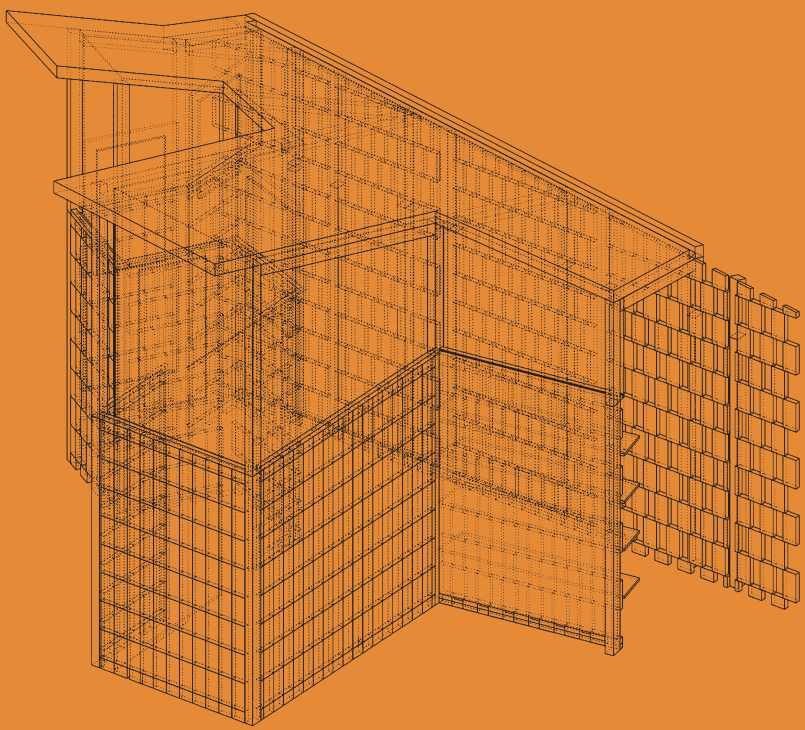
House Refurbishment in Carmena



by Izaskun Chinchilla Architects

Project Details

Practice:	Izaskun Chinchilla Architects
Designer:	Izaskun Chincilla
Title:	House Refurbishment in Carmena
Output type:	Building
Function:	Private house
Location:	Carmena, Toledo, Spain
Client:	Mariano Lorenzo Nombela and Maria Carmen Diaz Ruiz
Practical completion:	April 2013
Budget:	€494,000 (construction cost €452,000, including partial demolitions, excluding courtyard works)
Area:	305m^2 internal, 502m^2 external
Structural engineer:	Roberto Marín Sampalo
Cost consultant:	Julio Hérnanz Cabilla
Main contractor:	Mariano Lorenzo Nombela
Funding awards:	€6,000 from Toledo Province Heritage Preservation Commission
Izaskun Chinchilla Architects' contributors:	Carlos Jimenez Cenamor, Elisa Fernandez Ramos, Lys Villalba Rubio, Manuel Pascual García, Juan Antonio Chacón, Rosana Galián García, Carmen Blanco Romero

Statement about the Research Content and Process

Description

This refurbishment of an 18th-century house in Toledo province was completed following re-purchase by descendants of the original owners. The project has preserved essential characteristics of the original construction, valued by the clients, while updating structural and functional plans, services and outdoor spaces with salvaged building materials.

Questions

1. **How can design help to foster mixed family heritage interests and uses?**
2. **How can textures, finishes and details expose different architectural traditions and structural requirements?**
3. **How can contemporary salvaged building materials be reused and meet contemporary quality standards?**
4. **How can a dry outdoor space provide the pleasures of a garden without requiring high water consumption?**
5. **How can refurbishment processes be directed by socially and environmentally friendly decisions?**

Methods

1. **Discussions with the client about their needs and historical interests.**
2. **Sourcing houses from same period to purchase architectural salvage materials for the refurbishment.**

1 ***(previous page)***
Courtyard with the sunshade
Photograph Carlos Lozano

3. **Preparation of salvage materials for reuse.**
4. **Digital drawing (2D and 3D) to design the new building components and incorporate them into the existing building.**
5. **Natural ventilation, temperature and light studies to optimise indoor comfort and reduce energy consumption.**
6. **Visual and contextual research to design the garden and technical consultancy on salt depuration techniques for the outdoor swimming pool.**

Dissemination

Published in *Arquitectura Viva Monografías, Diseño Interior, Casos 2011: Curso de Arquitectura Sostenible, Innovacion Abierta: Arquitectura Española Contemporánea* and the *arcVision Prize 2013: Women and Architecture* catalogue; exhibited in Panama City; featured in a 20-minute segment on Castilla la Mancha TV's *Aqui vivo yo* programme.

Statement of Significance

Chinchilla was awarded Honourable Mention in the arcVision Prize: Women and Architecture 2013, with the house refurbishment in Carmena specifically cited as a reason.
The project received funding from the Toledo Province Heritage Preservation Commission.

Introduction

Historically, ancestral homes are understood to visually and architecturally represent the families with which they are traditionally associated, bearing the various signs of their occupiers (e.g. names, heraldry, aesthetic preferences). This house contains the architectural and visual histories of the Lorenzo-Diaz family.

Ancestors of the current owner built the house around 1875, and it remained in the family until it was sold in 1971. From 1945 to 1971 the family loaned the house to a local convent. In 2004, the house was offered back to the family for €89,060 because of severe structural decay. The owners bought the house to refurbish it for the family's current needs as well as to conserve its heritage.

The refurbishment project takes, as a point of departure, the challenge of strengthening and transforming the existing architecture, while also critically recovering good building practices from the past and combining them with contemporary techniques and lifestyles. The family has participated in developing the design, in locating other demolished houses for architectural salvage and in contracting workers. Izaskun Chinchilla Architects has helped them to draw, detail and build their preferences while introducing technical expertise on matters such as energy conservation, recycling of historical materials and structural reinforcement. [fig. 2]

The preservation of this house is important in the town's urban context because its mid-18th-century plan formed a trident that joined the church with the city hall and the two main squares. Since all the other houses have been redeveloped, the only remaining presence of this original architecture is across from the church and in the refurbished house. [fig. 3]

