

The classification of the structural elements according to UNI 8290:

<i>Classes of technology Units</i>	<i>Technology Units</i>	<i>Classes of Technical Elements</i>	<i>Technical Elements</i>
MAIN STRUCTURE	ELEVATION	VERTICAL ELEMENTS	DISCONTINUOUS WALLS IN REINFORCED CONCRETE, STEEL, WOOD MIXED TECHNOLOGIES
		HORIZONTAL ELEMENTS	BEAMS, ARCHES, TRUSSES, ROOFS IN REINFORCED CONCRETE, STEEL OR WOOD
CONTAINMENT STRUCTURE		SPATIAL ELEMENTS	WALLS, ROOFS
		VERTICAL CONTAINMENT ELEMENT	GRAVITY WALLS CANTILEVER WALLS SPECIAL WORKS
		HORIZONTAL CONTAINMENT ELEMENT	SUBFLOOR ON CRAWL SPACE
FOUNDATIONS		DIRECT FOUNDATIONS	CONTINUOUS FOUNDATION DISCONTINUOUS FOUNDATIONS
		INDIRECT FOUNDATION	FIXED PILES IN-SITU

The bearing structures can be classified according to their **morphology and constructive features**

CONTINUOUS



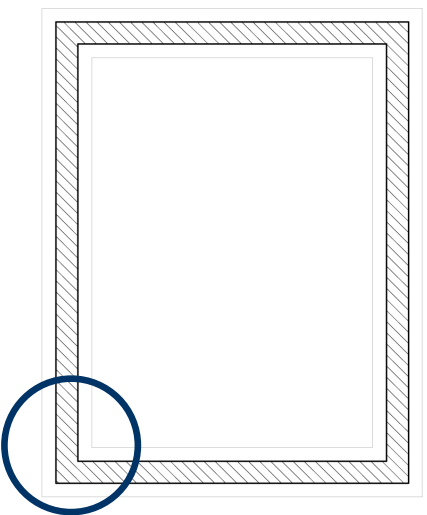
The structural framework bind the distribution of the spaces

DISCONTINUOUS

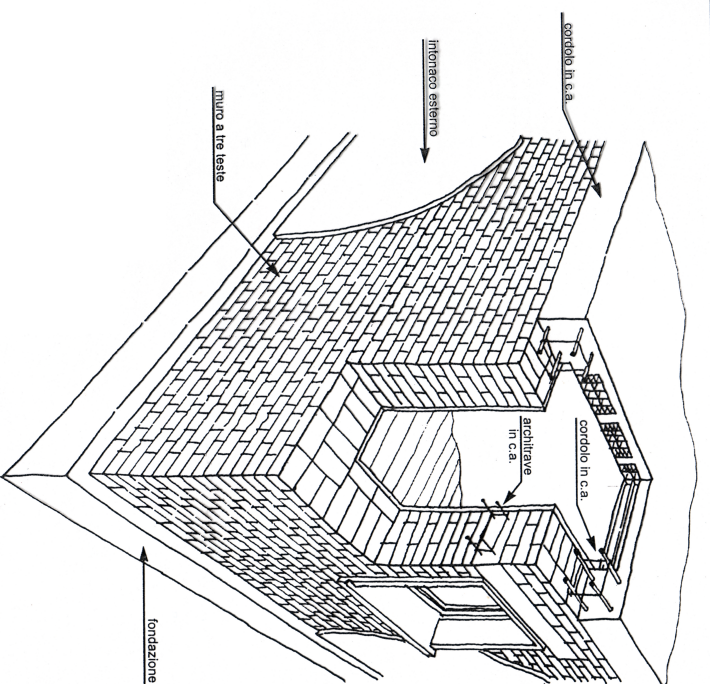


The structural framework allow flexibility and autonomy in the distribution of the space.

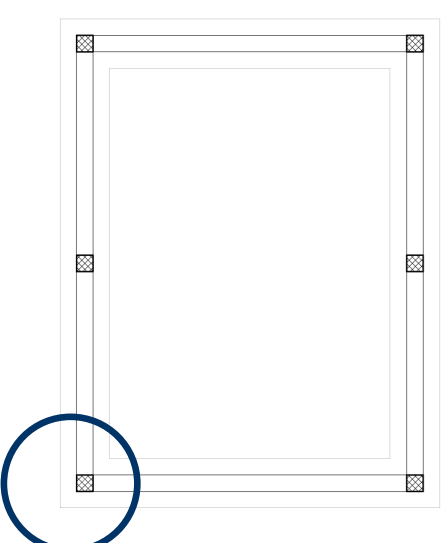
Structural scheme for the bearing walls



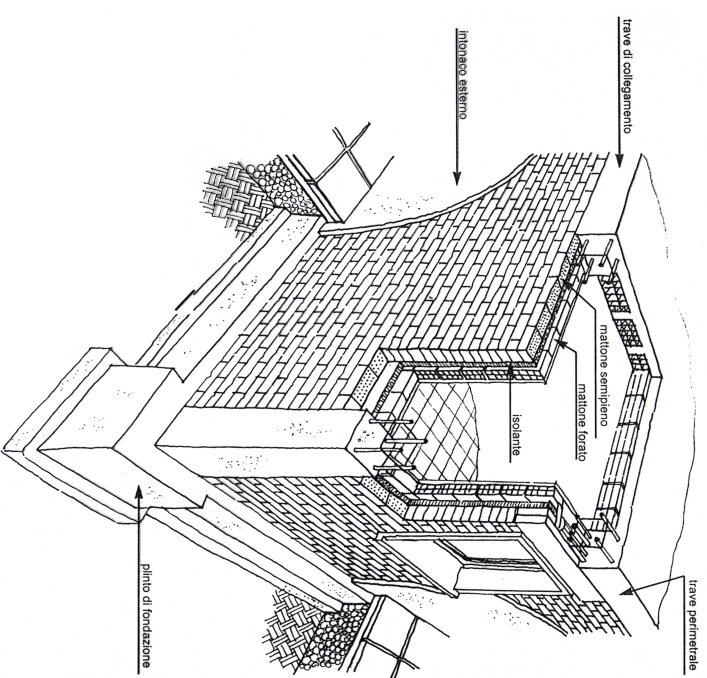
Axonometry of the bearing walls



Structural scheme for reinforced concrete pillars

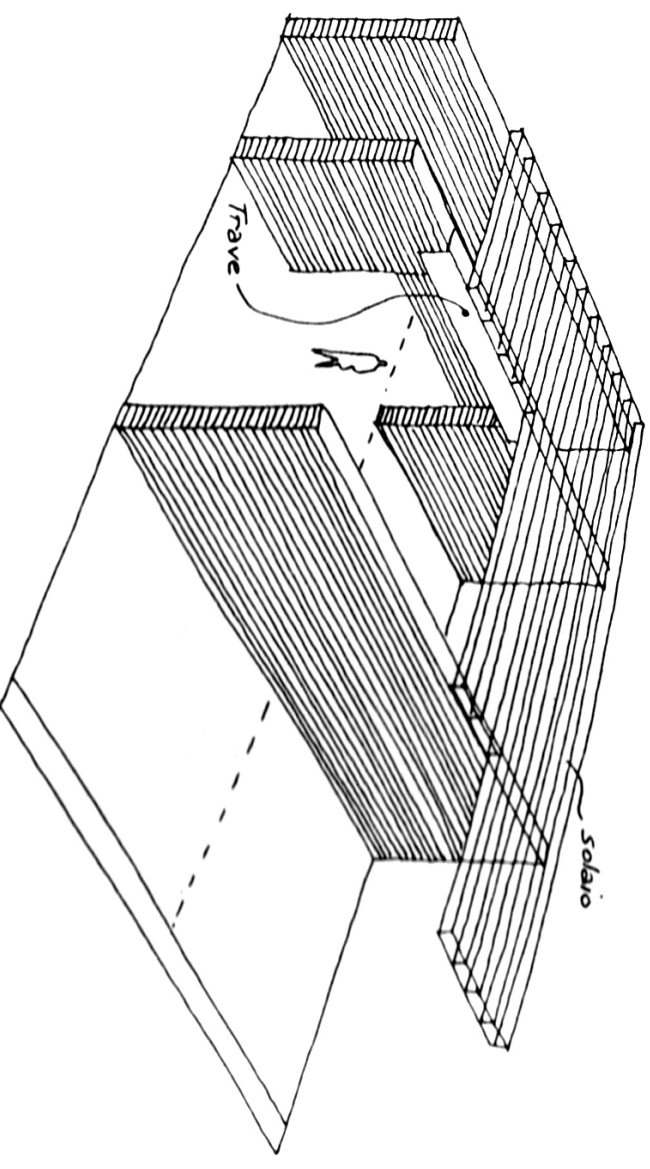
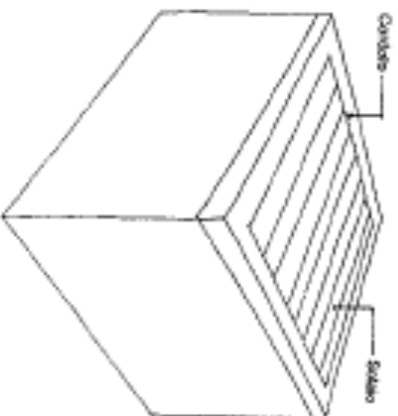


