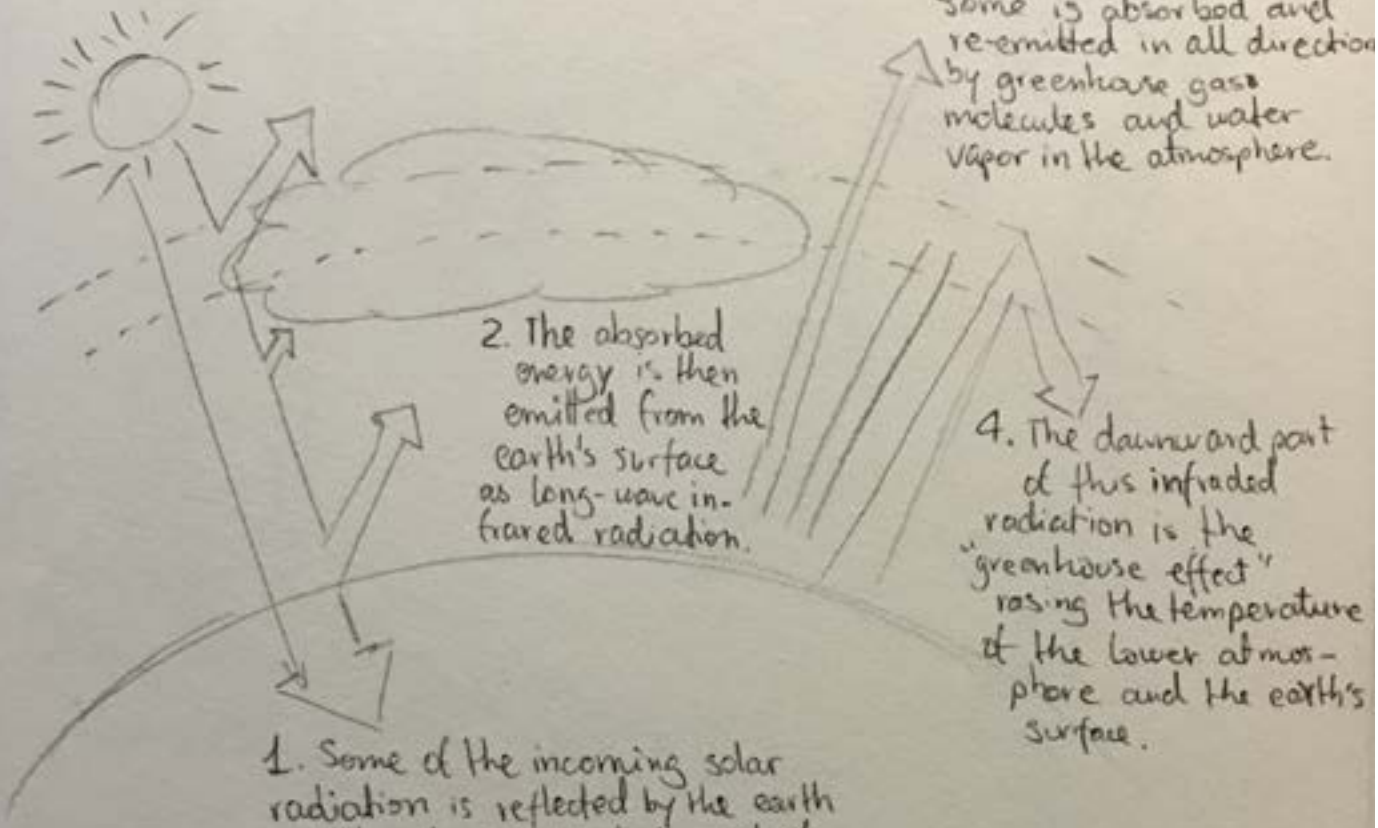
The 2030 Challenge

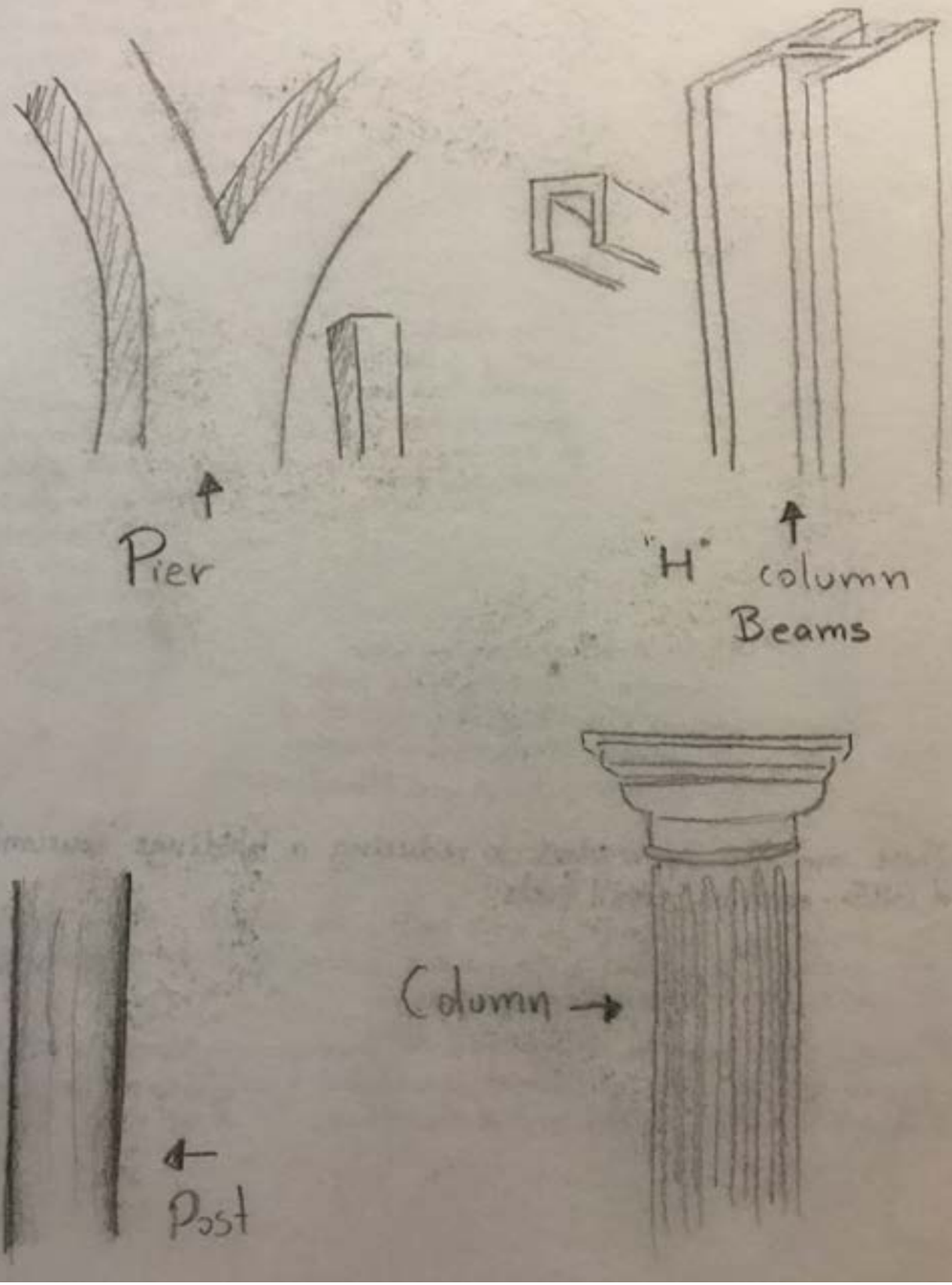
Out of 100%, 48% is consumed in the architectural field