2
Entrance and courtyard of the refurbished house
Photograph Borja Lorenzo


AYUNTAMIENTO
Calle General
Travesia del viento
Plaza de Cristo Rey
Calle de los peligros
Calle de Santa Justina
calle de los peligros
calle general Varela
calle general Varela
calle huerta
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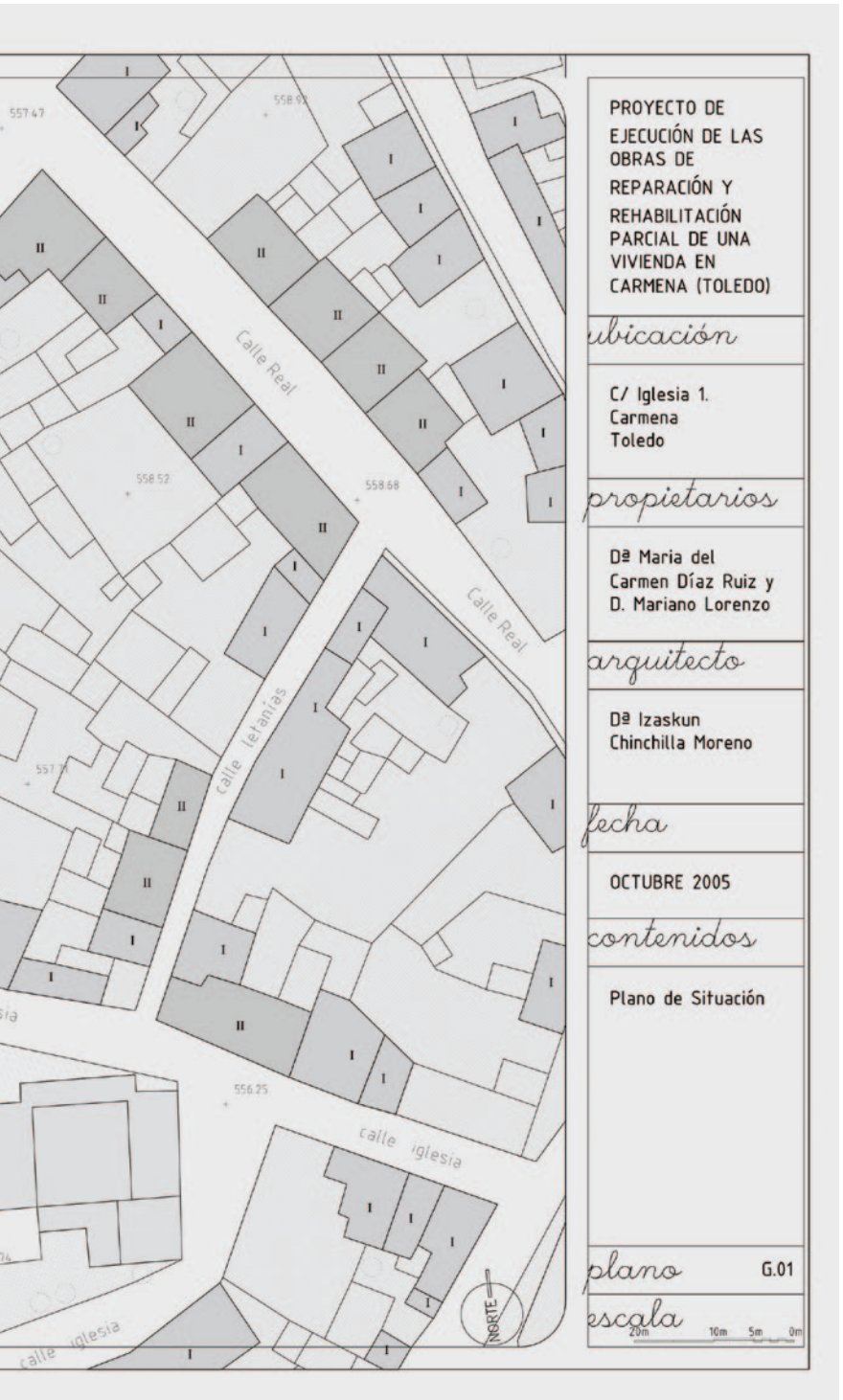
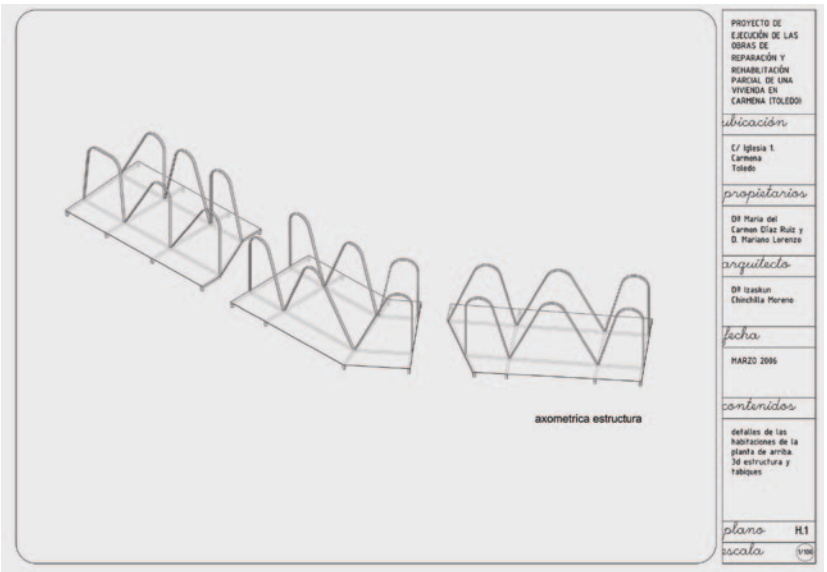


3
Location plan of house within Carmena's church 'trident' scheme



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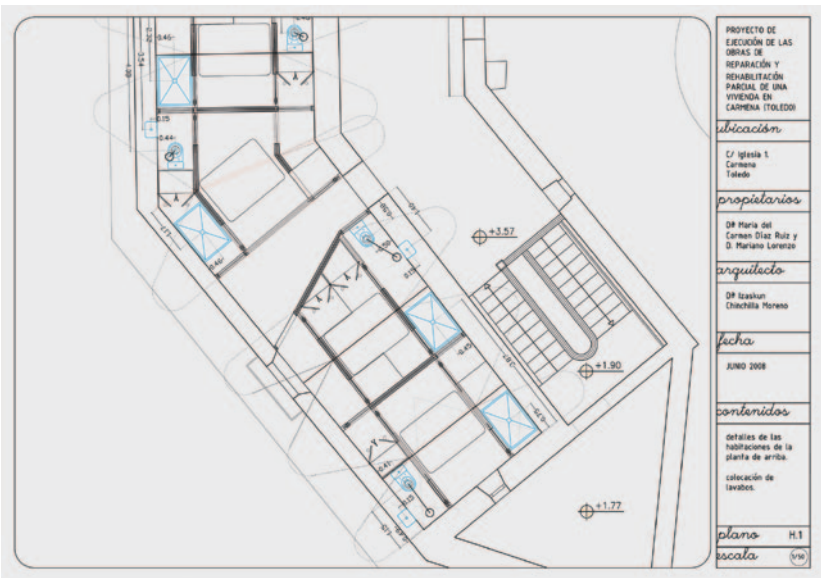


4b

4
First floor axonometric showing the proposition of the bedrooms as a sequence of wood units that can be added or dismantled without wet works

5
Salvaged building material, cleaned and measured
Photograph Carlos Lozano

Aims and Objectives

The aims of the project were both private and public, and the role of the architect reflects these different needs:

Private: to support the family's aspirations and design, and enable the materialisation of their intentions

Above all, the family wanted a home that would foster in its inhabitants a sense of optimism and happiness, and the refurbishment sought to realise this objective. To accomplish this, a flexible design was developed that responded to the family's changing needs and size, and accommodated both 'modern' urban living expectations and traditional forms of domesticity (e.g. cooking on open fires, outdoor bathing, natural ventilation). The project prioritised the recovery and maintenance of these 'ways of life' after decades of different usage. [fig. 4]

Public: to educate the broader local population about the house's value in urban, cultural and technical terms

The public objectives were to:

a. Contribute to the social and economic sustainability of Castilla la Mancha's territory, encouraging families to move to depopulated rural areas that have their agricultural and livestock viability under threat. (In 1930 Carmena had a population of 2,003 inhabitants. By 2006 it had fallen to just 834.)

b. Maintain and reveal the urban 18th-century trident scheme formed by the house, the church and the squares.

c. Contribute to the preservation of both ancestral housing as a local typology and local vernacular building techniques.

d. Transform the original house into a high-performance sustainable building by recovering its traditional passive heating and cooling circulation, lighting and food storage (larder), while introducing new environmental technologies, such as solar panels. Techniques included: recycling salvaged materials whenever possible; using building physics for solar gain and cross ventilation; updating the use of lattice and multilayer windows for climatic responsiveness; and improving the connections between outdoor courtyard and indoor spaces, with specific attention to orientation, to enable thermal and functional benefits. [fig. 5]

5

Questions

How can design help to foster mixed family heritage interests and uses?

— The house is now rich in multipurpose areas, each one bigger than 40m^2. We have enabled spatial divisions for different generations and uses, while maintaining the visual connection between the spaces. Similar schemes have been used by SANAA, such as House A by Ryue Nishizawa.

— Parts of the house can be used semi-independently. Frank Lloyd Wright's organisation of spaces around chimneys can be considered a precedent.

— Smaller bedrooms are made out of wood and treated like pieces of furniture. This approach borrows from Walter Gropius and Marcel Breuer's flexible furnishing and house design in the Weißenhofsiedlung Haus 16 in Stuttgart, as well as N. John Habraken's proposal for 'supports', in which the 'support' of the building is the interior fit-out.

— The kitchen, dining room and living room areas are joined. See studies of use cycles by Jo van der Broek and Heinrich Leppa in the early 1930s.