Axonometry of the reinforced concrete pillars

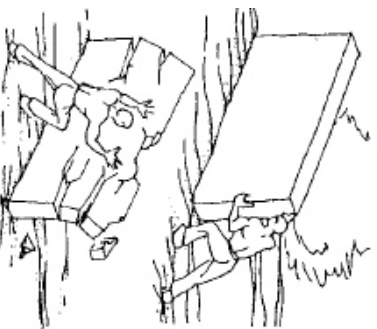


Continuous bearing structure

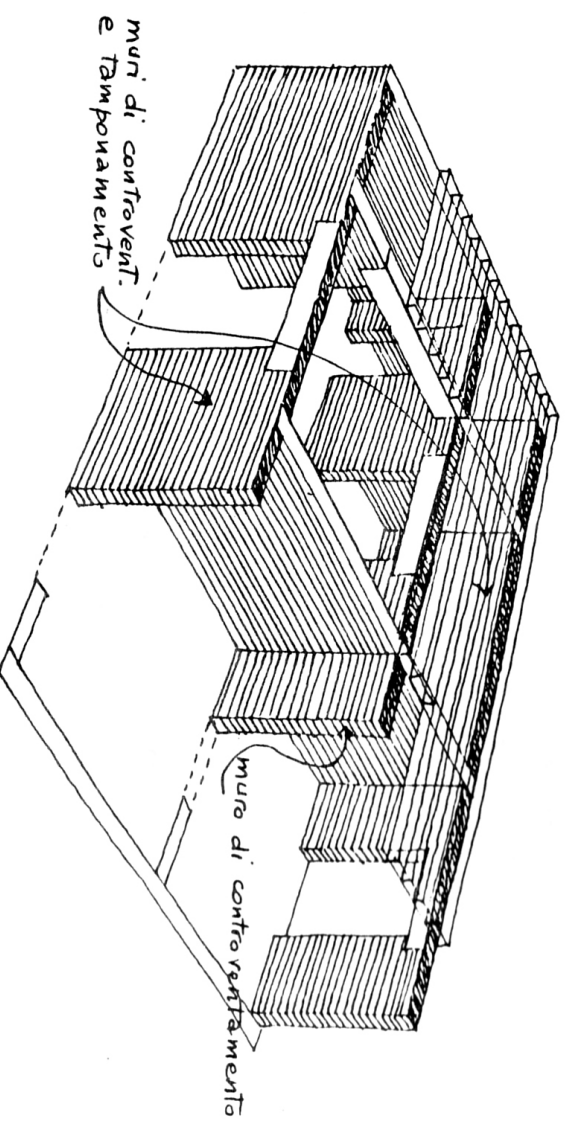
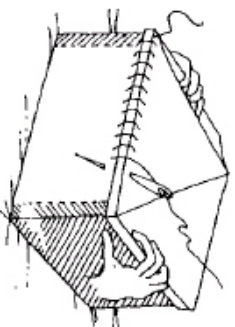
It is composed of a sequence of parallel wall partitions that support the horizontal floors; the wall partitions can be interrupted (by holes, compartments, etc..) but must be connected by curbs (normally in reinforced concrete) to provide continuous and uninterrupted support to the floors. The curbs must be continuous along the entire wall at the level of the floor and roof slabs.



Static considerations, related to the need to resist to the horizontal forces (especially seismic ones), often require that other walls, which are equally strong, are arranged orthogonally to the load-bearing ones, to provide rigidity to the structures; these walls, which do not have the function of carrying the floors, are called **fastening (controventatura)** and can also perform the function of **enclosing wall**. All the other walls of a building within a structure in load-bearing walls (i.e. the curtain walls and partitions) have no static function.



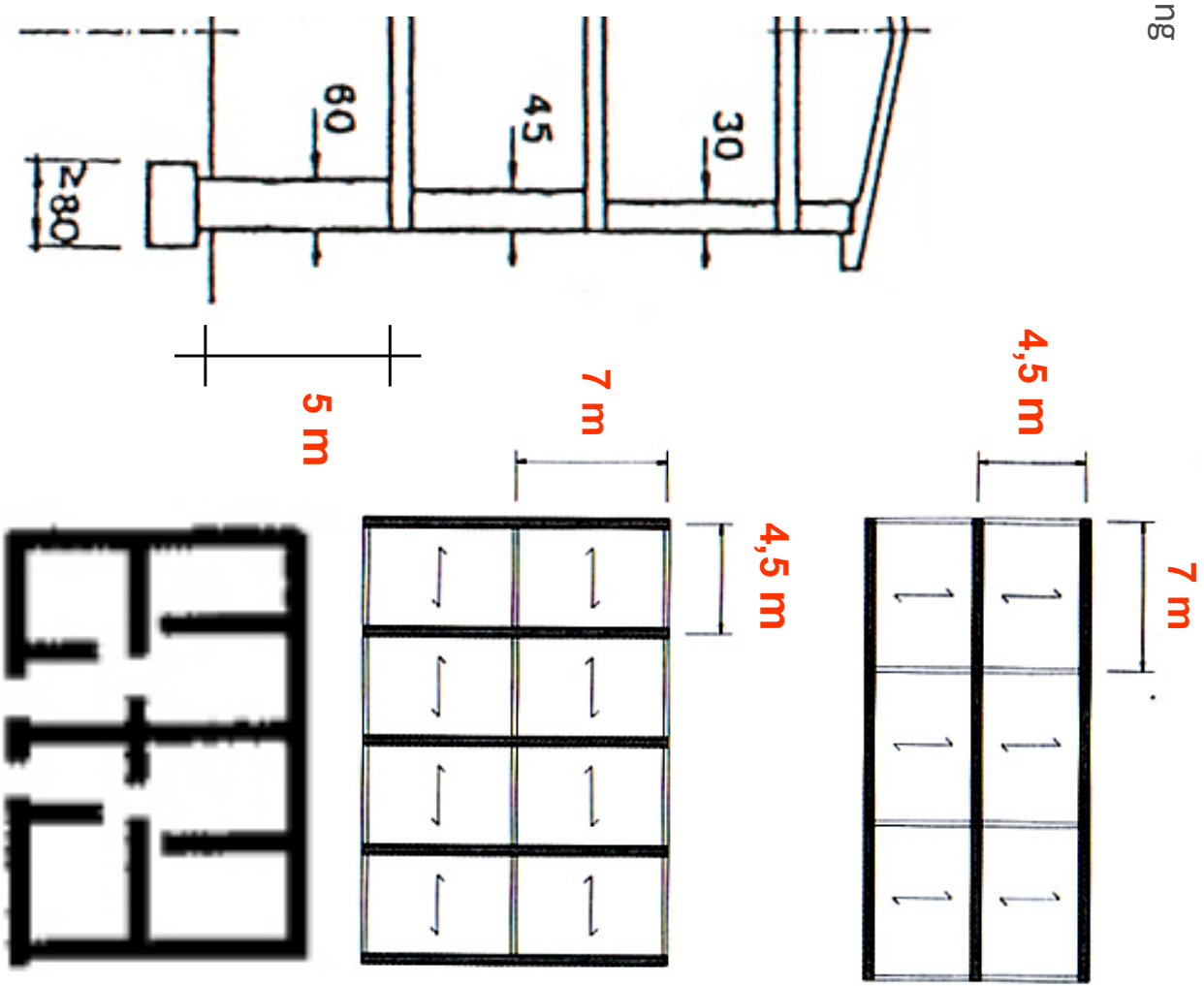
«Box» structure



Design criteria for the walls grid

The dimension of the single cells must respond to structural and functional purpose, and also to the distribution of the spaces in which the building is articulated.

