

Chapter 11 PREFABRICATED COMPONENTS

11.1 PRECAST HOUSEHOLD SHELTER

The installation of the household shelter (HS) is often in the critical path of construction works and often affects the progress of concurrent works on site. Hence, the use of precast household shelters in place of the current in-situ design will likely reduce the construction period.

A precast HS system, comprising L-shaped wall panels, has been developed. This precast system is more buildable and will be of better quality in comparison with those systems currently available. At the same time, the production costs of these new precast HS systems are comparable to those for in-situ shelters. This precast HS system will also eliminate the need for propping works on site. These potential savings in time and costs will make the precast shelters more attractive than conventional design.

- Attached diagrams show the proposed precast 'L' panel arrangement and the two standardised basic shelter dimensions.
- The 'L' panels are stable during installation, subject to the base conditions.
- RC stumps are provided at the base of the panels to support the panel weight before casting the shelter base slab.
- The 'L' panels reduce the amount of in-situ casting required for walls.

The weight of the 'L' panels is in the order of 5.5 to 6 tonnes. If this presents a problem to the crane lifting capacity, a lighter flat panel weighing 4 tonnes can be adopted. Refer to Figure 11.1, Figure 11.2, Figure 11.3 and Figure 11.4 for different views of the HS shelter.

For both proposals, the base slab and top slab are constructed in-situ.

Proposed precast HS shelter sizes

GFA range	Minimum internal floor area of HS	RECTANGULAR SIZE (m ²)
$GFA \leq 45 \text{ m}^2$	1.6 m^2	NA
$45 < GFA \leq 75 \text{ m}^2$	2.2 m^2	1.8x1.25 (=2.25)
$75 < GFA \leq 140 \text{ m}^2$	2.8 m^2	2.3x1.25 (=2.88)
$GFA > 140 \text{ m}^2$	3.4 m^2	Size 1: 2.0x1.7 (=3.4) Size 2: 2.3x1.5 (=3.45)

Note:

