



PRENOVA

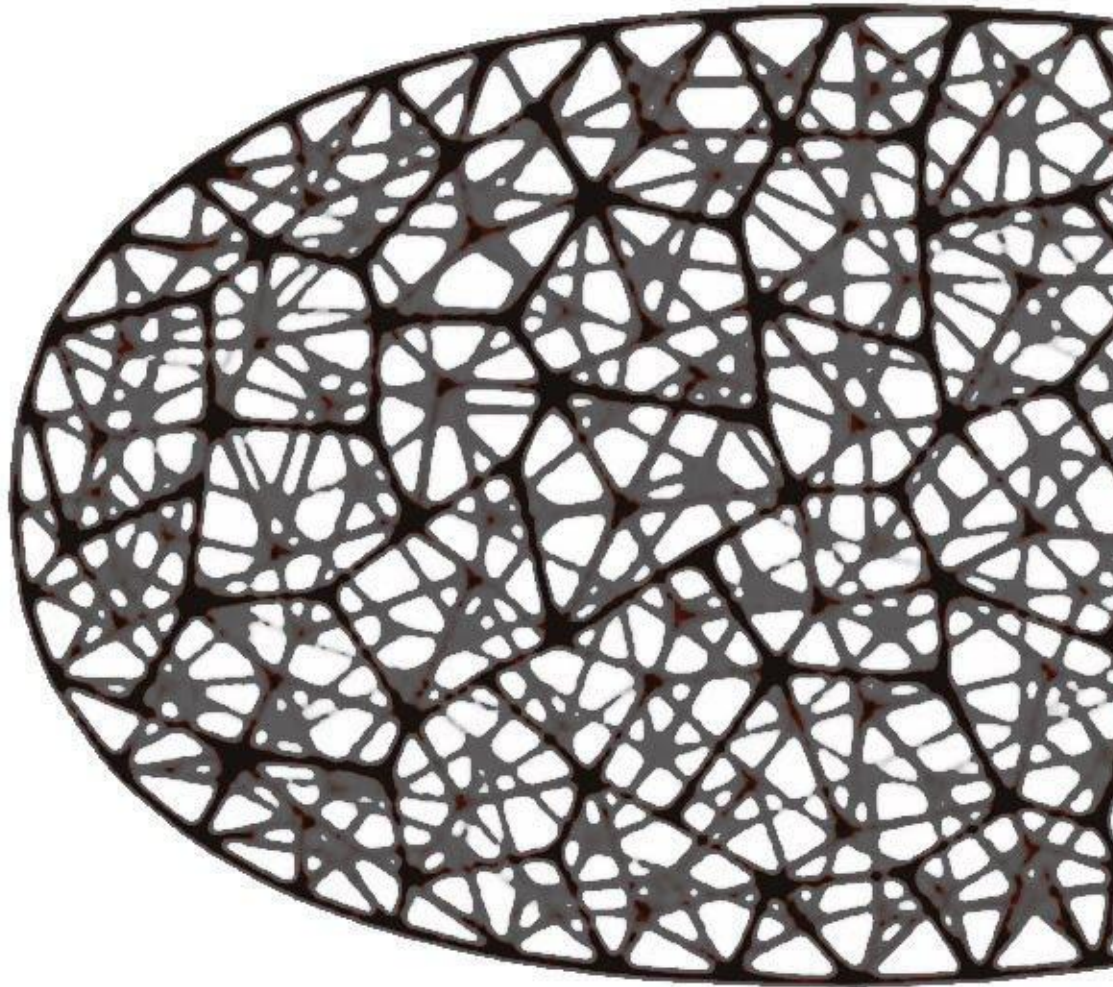
Sustainable Building Systems

1,000,000 m² built

10,000,000 recycled plastic discs and spheres produced

2024

ORIGIN



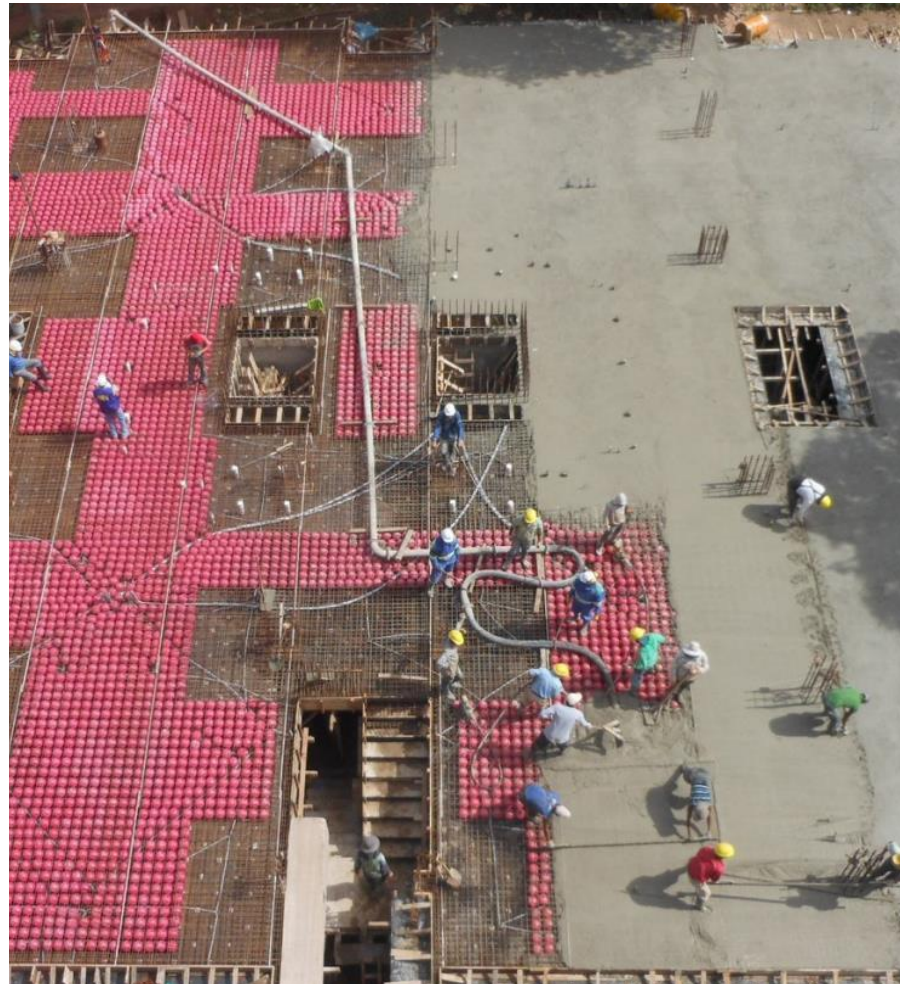
During 40 years Ricardo Levinton, an Argentinean architect, studied structural systems found in nature with a particular interest in the structure and composition of bones and skeletons which contain air in their interior.

After several years of research, Ricardo Levinton was able to reproduce these systems and managed to apply them in contemporary construction methods.

With this idea PRENOVA was created, on the basis of technology and innovation applied to architecture, designing and building lightweight and sustainable structures without beams.

ORIGIN

In the analogy between the cut of the **femur bone** and a **lightened Prenova slab**, solid areas are observed where cutting and punching strain appear and lightened areas where flexural strain are present.



SUSTAINABILITY

- **Saving up 30% concrete consumption and 20% steel consumption**

- **Better structural performance in a seismic area**

A Prenova building weighs less than a traditional one. Due to the reduction in the slab weight, it increases its efficiency.

- **Reduces CO2 emissions.**

Every 10 000 built m², 1000 m³ concrete are saved, which means that 220 tons of CO2 emissions are reduced from our atmosphere.

- **Spheres and discs are made out of recycled material**

This material is made out of waste that pollutes our environment. It is recycled to produce the spheres and discs which are then left inside the concrete slab.



METHODOLOGY

ARCHITECTURE

Flexibility

Large areas without beams

Ample cantilevering

Helps a better building design



ENGINEERING

Structural solutions

Efficiency in the different stages of a building construction

Reduction in the construction time

Cost savings

PRENOVA ONE



Thames 1380 School, Buenos Aires . Year 1981

PRENOVA ONE



O'Higgins 3401 School, Buenos Aires . Year 1981

PRENOVA TWO

ARGENTINA



PRENOVA TWO



Prision Melchor Romero, Provincia de Buenos Aires

PRENOVA TWO



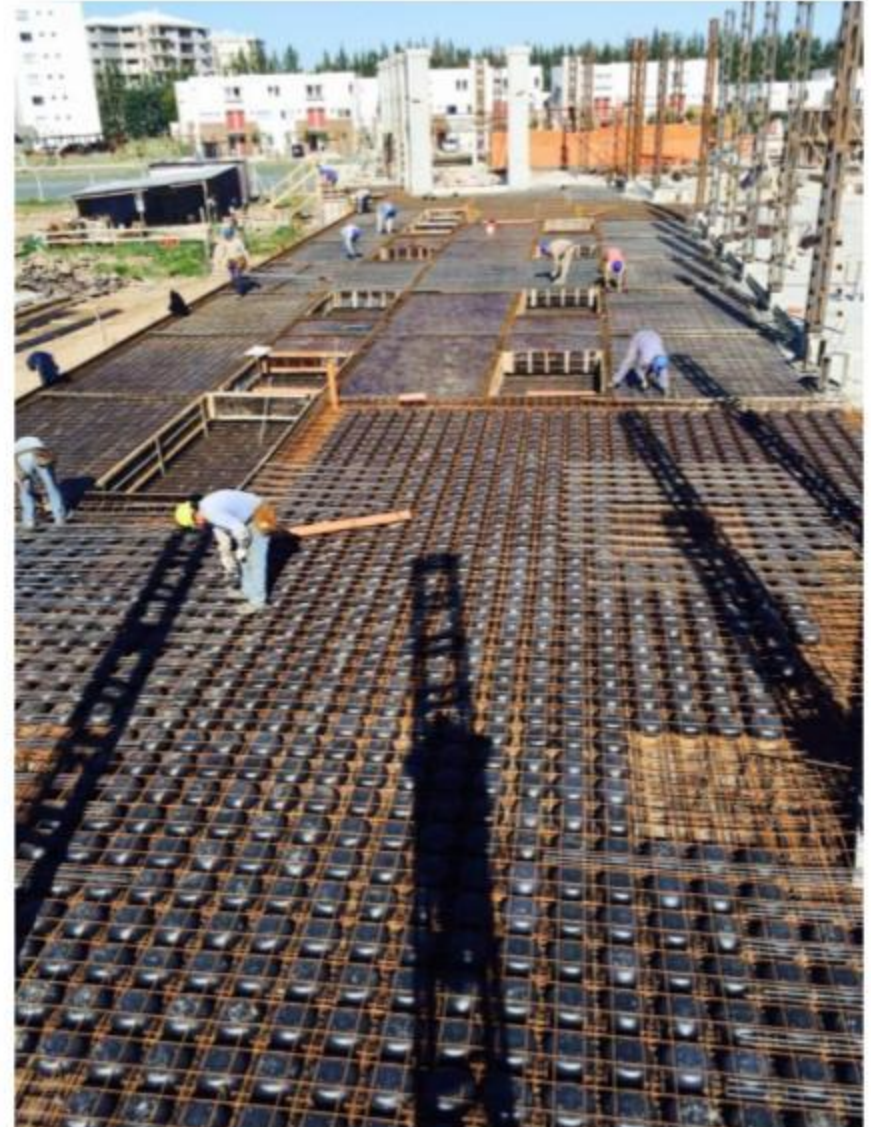
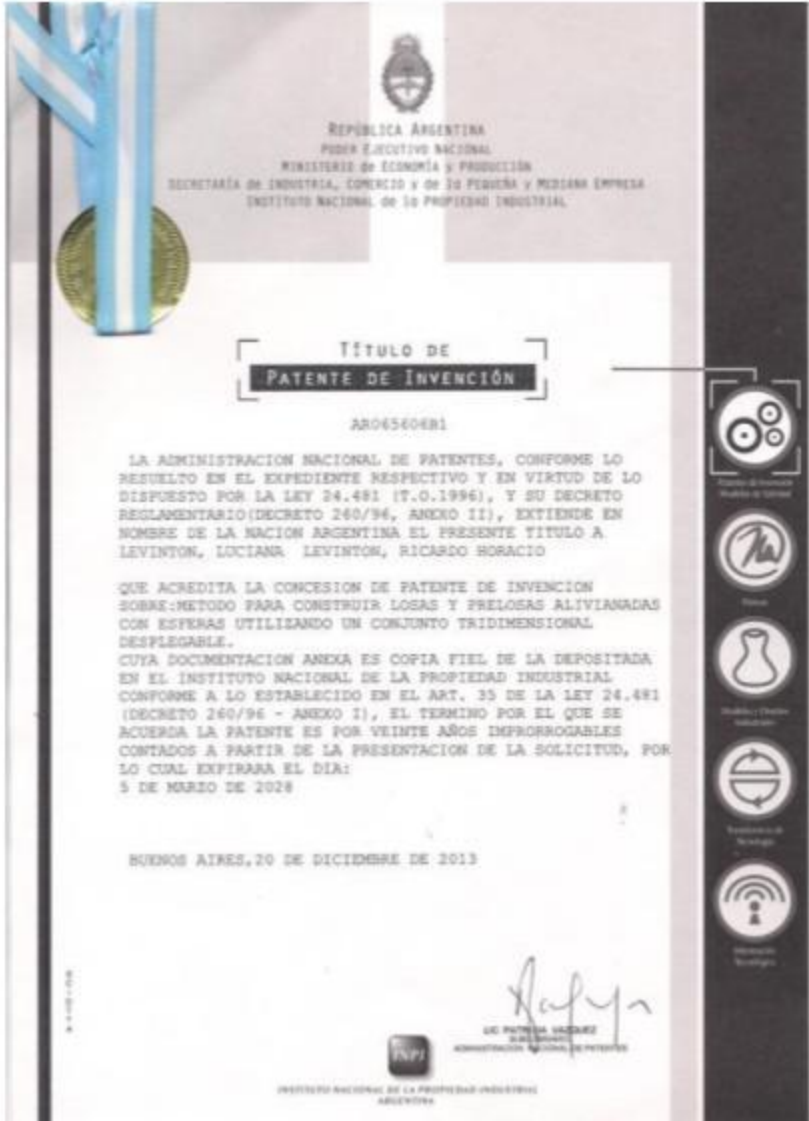
CARDBOARD CASSETTE