1. The distance between the vertical retaining walls in the case of floors warped in one direction must not exceed 4.5 m.
2. The structural grid in both flat and raised position must be regular.

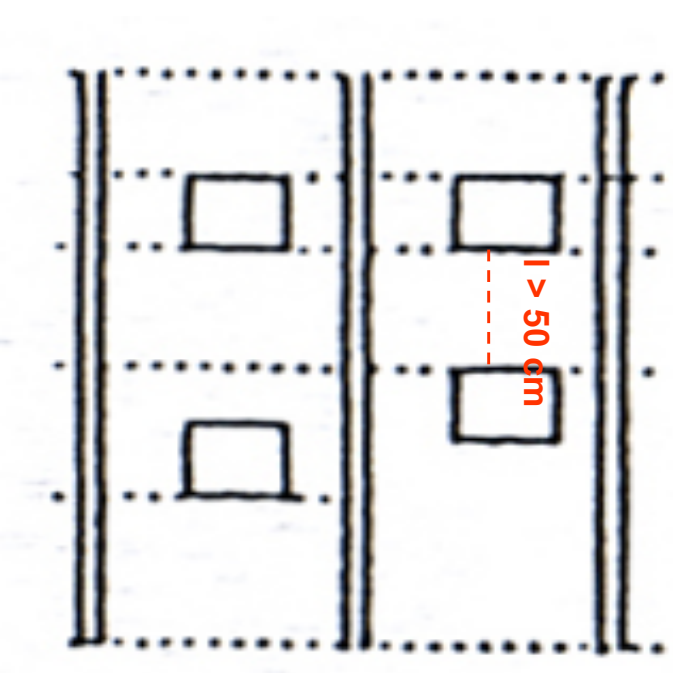
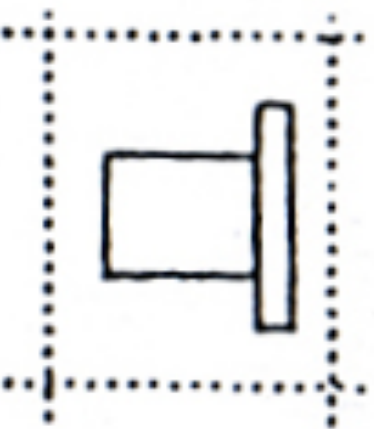


IN SEISMIC ZONE (D.M. 16.1.1996)
ORDINARY WALLS <ul style="list-style-type: none">- The distance between the walls to ensure the rigidity to the structure is 7 m.- The maximum distance between floors for ordinary masonry is 5 m.- Rigidity and masses on the height of the building must be reduced gradually.

Design criteria for the holes

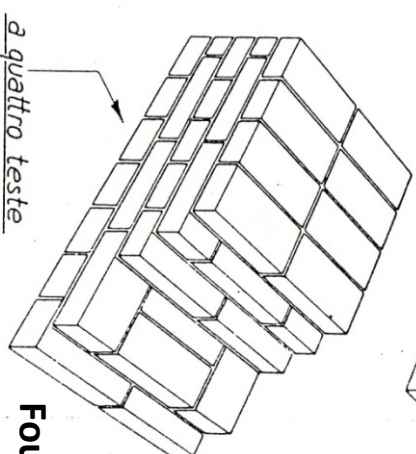
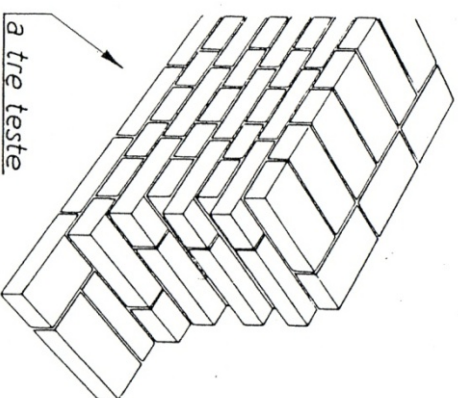
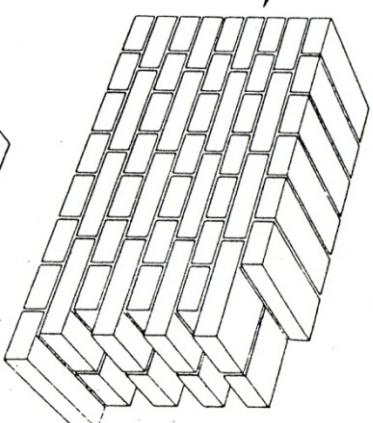
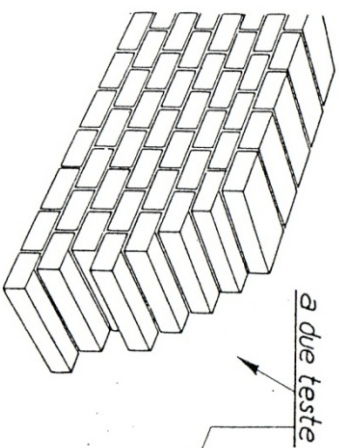
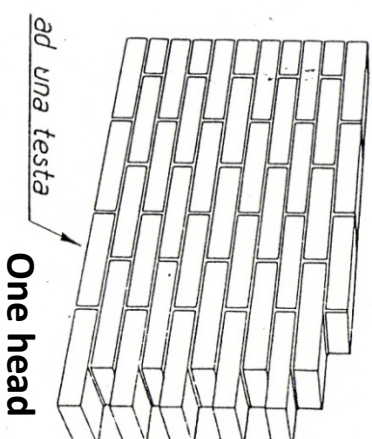
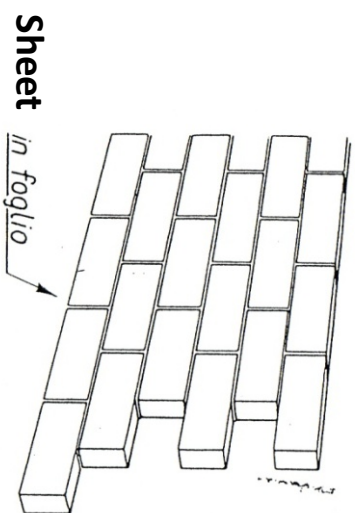
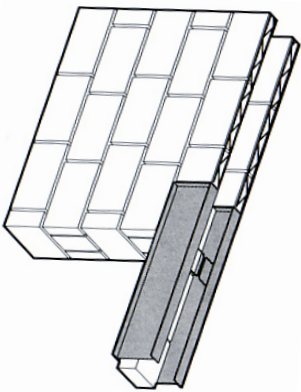
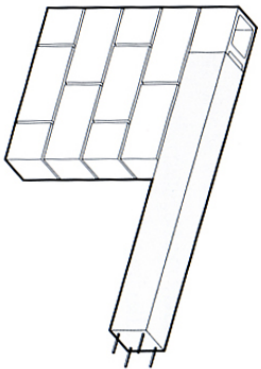
- 1) Vertically aligned openings;
- 2) The distance between the two holes must be greater than 50 cm.

