



Steel project description

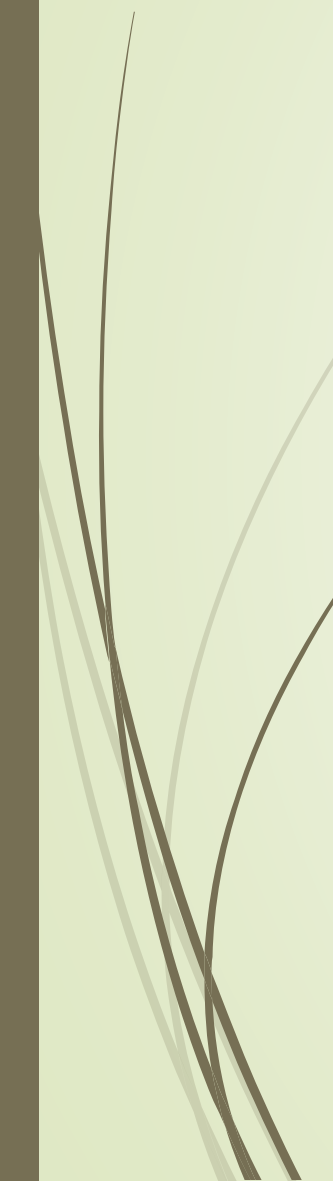
- Architectural department
- Third stage
- Detailed design drawings
- Prepared by staff

12.2.2023





Objectives behind this project:

- Make students to be familiar with constructing the buildings with steel structure.
 - Providing most important information about steel structure in the limited time.
 - Providing students through a small project a wide range of data regarding how to make such a projects totally by steel structure and the way of connecting between the parts of project and the structure it self.
- 

What is Steel Frame Structure?

- Steel frame is typically consisting of vertical column and horizontal beams which are **riveted**, **bolted** or **welded** together in a rectilinear grid. Steel beams are horizontal structural members that resist loads applied laterally to their axis. Columns are vertical structural members that transfer compressive loads. It can be used to form the skeleton of a building.
- Structural steel framing is typically designed, fabricated and established in accordance with applicable standards for instance **American Institute of Steel Construction (AISC)** and **Canadian Standard Association (CSA)**.



Types of Steel Frame Construction

- There are various types of steel frame construction which include:

1. Conventional Steel Fabrication

Conventional steel fabrication involves **cutting steel** members to the correct length and **welding** them to build the final structure.

This construction process may be executed on site entirely which require massive manpower.



2. Bolted Steel Construction

In this technique, all structural steel members are fabricated and painted off-site, then delivered to the construction site, and finally bolted in place.

- ▶ The size of the steel structural members is controlled by the size of the truck or trailer used to deliver steel elements.
- ▶ Bolted steel construction is substantially fast because lifting the steel members into place and bolting are all the works that need to be executed on construction site.
- ▶ It is considered to be the most preferred construction approach because the most of the fabrication can be done in workshops, with the right machinery, lighting, and work conditions.



3. Light Gauge Steel Construction

Light gauge steel is a thin sheet (commonly range between 1-3mm) of steel which has been bent into shape to form C-sections or Z-sections.

- It is broadly common and used for the construction of residential and small buildings. Benefits that light gauge steel construction provide include design flexibility, high construction speed, strong, lightweight, easy to remodel, Recyclable, good Quality (durable and low in maintenance).



Applications of Steel Frame Structure

- Steel frame structure is considerably suitable option for the construction of various buildings and skyscrapers due to its strength, low weight, speed of construction, large spans construction capability. steel frame structure can be used in the construction of the following structures:
 - High rise buildings
 - Industrial buildings
 - Warehouse buildings
 - Residential buildings
 - Temporary Structures



Then....

- Buildings - from houses to car-parks to schools and skyscrapers - rely on steel for their strength. Steel is also used on roofs and as cladding for exterior walls.
- Steel offers architects more design freedom in colour, texture and shape. Its combination of strength, durability, beauty, precision and malleability gives architects broader parameters to explore ideas and develop fresh solutions.



Steel structure generally use in construction of the single-story building such factory, warehouse (storehouse), shedding areas, etc....



The benefit of the steel structure are:

- 1- For constructing the big span buildings.
- 2- To save time.
- 3- Economy in weight and cost.