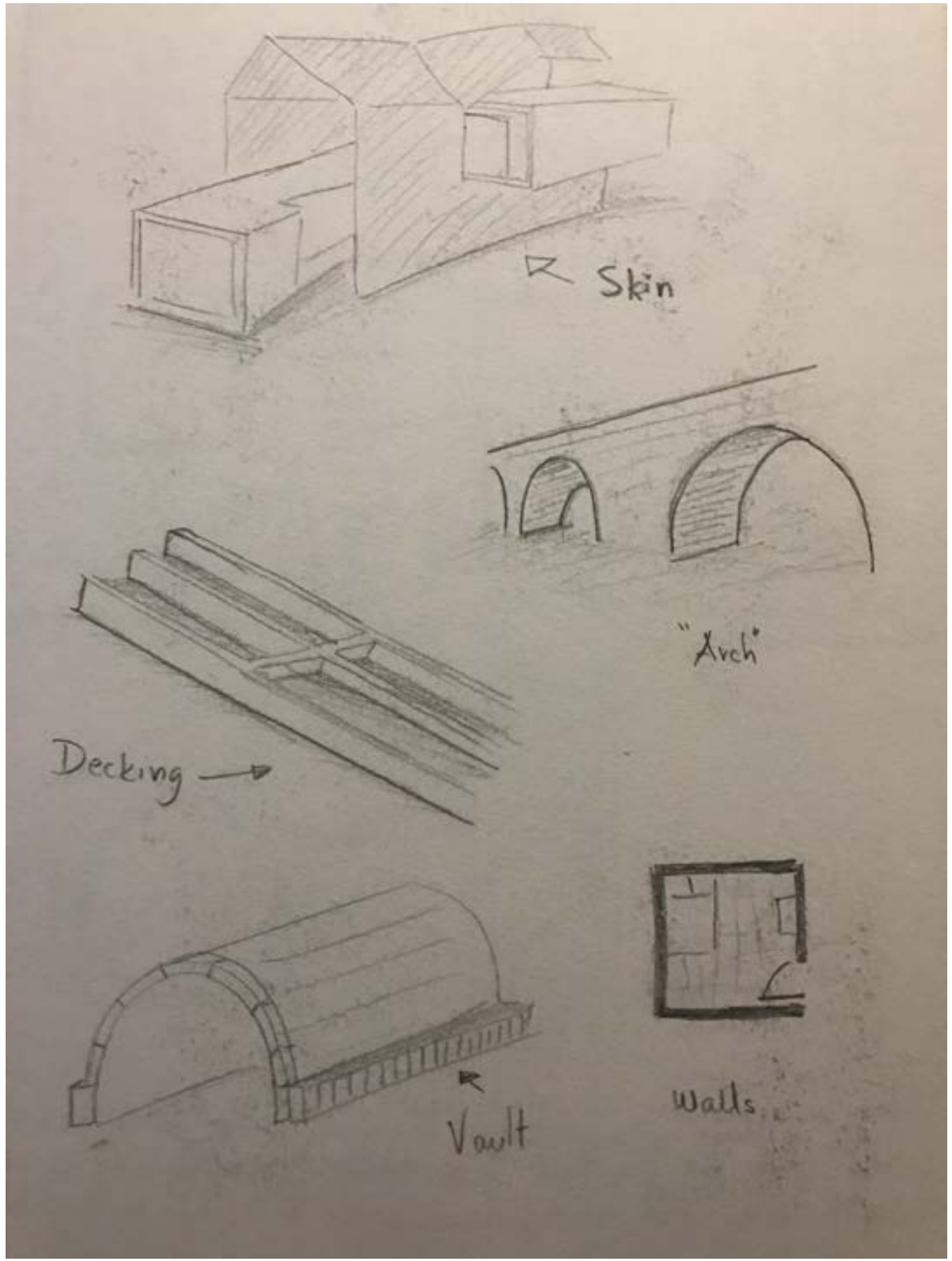
Energy

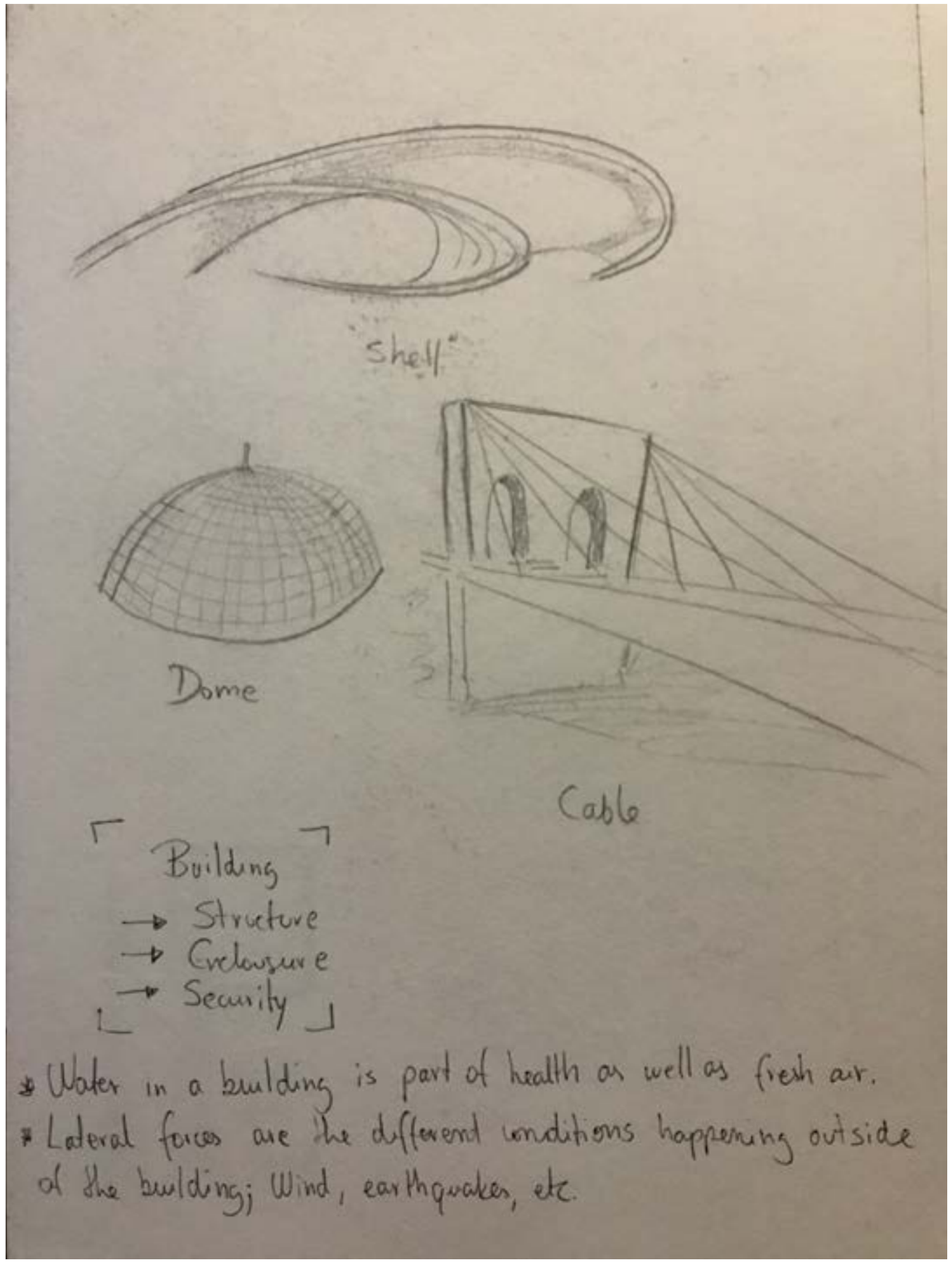


- **There are two approaches to reducing a buildings cousumtion of GHG-emitting fossil fuels.**
  - The passive approache is to work with the climate in design, site and orientate a building withe passive cooling and heating techniques to reduce its overall energy requierments.
  - The active approach is to generate its own energy from renewable sources (solar, wind, geothermal, low-impact hydro, biomass and bio-gas) that are available locally and in abundance.

Structures


Pier
"H" column
Beams
Column
Post

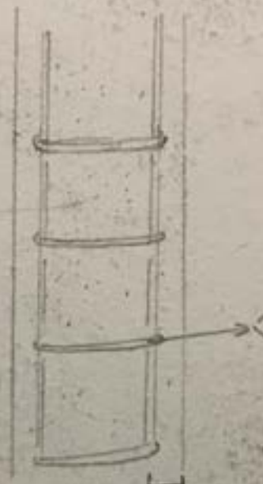

Skin
"Arch"
Decking
Vault