IN SEISMIC ZONE (D.M. 16.1.1996)
<ul style="list-style-type: none">- The position of the openings must ensure structural symmetry- The lintel must be made of reinforced concrete or metal



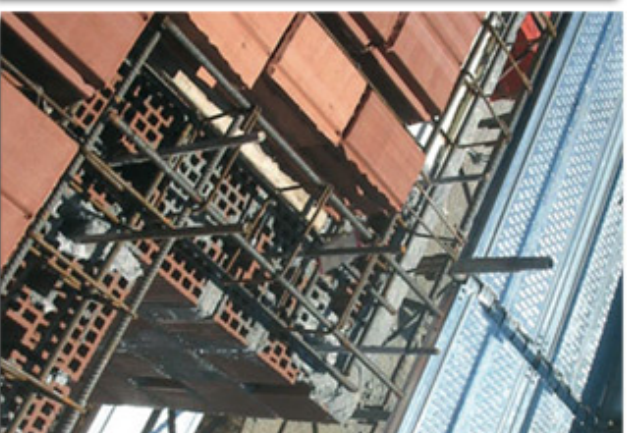
Types of brick walls

tipi di murature in laterizi (mattoni)



Elevation structure

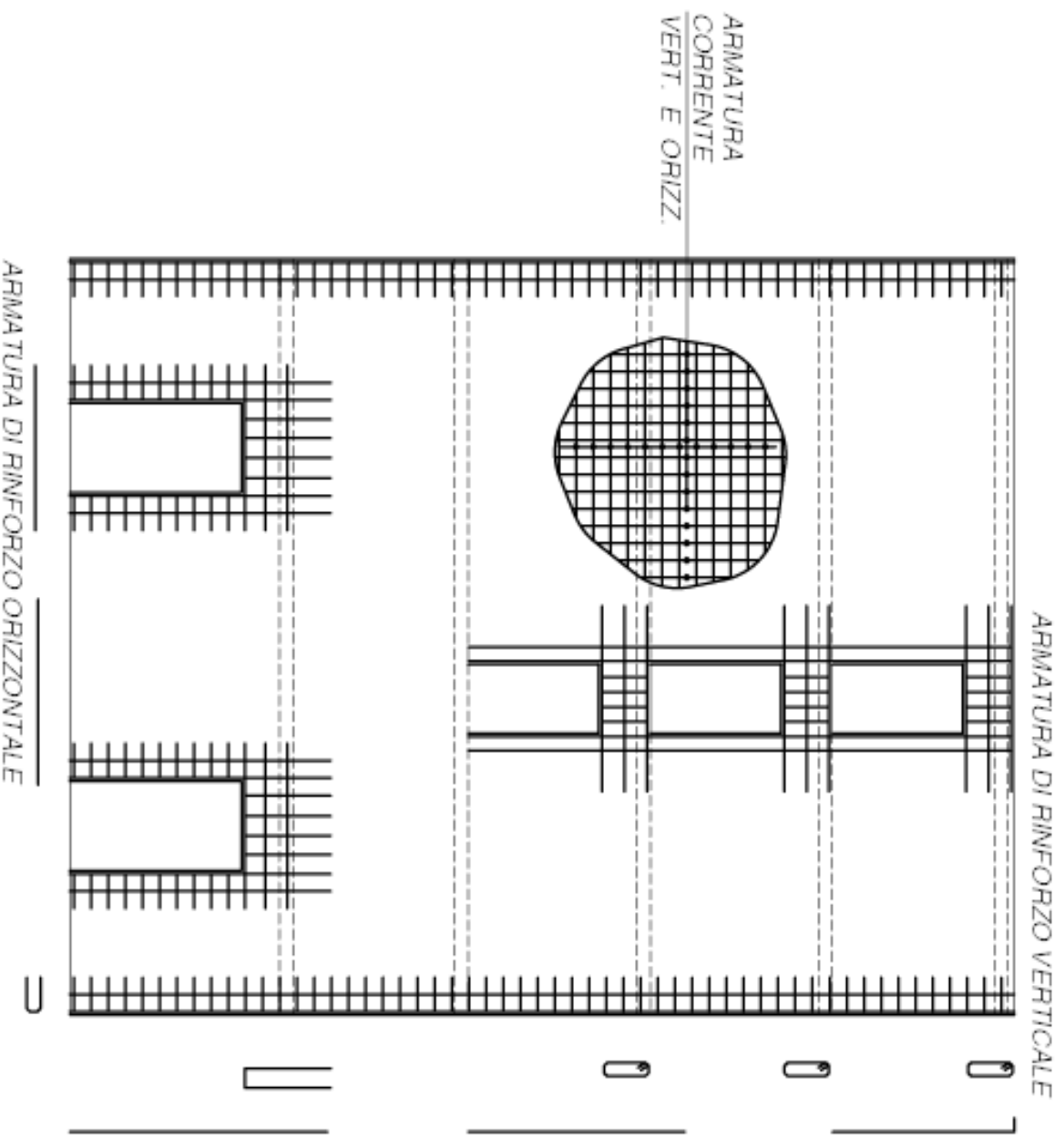
Continuous, vertical elements in reinforced walls



Elevation structure

continuous vertical elements in reinforced concrete

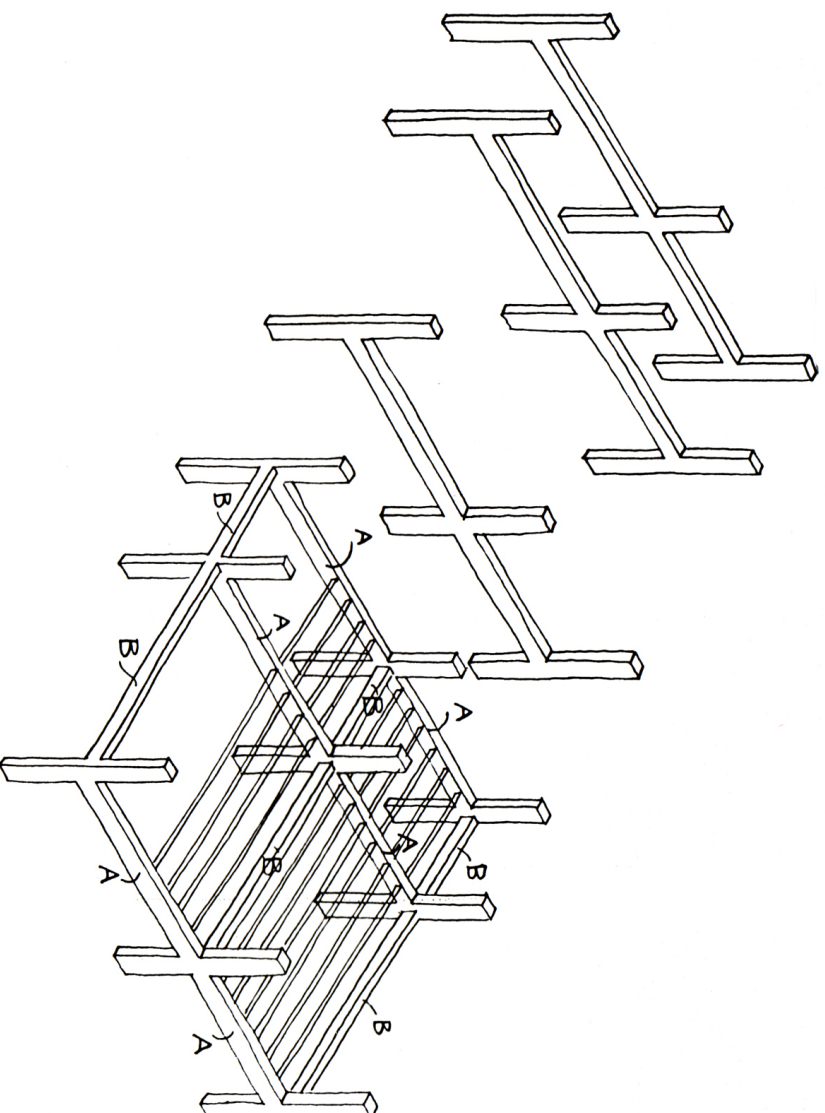
FIG. D.5.5./3 EDIFICIO A SETTI – DISPOSIZIONE ARMATURE