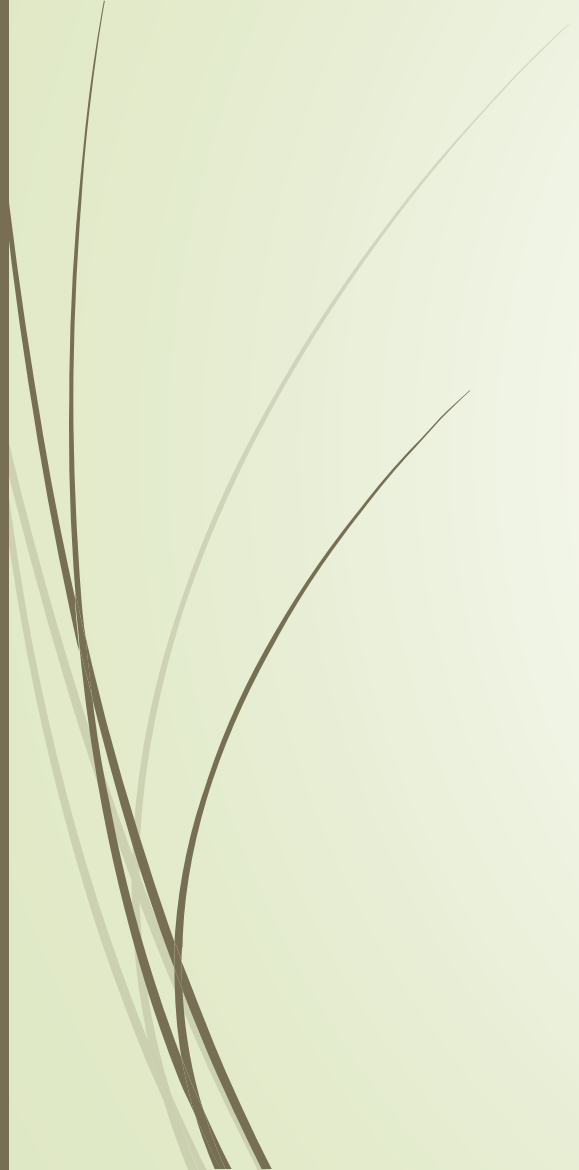






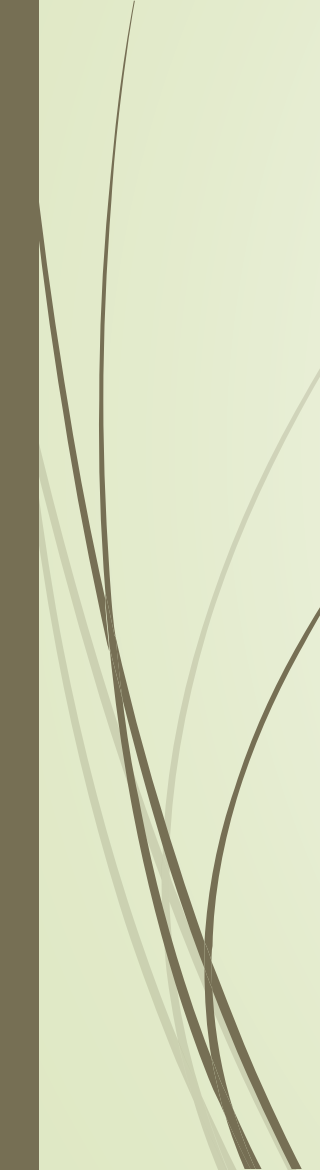


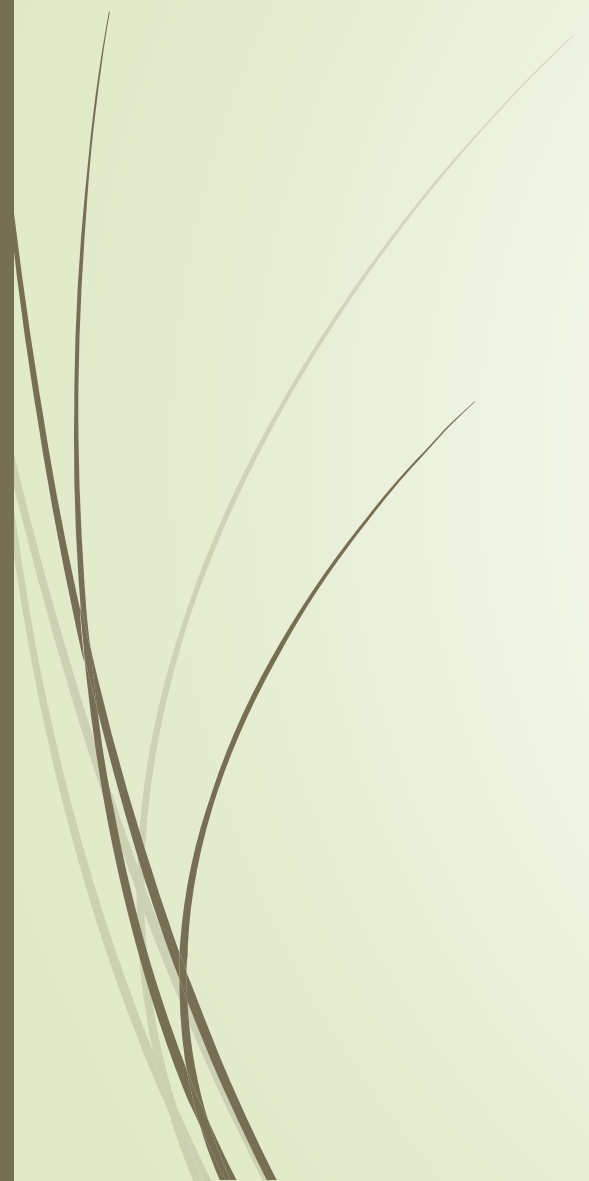


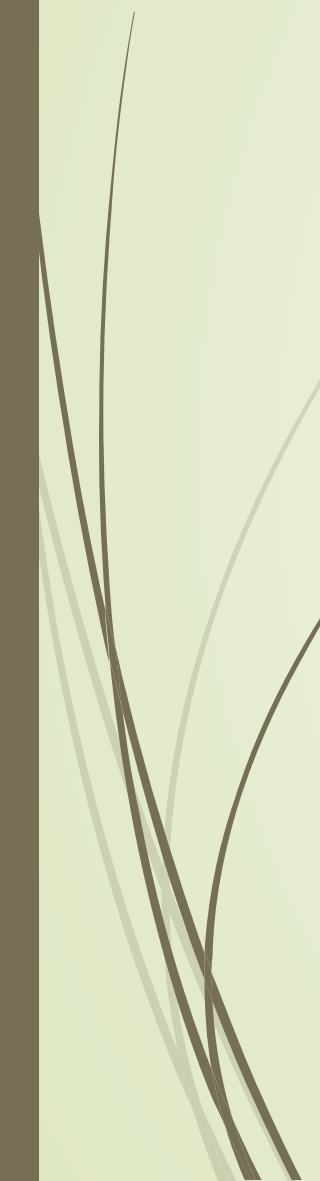








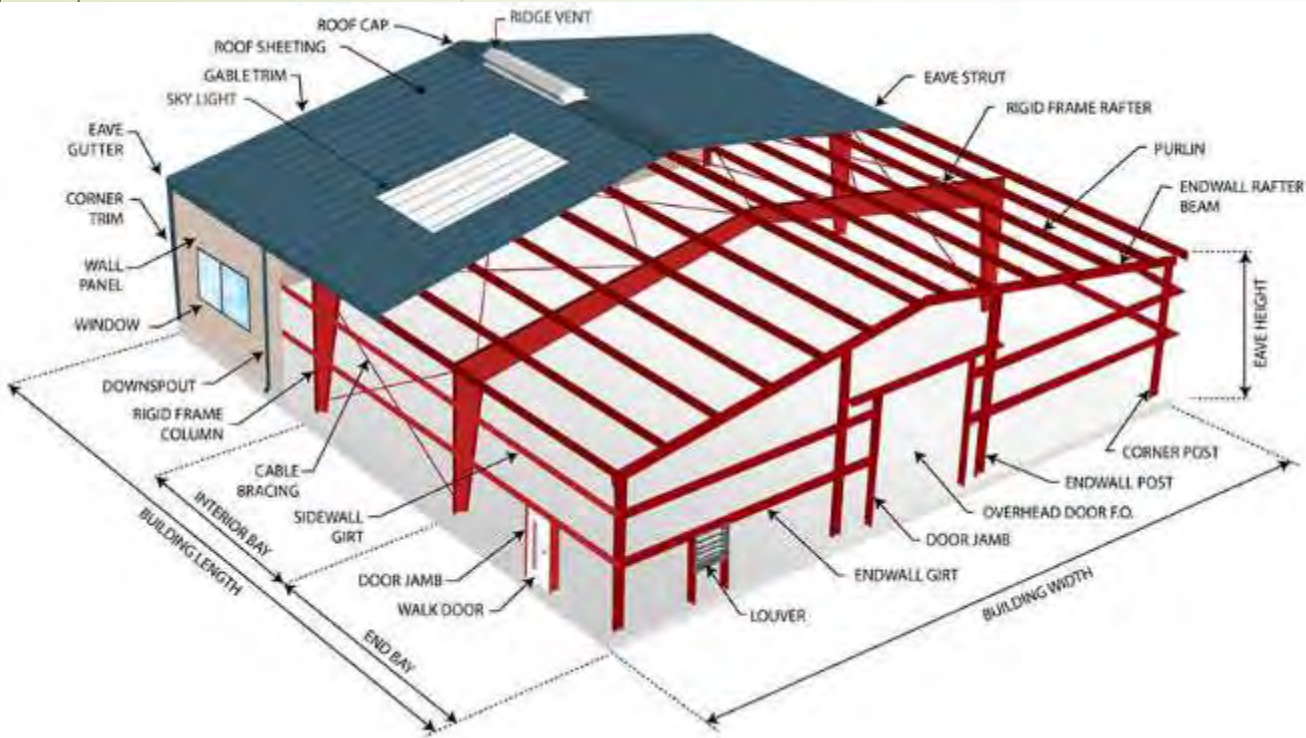








Our project

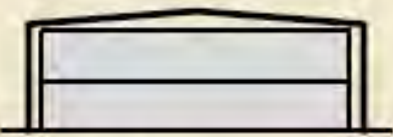


- Gymnasium hall
- Area (20*40)m + 5m canopy
- One part of the project is two story
- All the project should be built with steel structure(column, beam, intermediate floor, roof, stair,)
- Project consisting of:

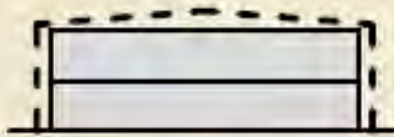
Ground Floor: Entrance, Small Shop, Lockers + Shower (5 units) and W.C (5 units) (for male and female), small cafe, Gym hall