Thickness of 250mm may be adopted depending on the set back distance

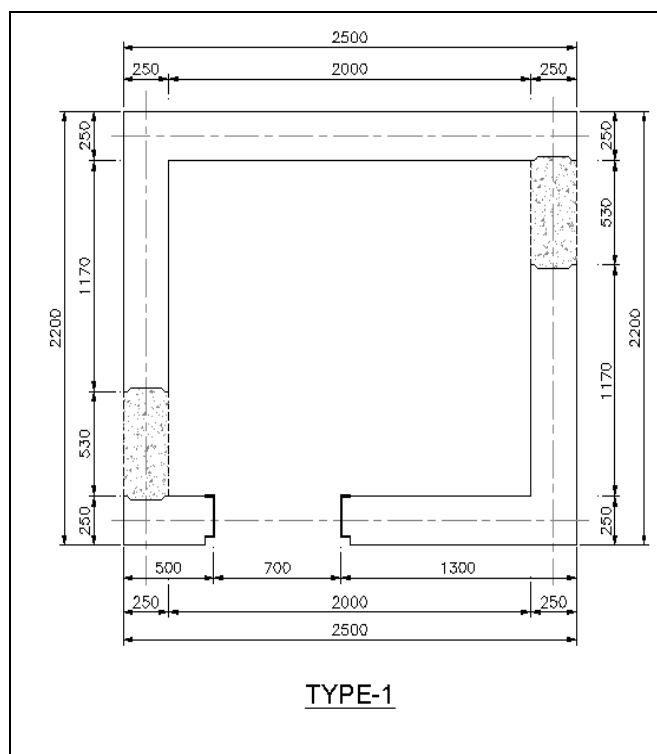


Figure 11.1 Plan showing type 1 (2m x 1.7m) of precast household shelter

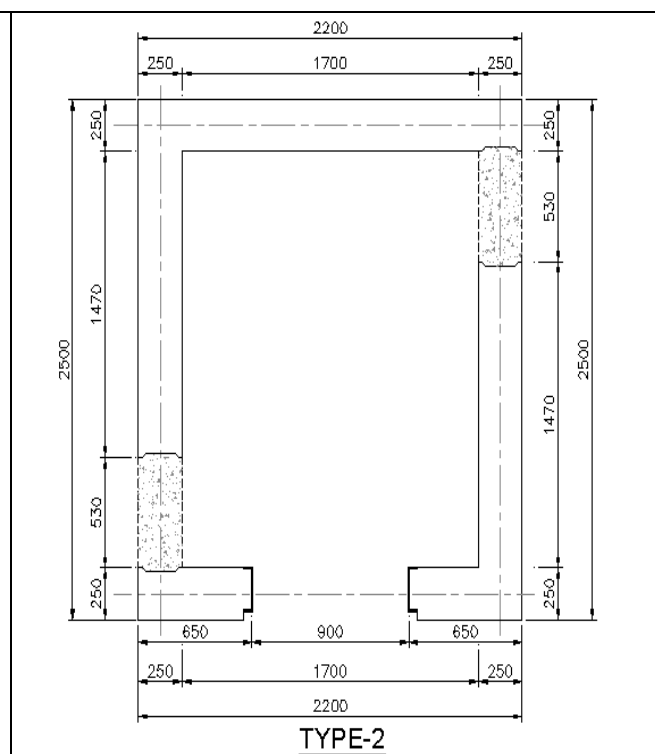


Figure 11.2 Plan showing type 2 of precast household shelter

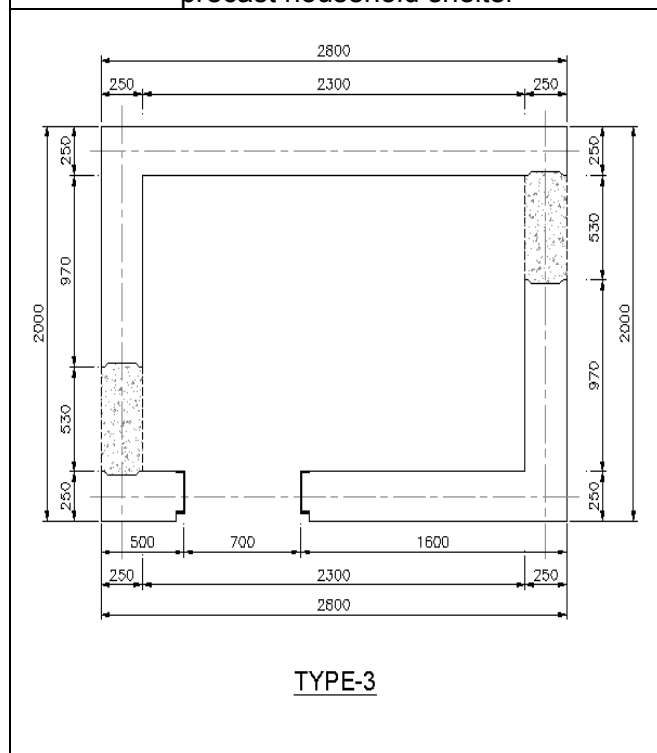


Figure 11.3 Plan showing type 3 of precast household shelter

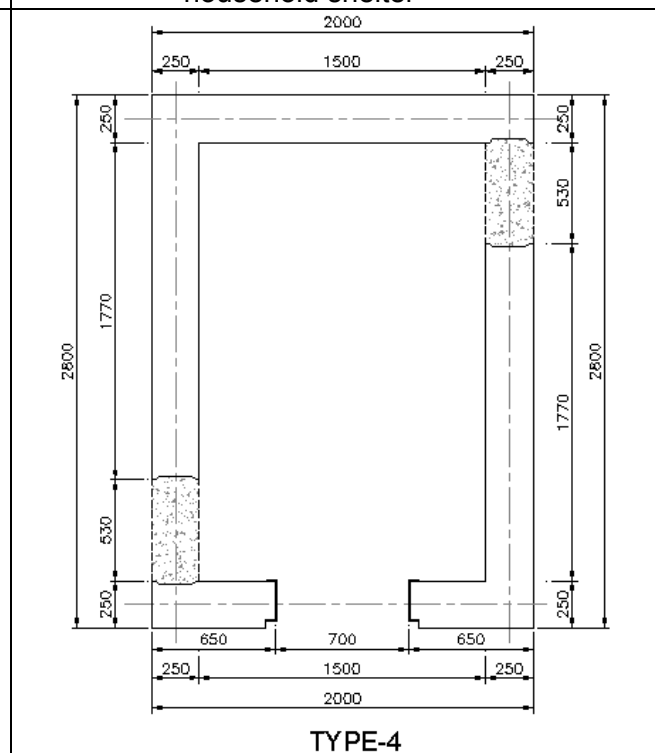
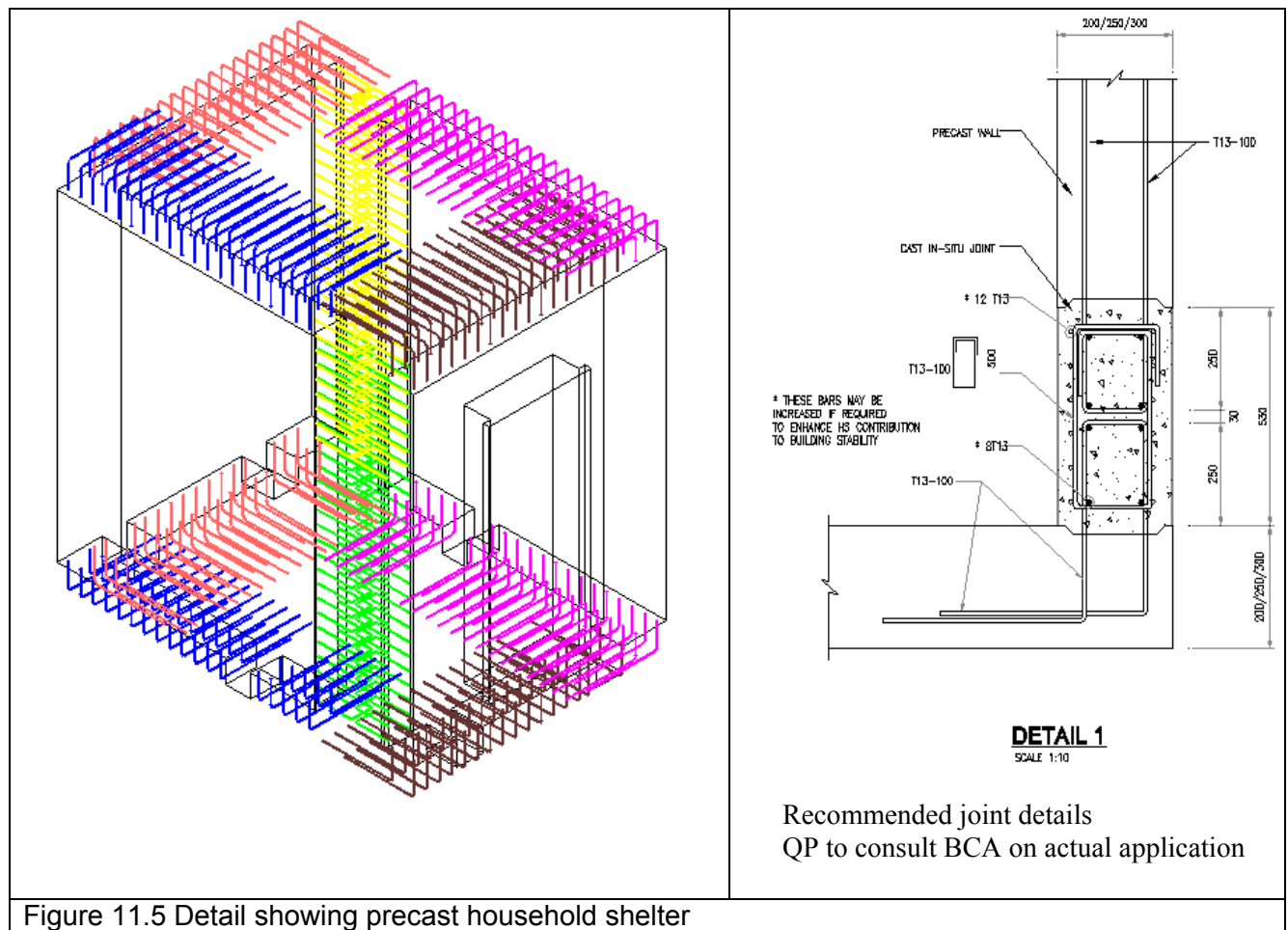


Figure 11.4 Plan showing type 4 of precast household shelter



11.2 PRECAST BOUNDARY WALLS

Precast boundary walls are similar to precast wall panels but are typically of smaller sizes. This makes them quite ideal for precasting as the smaller panels mean that the contractor would have fewer problems with handling, transportation and installation on site. At the same time, additional use of such precast components will result in improved site productivity and construction quality.

Joint details

The considerations for proper joint details in the precast boundary panels are similar to those for precast wall panels. The design of the wall joints will include the following considerations:

- water tightness
- installation method
- structural movement
- type of wall finishes
- panel sizes
- weathering
- tolerance

Finishes

The use of precast boundary walls continues to allow a wide range of design flexibility and innovation.

There is a wide range of surface finishes that the architect can use on the precast boundary wall design. The most common techniques used are modeling techniques like sand blasting, acid washing, polishing and honing, hammering and chipping to create the required effects. These finishes can then be treated with appropriate protective coatings to prevent weathering and staining problems.

A wide range of colours for precast boundary wall panel can be derived from aggregates, cement or pigments. Aggregate can provide colour to the final finishes. Cement with different colours can also give the desired colour for the boundary wall panel. Another form of colour finishes are colour and oxide pigments.

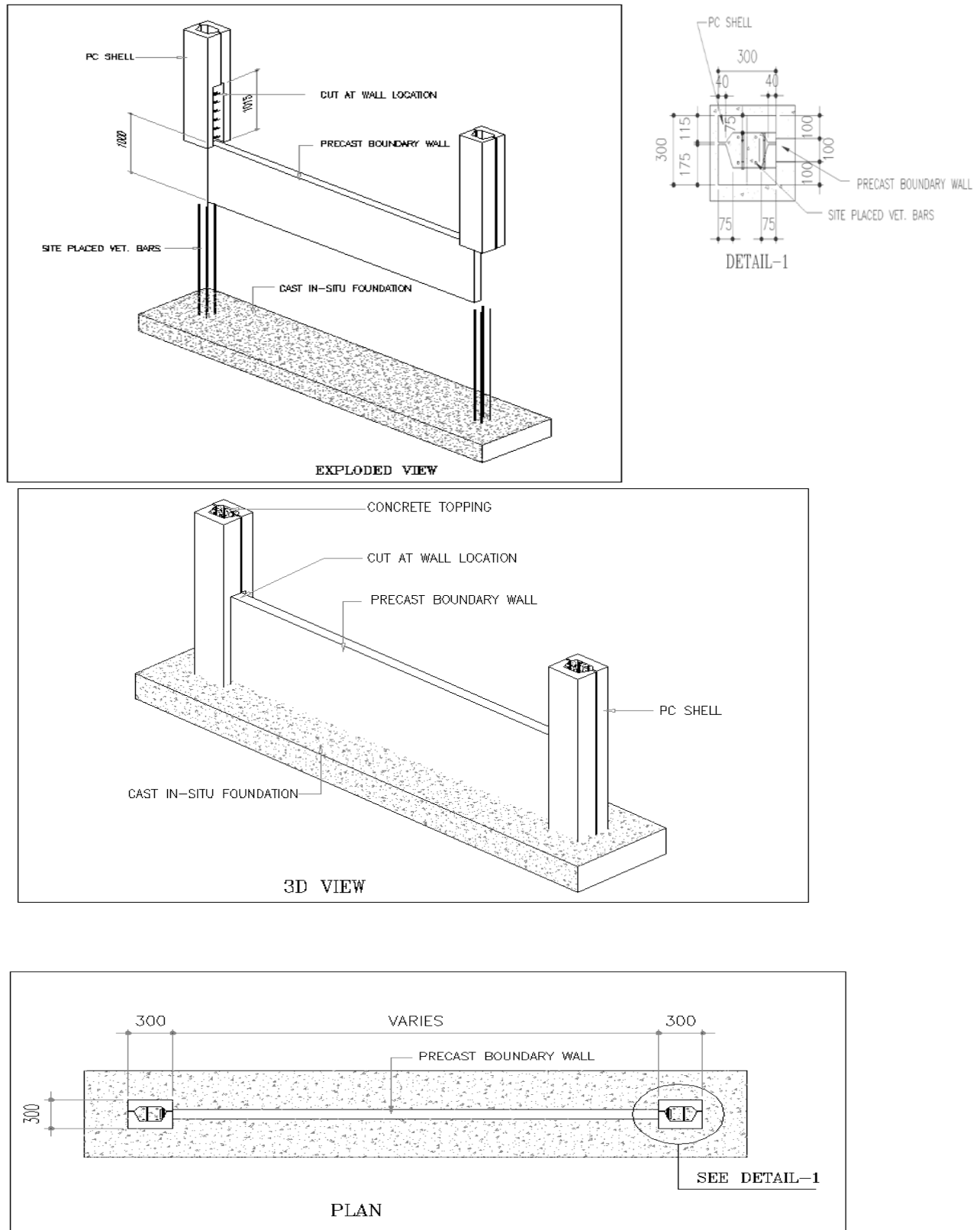


Figure 11.6a Details of the precast concrete boundary wall (type 1)

