

# A Prototype towards a Physical and Logical Architecture: Varela House

Un Prototipo hacia una Arquitectura Lógica y Física: Casa Varela

CLARA OLÓRIZ SANJUÁN

## Resumen / Abstract

Alejandro de la Sota's approach towards prefabrication re-defines architecture as a material practice. More in particular, his ways of 'projecting' with the Horpresa system in the Varela House respond to the challenge of designing a repeatable test-bed or 'microscopic preparation for great experiences' to address his contemporary conditions in housing demands. This essay introduces Sota's critical approach towards prefabrication from his notions of physical and logical architecture. These concepts will be developed through his application of the Horpresa panels: How they influenced his way of thinking, projecting, designing with the system from the prototype (Varela House) to the large scale (Orense and Bahía Bella complex) by means of spatial patterns and combinatorial assemblages. This reflection will address the relationship between the Horpresa system and Sota's projects, between means and ends, between technology or the new materials and architectural production.

El posicionamiento de Alejandro de la Sota's frente a la prefabricación redefine la arquitectura como una práctica material. Más específicamente, su forma de 'proyectar' con el sistema Horpresa en la Casa Varela se enfrenta al desafío de diseñar un 'tubo de ensayo' o 'preparación microscópica de las grandes experiencias' para responder a las demandas de vivienda de su tiempo. Este ensayo hace una introducción a la actitud crítica de Sota frente a la prefabricación desde sus nociones de arquitectura Lógica y Física. Estos conceptos se desarrollarán a través de su uso de los paneles Horpresa: Cómo influenciaron su manera de pensar, proyectar y diseñar con el sistema desde el prototipo (la Casa Varela) a la gran escala (los complejos de Orense y Bahía Bella) por medio de redes cristalinas y ensamblajes combinatorios. Esta reflexión servirá para abordar la relación entre el sistema Horpresa y los proyectos de Sota, entre los medios y los fines, entre la tecnología y los nuevos materiales y la producción arquitectónica.

## Palabras clave / Keywords

Prefabrication, Horpresa, System, Prototype, Grid, Assembly.

Prefabricación, Horpresa, Sistema, Prototipo, Retícula, Ensamblaje.

**Clara Olóriz Sanjuán** es doctora en arquitectura y líder de proyectos en Groundlab, especializada en proyectos de la ciudad, el paisaje y el territorio además del diseño de parques y espacio público en varios contextos internacionales. En la actualidad desarrolla su actividad académica en el programa Master Landscape Urbanism de la Architectural Association, donde es profesora. Codirige el programa AA Visiting School en Bilbao y el grupo de investigación de la AA Urban Prototypes. Ha publicado varios artículos y ha impartido conferencias y talleres en contextos profesionales, académicos y congresos en Venecia, Leeds, Cambridge, Ámsterdam, Uppsala, Lausana, Surat, Londres, México, Pamplona, Oporto y Bilbao.

Alejandro de la Sota's approach towards prefabrication re-defined architecture as a material practice. Given the Spanish conditions after the civil war, he developed radical ways to push the profession forward and to re-define architecture as a practice through the realignment or rather the synthesis of its traditional processes: design, production and construction. He understood the material with which the architect operates as a kit of parts and the pre-fabrication of them as a way of life, able to fuel architecture towards new material forms in order to seek solutions to face the collective challenges of his time. In doing so, the process of building became an assemblage of combinable off-the-peg parts, subverting existing building techniques and borrowing materials from industries external to architecture.

Sota's environment was deeply conditioned by the particular Spanish conditions. The situation in Spain in the 1950s and 1960s was strongly affected by the scarcity of dwellings and the growing concerns about the industrial production of dwellings. Together with these issues, Spanish socio-political and economic conditions, the scientific backwardness and the architects' thirst<sup>1</sup> for modernity gave rise to a particular rethinking of mass-production terms, especially regarding the industrial production of dwellings. In this context, this article focuses on the questions raised by the material transformations in the new methods of producing architecture, and more in particular, Alejandro de la Sota's ways of 'projecting' with the Horpresa system in the Varela House, a repeatable test-bed or 'microscopic preparation for great experiences.'<sup>2</sup>

He used this project and prefabrication system devised by Julio Garrido as a test-bed for three large-scale projects: a tourist complex from 1965 which posed the question of prefabrication as the problem of bringing a mass of people to the Manga del Mar Menor in Murcia, in Las Palomeras in Malaga and in the form of aggregative and infinite crystalline grids in the Orense complex. Thus, the Varela house can be seen as a prototype to test solutions to problems for the many, 'a collective step.'<sup>3</sup> Through Varela and its large scale applications, I will address specifically Sota's approach towards new materials offered by the industry; towards the question of prefabrication and technology which in his view, represented a way of thinking, a life-style, a way of tackling the architectural problems.<sup>4</sup> Prefabrication not only in the sense of fabricating before but of conceiving and designing before. In the introduction of this article, I will describe Sota's critical approach from his prefabrication stand towards his contemporary conditions, to then address more particularly, how the Horpresa panels influenced his way of thinking, projecting, designing with the system from the prototype to the large scale; from the individual to the collective. Consequently, this reflection will address the relationship between technology and architectural production, between the Horpresa panel and Sota's projects, between means and ends.

Regarding his approach, Sota used prefabrication as an instrument to criticise the architectural profession for their ignorance of the new techniques, for 'taking pleasure' in false assumptions derived from old principles, in his own words: 'Beaux Arts prevents us'<sup>5</sup> or 'Architecture-Architecture'<sup>6</sup> –referred to itself. As Manuel Gallego puts it in context with his previous works, during that epoch, Sota maintained a belligerent attitude with his contemporaries in the form of approaches and projects with a destructive charge, answering to this situation.<sup>7</sup> In a conversation with Mariano Bayón in 1974, Sota claimed that he was interested in writing for builders' magazines, for constructors. This statement shows what Bayón calls his 'allergy' to architects or De la Sota's renouncement of the architects' cultural panorama. In his 'house arrest,' he refused being published in any architectural review and only read advertisements about new materials, insulations, floors...<sup>8</sup>

1 "La conciencia del retraso científico, y la consecuente frustración que dominaba a la cultura española desde principios de siglo, produjeron una intensa, apasionada, ansia de modernidad." RUIZ CABRERO, G. *El Moderno en España. Arquitectura 1948-2000*. Tanais 2001. p. 9.

2 DE LA SOTA, A. "Casa Varela en Collado Mediano (Madrid)- Horpresa" *Hogar y Arquitectura*, March-April 1967, n. 69, p. 13.

3 "En cierto modo era la alegría de creer que se había avanzado en el sistema constructivo, la ilusión de creer que se había dado un paso colectivo." GALLEGO, M. "Casa Varela, Villalba" *Seis Testimonios*. Barcelona: Colegio de Arquitectos de Cataluña, 2007. p. 35.

4 "Prefabricación, en nuestra acción, es una manera de pensar; como dicen los políticos y los poetas, un estilo de vida." DE LA SOTA, A. "Sentimiento Arquitectónico de la Prefabricación" *Arquitectura*, February 1968, n.111. p. 12.

5 "Beaux Arts nos impide" DE LA SOTA, A. "Sentimiento Arquitectónico de la Prefabricación", p. 11.

6 DE LA SOTA, A. "Por una Arquitectura Logica, 1980" Puente, M. [ed.] *Alejandro de la Sota. Escritos, Conversaciones, Conferencias*. Puente, M. [ed.] Gustavo Gili, 2002. p. 70.

7 "Creo que en aquel periodo su postura respondía también a una actitud beligerante con lo que en aquel momento estaba más de actualidad en la arquitectura. Con su arquitectura contestaba a esa situación. En cierto modo, se puede entender así la carga destructiva de sus planteamientos y proyectos respecto a la arquitectura de su época. Coincide con un momento de inflexión respecto de su obra anterior." GALLEGO, M. "Casa Varela, Villalba" p. 34.