Torre Banco Galicia, CABA

PRENOVA THREE

ARGENTINA



PRENOVA THREE

EUROPE

WIPO PATENTSCOPE

World Intellectual Property Organization

1. (WO/2010/087) WEIGHT-REDUCING DISCS, SPECIALLY DESIGNED WEBS AND THE METHOD THAT INCLUDES THE AFORESAID FOR PRODUCING WEIGHT-REDUCED STRUCTURES SUCH AS SLABS, PRE-CAST, FLOORS, PARTITIONS AND BEAMS.

Fecha de publicación: 10/02/2010 N° de la solicitud internacional: PCT/CL2010/00006
 Fecha de presentación de la solicitud internacional: 10/08/2010
 N°: EP08 032 029 (E), EP08 238 029 (E), EP08 894 029 (E)

Solicitantes: LEVINTON, Ricardo Marcelo (PI/AR) (AR)
 Representado por: LEVINTON, Ricardo Marcelo (AR)
 Representado por: PATENTSCOPE, S.A. (AR) (AR) Avenida Pizarro 2425 Dpto. 300 Código Postal 7100114 Providencia (CL)

Fecha de prioridad: 2008/04/09 29-03-2009 AR

Título: (EN) WEIGHT-REDUCING DISCS, SPECIALLY DESIGNED WEBS AND THE METHOD THAT INCLUDES THE AFORESAID FOR PRODUCING WEIGHT-REDUCED STRUCTURES SUCH AS SLABS, PRE-CAST, FLOORS, PARTITIONS AND BEAMS. (ES) DISCOS ALIGERADORES, MALLAS ESPECIALMENTE DISEÑADAS Y EL MÉTODO QUE LOS INCLUIE PARA REALIZAR ESTRUCTURAS ALIGERADAS COMO PREDIGES, PUNTEOS, PLATOS, TABICADOS Y VIGAS. (FR) DISQUES D'ALLÈGEMENT, TRELLIS D'INFRASTRUCTURE CONÇUS SPÉCIALEMENT À CET EFFET ET PROCÉDÉ LES INCLUANT POUR LA RÉALISATION DE STRUCTURES ALLÉGÉES, TELLES QUE DES DALLES, DES PREDIGES, DES PLATEFORMES, DES CLOISURES ET DES PARTITIONS.

Resumen: (EN) The present invention relates to a weight-reducing disc (1) for producing lightweight reinforced-concrete structures, such as slabs, pre-casts, floors, partitions and beams, the present invention likewise relates to a mesh (2, 4) designed specifically for the invention and to the construction method for producing said structures. Said method makes it possible to manufacture the components that allow the construction of buildings with lightweight reinforced concrete structures. The aim is what the inventor can be said is that of construction in general, for example houses, buildings and bridges. The invention makes it possible to solve the problem of reducing the weight of structures by means of a construction method that includes a set of weight-reducing discs (1) in conjunction with perforated mesh (2, 4) specially designed for each web thickness, and the holes (5) for connecting said meshes (2, 4) together. Said set of discs and the method enable casts of minimum thicknesses to be lighter in weight. (ES) La presente invención se refiere a un disco (1) reductor de peso para realizar estructuras ligeras de hormigón armado como losas, prediges, suelos, tabiques o vigas, a una malla (2, 4) especialmente diseñada para ello y al método constructivo para realizar dichas estructuras. El método permite fabricar los componentes que hacen posible la construcción de edificios con estructuras ligeras de hormigón armado. El campo de aplicación de la invención es en general, como casas, edificios y puentes. La invención permite solucionar el problema de aligerar las estructuras con un método de construcción que incluye un conjunto de discos (1) reductores del peso, mallas (2, 4) especialmente especialmente diseñadas para cada espesor de losa y los pernos (5) para unir dichas mallas (2, 4). Dicho conjunto y método permiten aligerar losas de espesores mínimos. (FR) La présente invention concerne un disque d'allègement pour réaliser des structures légères de béton armé, telles que des dalles, des prédiges, des cloisons et des pontons, un treillis d'infrastructure conçu spécialement pour l'invention et un procédé de construction permettant de réaliser lesdites structures. Ce procédé permet de fabriquer les éléments nécessaires à la construction de bâtiments avec des structures légères de béton armé. Le champ d'application de l'invention est celui de la construction en général, notamment de maisons, de bâtiments et de ponts. L'invention permet de résoudre le problème d'allègement des structures au moyen d'un procédé de construction faisant intervenir un ensemble de disques d'allègement conjointement avec des treillis d'armature électro-soudés spécialement conçus pour chaque épaisseur de dalle. Des crochets permettant de joindre entre eux lesdits disques. Cet ensemble et le procédé permettent d'alléger des dalles d'épaisseurs minimales.

Estados designados: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BV, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GR, GT, HK, HN, HU, IL, IN, IS, JP, KE, KG, KH, KR, KP, KZ, LA, LC, LR, LS, LT, LU, LV, MA, MG, MK, MN, MW, MX, MY, NZ, PA, PG, PH, PK, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, ST, SV, TH, TJ, TN, TR, TT, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

Organismo Regional Africano de la Propiedad Intelectual (OAPI) (AF, AG, AL, AM, AN, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BV, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GR, GT, HK, HN, HU, IL, IN, IS, JP, KE, KG, KH, KR, KP, KZ, LA, LC, LR, LS, LT, LU, LV, MA, MG, MK, MN, MW, MX, MY, NZ, PA, PG, PH, PK, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, ST, SV, TH, TJ, TN, TR, TT, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW)

Organismo Europeo de Patentes (OEA) (AR, AZ, BV, CH, CL, DE, DK, ES, FI, FR, GB, GR, HU, IL, IS, IT, LU, LI, NL, NO, SE, SI, SK, TR, TT, UA, US, UZ, VC, VN, ZA, ZM, ZW)

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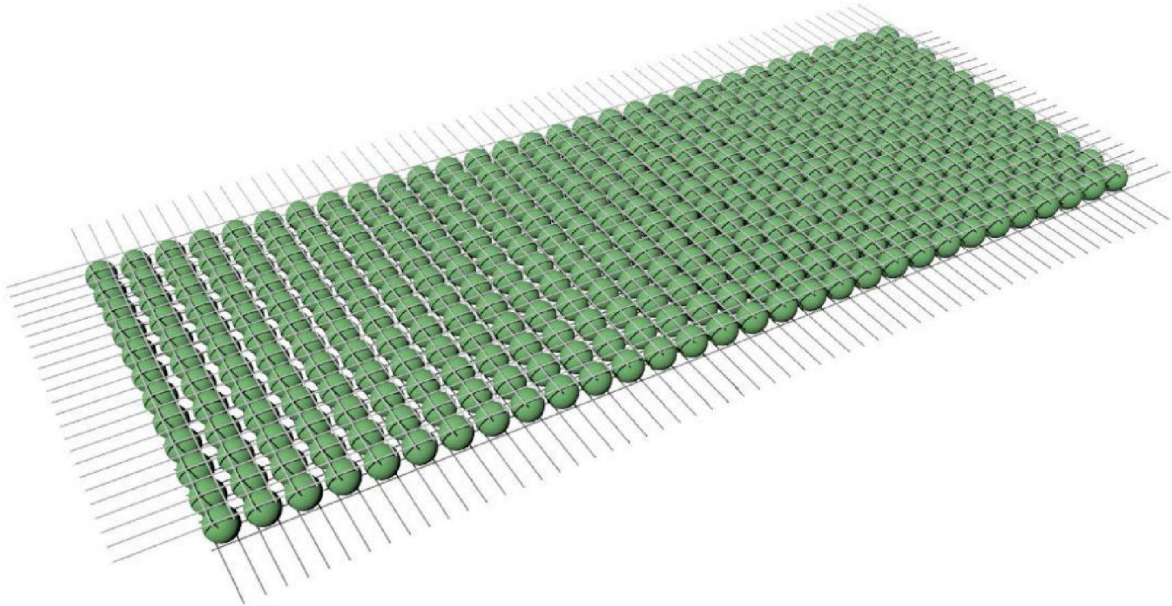
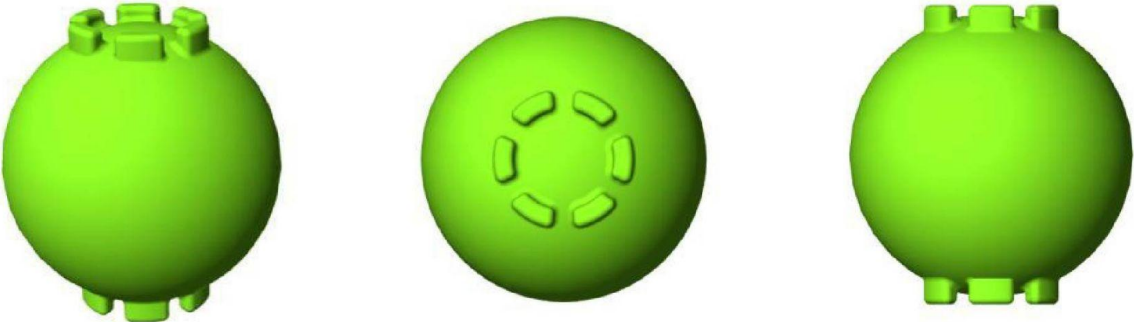
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Fecha de publicación: española (ES)