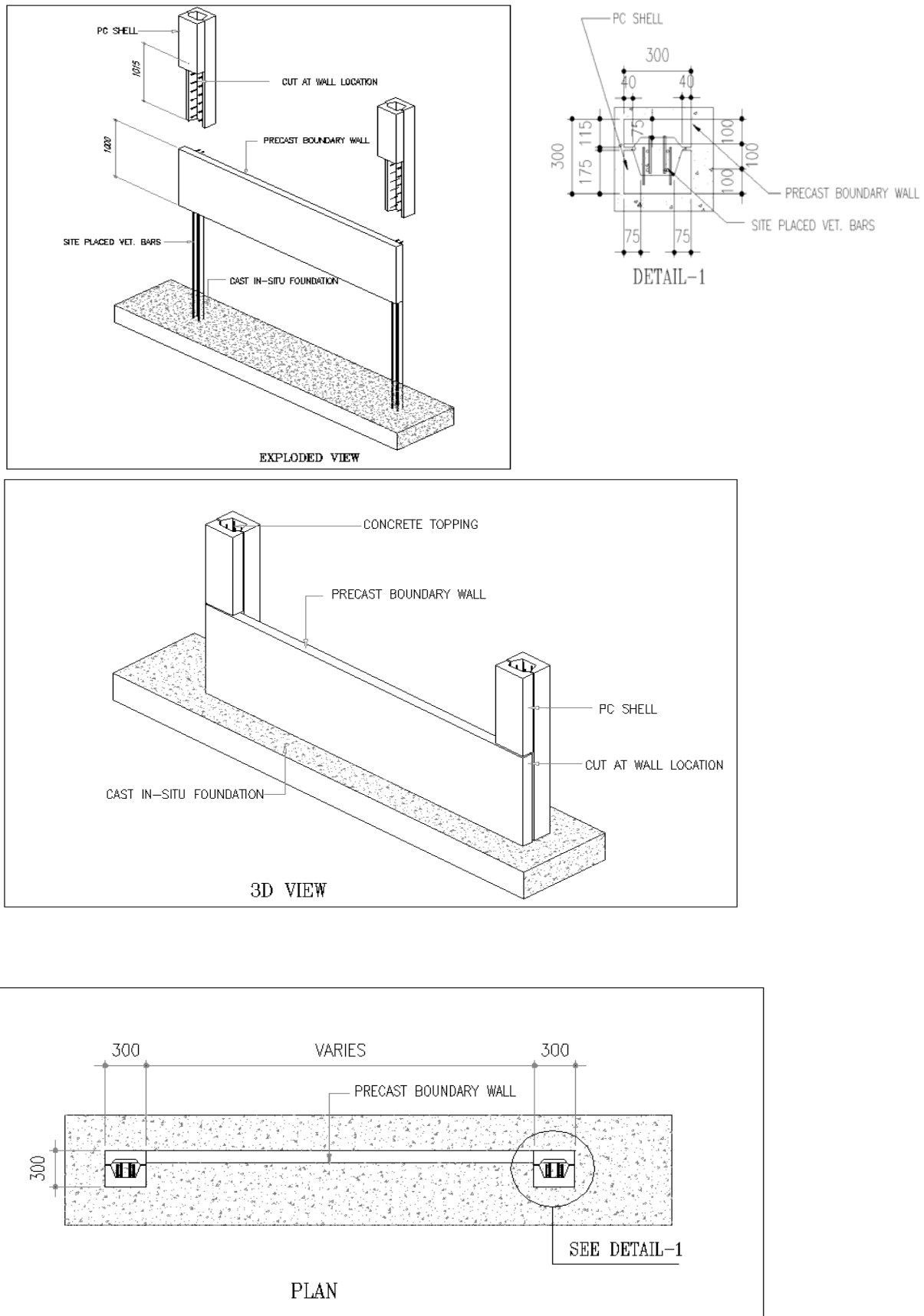


Figure 11.6b Details of the precast boundary walls (type 2)



Figure 11.7 Installation of wall base



Figure 11.8 Precast walls are placed and propped



Figure 11.9 Completed view of the precast boundary panel walls

11.3 PRECAST METER CHAMBER

A precast meter chamber/ compartment can be used. The meter chamber is the housing for the electrical meter, water meter, SCV/ TV board chamber and letterbox. The chamber is also very often the pillar for supporting the entrance gate.

The precast meter chamber is fabricated in two separate components; one is the chamber and the other consists of precast concrete shelves which slot into the precast chamber to separate each of the different services.

The size of the chamber is typically 800 x 800 x 1800 high. This results in a meter chamber that is of manageable size and weight. Hence, this precast component can be transported and installed easily. Moreover, the neat and proper compartmentalization will make it easier to run and install the services between the mains, the chamber and the house.

The finishes to the chamber can be similar to those for precast panels/walls and come in a variety of textures, colours and effects. Figure 11.14a to Figure 11.14c show the details of meter chamber type 1 and Figure 11.15a to Figure 11.15c show the details of meter chamber type 2.



