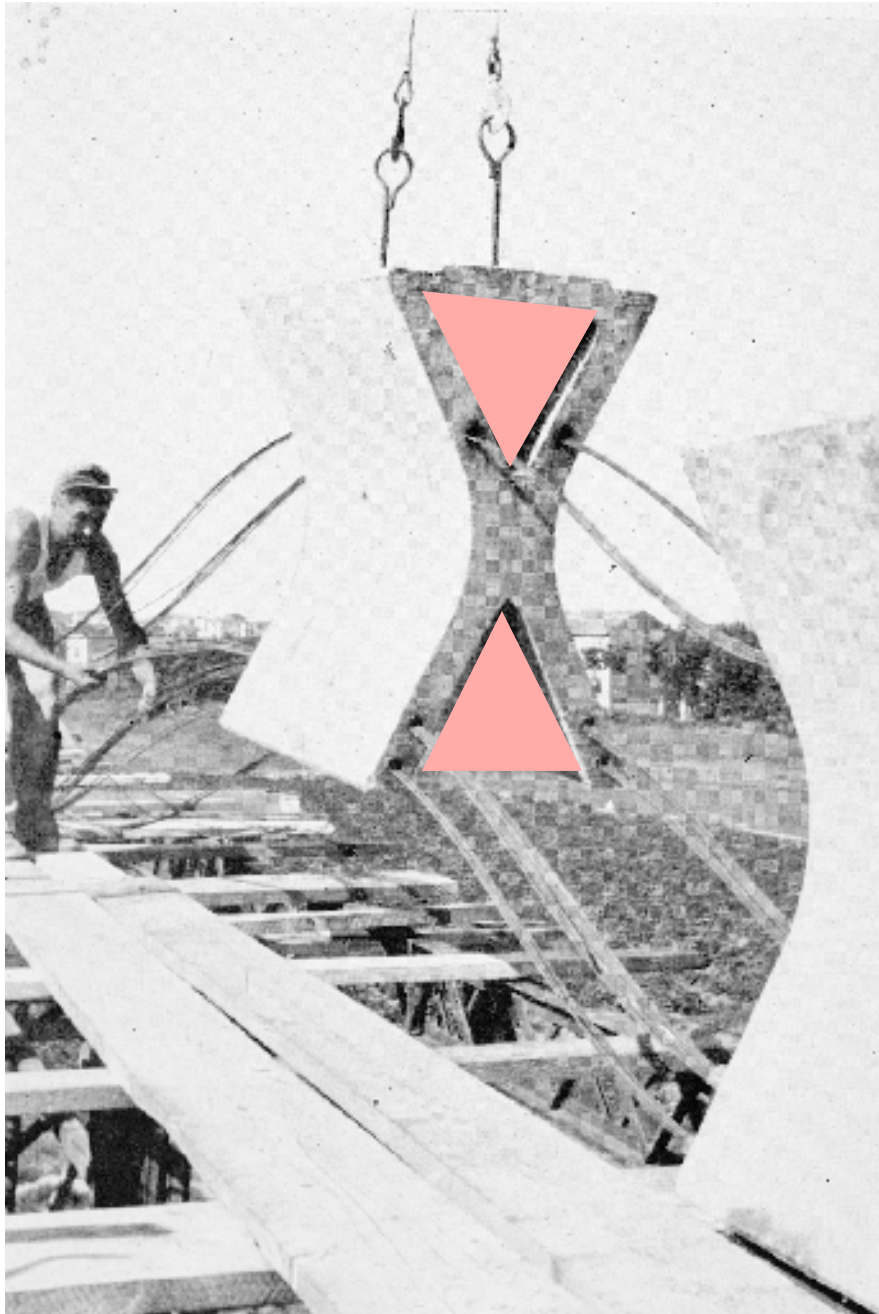
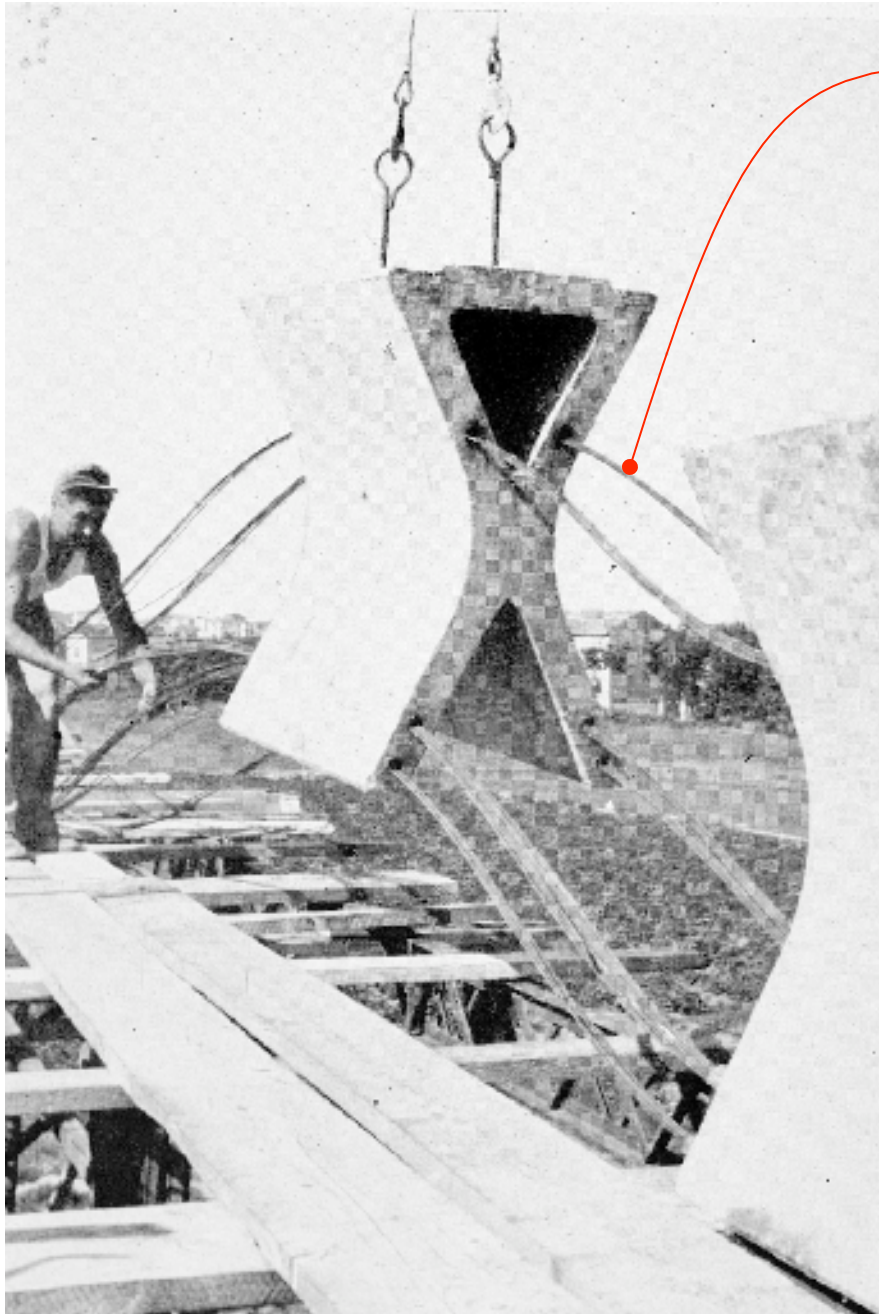


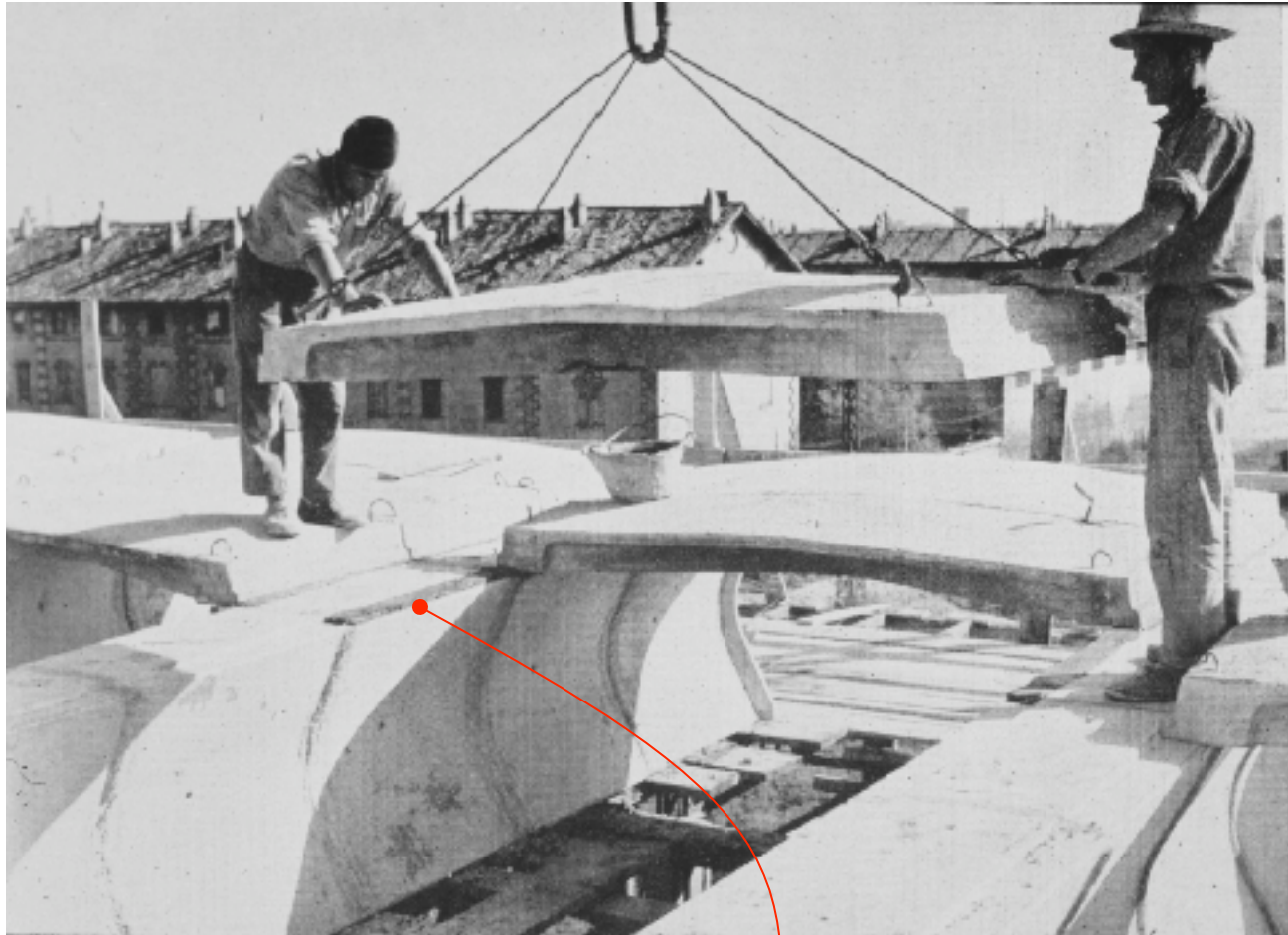
As an architect in Postwar Italy, Angelo Mangiarotti developed construction systems to save material