Appendix II – Design report

Project Plum Grove II: Restoring Old House for Village Community

Date: Jul 2023

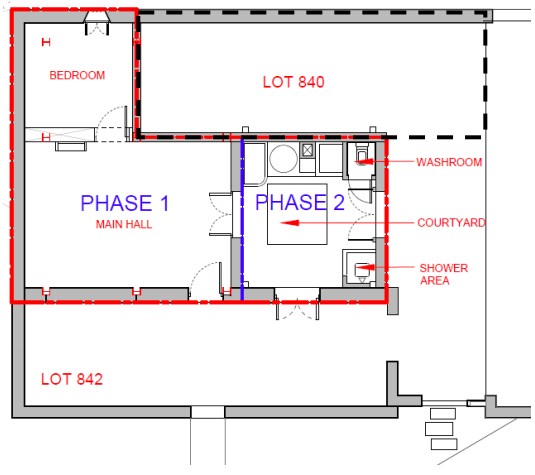
1 Design scope

Informed by the outcome of the Phase 1 project and discussion with experts and stakeholders, the design calls for conservation of key existing heritage (KPI item 2- No. of built heritage repaired), especially the ruined outer rammed earth wall, at the same time providing the essential utilities for Old House's continuing uses in the future as a village community hub and experience center for Hakka culture.

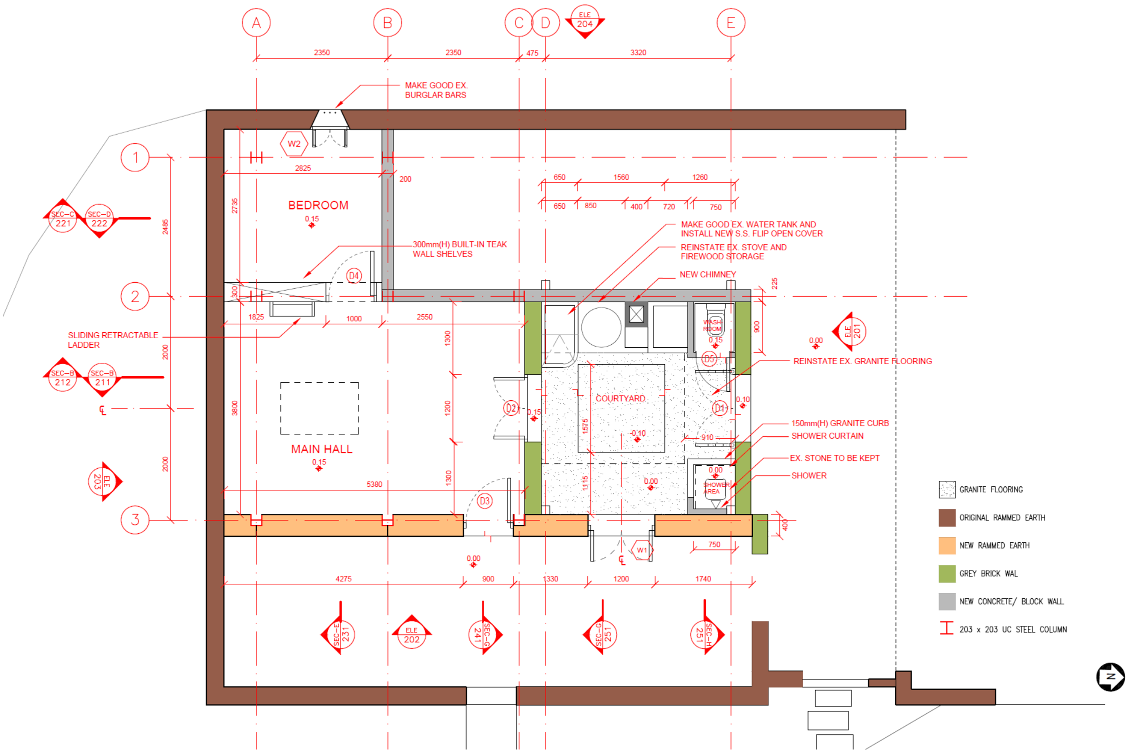
Specifically in Phase 2, restoration works will extend to the remaining site where the entrance courtyard (四水歸堂) was located. The existing kitchen facilities in brickwork, shower area and granite paving are to be preserved and restored. By rebuilding wall enclosures and a canopy, the spatial setting and lived experience of the traditional Hakka courtyard can be recalled. Subject to approval by the Lands Department, a new toilet may be built to serve new visitors.