First Floor: Manager, Meeting room, First Aid room, Account, Trainers rest rooms

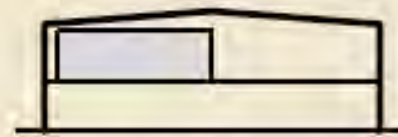
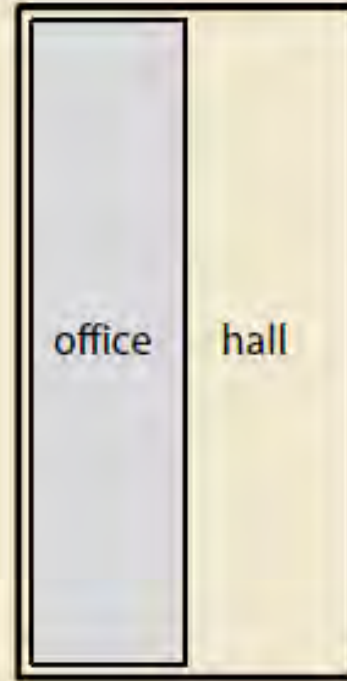
Space between each column 5m



(a) inside



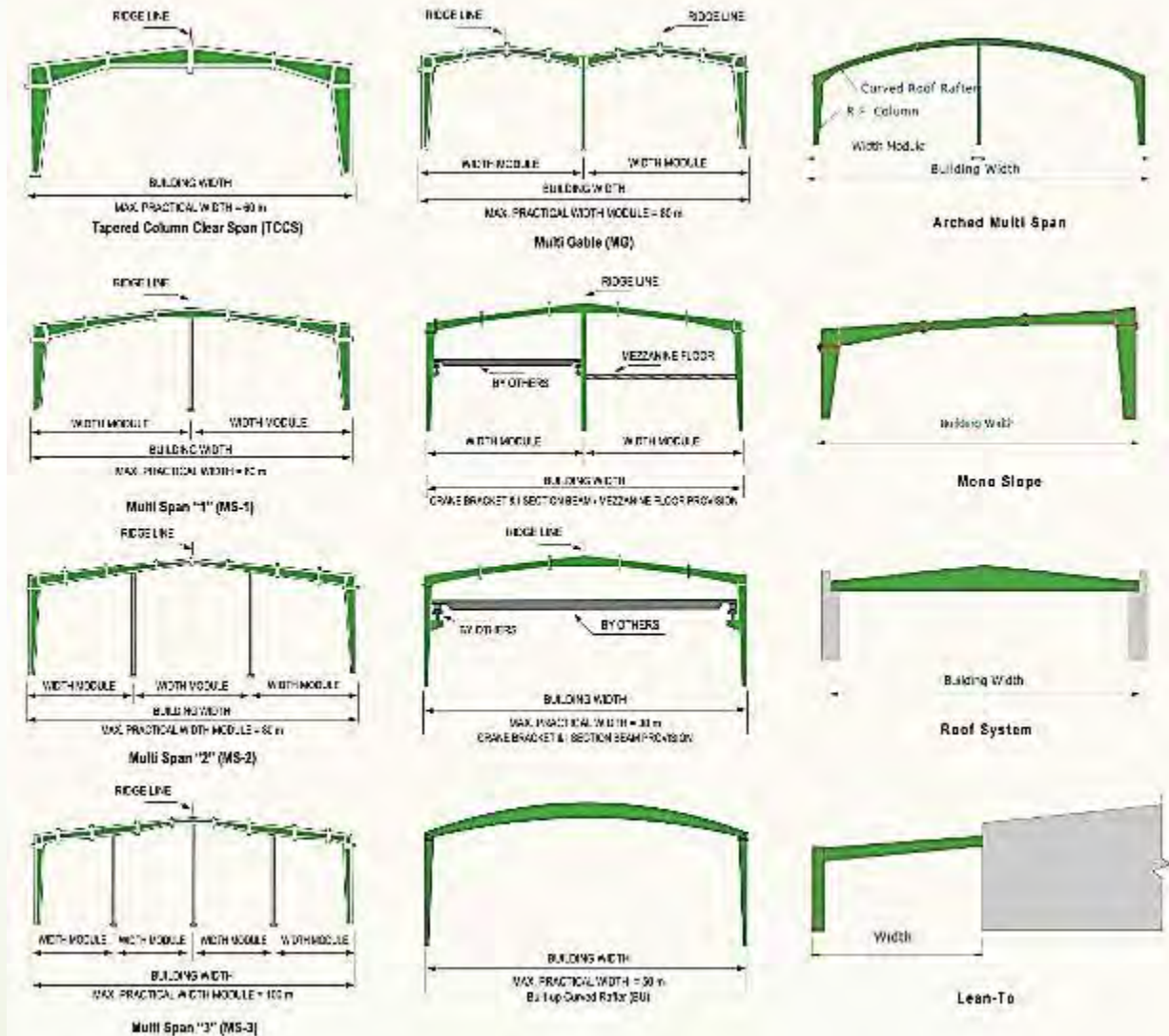
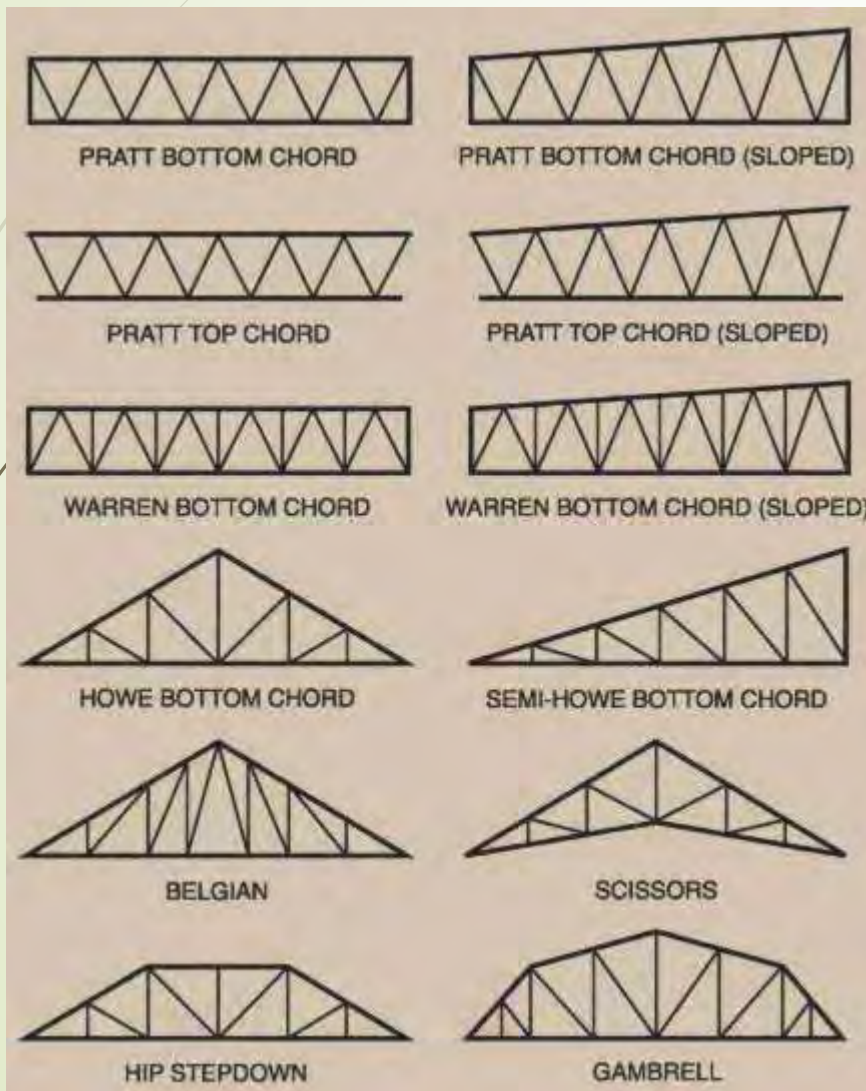
(b) outside