which was much more expensive than labor at the time



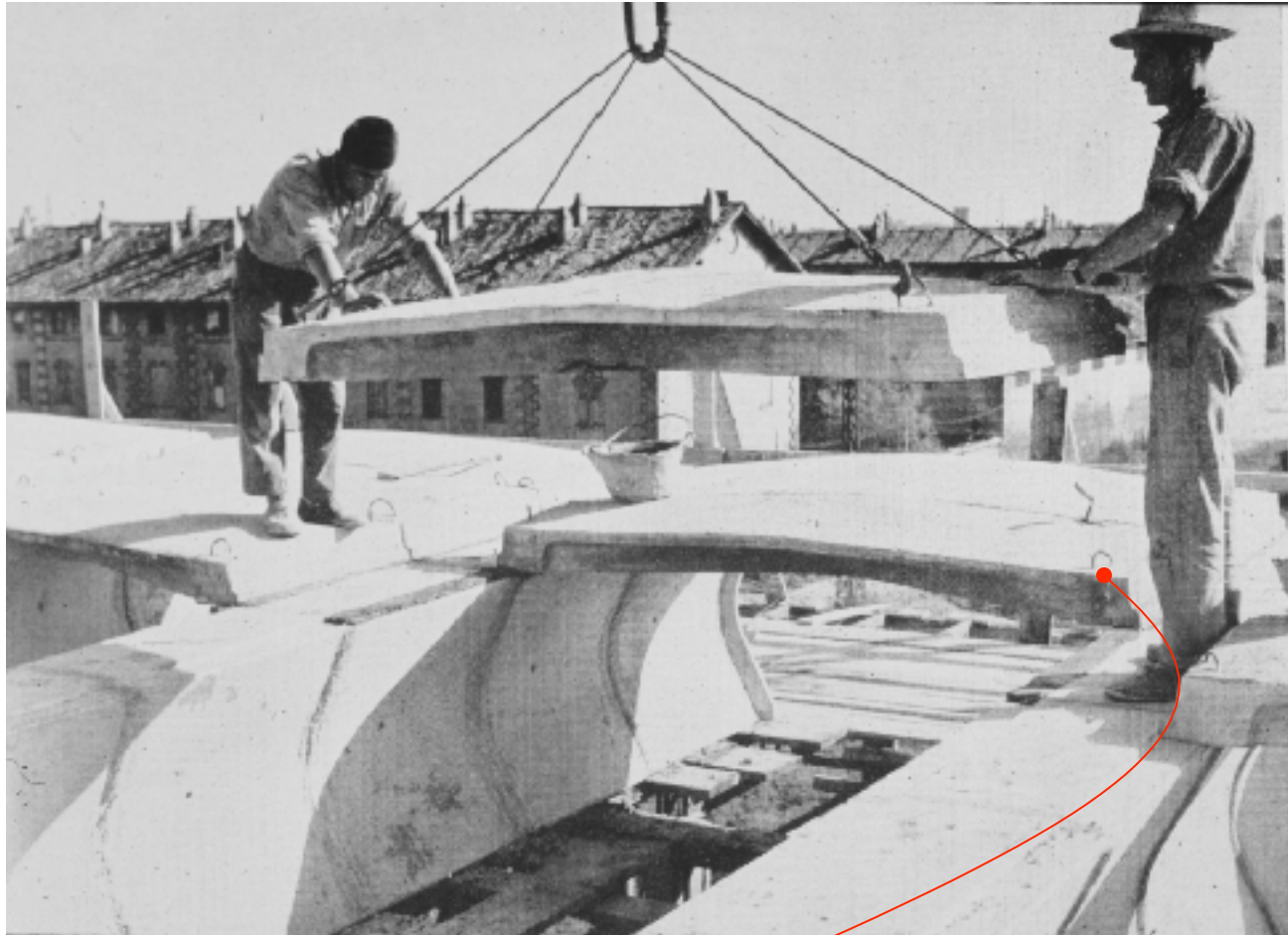
- The churches designed by Mangiarotti in this period had four columns, spaced over 100' apart, a span uncommon in site cast or standard precast of the time.