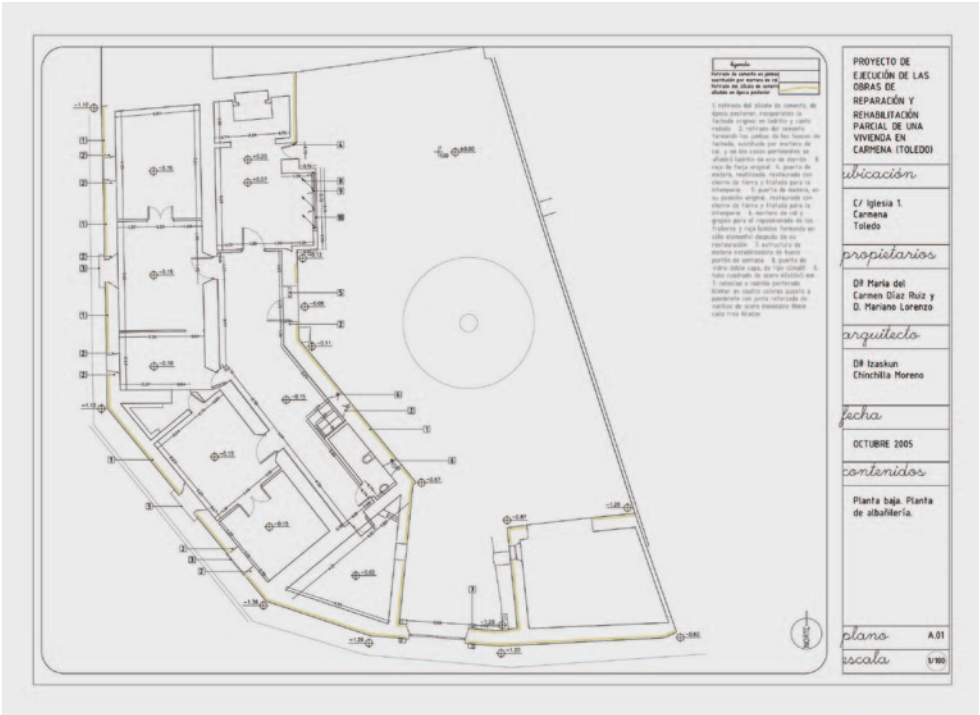
— The kitchen itself is designed to encourage gathering. None of the furniture is attached to walls, allowing for a greater number of people to work together in the kitchen. [fig. 6–8]

How can textures, finishes and details expose different architectural traditions and structural requirements?

The design rejects the need for historical legibility in buildings, associated with the Athens Charter, as an absolute value. Old materials allow for building new structures, whereas current ones are braided to evoke ancestral woodwork and carving.

The lighting system has been especially important. The hallway, where the staircase leads to the bedrooms on the upper floor, welcomes visitors with a series of lights arranged on metallic arches, whose organic forms were specifically designed for this space. They contain 27 LED lights oriented in different directions, allowing the creation of different ambiences within the 42m^2 space. The domes covering the living rooms contain approximately 30 LED points, recovering the Arab tradition of the celestial dome. [fig. 9–11]

6
Comparison of ground floor plans (a) before and (b) after the demolition, showing flexible strategies for activities distribution


PROYECTO DE EJECUCIÓN DE LAS OBRAS DE REPARACIÓN Y REHABILITACIÓN PARCIAL DE UNA VIVIENDA EN CARMENA (TOLEDO)
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Carmena
Toledo
propietarios
Dª María del Carmen Díaz Ruiz y D. Mariano Lorenzo
arquitecto
Dª Izaskun Chinchilla Moreno
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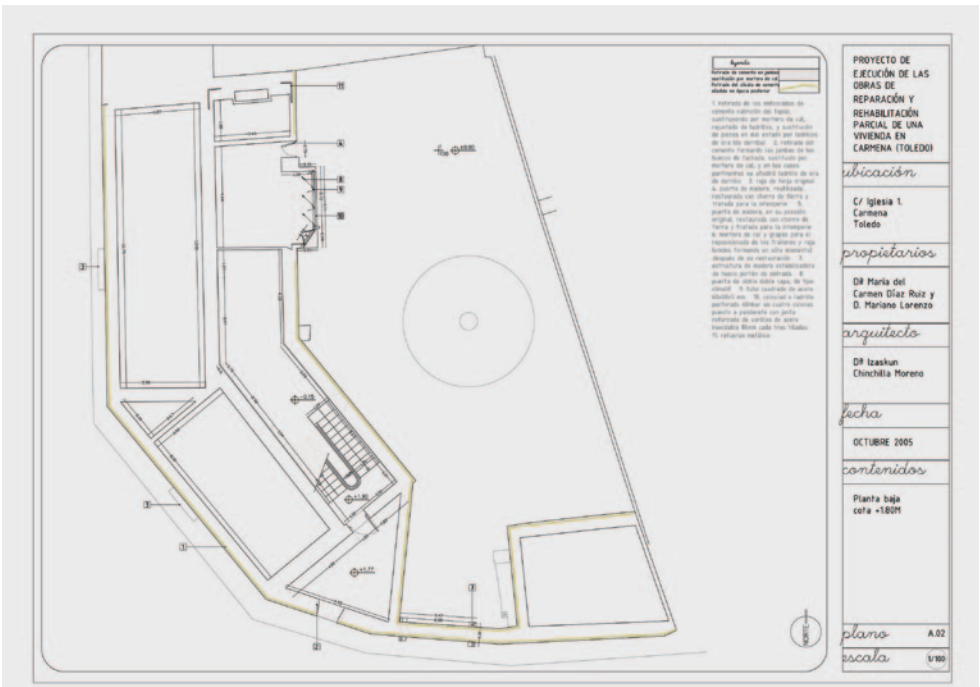
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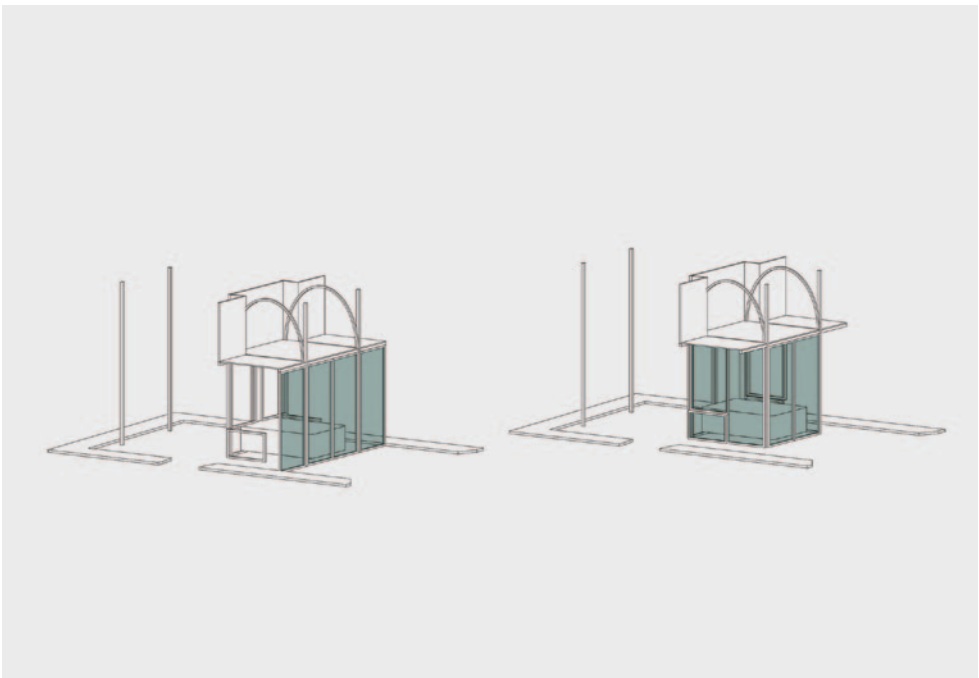
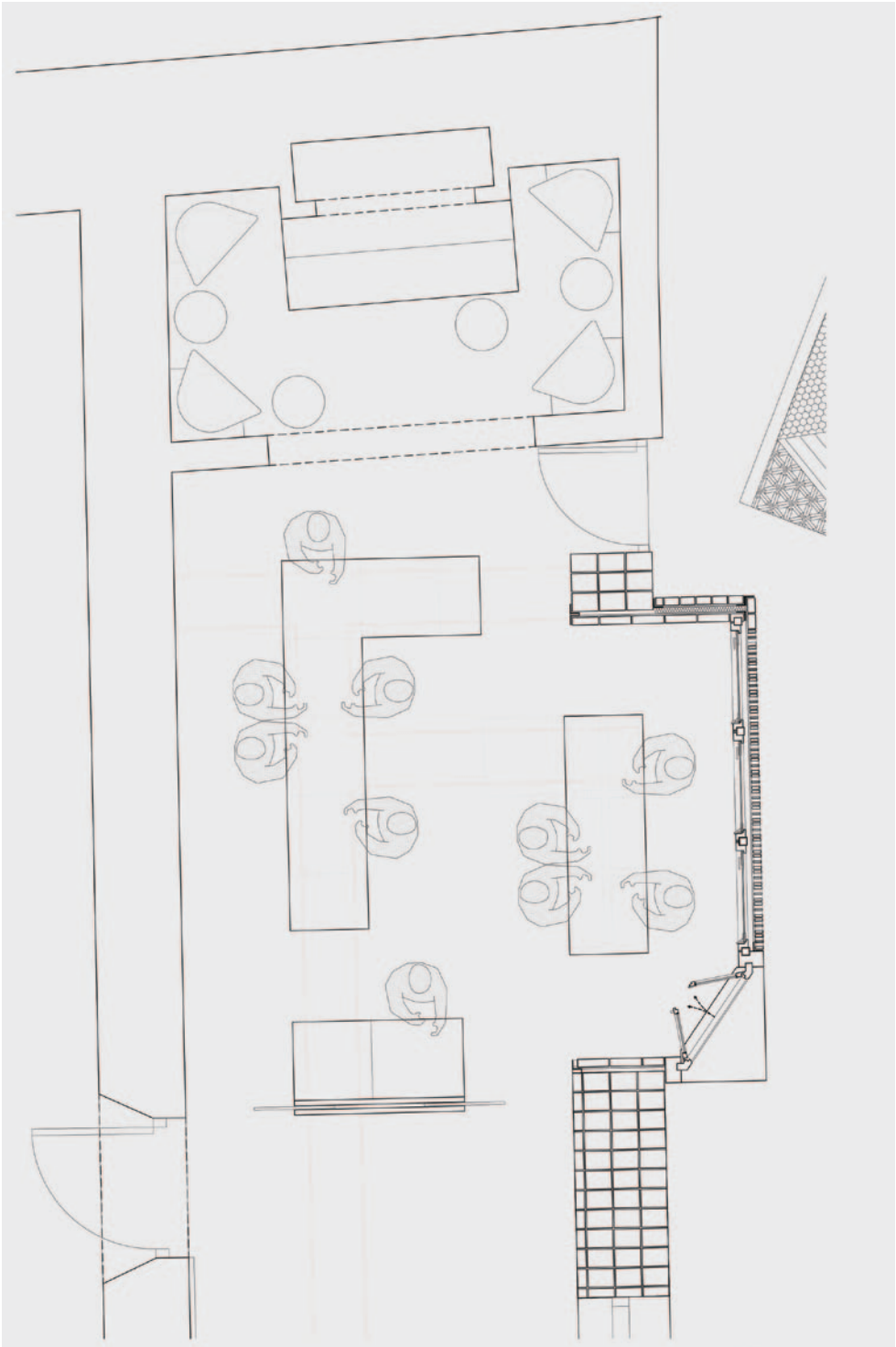