Walls



* Water in a building is part of health as well as fresh air.
* Lateral forces are the different conditions happening outside of the building; Wind, earthquakes, etc.

CONCRETE

Concrete =
- water
- cement
- coarse aggregate
- fine aggregate



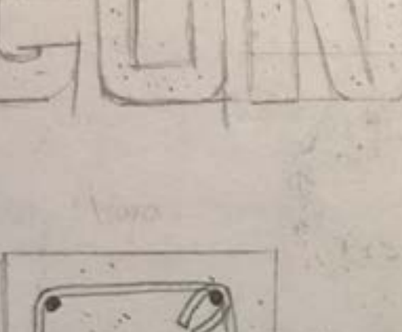
Reinforcement

lateral ties

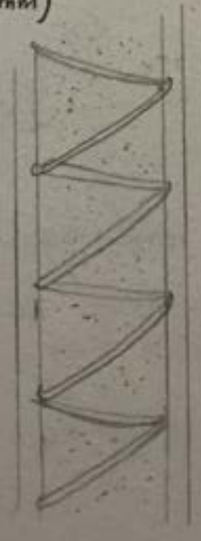
1-½" minimum of cover for reinforcement.

Rectangular columns:

dth gross area of 96 sq. in (61.935mm)

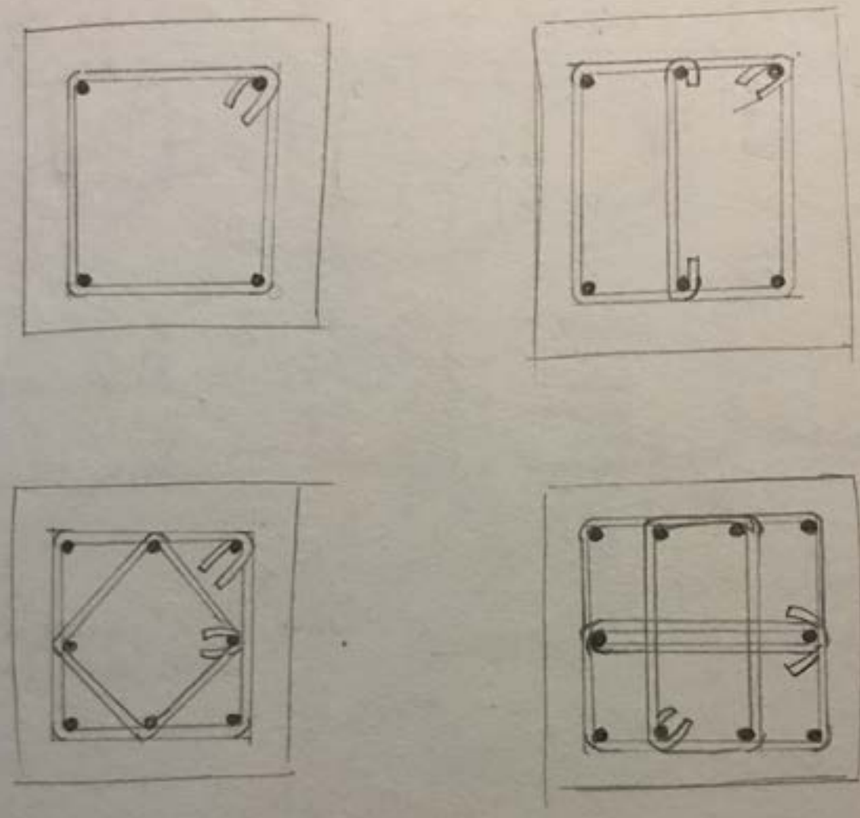


10"



Vertical reinforcement augments the ability of a concrete column to carry compressive loads, resist tensile forces when the column is subject to lateral loads.