8 "Escribiré algo en una revista de constructores, para constructores." BAYÓN, M. "Conversación con Alejandro de la Sota desde su propio arresto domiciliario" *Arquitecturas Bis*, n. 1, May 1974, pp. 25-27.

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Figure 1. Horpresa panel from the Bahia Bella house prototype. Image from *Hogar y Arquitectura*, n. 64, 1966. © Fundación Alejandro de la Sota.



- 9 VIOLLET-LE-DUC, E. *Discourses on Architecture*. London: George Allen & Unwin, 1959. p. 281.
- 10 In the previously quoted English edition (p. 319) 'composition' is translated as design. Since architecture belongs almost as much to science as to art properly so called, and as its conceptions are very largely dependent on reasoning and calculation, it must be allowed that design (French composition) is not the result of a mere process of imagination, but is subject to rules methodically applied, and that it must take account of the means of execution, which are limited. French edition *Entretiens sur l'Architecture*. Paris: Imprimerie de E. Martinet, 1872.
- 11 VIOLLET-LE-DUC, E. *Discourses on Architecture*. London: George Allen & Unwin, 1959. p. 304.
- 12 "La tecnología son los nuevos materiales y lo que con ellos puede hacerse y cómo. Los materiales son algo muy importante. Con ellos se construirá y a ellos se confía buena parte del resultado de la obra. Nuestra labor es explorar nuevos caminos, es algo obligado, casi inevitable..." DE LA SOTA, A. "Entrevista con Alejandro de la Sota" Sara de la Mata y Enrique Sobejano. *Arquitectura Española Contemporánea: Documentos, Escritos, Testimonios Inéditos*. Ángel Urrutia Núñez [ed.]. Madrid: COAM, Colegio Oficial de Arquitectos de Madrid: Universidad Autónoma de Madrid, 2002.
- 13 "El hombre construyó siempre con lo que tuvo a mano: barro, piedras, árboles, en sus primeros tiempos.

Con su imaginación inventó materiales nuevos y los usó: fundió y elaboró metales, los forjó y laminó, inventó hormigones, los pretenso, inventó estructuras y olvidó los pesados muros, soñó y alcanzó la posibilidad de cerramientos inverosímiles, muros cortina...

Claro, añadió el transporte. Lo que fabrica aquí puede usarse allá.

Los cerramientos de paneles de chapas metálicas con aislantes plásticos permiten nuevas

Sota's critique is paralleled in the Rationalist incorporation and subjection of form to 'the processes and materials employed,' in this case prefabrication, as a critique to 'the penchant we have always manifested for appearance.'<sup>9</sup> This idea underlines Viollet-le-Duc's notion of component and the building parts as a critique to the *Beaux Arts*' 'taste,' 'mere appearance,' restraining traditions and the 'absolute and limited principles of classic art,' as stated in *Entretiens*. He defines 'design' – in the original French *composition*<sup>10</sup> – as subjected 'to rules methodically applied, and that it must take account of the means of execution.'<sup>11</sup> Thus, in this sense, he defined 'design' as a scientific discipline whose principles incorporate production methods and materials, thus, merging design strategies and production techniques. This definition of design resembles Sota's 'Physical Architecture' as a consequence of the prefabricated means and materials used and his notion of 'Logical Architecture' in its methodology from the setting of a problem to its solution.

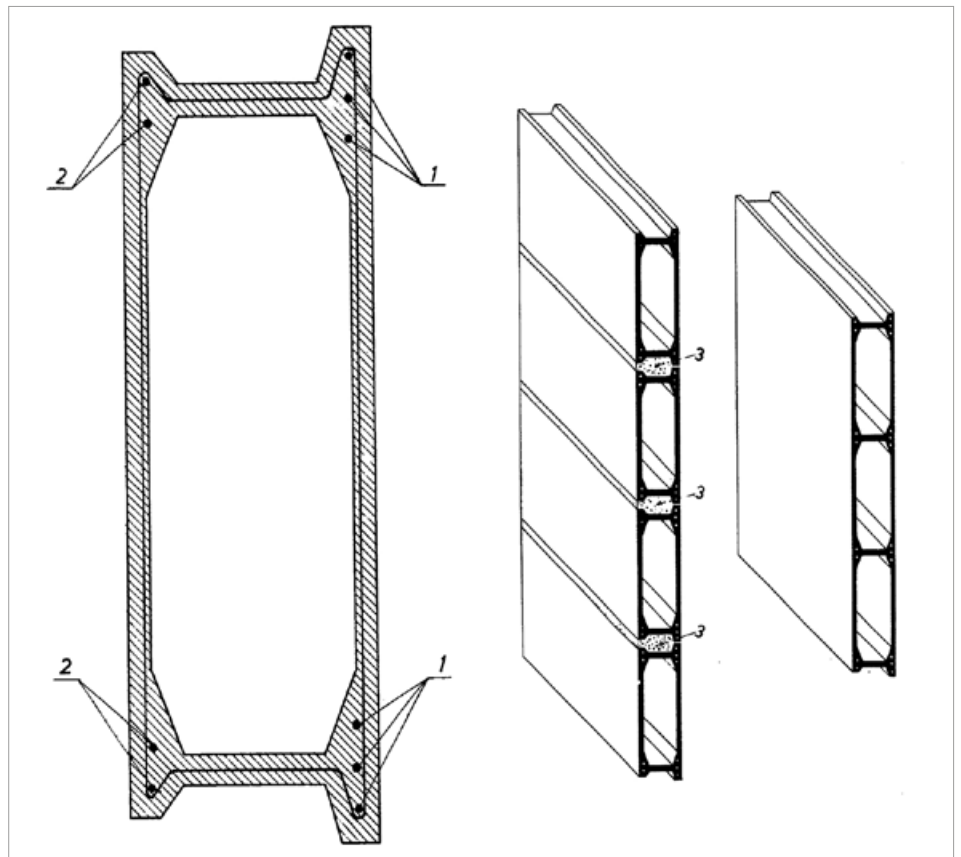
His stand on technology is therefore based on the new materials, what could be done with them and how, revealing his understanding of architecture as a material practice. He underlines the importance of the materials on which the result of the work depends. Then, the architect's inevitable duty, in Sota's words, becomes the exploration of new ways of operating with them.<sup>12</sup> Moreover, he stressed the condition of materials 'at hand' and their inventive use: 'Man always built with the materials he had 'at hand'; these materials evolved from clay and stones into lightened structures suitable to be transported. What is fabricated here can be used there. New metal sheets and plastic insulation liberated man from the great masses and the great loads.' For Sota, the architectural changes of the past were always cultural; today, they are material; thus, he claims 'only new materials enable us to do new architecture.'<sup>13</sup>

### Horpresa System: A New Materiality

An example of the incorporation of new materials in Sota's work is the use of the Horpresa system. The large-scale production or industrialization of the Horpresa panels became the raw material with which he projected his physical or new material architecture; the materials 'at hand' provided by the industry (figure 1).

New construction techniques stressed the importance of materials – the drawing of architectural forms and volutes which ignored the materials was over – and

Figure 2. Geometrical definition of the module Horpresa and panels composed by Horpresa modules with concrete joints or for walls following the concrete reinforcement. Illustrations extracted from the patent's details from espacenet and the European Patent Office.



shifted towards the assembly of parts. The Horpresa patent was claimed in Spain in 1961 and registered as FR1329898 (A)<sup>14</sup> in France in 1963. The patent for the prefabricated concrete panel was claimed by its inventor Julio Garrido and the applicant for the patent was Hormigón Pretensado S.A. It was accompanied by six illustrations and a description of the panel regarding its definition, geometry, assembly methods, manipulation, installation, catalogue of variations and economy.

From its definition, the document describes the hollowed pre-stressed concrete panel as an element for the construction of walls, slabs, facades and roofs for all categories of buildings. The geometrical definition consists of a box beam with ribbed ends in C-shape. The exterior plain faces are parallel to each other and the interior hollow has a rectangular shape with eight sides. Julio Garrido set the dimensions of the panels in a series of 16-17-18 and 20cm for the width, and for the other two dimensions: one is fixed to 43 cm, and the other – the span – is open to variation. The set of dimensions of the elements offered the possibility of variation to be adapted and assembled in various positions. Moreover, by pouring concrete in to the joints, a monolithic structure – either for a slab or a wall- could be obtained.