- Mangiarotti designed precast girders made of hollow elements, shown at left.
- The elements have concrete removed from non-working parts of the girder



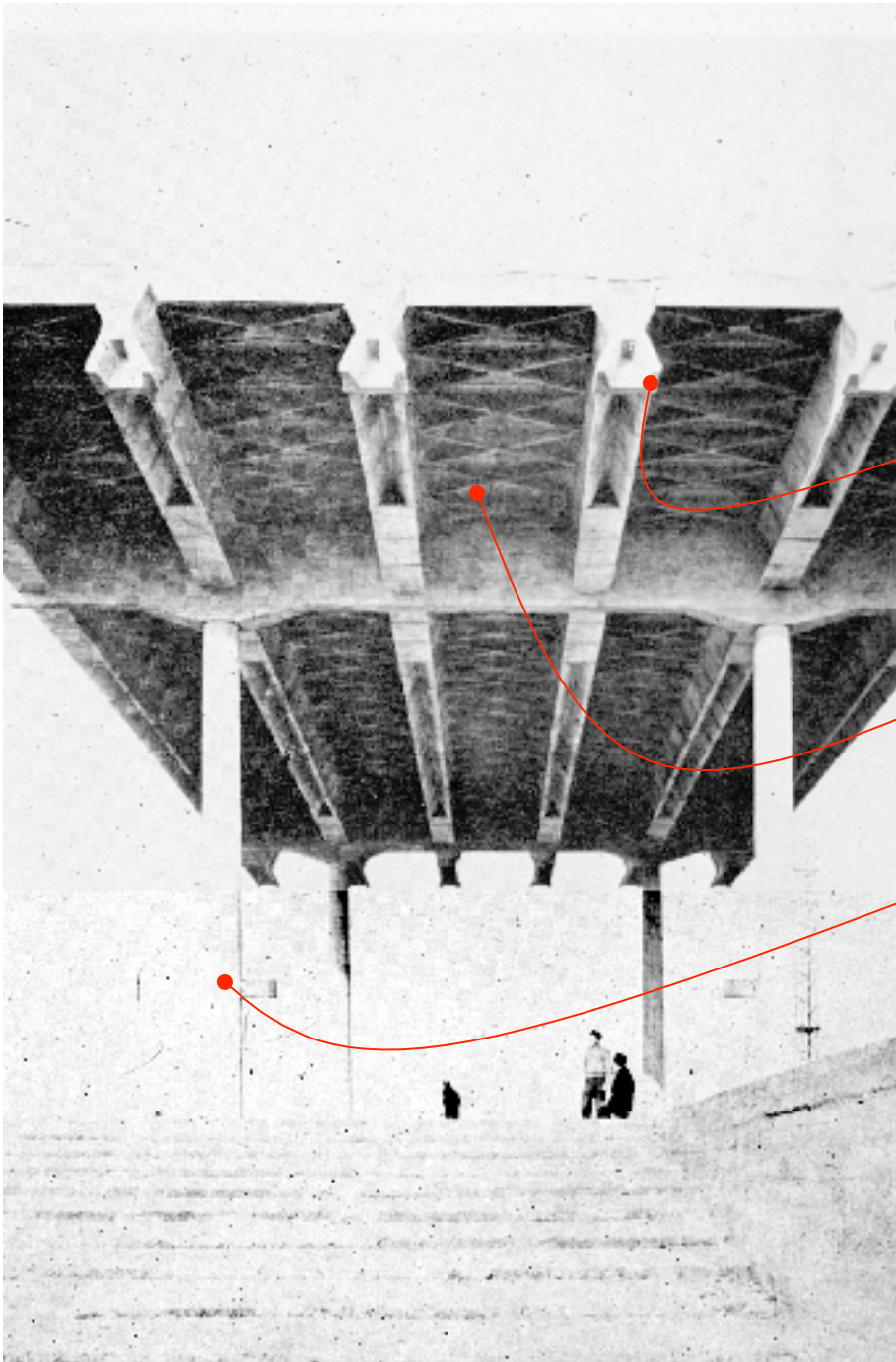
