2019 On Site Review Report

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Courtyard House Plugin

Beijing, China

Architect
People's Architecture Office

Client
Beijing Dashilar, Local Residents

Design
2013-2014

Completed
2016

Courtyard House Plugin
Beijing, China

I. Introduction

The Courtyard House Plugin by People's Architecture Office is a construction system comprised of prefabricated, interlocking panels that allows for the swift, affordable and durable retrofit of small-scale residential units within dense urban environments such as Beijing's traditional hutong (courtyard and alleyway) neighbourhoods. Adapting technology from the refrigeration industry The Plugin was first commissioned in 2013 by government-backed development initiative Dashilar Platform as a demonstration project for upgrading dilapidated units within one of the most centrally located of Beijing's traditional hutong neighbourhoods. Following the success of this original demonstration, the system has been implemented in other locations across Dashilar and further afield, including Shenzhen, enabling long-standing residents to avoid displacement from their communities and at the same time reactivating abandoned sites as affordable living and working spaces for young newcomers seeking sociable city-centre habitats.

II. Contextual information

A. Brief historical background

Please note that the Courtyard House Plugin system has been implemented at two sites in Shangwei Village, Shenzhen (the permanent rehabilitation of two residential units as part of the 2017 Shenzhen + Hong Kong Bi-City Biennale of Urbanism\Architecture), in addition to Beijing, but in the interest of concision, the information provided in this section relates to the neighbourhood of Dashilar where it was first implemented as a pilot project.

Beijing's over-600-year-old Dashilar neighbourhood is the most central of its designated "historical cultural neighbourhoods", located immediately south-east of Tiananmen Square. Dashilar has a rich history of trade, craft and culture, and is identified as the origin point of both the Peking Opera and Beijing's financial industry. It has historically been an area of mixed incomes and ethnicities, including a long-standing community of Hui Chinese, one of the country's Muslim minority groups (reflected in the presence of a mosque and Muslim restaurants in the district), and remains home to many small family-run businesses.

Dashilar is one of the most visible of Beijing's remaining courtyard-and-alleyway hutong neighbourhoods, once a prevalent urban typology across the city. In the past two decades, and especially in the burst of redevelopment leading up to the 2008 Beijing Olympics, over 70% of the city's hutongs have been demolished. In many cases, the hutongs have been cleared to accommodate modern commercial and residential towers and blocks. In the case of the Qianmen neighbourhood located directly across the central north–south axis road from Dashilar, government renewal has instead taken the form of faux-historic reconstruction, which while it may attract tourists, has struggled to match the diversity and vibrancy of the hutongs that it replaced. Both "tabula rasa" and "re-creation" approaches have attracted public criticism.

At the same time, remaining hutongs like Dashilar contend with problems of their own: complicated property ownership and shifting government policies; dilapidated and often unsafe structures; scarce provision of modern infrastructure such as private toilets and showers; and a marginalised residential population that includes both long-term elderly residents who may be rich in local social connections but poor in terms of

capital to mobilise, and rural in-migrants whose legal status bars them from access to urban services. Some residents who held private title to their homes have chosen to take up government relocation programmes, providing funds (based on unit size) to move to modern dwellings further out in the city. Those living in smaller, state-owned, or informally occupied units have a harder (or impossible) time taking part in these programmes.

In 2011 Beijing Dashilar Investment Ltd (a government-backed development company) launched the Dashilar Project as an alternative development strategy for the district. Pursuing a "soft", "nodal", "curatorial" approach to regeneration, Dashilar Project's stated aim is to "re-envision the area's past to promote a heterogeneous yet interdependent mix of business and people both old and new, restoring Dashilar's deserved prosperity, traditional vibrancy, and place within the city". In practice, this has entailed an almost overwhelming array of different projects by designers, architects and curators inserted within the district's buildings and public spaces, and an influx of younger, creative entrepreneurs and visitors, most notably during Beijing Design Week, which receives intensive local and international industry attention every autumn.

B. Local architectural character, including prevalent forms and materials

The area is densely populated low-rise. A survey by the redevelopment client revealed that the average residence's gross floor area is 22 square metres and that many nuclear families inhabit spaces of only 10 to 15 square metres. The majority of buildings are single-storey courtyards or bungalows. Many of the courtyards date from the Ming and Qing dynasties. These are interspersed with buildings from the early Republic of China period as well as those extending up to the present day. Courtyards which were traditionally inhabited by a single, extended family, have been cumulatively infilled by newer arrivals. A neighbourhood building survey classified the quality of the majority of the buildings in the district as "Poor Structure/No Facilities/No Maintenance". The same survey identified at least 200 vacant spaces within courtyards. Prevalent materials include timber, brick (including traditional grey "Beijing brick"), and tiled roofs. Most of the older buildings have pitched roofs. More recent informal extensions have been built with flat roofs and using an ad hoc collection of materials, including render and double-glazed vinyl-framed windows and doors.

C. Climatic conditions

Beijing has a continental climate, with hot, humid, rainy summers and cold, dry winters. June–August average high temperatures are 30/31°C, with perceived temperatures significantly higher than this due to high humidity. During the winter months, average temperatures hover below freezing. Air quality is often an issue, due both to dust from the desert areas of Mongolia and Central Asia, and smog from regional industry.

The humid summers and freezing winters both have significant impacts on residents living in poorly insulated and under-serviced old buildings. Hutong residents must air their bedding daily to prevent mould, and stories circulate of elderly residents freezing to death whilst using the public toilet facilities in the depths of winter.

D. Immediate surroundings of the site, including architectural character, access, landscaping, etc.

The pilot Plugins were implemented in courtyards typical of overall Dashilar character: dense, low-rise, and mixed; as described in the previous section.

Immediate circulation routes are by narrow, paved alleyways, which are heavily used as public spaces, with residents sitting out and socialising, walking their dogs, conducting business, and parking and charging their ubiquitous electric scooters.

Please consult "Map of Dashilar Plugins" to show relation of completed sites to the broader historic area and sites identified for potential future restoration.

E Topography of the project site

The Dashilar area is generally flat, although the courtyards' internal levels are of varied depths, due to historic building up of the ground plane over time.

III. Programme

A. History of the inception of the project; how the project was initiated

In 2013, the Dashilar Project began its "Dashilar Pilot Project", inviting architects and planners to submit proposals for building restoration. In the Pilot Project's first three years it assembled a database of over 100 proposals, of which only a few were able to pass the hurdles of a long approvals process involving government agencies as well as local community endorsement. Some of the few successfully implemented during this period include the Micro Yuan'er project by Zhang Ke (AKAA winner in the last cycle), and the first Courtyard House Plugin pilots, introduced to the public during Beijing Design Week 2014.

B. How were the architects and specialists chosen?

On the basis of the quality of their past work, People's Architecture Office were recommended to Jia Rong, Curator of Dashilar Platform by Yijing Xu and Neill Mclean Gaddes of the SANS practice, who were closely involved in Beijing Design Week programming in Dashilar.

C. General programme objectives

The Dashilar Pilot Project tasked its architects to address the following site conditions and constraints:

- Cumulative infill to traditional courtyards
- Dilapidated condition of structures
- Small unit sizes
- High-density occupation
- Minimal infrastructure (toilets, showers, heating systems)
- Complicated ownership structures
- Complicated policy landscape
- Residents' stated prioritisation of living conditions over historic preservation: "improve infrastructure, building quality and interior space usage efficiency".

Any changes to the original structure of a building in Dashilar requires an extensive approvals process: restoration plans are prohibited from exceeding original building height and from changing its style, size or location.

In the case of renovated vacant properties, only a limited number of uses were permitted to avoid competition with existing local businesses, including office space, residential space and temporary accommodations (for example hostels).

D. Functional requirements (i.e. architect's brief)

The first Plugins followed different briefs:

For the Courtyard House 72 North Plugin House location, Dashilar Platform wanted a space for their curatorial team to work, and in which they could host informal events such as community gardening workshops; in the facing (South) unit, they wanted a temporary accommodation space that could host one to two short-stay guests.

For the Courtyard House 37 location, comprising four different interventions within the existing courtyard structure, People's Architecture Office designed the scheme to accommodate their own working space, for a team of 20 staff, including a formal meeting room, informal flexible meeting and dining area, model-making workshop, kitchen, toilet and storage areas. In the remaining residential unit within their courtyard, they redesigned the existing dwelling of Mr Sun and his adult daughter.

A subsequent Plugin, the first private commission, came from Mrs Dong, for her home in the same Courtyard House 72 as the previous interventions. Mrs Dong sought to renovate her existing dwelling, shared with her adult son.

IV. Description

A. Building data: volumetry, massing, number of units, surface in square metres, etc.

Different iterations of the Plugin system have taken different shapes and sizes, although all have worked within the existing frameworks of the hutong structures. Projects have ranged in size from 5.6 square metres (a house for private client Mr Zhao) to 117 square metres (the total area of People's Architecture Office, comprising four different interventions). All of the hutong inserts are single-storey, although some include mezzanine levels or roof terraces.

For easy comparison, including client names, locations, floor area, date of completion, plans and sections please consult "Catalog of Built Plugin Houses".

B. Evolution of design concepts, including

1. Response to physical constraints – siting, climate, plot ratios, etc.

In the case of buildings deemed historically important by the authorities, the Plugin system is inserted within the existing structures: it never touches or is fixed to them, and often seeks to draw attention to the historic fabric by exposing it (for example via skylights that allow a view to the original roof structure above) or bringing it into relief (for example by the juxtaposition of the old painted timber window frame in front of the new metal-finished panel. In the case of buildings deemed replaceable, the Plugin structure replaces the demolished building on its existing footprint.

The Plugin panel's high insulation value is specified to create more comfortable living environments during Beiing's humid summers and cold winters. At client requests, the architects have also sought to maximise daylighting to the buildings, combatting the darkness of their built-up contexts.

