Synthetic Gardens rekindles the forgotten public greenhouse. The greenhouse became a common urban typology at the end of the nineteenth century through the convergence of three major factors: extreme population growth of cities due to the industrial revolution, advancements in glass and steel construction, and the need to reconnect urban populations to the natural world they left behind. In the later part of the twentieth century, with advances in the field and facilities of Botany, the social component of the glass house dwindled and greenhouses became increasingly devoted to research. Synthetic Gardens reconsiders the potential of the greenhouse as public space.

From its inception in the nineteenth century, the greenhouse has mediated and represented the relationship between the natural and the artificial. Creators of the earliest greenhouses sought to "capture" a piece of the exotic and preserve it in its original state by enclosing it in an artificial environment—the glass house. Despite centuries of advances in architectural thinking and technology, contemporary greenhouses perpetuate this early attitude by elevating functional requirements of vegetal cultivation over the quality of the architectural experience. If greenhouses are to become active public spaces again the relationship between the natural and the artificial (or architectural) must be rethought.

Aligning ourselves with recent cultural and scientific phenomena, we view the boundary between the natural and the artificial as increasingly blurred. In response to this we understand both organic and synthetic matter to be within the material regime of architecture. In other words, the paradigmatic separation between that which encloses (the architecture) and that which is enclosed (the vegetation) is no longer valid; rather, new relationships can be suggested through the concurrent design of organic and synthetic material.

Synthetic Gardens works from the ground up. Located on a steep slope in the Hollywood Hills, the ground must first be contained before it can be built up. As such, the majority of the site is covered with a soil retention system, first observed in a photograph by Toshiho Shibata and then transformed to work within the constraints of this difficult site. The system consists of various types of heavy fill enclosed by a robust membrane patterned with creases and seams which control the flow of fill through the blanket, providing an even thickness across the diverse topography. The membrane or "blanket" is not only designed for the organic matter underneath it but also the material above it: the gardens, the enclosures, the appliqué, and the flows of people which will inhabit it. Synthetic Gardens is not only a daytime destination; it has a night life as well. At dusk the spotlights in the barrel cactus garden and fiber-optic strands in the bamboo garden emerge with the same rhythms as the plants themselves. In this way the blanket is a substrate for pragmatics (soil retention), program (the events which arise through the behavior of crowds in movement), and effects (the color, the lights, and the plants which imbue vibrancy through their flickering relationships to the crenellated forms).

This project was done in collaboration with Ellie Abrons and Daniel Norell.
MODULARITY

The original soil retention system utilizes a repeatable module that consists of a series of creases and pinch points to engineer the distribution of fill, surface area, and flexibility. Visible in the diagrams, each module consists of a series of pockets (both continuous and discreet) and creases that manage the flow of fill. By changing the underlying geometry of the module we were able to engineer different physical characteristics in the system: (01) a change in the overall size of module; (02) discrete bend lines where multiple thin patches line up to make certain areas intentionally weaker than others; (03) fold lines created by a row of apertures that allow the blanket to negotiate deep creases in the landscape; (04) apertures; and (05) break lines that allow the blanket to fold back on itself and stack up like sand bags. This diversity of configurations substantially extends the original performance capabilities of the original system both in terms of soil retention and aesthetics.
SOIL RETENTION SYSTEM

For areas of lesser slope, large basins are carved into the existing terrain allowing matter to accumulate. This heavy zone acts in two ways: buttressing the blanket above, which slumps into the basin in compression; and as an anchor for the membrane below, which hangs in tension down the continuing slope. In order to accumulate mass in the basin, a scale shift in the module is necessary. By manipulating the geometry, the patterning and cadence of the overall membrane changes, figuring the basin zone. Modules are placed perpendicular to the slope in order to control the shifting of the aggregate fill. Overlapping blanket patches changes the direction of the system when the slope changes in the terrain.

The diagram below the section illustrates the physics of the system. Three vectors show the forces acting on each module of the blanket. Gravity (G) is proportional to the size of each module—this transforms across the blanket according to slope and program. The force of the earth pushing back on each module is proportional to the size of the module and its tangential relationship to the X-axis—in other words, its normal (N). The friction created (F) is proportional to the size of each module and the slope. The normal (N) and friction (F) forces form an equilibrium with gravity (G) such that the blanket is not in motion. This balance between size, weight, slope, and density is achieved through altering the geometry, proportions, cadence, and porosity of the membrane and its modules.

10 Toshia Shibata, Landscape

11 Typical basin section and force diagram
GREENHOUSE ENCLOSURES

The majority of the site is covered with the default soil retention system. This is a modular membrane filled with various types of heavy fill. The membrane is punctured with apertures that provide stability by allowing plants to grow through the membrane. Each landscape patch has at least two gardens that are grounded in the membrane.

The greenhouses are made possible by a simultaneous launching and erosion of the blanket, creating a crenellated bubble punctuated by progressively larger apertures. Daylight and insulation for the outer shell is controlled by the insertion of transparent foil membranes in the apertures. The figure of the greenhouse is blended with the surrounding blanket by the smooth transition between the regular crenellated surface and the lattice-like structure of the bubble.

Together with a top basin, each greenhouse forms a local circulation route crossing the main path. At night, the greenhouses are lit up from the inside, catching the attention of passing visitors. Across the valley, the greenhouses appear as glowing orbs.
COLOR AND GARDENS

The coloration strategy utilizes graduated changes between complimentary hues. This phenomenon is observed in many botanical examples and deployed across multiple scales in the project. On the macro scale, large topographical features are highlighted through condensed, vibrantly colored plants. Around these gardens a background color is applied, which transitions between the brightly colored garden and the surrounding blanket. This color is applied through synthetic means (as in paint) and organic means (through the planting of small flowers of one species, such as a dandelion). At a certain density the flowers provide a continuous swath of color across the hillside. The synthetic paint matches the color of the flower planted over it. Viewed from a certain distance the boundary between applied color (paint) and natural color (flowers) is diminished. These patches of color produce appear as large scale figures when viewed from the opposite side of the valley. The circulation routes feed into these vibrant gardens, emphasizing their capacity to act as collection pools for visitors.

Inside the larger greenhouses are smaller enclosures that house experientially saturated gardens, such as a moss garden. The moss grows over the brightly colored membrane, providing a superimposition of organic and synthetic materials. Water misters provide a cloud of moisture increasing the stimulation of senses through the garden experience. Outside this inner garden, under the bubble is the vine garden. Bunches of vine track the underside of the bubbles geometry, splaying down into a dense field of hanging threads.

Model photographs