(c) on top floor

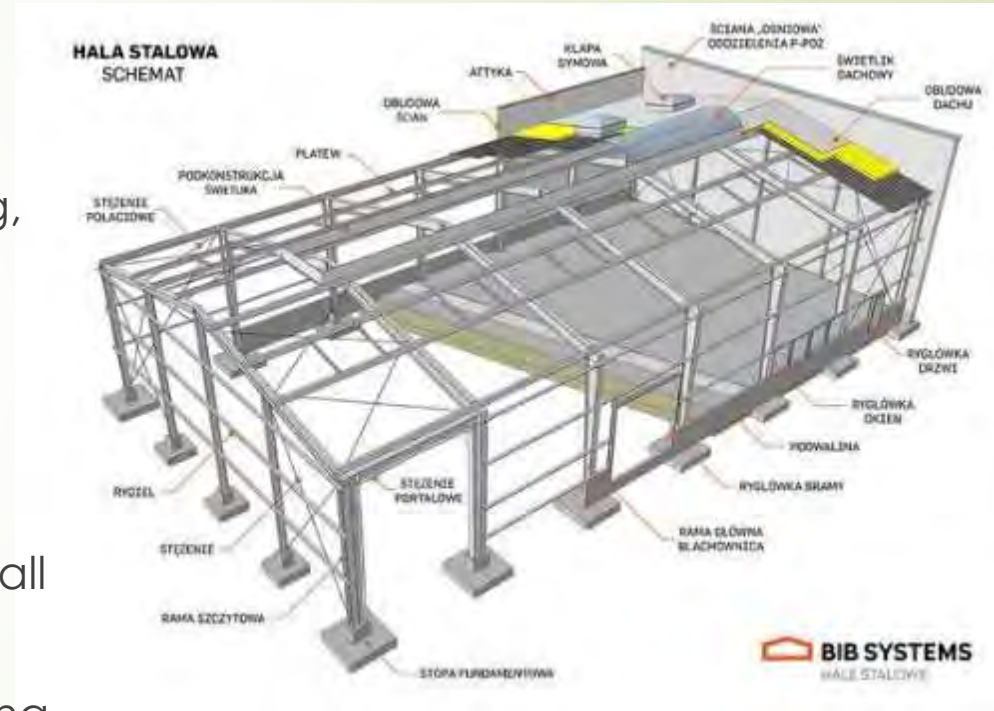
Submission requirements

* Each student should select a type of roof (frame) and shouldn't be repeated by another student.



