richness. His walls serve as anchors symbolizing permanence, alternating with slender elements. While creating a materiality of the Sonoran desert, he plays with a modernist spatial continuity.

Wallach's interior spaces are spacious and well lit, even though well shaded from harsh sun rays by overhangs, canopies, and transition spaces. Generous panes of glass open up the cafeteria to the desert. On the other hand, Predock "returns to architecture's first principles: . . . the ritual of procession and arrival, the retreat in the dark, cool cave[16]." At VVES, window forms and layout result from the way children sit and move; random openings express the playfulness of small children, while organized rectangular windows evoke the discipline learned in school by older kids. Limited openings are solely generated by life within.

In summary, the materiality of the wall today differs significantly from that of the Pueblos. To build affordable structures, both architects transform the traditional monolithic man-made wall into a composite assembly made of industrial components rearranged to provide adequate thermal insulation and shade. Both reinterpret the Sonoran wall tradition: while Wallach seeks its new constructive logic, Predock uses its symbolic power. Wallach emphasizes that stones are non-bearing veneers that no longer equate container and support. His massive walls are free standing planes rather than box 'wrappers' or box 'containers'. For Predock, the wall symbolizes a resistance to universalization, as a means to reconnect to site specific realities and myth, even though its construction relies on industrial techniques. Both architects recognize its visual power to withstand the arid land: mass, solidity, heavy texture, and color affirm its presence in the midst of empty and vast landscapes. The wall epitomizes conflicts of tradition and modernity and contradictions between vernacular and industrial materiality. In any event, the wall is no longer completely material, structural, and technical.

II- WICKERWORK ENCLOSURE FOR THE DESERT

Isn't such a wall analogous to its pre-architectural ancestor, when the "often solid wall behind the carpet had nothing to do with the creation of space?" (Semper[17]) Can the carpet or wickerwork then constitute a legitimate alternative enclosure for the Southwest? Indeed the carpet understood as the "original space divider, the essence of the wall, the visible boundary of space, distinct from other functions of the enclosure such as security, supporting a load, permanence, and so forth" (Semper[18]) evokes strong similarity with contemporary building skins.

A- The origin of wickerwork

The origin of wickerwork will be explored to extract lessons for contemporary designs. At first glance, wickerwork has too limited a history in the Sonoran desert to serve as precedent. However, while Native Americans of Northern Arizona built with stones and bricks, the sandy soils of Southern Arizona forced Hohokam, Pima, and O'Odham (also called Papago) nations to construct with lightweight structures (arrowweed, cottonwood, palo verdes, or mesquite) and a mixture of mud and straw acting as reinforcing. Pima (Fig. 8a) and Hohokam built kis, brush and mud covered light framed structures. O'Odham huts were made of sticks and saguaro rafters with a layer of ocotillo thatch that held a mud and straw plaster outer skin over which the adobe mixture could be laid vertically or horizontally. Summer shelters (Ramadas) were made of flexible and light collages of materials woven together more or less crudely, supported by posts and beams (see Fig. 3). Chiricahua Apaches erected Wikiups, lightweight structures woven together with a cover of mud. Even the sturdier Navajo hogans of Central Arizona (Fig. 8b & c) used logs woven into "sky-baskets" above the "earth-bowl," applying their weaving art to construction.

In this area "favored by climate," the use of wickerwork did precede the masonry wall," as suggests Semper, and "the masonry wall is an intrusion into the domain of the wall fitter." Sonoran Desert primitive enclosures relied on weaving techniques whether 1) a woven skin was stretched over posts and beams, similar to the tent's carpet or 2) a lightweight woven frame was covered with mud. These two types were distinguished by Semper as the interwoven fence, including hedge-fence, and the pen, "bound together by sticks and branches — later transformed to basts". Later substitutions with clay tile and stones, he claims, retained textile art's main principle, which is to afford "great pliancy, considerable absolute strength, surfaces to cover, hold, dress, enclose and so forth." (Semper[19]) This broad definition of textile walls, as "braiding of mats and covers" and as space enclosures borrowing construction techniques from nature will be used here. Membranes that afford some degree of transparency, enclose spaces with flexibility while drawing patterns may be best defined as textile art rather than masons' art.