In terms of structural resistance, the strength of the modules is provided by the thickness of 1,5cm in the exterior faces and the 2cm thicker ribs. The steel reinforcement is located in the enlarged areas between the exterior faces and the cross ribs (figure 2). Panels are conceived as tiles of great lightness and great strength in all directions regarding manipulations and on-site installation. Maximum traction resistance is 30 kg/cm<sup>2</sup>, compression is 130 kg/m<sup>2</sup> and a permanent load of 20 kg/cm<sup>2</sup>. Regarding structural performance, the disposition of the steel rods can vary depending on the required strength: thus, eight different steel dispositions ranging from 28 to 160 mm<sup>2</sup> complete the variation of the series of 32 elements.

Due to its flexibility, working in all directions, the modules can perform as any element of the building, opening up a wide range of possibilities for its usage in the design of habitable spaces. In order to equip these spaces, the hollowed panels can house electricity and plumbing installation; these hollows can also perform as air-

soluciones. Piensa el hombre con un sentido de liberación respecto a los grandes macizos y a los grandes pesos.

Así, liberado, podría olvidarse hasta de la Arquitectura heredada.

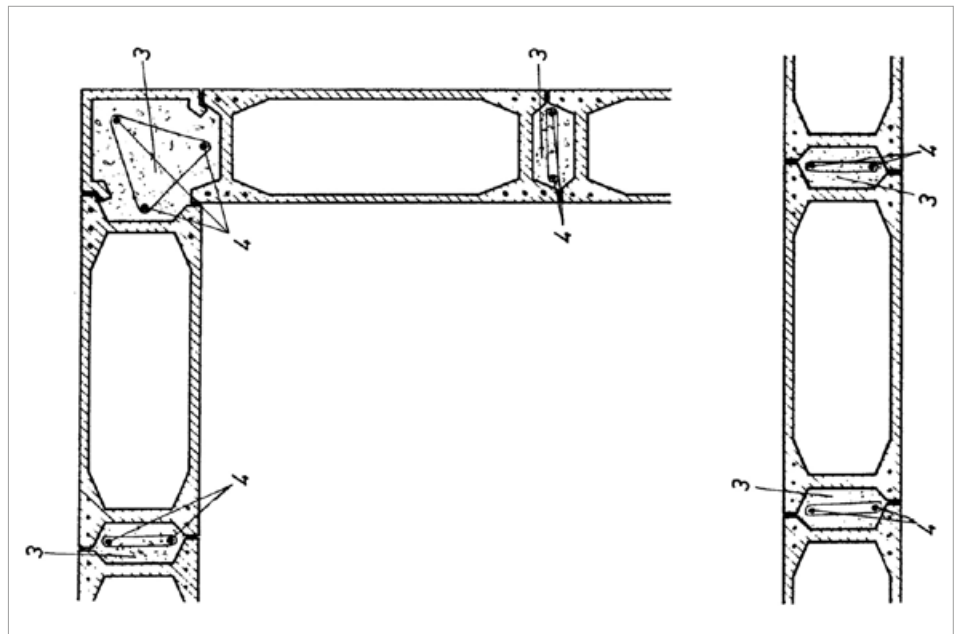
Los cambios de estilos arquitectónicos fueron siempre culturales. Hoy son materiales; únicamente los nuevos materiales nos permiten hacer nuevas arquitecturas." DE LA SOTA, A. Prologue "Nuevos materiales, nuevas arquitecturas" *Tectónica: monografías de arquitectura, tecnología y construcción*, 1996, n.1, p. 2.

<sup>14</sup> Patent Publication number: FR1329898 (A); Publication date: 1963-06-14; Inventor(s): SERRANO JULIO GARRIDO; Applicant(s): HORMIGON PRETENSADO; International Classification: E04C2/04; E04C2/04, European: E04C2/04D; Application number: FR1962090513519620726; Priority number(s): FR19620905135, 19620726 from espacenet and the European Patent Office.

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Figure 3. Horizontal section of an intersection at an angle and a wall composed by horpresa modules and reinforced poured concrete in their assembly joints. Illustration extracted from the patent's details from *espacenet* and the European Patent Office.



conditioning ducts, enhancing the environmental conditions of the space enclosed by the Horpresa modules.<sup>15</sup> The illustrations accompanying the patent show different modes of utilization and location of the module depending on the requirements: a light slab whose joints are assembled by means of concrete poured on site; intersection of the Horpresa panels by means of a pillar of reinforced concrete; a horizontal section of a wall and reinforced concrete joints (figure 3).

From an economic point of view, the system is presented as an advantageous construction element in terms of labour efficiency and easy installation due to the manoeuvrable dimensions of the components; there is no need for special transportation – a 60m<sup>2</sup> dwelling unit can fit in one transport unit. In doing so, an affordable industrial cost was achieved, due to the reduced number of pieces in relation to their different possibilities of assembly – industrial cost has repercussions on the catalogue and the size of the series and consequently, on the monotony of the final product and the combinatorial possibilities. In sum, the system's patent showed flexible structural, dimensional, economical, positional and installing operability of the components in the provision of an affordable and inhabitable environment. The Horpresa module represented the matter with which architects could elastically materialize their designs, by means of the combination of the elements. It provided Sota with a set of operational principles and dimensions to project.

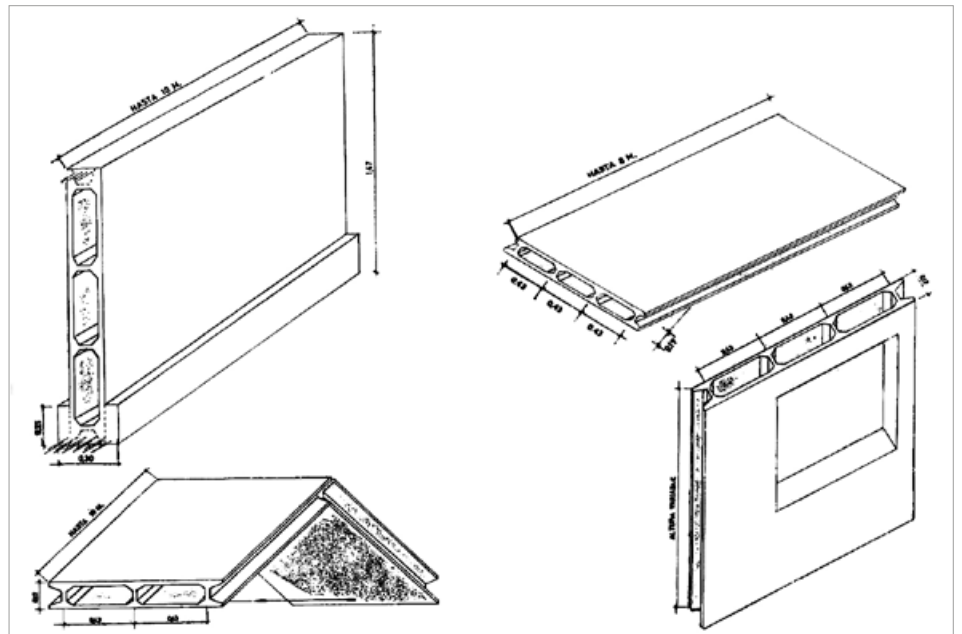
These characteristics of the Horpresa system refer to its production and assembly, but how are these combinatorial possibilities incorporated into design? What are the logics derived from it? How does the architect operate or 'think before' when projecting with this system? How does it condition design? These questions will be addressed in the next sections through the dimensioning of the architectural space in pursue of a 'logical architecture' and the notion of the catalogue as the combination of materials in the fabrication of 'physical architecture.'