The architects have conductive extensive urban-scale analysis of the many different types and sizes of Dashilar's courtyard houses, optimising panel size parameters for best fit, establishing suggested guidelines to govern the permitted rebuilding of informal additions within the courtyards to help to rationalise circulation in public areas, and even created a matrix of suggested optimal programmatic configurations depending on building type. (Please see "Plugin House Manual" for illustrations.)

2. Response to user requirements; spatial organisation

When possible, the architects have tried to create connections to the public areas of the courtyards, for example through the creation of fully opening façades, rooftop terraces, or expandable outdoor shower areas. Later iterations of the system have created thinner walls and pitched roofs (housing mezzanines for sleeping areas for example) to maximise internal usable areas for their occupants.

3. Purely formal aspects – massing, articulation of façades, decorative features, use of traditional motifs, etc.

In keeping with their industrial origins, and in order to bring the historic fabric they are adjacent to into relief, Plugins deploy a very simple, functional aesthetic. Surfaces tend to be white, or metallic (steel, or gold-tone).

4. Landscaping

After new septic tank systems are installed, the courtyards' ground surfaces have been rebuilt in either timber (Courtyard House 72) or brick (Courtyard House 37).

The courtyards contain various potted plants, most decorative, some edible, in keeping with the general ambiance of the area, which has a growing community gardening movement, actively encouraged by Dashilar Project. One of the Plugins has a small bamboo plant growing directly in the ground beside its operable façade.

C. Structure, materials, technology

1. Structural systems; in restoration projects, structural interventions

The Plugin modules incorporate structure, insulation, wiring, and interior and exterior finishes in prefabricated panels; installation and assembly with a hex-wrench requires no more than one day, and can be done without specialised labour.

Developed in partnership with a refrigerator manufacturer, the Plugins' adjustable moulds allow the prefabrication of custom shapes and sizes without significantly increasing cost; mezzanine levels (supported by additional columns, which the panels can be cut to accommodate) can be specified to increase usable space.

Panels can be moulded as flat, 90 degree or 120 degree variations.

2. Materials

The sandwich panels comprise a layer of high-density, closed-cell polyurethane insulation between two sheets: sheet metal on the exterior, and the interior is magnesium oxide drywall, which is fibre reinforced, water resistant and fire resistant.

The panels lock together with integrated metal cam-locks, inserted during the moulding process and operable with only a hex wrench. The closed-cell polyurethane foam excludes water penetration. The continuous use of the panels for ceiling, walls and roof prevents thermal bridging.

Because the panel moulding process does not generate any surface heat, nearly any finish material can be bonded to it. Both external and internal finishes are integrated into the panels, and can be specified by the clients. External finish options include 304 stainless steel and ALUCOBOND.

Different doors and windows, for example aluminium broken bridge frames or double-glazed windows, can be specified according to client budgets and tastes.

3. Construction technology

The system is explicitly designed to be installed by small teams of unskilled workers, requiring no special machinery or equipment. The lightweight prefabricated panels are cheap to transport from the factory, and can be easily carried in and erected by hand, and installed using only a hex wrench, which activates the integrated panel locks.

4. Building services, site utilities

The panels integrate electric wiring and lights. In the residential units, small kitchen units contain built-in ovens, ventilation hoods and sinks. Sanitary systems comprise standalone composting toilets, for individual units, or shared septic tank systems, for larger courtyard refurbishments.

D. Origin of

1. Technology

China.

2. Materials

China.

3. Labour force

China.

4. Professionals

Architects: China (one of the architectural principals is Chinese American, the other two are Chinese nationals).

Contractors: China.

Consultants: China.

V. Construction schedule and costs

A. History of project design and implementation, with dates

Beijing

Original project for Dashilar Project (Courtyard House 72):	commissioned 2013
Original project design:	2013–2014
Original project construction:	2014
Original project completed:	2014
Subsequent projects (rolling commission, design, construction, completion phases):	2014–2016

Shenzhen

Projects for Shenzhen + Hong Kong Bi-City Biennale (rolling commission, design, construction, completion phases):	2016–2017

B. Total costs and main sources of financing

Year	City	Property	Area m^2	Construction cost USD	Client	Design free USD
2013	Beijing	Initial Plugin design concept	–	–	Dashilar	1,500
2014	Beijing	Courtyard House 72 North Plugin House	43.7	26,900	Dashilar	7,000
		Courtyard House 72 South Plugin House	20.3	14,200		7,000
2015	Beijing	Courtyard House 37 North Plugin House A	48.7	23,000	People's Architecture Office	0
		Courtyard House 37 North Plugin House B	46	21,700		
		Courtyard House 37 East Plugin House	11.9	5,600		
		Courtyard House 37 West Plugin House	10.4	4,900		

Year	City	Property	Area m^2	Construction cost USD	Client	Design free USD
2015	Beijing	Plugin House	–	–	–	0
		Mrs Dong Plugin House	14.1	6,700	Mrs Dong put in 1,500 USD, the rest was subsidised by Dashilar	949
		Courtyard House 37 South Plugin House	28.7	9.500	Dashilar	4,550
		Mr. Sun's Plugin House	17.1	4,200		
		Courtyard House 30 North Plugin House	8.4	5,631		
		Courtyard House 30 East Plugin House	14.6	10,400		
		Courtyard House 32 North	24.5	13,675		
		Courtyard House 32 South	22.8	9,000		
2016	Beijing	Mrs Fan's Plugin House	13.6	14,100	Mrs Fan	2,695
		Mr Zhao's Plugin House	5.6	4,900	Mr Zhao	2,594
2017	Shenzhen	Mr Huang's Plugin House	11	8,900	Mr Huang	4,448
	Shenzhen	Mr Fang's Plugin House	15	13,400	Mr Fang	4,448
	Rural site	Mr Zhe's Plugin House	35	31,300	Mr Zhe	7,414

C. Comparative costs (if relevant)

Typical cost of government-renovated projects: 5,000 – 6,000 RMB/m^2

Plugin House renovation cost: 2,500 – 3,500 RMB/m^2

D. Qualitative analysis of costs (per square metre, per unit, etc.)

For an extensive and informative comparison of the costs vs conventional renovation, please consult "Plugin House Manual".

E. Maintenance costs (heating, cooling, etc.)

- Energy use comparison:
  Typical courtyard house: 2,780 kw/h each year
  Plugin House: 916 kw/h each year

- Septic system maintenance cost:
  Courtyard 72 septic tank: 1,000 RMB every 5 years
  Courtyard 37 septic tank: 800 RMB every 3 years
  Mrs Fan Plugin House composting toilet: 400 RMB per year

F. Ongoing costs and "life performance" of building, in terms of materials, maintenance, etc.

Not applicable.

VI. Technical assessment

A. Functional assessment (use)

The Plugins are well designed for their designated functions, effectively maximising the usability of limited available space.

B. Climatic performance, lighting, natural and/or mechanical ventilation, sun control, insect control, acoustics, orientation, etc.; description of systems developed and utilised

The panels are insulated, aiding thermal regulation and limiting noise transfer, and integrate electrical wiring and low-energy lighting. All of the windows, skylights and doors are manually operable to allow for natural ventilation and flexible interactions between the private indoor spaces and semi-public shared courtyards.

C. Response to treatment of water and rainfall; discharge of water, and retention and release system(s), if any

Not applicable.

D. Environmental response; adaptation to the natural environment; adaptation to native flora and fauna

Not applicable.

E. Choice of materials, level of technology

The choice materials and levels of technology are well considered and appropriate to the project context and client needs.

F. Response to, and planning for, emergency situations, i.e. natural disasters, floods, winds, fires, earthquakes, etc.

Not applicable.

G. Ageing and maintenance problems

The Plugins in Dashilar are robustly built and are generally holding up well after four to five years of active use. A few minor maintenance problems were reported by residents. The primary reported maintenance challenge relates to the sanitary systems: composting toilets (standalone Plugins) and septic systems (multiple Plugins around a shared courtyard). Users of the former reported difficulties getting used to the upkeep of the different system (which requires regular addition of special bacteria to aid the breakdown of solid waste), and the latter said that smells could sometimes be a problem in common areas during warm weather. One resident mentioned that because the shower room floor is flush with the external floor, overspill can be a problem, but no water damage was evident at the threshold. The expandable outdoor shower custom designed for Mrs Dong freezes during winter months.

H. Design features: massing and volume, articulation of spaces, integration into the site (topography and neighbouring buildings)

The massing and volume of the Plugins are always dictated by their existing structures and plots, either as infill within existing walls and roof structures, or replacing a demolished (non-historic) structure on its original built footprint.

I. Impact of the project on the site, in terms of increased circulation or vehicular movement, changes required for infrastructure (particularly for projects in high-density areas), etc.

One of the major advantages of this technology is its ability to be installed with minimal site impact. As no machinery is involved in their assembly, the prefabricated panels can be carried in by hand if necessary – particularly useful in narrow alleyways that only permit pedestrians and two-wheeled vehicles. The sanitary systems – composting toilets and septic tanks – are also specified to operate independently of common sewage lines, which as previously mentioned are largely absent in Dashilar.

J. Durability and long-term viability of the project

The individual units are robustly built and their owners/users are keen to continue using them and to recommend the system to other potential clients.

K. Ease and appropriateness of furnishings; interior design and furnishing

In the private units, furnishings are provided by the respective owner, so vary considerably; the residents take pride in customising their spaces. In the commercial units (e.g. People's Architecture Office's own studio, and the co-working space and short term rental units originally commissioned by Dashilar Platform, some of the furniture is custom designed by PAO (which also has a product design division), for example triangular tables to fit into tight corners.

VII. Users

A. Description of those who use or benefit from the project (e.g., income level, socio-cultural profile, etc.)

The long-term residents of Dashilar's hutongs, some of whom have become clients for Plugin houses, are working-class Chinese of diverse ethnic backgrounds, many of whom have lived in the area for generations.