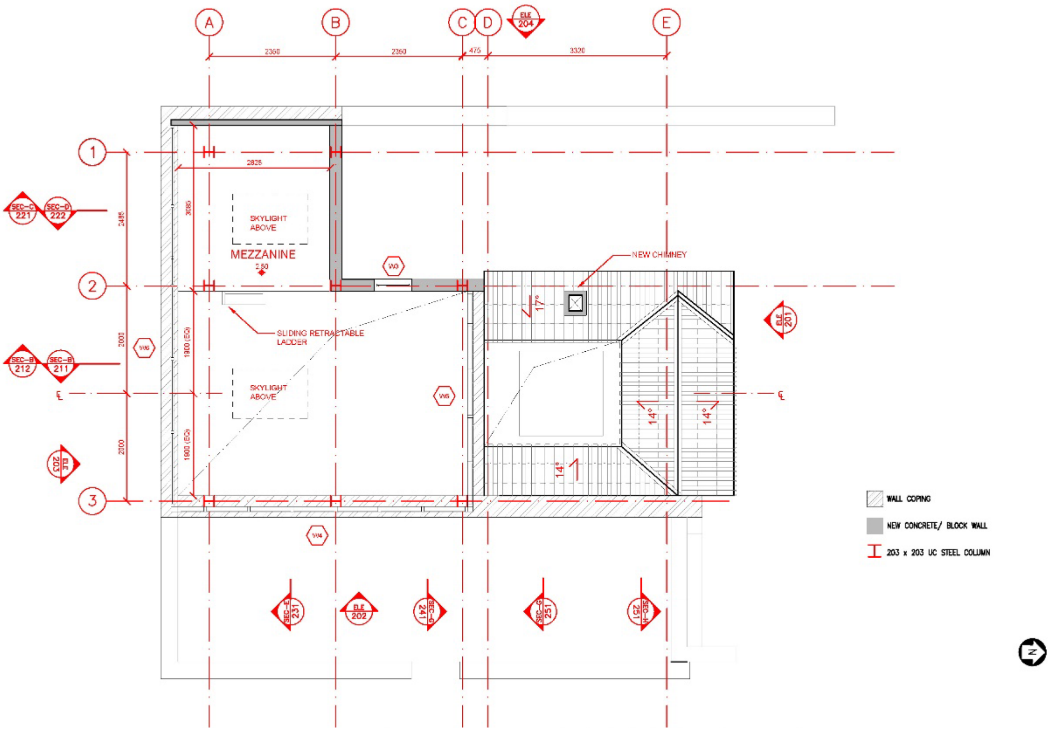
In spite of the confined scope of works within Lot 841, potential development of the neighboring lot was taken into account in the design process, aiming for a consistent, harmonious design of the Old House complex as a whole. (neighbouring lots are excluded in final design, drawings and construction)

Old House's original layout



Old House lot plan

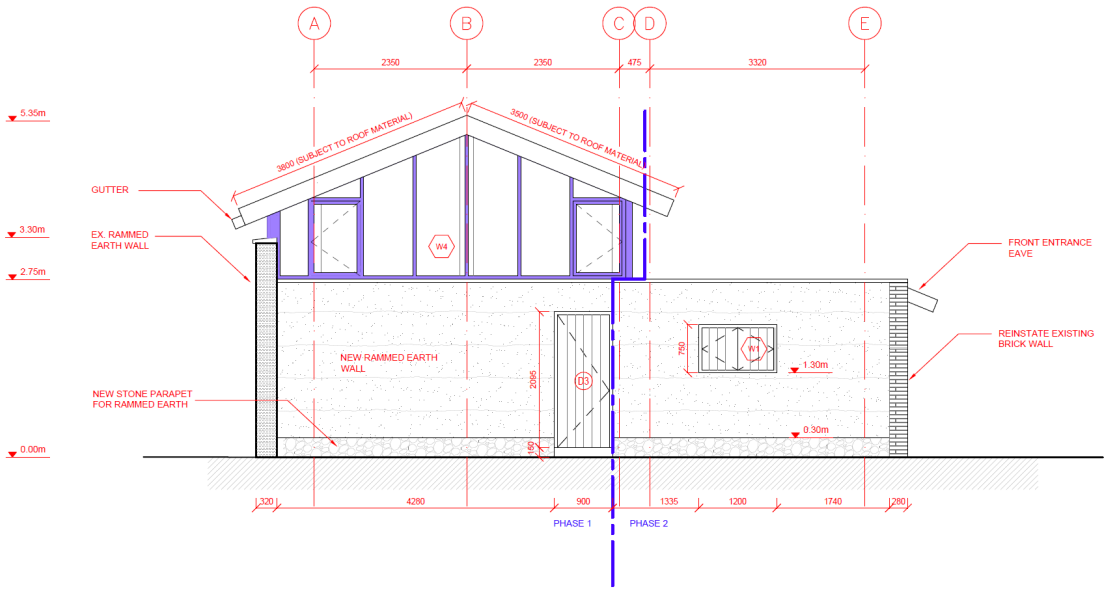

A
B
C
D
E
ELE 204
MAKE GOOD EX. BURGLAR BARS
BEDROOM
300mm(H) BUILT-IN TEAK WALL SHELVES
SLIDING RETRACTABLE LADDER
MAKE GOOD EX. WATER TANK AND INSTALL NEW S.S. FLIP OPEN COVER
REINSTATE EX. STOVE AND FIREWOOD STORAGE
NEW CHIMNEY
REINSTATE EX. GRANITE FLOORING
COURTYARD
MAIN HALL
150mm(H) GRANITE CURB
SHOWER CURTAIN
EX. STONE TO BE KEPT
SHOWER
GRANITE FLOORING
ORIGINAL RAMMED EARTH
NEW RAMMED EARTH
GREY BRICK WAL
NEW CONCRETE/ BLOCK WALL
203 x 203 UC STEEL COLUMN


A
B
C
D
E
ELE 204
SKYLIGHT ABOVE
MEZZANINE
NEW CHIMNEY
SLIDING RETRACTABLE LADDER
SKYLIGHT ABOVE
WALL COPING
NEW CONCRETE/ BLOCK WALL
203 x 203 UC STEEL COLUMN

2 Design strategies

In line with Old House's experimental restoration approach in Phase 1, The Phase 2 project further explores design integration between traditional materials and modern construction method, sensitively incorporating existing elements into the design.

At ground level, the ruined brick walls, internal rammed earth wall and timber doors are rebuilt to give strong, authentic textures. In contrast, the upper façade is fully glazed for a sense of lightness and better natural lighting in the main hall. Juxtaposition of diversified materials establishes relationship between the old and the new, glass and brick as well as earth and steel, articulated at tectonic and detail level. By introducing a separate structural frame to support the non-loadbearing walls and façade materials, the once fragmented ruins are stitched together as a complete fabric of the old Hakka dwelling.