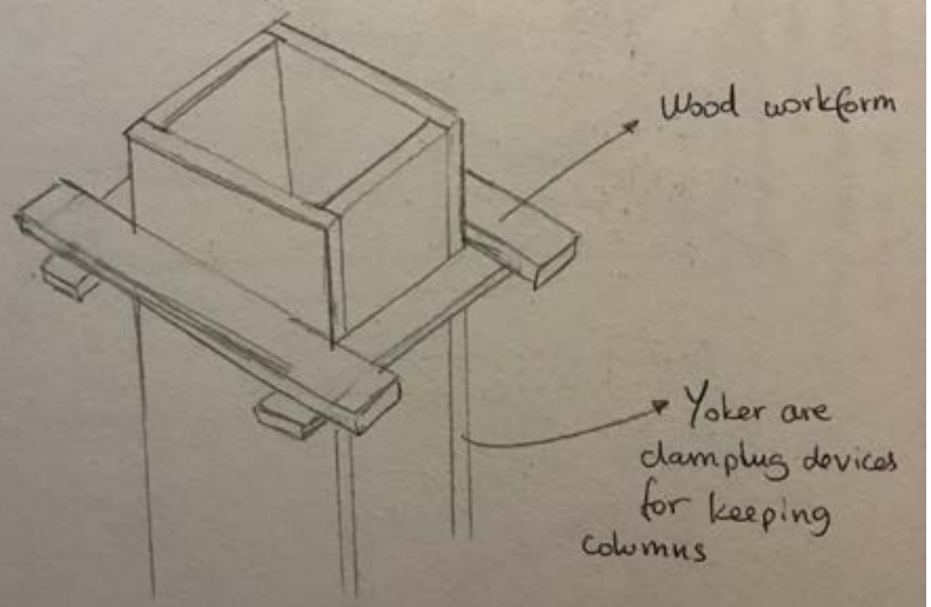
Types of reinforcement.

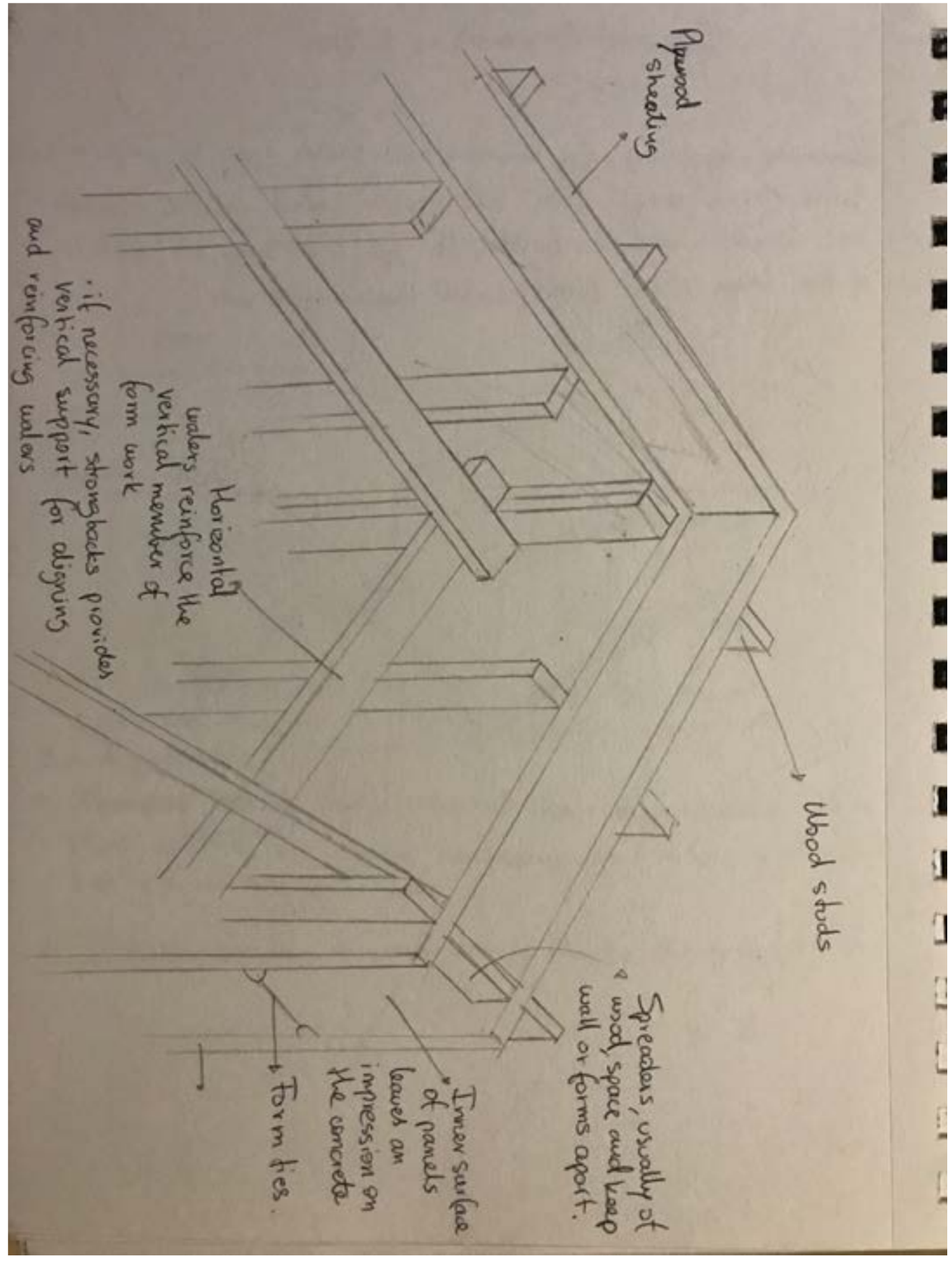


* Whenever possible, vary required steel reinforcement rather than column size; when necessary, vary only one dimension of a column at a time.
* Columns should be continoos to the building foundation.

Concrete Formwork.

Concrete formwork for columns and walls may be custom-built for a specific job, but prefabricated, reusable panels are used whenever possible. Its job is to keep the position of the shape of the forms until the concrete sets.