Intergenerational living is common, for example multiple clients are elderly residents sharing space with their adult children. Newcomers using the Plugins tend to be middle-income young Chinese professionals, who have moved to Beijing from elsewhere, working in the creative and service industries.

B. Response to the project by clients, users, community, etc.

1. What do architectural professionals and the cultural "intelligentsia" think about the project?

The project has been widely exhibited, awarded and written about within elite international circles of architecture and design (Venice Architecture Biennale, Shenzhen + Hong Kong Bi-City Biennale of Urbanism\Architecture, International Architecture Biennale Rotterdam, London Design Museum, Harvard Graduate School of Design, World Architecture Festival, Architectural Review, Abitare and so on – please see Section IX: Bibliography below for further details). Whilst the Dashilar Platform's "nodal approach" to regeneration and Beijing Design Week's temporary activations with which the project is affiliated have been met with mixed critical reviews, the Plugin project itself has generally been praised as one of the more convincing and long-lasting of the approaches generated by these cultural activities.

2. What is the popular reaction to the project?

Neighbours of the residential Plugin projects seamlessly interact with them as an integrated part of the hutong. The more public-facing office Plugins (the former Dashilar Platform offices, now a co-working space, and People's Architecture Office) are regularly visited by tourist/study groups, increasing their visibility.

The popular press in both China and abroad have expressed keen interest in the project as an innovative and affordable approach to the vexed problem of refurbishing Beijing's hutongs in a way that preserves and strengthens their communities as well as its application to other residential infill sites further afield.

3. What do neighbours and those in the immediate vicinity think about the project?

According to the client and architects, some neighbours were initially sceptical about the pilot versions initiated during Beijing Design Week, but their eventual embrace of the project is evidenced by the decision of multiple local residents to commission Plugins for their own housing renovations using their own funds. Observed interactions between Plugin residents, including newcomers, and their neighbours are amicable.

Video interviews with various residents/clients can be viewed here:

- General overview with Wang family:
  https://www.dropbox.com/s/nrn0k1t49xez6vj/courtyardhouseplugin_CNN.mp4?dl=0
- Mrs Dong's Plugin House interview:
  https://vimeo.com/153077848
- Mrs Fan's Plugin House interview:
  https://vimeo.com/194316406
- Mr Zhao Plugin House interview:
  https://www.dropbox.com/s/6fkxiq4p08x83yx/Zhao%27s%20Plugin%20House.mp4?dl=0
- Plugin House openings:
  https://vimeo.com/153080055w

VIII. Persons involved

A. Identification of project personnel and their roles in the project (e.g., client, architect, planner, consultant, craftsmen, etc.)

Client:	Dashilar Platform, Beijing, China Jia Rong, founder
	Beijing Dashilar Investment Limited, Beijing, China Shao Wei, manager
	Mrs. Dong, Mr. Sun, Mrs. Fan and other plugin owners who wish to remain anonymous
Architect:	People's Architecture Office, Beijing, China James Shen, Feng Zang and Zhe He, founding partners
Strategic planning and place making:	SANS Practice, Shenzhen, China Xu Yijing, founding partner Neil Gaddes, founding partner
Curator:	Future Plus, Shenzhen, China Huang Weiwen, founder and director Chen Xue, manager

IX. Bibliography

A. List of publications

Exhibitions and Installations

- 2018 Across Chinese Cities – The Community, Venice Architecture Biennale, Venice, Italy
  Exhibition: People's Station, Urban Village Plugin House
- 2018 Boston City Hall, Boston, US
  Installation: Plugin House https://www.boston.gov/housing/plugin-house-initiative
- 2018 Harvard University Festival of the Arts, Cambridge, US
  Installation: Plugin House
- 2017 Design Museum, Beazley Designs of the Year, UK
  Exhibition: Plugin House
- 2017 Mass Interventions, People's Station, Yantai, China
  Retrospective Exhibition: Seven Years of People's Architecture Office and People's Industrial Design Office
- 2017 Bi-City Biennale of Urbanism\Architecture, Shenzhen and Hong Kong, China
  Exhibition: Courtyard House Plugin

- 2016 Towards a Critical Pragmatism: Contemporary Architecture in China, Harvard University GSD, Cambridge, MA
  Exhibition: Courtyard House Plugin
  http://www.gsd.harvard.edu/exhibition/towards-a-critical-pragmatism-contemporary-architecture-in-china/
- 2016 Sharing & Regeneration, Fondazione EMG dot ART, Venice Architecture Biennale, Venice, Italy
  Installation: Courtyard House Plugin
- 2016 China Pavilion, Venice Architecture Biennale, Venice, Italy
  Exhibition: Courtyard House Plugin
- 2016 The Next Economy, International Architecture Biennale Rotterdam, Netherlands
  Exhibition: Courtyard House Plugin
- 2015 Triennial China Design Exhibition, Guanshanyue Art Museum, Shenzhen, China
  Installation: Full-scale Plugin
- 2015 Bi-City Biennale of Urbanism\Architecture, Shenzhen, China
  Exhibition: Courtyard House Plugin
- 2014 Beijing Design Week, Beijing, China
  Installation: Courtyard House Plugin as "Dashilar Pilot"
- 2014 Across Chinese Cities, Venice Architecture Biennale, Venice, Italy
  Exhibition: People's Architecture Office as "Dashilar Pilot"
- 2014 Making Community, CFCCA Gallery, Manchester, UK
  Exhibition: Courtyard House Plugin
- 2014 CREATIVE©ITIES, Kaohsiung, Taiwan
  Installation: Courtyard House Plugin

