City of Caracas, in which the evolution of the structural approaches are observed from the more discreet portico framed systems in the beginning to those of the curved or folded shells projected in the early fifties, real plastic and structural feats carried out thanks to technical innovations and to the contributions to the design adjustments provided by the Engineers Juancho Otaola & Oscar Benedeti and their enterprise Precompressed.

As one walks along the open structures of the covered corridors it is possible to observe, there opposite, hermetic figures of a strenuous presence, such as those of the auditoriums, in some of which prevail portico frame systems with vertical members that reduce their section as they come closer to the ground.

Veils

The other fundamental theme in Villanueva's architecture is that of the veils or lattice work that owe so much, not only to the legacy of Islamic culture but also due to the questioning of the Brazilian architects of the forties, but especially that proposed by Affonso Eduardo Reidy, mainly in his complex of Pedregulho in Rio de Janeiro. Villanueva also recognises, in his book Caracas in three times, the debt that he owes to his colonial heritage when he creates the wefts in which he so well established subtle connections between the hidden, the veiled and the explicitly exposed.

The veils in Villanueva's tropical cosmos present subtleties in their densities and forms which manifest themselves according to the nature of their circumstances: depending on how they relate to the proximity of the openings or open spaces; according to their vertical or horizontal position depending on whether it is the ceiling or wall, lattice work or pergolas; or regarding their disposition with respect to the sun. Thus through this interaction with the proximity of the none veiled, of their relationship with what is above and below or their orientation, emerges the design of the weft and the magic of the everyday different moving shadows.

Villanueva created his screens of light, not only to solve a climate control problem, but also to offer the spectacle of its lattices and the reticulate mobile shades that vary with the passing of the hours. The theme of the veils acquires therefore, a stature that is located in the dimensions of looking and perceiving, beyond which, is the always present relation of the continuity between the interior and the exterior which nevertheless requires the different shades that fall in between the fully exposed, without barriers, and the completely opaque.

Fluid space

The fluid space constitutes the arrival of the great aspirations of the 20th century. As in cubism, Le Corbusier sought transparency, the penetration of the interior and exterior space and the introduction of the movement in the static form, as expressed by Stanislaus von Moos and as noted in projects as early as those of the Centrosoyus in 1928 and the Soviets Palace in 1931, in which clear references appear to the structure and the lobby of the Aula Magna.

The fluid space allows a continuous vision that the displacement completes. From the distant intuition of a treasure, we are offered at distinct moments and at different times, passing from the certainty of its existence to the reward of its acknowledgement; then the precise look is required, the delight in the details that direct acknowledgement gives place to which has been prepared by infinite preambles.

The fluid space is the place of the infinite veils: of the artificial open works that let in the air, the sun or allow us to glance through them as well as the natural wefts of low vegetation or trees; it is the meeting area of volumes and surfaces suspended by graceful overhangs; it is also the place of time, of lattices' shadows that roam around floors and walls, that appear and disappear with the passing by of clouds or the movement of the sun. The fluid space is also the place of motion, discovery and surprise; it is the appropriate place for an in depth observation which is overlapped with individuals that move to seize it and that of an interior that is also an exterior. The fluid space appears before us then as the place of arrival of a search in time, as the fundamental objective, sensed more than known, but brilliantly achieved in the University City of Caracas in the fifties.

Silvia Hernández de Lasala, Architect, Dr. Architect of Architectural History by the Central University of Venezuela.

The School of Petroleum Engineering

José Javier Alayón González

The School of Petroleum Engineering of Maracaibo, at the western end of Venezuela, is framed within the expansion project of the University of Zulia, driven by the booming oil industry in those years. The building was to be located on a plot adjacent to the University Hospital of Zulia, a construction that had begun at the beginning of the decade. This area of expansion of the city, which main pole of attraction was constituted by the airport "Grano de Oro", the Liberator headquarters and the Surgical Hospital, were to become the future University area.

In this project, immediately after the core set of the Central University of Venezuela, the urban and climatic conditions are different. Neither the existing buildings, nor the future ones, are arranged by a general campus project, being the area for the time a faded grid of very low density. On the other hand, the marabino extreme climate (average temperature of 32 °C), is very different to the mild one of the valley of Caracas. However, in 1943 Villanueva had already designed and built in Maracaibo the neighbourhood unit General Rafael Urdaneta, and three years later a school within the same housing project.