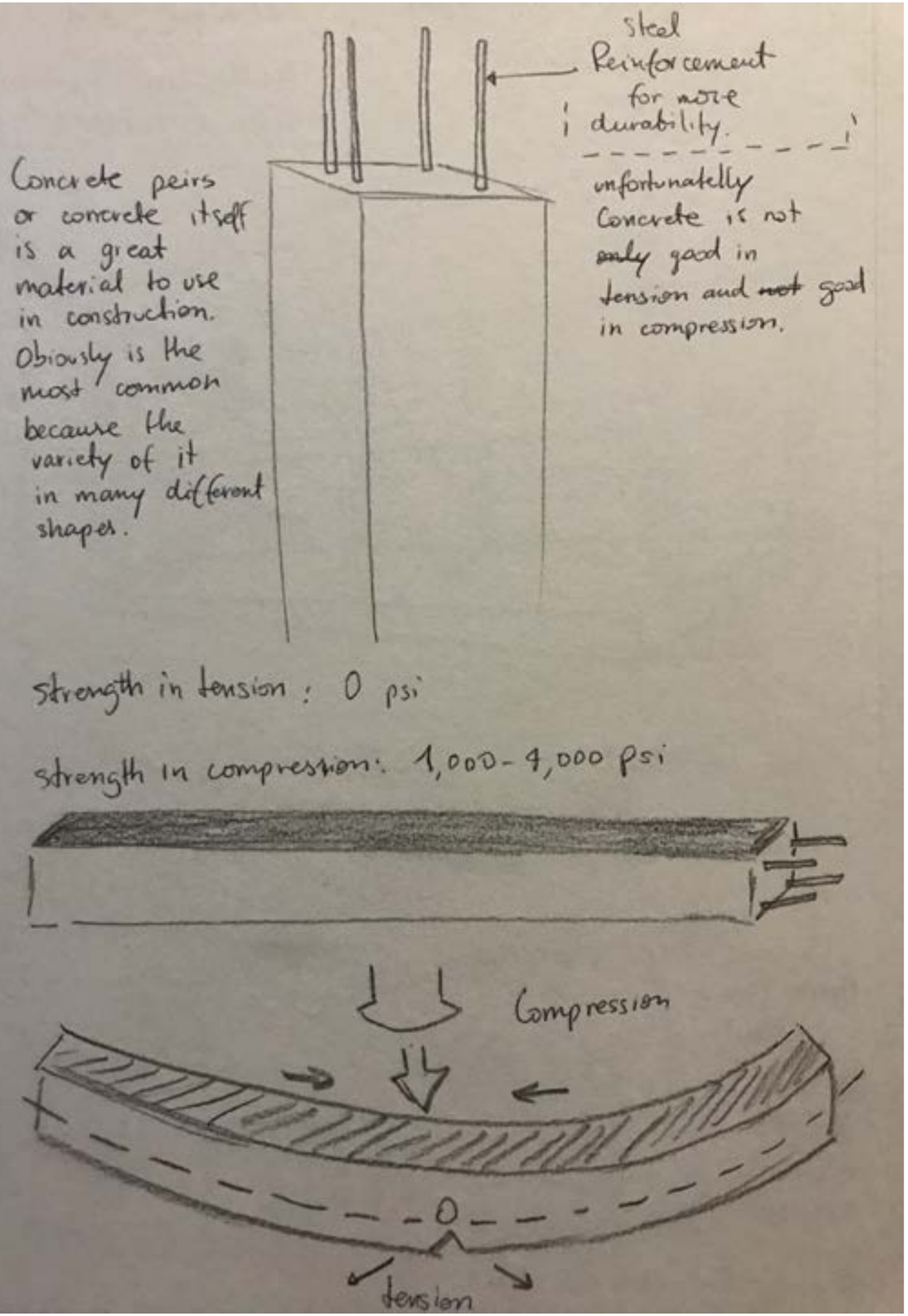
Concrete Mixture.

Concrete is made out of 4 materials.
- Portland cement.
- Water (Potable water)
- Course aggregate
- fine Aggregate.

In order to get a good quality concrete we need to:
- Use clean, sound ingredients
- Mix them in the correct proportions
- Handle the wet concrete properly to avoid segregting its ingredients
- Cure the concrete under controlled conditions.

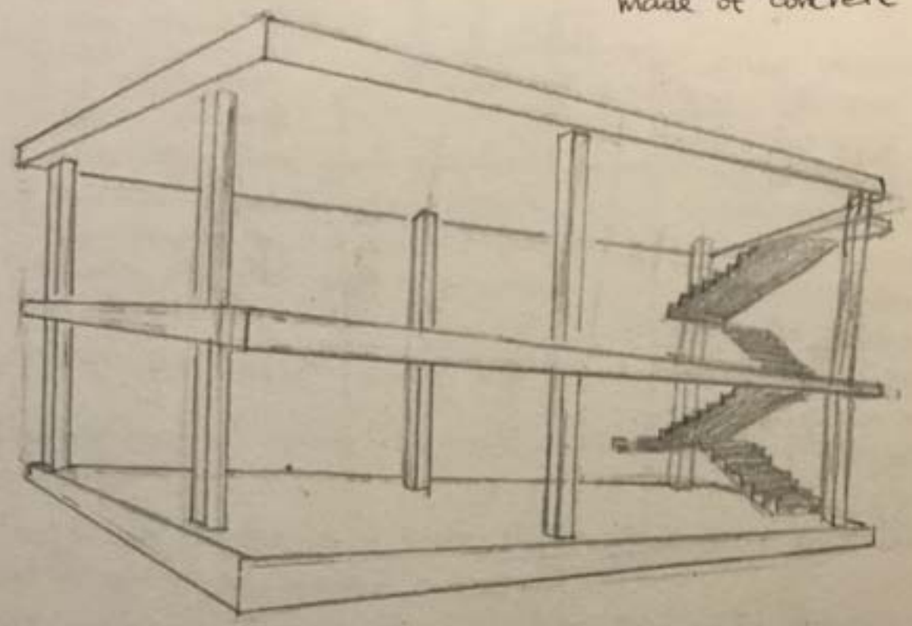
The amount of water is vere crucial in the mixture for concrete:
- Too much water will make the mixture easy to manage but it gonna be weak.
- less water will make the mixture strong but not easy to manage.

the right amount of water for the best quality in concrete will be: 45 - 60%.