3 Structural options

To determine the appropriate structure to suit the long-term uses of the renovated Old House (6 years or longer), two options of permanent structural systems were studied i.e. reinforced concrete structure and steel framing.

3.1 Logistics and site works involved.

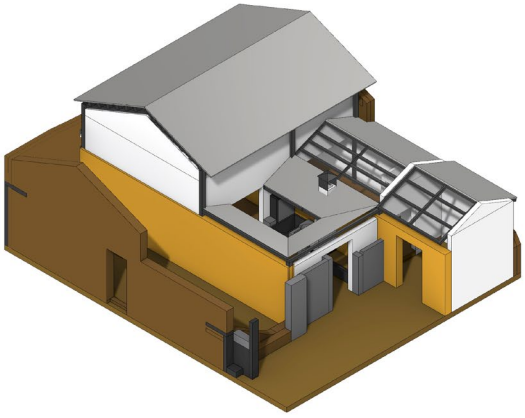
The remoteness of Mui Tsz Lam poses additional challenges to construction works, including difficulties in material transportation along the narrow meandering path as well as workmanship issues due to limited access to equipment. These two critical factors were studied in comparing the pros/cons of different structural systems. The design team consulted construction experts to understand each system's feasibility in construction.

The materials of reinforced concrete can be delivered to site in small batches (cement, sand, rebars), but construction requires wet trades and excessive site works. In comparison, despite the long steel members are more difficult in transportation, they can be quickly cut and welded together on site, also allowing higher precision.

3.2 Member size

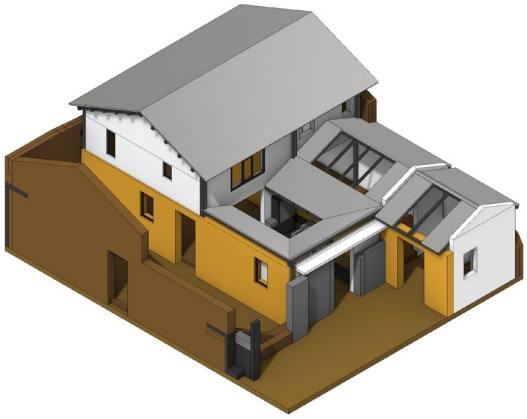
Test design schemes were made to study the interfacing details and tectonic expression. With smaller member sizes (sectional dimensions ranging from 65mm to 203mm), the steel structure allows for more flexibilities in articulating the structural frame at the tectonic level. The frame can also be embedded in the wall materials, freeing up more internal spaces.

4 Design development

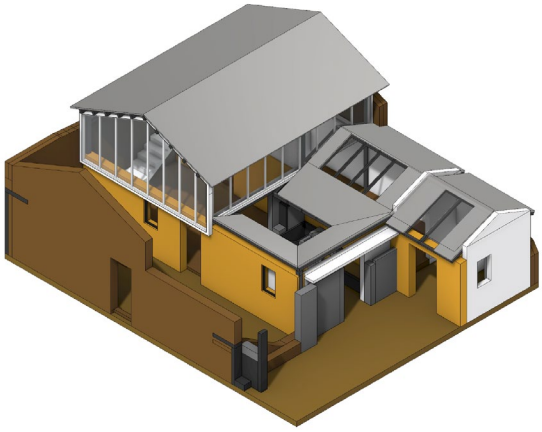


Contrasting material expression for lower and upper part of facade

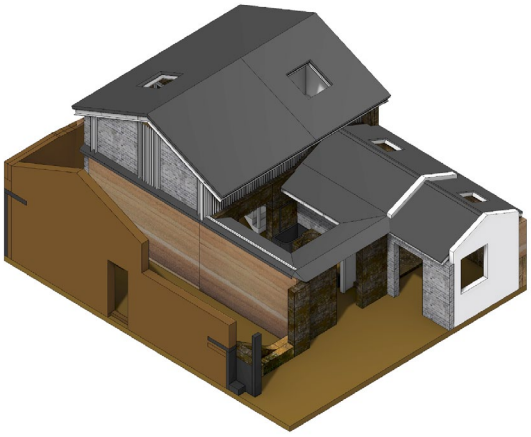
Façade test



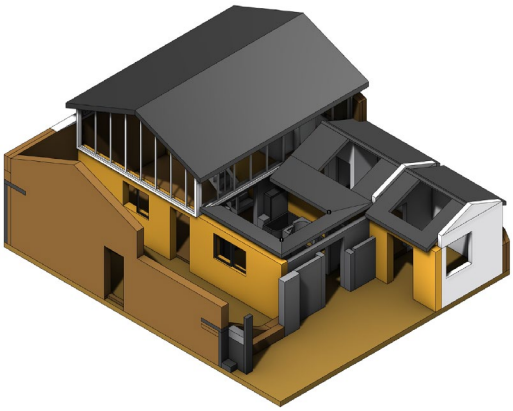
option 1 – solid wall + small window openings