7

7
Studies of the ground floor plan

8
Studies of the kitchen are in terms of the number of users



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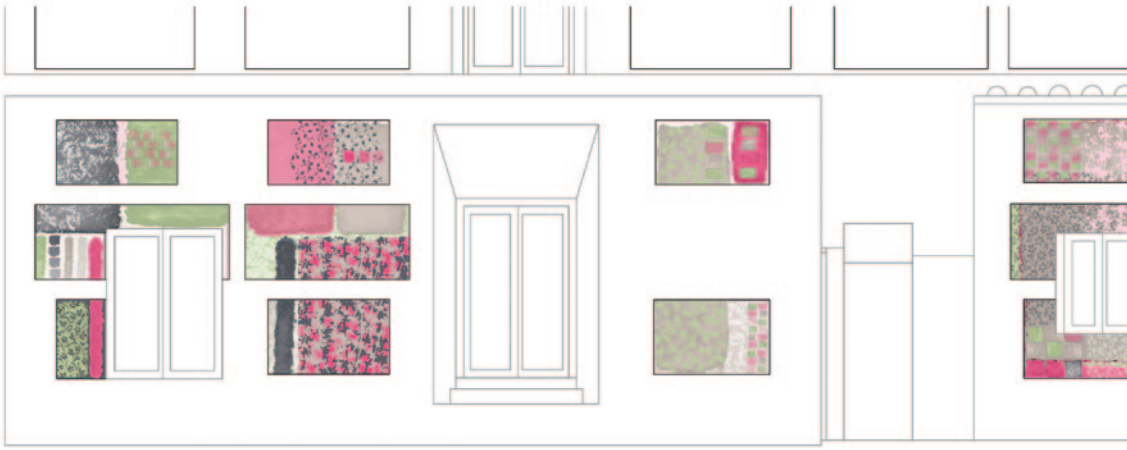
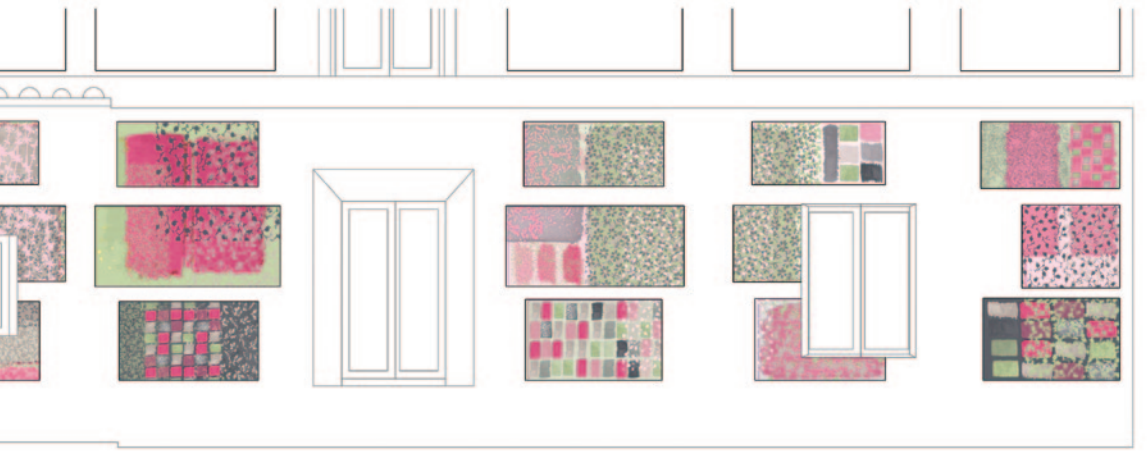
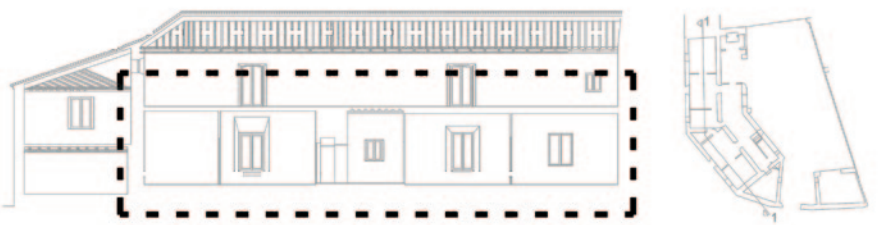


9
Dining room view





SECCION LONGOTUDINAL 1

10

10
Upstairs bedroom with treatment of textile finishes
Photograph Borja Lorenzo

11

11
Domes containing 30 LED lights, allowing the creation of different ambiences
Photograph Maria Carmona

12

How can contemporary salvaged building materials be reused and meet contemporary quality standards?

Salvaged elements and fragmented pieces are an essential part of the intervention [fig. 12–17]. The list of main reused elements and possible types of transformation, reinforcement and recombination, includes:

— Only old ceramic roof tiles have been used, which have improved water-repellent capacity.

— Most hydraulic floor tiles have been recovered from existing houses. Only approximately 23 per cent of the total surface uses new floor tiles fabricated in Tangier, Morocco, using crafts techniques.

— All wood used in the outdoor and indoor structure is reclaimed and at least 100 years old. It took over a year to find the longer beams used in the courtyard. Smaller sizes were combined with metal to reach the necessary spans.

— Reclaimed windows and doors from the convent have been combined with air-sealed and thermally insulated frames of glass to ensure thermal breaks.

How can a dry outdoor space provide the pleasures of a garden without requiring high water consumption?

The house is organised around an open courtyard, which is accessed through a gate from the street. This is an original characteristic of urban ancestral houses in the area. Similar sequences can be found in certain Arab houses. The preservation of the courtyard as an entrance is therefore substantial in terms of preserving the house's typology as well as the area's architectural and cultural history.

Part of the research focused on impressionist paintings which create the illusion of nature. The tiled courtyard features a pool, as well as a ceramic wall representing an abstract version of a Monet poppy field.