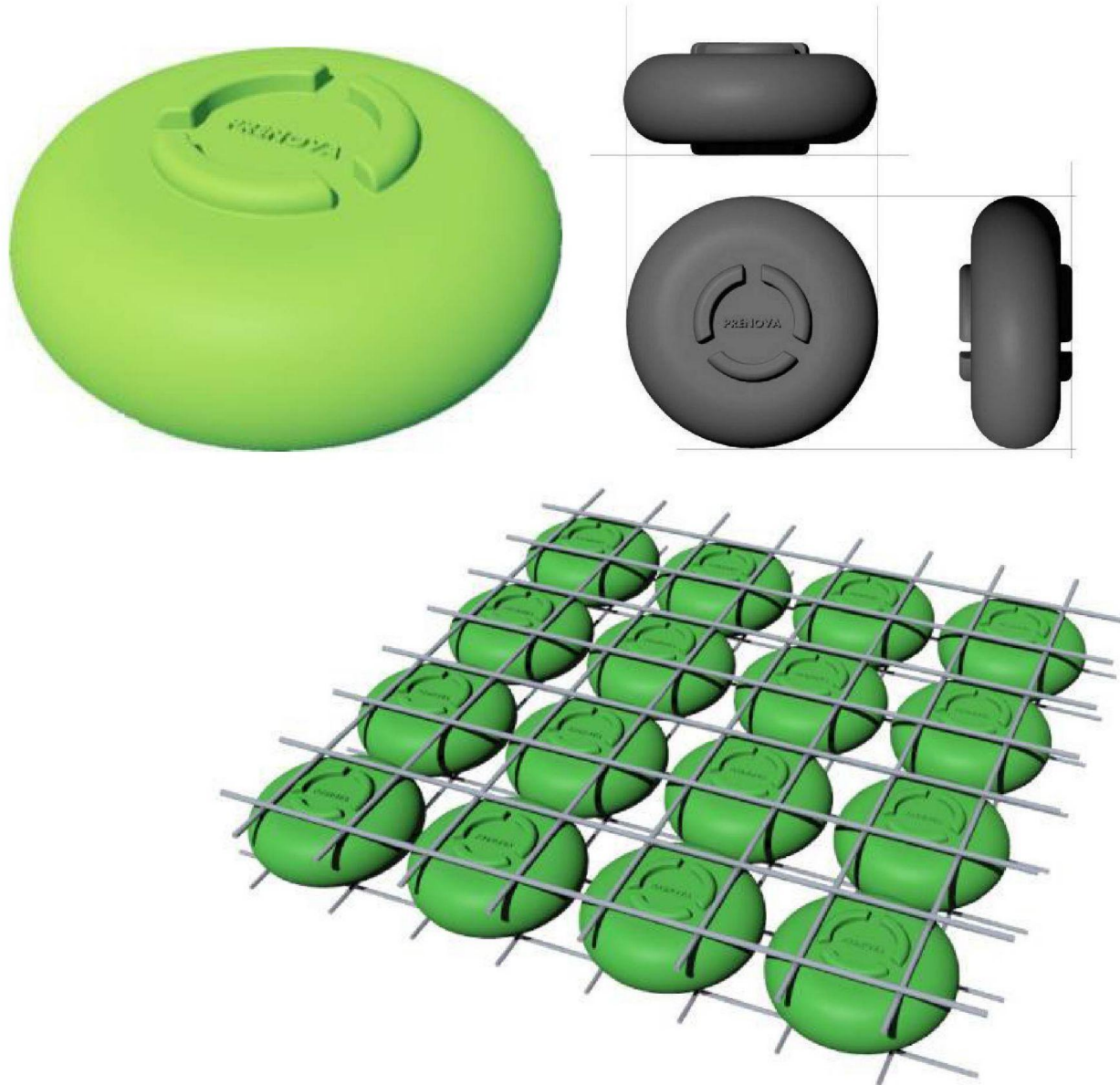
Fecha de solicitud: española (ES)