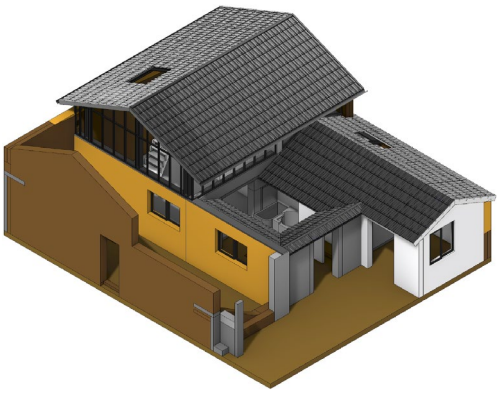


Option 2 - small window openings for lower façade + fully glazed upper facade

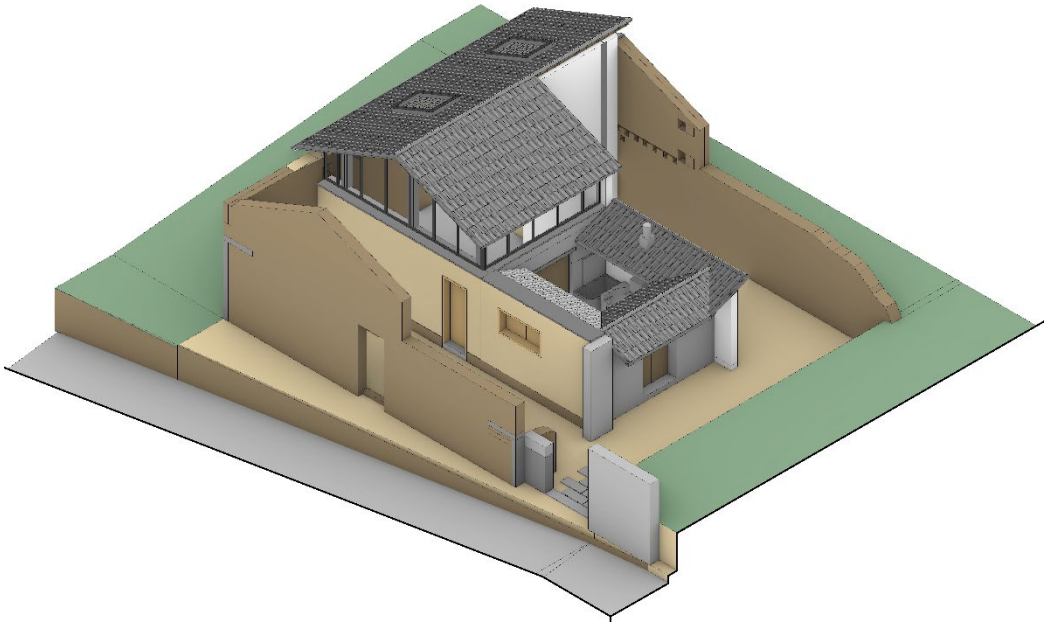