Completed precast meter chamber

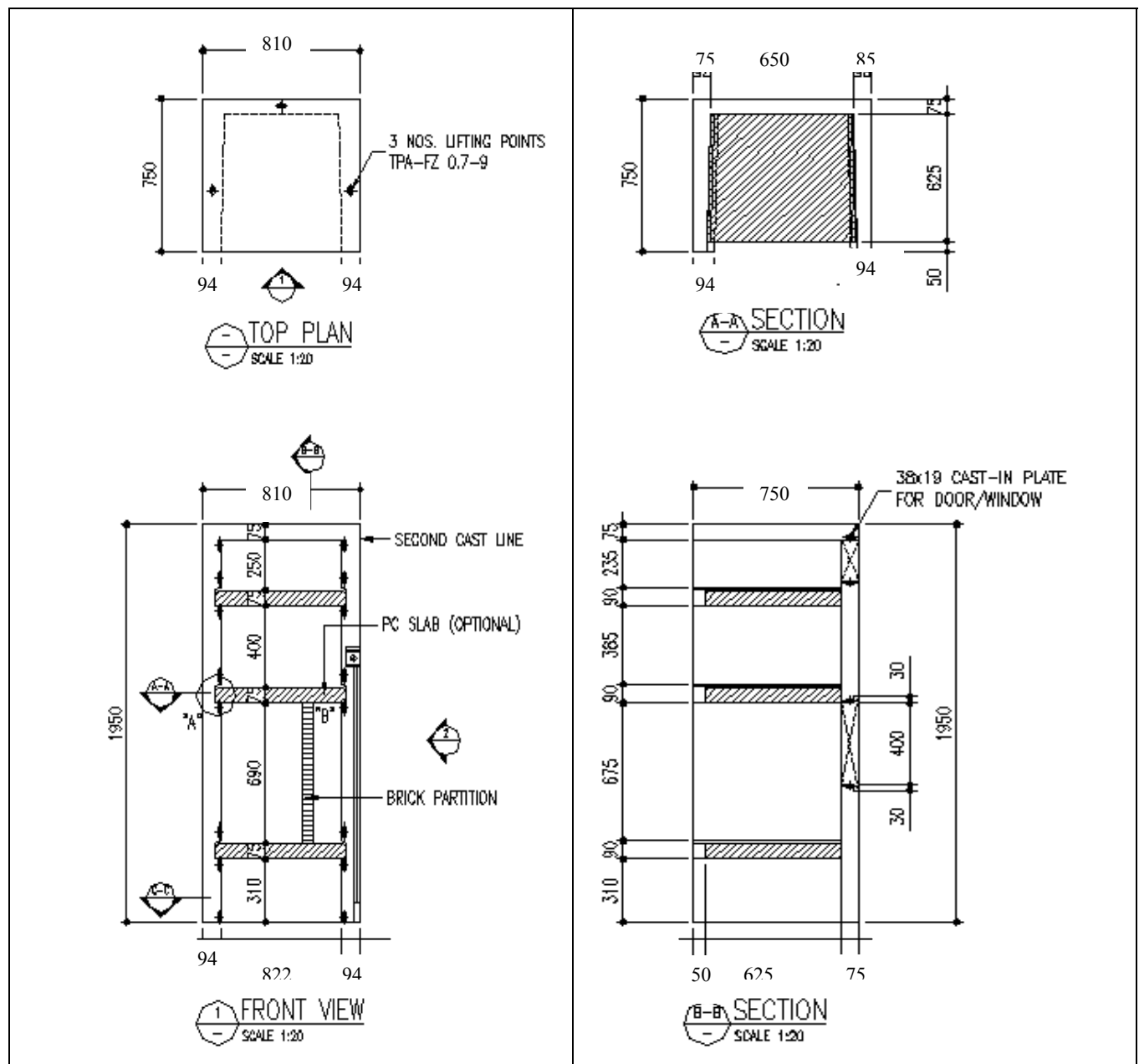


Figure 11.11a Details of meter chamber 1

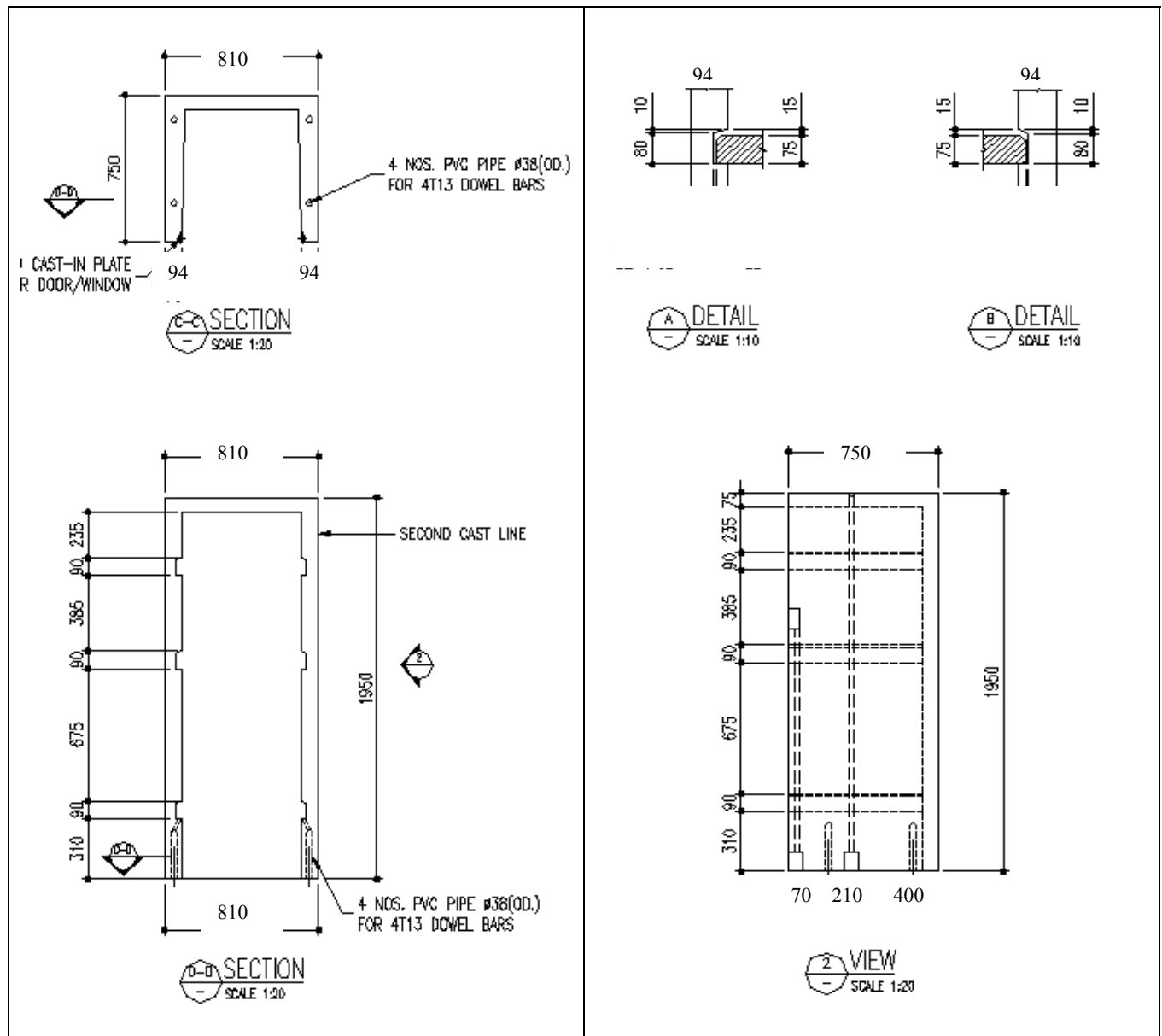


Figure 11.11b Details of meter chamber 1

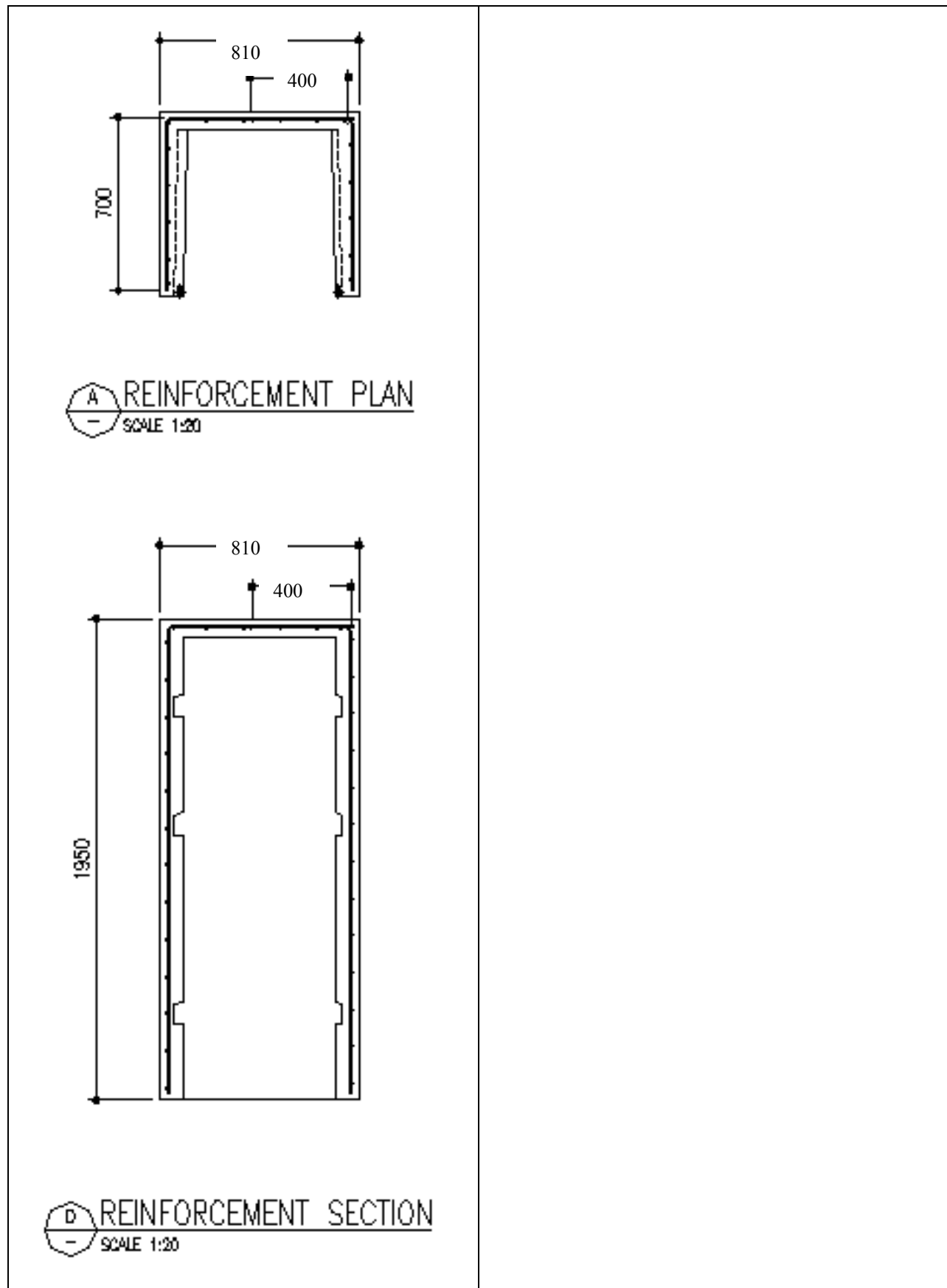


Figure 11.11c Details of meter chamber 1

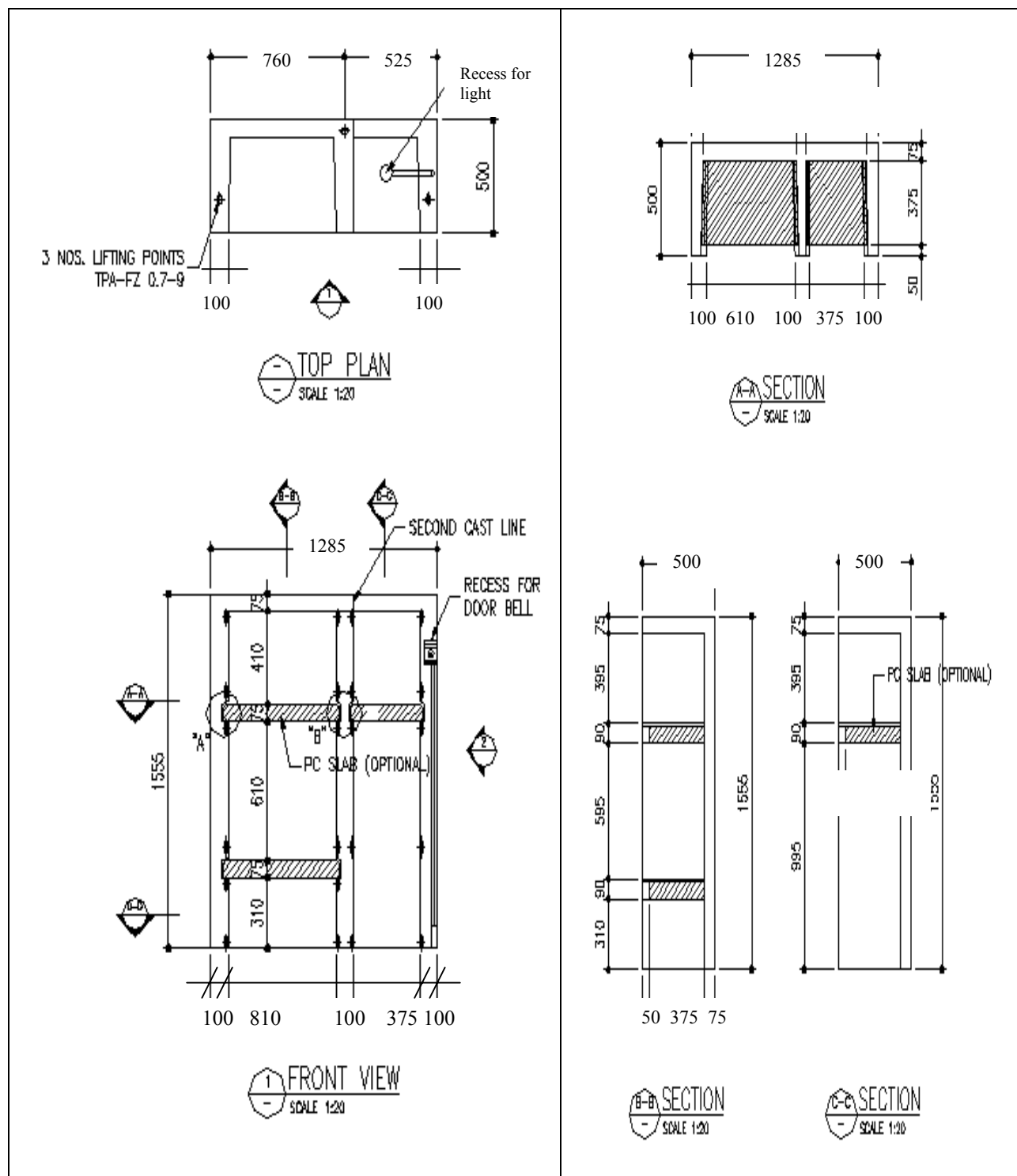


Figure 11.12a Details of meter chamber 2

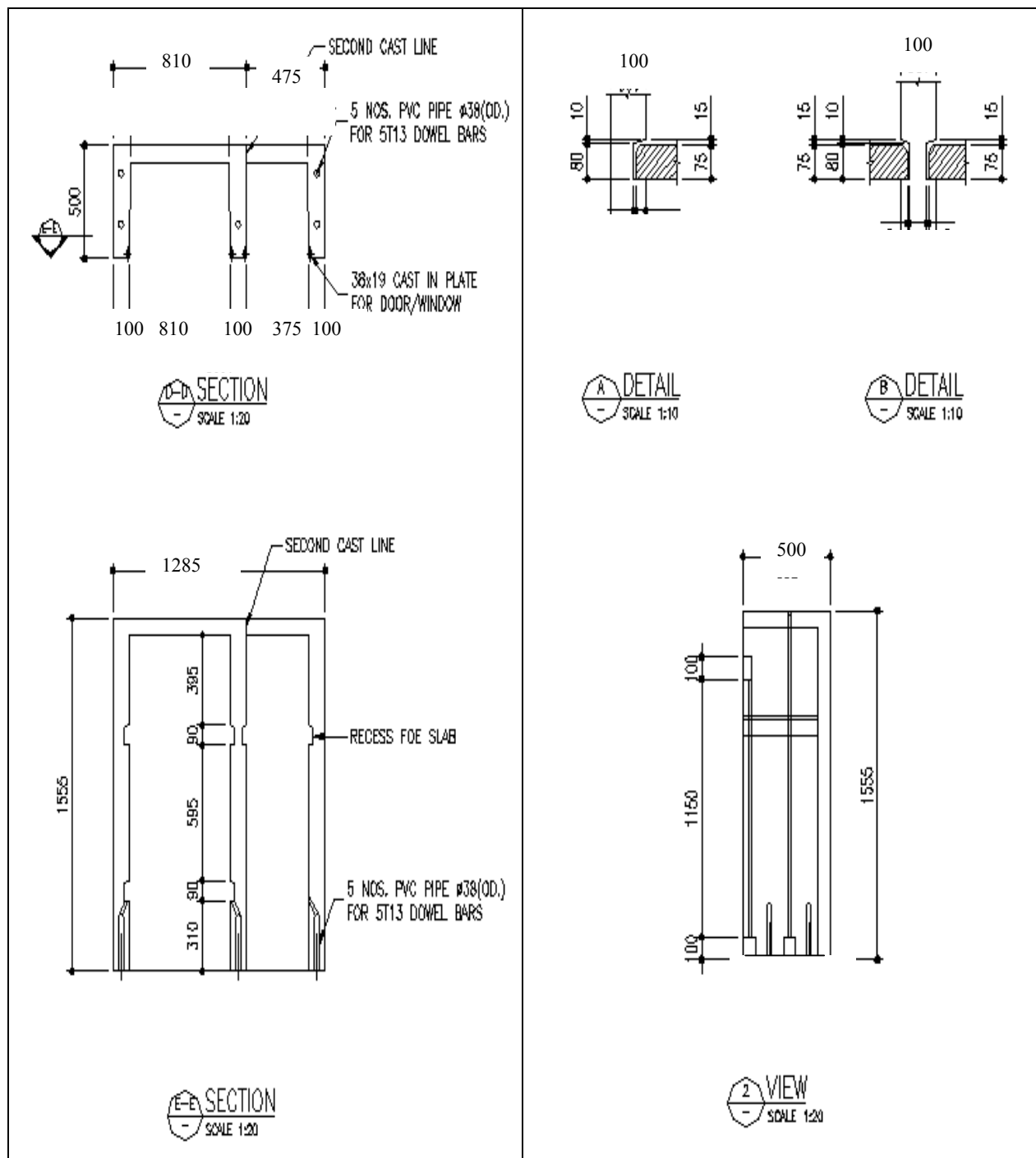


Figure 11.12b Details of meter chamber 2

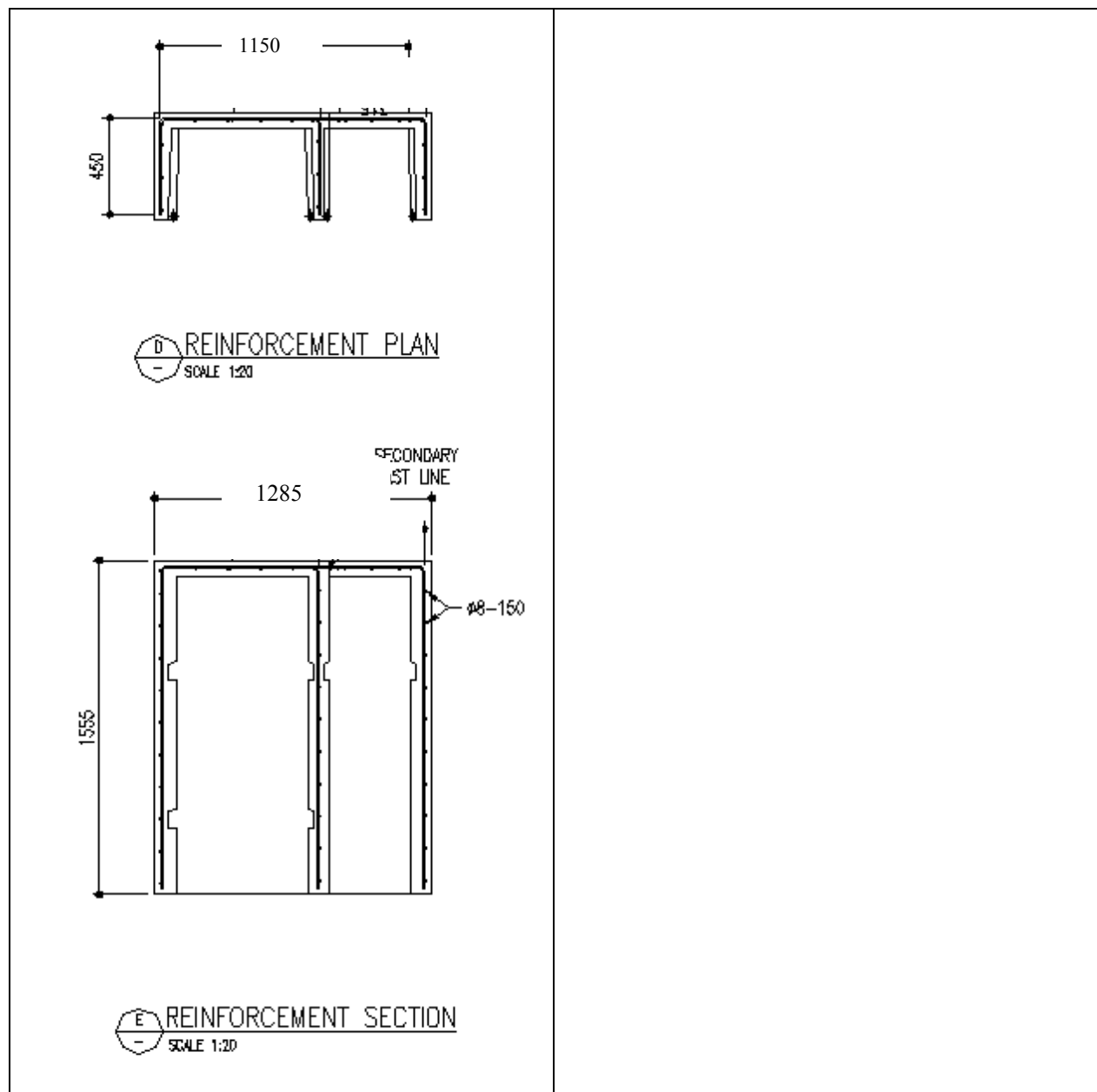


Figure 11.12c Details of meter chamber 2

11.4 PREFABRICATED STAIRCASE

The precast staircases proposed here are of standard sizes with tread sizes between 225mm to 250mm and risers between 150mm to 175mm. On the other hand, steel staircases can come in non-standard sizes to suit the architectural design.

Precast/ steel staircases can be fabricated to a range of various forms and shapes. There are three basic staircases profiles:

- Curved
- Straight
- Spiral profile

In the case of the terrace and semi-detached houses, these staircases can be fabricated in three ways:

- Type A for flight only
- Type B flight and top landing
- Type C flight and base landing

The erection of the staircase can either be on the critical path or non-critical path of the construction sequence. In each case, prefabricated staircases will result in better quality, accuracy and productivity. The prefabricated staircases can be installed quickly and messy, cast-in-situ works can be eliminated.

There are two main methods for fixing and installing the prefabricated staircases. The staircase can either be prefabricated together with the landing as a complete unit or it can be prefabricated separately and installed on site. The prefabricated staircase should be designed to ensure easily transportation and hoisting. However, in most cases, the size and weight are usually within the manageable capacity of the cranes.