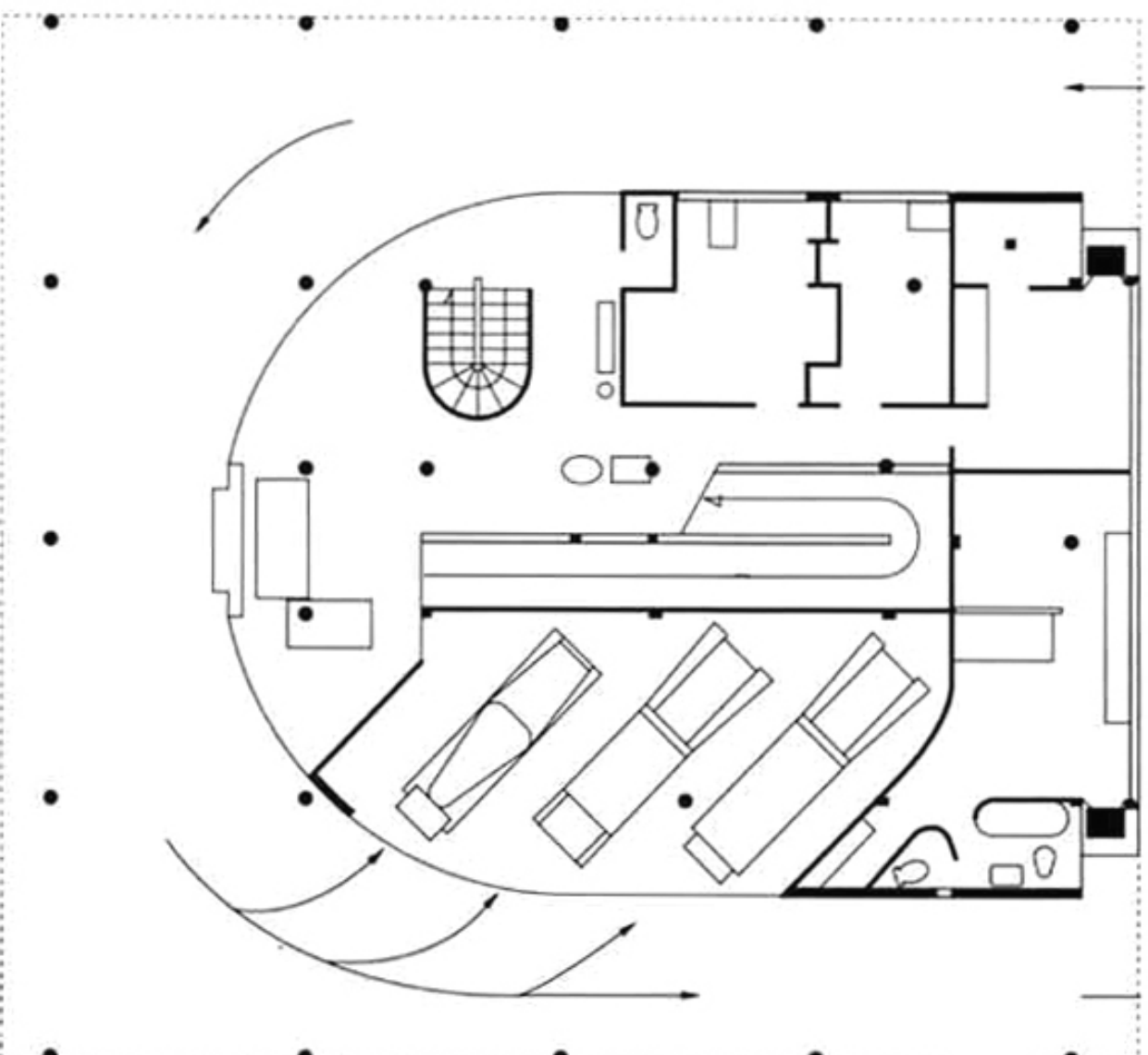
**DISPOSITION OF THE
REINFORCEMENT WITHIN
THE WALL**

Discontinuous Structure

A discontinuous load-bearing structure, similarly, results from the coupling of parallel frame structures (in which the main beams 'A' carry the floors), connected by other horizontal beams (secondary beams 'B'), which are usually less height and which have only to stiffen the structure. In the structure, each element (pillar, beam) is integral to the others and contributes to the resistance of the whole. In the discontinuous load-bearing structure, all the external closures are beared (non-load-bearing), i.e. plugging. Even the internal partitions are not load-bearing (partitions).



The relationship between the structure and the shell

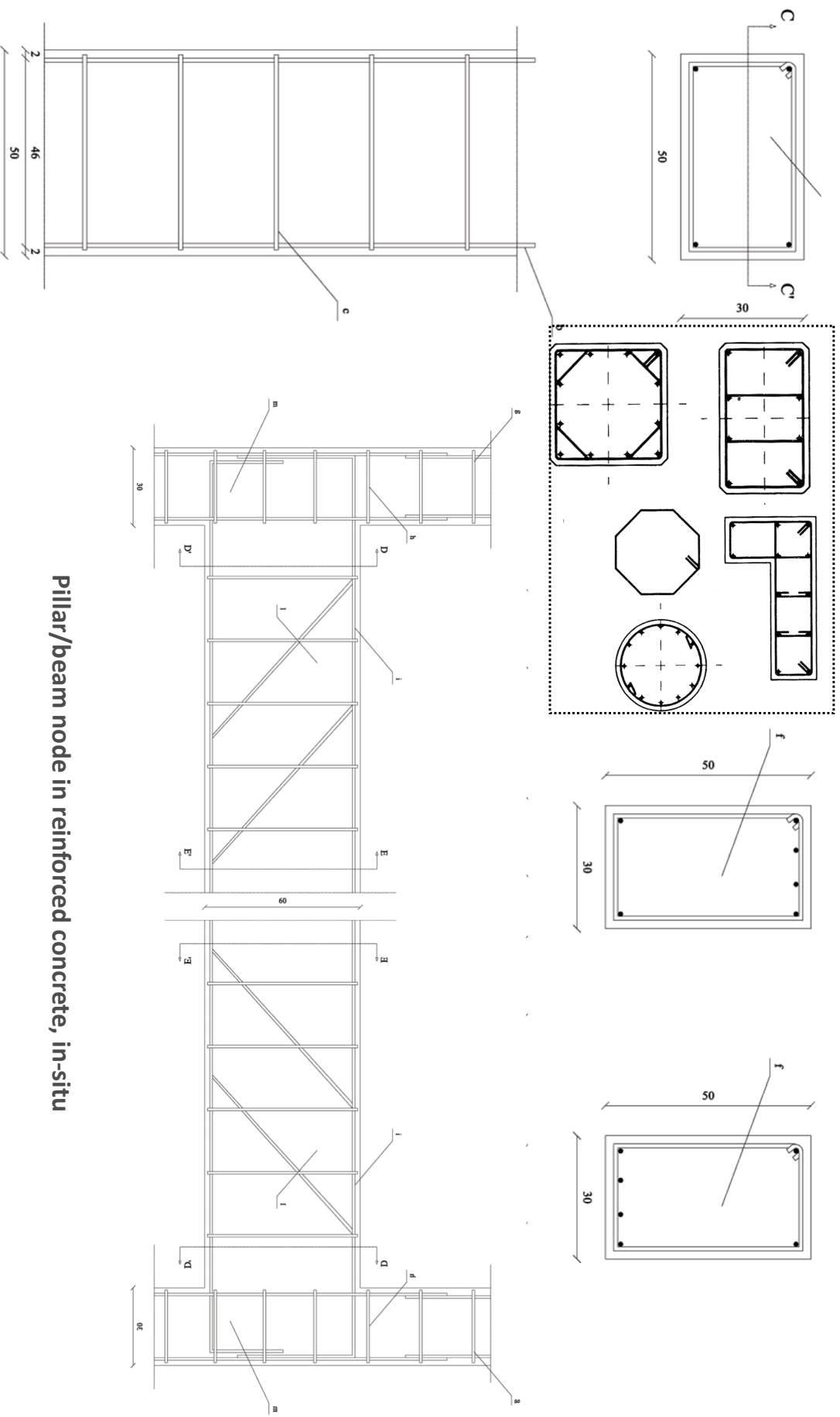




Ville Savoye, Le Corbusier, 1928-1931

Vertical elements framed types in reinforced concrete

For the resistance of the structure, in the pillar is relevant the amount of surface area of the section; for the beam, is more relevant the height of the section, with the same surface area.