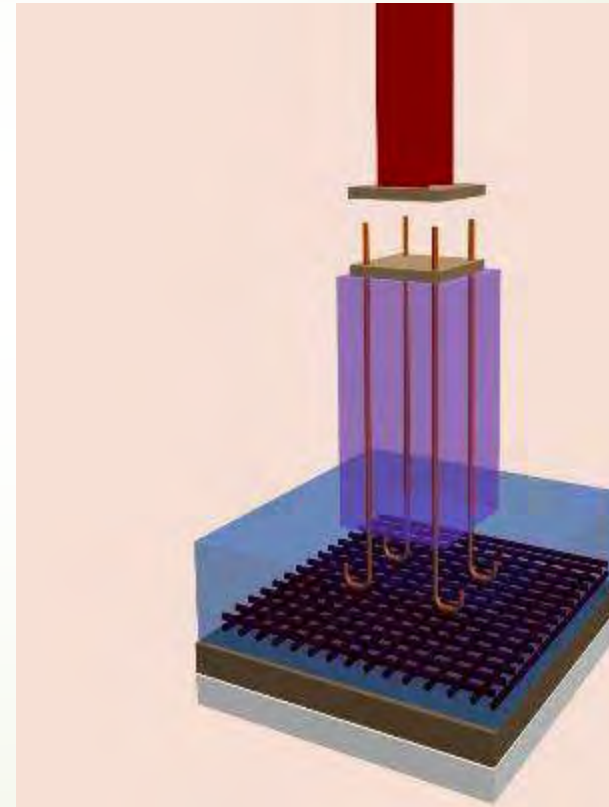
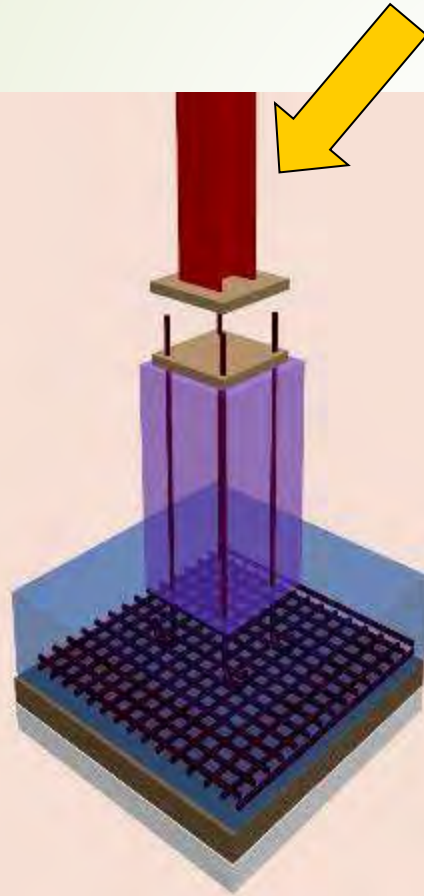
Submission requirements

- ▶ Foundation plan scale (1/50) including all drawing requirements (axes, dimensions, locations, levels, ...)
- ▶ Ground floor plan scale (1/50) with all drawing requirements as mentioned before.
- ▶ First floor plan scale (1/50) with all drawing requirements
- ▶ 1 section scale (1/50) clarifying (the height of the building, the stories of building, stair (if possible)) with all drawing requirements
- ▶ 2 elevations scale (1/50) with all drawing requirements
- ▶ Stair detail
- ▶ Roof (frame) detail
- ▶ Door and window detail and their connection with the wall
- ▶ Foundation detail
- ▶ Detail of the most of the connections between the building structure.
- ▶ Detail of Connection of the intermediate floor with the columns and other part of the building
- ▶ Building service plans and details contains water supply system, sanitary system and electricity distribution.