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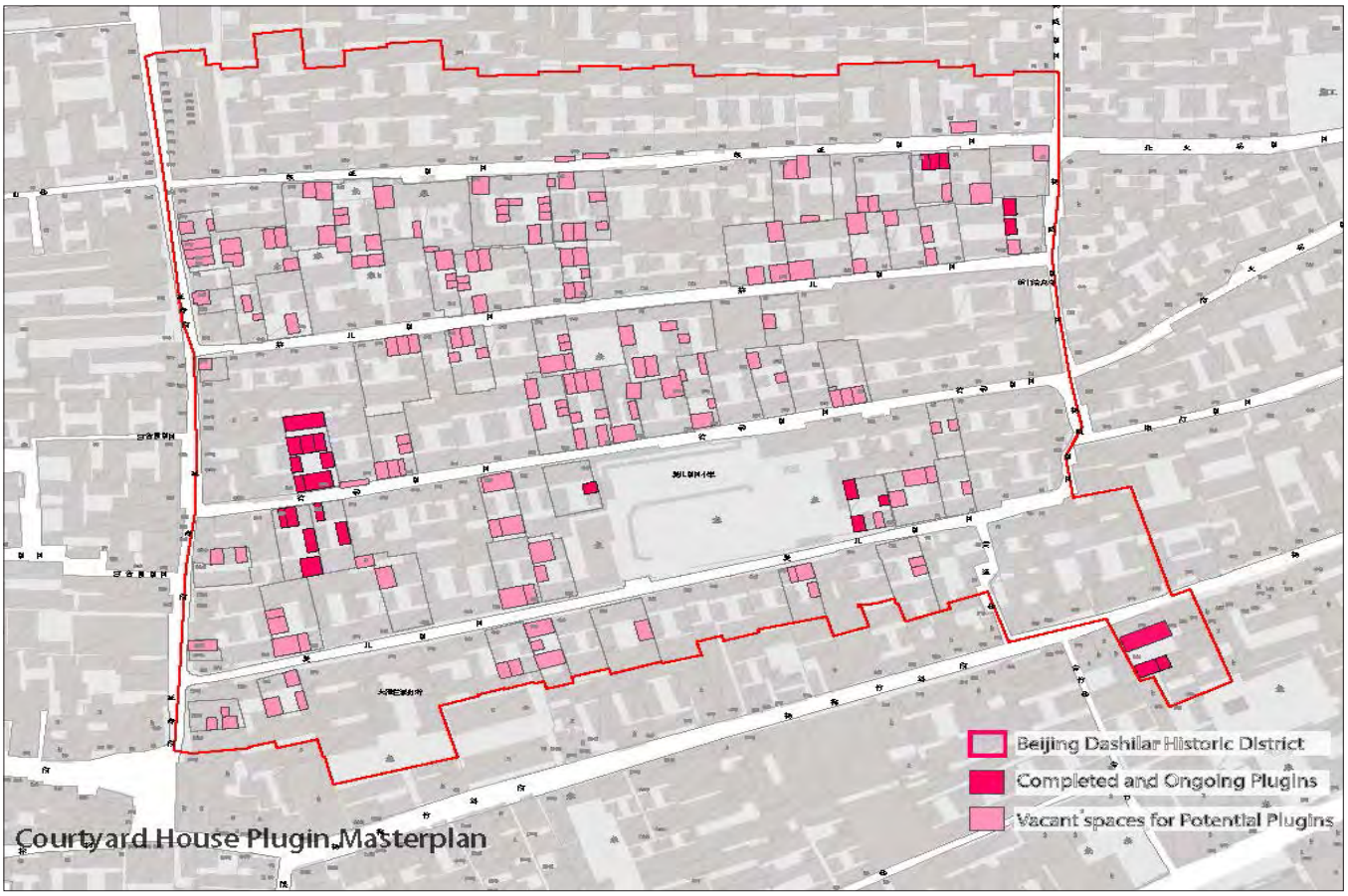
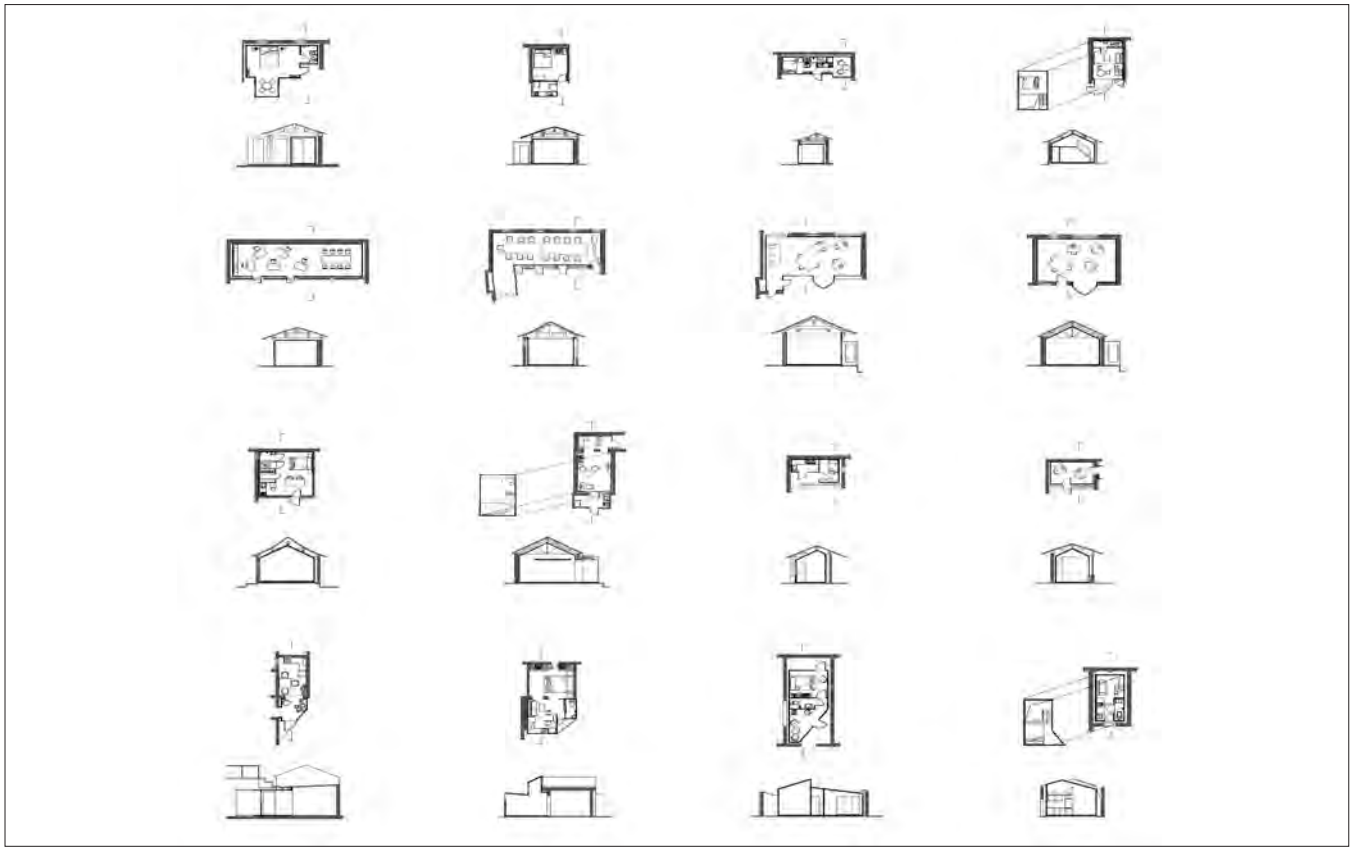
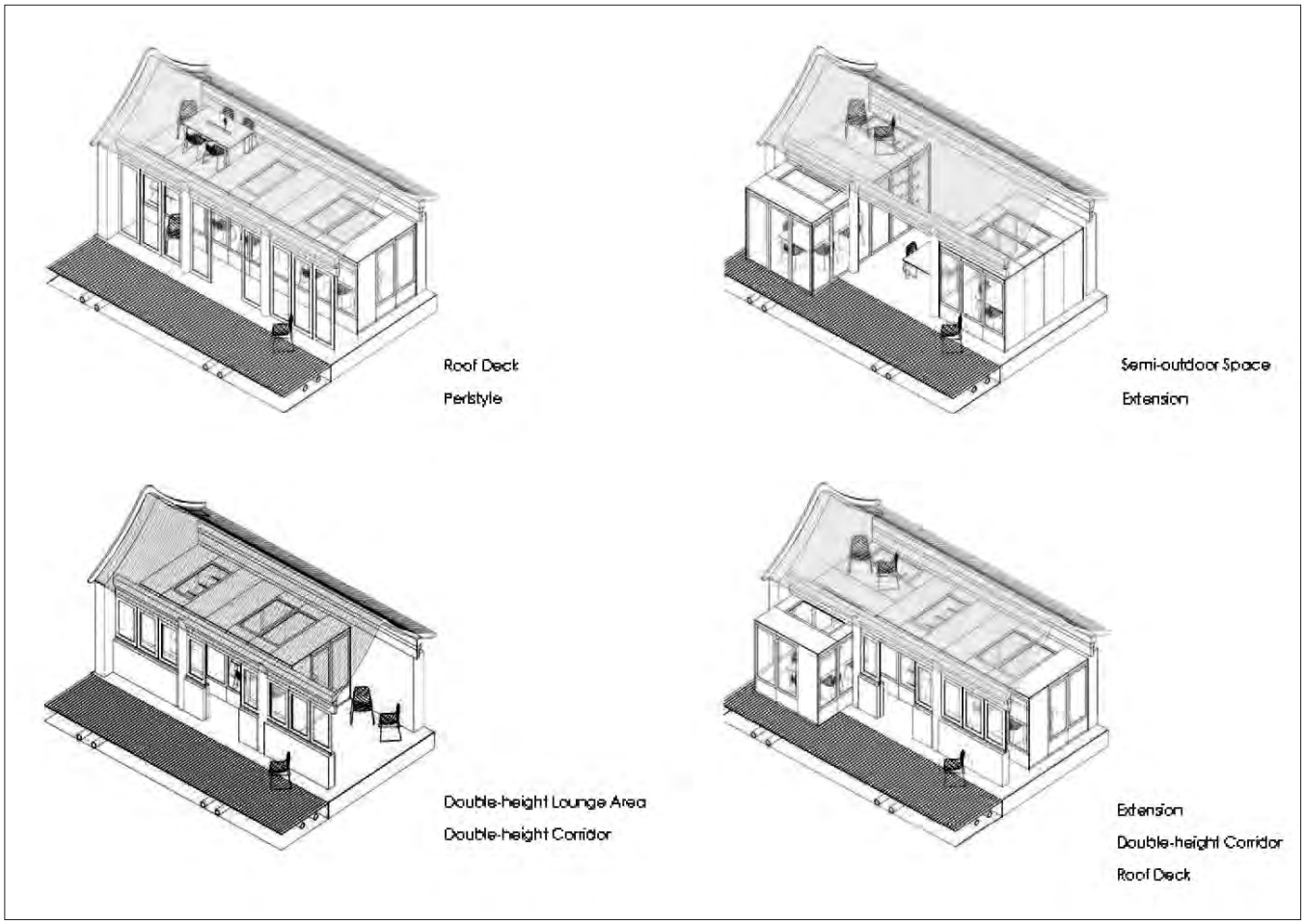
Mongolia
Beijing
CHINA
India
Myanmar

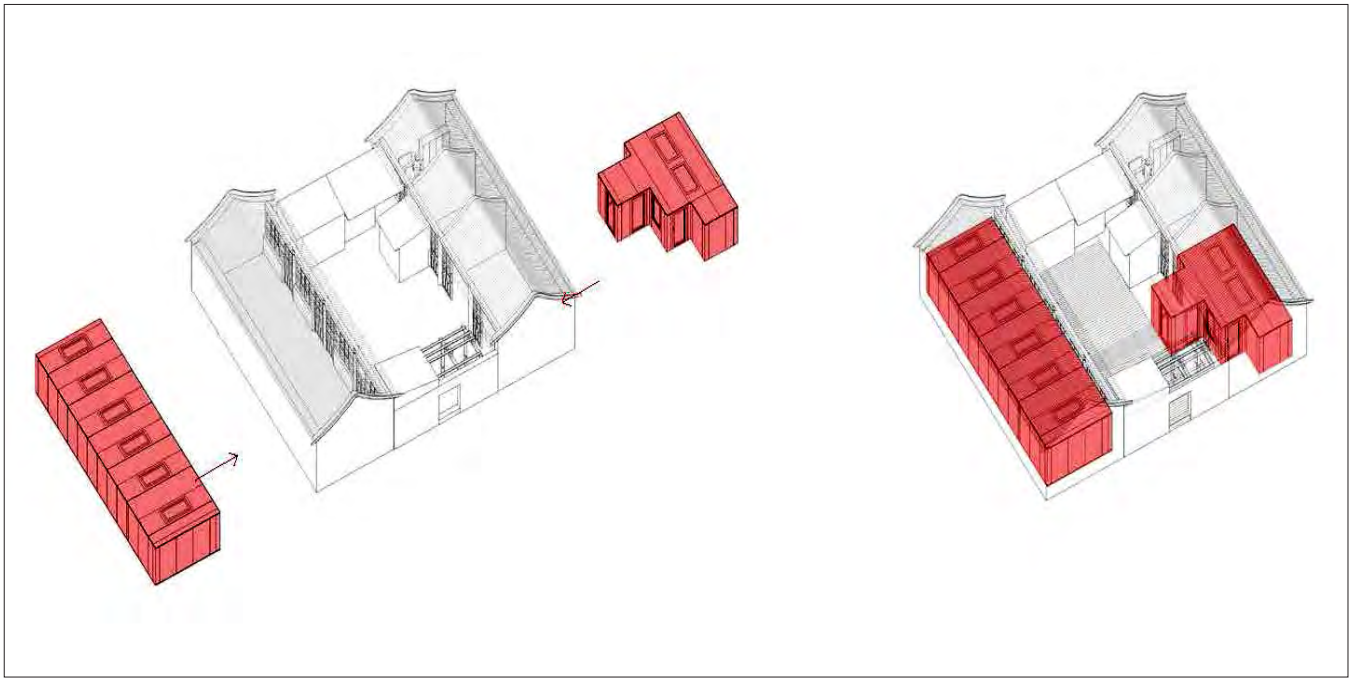

Beijing Dashilar Historic District
Completed and Ongoing Plugins
Vacant spaces for Potential Plugins
Courtyard House Plugin Masterplan