B. Materials and structural behavior of wickerwork.

How can wickerwork be transposed into contemporary enclosures? What principles of primitive construction are analogous to or valid for current construction?

Even though wickerwork is not limited to textiles, the study of tents adds clarification. The initial structural challenge was to stretch flexible covers without substantial deformation and to overcome their span limitation. The substitution of natural fabrics with man-made materials[20], overcome their lack of stiffness. The replacement of initial sticks and mats with ropes, bars (geodesic domes), or networks of cables and saddle shapes (Otto, Nowicki, Saarinen, Tange) permits now to cover large structures (Jeddah and Denver airports) with fabric. Thus textiles (structural or fabric like) can be applied to large and more permanent buildings. Nonetheless, they resist in tension. Another structural challenge lies in the detailing of connections (knots) that are the place of friction and shear stresses. The art dedicated to connective pieces characterizes the history of tent structures, as well as today's lightweight structures, curtain wall, and cladding, whose design is mostly guided by lateral forces. Finally, textiles' greatest enemy is the wind and must reduce fluttering of the membrane. Most primitive tents were shaped to resists dominant winds (for instance, the tippi of North America). Proper anchorage to the ground is also critical to the stability of the whole structure. These are significant distinctions from the wall, which is solidly stacked on its foundation.

Predock uses horizontal planes made of welded steel members to shade exterior spaces; they are treated as rigid planes, anchored tightly to walls. Wallach's canopy that shades the restaurant entry illustrates another version of steel wickerwork. This light gage sheet metal cover weaves vertical blades together with a steel pipe, creating loosely tied horizontal brise soleils. Intricate connective devices (Fig. 10.) anchor the lightweight steel canopy to its support, clearly expressing the stresses occurring at these knots. Eddie Jones's vertical screen wall at Cardinals Headquarters in Chandler, acts as a non-bearing space divider whose primary purpose is to shade the west sun (Fig. 9.) Such screen, made of chimney flues, is limited by its ability to self-support, analogous to a fabric enclosure. All three enclosures create an intricate pattern of light and shadows woven with materials.

C- Function of wickerwork.

The primary function of such enclosures is to protect from rain and sun. The black tent of Berbers and Bedouins (made of two mats, Rhizas, that support a horizontal stick hammar with a piece of cloth anchored to the ground with stakes) provides as much as 20 degrees Fahrenheit temperature difference between inside and outside[21]. The thick black material absorbs heat during the day that it radiates at night. The loose weaving lets hot air flow through the membrane, permitting natural breathing. Fabric thus can inherently provide thermal mass and shade significantly sheltered spaces. At the Arboretum, near Phoenix, Wallach uses similar principles with the design of concrete waffle slab woven together by steel reinforcement to cover exterior spaces. Waffles are pierced to let warm air escape; the concrete thermal mass radiates heat captured during the night and provides shade during the day. That cover is not conceived as a solid and opaque plane, but as a wickerwork.

With fabrics, screens, or membranes, the desired quality of light within the enclosure determines the choice of material. A subtle quality of diffuse light permeates the fabric of teepees. Predock uses a tent to modulate light in the multipurpose room (Fig. 11): "I love the way it mitigates and filters light through the skylights." Designing enclosures as fabric integrates light and air as full component of materials.

In arid lands, protection from the rain is only an occasional concern. Exterior spaces are living spaces; "containers" are not limited to interior enclosures. Traditional ramada weaving techniques shade appropriately courtyards and patios, true living areas. Wallach introduced a steel wire woven mesh intertwined into a steel structure to shade outdoors (Fig. 12.) In addition, a combination of ground covers and deciduous plants provides seasonal climatic control, intertwines nature and man-made shelters, and modulates air and light quality. Wickerwork techniques induce greater continuity between in and out, using both daily and seasonal migration strategies that take advantage of milder climate conditions. Such enclosures infer environment sensitivity, a quality that is often lost in sedentary and monumental buildings.

D. Do wickerwork enclosures have a raison d'être

Do wickerwork enclosures have a raison d'être in our seemingly sedentary civilization? Indeed, such precedents are found mostly in nomadic dwellings, even though tents served multifarious purposes throughout history[22]. What lessons might these offer?