Pillar/beam node in reinforced concrete, in-situ

Visible beam – disposition of the reinforcement

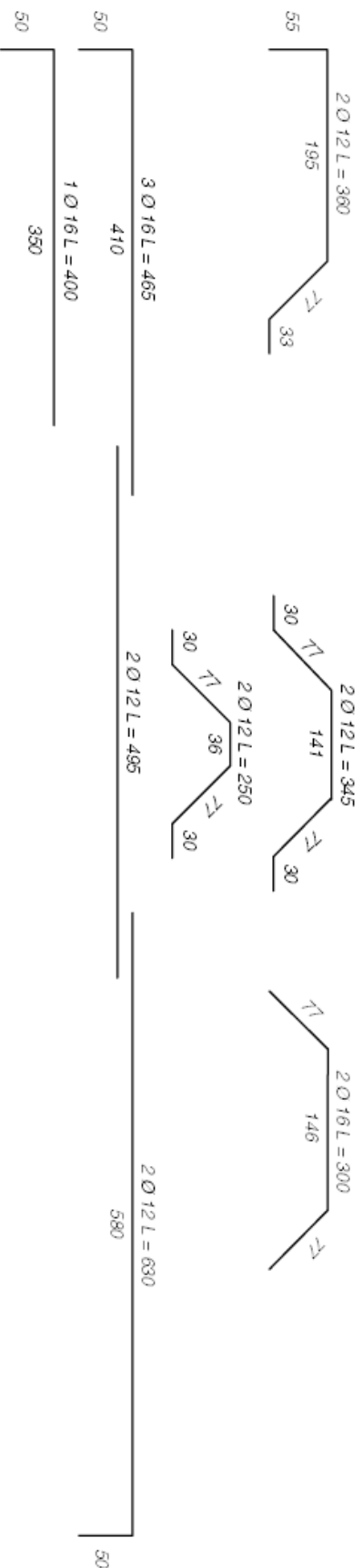
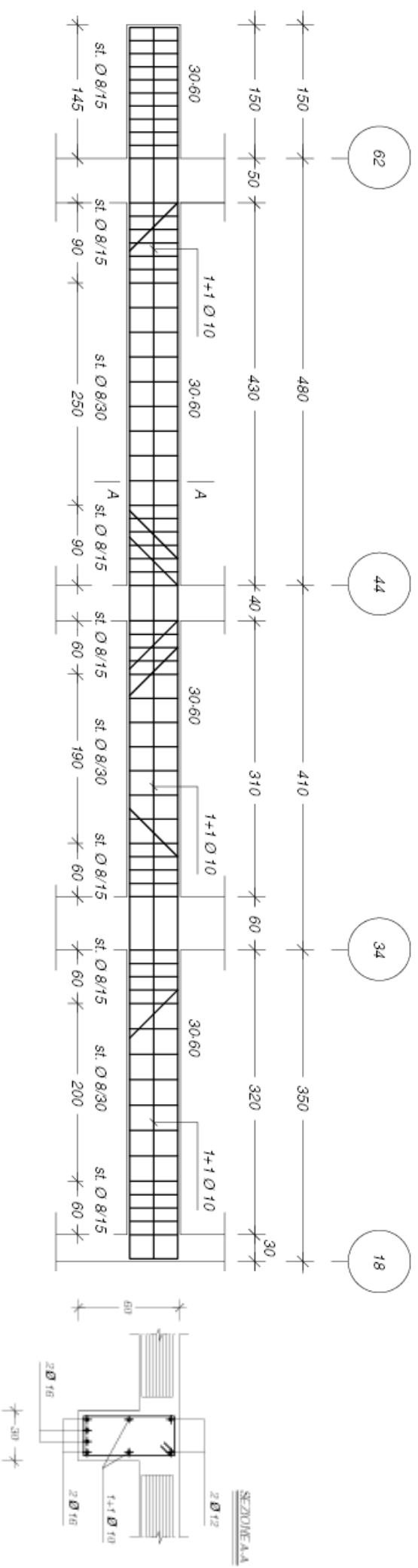
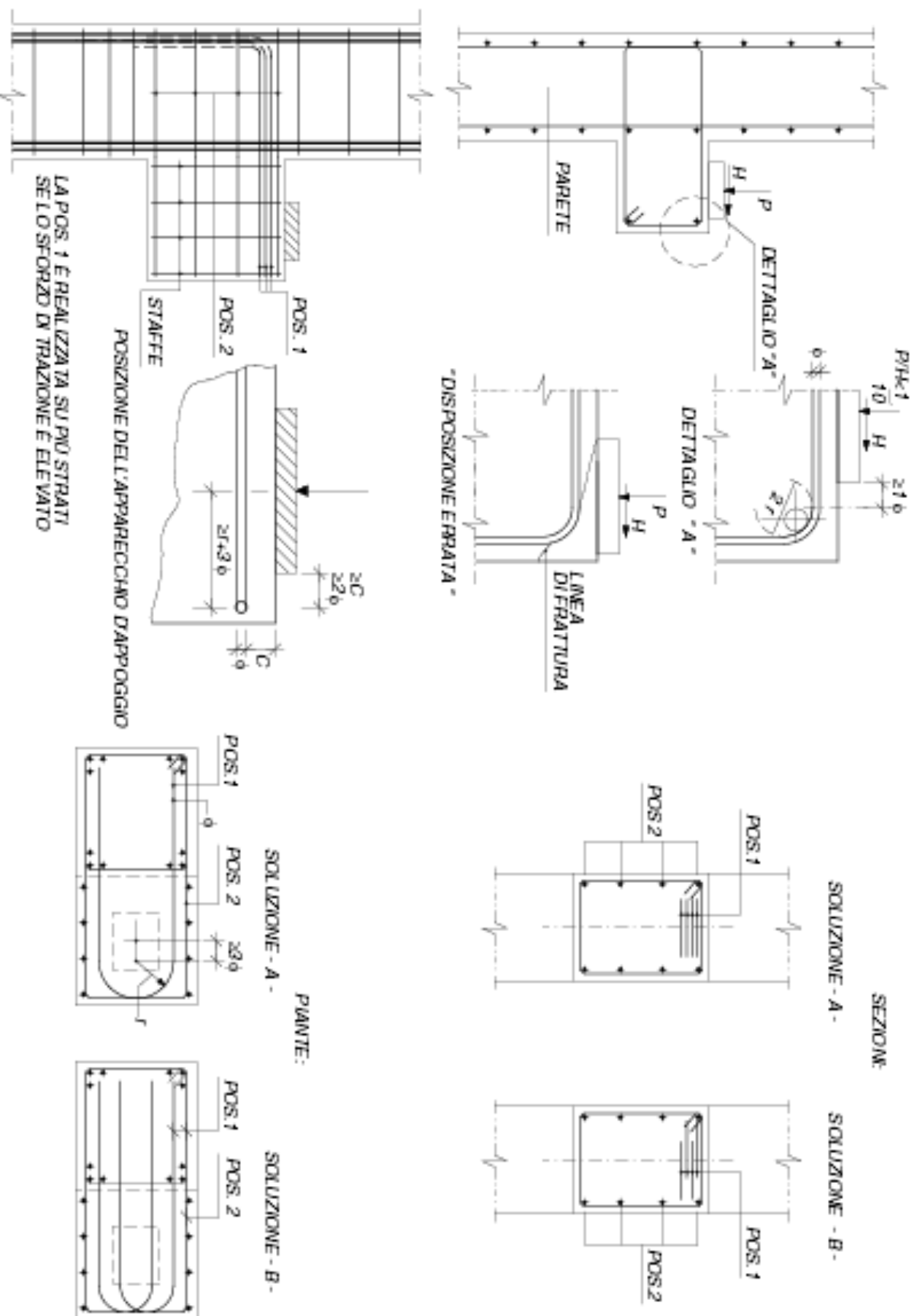


FIG. D.5.6/9 MENSOLE TOZZE - POSIZIONAMENTO E DIMENSIONAMENTO DEGLI ELEMENTI TESI E COMPRESSI



Vertical Elements framed types in steel

FIG. D.5.12./1 BASE DI COLONNA (vincolo a cerniera)