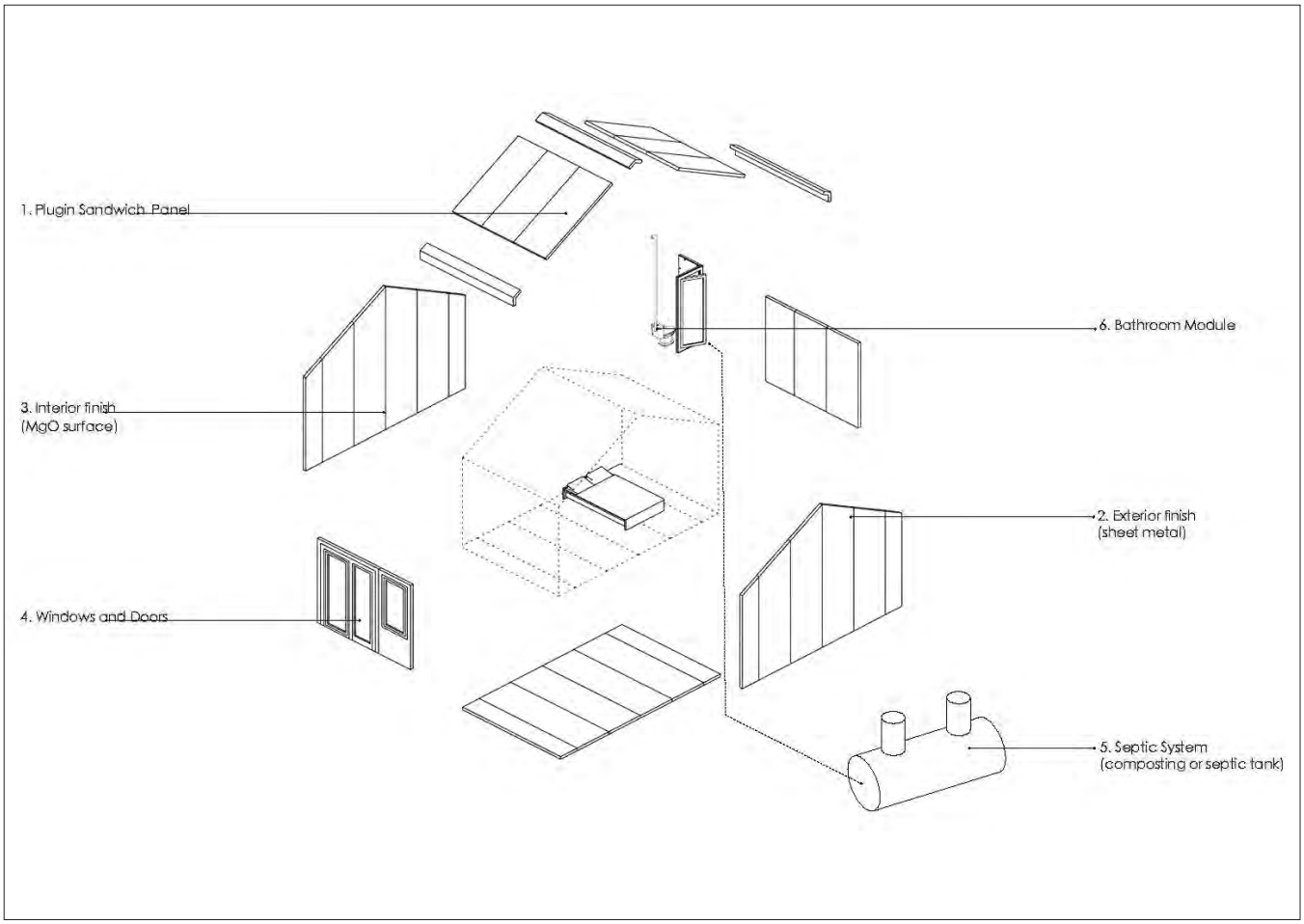
Matrix of Built Plugin Houses



Spatial configurations options



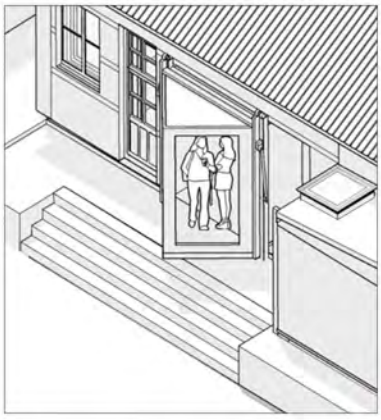
First implemented in the historic Muslim district of Dashilar and now on multiple urban sites including Shenzen, the system of pre-fabricated modular structure integrated within existing buildings provide new quarters in old settings.



Courtyard House Plugin Parts

The Courtyard House Plugin is the first prototype of a modern house designed to be inserted into an old house that has fallen into disrepair. It is a house within a house.

When closed, the triangular space adds extra space to the interior. To extend the interior space to the exterior, it opens vertically to provide an intimate connection between the interior and the yard.



Vertical Solarium Closed

Vertical Solarium Closed

Vertical Solarium Open

Vertical Solarium Open

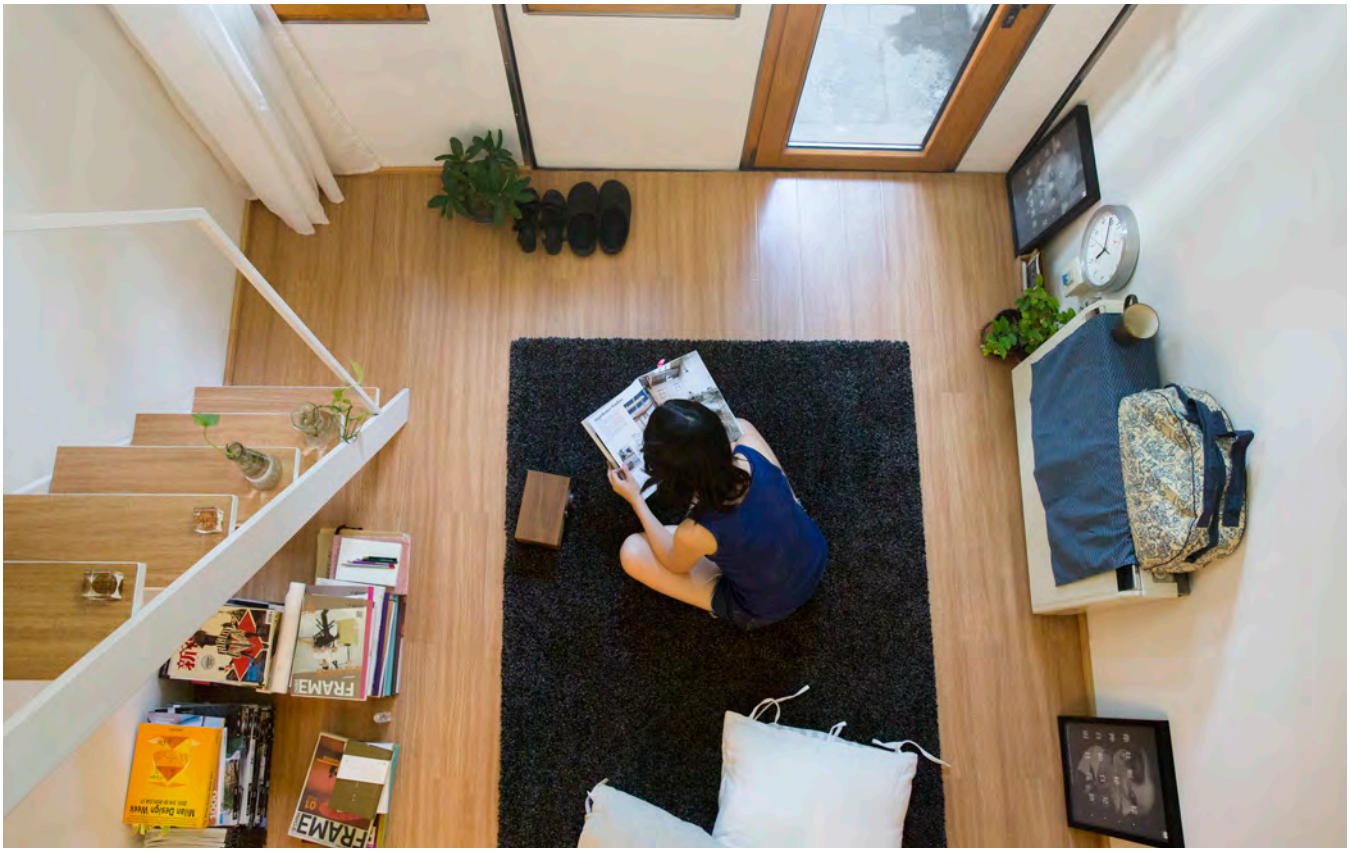
Plugin in Shenzhen. The Plugin system allows to upgrade, renovate and replace damaged old structures without demolishing historic buildings and relocating families. It is a way of preserving historic traces in old structures.

Plugin in Shenzhen. The modular system can be customized for each specific building, each specific space, size and location.

The Plugin uses prefabricated panels made of a composite that incorporates structure, insulation, wiring, plumbing, interior and exterior finishes into one molded part.

The architects have tried, when possible, to create connections to the public areas of the courtyards through the creation of opening façades.

The experimental Courtyard House Plugin, first introduced in 2014 in Dashilar during Beijing Design Week, has now expanded into a systematic solution for the historic neighborhood. The project has been implemented in Beijing as well as Shenzhen.



Creation of mezzanines allow residents to almost double their space by making use of the area under the pitched roof.