While its heritage is agricultural, the Southwest is now a hub of post-industrial growth. The landscape demonstrate conflicts between a rustic tradition rooted in the land and trends of imported "commodification, universalization, and dematerialization[23]." "Edge cities"[24] built for the car replace dwellings regulated by the body. Their undefined and fluctuating boundaries push the edge of a giant suburbia farther into the desert. Today's icon of the West is that of the highway, a black ribbon of asphalt with a dotted yellow line running to the horizon[25], glorifying the conquest of vehicles over the land, the image of fluidity and transience for highly mobile new pioneers.

References to nomadic encampment express underlying qualities of post-industrial lifestyles, as well as referring to Arizonan gold miners' settlements. For instance, Predock chooses to set a tent at the center of the school complex. "The frittering fabric has a nomadic ephemeral quality, that makes reference to transient desert occupations. The school is a

permanent thing, yet the tent is a small gesture to settlers of the desert, always on the move. The tent is loaded with allusions[26]."

In summary, wickerwork structures inform the design of contemporary enclosures, either technically or formally. Predock uses wickerwork for its symbolic power, Wallach and Jones for its appropriate climatic properties, as a breathing skin that intertwines air, light, and materials. Textile enclosures can be divided in two types: woven skins or stretched fabrics. Both self-supporting, they divide or contain spaces with flexibility. While suggesting temporality, they do have substance, temperature, and colors. By braiding air, light, and materials, they stretch boundaries of living spaces to include outdoors, providing continuity between in and out. Such enclosures weave nature and architecture, embracing the desert's climatic conditions rather resisting them. Furthermore, the contemporary reinterpretation of ephemeral nomadic encampments relates to fluid and immaterial qualities of our current Zeitgeist.

CONCLUSION: FOR A NEW MATERIALITY

This paper intends to demonstrate that "the dark and corded tents of the Bedouin are no less material than the stone vaults of a 14th century French monastery." (M. Benedickt[27]), that both wall and wickerwork have legitimate substance. While Sonoran Desert architecture is often referred to as an architecture of walls[28] that resist strongly to the harsh climate, both the history and the evolution of wickerwork make it an appropriate means of containing spaces with flexibility, integrating air, light and nature. In fact current construction techniques fuse wall and wickerwork techniques. The evolution of walls into composite assemblies, only partially load-bearing, confirms that walls and skins are increasingly separate and that what we see is often a skin rather than a bearing assembly. In many respects, lightweight structures, cladding, curtain walls, and sun screen devices act more like wickerwork than walls.

The question is not which is the most appropriate enclosure for the desert, but how we use them appropriately. Wallach, in search of structural integrity, designs walls as abstract planes rather box containers, emphasizing the new role of the wall and its composite nature. When using wickerwork, he accentuates the tensile behavior of covers, their fragility. Predock is more concerned with the visual and symbolic qualities of both techniques. While using main stream methods of construction, he often negates their ancestral constructive logic, giving prevalence to symbols over technology.

In designing abstract walls as signs of permanence, Predock raises another issue that refers to the basic purpose of architecture. Do we assume that monumental, opaque components are the true essence of architecture as a means to seek serenity and stability? Ciriani[29] states that "there are two temporal registers, two modes of permanence in a building: what is opaque and will ultimately become beautiful ruins; and what dresses the building, the more fragile envelope, realm of transparency, of metal and glass, that will rust and break." Do we continue to assume that one register is more noble than the other?

Or do we seek to express our Zeitgeist, to truly redefine architecture by using the potentials of new technologies. Can we "break away from the platonic idea of a static world" to intertwine fluctuating elements such as air, light, nature into architecture? Are we not at a turning point where instead of "Shelling's description of architecture as frozen music, we are looking for an architecture more like modern music, jazz, or poetry, where improvisation plays a part, an indeterminate architecture containing both permanence and transformation?" (Rogers[30])

NOTES

[1] Wall: a work of stone, brick or other materials, intended for defense or security, or for an enclosure (Webster)

[2] Enclosure: that which encloses, as a fence (Webster); cloture, enclos, (French); from Latin, includere, surround with walls, etc. (Petit Larousse); enclose: that which surrounds; encompass; hem in, will be distinguished from Envelope: that which envelops; a wrapper (Webster); covering, Bekleidung (German).