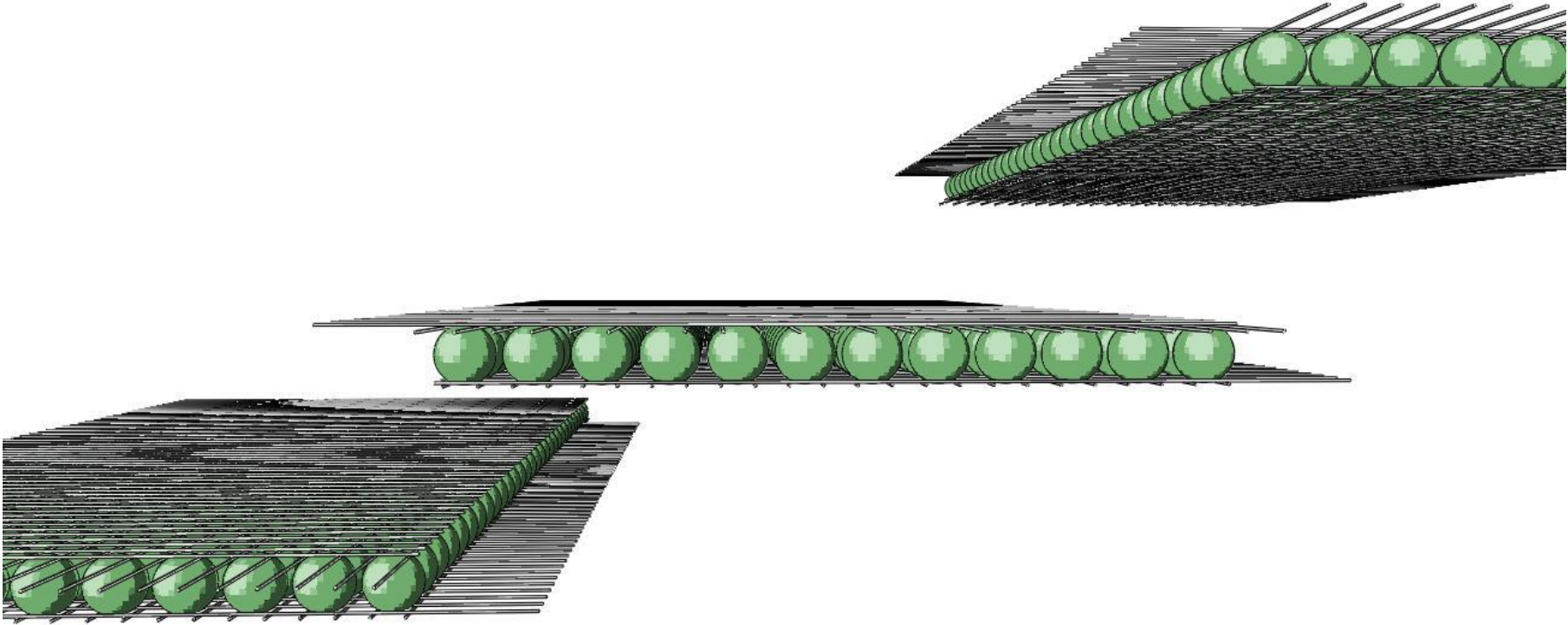
SPHERE



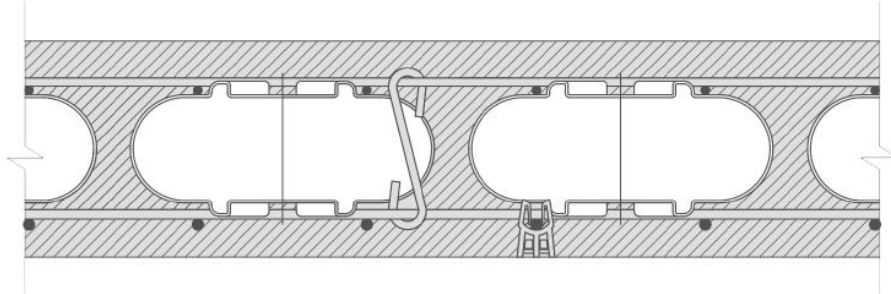
DISC



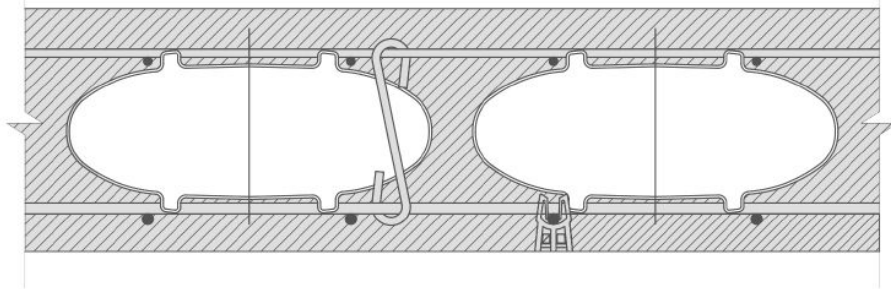
KITS PRENOVA



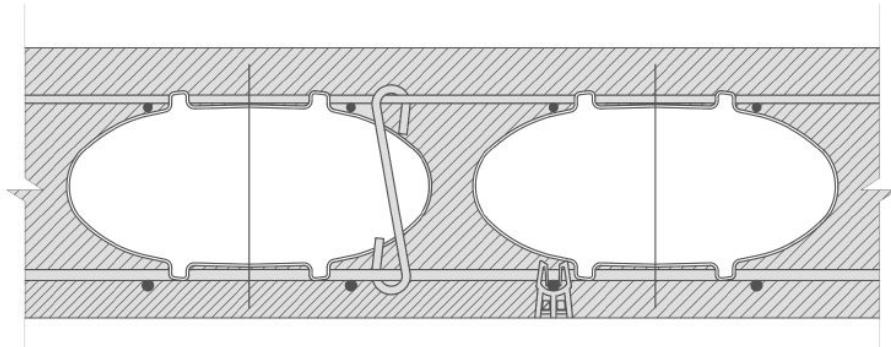
SLAB THICKNESSES



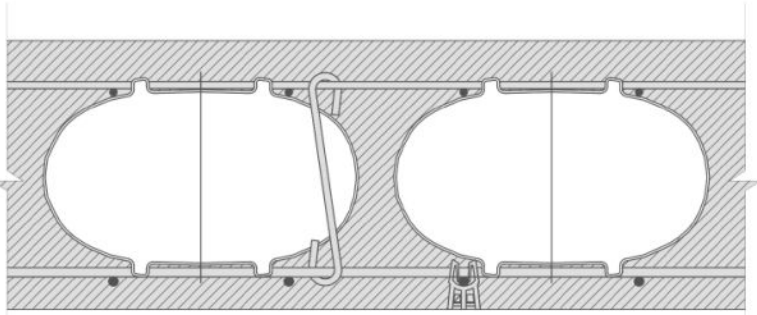
16cm
for 5m spans



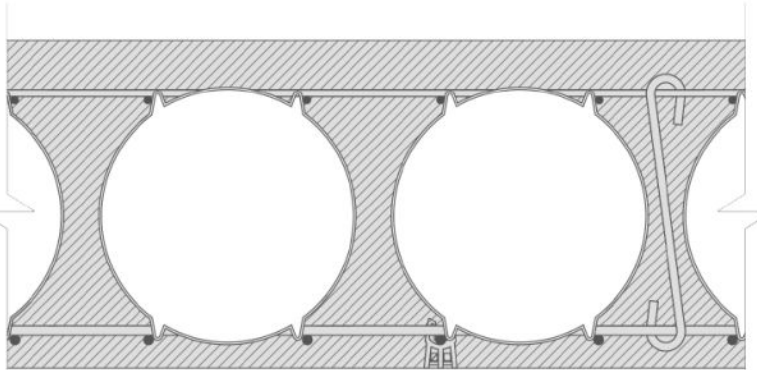
18cm
for 5,7m spans



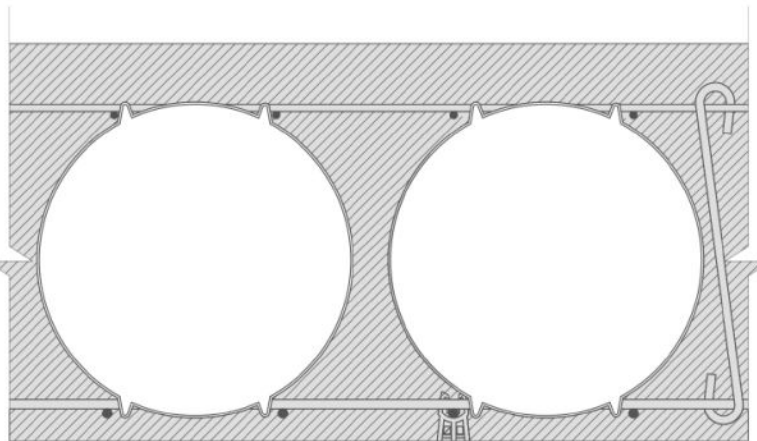
20cm
for 6,3m spans



23cm
for 7,5m spans



28cm
for 9m spans



34cm
for 10m spans

PRODUCTION



INSTALLATIONS ENCASED IN CONCRETE



Encased in concrete

HEATING INSTALLATION



Encased in concrete

SANITARY INSTALLATION



Encased in concrete

ELECTRICAL INSTALLATION



Encased in concrete
PASSES



SCOPE

The service we provide includes:

01. Elaboration of the preliminary design of the structure with the construction system.

Realized by the Architect Ricardo Levinton

02. Advice for carrying out the structural calculation to the Engineer designated by the client.

Manual delivery with design parameters of the construction system.

Sending examples of calculation of similar works carried out.

Technical advice for the choice of the structural prototype.

Delivery of typical construction details of slabs.

Delivery of disk counts and slabs spheres.

03. Training.

Preparation and delivery of Operational Manual of Prenova slabs.

Training to the director of work in the assembly of a prototypical sector of slab.

Advice on facilities and terminations.

04. Supplies provision.

According to the contracted system, we provide: PRENOVA spheres, discs or caissons, in the case of "Slabs without lightened beams". PRENOVA molds for the execution of "PRENOVA Precast" panels. Connector devices for walls with insulation.

SAVINGS



Less concrete and steel consumption

Less workforce cost

CO₂ reduction

Elimination of subfloors and ceilings

TOTAL COST SAVING 20%

(including Prenova fees)

OTHER SAVINGS

- **Administrative and indirect costs** - reduction in the construction time
- **Work-related accidents / work safety and health standards costs**
- **Supervisions**
- **Insurances**
- **Foundations and vertical structure – 15% savings**

ADVANTAGES

- **Flexibility**
- **Efficiency**
- **Steel and concrete savings**
- **CO2 reduction**
- **Large areas without beams and ample cantilevering**
- **Less construction weight (better structural performance in a seismic area)**
- **Elimination of subfloors and ceilings**
- **Less time construction**
- **Construction cost saving**

PRENOVA SYSTEM COST



- 1. COST OF ENGINEERING WORKS BY PRENOVA 10USD/M2
COST OF PROVISION OF DISKS AND SPHERES 5 USD/M2
TOTAL COST : 15 USD/M2**
- 2. SALE PRICE 25 USD/M2 TO 35USD/M2**
- 3. BENEFITS 10 TO 15 USD/M2**

**SAMPLE: ON 100.000 SQM CONSTRUCTION
BENEFITS: USD 1,000,000 TO USD 1,500,000**

**CONCRETE REDUCTION 35%
STEEL REDUCTION 20%
HOUR MAN PER SQM 30%
REDUCTION TOTAL SAVING COST 20% COMPARED TO SOLID SLABS**

SYSTEM PERFORMANCES

PROA Building

WORKFORCE

SLAB (28 cm)

INCLUDES

- 1- Manual arming of meshes with steel bars by on-site workers
- 2-Mesh placement
- 3-Placement of spheres
- 4-Placement of reinforcements, hooks and ties

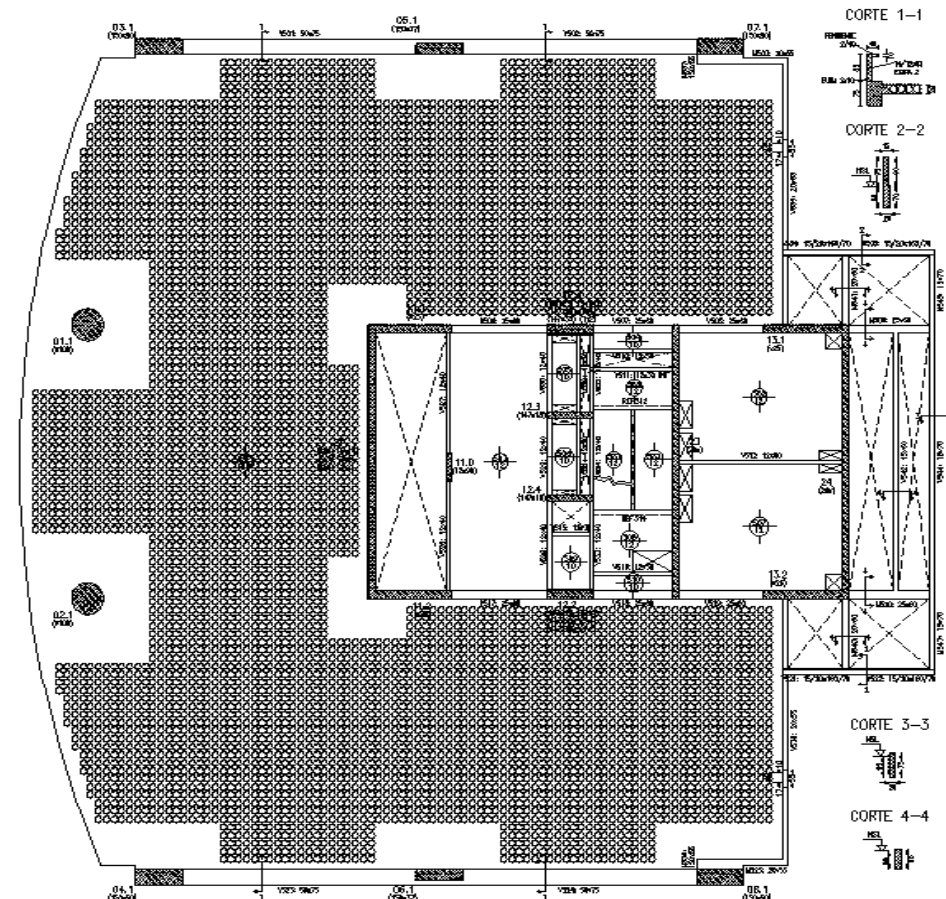
DATA	
SQUARE METERS	620
DAYS	4
WORKERS	16

PRODUCTIVITY	
HOURS	512
SQUARE METERS	620
HOURS PER SQUARE METER	0,83
ESTIMATED WITH MESH (60%)	0,50

NOTES

A tower crane was used on the construction site.

No on-site kits were used. For the case of assembly of kits, 15% is optimized on site.



SYSTEM PERFORMANCES

MATERIALS

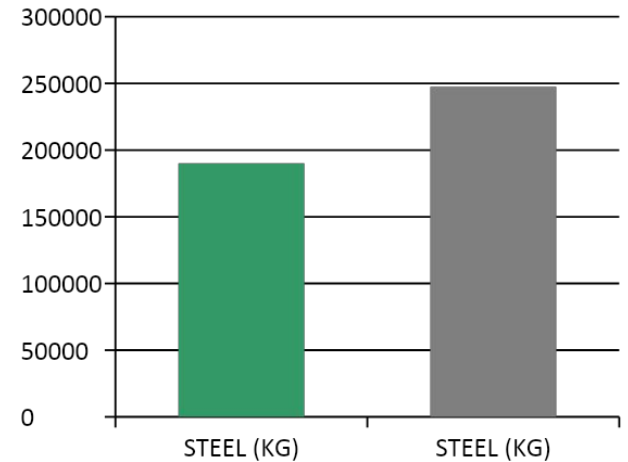
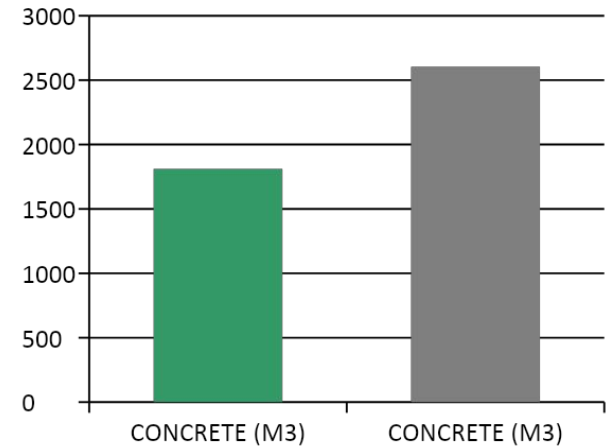
CONCRETE	M3/M2	M2	M3
LIGHT ZONE CONSUMPTION	0,18	465	86
SOLID ZONE CONSUMPTION	0,28	155	43
TOTAL CONSUMPTION			129