- The girder parts are strung together on cables passing through conduits cast into the girder part.
- After all the parts are strung together, the cables are post-tensioned to pull the girder together.



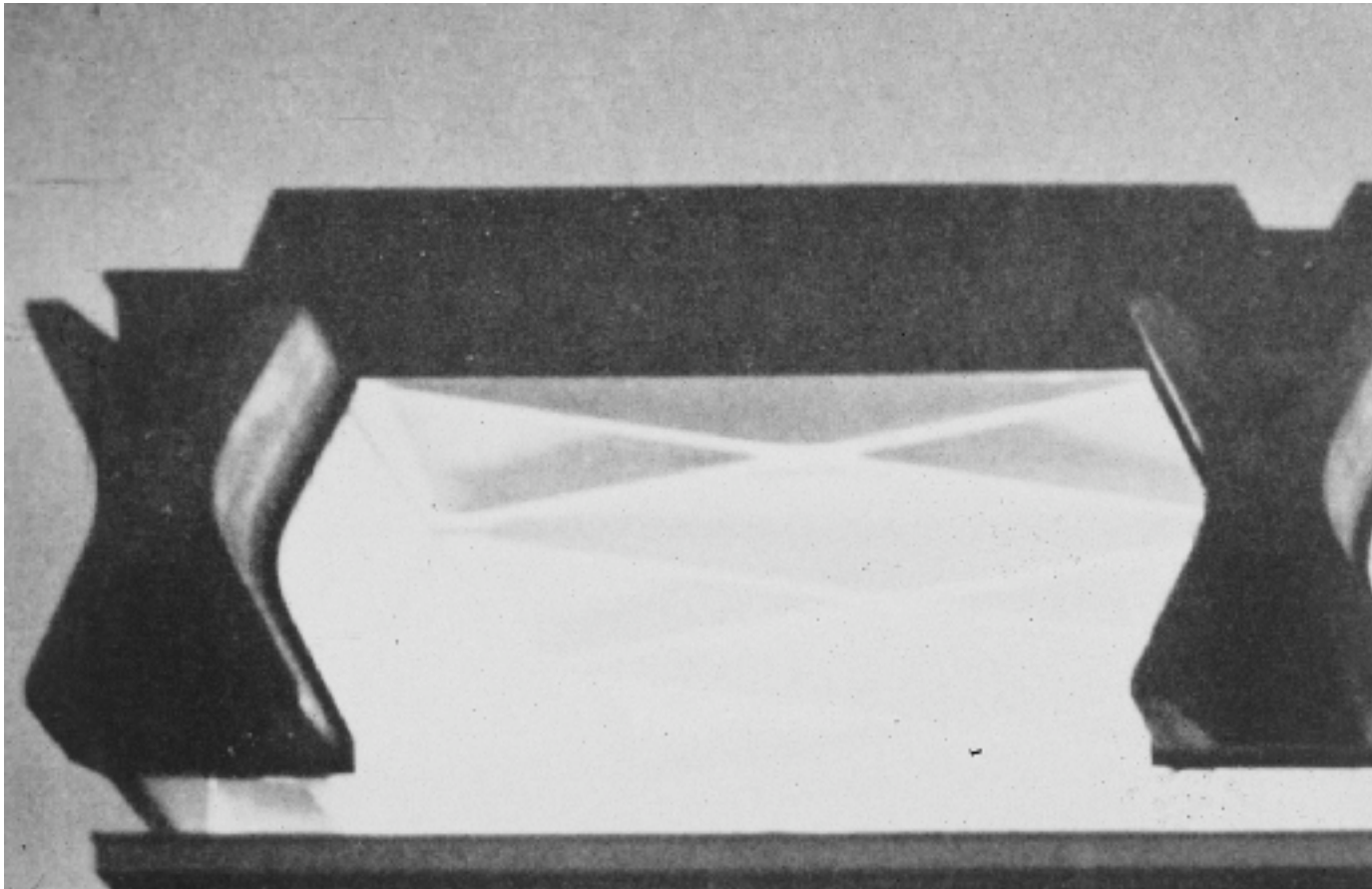