[3] Gottfried Semper, "Style: the Textile Art," *The Four Elements of Architecture and Other Writings* (Cambridge: CUP, 1989)

[4] Wickerwork: entwining or weaving of materials (Semper, ibid. p 103)

[5] Bernard Tshumi, "Six Concepts," *D: Columbia Documents of Architecture and Theory*, Volume 2, New York: Columbia University Graduate School of Architecture, Planning and Preservation, 1993

[6] Viollet Le Duc, *Entretiens sur l'Architecture*, ed. integrale, 4th ed., Entretien V (Bruxelles: Pierre Mardaga, 1986) 465

[7] Additional concepts were extracted from David Leatherbarrow, *The Roots of Architectural Invention: Site, Enclosure, Materials* (Cambridge, Mass: UP, 1993)

[8] Reynar Banham, *Scenes in America Deserta* (Peregrine: Utah, 1982) 87

[9] Alan Gowans, *Styles and Types of North American Architecture: Social Function and Cultural Expression* (USA: Harper Collins, 1992)

[10] Rina Swenbell in "Pueblo Space Form and Mythology," *Pueblo, Style, and Regional Architecture*, ed. by Nicholas Markovich et al. (New York: Van Nostrand Reinhold: 1992)23

[11] Nina Veregge, "Transformations of Spanish Urban Landscapes in the American Southwest, 1821-1900," *The Journal of the Southwest*, Vol. 35, #4 (Tucson: UAP Southwest Center, Winter 93)

[12] Kenneth Moffett, "The Wall in Recent Architectural Form: A Pattern Evolution towards Autonomy" (*JAE*: May 1994) 242-257

[13] Semper, "Style: the textile Art," ibid., 254

[14] Lawrence Cheek, "Desert Blooms," (*Architecture* Jan 1990) 92-97

[15] Kenneth Frampton, "Critical regionalism Revisited," *Critical Regionalism: The Pomona Meeting- Proceedings*, ed. Spyros Amourgis (California: College of Environmental Design, California State Polytechnic University, 1991)

[16] Miriam Horn, "The Rise of the Desert Rat" (*Vanity Fair*: Mar 1993)114

[17] Semper," The Four Elements of Architecture," ibid., 103

[18] Semper, "The Four Elements of Architecture," ibid., 104

[19] Semper, "Style: the Textile Art," ibid., 215

[20] Cotton and hem were first replaced by vinyl that deteriorates with UV; then by glass fiber reinforced plastics coated with Teflon and occasionally reflective plastics, that resist up to 1000 degree Fahrenheit, 800#/SI, and are self-cleaning; pre-stressed pressured or air filled membranes further increased the spanning capacity of such membranes Salvadori, *Why Buildings Stand Up* (New York: W. W. Norton & Co., 1980)

[21] Larry Medlin, lecture at the University of Arizona, CCP, Sep. 1994

[22] Bidault reminds us that tents were not solely used by nomadic civilizations leading a pastoral life but served multifarious purposes throughout history. Assyriens & Perses Kings, Bible Patriarchs, François I lived in tents draped with rich fabrics. Tents served military expeditions: Greeks, Romans (tentorium and tabernaclum), Napoleon's, modern armies. Tents are used for missions, explorations, camping, temporary shelters etc. For Bernard and Lacroix, nomadism is influenced by history, for nomadic regions expand beyond areas of rare rains. Jacques Bidault et al., *L'Homme et la Tente* (Paris: Susse, 1946)

[23] Ellen Dunham Jones, "Loosing identity in Post-Industrial Architecture and Urbanism" (*Modulus* 20 1991)87-107

[24] Joel Garreau, *Edge Cities* (New York: Doubleday, 1991)

[25] Reyner Banham, ibid.