Option 3

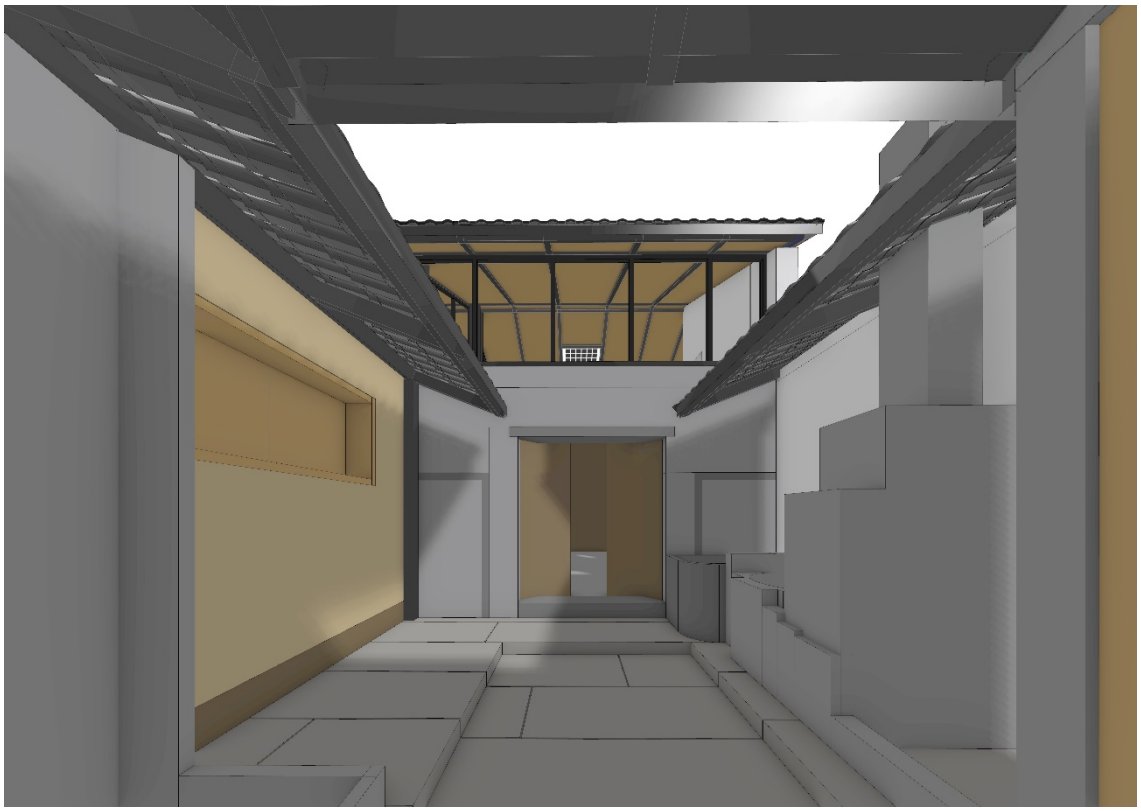




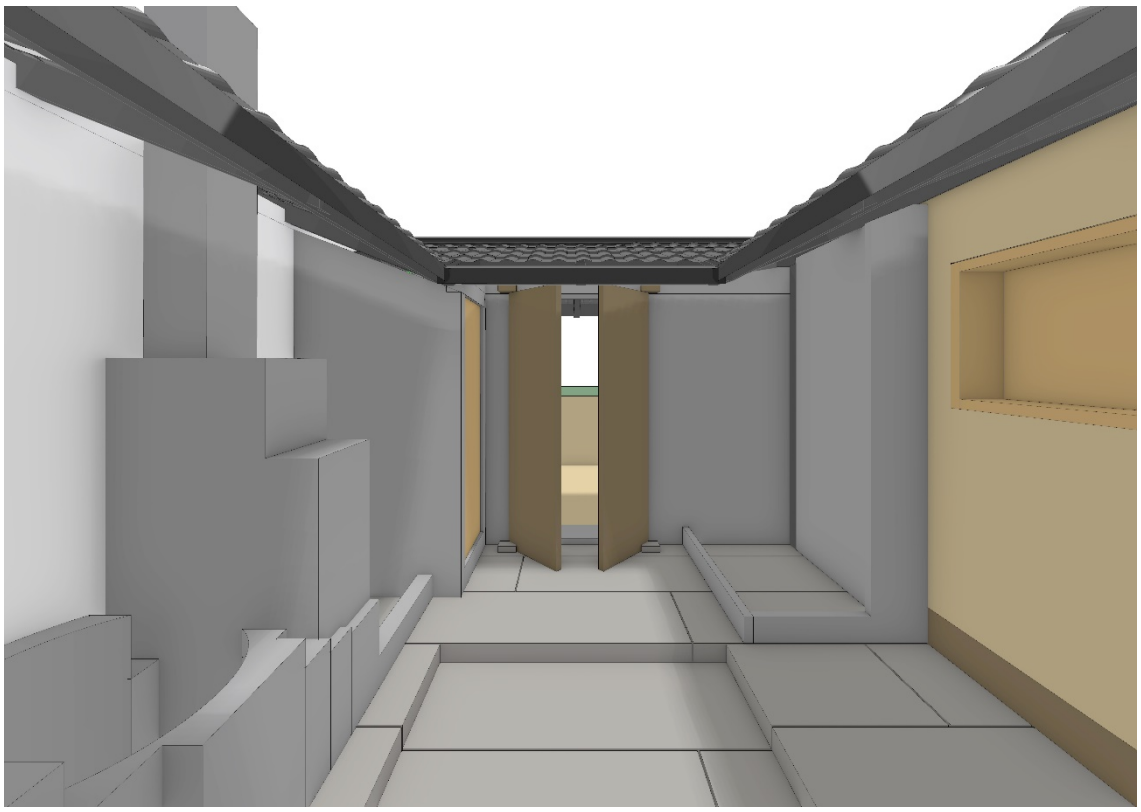
Lot 840 house (not in project scope) expressed as a separate volume