- With the girder post tensioned, precast slabs are placed on a setting / leveling bed of mortar.



- After this step, a site cast slab is poured on top to tie the slabs and girders together. Note the lifting cables being left in place to provide additional grip for the sitecast conc.



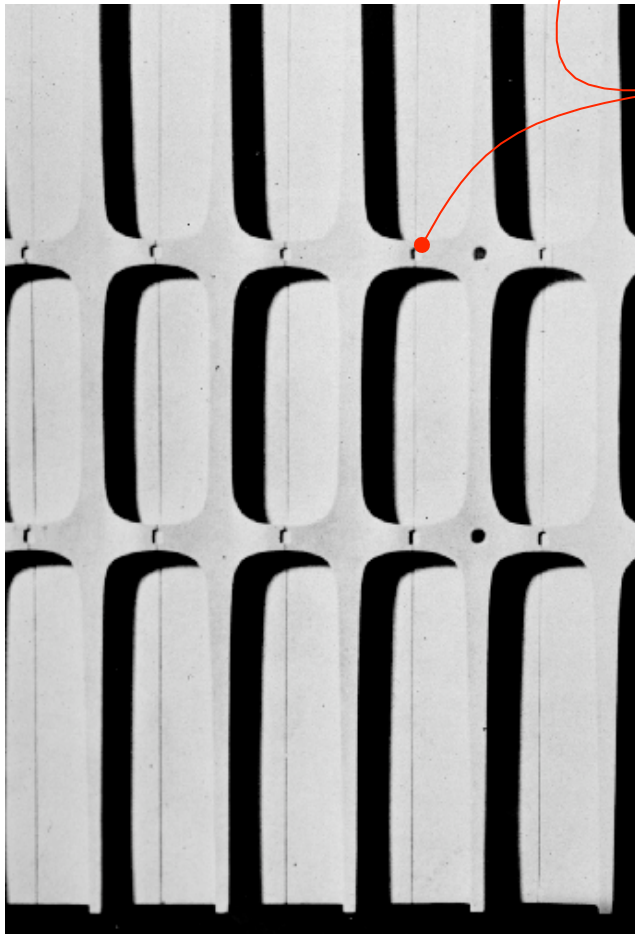
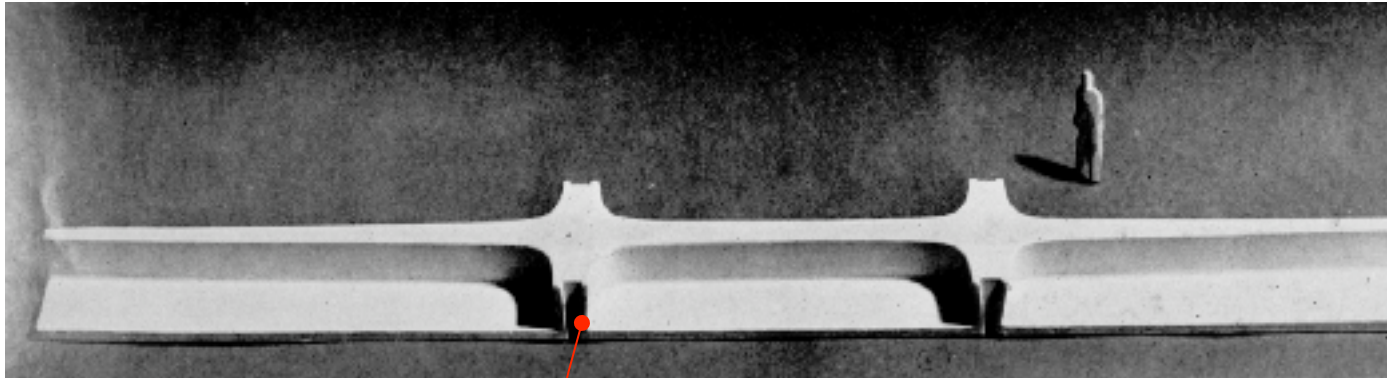
- When fully assembled, the frame shows all its components clearly.