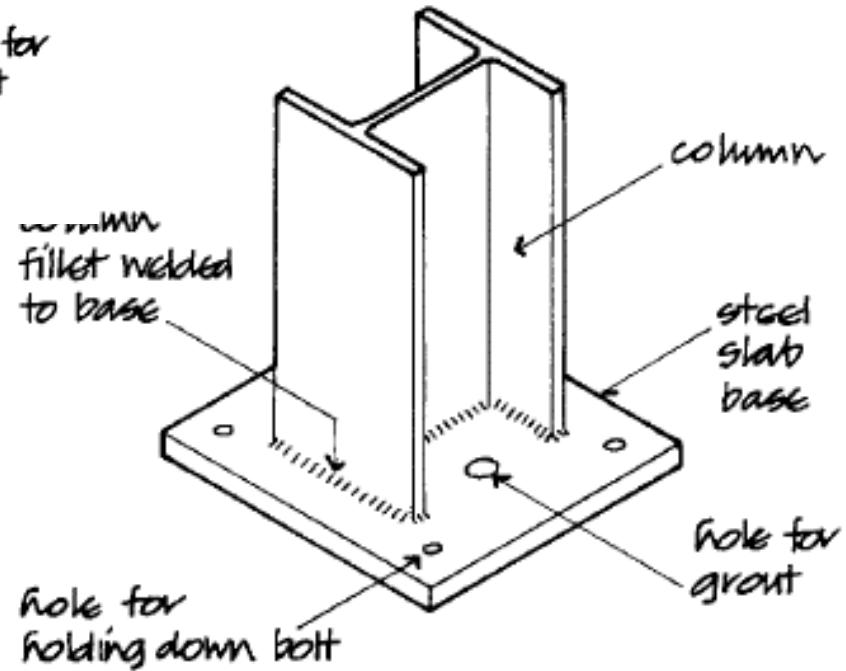
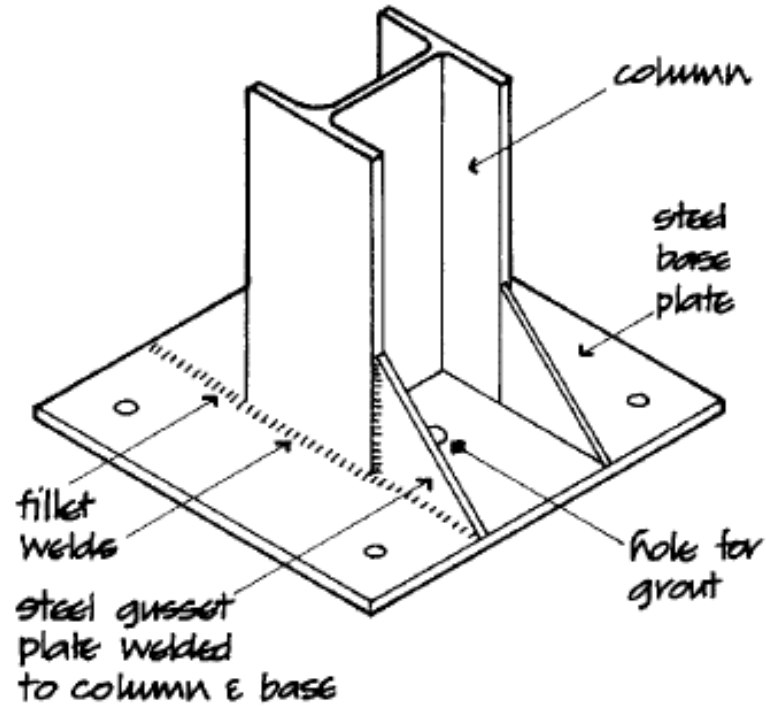