The programme and the compound

The School of Petroleum project is perhaps the one that in the most decisive and clear way, of those employed in his contemporary works of the University campus of Caracas, has been composed as a system. The substantial difference between the academic and modern composition, -Alan Colquhoun tells us - is that in the latter the combination of the parts is free, a set of permutations between fixed elements that does not respond to pre-established rules, or the repetition of previous forms. Therefore, it is the freedom of combination, the absence of predetermined rules along with the creation of their own, what differentiates modern architecture from the classical one, not the absence of composition itself. In spite of that, the intrinsic relationship that the term "composition" drew with

the academy, and with it the "stylistic imitation architecture", provoked an effect of logical rejection in an avant-garde that was trying to break with everything that was previous. Therefore, this new way of projecting would have to be nominated under a different term, and as Colquhoun explains, the most antagonistic concept towards the composition would be that of the system. In this way, the building which parts are arranged amongst themselves, under a global conception of internal functioning, is the alternative to the process of "election" of the academic method in which Villanueva was formed as an architect in Paris and which he used, although each time less, until the 40 's.

The preliminary draft presented in April 1954, already establishes a rigorous north-south orientation (Fig. 4). In this same plane, a corner of the neighbouring University hospital is drawn, designed by the Swedish architect Hakon Ahlberg. A large building of two parallel and rationalist blocks oriented in the same direction. The need to capture the winds coming from the north, it determines this orthogonal disposition ignoring an urban layout which was yet to be consolidated.

Villanueva claimed that it would be necessary to scale the buildings in relation with their surroundings and if we compare their similar proportions and the absence of any other surrounding urban scale, we can understand the formal correspondence with the hospital. Contrary to the recommendations of the university commission, Villanueva establishes the premise of not using artificial air conditioning. This approach, certainly risky for the city of Maracaibo, a priori seemed the main problem to solve. The adopted solution distributes the pavilions of classrooms and laboratories in parallel, sufficiently separated, in such a way that they can receive the greatest amount of fresh air, coming from Lake Maracaibo, without hindering each other.

This large gap between the volumes ensures, apart from the aeration, the perspective view from the perpendicular connector element, at the same time facilitating the reading of a rotund and dilated body.

The great dimension of these pavilions generated a problem of scale in front of the standard solutions of the sunshield, losing its expressiveness or "decorative value" in the immensity of the volume. In the portfolio of the University Campus of Caracas, there was already a wide range of tested solutions for the natural conditioning of the buildings: sunshades of different shapes, sizes and orientations, fretwork walls, cracked ceilings, etc. However, an emphatic vision of pure volumes, the problem of the shape seems to prevail in this project. Oblique circulations through the voids between pavilions, evidence the depth of the volume on the circuit, because as Villanueva explained: "Looking at a building diagonally one better realizes its formal appearance".

If in Caracas the covered walkways were connecting elements, formally and functionally independent of the buildings they served, in Maracaibo they would be the backbone of the compound.

The axial corridor, distils a certain academic reminiscence, although the alternation of the halls and laboratories that are attached perpendicularly, destroys what could have been a classical composition in a patriarchal cross. An axis can also be traced, although in a less obvious manner, in the central complex of Caracas. In the access, an expanded inner courtyard connects the most singular uses and of greater capacity: the auditorium and library.

The cafe is separated like a satellite giving it formal and use autonomy.

At the same time this axial and organic solution allows the school to grow from this trunk, to which new pavilions adhere, as in fact happened with a fifth pavilion without altering its functioning. With its horizontal development, Villanueva gives the complex an urbanity which the context lacks converting the school into a scaled campus.

The shape problem

The glass enclosure of the terrace of Caoma or that of the classrooms of the faculty of Humanities of the UCV, do not pursue the immateriality or the literality of the transparency. They are made of glass, but with a strong carpentry presence. Villanueva hardly ever expressed himself about the interior - exterior spatial relation as a continuum. When he looks for this integration in the project he does it in a direct manner, physical and about this he said: "Architecture has as an objective the creation of a certain space, in order to perform in it a particular human function, individual or collective. The result of this principle: the space is cut in two, the one that is outside and the one that is inside." In fact, Villanueva privileges constantly the interior space, as the main performer and characterization of architecture.

Architecture is a game of volumes "gathered under the light" but the architectural space is an interior space in which this one penetrates. And states: "It is necessary to create space and then the form; and not create form and space as a complement".

The thick film filter of Maracaibo surrounds the space adjusting to it, adhering as a real skin to the structure. When Villanueva stated that: "With the conquest of space and abandonment of a particular point of view, the surface acquires strength and importance", then one understands enclosure of the school of petroleum and its configurational power, capable of giving shape. It is clear that a deliberate search of the form exists, the architectural volume as a result of interior space, but it reaffirms the role within the system to which it belongs.