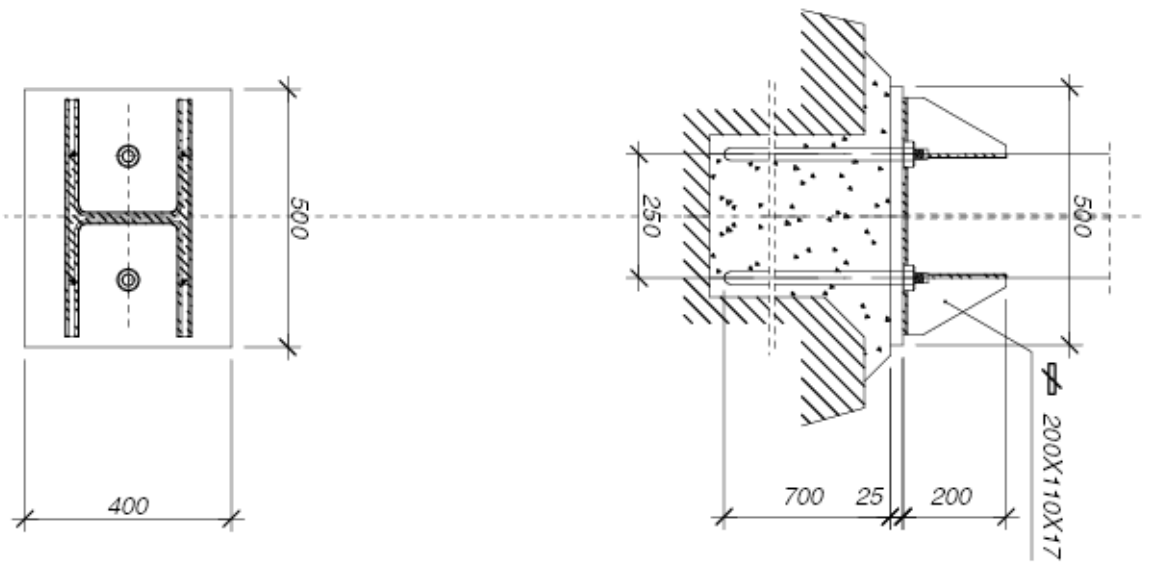


FIG. D.5.12./2 BASE DI COLONNA (vincolo a incastro)

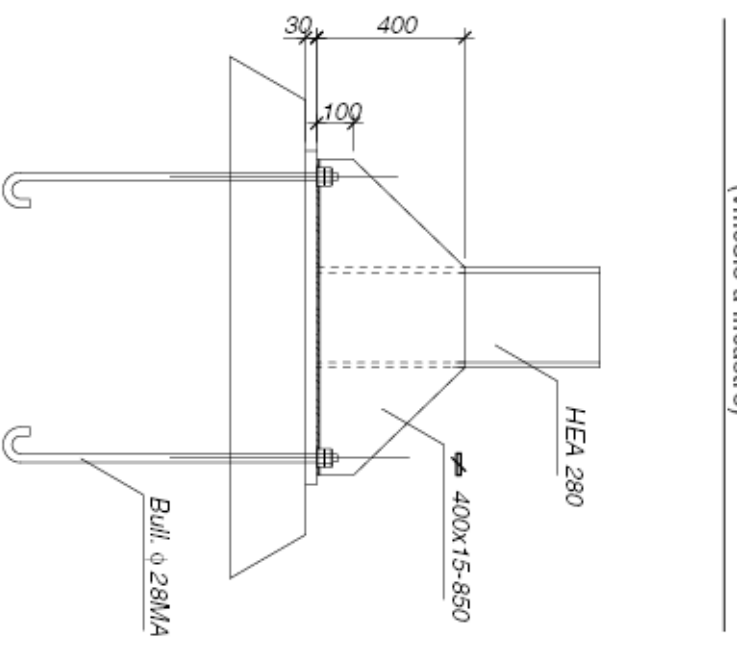
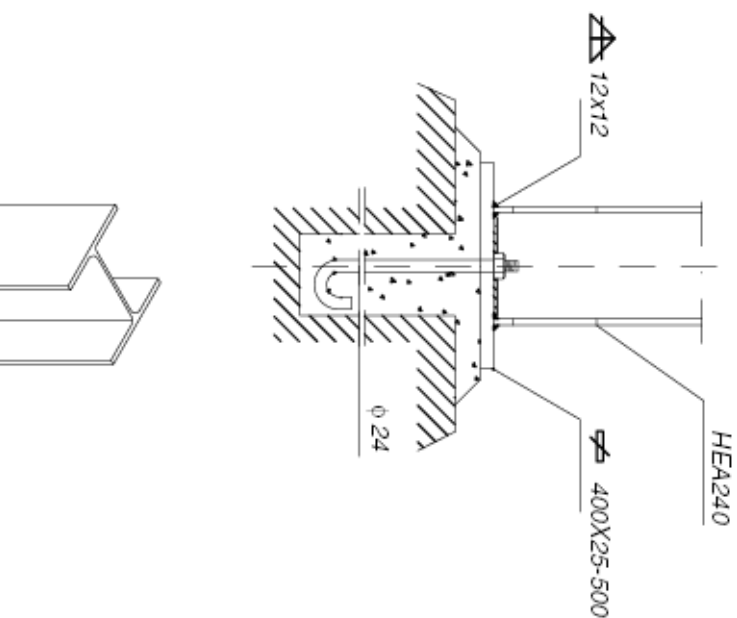
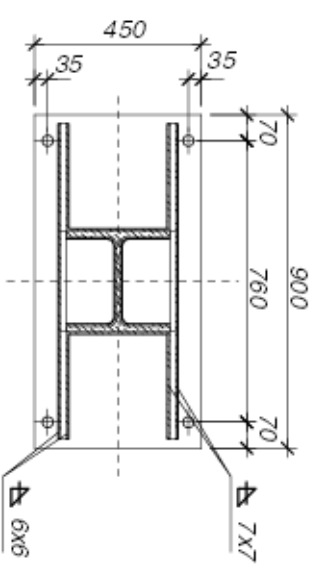
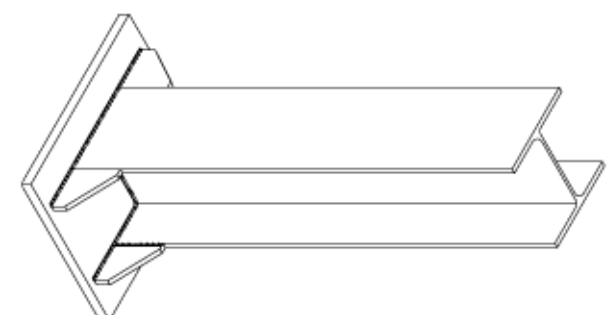
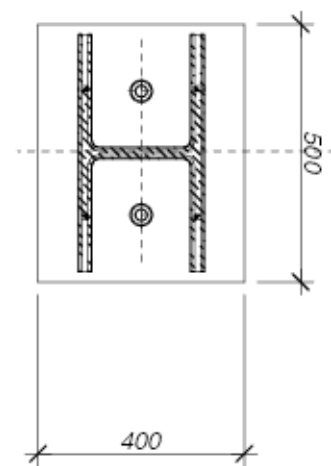


FIG. D.5.12./3 APPOGGIO SEMPLICE DI TRAVE A COLONNA



Vertical Elements framed types in steel

FIG. D.5.12/4 INCASTRO TRAVE-COLONNA (Passante)