Figure 11.13 Precast Flight



Figure 11.14 Cantilevered precast treads



Figure 11.15 Steel plate forming treads and rises



Figure 11.16 Steel stringer beams with steel treads



Figure 11.17 Steel plates supported by centre column



Figure 11.18 Steel plates supported by tension rods



Figure 11.19 Steel plates supported on vertical steel channels



Figure 11.20 Steel plates supported on 2 steel beams



Figure 11.21 Prefabricated spiral staircase

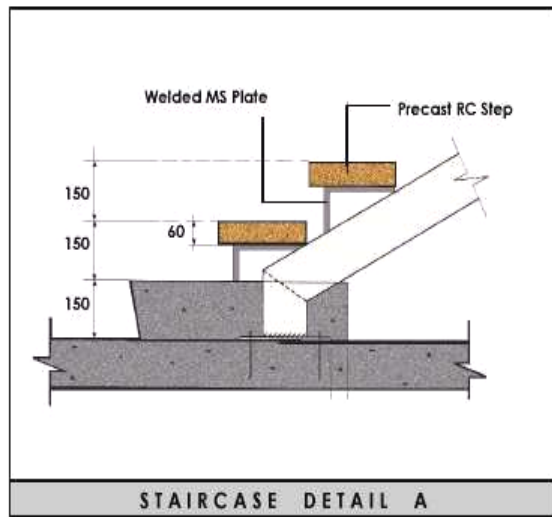


Figure 11.22 Details to staircase in Figure 11.20

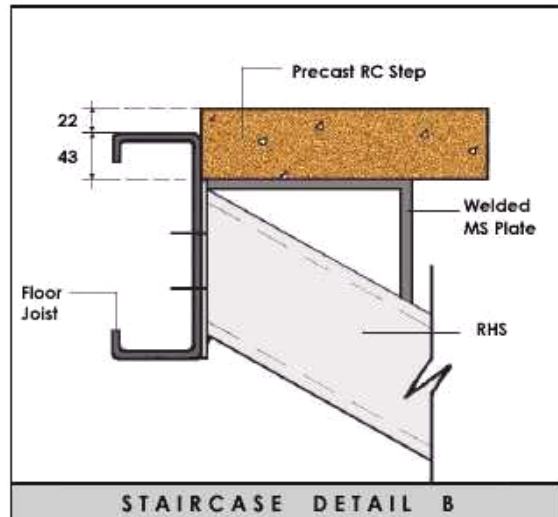


Figure 11.23 Details to staircase to frame connections

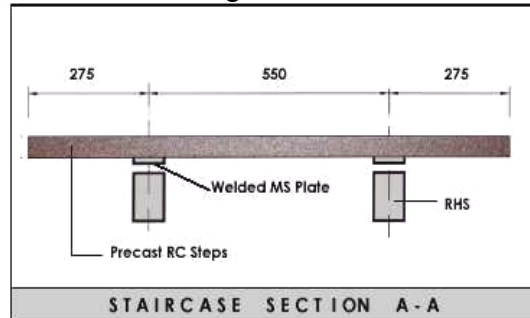


Figure 11.24 Details of prefabricated treads

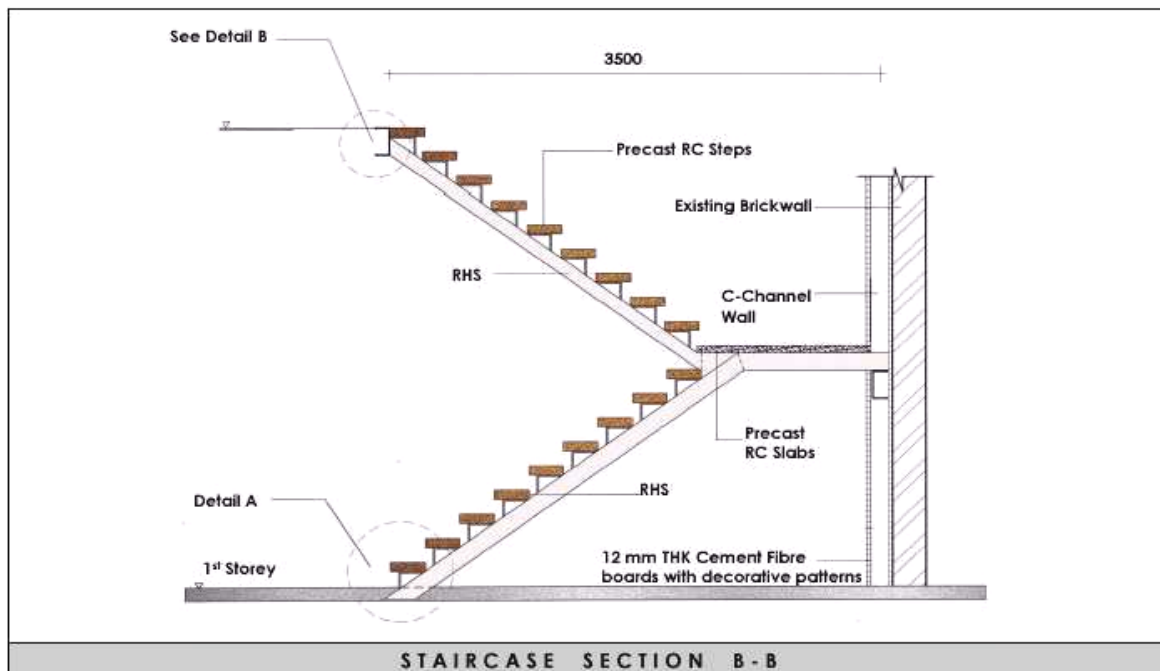


Figure 11.25 Sections of prefabricated staircase

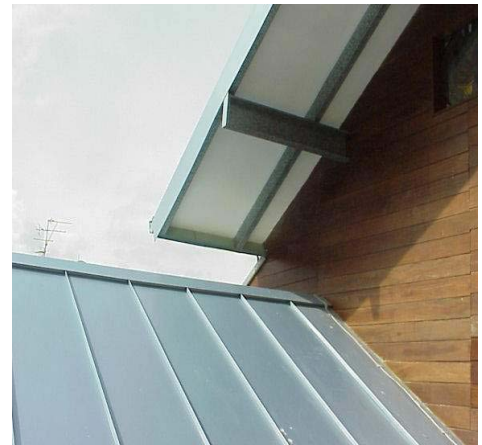
11.5 METAL ROOFING SYSTEM

Over the years, metal roofing system such as corrugated metal and patented steel roof-deck materials have gain much popularity in landed housing from the common conventional timber battens and interlocking roof tiles.

Corrugated metal may be insulated and surfaced with build-up covering. Metal plates formed with interlocking ribs which increase strength and stiffness are manufactured in many different styles. These decks are usually covered with a vapor seal, a rigid insulating board, and a built-up roofing. They are installed either with ribs up or with ribs down. With ribs up these results a smooth ceiling which maybe shop-painted with a baked-on enamel. If the appearance is objectionable with ribs down, an acoustical material maybe applied to the lower surface.

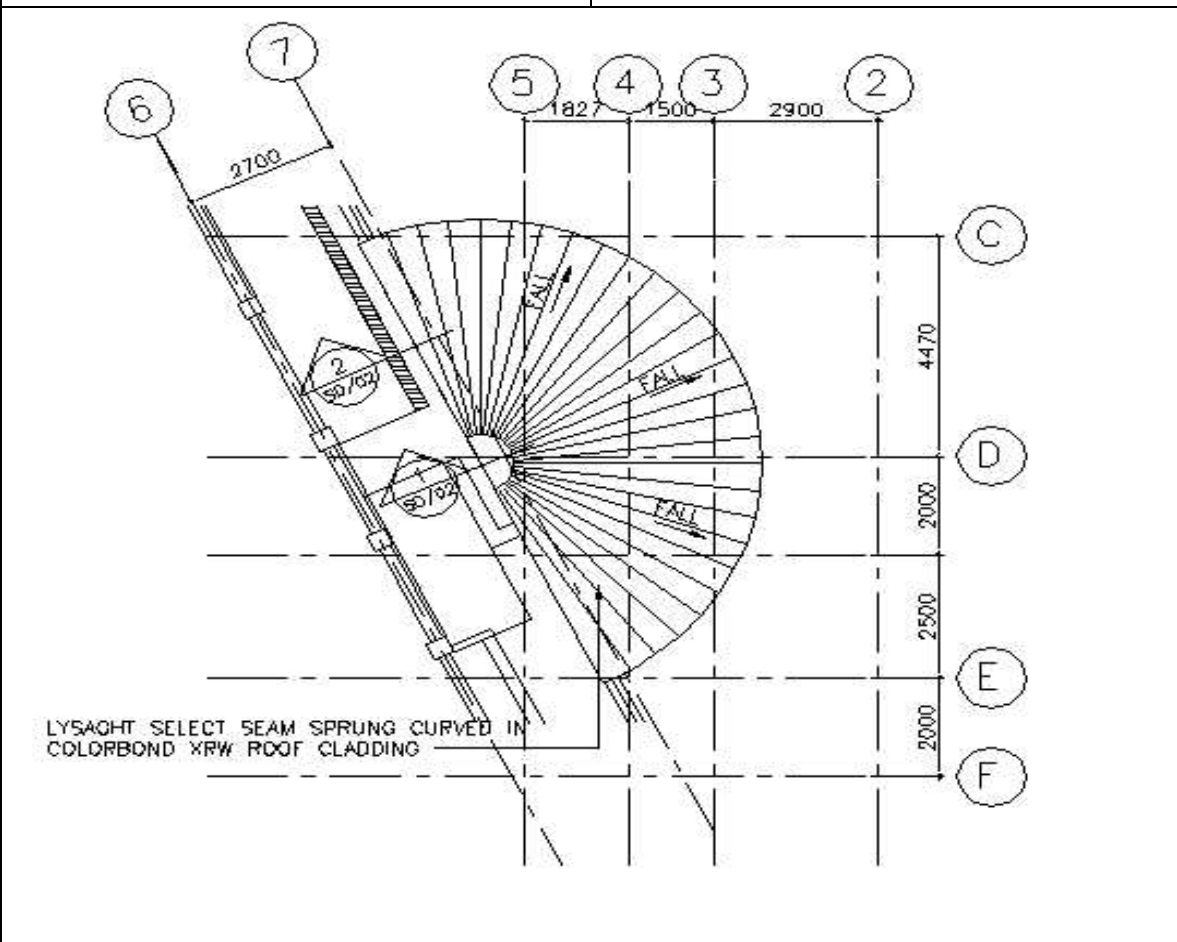
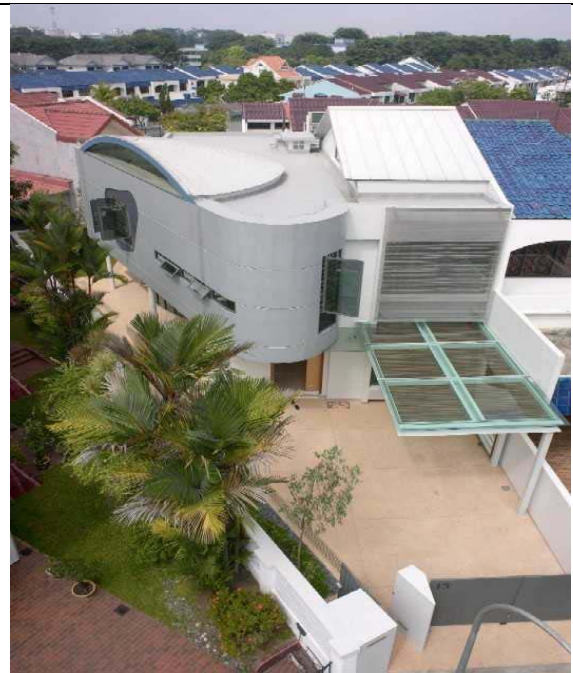