The implemented projects have convincingly displayed the system's potential to allow existing, usually older residents to upgrade their existing properties and remain within their communities (preventing displacement), whilst also rehabilitating abandoned properties to welcome new, usually younger users to the neighbourhood.

Courtyard House Plugin

Beijing, China

5258.CHI

2019 Award Cycle

Architect	*People's Architecture Office*
Client	*Beijing Dashilar, Local Residents*
Design	*2013-2014*
Completed	*2016*

This prefabricated modular system was first developed as a prototype for installation within courtyard houses in the traditionally Muslim district of Dashilar, in Beijing. The dense historic neighbourhood is home to disadvantaged communities who do not have the means to renovate the buildings. The Courtyard House Plugin initiative aims to upgrade dilapidated structures in an adaptable and cost-effective way, therefore both improving the residents' living conditions and preserving the original architecture. The modules comprise the structure, insulation, wiring, and interior and exterior finishes in prefabricated panels. Installation and assembly takes no more than one day and does not require specialised labour. The Plugins represent a radically new approach to urban upgrading in China, where vast areas are regularly torn down. The central government approved the first two prototypes, and to date, some 15 houses have been upgraded.

Courtyard House Plugin

Beijing, China

Architect	People's Architecture Office Beijing, China
Client	Central Government, Local Residents
Commission	2013
Design	2013 – 2014
Construction	2014 – 2014
Occupancy	2014
Site	443 m^2
Ground Floor	354 m^2
Total Floor	354 m^2
Costs	USD 157,000
Programme	The economical, pre-fabricated modular system is mounted within existing buildings to provide new quarters in old settings; it was developed as a prototype within courtyard houses in the traditionally Muslim area of Dashilar in Beijing. The modules comprise structure, insulation, wiring, and interior and exterior finishes in prefabricated panels; installation and assembly with a hex-wrench takes no more than one day, and without specialised labour. Adjustable moulds permit the prefabrication of custom shapes and sizes without significant increase in cost; mezzanine levels can be specified to double the amount of space in each unit. The central government approved the first two protypes, and the project has now been expanded to other cities in China.

Building Type	Conservation & Adaptive Re-Use
2019 Award Cycle	5258.CHI

Yangmeizhu 72, Wang Family Courtyard House

Courtyard House Plugin: A-House-Within-a-House

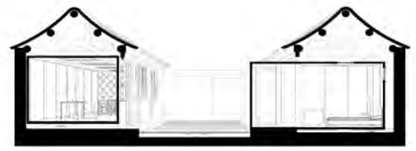
The Courtyard House Plugin is a prefabricated modular system for urban regeneration. Using a house-within-a-house approach, dilapidated structures can be upgraded without demolishing historic buildings and relocating families, keeping communities intact. The Courtyard House Plugin was initiated in Dashilar, home to one of Beijing's largest Hui Muslim communities. The Wang Family Courtyard House, above, was the first Plugin Project. The family has been a part of Dashilan's large Hui Muslim community for twenty-one generations.

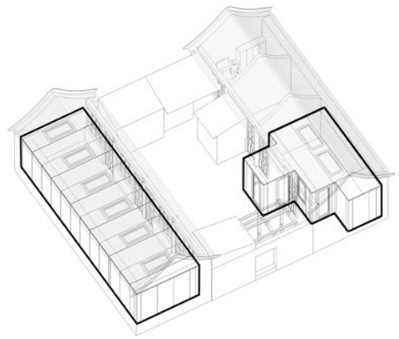
Plugin Panels snap and lock together with a single hex wrench, allowing the entire Plugin structure to be assembled by a few people needing no special skills or training. The result is a well-sealed and insulated interior that reduces energy costs by a third. 'Plugging in' is half the cost of typical means of construction.

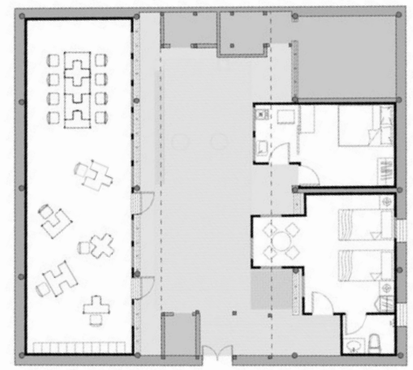
The construction process of Yangmeizhu 72's Courtyard House Plugins took only one day.

Preserved in its unedited state is the green color of the South House which symbolizes the Wang family's Muslim Heritage juxtiposed with the the red color of the Han Chinese, representing the complex history of the shared courtyard.

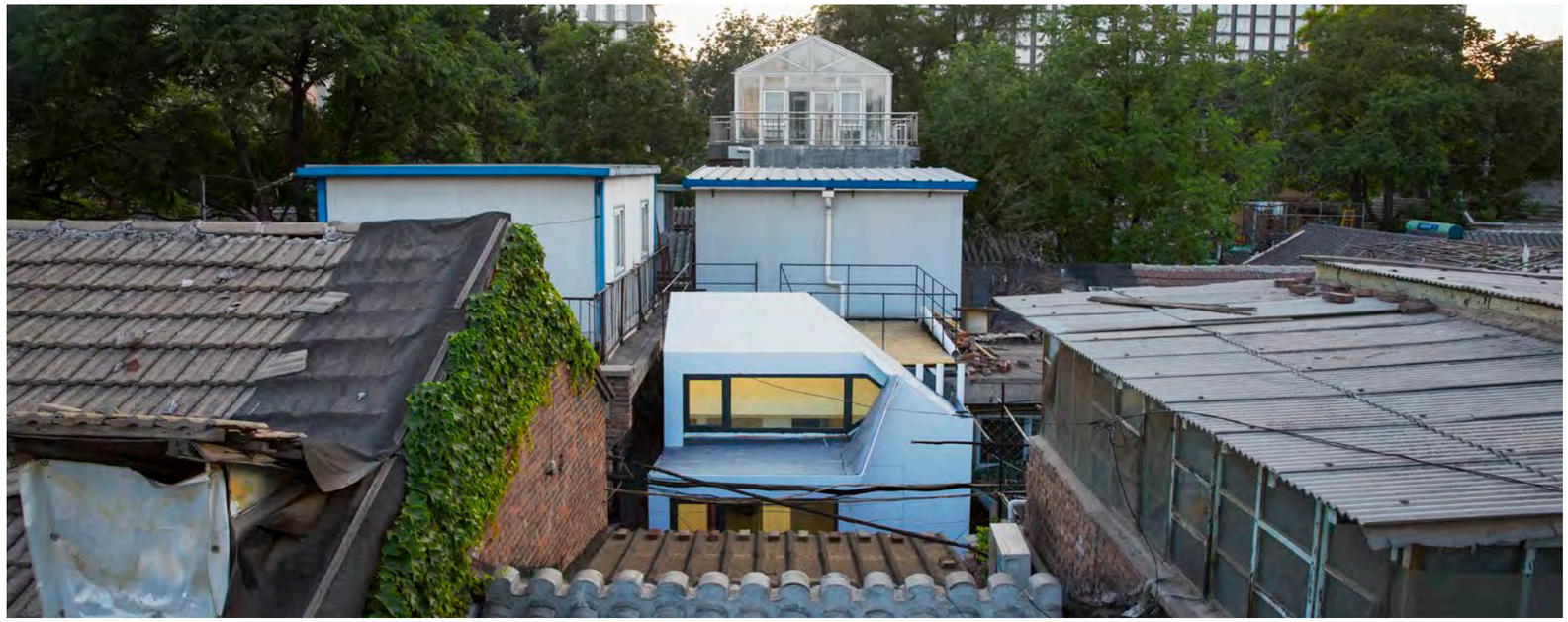
A stone mortar, found during excavation was used to make the Wang family business' famous traditional Hui medicinal herbal plaster.







Yangmeizhu 72 Courtyard Floor Plan



Guangcai 33 courtyard, Mrs. Fan’s Plugin

Yangmeizhu 72 Mr.s Dong’s Plugin before Renovation

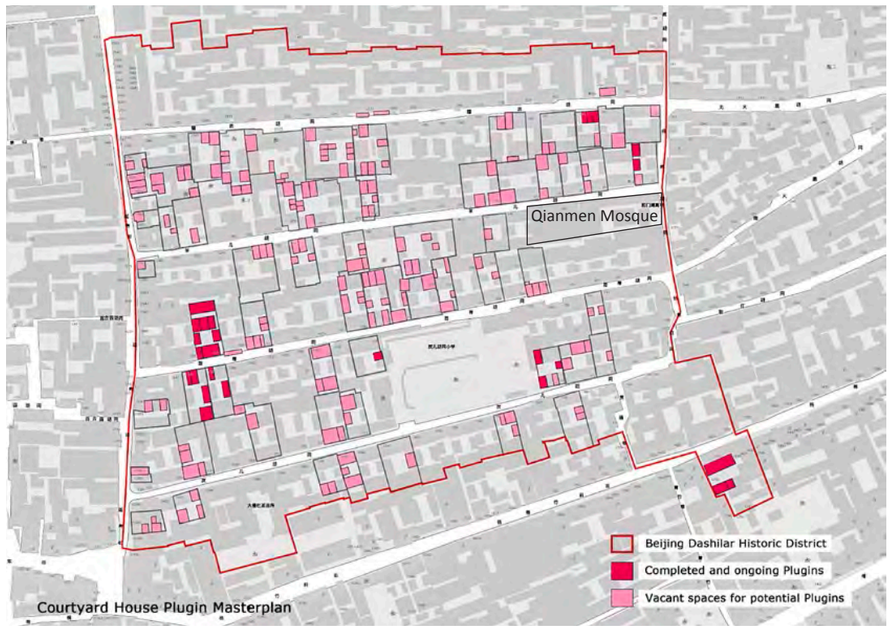
Yangmeizhu 72 Mr.s Dong’s Plugin after Renovation

Tiaozhou 32 Courtyard before Plugin Renovation

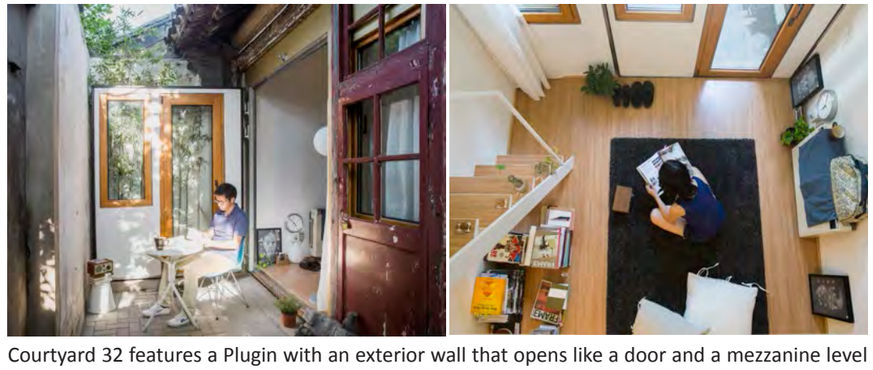
Tiaozhou 32 Courtyard after Plugin Renovation

Since the Wang Family Courtyard House Plugin, the system has been deployed on an urban scale and used to retrofit courtyard houses throughout the Dashilar District. Vast areas in China are still being torn down without a second thought. People are forced from their homes, social ties of tight-knit communities are cut, and layers of a tumultuous history are lost. The Courtyard House Plugin serves as an alternative to urban renewal through gentle urban regeneration.