STEEL	KG/M3	M3	KG
TOTAL CONSUMPTION	105	129	13580

TOTAL CONSUMPTION FOR 14 SLABS	
CONCRETE (M3)	1811
STEEL (KG)	190118

TRADITIONAL SOLID FLAT SLAB CONSUMPTION	
CONCRETE (M3)	2604
STEEL (KG)	247380

CONCRETE SAVINGS	30%
STEEL SAVINGS	23%

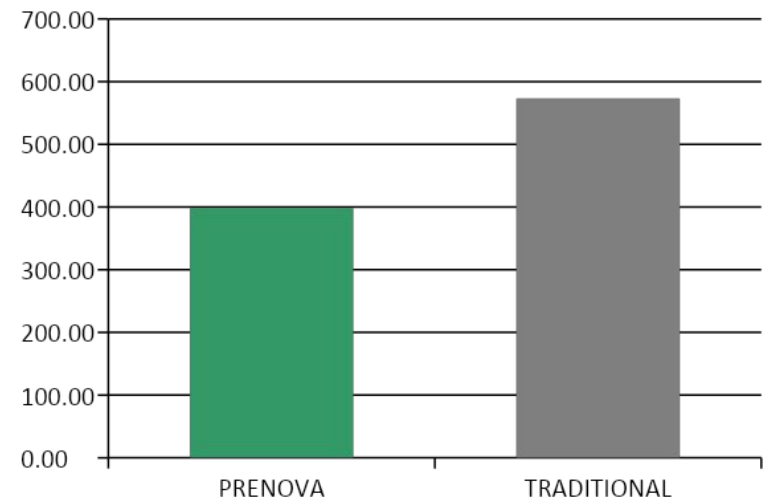
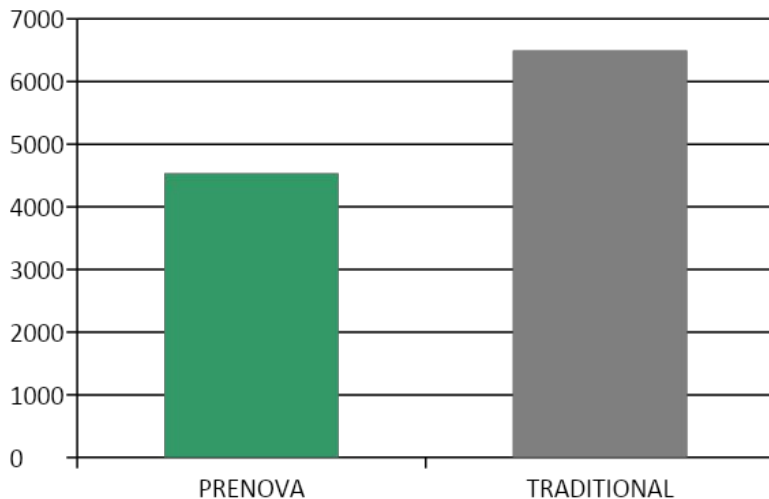


SYSTEM PERFORMANCES

WEIGHT AND SUSTAINABILITY

WEIGHT OF SLABS	PRENOVA	TRADITIONAL	SAVINGS
CONCRETE (Tn)	4346	6250	30%
STEEL (Tn)	190	247	23%
TOTALS (Tn)	4536	6497	30%

SUSTAINABILITY	PRENOVA	TRADITIONAL	CO2 NOT ISSUED
CO2 ISSUED (Tn)	398,34	572,88	174,54



PRENOVA CERTIFICATES



- **LEED certification**
- **ACI** American Concrete Institute 318
- **ASTM** American Society Testing Material
- **CIRSOC**
- National Institute for Seismic Prevention **INPRES** requirements

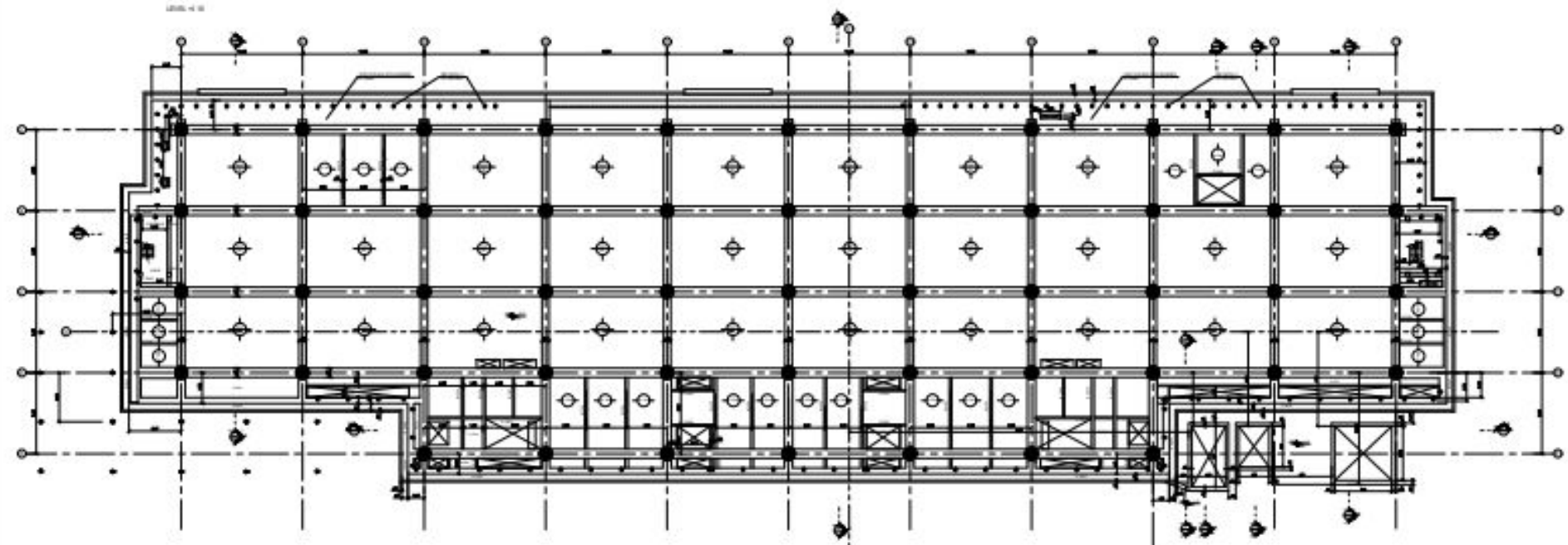


Zvartnotz Airport



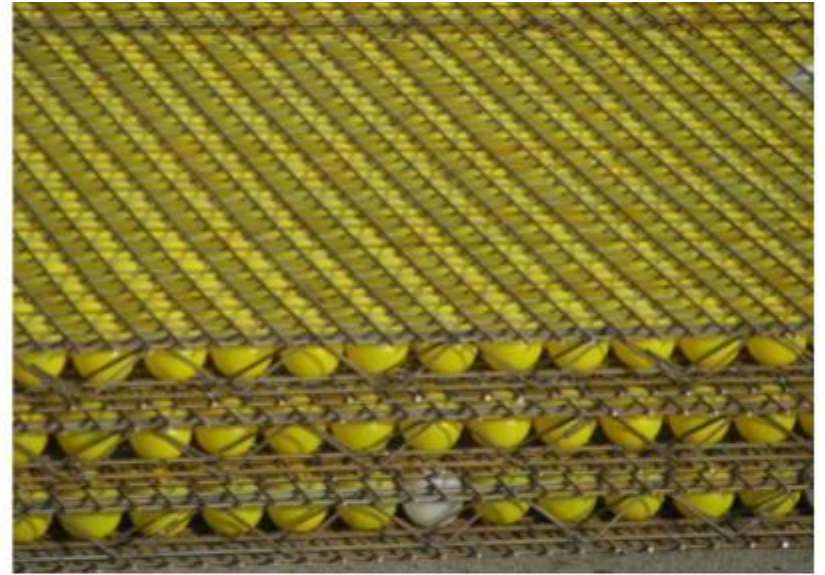
Yerevan, Armenia / Area: 45.000 m²

Zvartnotz Airport



Yerevan, Armenia / Area: 45.000 m²

Zvartnotz Airport



Yerevan, Armenia / Area: 45.000 m²

Zvartnotz Airport



Yerevan, Armenia / Area: 45.000 m²

Ezeiza Airport



Ezeiza, Buenos Aires, Argentina / Area: 18.160 m²

Ezeiza Airport



Ezeiza, Buenos Aires, Argentina / Area: 18.160 m²

Proa Office Building



Vicente López, Buenos Aires, Argentina / Area: 12.000 m²

Proa Office Building



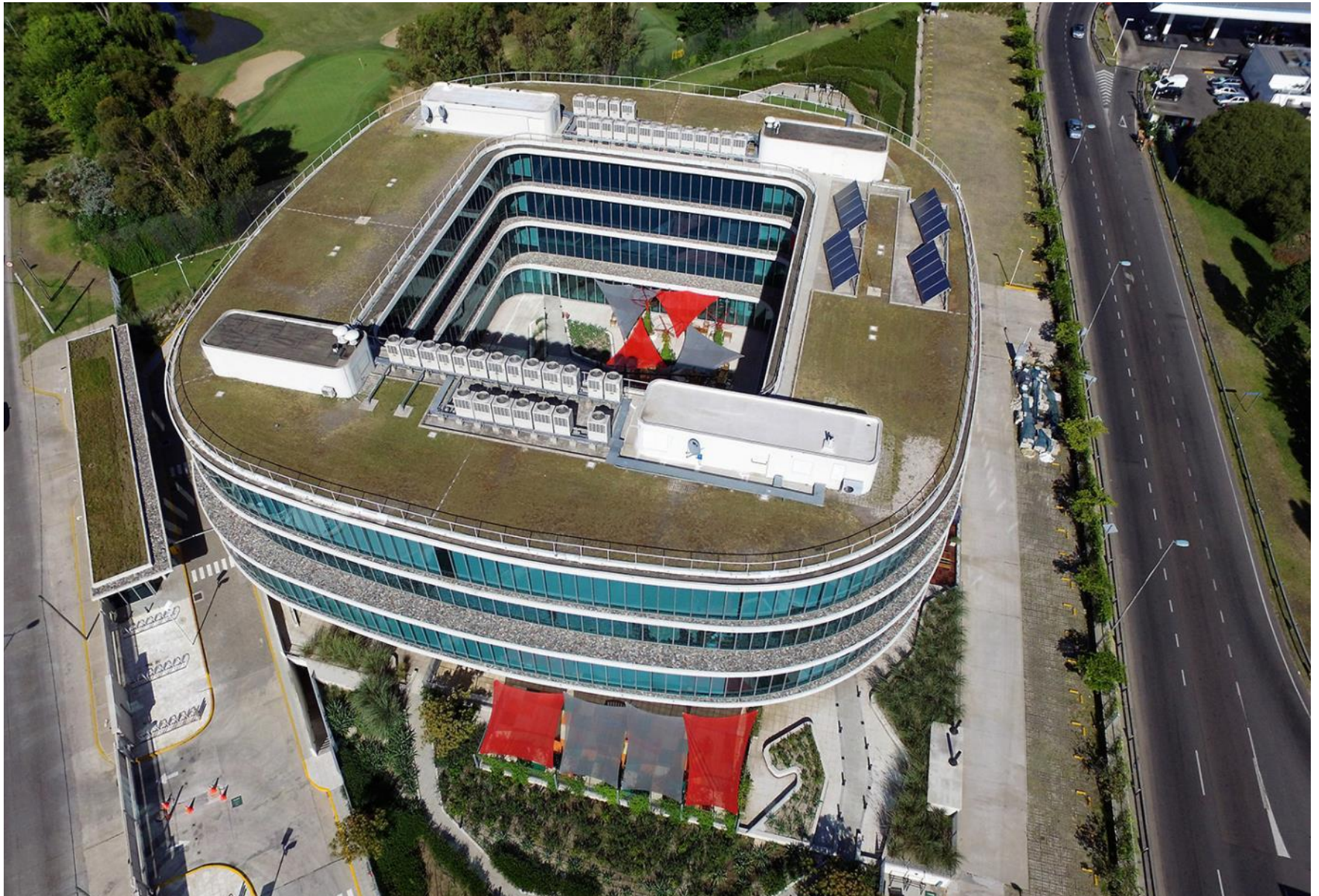
Vicente López, Buenos Aires, Argentina / Superficie de losas: 12.000 m²