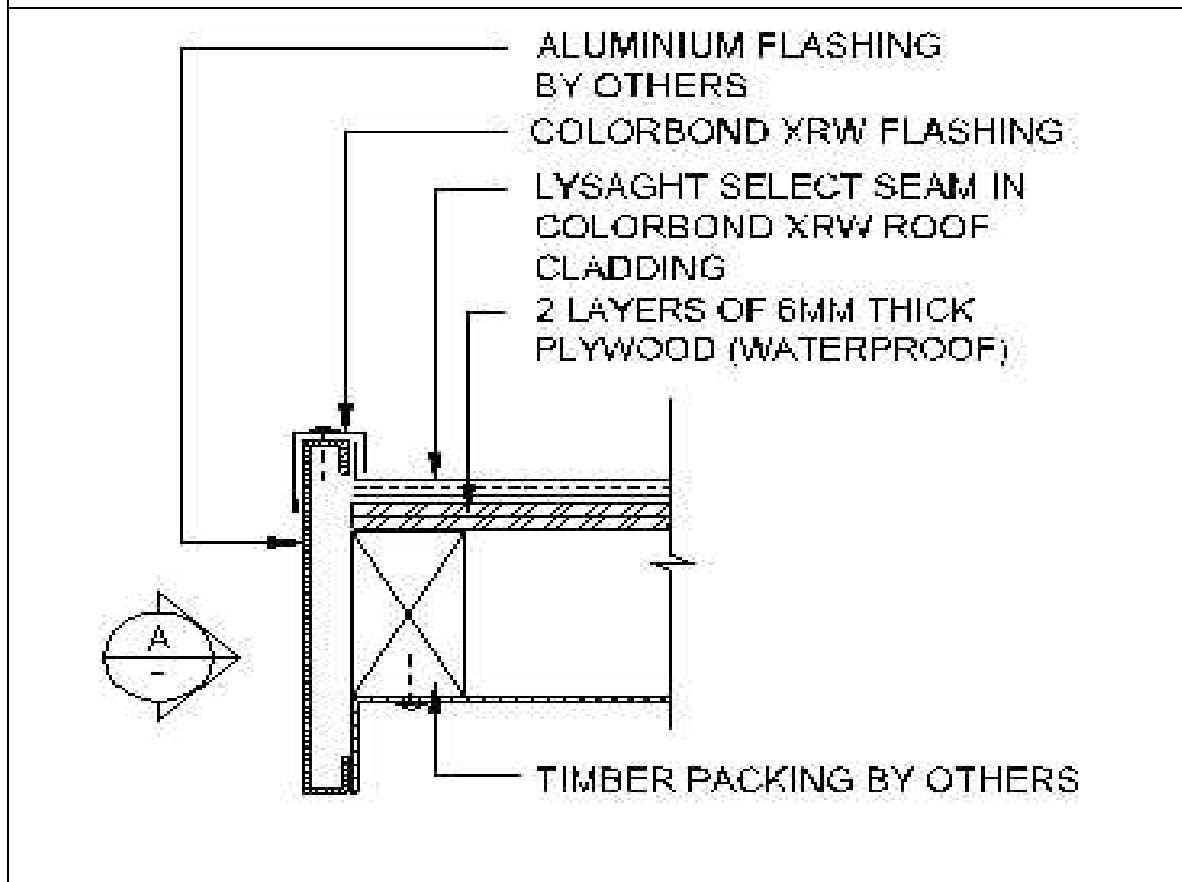
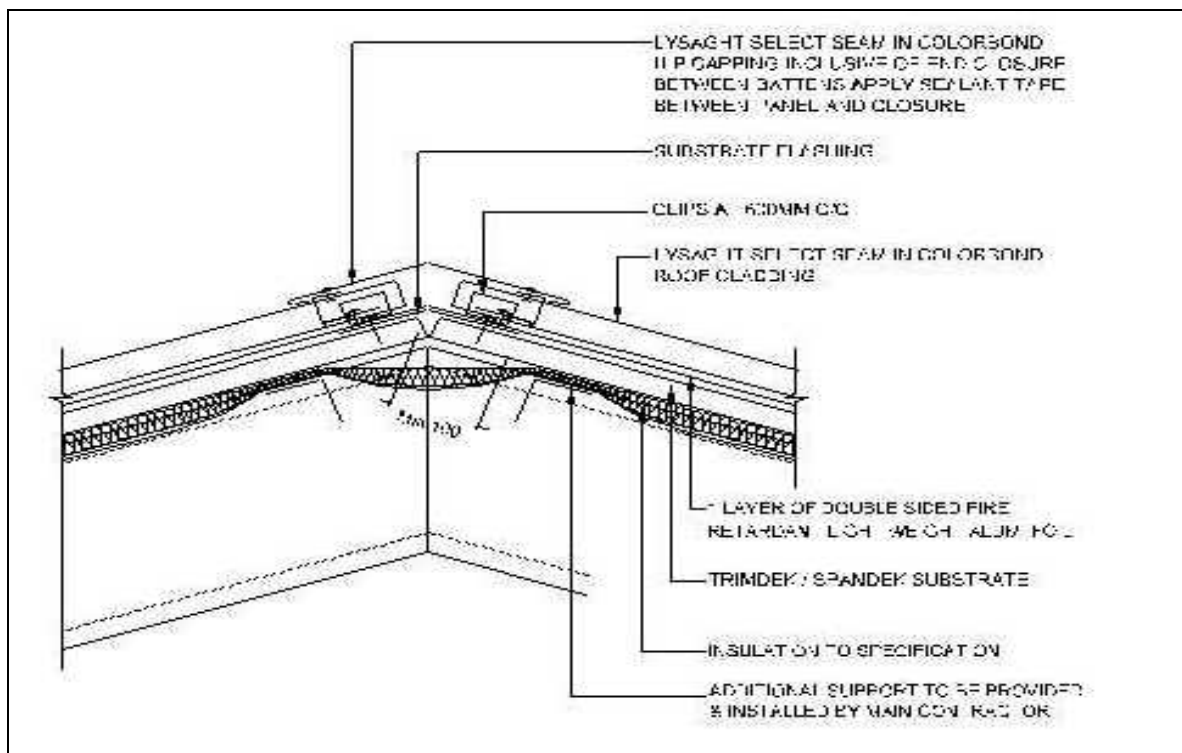
*House at Upper Changi Road East
Architects: A-Alliance Architects*