### Logical Architecture: Crystalline Patterns

The dimensions that are reflected in this image (figure 4) are critical in the use of the panel in Sota's projects. The industrialization of construction components entails a modular coordination that conditions the architectural design and product. In the Varela house, the foundations (garage and storage) were built on site and made of stone masonry walls. Similar to the Miraflores project, in collaboration with Corrales and Molezun, this base contrasts with the upper level of the house which is built with off-site light prefabricated materials: horpresa (slabs, exterior walls and roof)

<sup>15</sup> The thermal resistance is equivalent to a half foot brick wall, it can be enlarged by adding a wall with some space in between for insulation. Data extracted from Garrido's article published in *Hogar y Arquitectura*, May-June 1966, n.64. p. 43.

Figure 4. Dimensions of prefabricated panels according to the Horpresa patent from Julio Garrido's article published in *Hogar y Arquitectura*, 1966, n.64. © Fundación Alejandro de la Sota.



and tafisa, tablex, novopanel and fibropanel (for interior divisions and insulation). These panels modulate the structural framework, inner walls and cladding.

The foundations are divided in 4 spans by 6m beams: one of 2.75m for the entrance and storage and 3 of approximately 5m for the house. These modulations continue through the slab and roof (figures 5, 7) building a grid on which the house distribution is organised (figure 6). Added to the structural framework, the facades are modulated in the plan by the number of Horpresa panels they contain. In the interior, the cladding joints are materialized by means of brass profiles and construct a grid that reads the standard dimensions of the wooden fibreboard panels. In essence, the Varela house becomes a test-bed where de la Sota operates within a spatial pattern derived from the horpresa module where combinatorial assemblies take place.

'It is graph paper! And of course here there is everything,'<sup>16</sup> says Bayón. This graph paper contains everything – structural plans, prefabricated walls, even installations – and it reflects the new modes of projecting with the system. The gridded paper is the instrument with which the system lays down the guidelines or norms for the production of architecture. Since it is a prefabricated system, everything is ruled according to its dimensions and unified under the systemic laws. According to Bayón, de la Sota used to tell them that 'there are some form of crystalline meshes that are not visible and architecture reveals them.' He describes these meshes as a stereotomy – the geometry of cutting and assembling stones – inherent to space and the role of the architect is to unveil them; the role of architecture is to actualize them through the crystallographic twinings or macles.

The graph paper is also one of the initial steps in the design of dwellings in Alcudia or in Bahía Bella, as it can be seen in Sota's hand sketch (figure 9). Here, as in the Varela house, the logics of architecture from the setting of the problem of the collective dwelling are defined by the horpresa system. These modular crystals develop under systemic organizing rhythms, graticules, or grids providing with complete solutions: everything is contained in the panel system. Sota's graph paper shows not only the way he operates with the repeated components but also his spatial conception and architecture's role within his notion of 'logical architecture.'

### 'Physical Architecture:' Design as Combination from a Catalogue

Garrido departed from a finite and determined number of types to be produced in great series and assembled as an open system. He claimed that within the complex industrial process, the climax was in the assembly,<sup>17</sup> which deeply

16 BAYÓN, M. Interview with Clara Olóriz in his studio, Madrid 23rd April 2009.

17 In his article about 'metaphysical speculations and architecture' he stated that matter could be cut so that by regathering the pieces, we could build universes with all and no dimensions, i.e. finite spaces can be constructed within an infinite space, and at the same time, they can contain it. He concluded that by learning from matter's stereotomy, the immaterial can be achieved, the burden of the gravity can disappear and gives place, instead, to the transfinite. GARRIDO, J. "Las especulaciones metafísicas y la Arquitectura" *Arquitectura*, February 1968, n.111. p. 14.

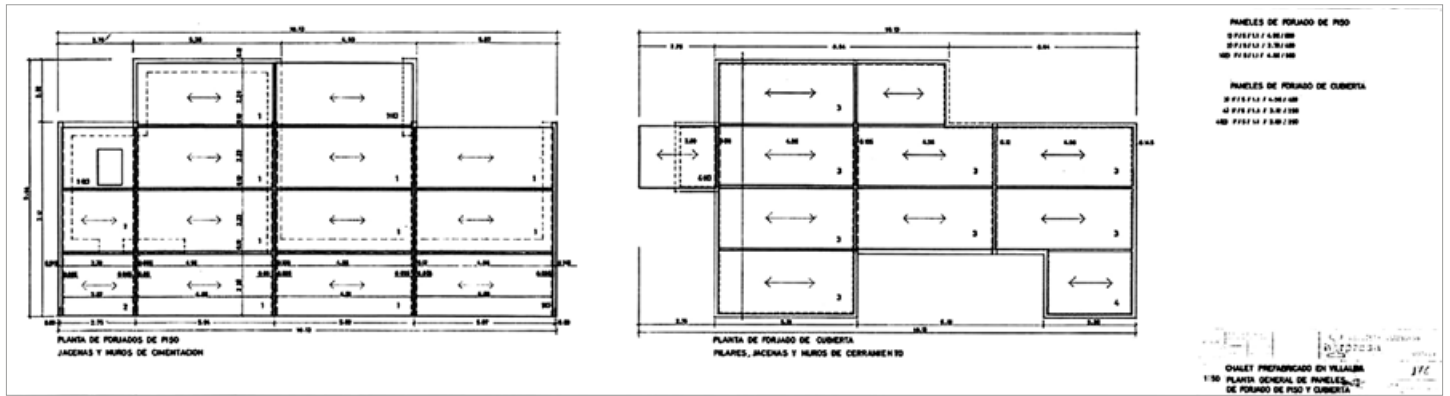


Figure 5. Slab panels of Varela house. Image from © Fundación Alejandro de la Sota.

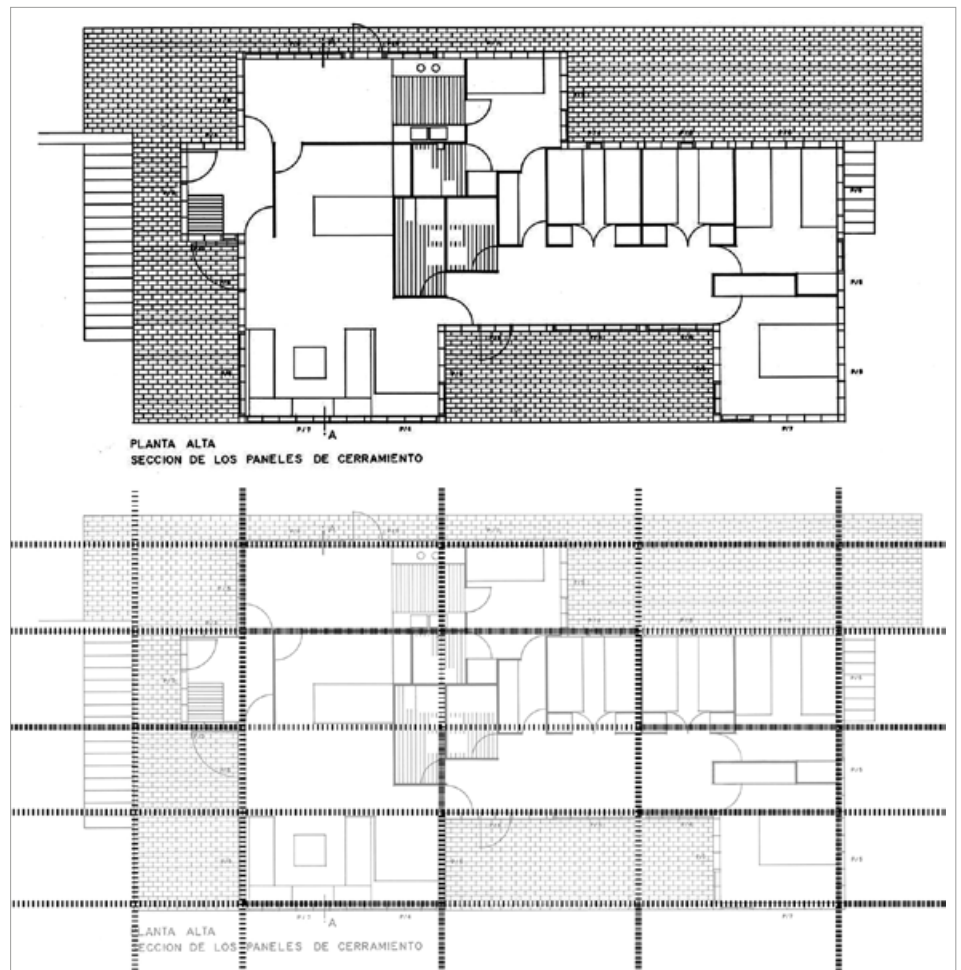


Figure 6. Varela House Plan showing number of façade panels. Image from © Fundación Alejandro de la Sota. Second image grid created by the author of the article.