[26] Interview conducted in July 1994 by author

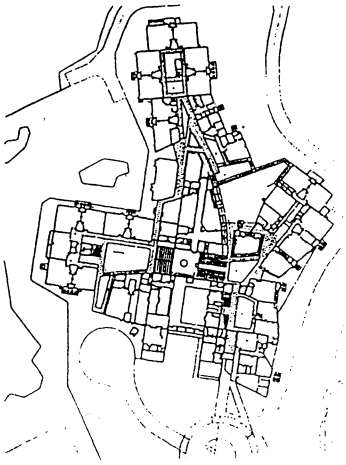
[27] Michael Benedickt, *For an Architecture of Reality* (New York: Lumen, 1987)

[28] Will Bruder, lecture at the University of Arizona, Sep. 1994

[29] François Chaslin et al., "Faire la Lumière, un Entretien avec l'Architecte" (*AA* #282, Sep. 1992)81

[30] Richard Rogers, *Architecture: A Modern View* (New York: Thames and Hudson, 1991)

Illustrations



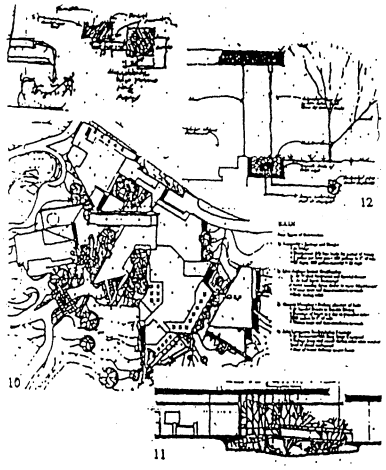


Fig. 1- Ventana Vista Elementary School
Site plan (left)
Courtesy of Burns-Walt-Hopkins Architects

Fig. 2- ASDM Restaurant, Site plan (right)
Courtesy of Les Wallach, FAIA

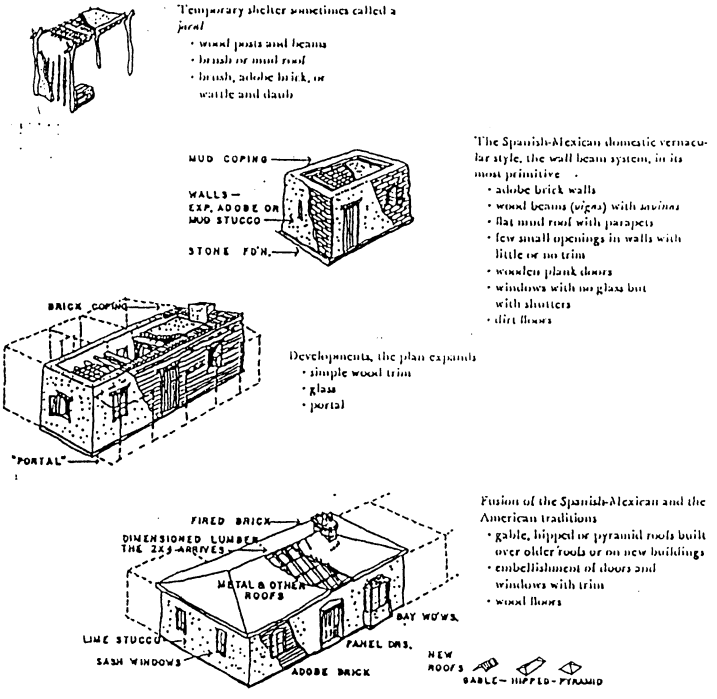
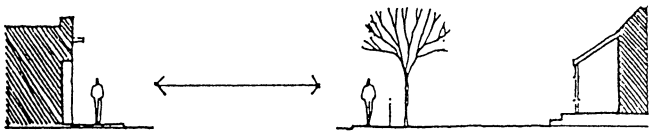
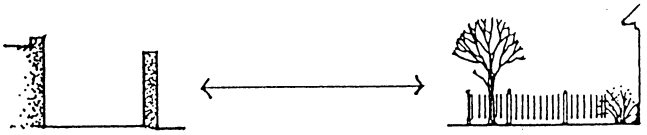


Fig. 3- Evolution of the enclosure in Southern Arizona
Courtesy of Arizona Historical Society



From a defensive, closed condition of no exchange to an open, multilayered zone between private and public spaces



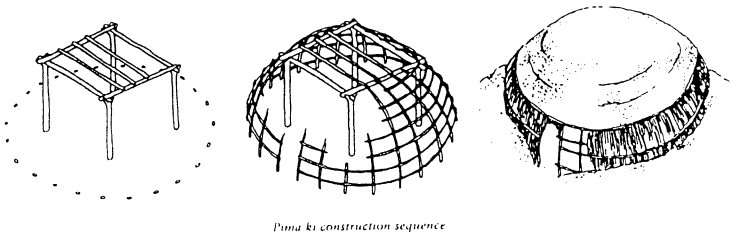
From a wall that creates spatial enclosure and thus visual as well as functional privacy to an "open" demarcation created by landscaping or a fence