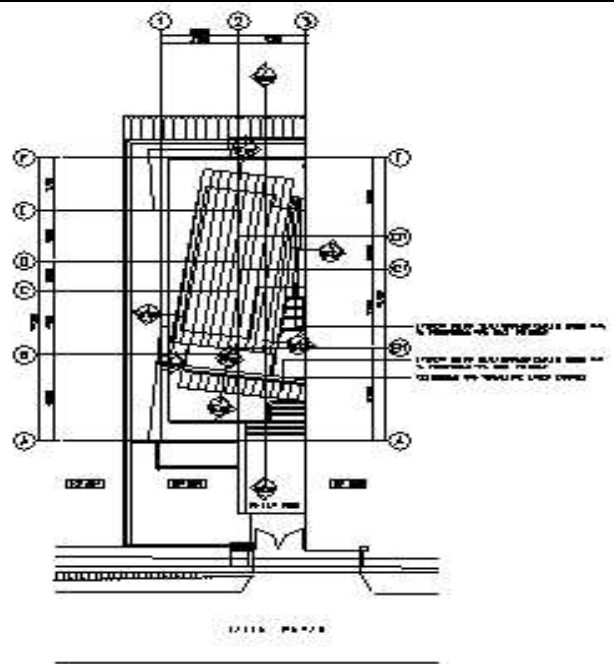




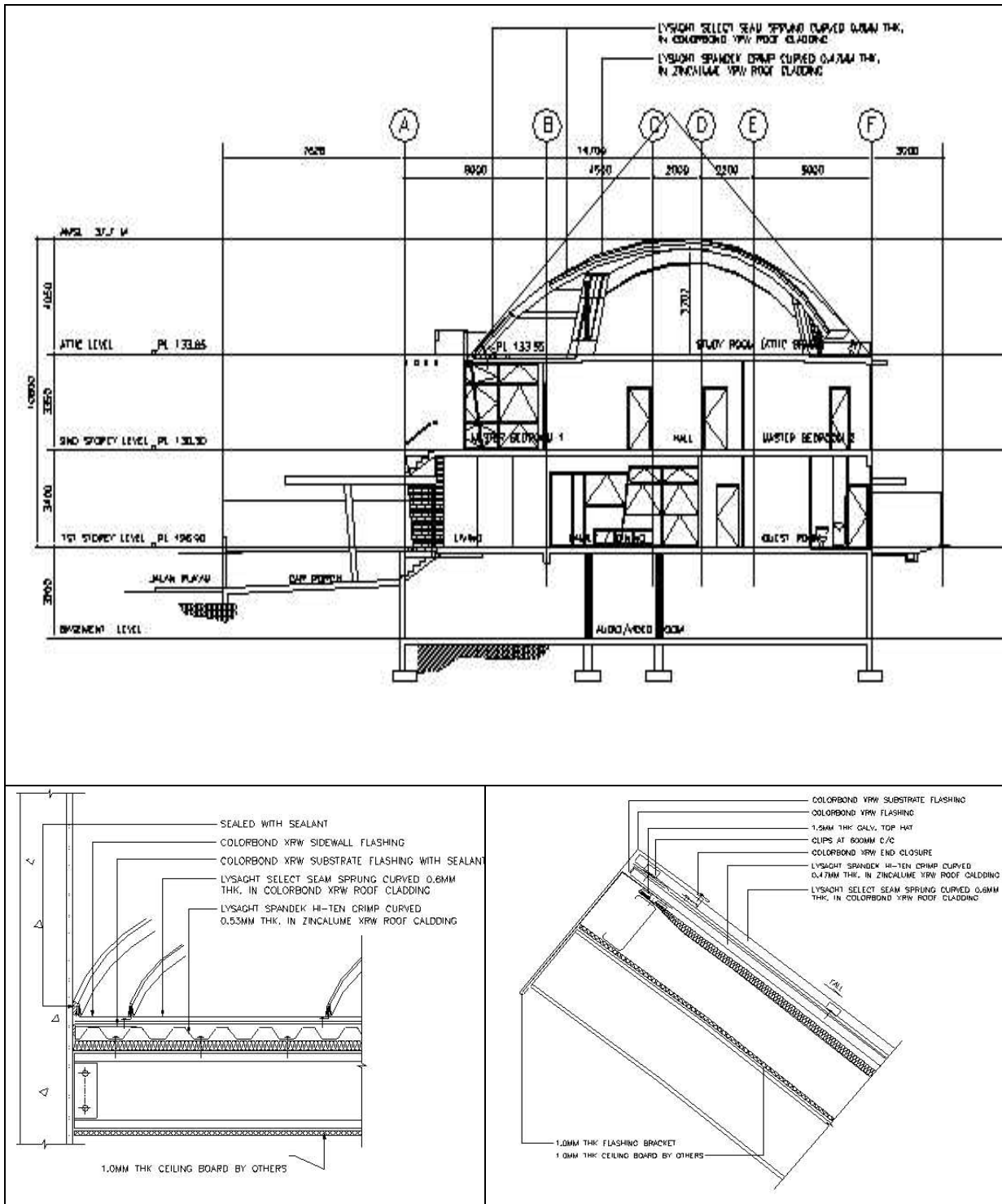
House at Sunrise Drive
Architects: LOOK Architects
Main Contractor: Good View Construction P L
Details recommended by BHP Steel Lysaght





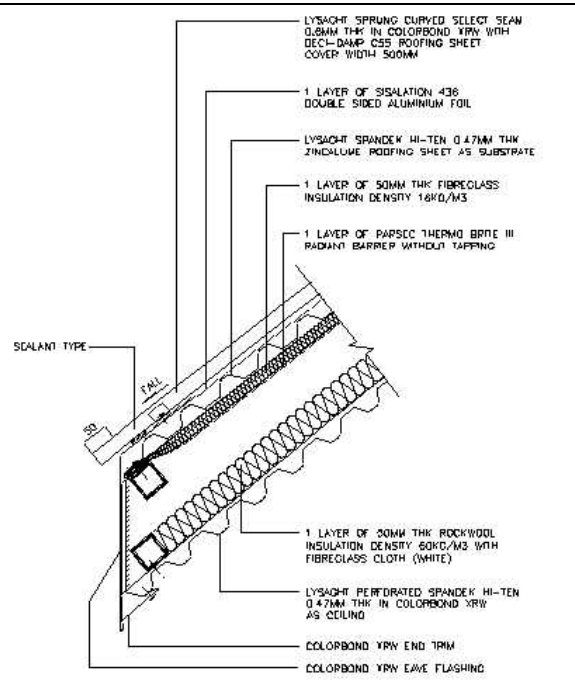


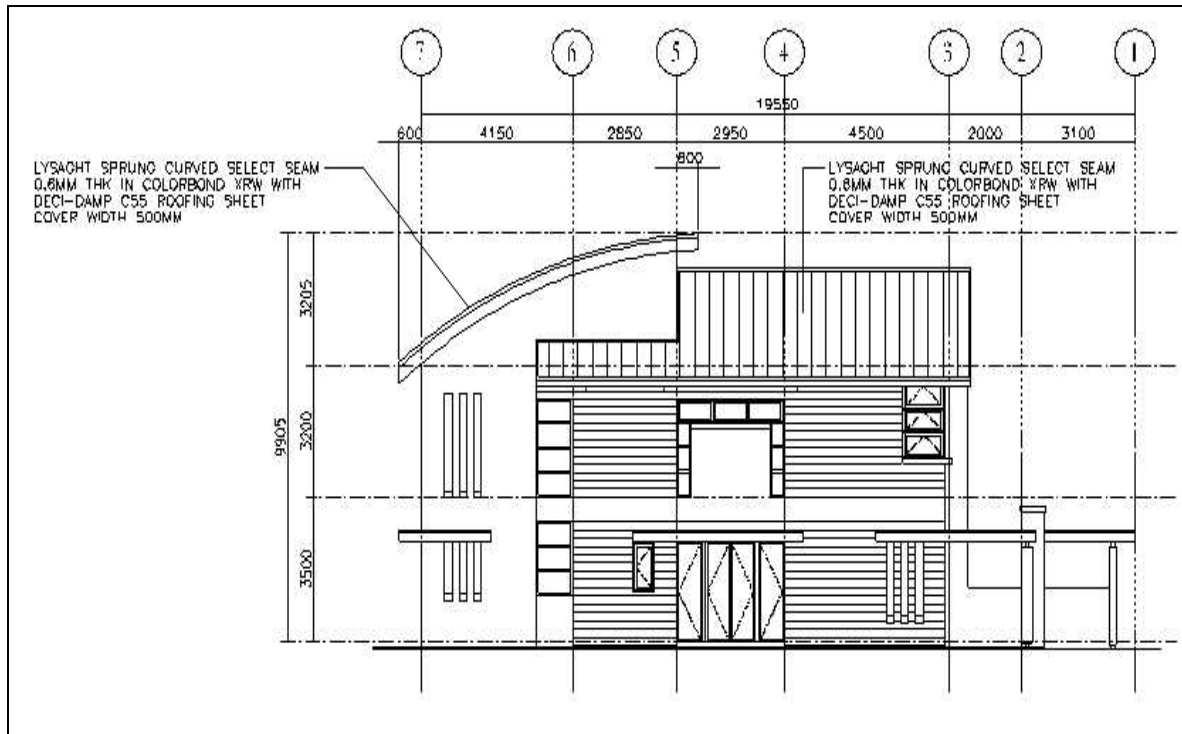
House at no. 35 Jalan Rukam
Architects: CLLA Architects P L
Main Contractor: Jimac Pte Ltd
Details by recommended by BHP Steel Lysaght





House at no. 73 Thomson Ridge
Architects: AXO Architects International





LYSAGHT SPRUNG CURVED SELECT SEAM
0.6MM THK IN COLORBOND XRW WITH
DECI-DAMP C55 ROOFING SHEET
COVER WIDTH 500MM

1 LAYER OF SISALATION 436
DOUBLE SIDED ALUMINIUM FOIL

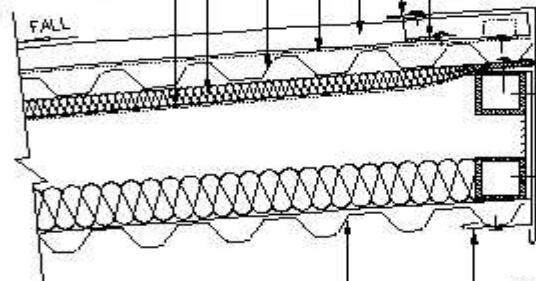
LYSAGHT SPANDEK HI-TEN 0.47MM THK
ZINCALUME ROOFING SHEET AS SUBSTRATE

1 LAYER OF 50MM THK FIBREGLASS
INSULATION DENSITY 16KG/M3

1 LAYER OF PARSEC THERMO BRITE III
RADIANT BARRIER WITHOUT TAPPING

LYSAGHT SELECT SEAM TRANSVERSE
FASCIA CAPPING INCLUSIVE OF
END CLOSER

SEALANT TYPE



COLORBOND XRW END TRIM

LYSAGHT PERFORATED SPANDEK HI-TEN
0.47MM THK IN COLORBOND XRW
AS CEILING