12
Floor tiling reusing existing pieces in the kitchen
Photograph Maria Carmona

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13
Reinforcement with metal arches
Photograph Carlos Lozano

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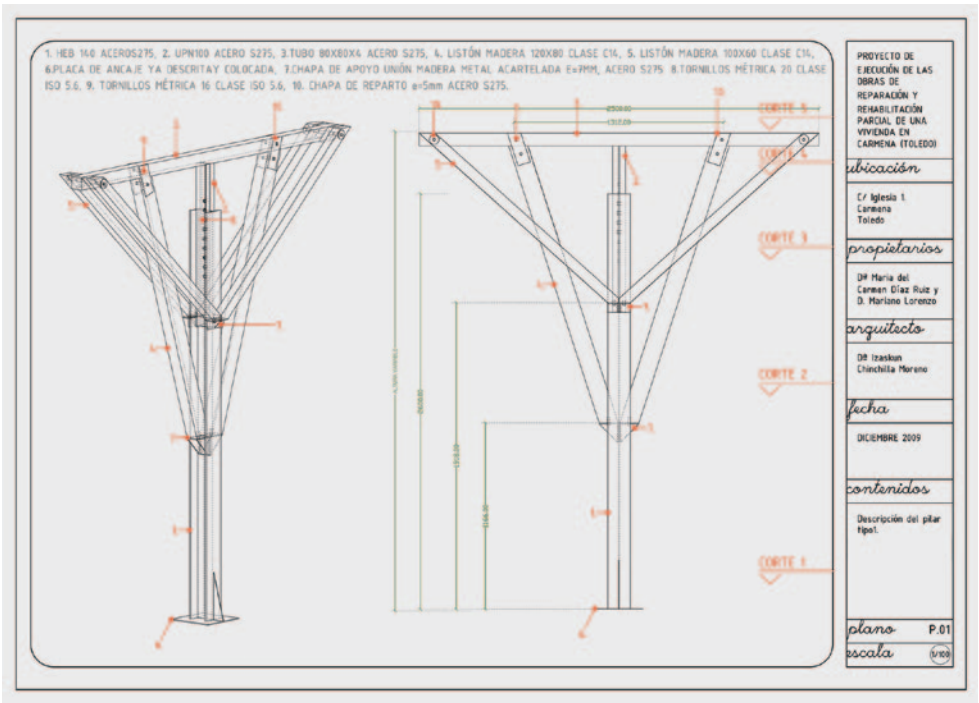
14
Indoor partition combining reused windows and doors from the convent period
Photograph Carlos Lozano

15



16

15
View of the courtyard
Photograph Carlos Lozano

16
Details of the wood structure in the courtyard showing the reinforcement with metal pieces

17

How can refurbishment processes be directed by socially and environmentally friendly decisions?

— The project helped locals to value vernacular architecture and use local passive energy technologies.

— Older local workers with rare craft skills, such as bamboo weaving, worked on the refurbishment.

— Passive energy principles have been used throughout.

— The first canopy in the courtyard hosts solar panels sufficient for the house's heating, water consumption and pool acclimatisation.

— Most materials come from demolitions in the local area, dramatically decreasing carbon emissions produced by fabricating new components.

Context

The project is situated within a diverse context because of its emphasis on private and public needs as well as preservation and innovation.

Rural development

The objectives for the design of the house are based on the Castilla la Mancha Regional Government's 'Program for Sustainable Rural Development 2010–2013'.

Anthropology of ancestral houses

The relationship between family and space and the importance of traditional customs have been widely studied by anthropologists looking at vernacular dwellings across the world (e.g. Rosana Waterson's *The Living House: An anthropology of architecture in South-East Asia,* 1990).

Critique of pure modernism

The project establishes a critical relationship within and against modern architecture that has a political aim. On the one hand, it uses strategies relying on flexibility; on the other hand, it denies the aesthetic, spatial and technological purity and efficiency of the modern in favour of the specific preferences of the users.

17
Entrance gate, incorporating reused windows and doors
Photograph Borja Lorenzo

18

Heritage preservation of rural houses

Until the 1980s, Spanish regional governments did not consider rural houses to have heritage value. High numbers of houses are only now starting to be classified as examples of 'heritage' (e.g. 150 houses were protected in Castilla la Mancha in 2012). The project acknowledges the work of José Luis García Grinda at ETSAM, Technical University of Madrid, in protecting rural housing.

Colour in architecture

In his *Color and Human Response: Aspects of light and color bearing on the reactions of living things and the welfare of human beings* (1978), Faber Birren, considered the father of applied colour psychology, states: 'The study of color is essentially a mental and psychological science, for the term color itself refers to sensation.' Birren's theories have influenced the design of the house. [fig. 18–20]

Energy efficiency

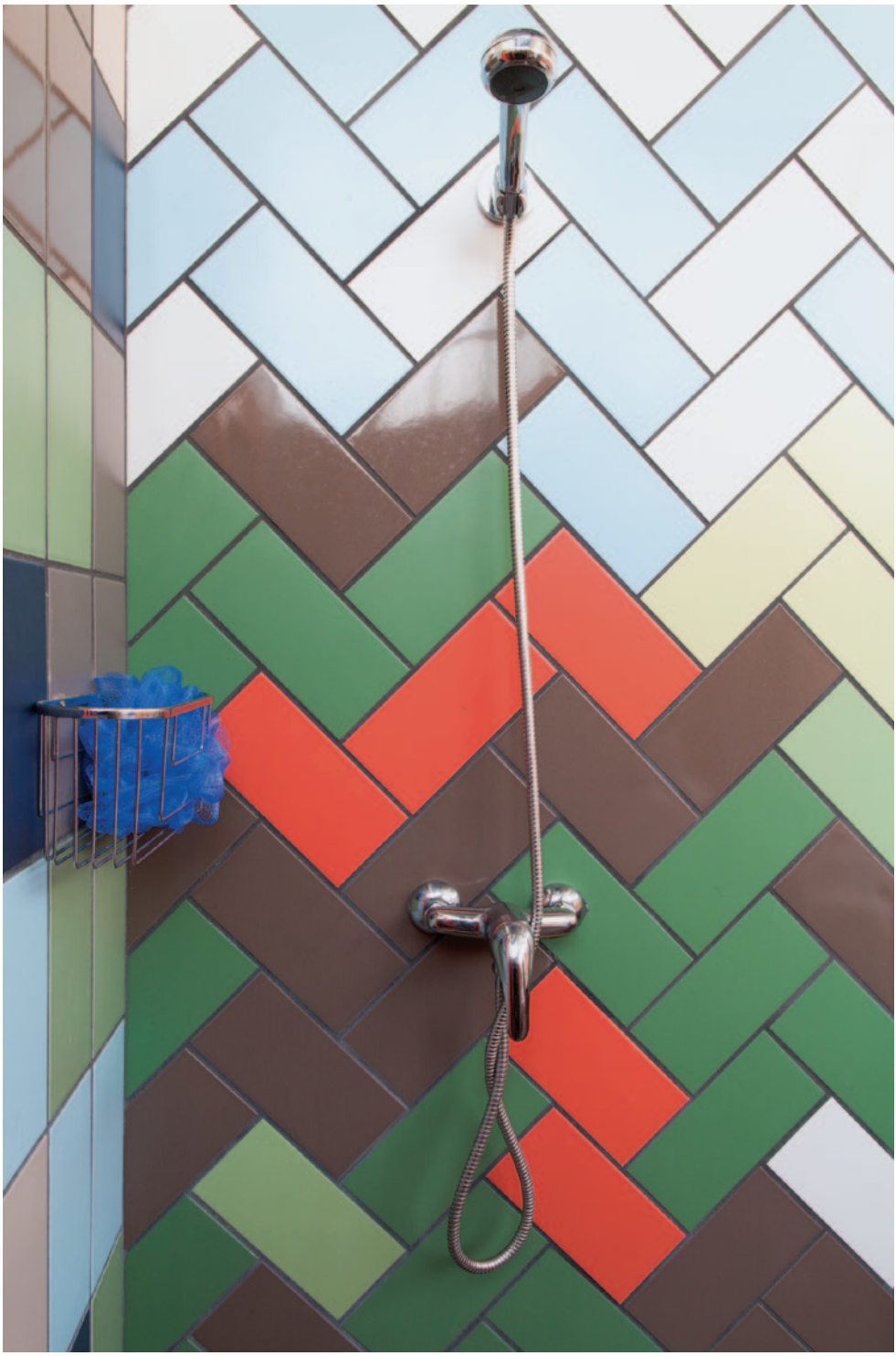
The project builds upon research into energy efficiency in vernacular architecture by Javier Neila and César Bedoya at ETSAM, Technical University of Madrid.

Salvaged materials

The use of salvaged materials in the design follows the credo put forward in Michael Braungart and William McDonough's *Cradle to Cradle: Remaking the way we make things* (2002). L. Hunter Lovins describes this approach in 'Rethinking Production' as an economic, industrial and social framework that holistically works to create waste-free systems (*State of the World: Innovations for a Sustainable Economy,* 2008).