Johnson & Son Offices



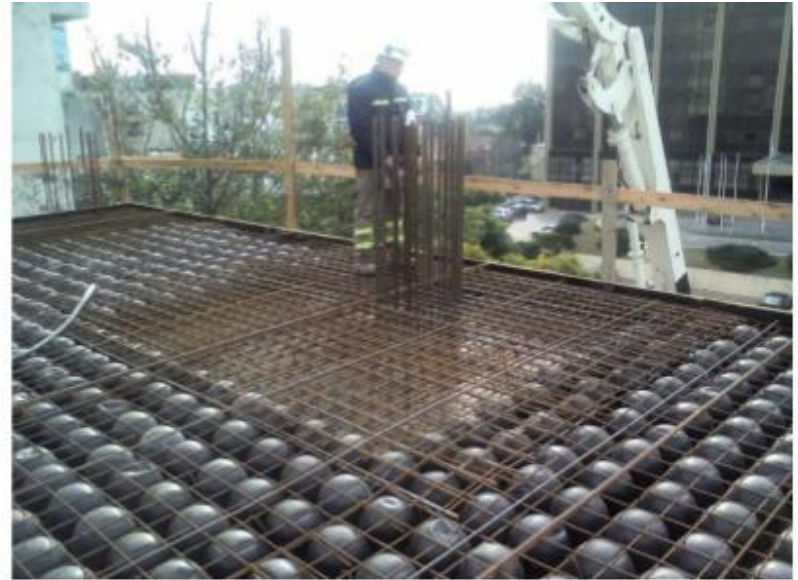
San Isidro, Buenos Aires, Argentina / Area: 17.880 m²

Johnson & Son Offices



San Isidro, Buenos Aires, Argentina / Area: 17.880 m²

Libertador 650 Offices



Vicente López, Buenos Aires, Argentina / Area: 2.782 m²

Libertador 650 Offices



Vicente López, Buenos Aires, Argentina / Area: 2.782 m²

Forbes Offices



Mar del Plata, Buenos Aires, Argentina | Area: 2.650 m²

Forbes Offices



Mar del Plata, Buenos Aires, Argentina | Area: 2.650 m²

Serena Parque San Martín



Serena Parque San Martín



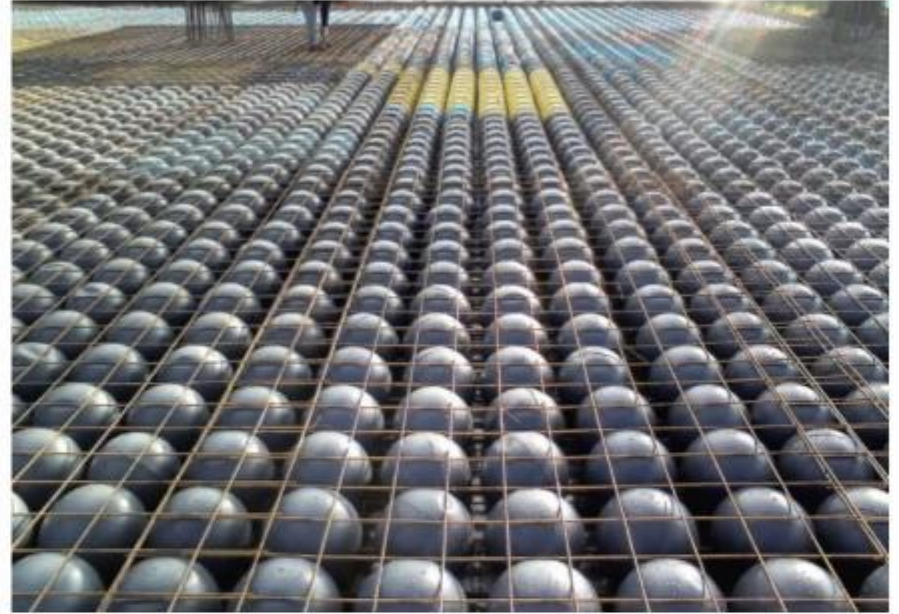
Mar del Plata, Buenos Aires, Argentina | Area: 6.433 m²

Las Heras Building



Mar del Plata, Buenos Aires, Argentina / Area: 8.300 m²

K41 Commercial Center



Moreno, Buenos Aires, Argentina / Area: 17.050 m²

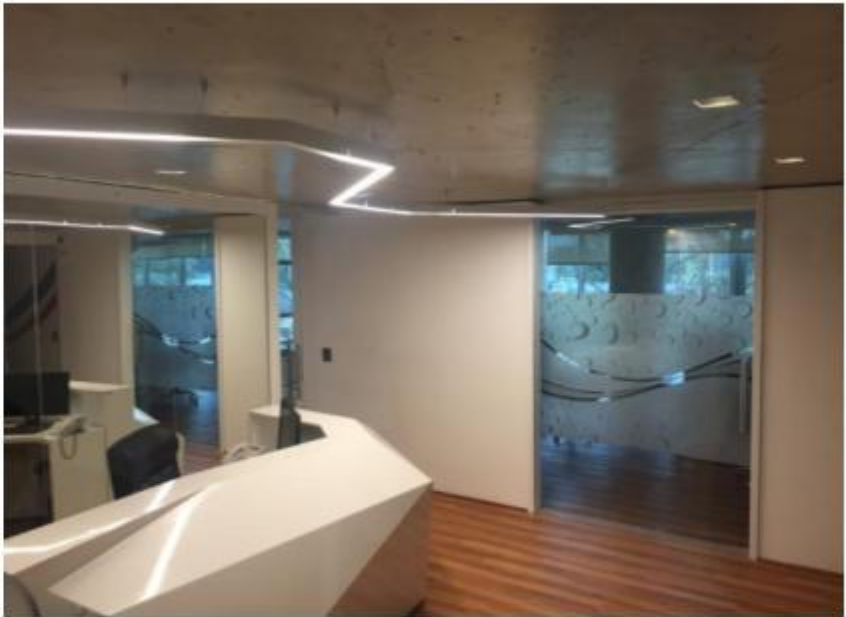
K41 Commercial Center



K41 Commercial Center



K41 Commercial Center



Arq. Juan Micieli | Moreno, Buenos Aires, Argentina | Area: 17.050 m²

11 de Septiembre Offices



Arqs. Adamo-Falson, Fotografía: Cristóbal Palma



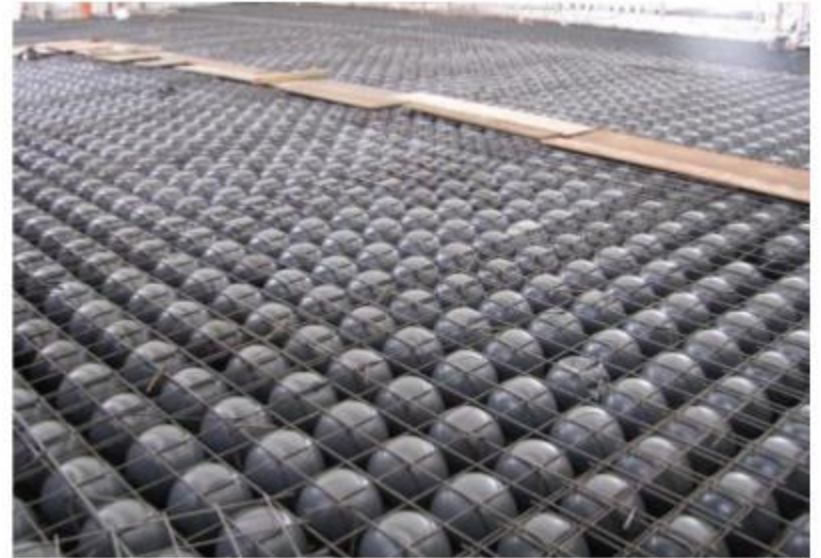
Capital Federal, Buenos Aires, Argentina / Area: 1.600 m²

Álamos de los Andes Hotel



San Martín de Los Andes, Argentina / Area: 1.474 m²

La Plata Hotel



La Plata, Buenos Aires, Argentina / Area: 10.500 m²

La Diva Residential & Commercial Center



La Diva Residential & Commercial Center



Córdoba, Argentina / Area: 31.000 m²

Chateau Residential Building



Nordelta, Buenos Aires, Argentina / Area: 9.600 m²

Chateau Residential Building



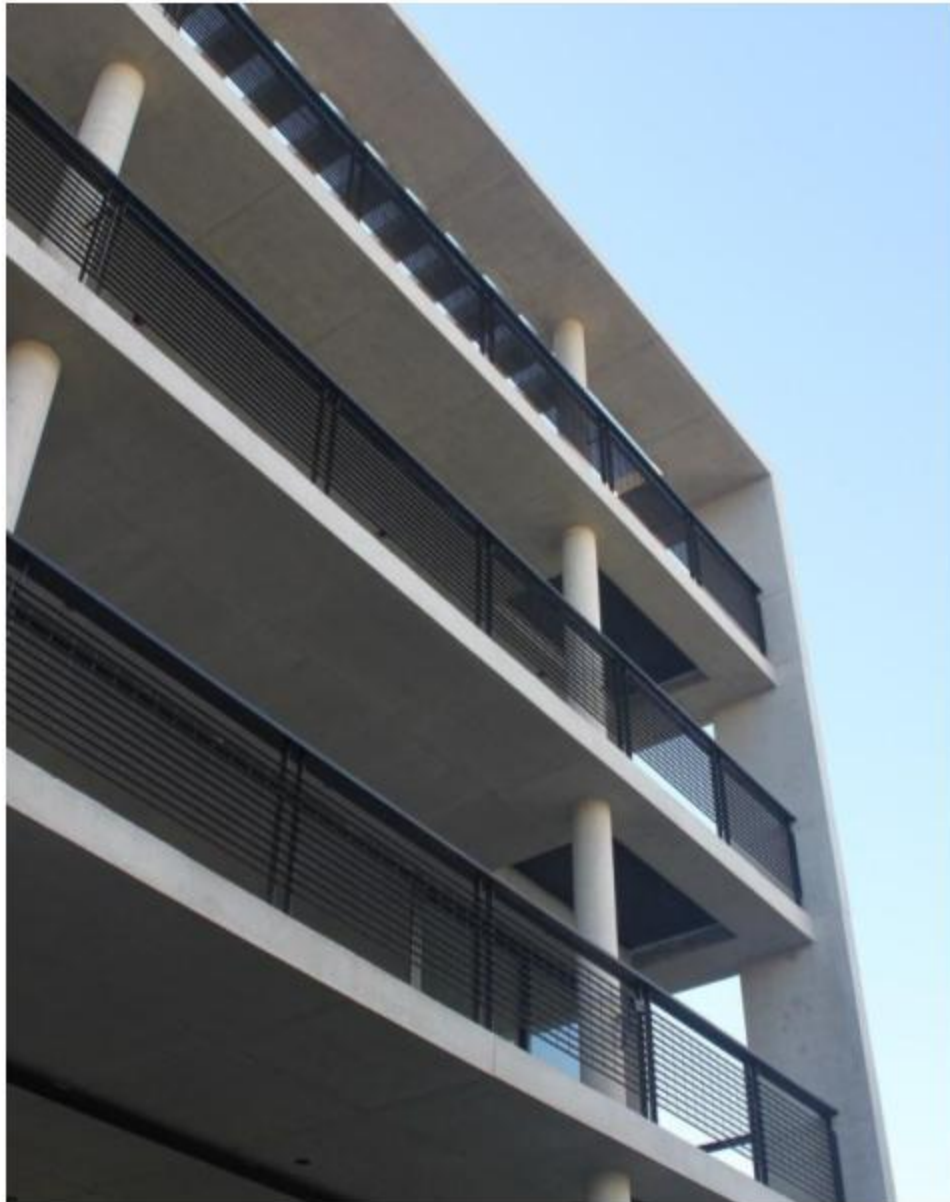
Nordelta, Buenos Aires, Argentina / Area: 9.600 m²