Fig. 4- Evolution of enclosures: from wall to porch, from wall to fence
Courtesy of Nina Veregge, "Transformations of Spanish Urban Landscapes in the American Southwest, 1821-1900", The Journal of the Southwest, Vol 35, #4 (Tucson: UAP Southwest Center, Winter 93)

Fig. 5- Walls at VVES, Tucson
Photograph by author (left)

Fig. 6- Walls at ASDM Restaurant, Tucson
Photograph by author (middle)

Fig. 7- Walls, column, and beam at ASDM
Photograph by author (right)



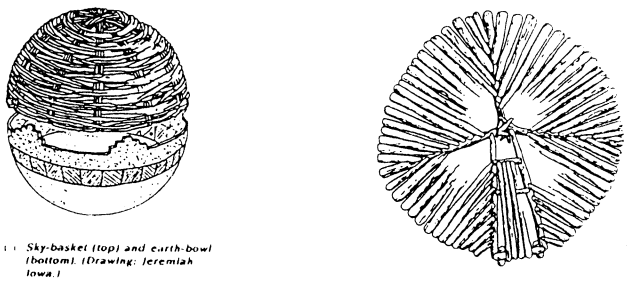
Pima ki construction sequence

Fig. 8- Weaving construction techniques

a- Pima *ki* construction sequence (top)
Courtesy of Peter Nabokov et al., Native American Architecture (Oxford: Oxford UP, 1989)

b- Sky basket and earth-bowl (bottom left)
Courtesy of Rina Swenbell in "Pueblo Space Form and mythology", Pueblo, Style, and Regional Architecture, ed. by Nicholas Markovich et al. (New York: Van Nostrand Reinhold: 1992)23

c- *Hogan* construction (bottom right)
Courtesy of Peter Nabokov et al., Native American Architecture (Oxford: Oxford UP, 1989)



Sky-basket (top) and earth-bowl (bottom). (Drawing: Jeremiah Iowa.)

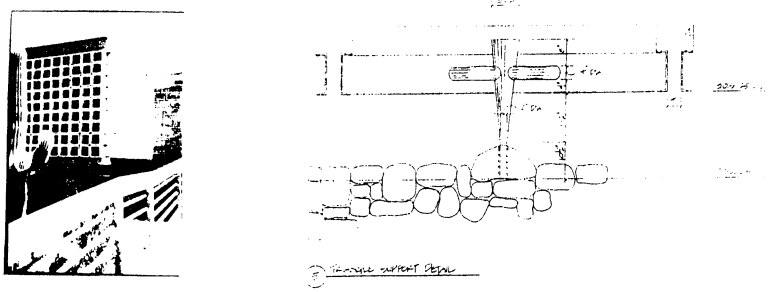
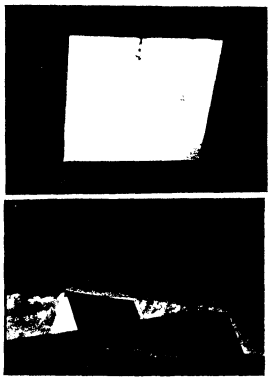


Fig. 9- Screen wall at Eddie Jones's Cardinal Headquarters (left)
Photograph by author

Fig. 10- Connective detail at ASDM (right)
Courtesy of Les Wallach, FAIA



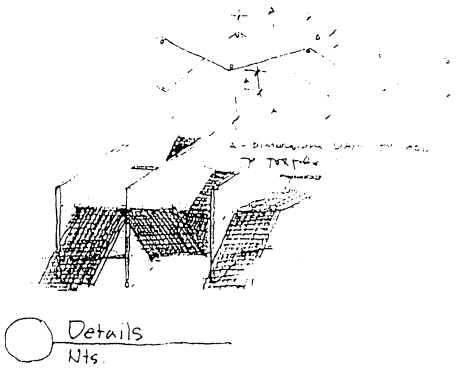


Fig. 11- Tent at VVES, Tucson (left)
Photographs by author

Fig. 12- Detail of wire mesh cover for ASDM (right)
Courtesy of Les Wallach, FAIA