- The “X” shaped girders,
- The roof slabs,
- The four columns



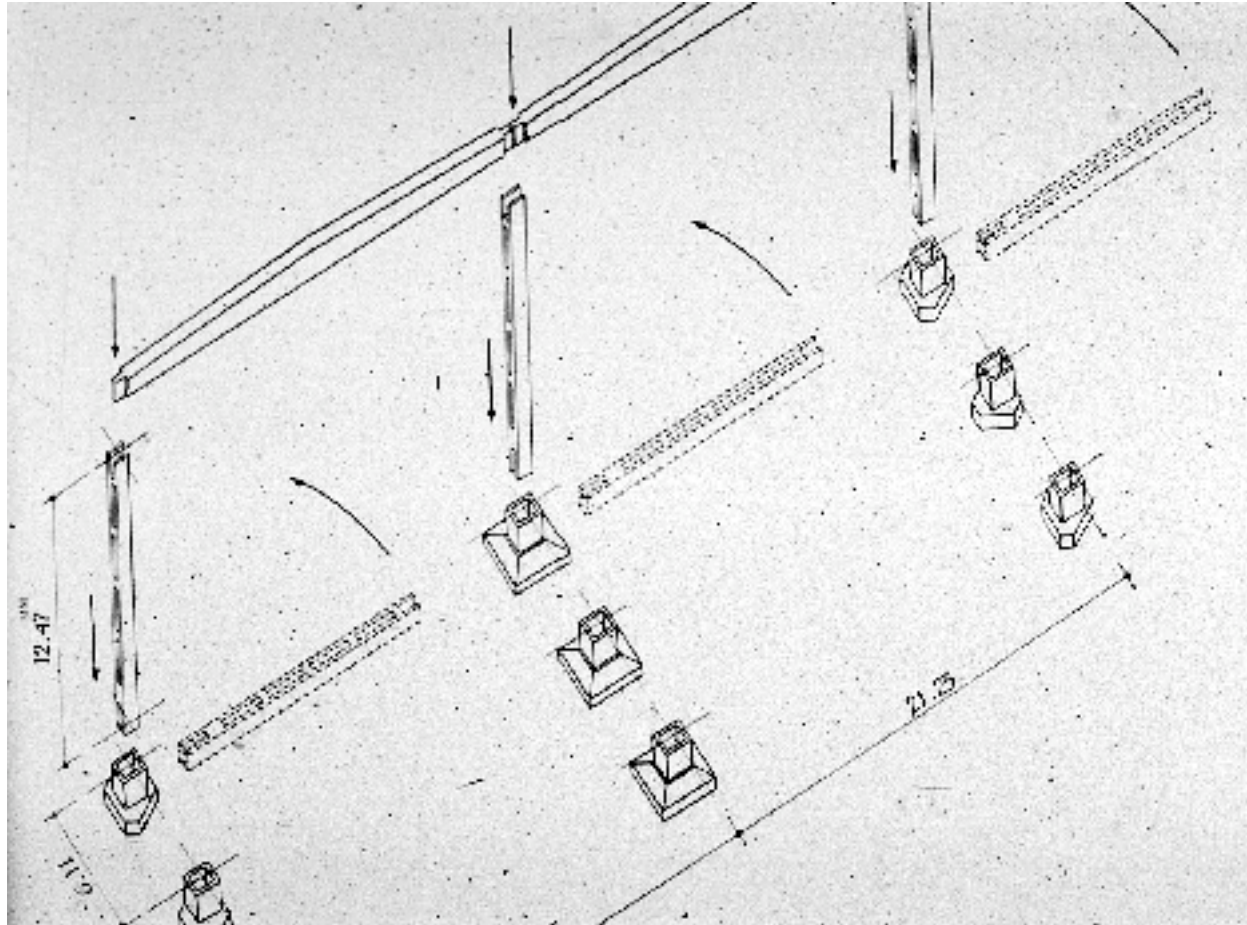
- To close in the ends of the building, acrylic plastic panels are cut to fit around the “X” girders, and are glazed into place with rubber gaskets.