Chateau Residential Building



Nordelta, Buenos Aires, Argentina / Area: 9.600 m²

Vilela Residential Building



Capital Federal, Buenos Aires, Argentina / Area: 1.400 m²

Italia y Albarellos Residential Building

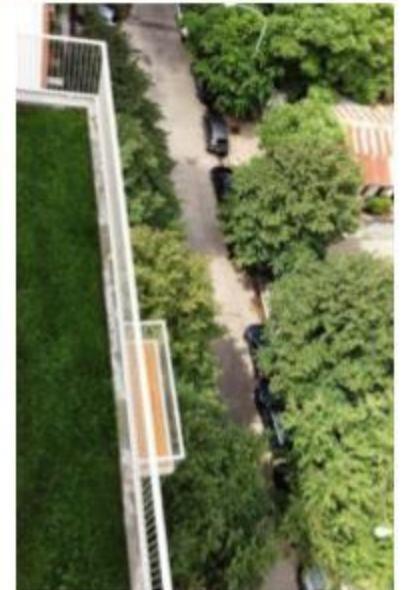


Tigre, Buenos Aires, Argentina / Area: 6.500 m²

José Hernandez Residential Building

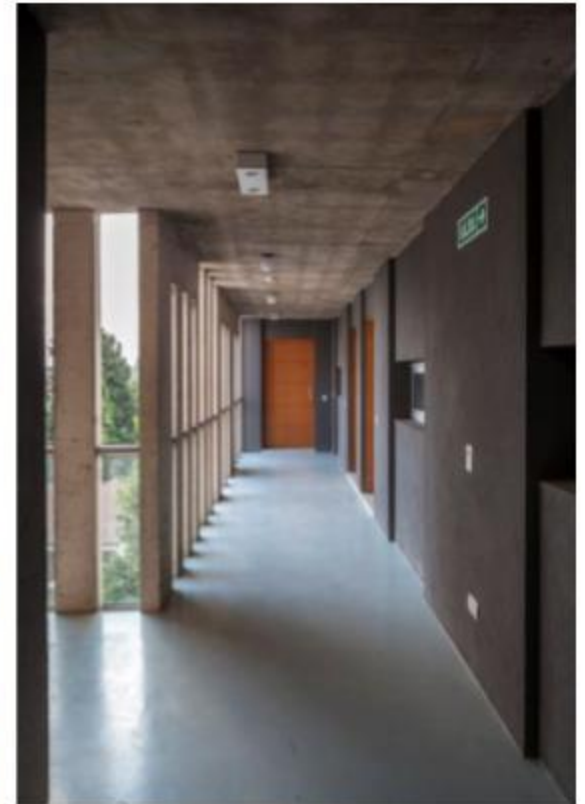


Ancon Residential Building



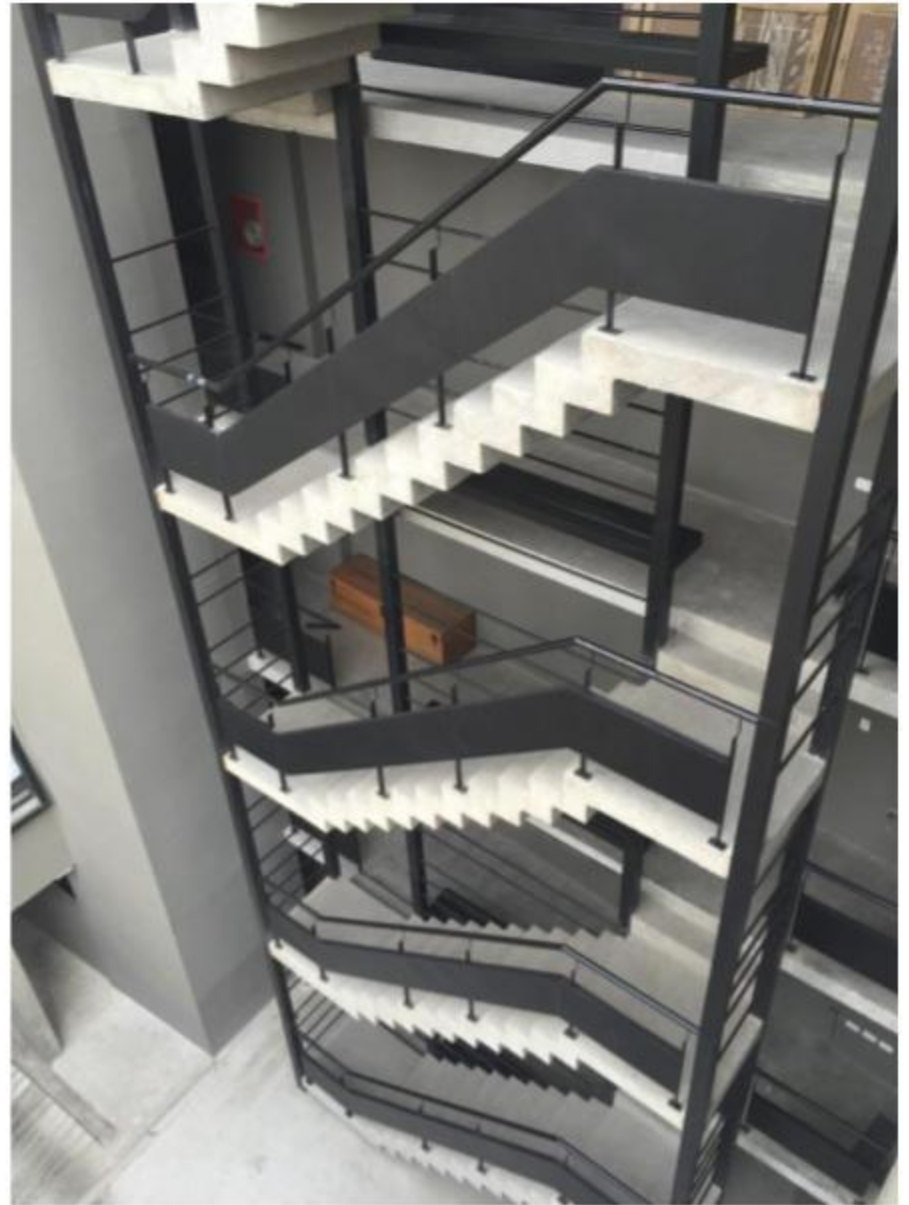
Capital Federal, Buenos Aires, Argentina / Area: 1.441 m²

Jacinto Chiclana Residential Building



Moreno, Buenos Aires, Argentina / Area: 3.000 m²

Tigre Residential Building



Tigre, Buenos Aires, Argentina / Area: 6.500 m²

Residencial building



Rosario, Santa Fé, Argentina

Residencial building



Rosario, Santa Fé, Argentina.