Courtyard House Plugins are custom designed, working intimately with local residents to understand their needs. Mass production ensures high quality and low cost, making Plugins affordable for disadvantaged communities. Our clients and the Plugins of Mrs. Dong, Mrs. Fan, and Mr. Zhao are shown above respectively from left to right.



The People’s Architecture Office Headquarters located at 37 Tiaozhou Hutong in Dashilar is also a Courtyard House Plugin.



Courtyard 32 features a Plugin with an exterior wall that opens like a door and a mezzanine level that adds additional space to a tiny residence.

This Plugin House in the Urban Village Shangwei in Shenzhen is an example of the Plugin approach brought to locations outside of Beijing.

Yangmeizhu 72, Wang Family Courtyard

Before Courtyard House Plugin Renovation

After Courtyard House Plugin Renovation

Before Courtyard House Plugin Renovation

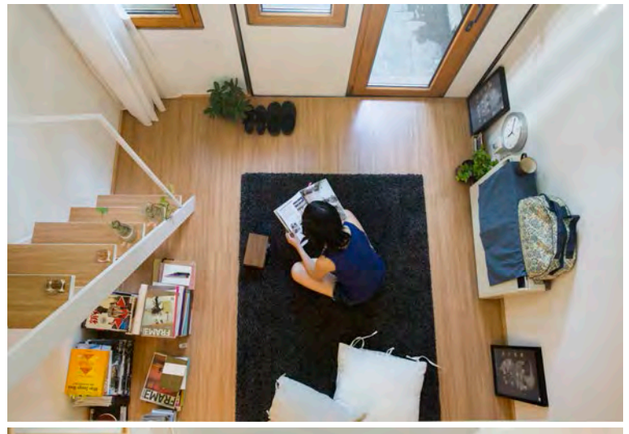
After Courtyard House Plugin Renovation

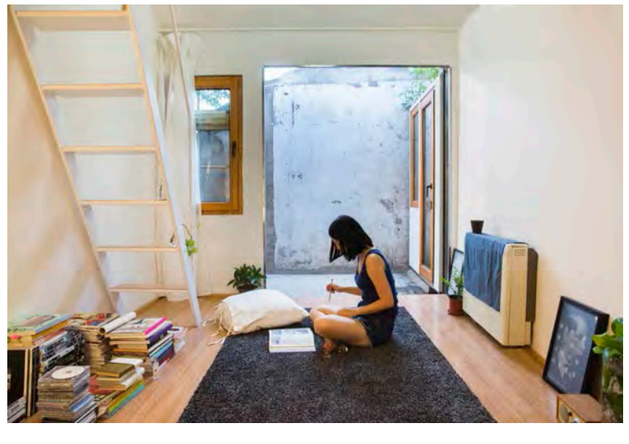
One of the achievements of the Courtyard House Plugin project is to renovate by doing nothing to the original building. Preservation of buildings in China, usually large structures such as temples and palaces, involves rebuilding heavily altered versions of the original and the telling of a highly curated history. By building within the existing structure we preserve an unedited history with all of its layers of complexity.

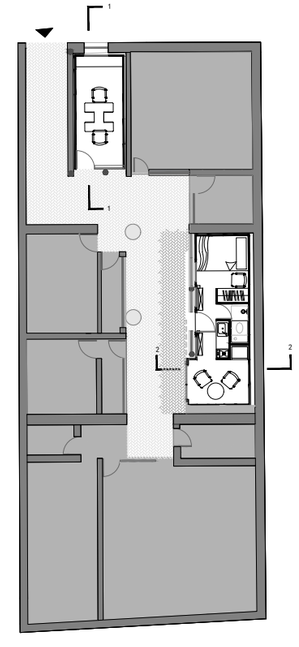
For example, Courtyard Yangmeizhu 72, the Wang Family Courtyard, embodies traces of a tumultuous past in its architecture. The Wang family has been part of Dashilar's large Hui Muslim community for 21 generations. But during Mao's Cultural revolution, single family courtyard houses became multi family residences, subdivided into multiple units with Hui and Han families sharing one common courtyard. The green facade of the South House, symbolizing the Hui people's Islamic faith, can be seen juxtaposed with the red facade of the North House, representing the Han Chinese. While the aesthetic of the courtyard house is not unified in a typical way, it accurately represents the local population and their history.

The Wang family residence is also historically significant for its variation on the traditional courtyard house. The Wang family was known for their Chinese medicine shop in front of their courtyard house. The structure is representative of a unique mixed-use typology in Dashilar which consists of several interconnected courtyards that served as residence, medicine factory, and shopfront. A stone mortar, found during excavation for the septic tank of the Courtyard House Plugin, is a reminder of the staple of the Wang family business: traditional Hui medicinal herbal plaster called Gou Pi Gao that has now become widely used across the country.

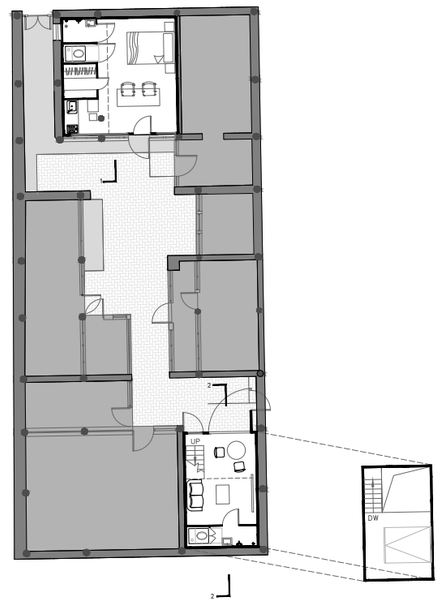
The completion of the first Plugin coincided with a public exhibition on the Hui history of the house. Found artifacts were displayed along with information panels place directly on architectural elements unique to Hui culture. The information was gathered from recorded interviews with the Wang family and their neighbors. This was the first time the Wangs told their story publicly and have since continued to be stewards of their family's history by installing a permanent exhibition in the original shop front space.







Tiaozhou Hutong 30 Floor Plan



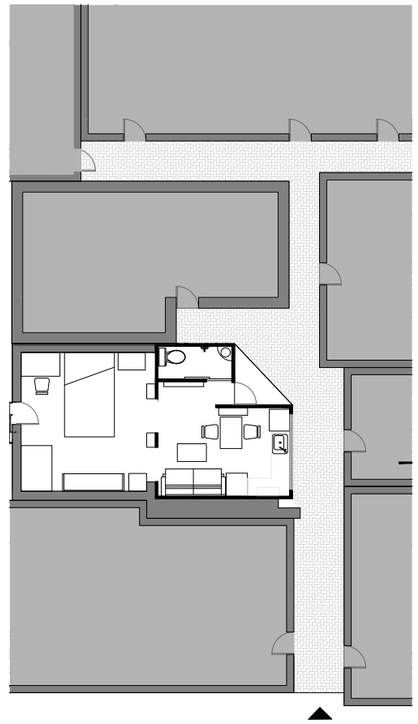
Tiaozhou Hutong 32 Floor Plan

Guangcai 33, Mrs. Fan’s Plugin

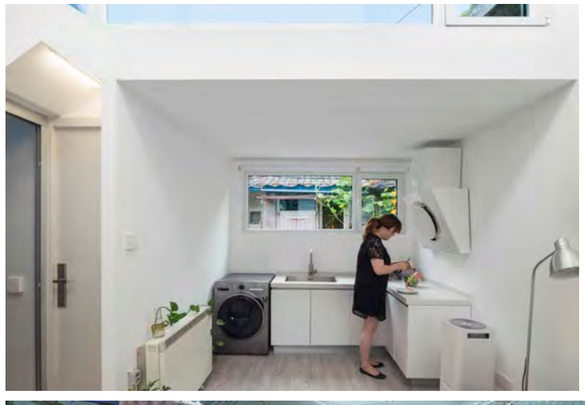
Mrs. Fan is from a traditional Chinese family. Newlyweds like her are expected to purchase a car and move into a new house in the suburbs to start the next phase of their life. But for people in their early 30’s who wish to be financially independent, the astronomical price of real estate in Beijing makes buying a house on their own nearly impossible.

Mrs. Fan was born and raised in the Changchun Jie Hutong neighborhood in the center of historic Beijing. By the time she was in high school her family had moved to the suburbs while her old neighborhood, with outdated infrastructure and overcrowding, continued to descend into slum-like conditions. But Fan never got accustomed to suburban residential towers, preferring the intimacy of the close knit community she came from.