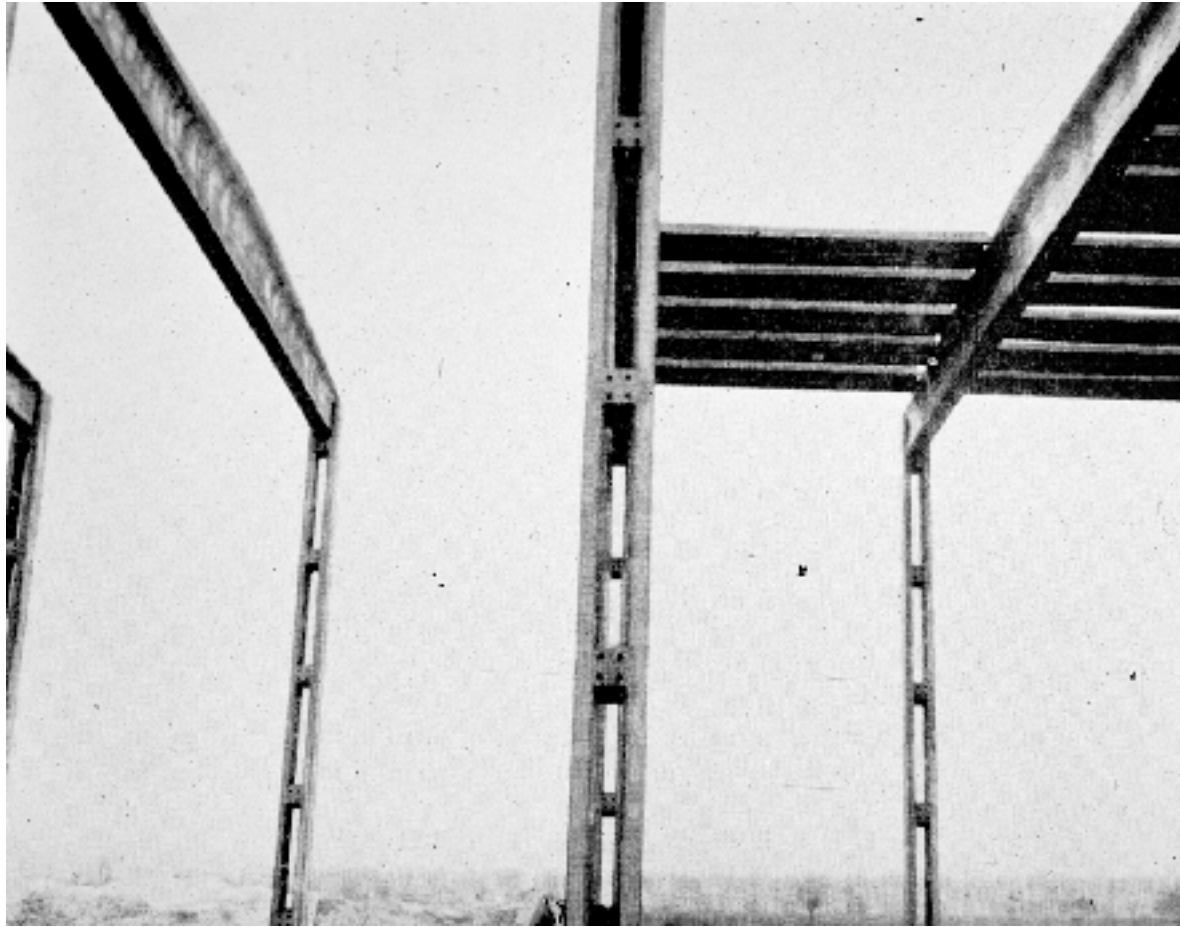
- Mangiarotti also designed an 8 column church which had an early version of the single tee.



The tee's are welded together at the transverse stem joints to make a unified roof structure.



- He also designed a system for quick construction of warehouse space which included a sleeved footing element to hold the column stable, and a column, with a central void to provide natural light.



- The void between side faces of the column also acts to remove unemployed material and make the place for the precast beam to sit until being welded. Cross tie sections keep the column faces from deflecting.