Residential Building



Santa Cruz, Bolivia / Area: 8.800 m²

“O” Residential Building



Punta del Este, Uruguay / Area: 10.500 m²

“O” Residential Building



Punta del Este, Uruguay / Area: 10.500 m²

CASA GRANDE



José Ignacio, Uruguay

CASA GRANDE

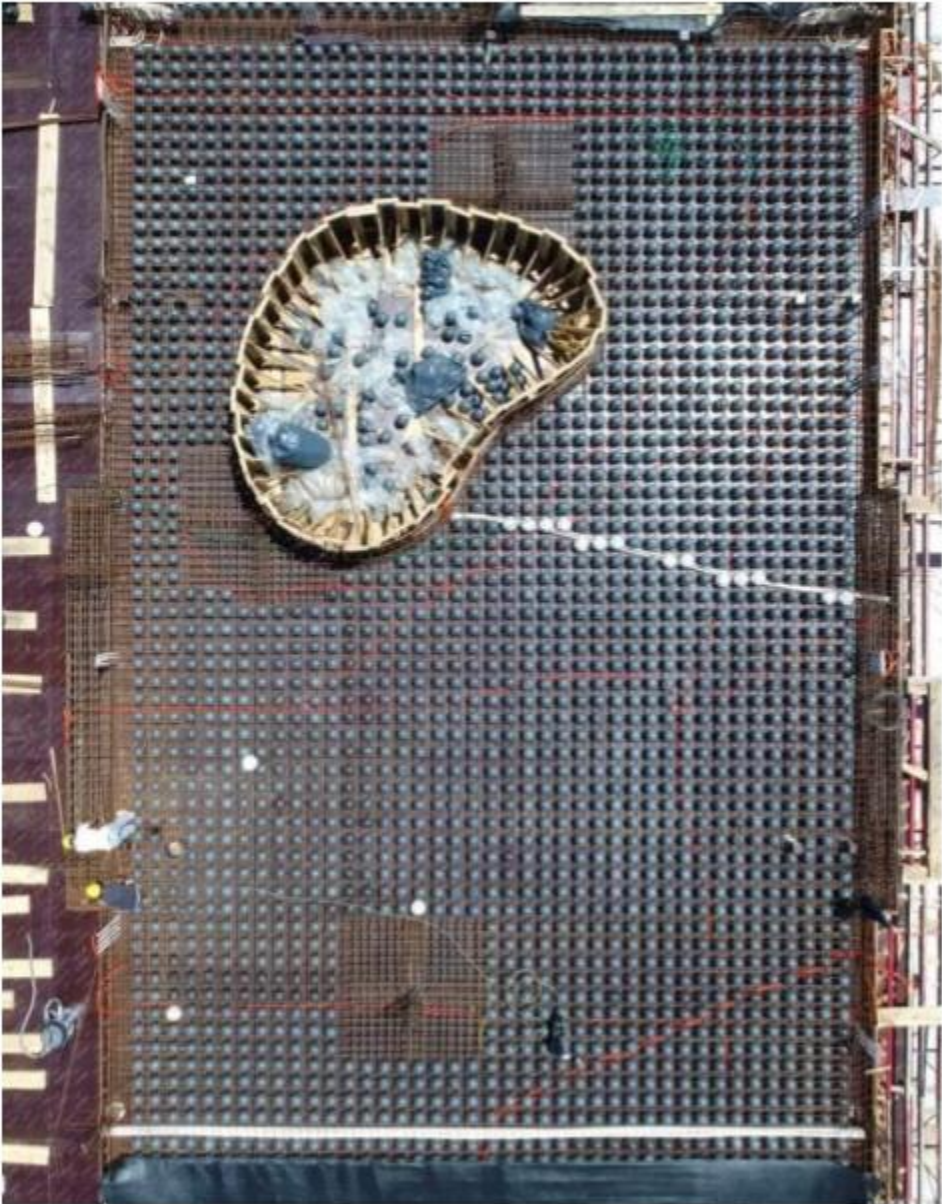


José Ignacio, Uruguay

CASA GRANDE



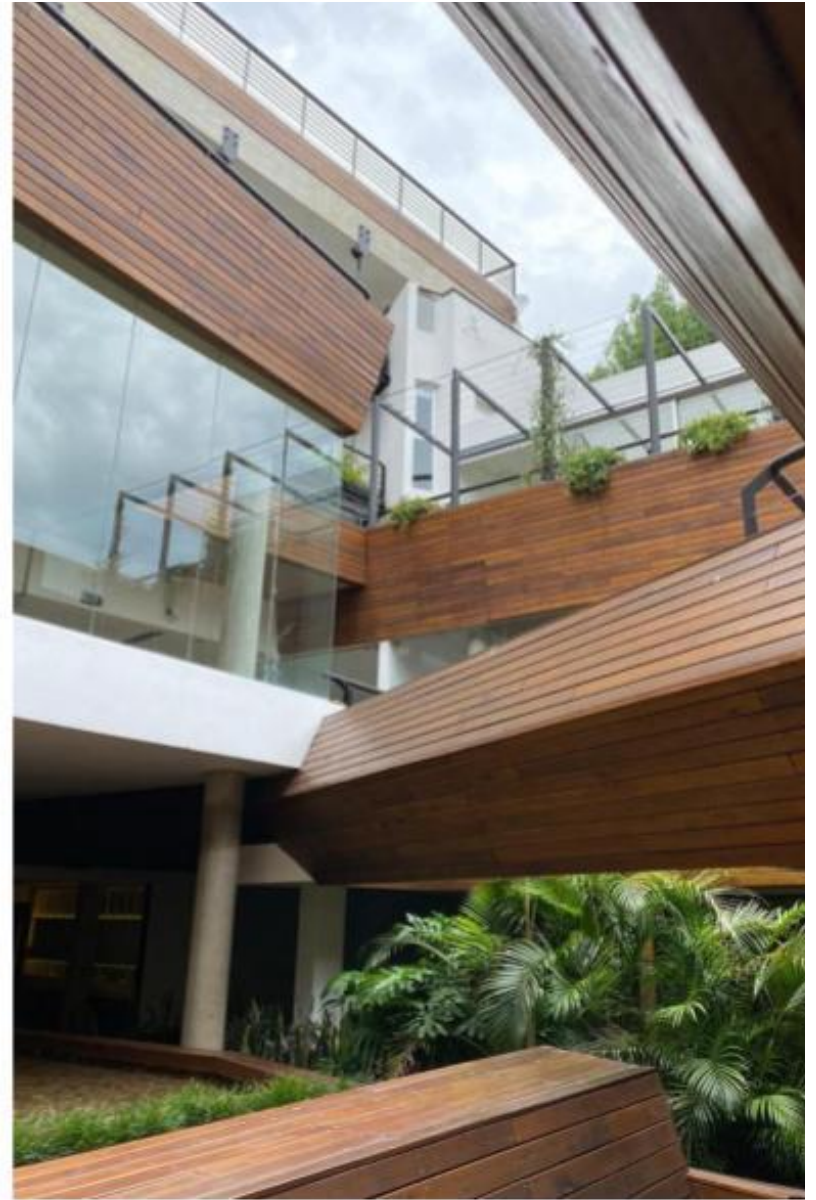
CASA GRANDE



“Alma de Agua” Building



“Alma de Agua” Building



DOLORES COURTS



Dolores, Buenos Aires, Argentina / Area: 14.000 m²

DOLORES COURTS



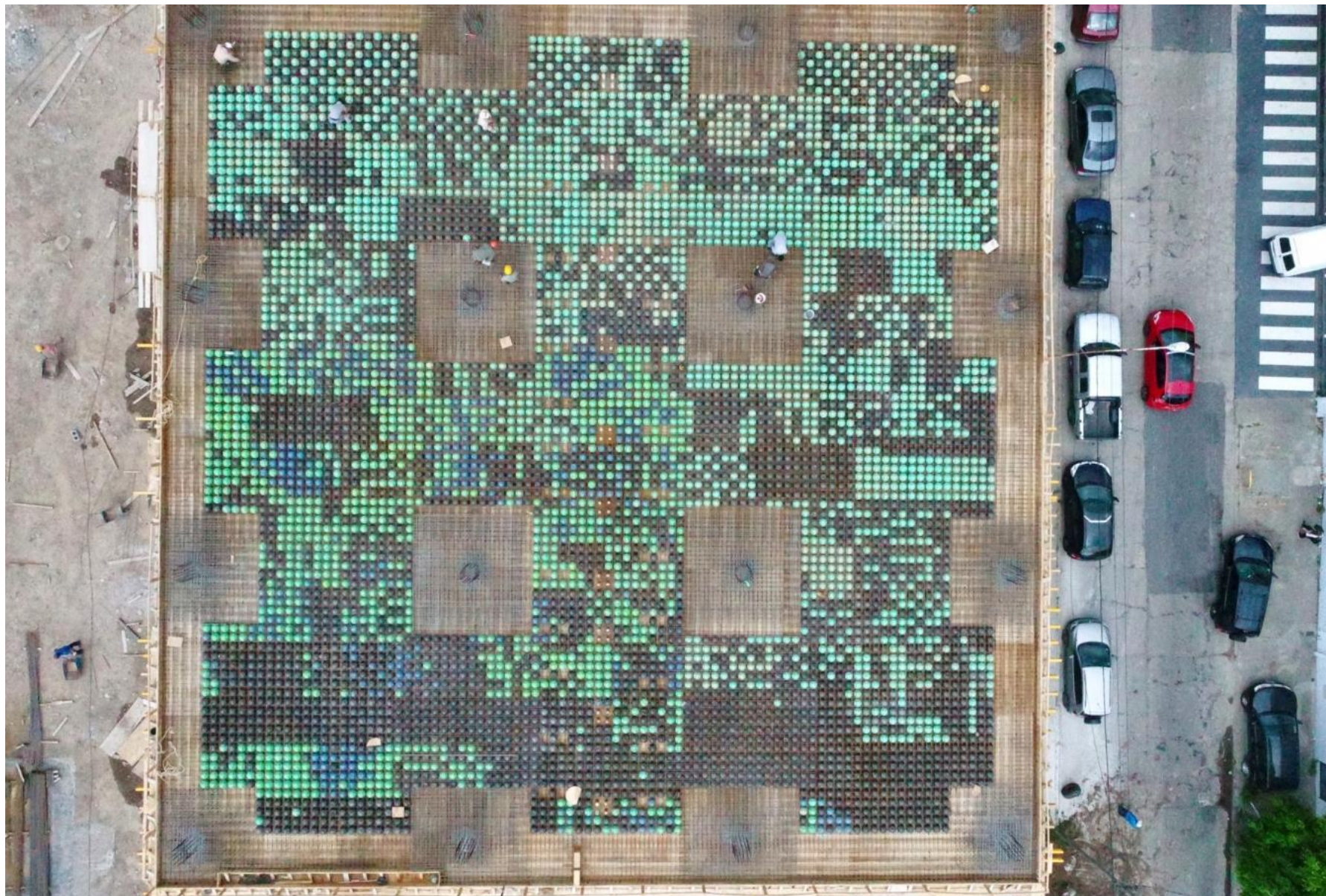
Dolores, Buenos Aires, Argentina / Area: 14.000 m²

DOLORES COURTS



Dolores, Buenos Aires, Argentina / Area: 14.000 m²

WORK IN PROGRESS– VACANI



Lomas del Mirador, Buenos Aires. Area: 5.000 m²

WORK IN PROGRESS – VACANI



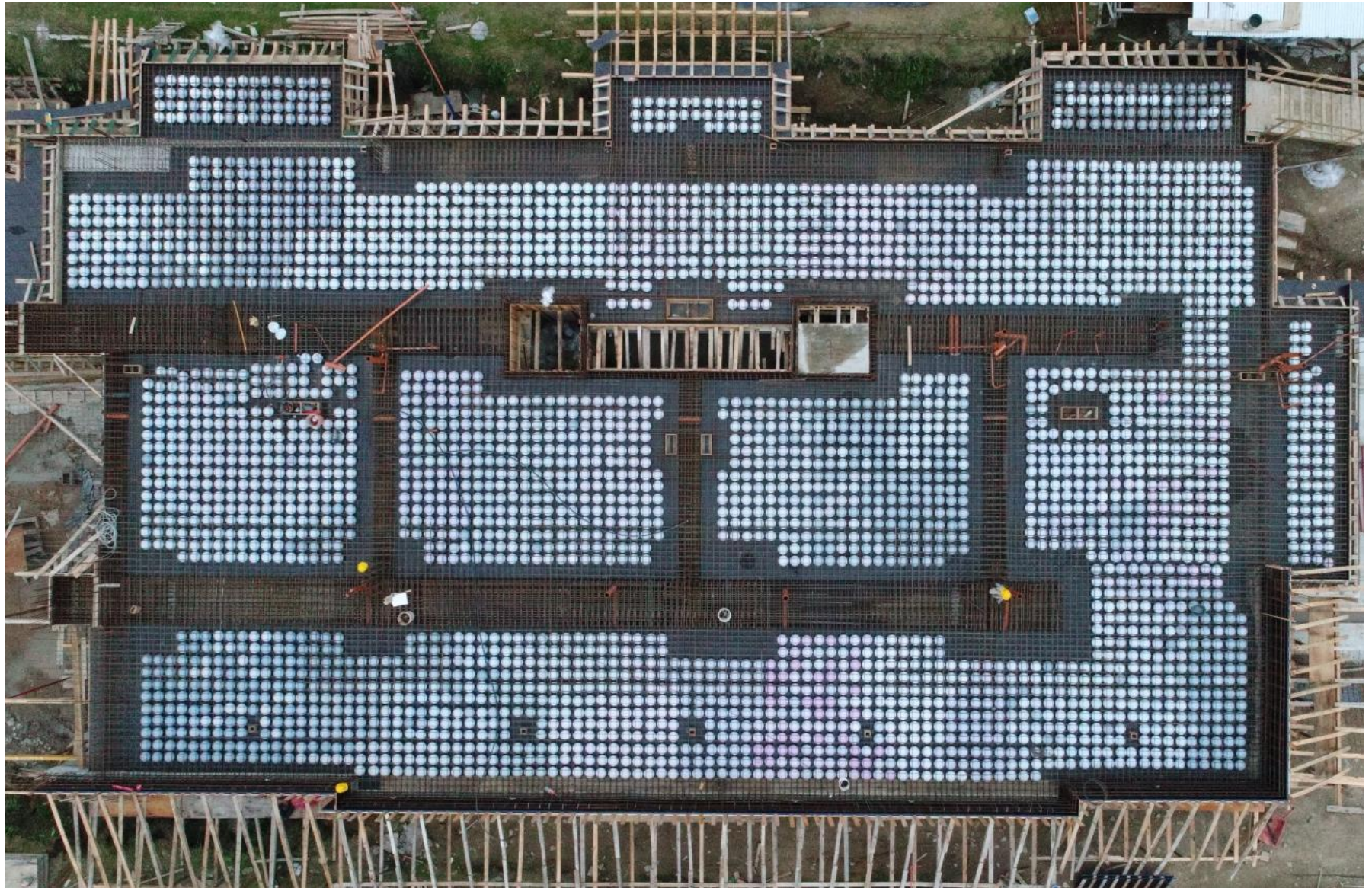
Lomas del Mirador, Buenos Aires. Area: 5.000 m²

WORK IN PROGRESS – VACANI



Lomas del Mirador, Buenos Aires. Area: 5.000 m²

WORK IN PROGRESS – KIRI



Nordelta, Buenos Aires. Area: 5.000 m²

CONTACT



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