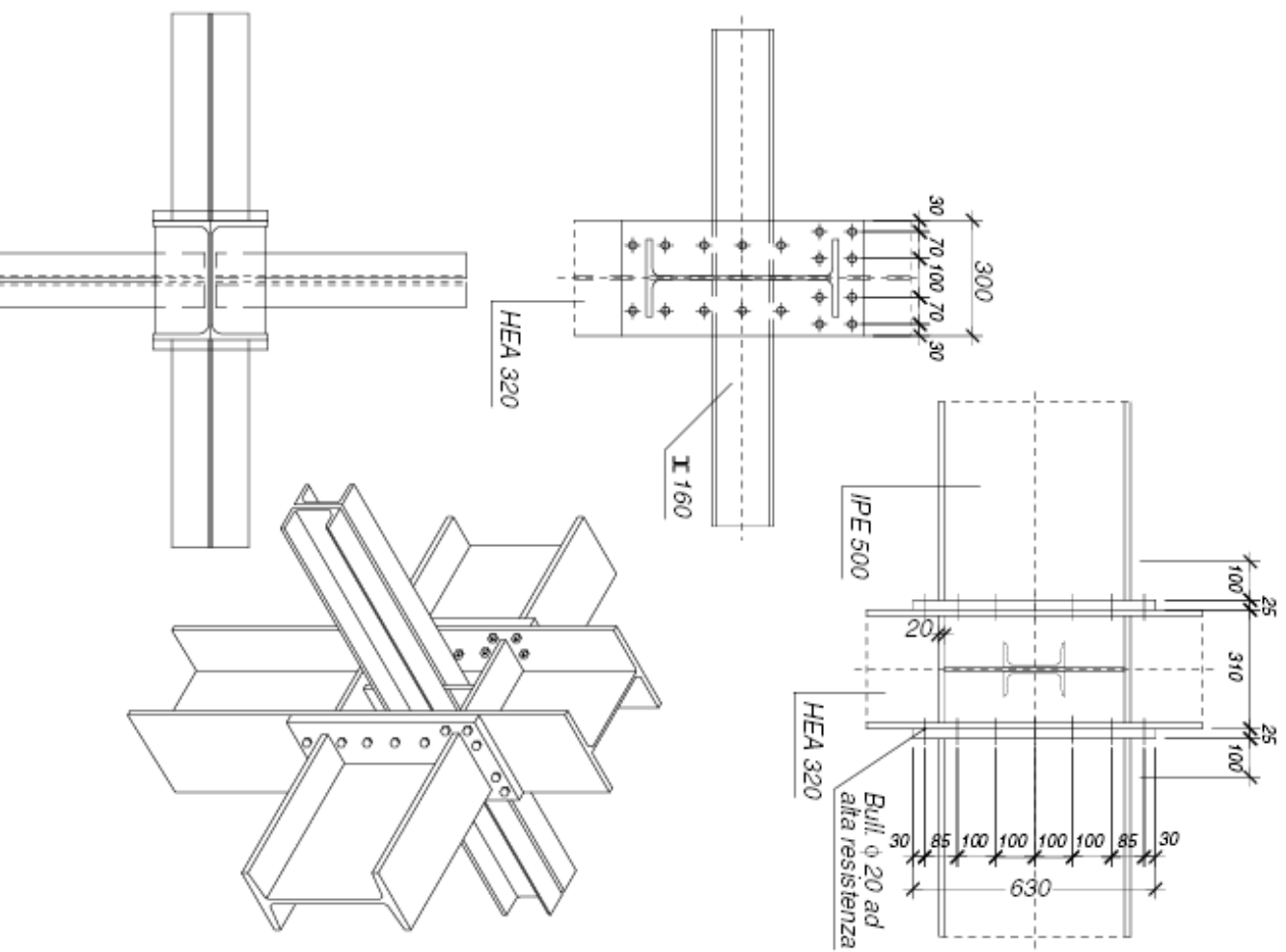
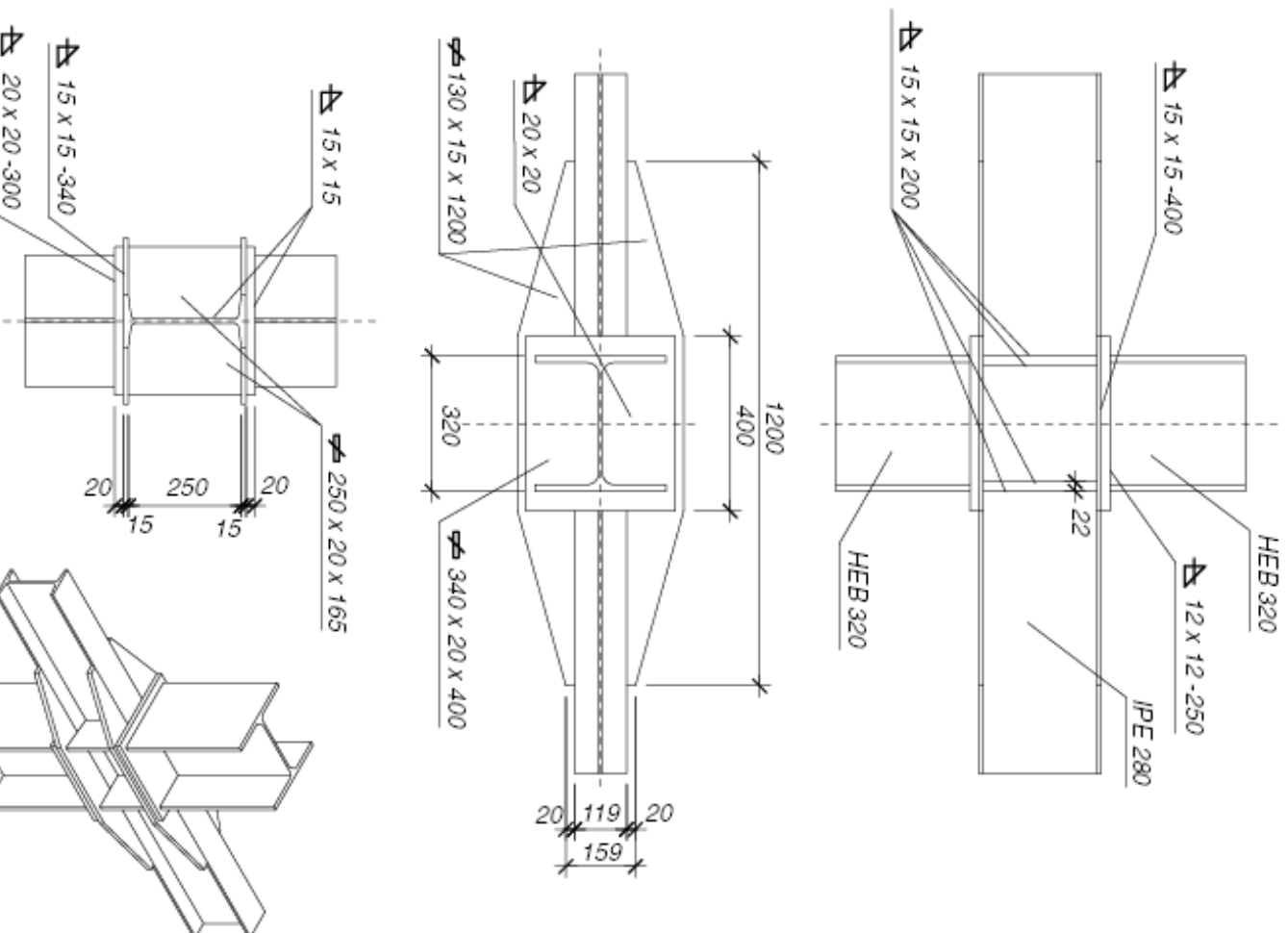
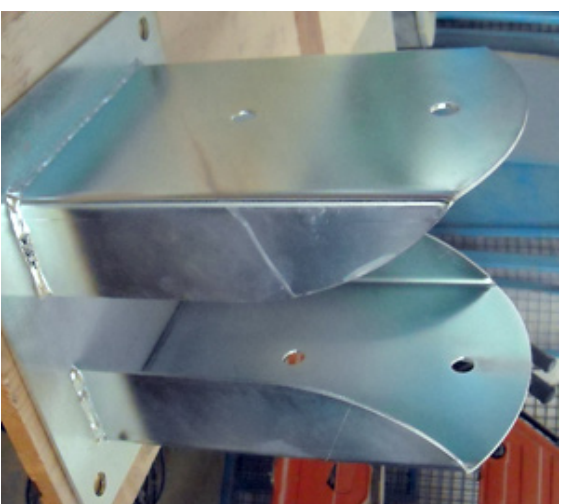
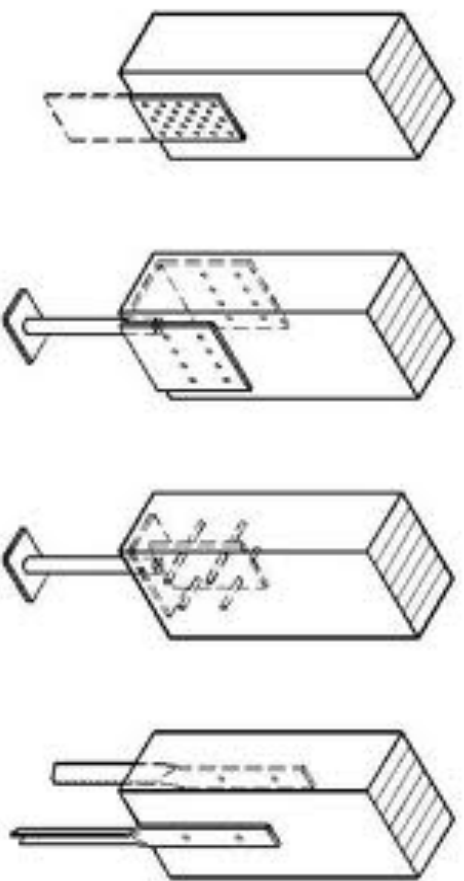


FIG. D.5.12/5 ATTACCO TRAVE (Passante) – COLONNA



Vertical Elements framed types in glulam wood



sistemi di collegamento

Staffa a bicchiere per pilastri

Incastro a coda di rondine