Final design of Old House



View from main entrance

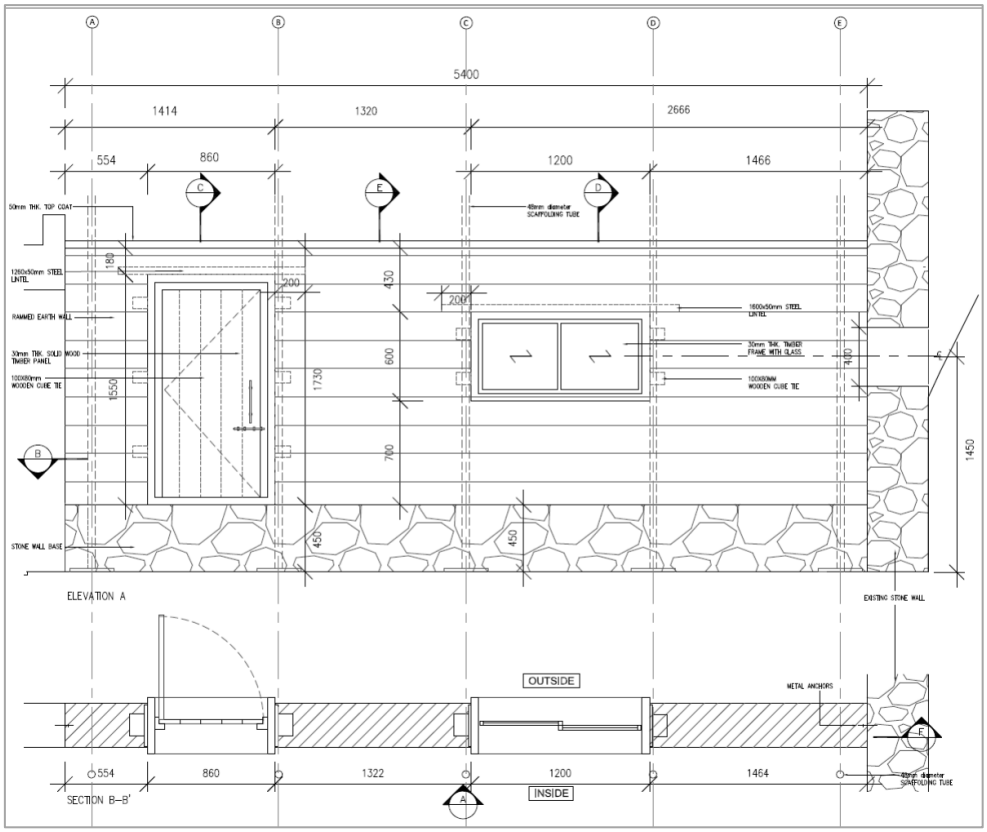


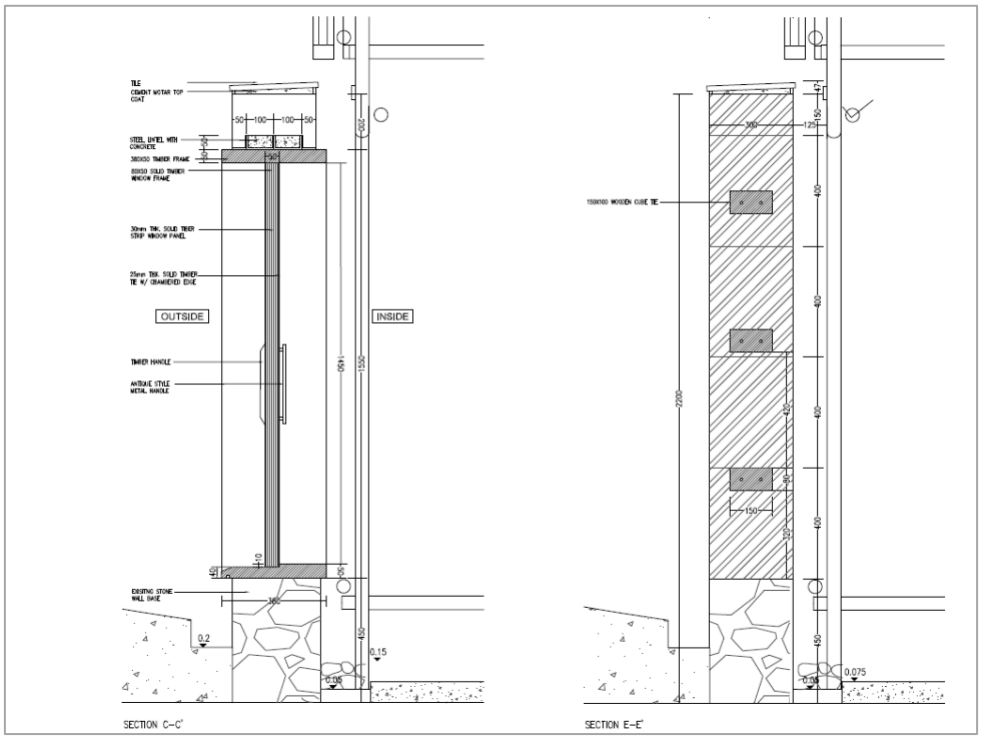
View towards main entrance

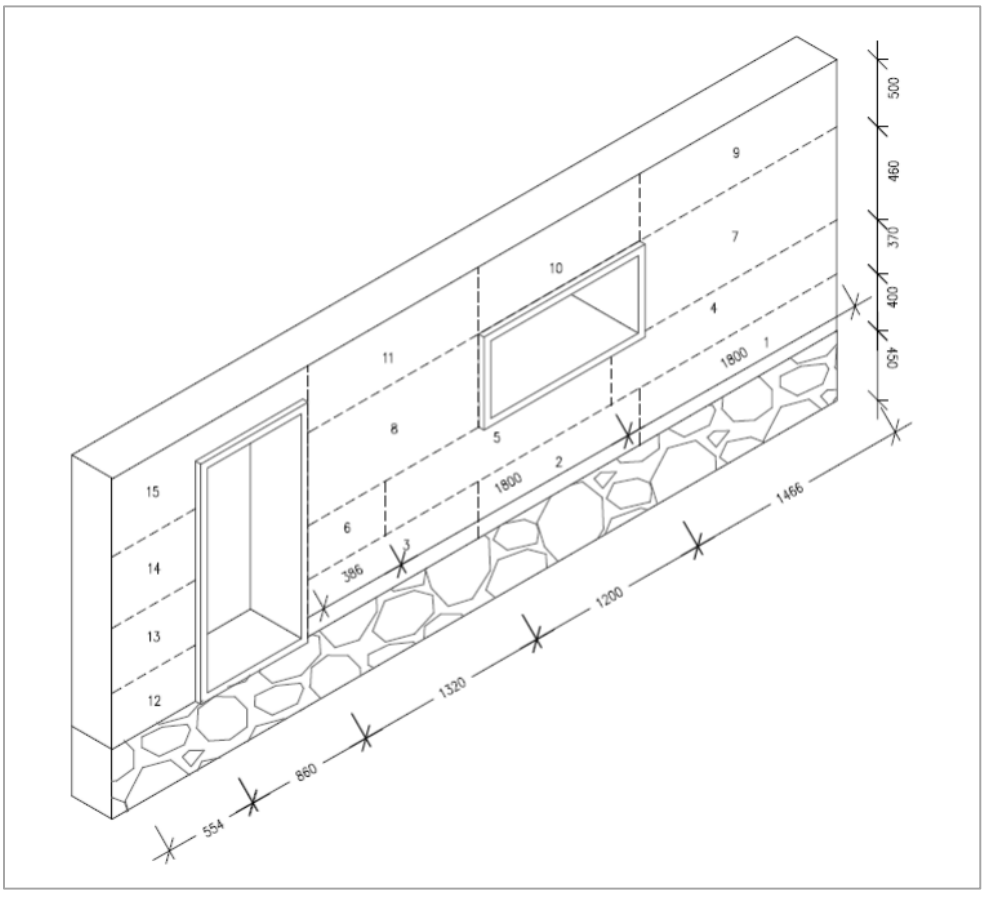
View inside main hall – display shelves are proposed to showcase Mui Tsz Lam’s artefacts