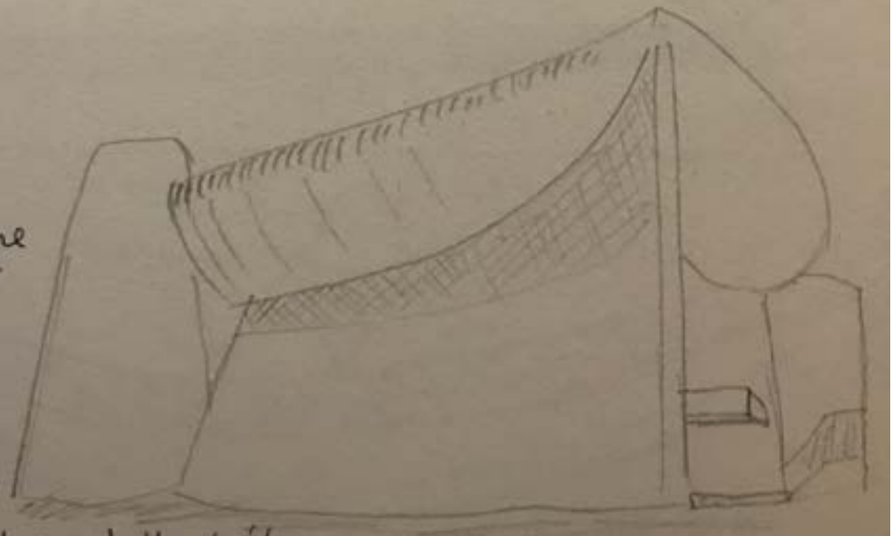


Dom-ino House

Another great building made of concrete



Le Corbusier

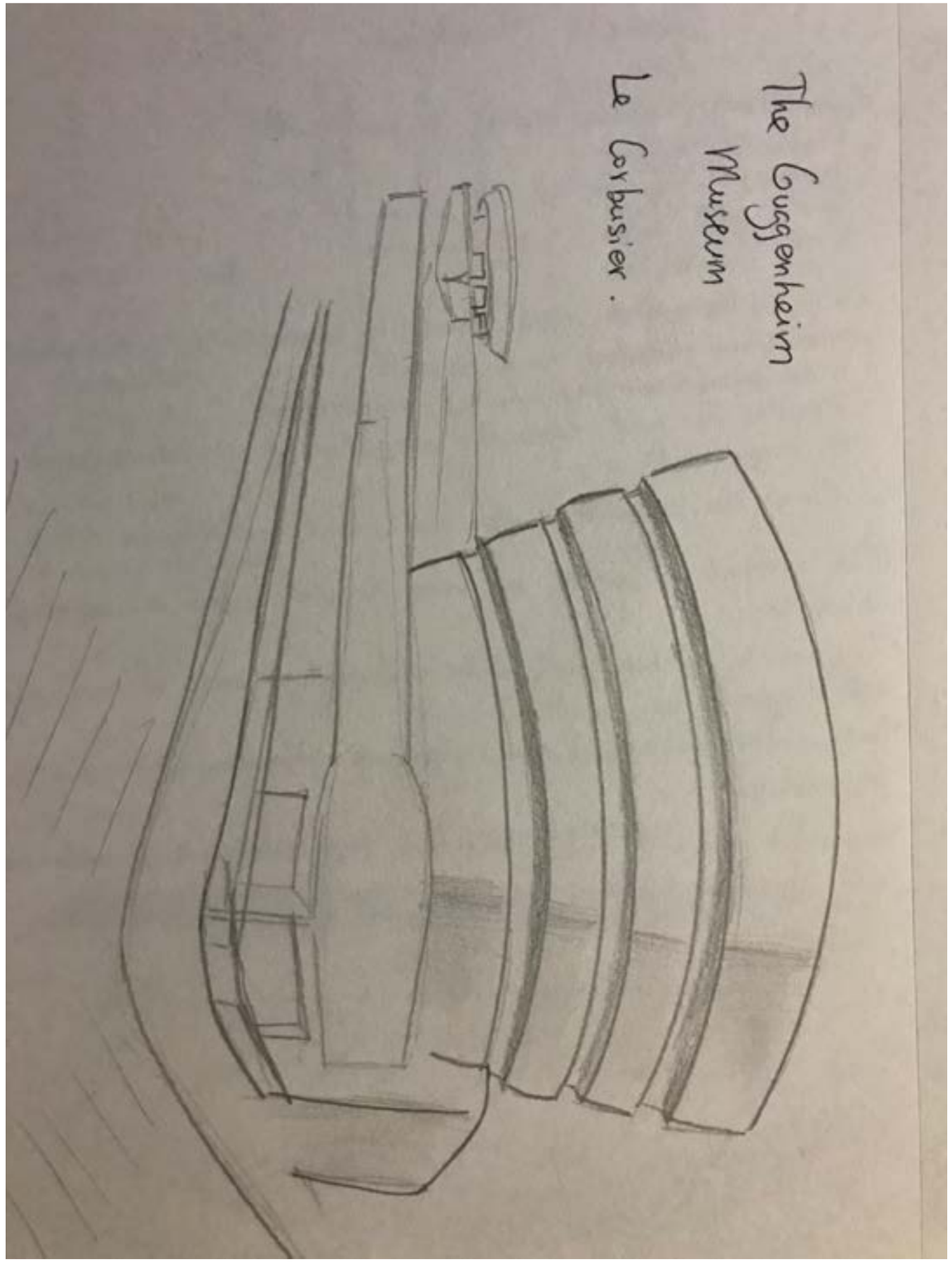


Notre Dame du Haut

A great example of concrete being used as part of the structure and the façade.

The Guggenheim Museum

Le Corbusier.



STEEL

It's been one of the most common material used in construction.

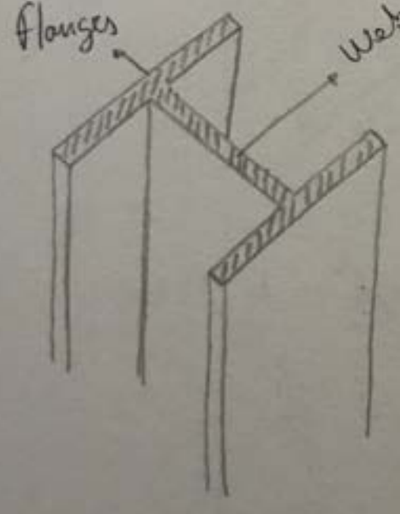
Unlike concrete, steal is somehow much better because is good in tension and compression.

Strength in tension

24,000 - 43,000Psi

Strength in compression.

24,000 - 43,000psi.



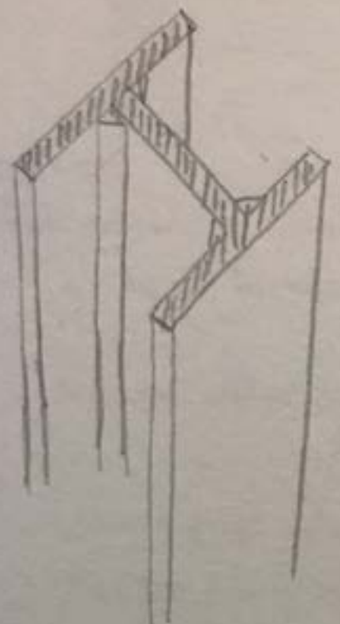
W shape

Columns sections may also be fabricated from a number of shapes or plates to fit the desire end-use of the column.

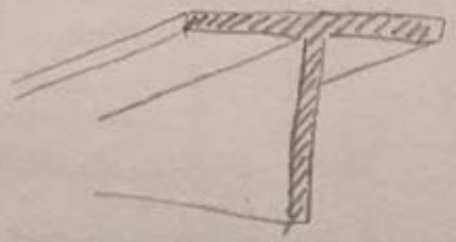
The most frequently used section for columns is the wide-flange (W) shape.

It is suitable for connections to beams in two direction, and all of his surfaces are accessible for making bolted or welded connections

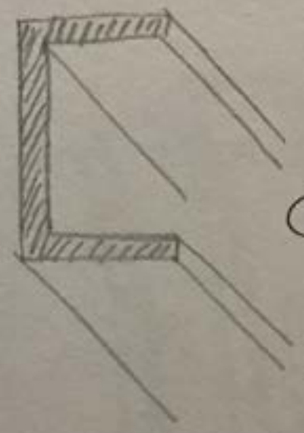
Othe steal shapes used for columns are round pipes. and square and rectangular tubing.