18 WACHSMANN, K. *The Turning Point of Building: Structure and Design*. New York: Reinhold Publishing Corporation, 1961. p. 11.

19 During the 1950s and 60s, these principles gave birth to clip-on architecture such as Cedric Price's Fun Palace, based on structures that provided space for installations and by means of mechanical connections and erection crews housed the flexible prefabricated spatial units to fit different uses. These studies on off-site built components, plug-in architecture and clip-on elements were inherited by the Archigram group that developed a body of theories and projects that were published in their magazine.

20 DE LA SOTA, A. "Conjunto residencial para vacaciones (1480 viviendas y apartamentos) en la Manga del Mar Menor (Murcia). Proyectado en su totalidad con el sistema 'Horpresa.'" *Hogar y Arquitectura*, May-June 1966, n.45. p.45.

determined on the one hand design processes and on the other hand, the product or architectural spaces. Similarly, Wachsmann states 'building becomes assembly,'<sup>18</sup> due to industrialization techniques. He stresses the fact that due to industrialization techniques the process of building was envisaged as an erection crew, and carpenters or steel makers would be substituted by universal erectors.<sup>19</sup>

In the same way, Sota posed the question as the elimination of the mason's work considered as an 'alien element.'<sup>20</sup> The following images (figure 10) reflect the on-site assembly of the Horpresa panels in which 'dry' or 'physical' architecture consisted of the assembly of a set of ready-made components piled up on the construction site by means of a crane; showing a new construction operability. Architectural modes of operation shifted to the project of the system: producing, joining, connecting, assembling and linking according to the system's set of rules. On the grid provided by the previously analysed spatial patterns, the assembly of the components was translated into design strategies and the final product into the emphasis on the combinations and relations between the different parts.

This material condition led Sota to think about architecture as 'physical architecture' in opposition to 'humid' or 'chemical architecture.' Industry provided

Figure 7. Varela House Slab Panels. Image from © Fundación Alejandro de la Sota.

This microscopic experience is translated into the larger scale of the Colegio-Residencia Orense as a ruled graph paper. In an interview with Mariano Bayón, he recalled de la Sota being very worried because he had been working on this project for three years, the client was coming to visit him, and he had only one plan (figure 8).

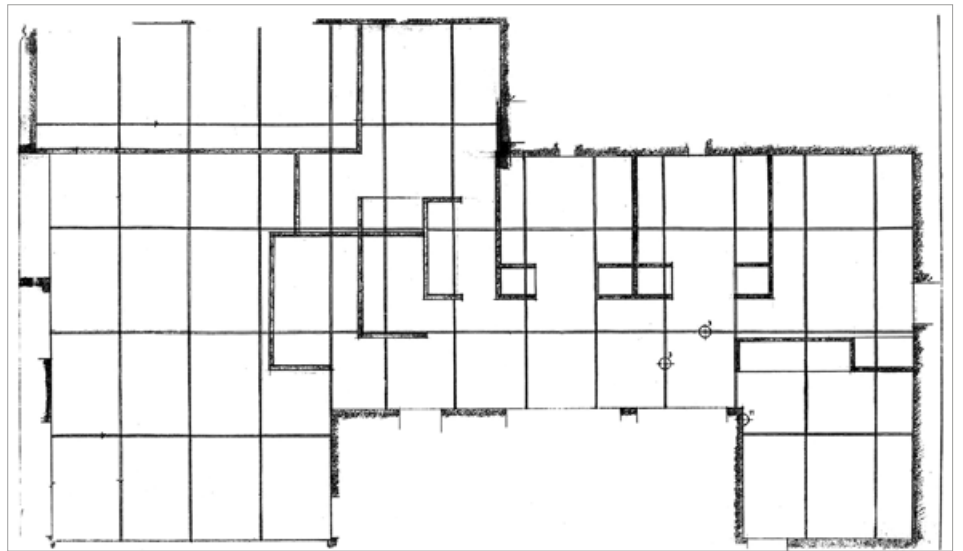
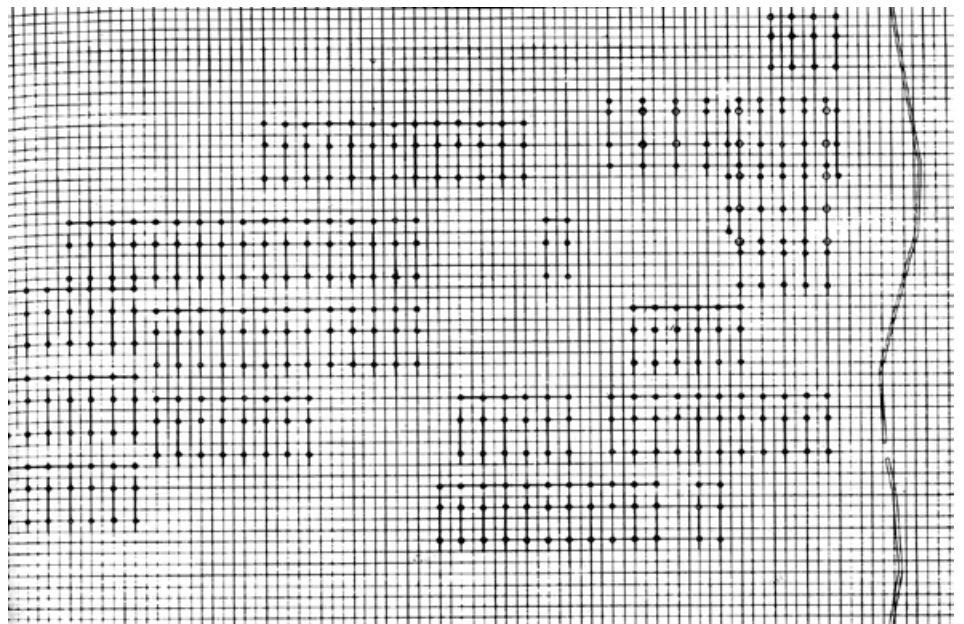


Figure 8. Colegio-Residencia Orense. “Sentimiento arquitectónico de la prefabricación,” *Arquitectura* 111, February 1968. © Fundación Alejandro de la Sota.



architects with a set of material components to be assembled both in terms of dry construction and in terms of design. In ‘chemical’ architecture, the combination of different materials and concepts produces a third compound, different from its components. As a counterargument, ‘physical architecture’<sup>21</sup> materializes the assembly of different parts obtaining a third one which contains the properties of its components plus new ones resulting from the assemblage.

‘Physical architecture’ stretched the qualities of raw materials – also considering as raw materials ‘ready-made’ components ‘at hand’–, dry construction and assembly strategies.<sup>22</sup> Form was then determined by the juxtaposition of the materials, by the linkage of the components enhanced by the use of the new prefabricated techniques and assembly methods of mounting and dismounting. Thus, Sota’s physical notion of architecture was intimately related to industrialized techniques and the use of components ‘at hand’ selected from catalogues, placing ‘cleanly’ the new materials provided by the industry.