18
Colour applications in the sitting room
Photograph Maria Carmona

19



20

Methods

Discussions with the client about their needs and historical interests

The family's needs informed the overall approach to the refurbishment. Discussions with the client were combined with research into the architectural, urban and rural history of the area and into vernacular building typologies.

Sourcing houses from the same period to purchase architectural salvage materials for the refurbishment

This stage required identifying materials from semi-demolished houses and analysing the structural capacity of each element. It has taken more than four years of visits, thorough evaluation and selection to complete this process.

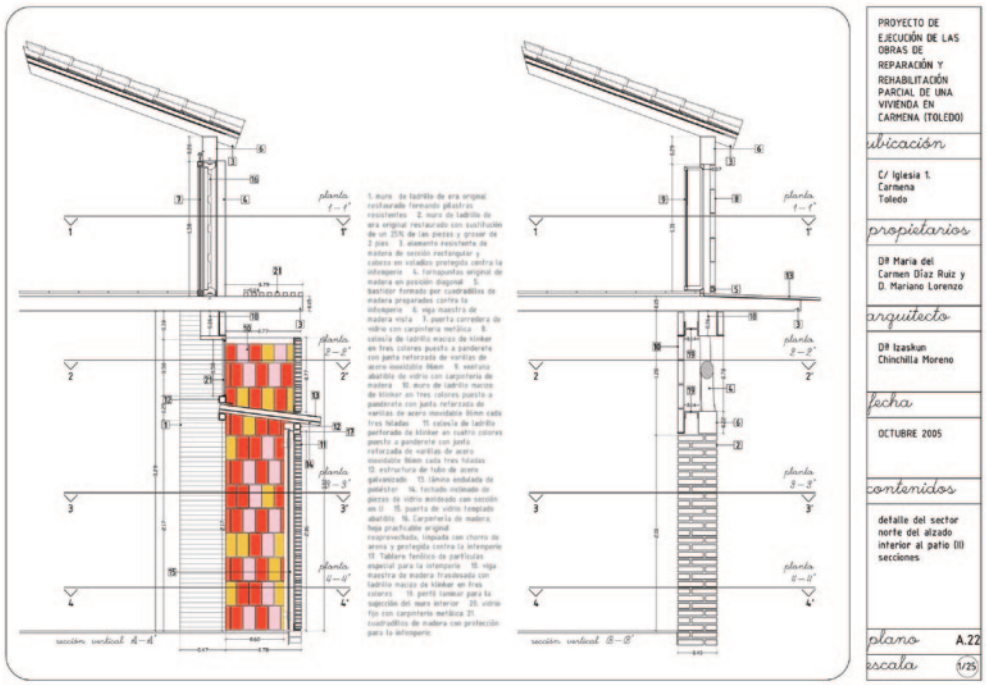
Preparation of salvage materials for reuse

The use of salvaged elements inverts the usual design methodology where the architectural design is made prior to the purchase of materials and fabrication. Once we had found suitable building elements to salvage, each one had to be cleaned, refurbished, tested for structural resistance, measured and drawn; only after this process were we able draw the plans. The technical procedures to repair and clean most of the materials included: sanding or sandblasting (removing about 0.2mm of the surface), chemical vacuum

treatment of the wood and polyester-fibre reinforcement of ceramics.

Digital drawing (2D and 3D) to design the new building components and incorporate them into the existing building

Once all of the salvage materials were prepared for reuse, 2D and 3D digital drawings were used to thoroughly explore possible designs, decide on the architectural composition and ensure suitable interconnections between the existing, salvaged and new building components.



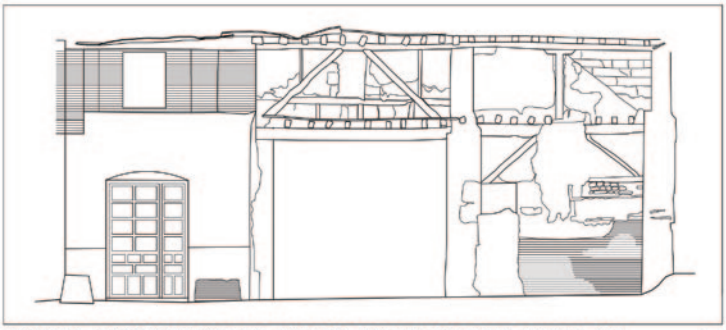
22a

19 *(previous page)*
Colour applications in the upstairs bedrooms
Photograph Maria Carmona

20 *(previous page)*
Colour applications in the outdoor changing room
Photograph Borja Lorenzo

21
First courtyard canopy designed to support solar panels
Photograph Maria Carmona

22a
Kitchen brick lattice: cross section



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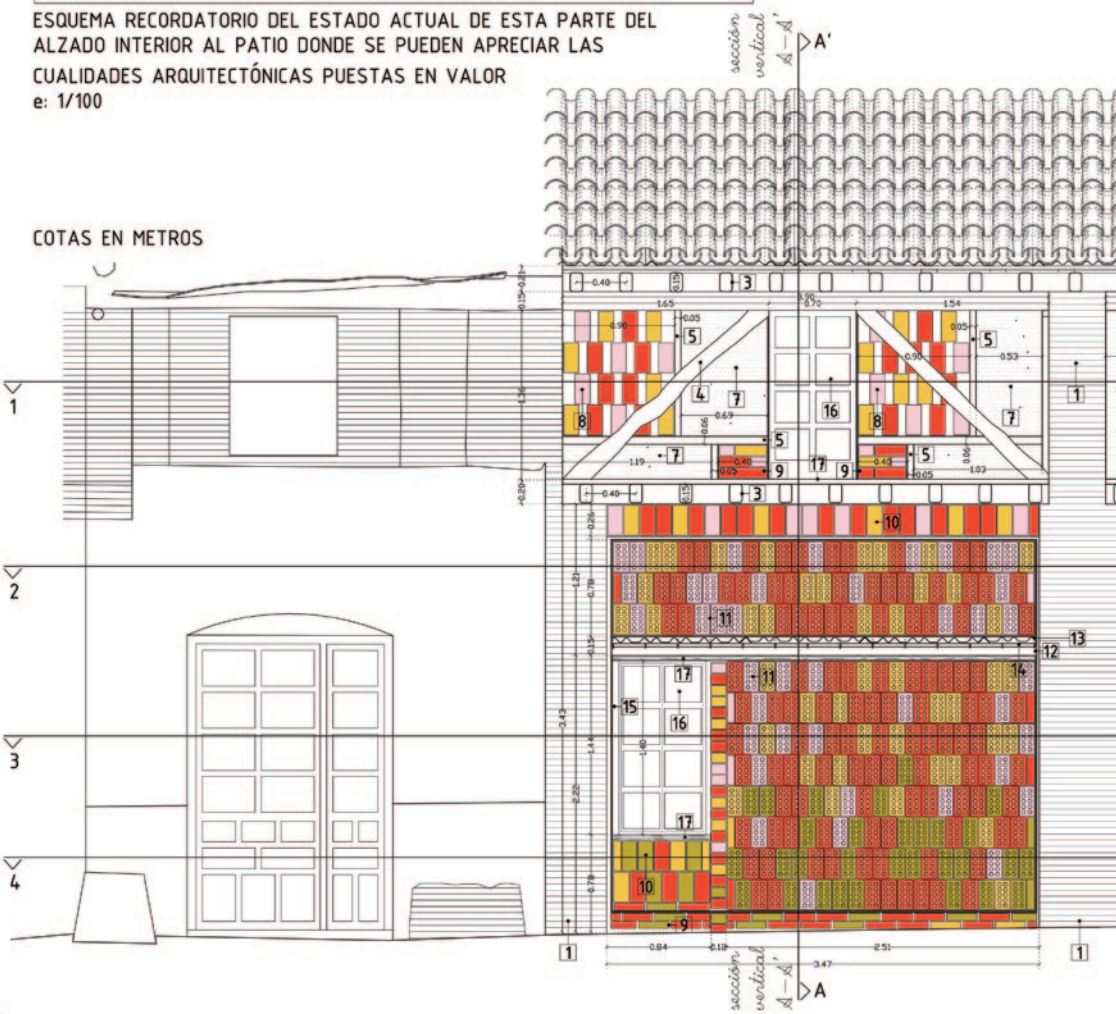
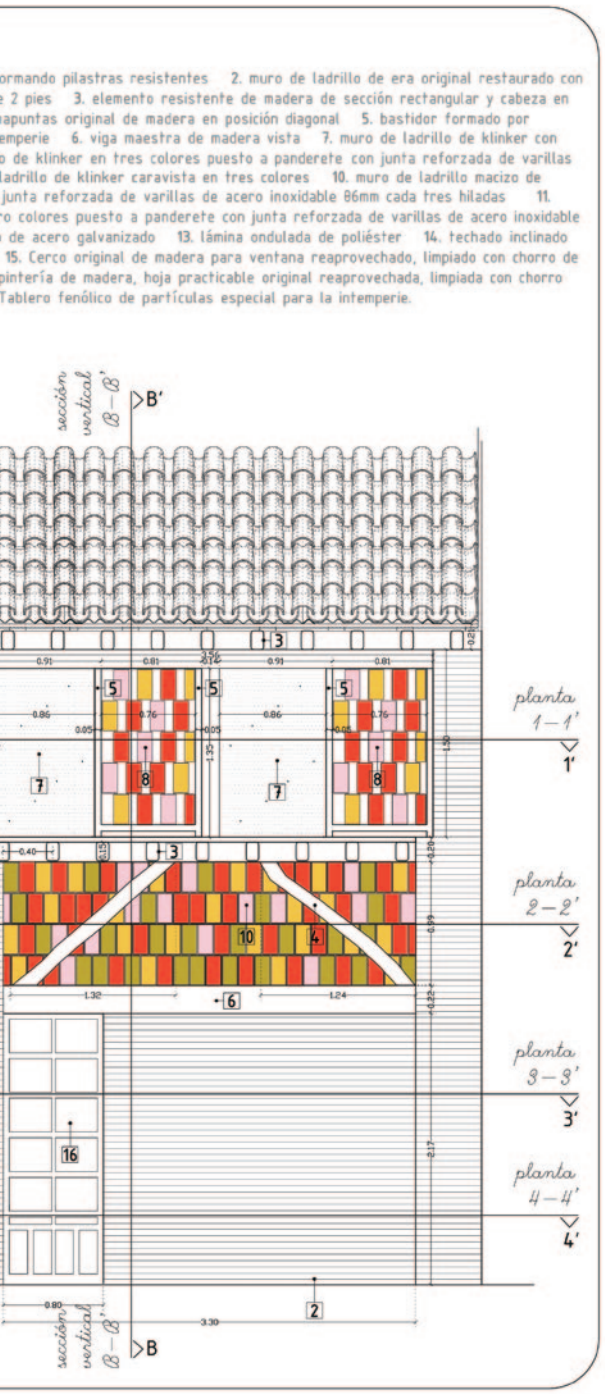