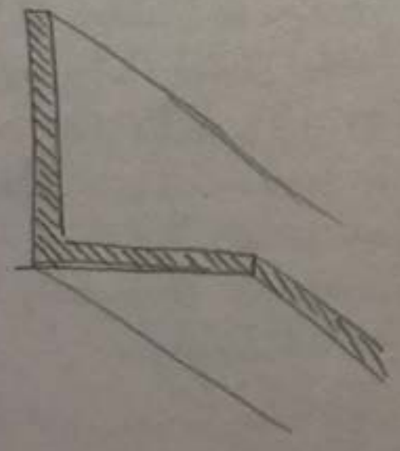
Welded plates



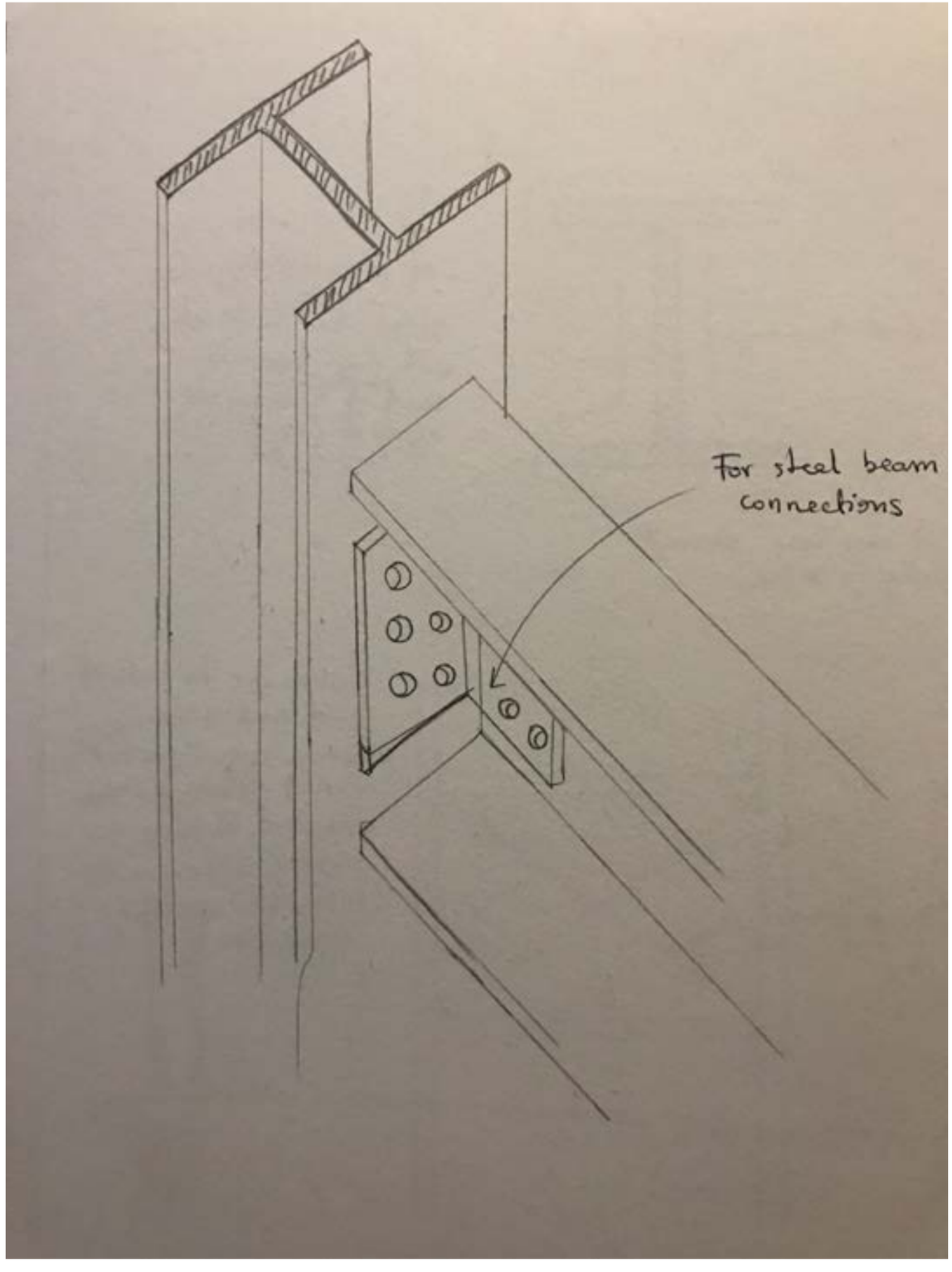
Wf column.



Channel = C col.

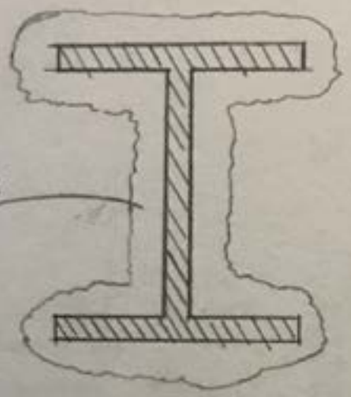


Angle : "L" shape.



For steel beam connections

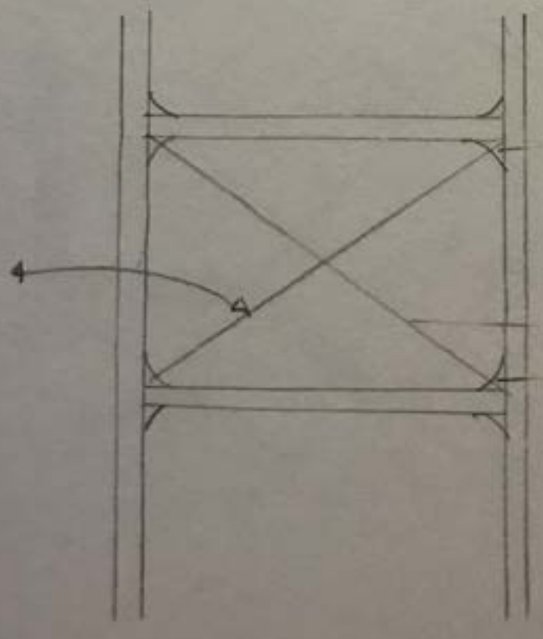
Fireproofing



Fire-resistive

It is a way of preventing steel to be in touch with fire because steel is vulnerable against fire.

Steel can lose strength rapidly in a fire.