FOUNDATION OF STEEL STRUCTURE

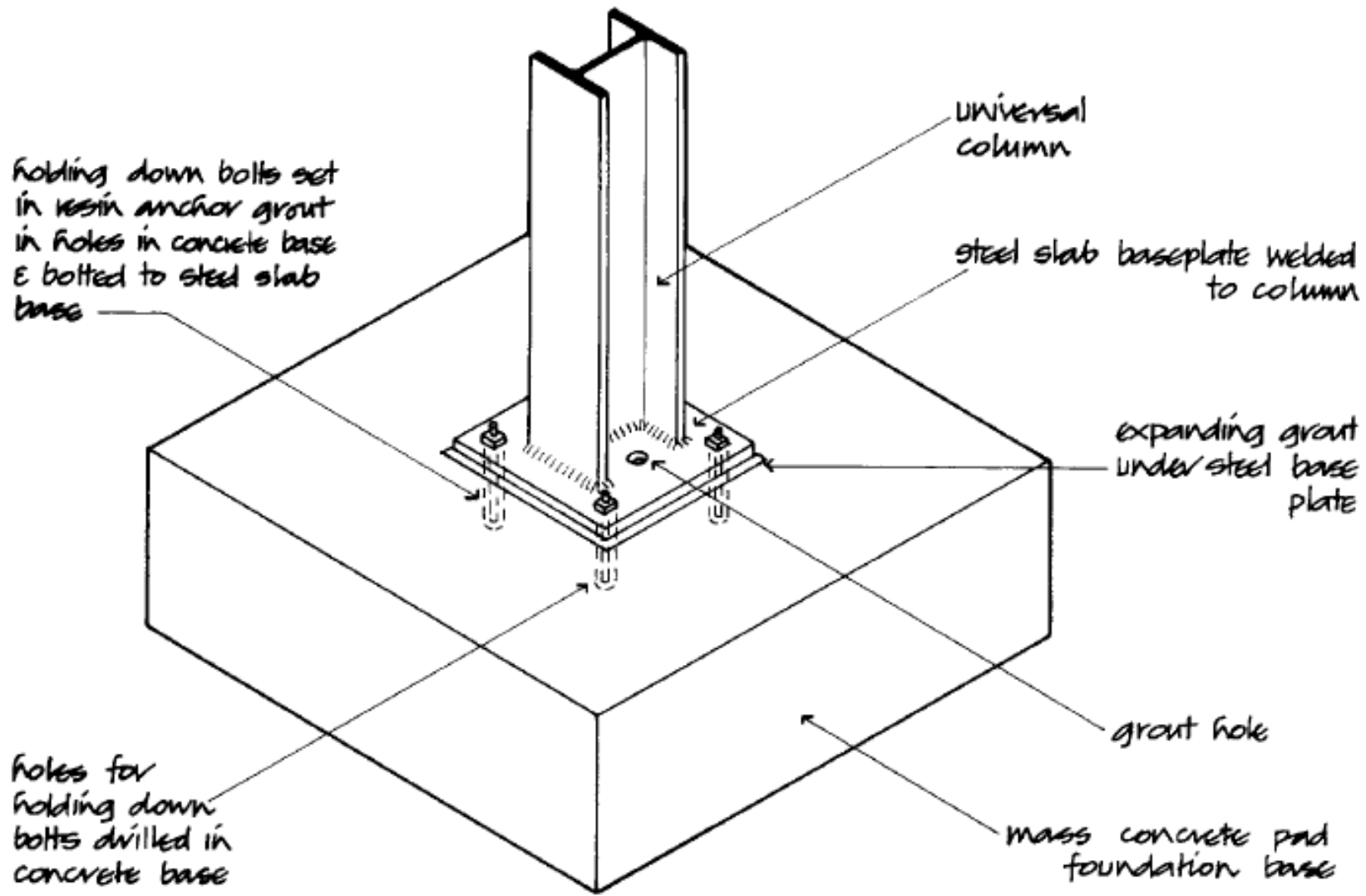
STEEL SECTION WITH CONCRETE FOUNDATION



Column welded to slab base



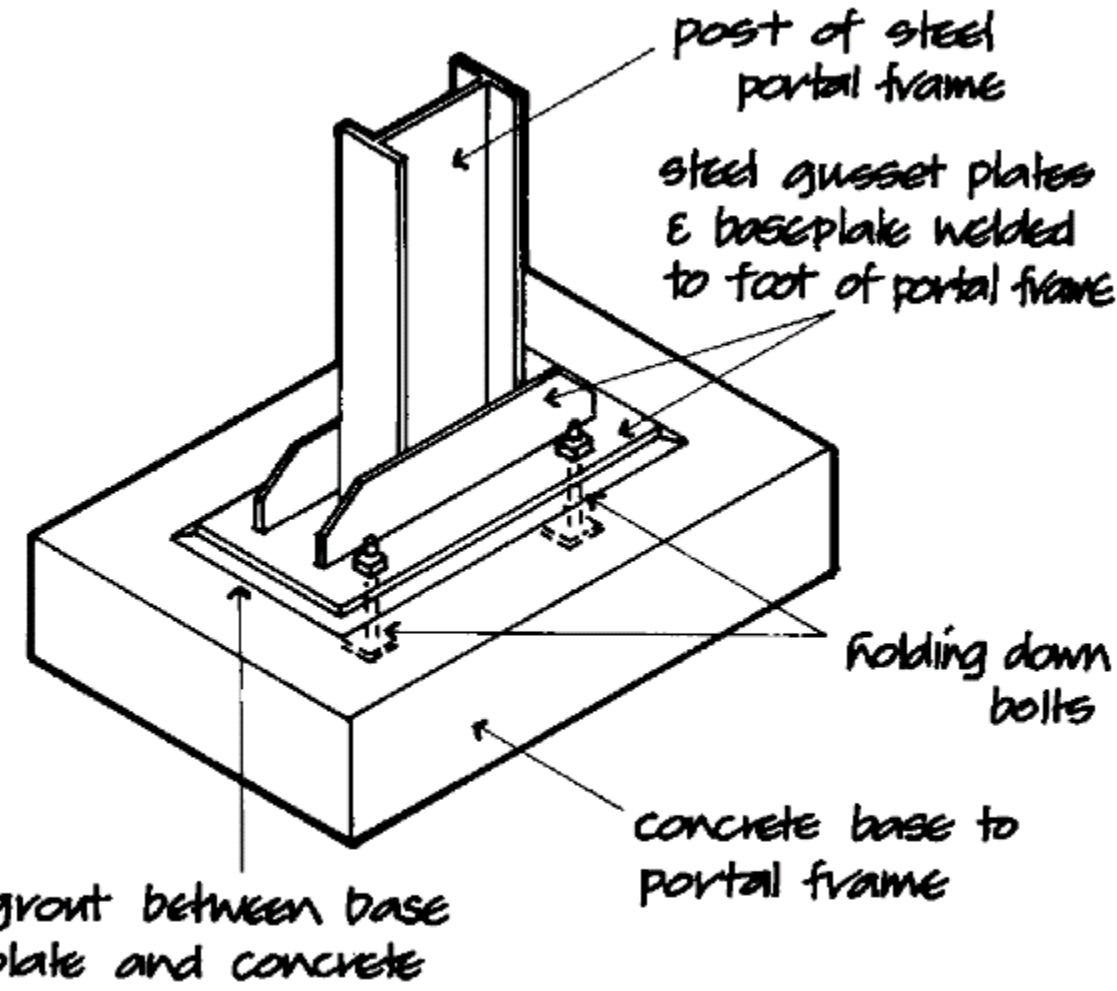
Column welded to slab base



Steel slab base on concrete pad foundation

Fixed base to Steel column

Foundation



Fixed base to steel portal frame

<https://www.youtube.com/watch?v=ADhbGfbd43k>

<https://www.youtube.com/watch?v=-GePI7noLuE>