PROYECTO DE EJECUCIÓN DE LAS OBRAS DE REPARACIÓN Y REHABILITACIÓN PARCIAL DE UNA VIVIENDA EN CARMENA (TOLEDO)

ubicación

C/ Iglesia 1.
Carmena
Toledo

propietarios

Dª Maria del Carmen Díaz Ruiz y D. Mariano Lorenzo

arquitecto

Dª Izaskun Chinchilla Moreno

fecha

OCTUBRE 2005

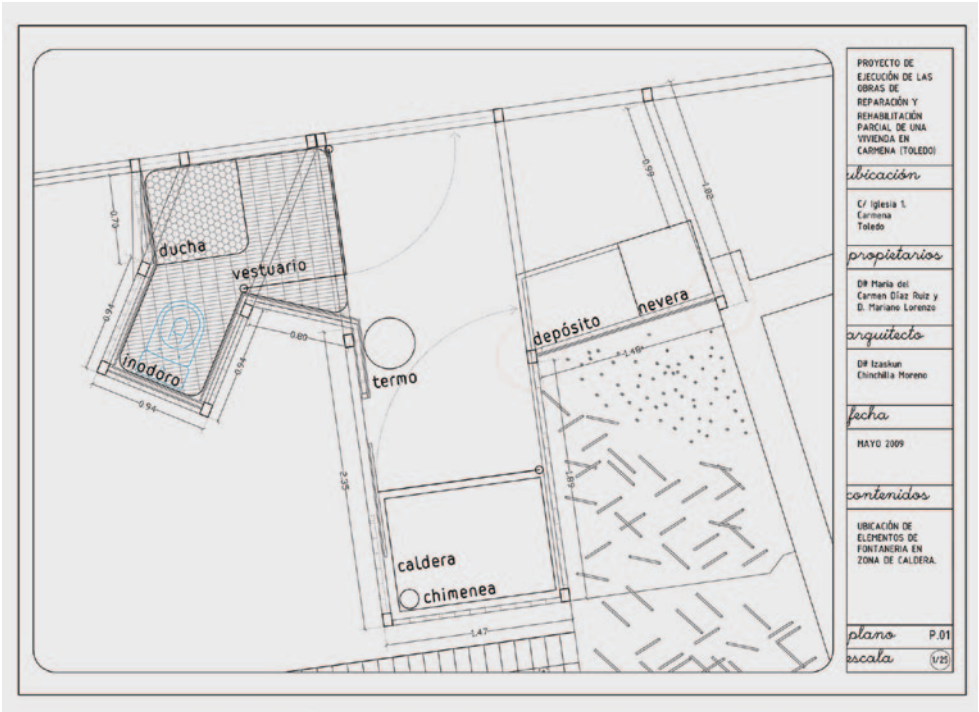
contenidos

detalle del sector norte del alzado interior al patio (I) alzado

plano A.21

escala 1/40

22b
Kitchen brick lattice: elevation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ubicación
C/ Iglesia 1.
Carmena
Toledo
propietarios
Dª María del Carmen Díaz Ruiz y D. Mariano Lorenzo
arquitecto
Dª Izaskun Chinchilla Moreno
fecha
MAYO 2009
contenidos
UBICACIÓN DE ELEMENTOS DE FONTANERIA EN ZONA DE CALDERA.
plano P.01
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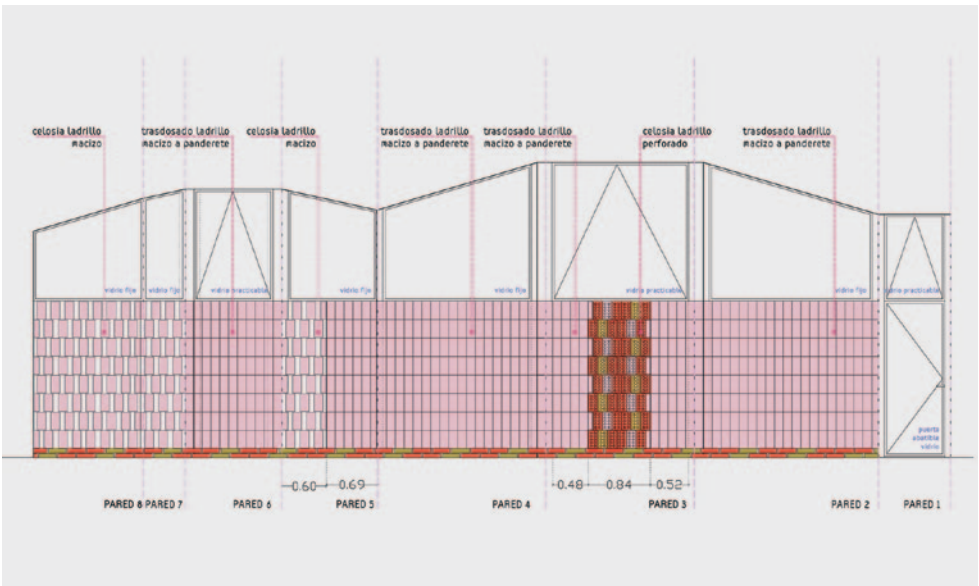
23a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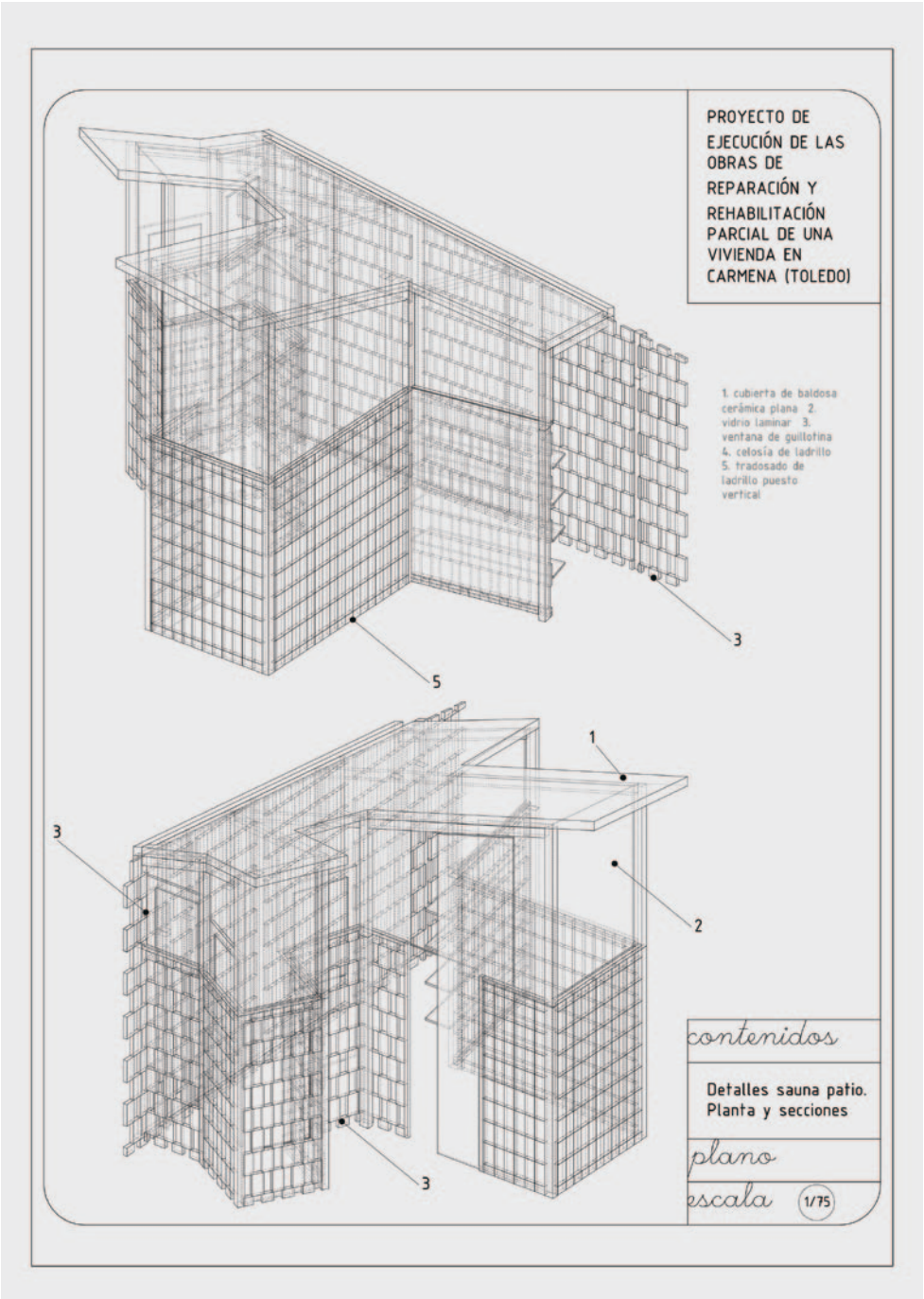
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contenidos
Detalles sauna patio. Planta y secciones
plano
escala 1/75