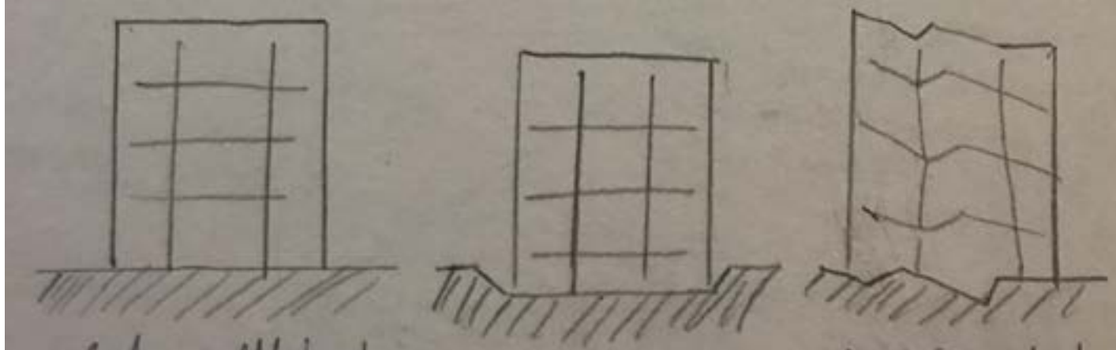


across bracing

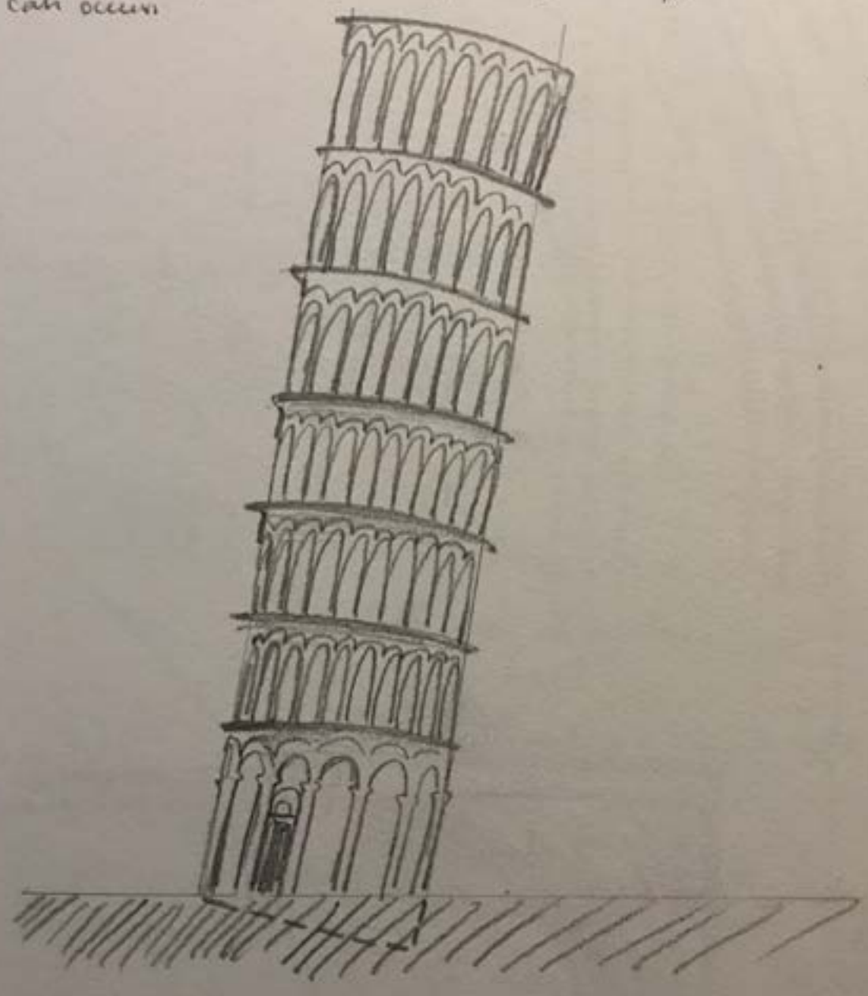
Resistance to lateral wind and seismic forces requires the use of shear planes, diagonal bracing, or rigid framing with moment-resisting connections.

FOUNDATION

knowing about Foundation is very neccesary in the architectural field.
Whenever a architectural project is about to be built, the architect and the engineer need to know the conditions of the soil.
If it is not in good conditions, the safety of the people who are going to habitad, would be in danger. Or it will waste a lot of money.

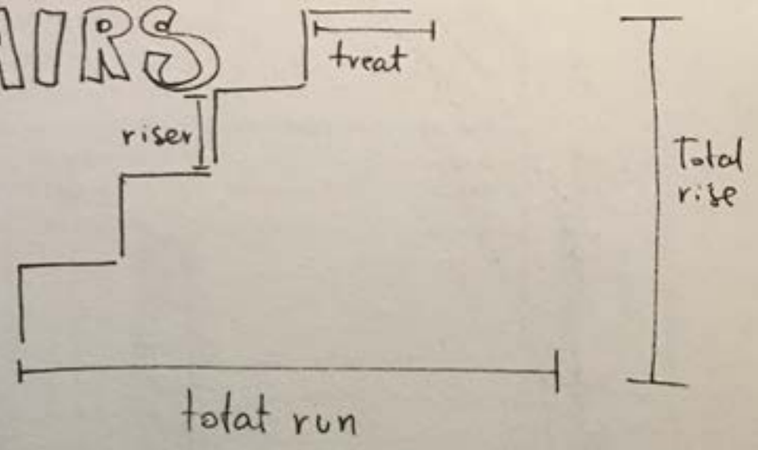


Checking on the soil must be done throughout the whole area wher the building is gonna be. In case that the engineer believes that the whole site's soil is in good condition by checking a square feet only, unexpected results can occurs

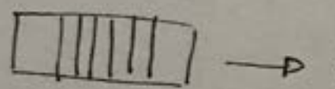


The leaning tower of Pisa is a clear example of how much the soil can affect the foundation and the building itself.
The sorrounding buildings in the same area where this famous building is, have a flat soil (in good condition) but the tower of Pisa didn't have a good soil and it give an inclination that was not expected in the design.

STAIRS



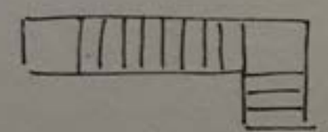
Types of stairs



→ Straight run riser

One level to another without turns

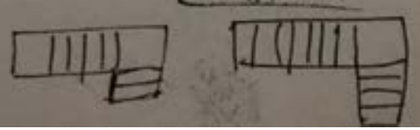
12' for landings - limit code regulations.

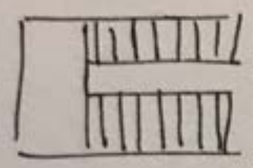


Quater turn stairs

It adopts the "L" shape making a right angle turn in the middle path of travel.

Variations



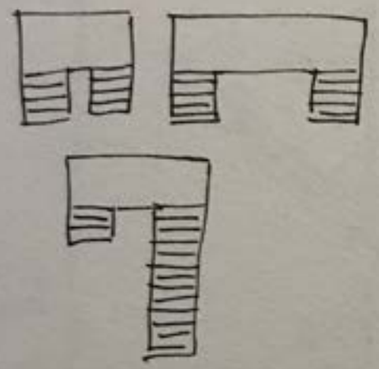


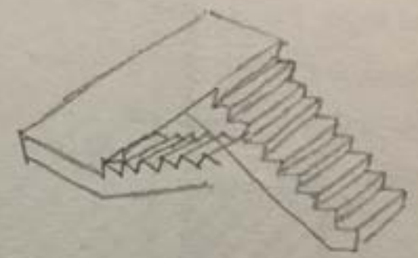
Half turn stairs

It turns 180° or through two right angles at an intervening landing

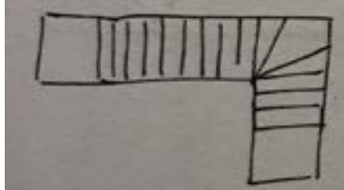
This types of stairs are more compact.

Variations





Windin Stair



It is any stairway constructed with winders as a circular or spiral stair

Building codes generally restrict the use of winders to private stairs within individual dwelling units.

Circular stairs

Even though a circular stair is constructed with winders, the building code might allow its use as part of the means of egress from a building if its inner radius is at least twice the actual with of the stairway.