One of the mediums through which the industry puts elements at architects’ service is the catalogue. It performs as a device that materializes the linkage between architects and industry. It reflects the transformation in their modes of operation by putting ‘at hand’ the series of dimensionally coordinated modular components. This device shifted the practice of architecture towards the act of projecting with this set of available parts. The idea of ordering parts from a catalogue spurred the conception of design and construction as the assemblage of combinable off-the-

21 “Arquitectura que yo a mi manera llamé ‘física’ entendiendo esta cualidad como la unión de elementos distintos para que juntos se obtenga un tercero nuevo que, sin perder ninguna de las propiedades de los que se habían unido, tenga unas absolutamente nuevas. Al contrario de la arquitectura ‘química’ que usando materiales y conceptos distintos forma un tercero único, lejos de cualquiera de los que lo formaron.” DE LA SOTA, A. *Alejandro de la Sota. Arquitecto*. Madrid: Ediciones Pronaos, 1989. p. 16.

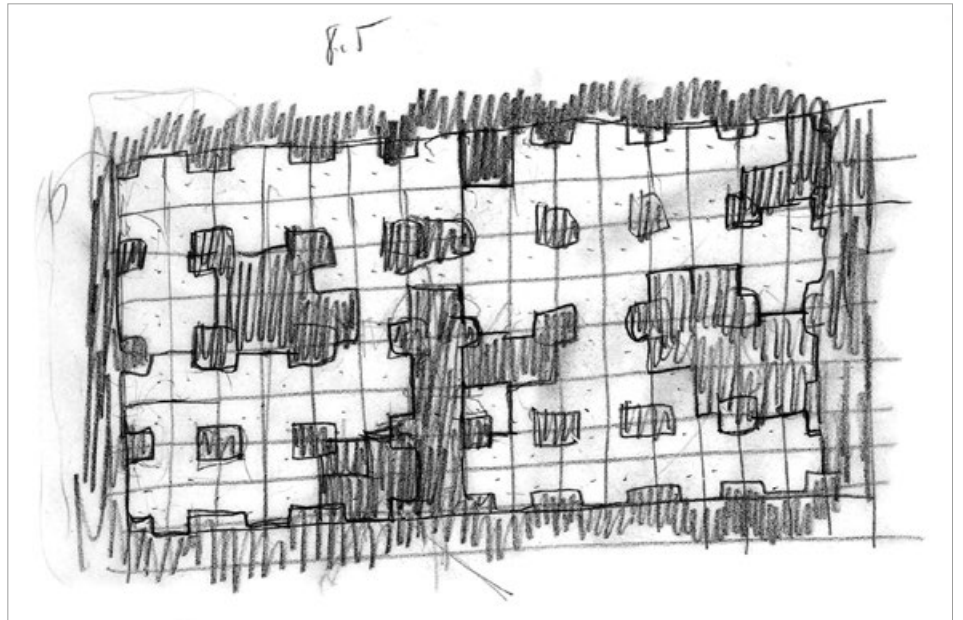
22 As Manuel Gallego, one of his disciples who worked on the Varela house project stated: “En el proyecto de Cumial, el Colegio residencia para la Caja de Ahorros provincial de Orense (1967), realiza bloques esquemáticos, económicos en su forma. En él se pone de manifiesto la obsesión por la construcción en seco, el montaje, el gusto por lo físico, por la arquitectura física.” GALLEGO, M. “Casa Varela, Villalba” p. 38.



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Figure 9. Sketches showing the principles guiding the patterns of arrangement in the project in Bahía Bella, Murcia. Image from © Fundación Alejandro de la Sota.



rack coordinated parts. The architects' agency was then utterly shifted. Examples of this new operability of the catalogue are Le Corbusier's *Pavillon de L'Esprit Nouveau*, which according to Reyner Banham anticipated the exercise of 'creative choice,' 'being furnished and equipped from manufacturers' catalogues' or the Eames' Case Study n.8, composed of off-the-shelf elements ordered from catalogues. According to Stirling, they were 'selected from trade catalogues of industries not usually interested in housing, such as marine and aircraft fittings and factory building units.'

23 DE LA SOTA, A. *Alejandro de la Sota. Arquitecto*. p. 110.

24 "Todo sorprende por lo inesperado, una sensación provocada al darle la vuelta a las cosas y subvertir casi todos los elementos de la construcción de la casa, al descubrir nuevos modos de hacer y nuevos usos de los materiales [...] todo ello montado con una muy simple perfilería plegada de latón, una especie de bricolaje con elementos industriales." GALLIGO, M. "La Casa Varela" p. 311.

Also Llinás, who in collaboration with De la Sota restored his building for the Civil Government of Tarragona, described De la Sota's transgression of stereotypes as the 'recovering' of metal sheets, preformed materials, screws and rivets from industrial manufacturing to make them manifest in his buildings as an architecture of his time, as an alternative to architectural stereotypes' subjugation. The use of materials 'at hand,' available from industry, was proposed as an alternative to 'humid' architecture.

En suma, rescatar de los polígonos industriales chapas, materiales preformados, tornillos y remaches para disponerlos a la vista en sus edificios es un acuerdo positivo con los postulados de la mejor arquitectura de su tiempo, pero también es una alternativa personal al sometimiento a los estereotipos de la arquitectura, encarnados probablemente en la arquitectura húmeda: es el "hacer arquitectura sin hacerla." LLINÁS, J. "Arquitectura sin Trabajo" *Alejandro de la Sota*. Barcelona: Fundación Caja de Arquitectos, 2009. p. 14.

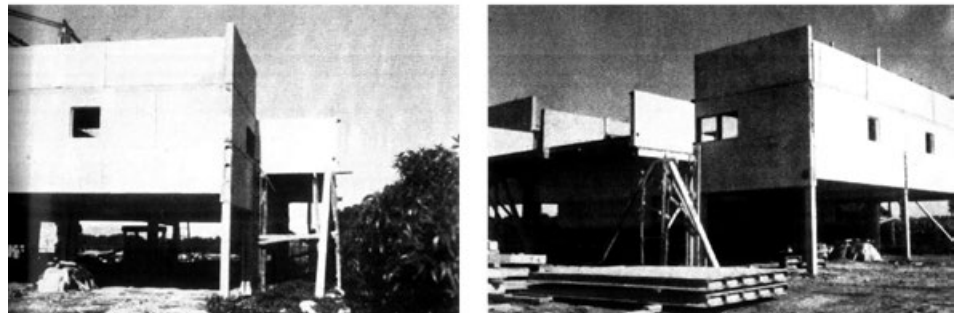
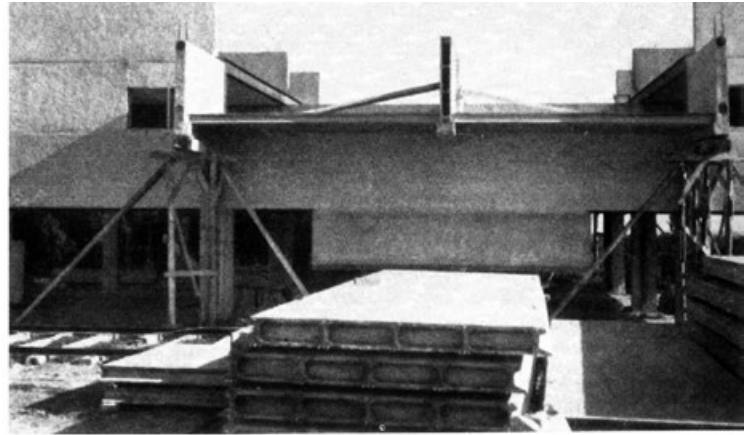
25 DE LA SOTA, A. "Mensaje a los Recién Titulados" *Método* 119 Promoción de la Escuela de Arquitectura de Madrid, p. 6-10.

Sota, in his conception of building as an assembly of what he had 'at hand' from construction and external industries' catalogues, borrowed windows, locks, doors and details from the railway and bus industry in the Varela house.<sup>23</sup> His disciple Manuel Gallego brilliantly describes his subversion in his description of the Varela house, in relation to his tendency and lack of prejudices towards the use of components from external industries. As he puts it, it consisted of 'some sort of *bricolage* with industrial elements:' 'everything is surprising, shocking when he turns upside down and subverts almost every constructive element in the house, when he discovers new ways of doing and using the materials.'<sup>24</sup>

Industries' catalogues made possible Sota's 'physical architecture' and the shift towards a new materiality. According to Sota, the copious information related to covering and enclosing construction systems that arrives in our hands everyday, gives us an idea of how much is already resolved commercially and how much these systems evolve; with a choice, with a purchase, we would have solved it, we are intermediaries.<sup>25</sup> Thus, paralleling Banham's concept of 'design by choice.'