The totalizing response of the enclosures creates discreet bodies, of an opaque and uniform texture to the south and of vertical, mobile and multicoloured blinds to the north. Resting directly on the ground, these monoliths only yield to the will of the ground floor in the bodies of the staircases at the end of the simple span. The staircase is accentuated, as in most of Villanueva's works, but it does not turn into an exempt piece. The wall-lattice gives continuity to the corridor which becomes a staircase and returns on another level. All the circulation areas, arranged in the southern facade, act like corridors, isolating and refreshing the box even more.

Although the volume does not lose the particularities derived from the site, it now works as a whole and not in different plans. With the integration of solar protection in the window frame, the rhythm established by the sunshades disappears, the changes in densities of different fretwork blocks, resizing the "discipline of the facade as a mechanism" that, as well noted by Juan Pedro Posani, defined much of his architecture of the 50s.

The solution of Maracaibo is more a mechanism than a facade and arises from an inner

need for regulation, and its exterior will be a consequence of this.
The observance is now towards a few internal laws. The facade is not made up; it is a coherent system per se. The meteorization of the opening redistributes the full and the empty, by merging the mechanisms of solar control with the wall in a universal form: the lattice-wall.
The game of shadows, organized and geometric, gives way to geometry, equally rigorous in its approach, but illusory and changeable in its reading, producing a moiré effect.
This optical effect, deeply exploited by kinetic art, gives the volume a plastic quality which raises the architectural box to an artistic level.
The intention of integrating art into a body created under these principles requires that the integration leads to universal solutions which correspond to the result of this operation, where there are no gaps between the structures. Thus, the plastic intervention is focused on the elements of mobile solar control, in the chromatic game of its slats or using these as a base for the pictorial composition that, in turn, assumes and integrates these components and their movement as part of the same.

The standardized construction

The structural system of the pavilions, with great load bearing required only in the spaces with the laboratory machinery, is a standard system of porticoes. What stands out is the effort to maintain a continuous and thin line in the façade, which frames the pivoting slats, or the lattice-walls (Fig. 6). To accomplish this, the slab of the roof hangs from the beams, leaving the exterior of them exposed on but reducing the section of the projection span in an inverted cantilever mode, making it invisible to pedestrians and keeping the continuity of the upper vertex of the façade. Once fulfilling its rational function, the structure could transcend in a plastic fact, serving as an ornament to its surfaces and as a symbol of functionalism".
The auditorium is practically a reissue of the concert hall of the central complex of the UCV, with the same system and number of porticoes that sustain the curved roof. This building, along with the great projected marquee, which is also similar to the access of the Rectorate building in Caracas, but sustained by tensors, are the greatest efforts to make the structure expressive.
Also regarding Caracas, a reduced palette of standardized materials is even further evidenced for all the enclosures, in a clear intention to accelerate the construction processes by means of industrialized materials and the plastic exploration of them.The fretwork blocks and the pivoting shutters constitute practically the entire enclosure of the pavilions. Only in a few lower floors, retracted under the projection of the higher floors, the traditional windows with romanilla blinds are used, very effective in a more localized climate control. For Villanueva, the shape is built, its creation" is an imposition of the matter and the construction procedures, but its real value cannot be translated by only, taking into account the structure".

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Residential unit "El Paraiso"

Paulina Villanueva

1 Public housing as a cause

In June 1965, during the celebration of the XI Pan American Congress of Architects held in Washington, Carlos Raúl Villanueva presented a short paper under the brief title: Housing. Modern architecture had at this moment shown signs of evident fatigue and had found its way back after arriving at countless dead ends. In his paper Villanueva reaffirmed his status as a modern architect and reminded his fellow colleagues that their goal as architects "which concerns them with an irrefutable urgency is the creation of a definitely more human and better world."
The happiness of man, the attainment by all of us of a full and satisfying life, is the cause, the purpose of the new architecture, the essence of the spirit that gave impulse to the architecture of the early twentieth century. Villanueva was trained in these ideals in the Paris of the first quarter of the century; his concerns took him beyond the doors of the School of Fine Arts where he studied architecture.
In this cause, the voice of Le Corbusier is the guide, the light in the way of this tireless search which opened up with the turn of the century for architecture. Corbusier was a "chercheur " who embodied his ideas in his designs and profuse writings, searching to build a new language for architecture and urban planning, but beyond that, and in essence he did it to convince, persuade and educate his followers on the path towards the tomorrow. Villanueva was one of those followers who likewise devoted all his efforts to lay the foundations, to forge this new architecture in a country where everything or almost everything was to be done.
Venezuela offered fertile territory and Villanueva worked tirelessly, not in a private professional office, but in the service of the state, firstly for the Ministry of Public Works, then the Workers' Bank and finally for the University City. Housing, Education, Art and Urbanism constituted the centre of his pro-