5 **Outcome from Phase I** –

localized rammed earth wall constuction and openings treatment at Mural House




TILE
CEMENT MORTAR TOP COAT
STEEL LINTEL WITH CONCRETE
38X50 TIMBER FRAME
80X50 SOLID TIMBER WINDOW FRAME
30mm THK. SOLID TIMBER STRIP WINDOW PANEL
25mm THK. SOLID TIMBER TIE W/ CHAMFERED EDGE
OUTSIDE
INSIDE
TIMBER HANDLE
ANTIQUE STYLE METAL HANDLE
EXISTING STONE WALL BASE
SECTION C–C'
150X100 WOODEN CUBE TIE
SECTION E–E'


1
2
3
4
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10
11
12
13
14
15
1800
1800
500
460
370
400
450
1466
1200
1320
860
554
386

6 Case studies

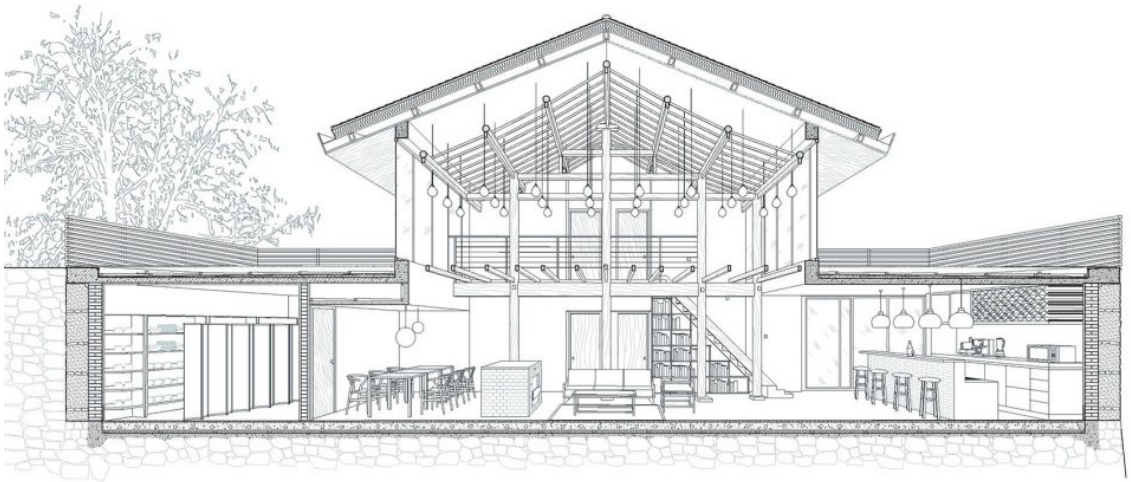
6.1 Rammed earth construction and conservation