In the Varela house, a great variety of different components come from different systems, industries and catalogues to provide flexibility and openness in a constructive, spatial or programmatic sense but also in its domesticity. The assembly of the panels allows a flexible distribution of the house for a very numerous family: 115 sqm held 14 people. It is distributed in three bands: the common spaces (living room and dining room closer to the main entrance), service core (kitchen and bathrooms) and the rooms in L shape. A service room and entrance is located on the back connected to the kitchen. Two terraces provide an elevated open space to enjoy the landscape views. The use of prefabricated molecules – from the assembly of various Horpresa components – and prefabricated inner panels, enclosed the spaces, allowing a flexible and extensible distribution of the uses. The corridor that connects the rooms, rather than circulation, becomes a multi-purpose space for various family activities, as can be seen in the plan, modulated by the Horpresa rhythm.

Figure 10. Horpresa panels laid on the construction site, Bahia Bella. Hogar y Arquitectura n.64, May-June 1966. © Fundación Alejandro de la Sota.



The detailing and openings of the windows allowed the creation of multiple ambiances and relationships with the surrounding landscape.<sup>26</sup> Tafisa panels were used for the insulation and finishes of the house and to make, cosier and warmer ambiances. The compactness, as Gallego describes, of the 14 beds accommodated in the bedrooms and the services core, contrasts with the openness of the common spaces and their continuation in the open terraces. It responds to the needs of the inhabitants in a new open and flexible way of conceiving common space, suggesting a new form of inhabitation. These ideas hint towards the possibility of addressing collective needs with a similar solution, as the prefabrication of ideas or the aforementioned 'to fabricate before/ to think before' which was reflected in the projects in Orense, Murcia and Málaga.

Thus, from the geometrical definition and the behaviour regarding forces and tensions to the programmatic adaptation, the Horpresa system becomes the infinite, open, comprehensive and unitary whole which gives order to the coordination and relation of the panels, as an organizing principle. As the report for Bahia Bella reads, it is a project developed from the basis of the Horpresa panel. Sota 'projects with the system.'<sup>27</sup> The operability of the production systems opened up a whole new range of syntax and different arrangements of the prefabricated components. Against some of his contemporaries who regarded these systems as restricting the freedom of the designer or the user, for Sota, construction systems triggered a new potential logic for assembly, acting as a liberating rather than a restraining force.

### From the Microscopic to the Larger Scale

At a larger scale, in the tourist complex of Bahia Bella, the serial spaces determined a modular volumetric arrangement in various levels producing multiple repeatable typologies. Throughout the different scales, from the position of the panels, the on-site assembly, the origination of spatial volumes, the distribution of the construction unit, to dwelling typologies or collective patterns, the Horpresa system determined the tactical strategies in the organizing principles, from material tension to spatial relations and programmatic spaces. The modular assembly principles were translated from the scale of the panels to the housing units, to the urban complex

26 Details about these ambiances, the use of elements borrowed from other industries can be seen in *Alejandro de la Sota* by Abalos, Llinas and Puente or in the Alejandro de la Sota's digital archive.

27 GALLEGO, M. "Casa Varela, Villaalba" p. 36.

## CLARA OLÓRIZ SANJUÁN

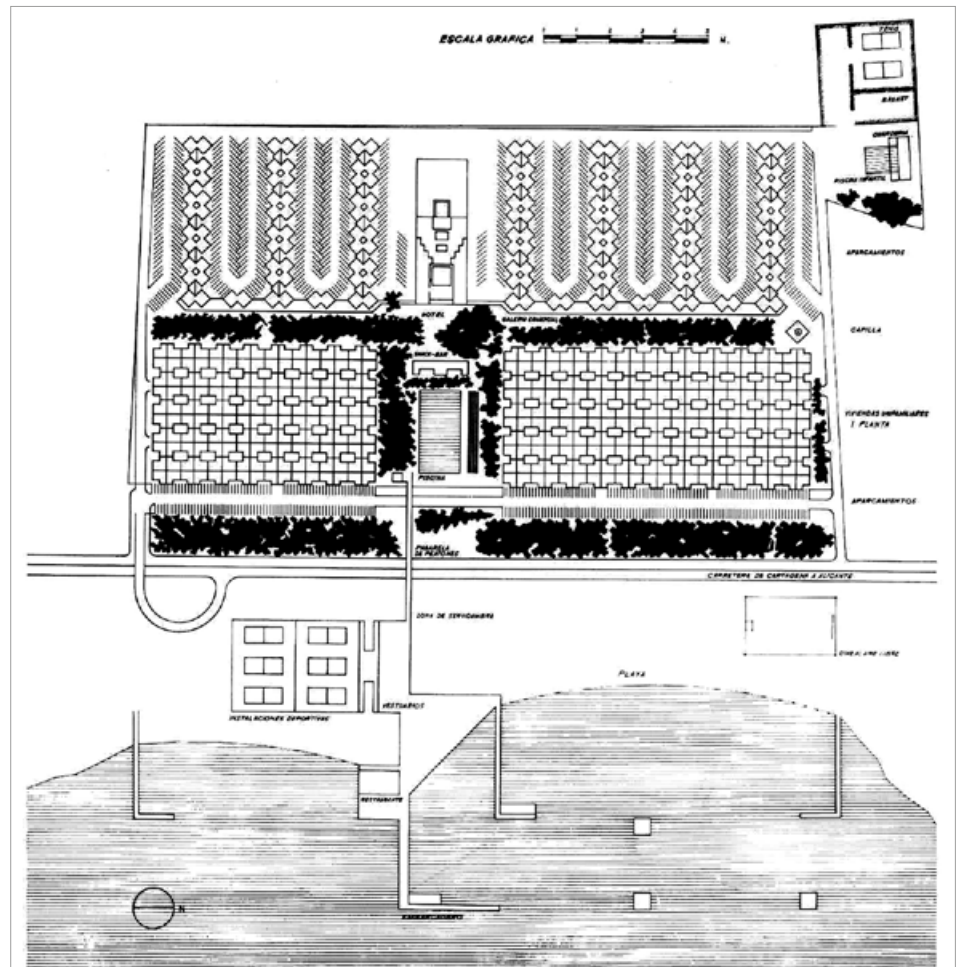
A Prototype towards a Physical  
and Logical Architecture: Varela  
House

Figure 11. Overall plan Bahía Bella from *Hogar y Arquitectura* n. 64, 1966. © Fundación Alejandro de la Sota.

in the larger scale. Here, the combinatory possibilities of physical architecture in the Varela house become assembly and spatial patterns at the collective scale.

As it can be seen in the plan (figure 11) for the touristic complex, the grouping of the individual house typology in the areas closer to the sea constructs a spatial complex or grid whose cells are revealed by the aggregation of the housing units and their alternation with the open spaces and common patios. The addition of the towers on the back materializes a larger structure, containing several typologies depending on the family sizes (figure 12). At the same time, both typologies, house and flat, similar to the Varela prototype are modulated through the horpresa panel as shown in their slab plans (figure 13).

### A New Operability: 'Means and Ends are the Same Thing'

These design strategies determined by production systems are named according to Alan Colquhoun as 'to project' in relation to rationalist design strategies and to differentiate them from academicist methods of composition. The latter are linked to the method 'to compose' and the former 'to project,' as Colquhoun names it referring to Italian words due to its absence in the 'Anglo-Saxon' countries, *composizione/progettazione*. Analogously, in Spanish the same distinction is made between *proyectar* and *componer*. This parallel echoes the ideas gathered at the beginning of this article: Sota's critical stance towards Beaux Arts and his common approach towards materials and techniques with Viollet-le-Duc. According to Colquhoun, this distinction proceeds from Classical composition's 'notion of arranging the parts of architecture like elements in a syntax, and according to certain a priori rules to form a whole'<sup>28</sup> and the Romantics' 'concern for the processes of generation, growth, and development' determined by production rules. Sota's projects consist of the assembly of components according to laws established by a broader or

28 COLQUHOUN, A. "Composition versus the Project" *Collected Essays in Architectural Criticism*. London: Black Dog, 2009. p. 181.