23c

Natural ventilation, temperature and light studies to optimise indoor comfort and reduce energy consumption

The whole refurbishment is driven by environmentally friendly design principles [fig. 21–23]. These include:

— Refurbishing vernacular buildings and enhancing their use of passive ventilation and locally sourced technologies;

— Employing elderly local workers whose crafts are increasingly rare;

— Reducing carbon emissions (e.g. by salvaging local materials to reduce transport and fabrication costs);

— Installing solar panels into the courtyard for heating the house and pool.

Thermal design required eight different types of windows combined with brick lattice to be tested. The brick lattice was combined with superior glass pieces in a number of ratios of brick to glass for each of the house's windows, depending on their orientation. All combinations were tested on-site to reach optimal results in terms of light and thermal insulation. [fig. 24–26]

Visual and contextual research to design the garden and technical consultancy on salt depuration techniques for the outdoor swimming pool

The courtyard is a filter between the public space and the intimacy of the house, and is part of the traditional sequence of spaces in Arab housing. We retained this typology as part of the area's cultural history, and decided to tile it and add a pool. To achieve the final design we researched impressionist paintings that create the illusion of nature using only spots of colour of different sizes and intensity. This logic also informs the artificial lighting design, in which a brick lattice is pierced with tiny holes that introduce thousands of small spots of lights. [fig. 27–29]

Technical consultancy on salt depuration techniques for the outdoor swimming pool was supplied by Hindritec (www.hidritec.com).

23 ***(previous page)***
Details of the façades changing with orientation:
(a) plan
(b) elevation
(c) axonometric view

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Brick lattice with eastern orientation in kitchen
Photograph Maria Carmona

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25
Exterior wood protection with south-western orientation
Photograph Carlos Lozano

26
South façade of changing room using solar chimney techniques
Photograph Carlos Lozano

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27 ***(previous page)***
Night view of courtyard
Photograph Borja Lorenzo

28
Fake shadows drawn in the blinds
Photograph Carlos Lozano

29
Both the floor and the covering sunshade imitate 'natural' patterns of light, shadow and colour
Photograph Carlos Lozano

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Courtyard with the pool
Photograph Carlos Lozano

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Dissemination

Published in *Arquitectura Viva Monografías* (2010), *Diseño Interior* (2011), *Casos 2011: Curso de Arquitectura Sostenible* (2011), and the *arcVision Prize 2013: Women and Architecture* catalogue (2013).

Exhibited in *Innovacion Abierta: Arquitectura Española Contemporánea,* curated by Enric Ruiz Geli and Ariadna Cantis, an exhibition of innovative Spanish architecture presented in Panama City (2011). Contributed to the exhibition catalogue and website (2011).

Regional television coverage *Aqui vivo yo* from Castilla la Mancha TV dedicated a 20-minute programme to the house to help promote the preservation and refurbishment of rural heritage houses (17 June 2013).

The house refurbishment in Carmena was cited as one of the works leading to Izaskun Chinchilla being selected for an Honourable Mention in the Italcementi Group's arcVision Prize: Women and Architecture 2013. The jury included Shaikha Al Maskaru, Vera Baboun, Odile Decq, Victorie de Margerie, Yvonne Farrell, Samia Nkrumah, Kazuyo Sejima, Benedetta Tagliabue and Martha Thorne.

31
Hallway looking to the kitchen
Photograph Maria Carmona

32 *(overleaf)*
Living room
Photograph Carlos Lozano

Related publications by the researcher

Book chapters

pp. 52–54
Izaskun Chinchilla, 'Propuestas alternativas a la segunda vivienda en zonas semirurales' [Alternatives visions for weekend houses in rural areas]. ***Innovacion Abierta: Arquitectura Española Contemporánea*** **[Open innovation: Spanish contemporary architecture]. Panama City: Museo del Canal, 2011. 70–71.**

pp. 55–61
Izaskun Chinchilla, 'Tres prácticas habituales entre arquitectos que una visión integral de la sostenibilidad obligaría a cambiar' [Three common architectural practices, an integral vision of sustainability should force us to change]. ***Casos 2011: Curso de Arquitectura Sostenible*** **[Cases 2011: Course on sustainable architecture]. Las Palmas de Gran Canaria: Universidad de las Palmas, 2011. 44–49.**

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pp. 66–75
Italcementi Group, *arcVision Prize 2013: Women and Architecture* [catalogue] (Mar 2013): 16–22.

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'Architect Carla Juaçaba wins the arcVision Prize: Women and Architecture', *Italcementi Group* (8 Mar 2013): www.italcementigroup.com/ENG/Media+and+Communication/News/Building+and+Architecture/20130307.htm

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'Izaskun Chinchilla, House in Carmena, Toledo', *Arquitectura Viva Monografías* 145: *Houses in Detail* (Sep/Oct 2010): 46–57.

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Marta Pérez Astigarraga, 'Tradición del siglo XXI' [21st century tradition], *Diseño Interior 222* (Jan 2011): *Nuevo Románticos: La tradición de otra manera* [New Romanticism: Tradition the other way round]: 72–79.

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pp. 102–103
'LIGA 07: Casa, árbol, chocolate, chimenea', *Arquine* (29 Oct 2012): www.arquine.com/blog/liga-07-casa-arbol-chocolate-chimenea

pp. 104–106
Alexandra Molinare, 'LIGA 07 / Casa: árbol, chocolate, chimenea / Conferencia Izaskun Chinchilla', *Arch Daily México* (29 Oct 2012): www.archdaily.mx/event/liga-07-casa-arbol-chocolate-chimenea-conferencia-izaskun-chinchilla

p. 107
'Ancestral house, Toledo', *Archilovers* (11 Mar 2013): www.archilovers.com/p80117/Ancestral-House

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Hallway looking to stairs
Photograph Maria Carmona

Bartlett Design Research Folios

ISSN 2753-9822

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objectif

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Proofreading:
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