The Innovative Lab of Architecture & Art by CLAB

2018, Chengdu, China

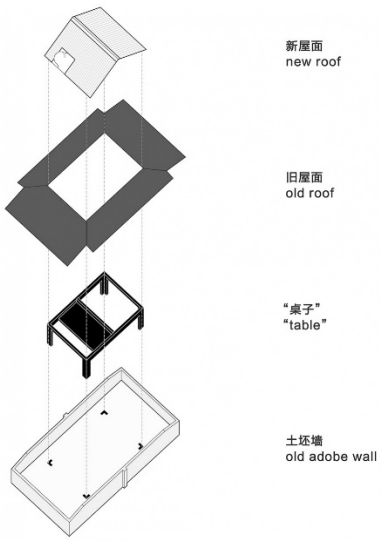
Half House by SU Architects

2015, Huzhou, China



Wanjian Village Children’s Library by Onearthstudio

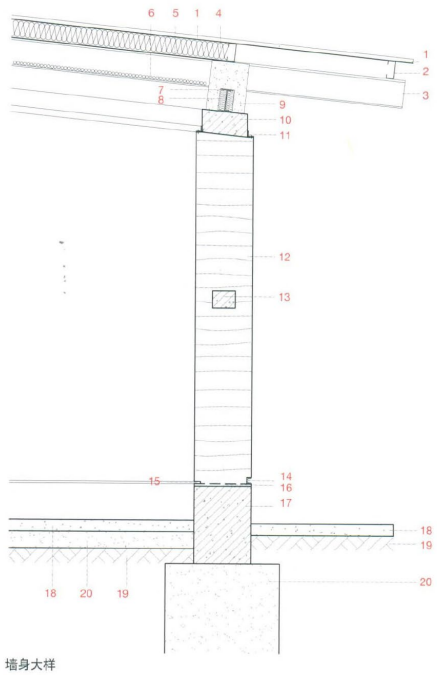
2019, Anhui, China



6.2 Construction details

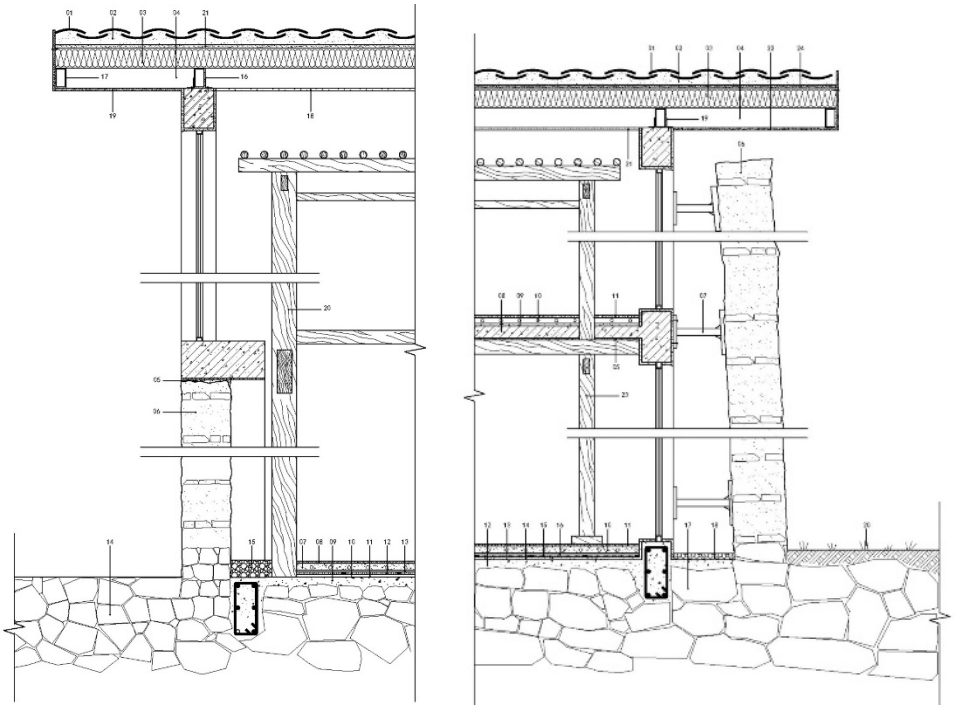
Macha Village Center by Onearthstudio

2016, Gansu, China



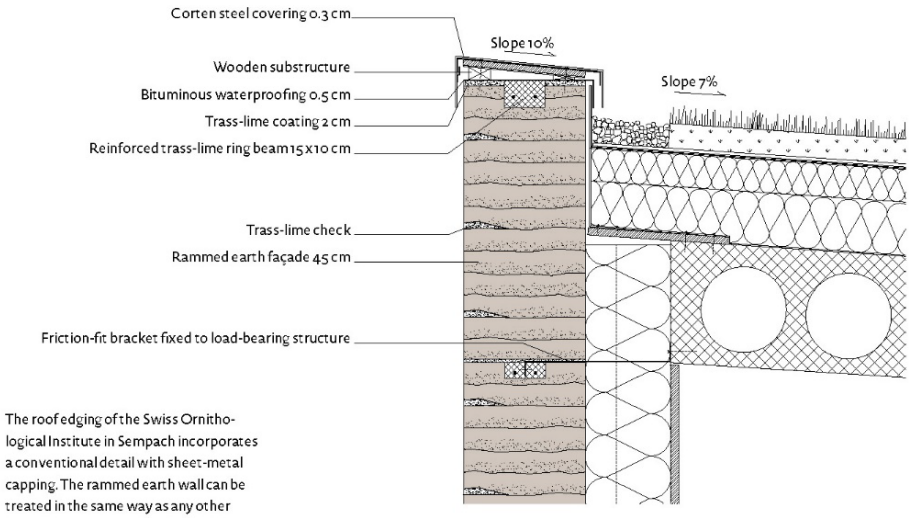
Half House by SU Architects

2015, Huzhou, China



Swiss Ornithological Institute by :mlzd

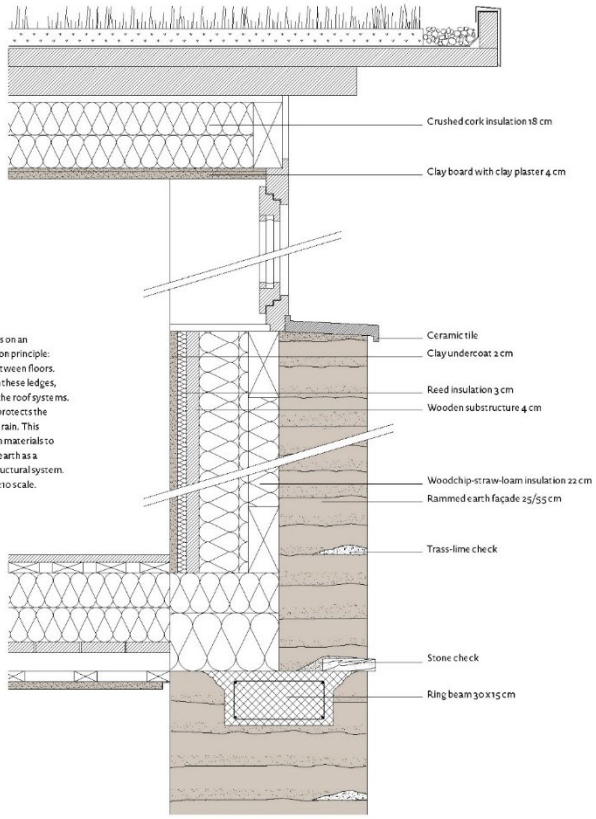
2015, Sempach, Switzerland



The roof edging of the Swiss Ornithological Institute in Sempach incorporates a conventional detail with sheet-metal capping. The rammed earth wall can be treated in the same way as any other form of massive construction. Roof edge at 1:20 scale.

Rauch House by Martin Rauch

2018, Vorarlberg, Austria



The Mathies House relies on an ancient earth construction principle: the wall is recessed in between floors. Timber framing bears on these ledges, integrating the slab and the roof systems. The projecting roof line protects the rammed earth wall from rain. This combination allows both materials to exhibit their strengths – earth as a façade and wood as a structural system. Façade cross section at 1:10 scale.