The affordability of the Plugin House, thirty times less than the cost of buying a typical apartment, made moving back to where Mrs. Fan grew up a practical reality. The living standard and energy efficiency of a Plugin equals or exceeds that of new apartment towers. And her daily commute to work is now reduced from four hours to one. The Plugin replaces part of the old house and adds new functions such as a kitchen and bathroom. The Changchun Jie neighborhood has no sewage system, so public toilets are usually the only option. But an off-the-grid composting toilet system integrated into the plugin makes Hutong life much more convenient. A roof deck gives her breathing room from the dense surroundings and private social space.



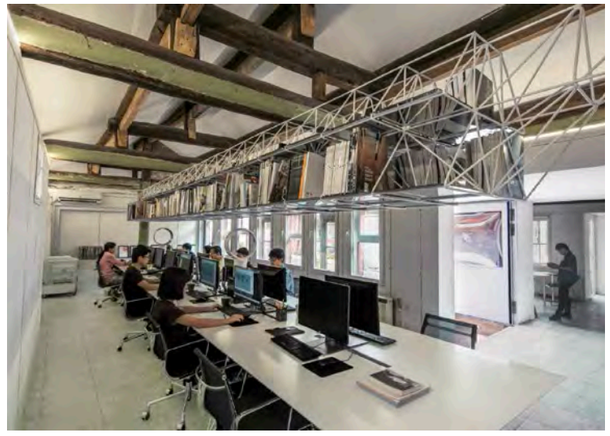
Courtyard Guangcai 33 Floorplan

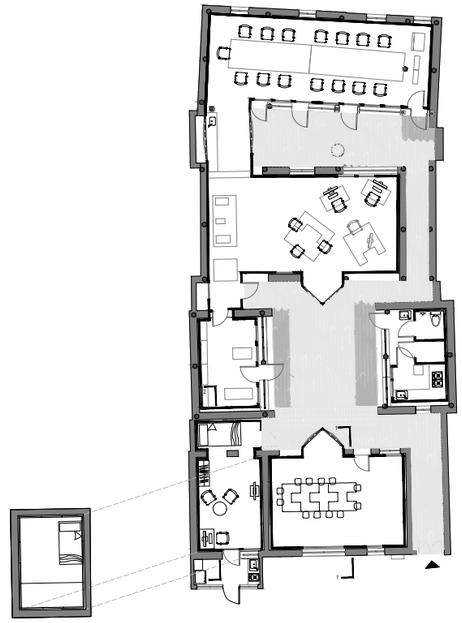


Before Courtyard House Plugin Renovation

After Courtyard House Plugin Renovation

Tiaozhou Hutong 37



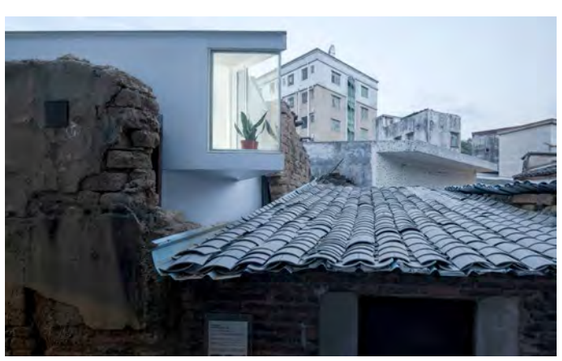


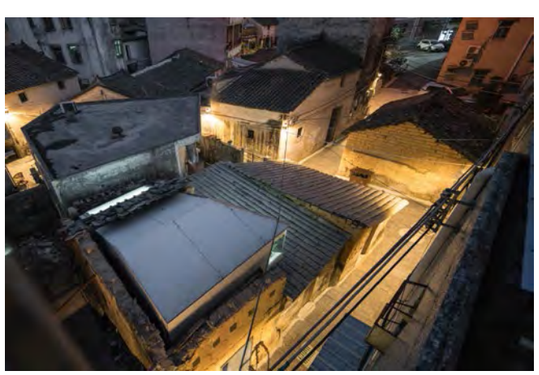
Tiaozhou Hutong 37 Floor Plan

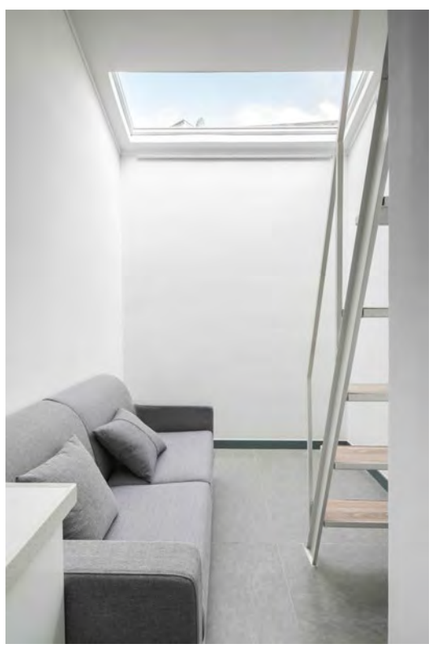
In 2015 that People's Architecture Office relocated to Dashilar in order to be closer to Courtyard House Plugin projects and residents. The space was also renovated using the Courtyard House Plugin system and features large enclosures that open vertically to connect the interior to the shared courtayard. The courtyard house is shared with a resident who also chose to renovate his property with a Plugin.

Shangwei Urban Village Huang Family Plugin House

The Huang Family Plugin House is a tiny 15sqm space located in the urban village Shangwei in Shenzhen. Because part of the original roof still remains, the Plugin House insertion acts as structural reinforcement and as a protective measure against any structural issues the original house may have. To add additional space, the bedroom is placed on a mezzanine level with a corner window that cantilevers over a collapsed wall, offering a panoramic view of the village roofline. A skylight is placed where the original roof has collapsed, inviting natural light into the deep lot.

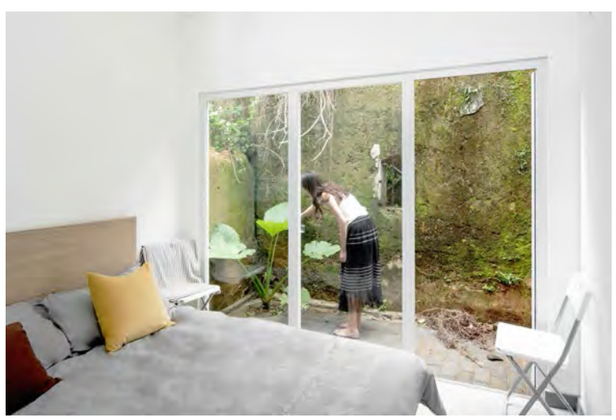






Shangwei Urban Village Fang Family Plugin House

The Fang Family Plugin House located in the urban village Shangwei in Shenzhen. It is slightly larger at 20sqm. The house features a clerestory window to bring southern light into the bedroom area at the rear of the house. For both locations, the Plugin House System raises living standards by adding efficient mini-split units for heating and cooling, modern kitchens, and off-the-grid composting toilet systems.



Courtyard House Plugin

Beijing, China

Clients

Dashilar Platform, Beijing, China

Jia Rong, *director and chief curator*

Beijing Dashilar Investment Ltd, Beijing, China

Shao Wei, *manager*

Various Plugin owners, Beijing, China

Architect

People's Architecture Office, Beijing, China

James Shen, Zang Feng, He Zhe, *founding partners*

Dashilar Strategic Planning and Co-Curator

SANS Practice, Shenzhen, China

Xu Yijing, Neill Gaddes, *founding partners*

Project Data

Ground floor area: ranging from 5.6 m^2 to 48.7 m^2

Cost per m^2: 370–390 USD

Commission: 2013

Design of Plugin System: 2013 – ongoing

Construction: 2014 - ongoing

Occupancy: 2014 – ongoing

People's Architecture Office

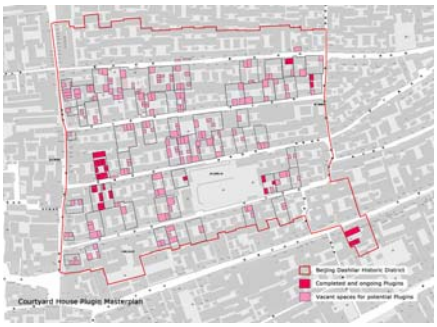
People's Architecture Office (PAO) is an international practice with offices based in Beijing and Boston. The multi-disciplinary studio was founded in 2010 by James Shen, He Zhe and Zang Feng. With the belief that design is for

the masses, the practice is focused on social impact through design, particularly in the areas of housing, education and urban regeneration.

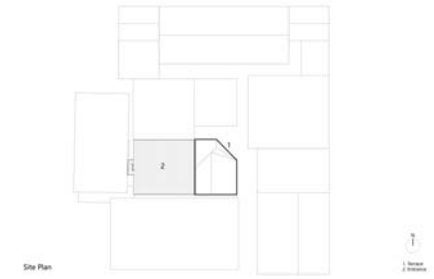
People's Architecture Office is the first architecture firm certified as a B-Corporation in Asia and serves as a model social enterprise. *Domus* magazine named PAO as one of the world's best architecture firms of 2019 and *Fast Company* listed PAO as one of the world's ten most innovative architecture companies in 2018. The studio's award-winning works have been exhibited at the Venice Architecture Biennale, Harvard Graduate School of Design and the London Design Museum.

Website

www.peoples-architecture.com



Courtyard House Plugin Masterplan.jpg



Guangcai Courtyard No.33 Mrs. Fan's Plugin-Site Plan.jpg

Tiaozhou Courtyard No.30.jpg

Tiaozhou Courtyard No.32.jpg

Tiaozhou Courtyard No.37.jpg

Yangmeizhu Courtyard No.jpg

Yanshou Courtyard No. 23 Mr. Zhao's Plugin House.jpg

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P05258_CHI_03.jpg

P05258_CHI_04.jpg

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