Figure 12. Plans showing the different arrangements and possible distributions in the apartment towers. *Hogar y Arquitectura* 1966, n. 64. © Fundación Alejandro de la Sota.

rather infinite Hopresa system to which they belong. If composition is the result of academic methods, the system becomes the product of rationalist design, thus as Colquhoun suggests: ‘the building as system,’ as opposed to the academic building as composition.

The Varela house becomes a prototype about a new architectural operability at a larger or collective scale: how to design for the masses with an industrial system. As it is reflected in the Orense plan (figure 14), the Hopresa panels are combined in a grid determined by the dimensions of the system. On that crystalline pattern, the combination of open spaces and built components produces a spatial arrangement or rhythm that is repeatable and infinite and that follows the rules dictated by the system, providing industrial efficiency and economy.

The images from the previous sections have reflected on (1) the industrial production of material components (2) the crystalline patterns conditioned by the system’s dimensions or projecting with graph paper, (3) the assembly and combination of the components according to the system’s rules and (4) how those production dynamics are translated into design through various scales from the individual to the collective. This operative framework brings closer not only design, production and assembly tactics but also processes of production and product, dissolving their boundaries under the umbrella of ‘production systems.’ De la Sota described the tourist complex in Murcia as ‘naturally’ –in the architect’s words – influenced by the system, because for Sota: means and ends are always the same thing.<sup>29</sup> The prefabricated system, constituting the means of design and production process and the end product, the building complex, are the same thing. Consequently, the product is the system, thus, the building becomes the system and, moreover, the emphasis shifts from the end product to the process or the means; building becomes assembly and the product becomes process. The hopresa system

29 “La prefabricación de Hopresa fue la base para pensar. Influyo, naturalmente, en el proyecto: medios y fin son siempre la misma cosa.” DE LA SOTA, A. “Conjunto residencial para vacaciones (1480 viviendas y apartamentos) en la Manga del Mar Menor (Murcia). Proyectado en su totalidad con el sistema ‘Hopresa.’” *Hogar y Arquitectura*, May-June 1966, n.45. p. 45.

### Estructura planta tipo

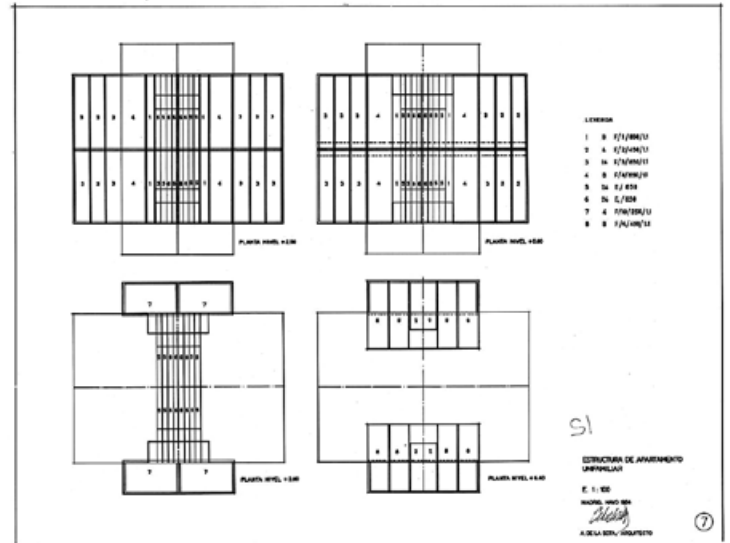
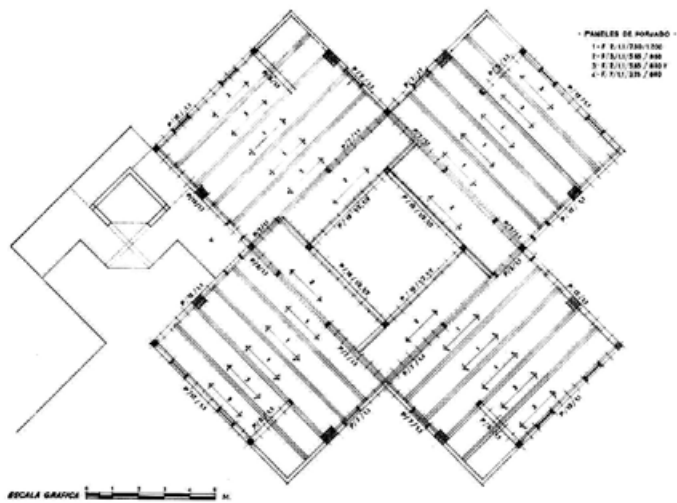


Figure 13. Slab plans for the tower *Hogar y Arquitectura* n. 64, 1966. Individual house slab from Alejandro de la Sota archive online. © Fundación Alejandro de la Sota.

determines the relations and arrangements between the spatial entities of a unit or a complex across scales, shifting the emphasis on external form or academic appearance to the stress on relationships and processes.

The notion of a Physical and Logical Architecture, in De la Sota terms, made possible by the development of an aggregative and modular prototype suggests the possibility of a multi-scalar design method. The logic and the physics of this component, extracted by industrialisation systems, allows the extrapolation of its architectural principles into the collective form, as tested in de la Sota projects. This prototypical solution and approach remained a challenge for Sota and his contemporaries, as they faced housing shortage. Sota's definition of prefabrication, quoted at the beginning of this essay, can be turned into a question which is still relevant in today's complex urban conditions and prototypical approaches: can a prototype, that is conceived and designed here, be used there? Can design strategies be prefabricated?

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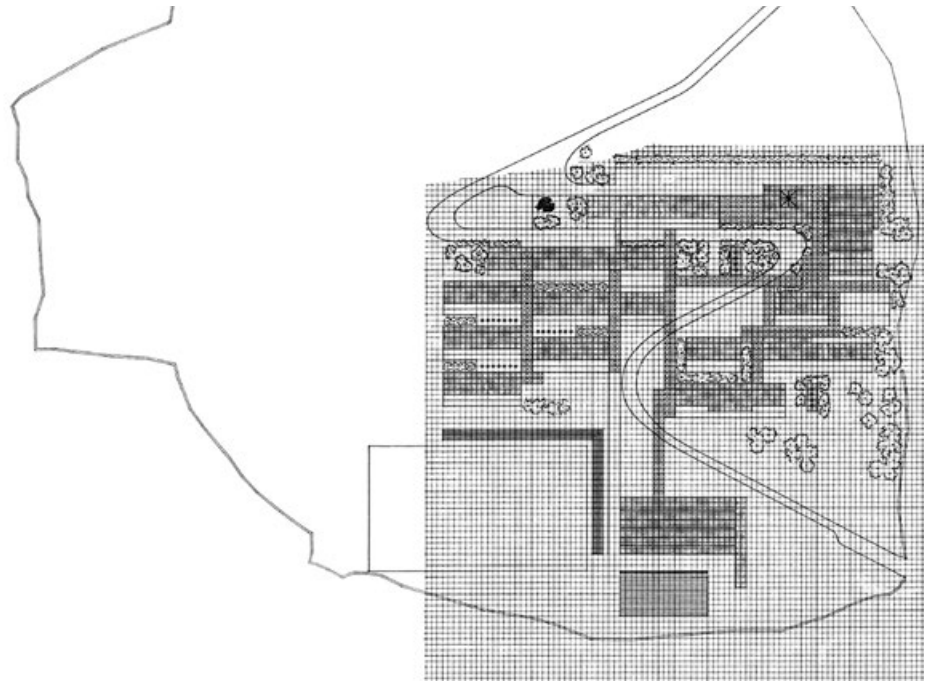
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Figure 14. Colegio-Residencia Orense Plan. ©  
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