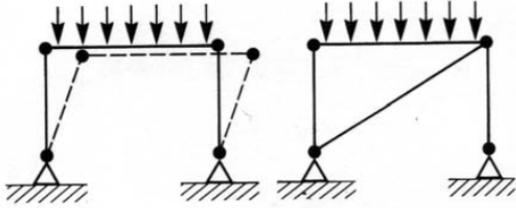


- Rigidity and strength are dependent on the properties of the structural material and size of the cross sections.



The frame on the left is capable of achieving equilibrium under the loading but is unstable. The diagonal brace on the right diagram allows it to achieve stable equilibrium.

Post and Beam Structures

The basic structural form in domestic construction is the post and beam structure. These structural forms may be identified as horizontal spanning members (beams) supported on vertical posts (columns) or planes (walls). This basic system repeats itself throughout the main structure of the domestic house form.

Beams: A beam in its structural sense is defined as a bar acting in bending and shear.

There are three basic support systems

Simply supported: a member supported by two support points usually at each end of the member. A window lintel is an example of a simply supported beam.

Continuously supported: a member supported at three or more support points, usually at equidistant centres. Such support systems generally deflect less than simply support systems over the same span as the supports act together to offer more restraint from deflection. A floor joist acts as a continuously supported beams.

Cantilever: A member supported at one end by a fixed support, the other end being free of support. The distance of a cantilever is limited by:

- The load on the cantilever and the backspan
- The beam depth
- The backspan distance
- Beams primarily fail in bending, generally when the tensile stress at the base of the beam exceed the capacity of the member. Deflections of beams are generally designed within certain tolerances, however, often timber beams will still perform their structural function even though the amount of deflection may be unacceptable.

Columns

- Columns are vertical structural support members that primarily act in compression, although they are susceptible to bending forces that cause failure. To compensate for this factor columns are designed with consideration to their cross section as a proportion of their length.
- There are two basic structural joining systems. A rigid joint prevents the rotation of the connecting members and therefore are structurally stronger than members that are connected as pinned joints which still permit relative rotation of the members at the end.

Consultants

Land Surveyor

A land surveyor assesses the surrounding terrain and landscape for the purpose of development.

- A land surveyor determines, locates and defines the boundaries of public and private land. This information is required as the boundary is different to the existing fence lines and provides an accurate boundary line. This information is used to provide the area which a building can be placed and constructed.
- A land surveyor also establishes the existing conditions survey. An existing conditions survey provides accurate information on the site, providing information on currently present buildings, vegetation, slope of the land, building heights and road features. This information is required as it provides the context of the surroundings and the pre-existing conditions of the site. This information is used to guide the architects design and establish a potential demolition plan.

Geotechnical Engineer

Geotechnical engineers carry out investigations to obtain information about the foundations.

- A geotechnical engineer provides information on the bearing capacity of the soil. This information is required as it gives the capacity of the soil to bear the ultimate load per unit which the soil or rock can safely carry before failure or uncontrolled deformation occurs. This information will be used to provide an allowable bearing pressure upon the foundations which must be adhered to to ensure failure of the foundations, footings and entire structure does not occur.
- A geotechnical engineer also provides information on the soil classification found on the specific site. The soil classification is important as it is an indication of the expected extent of soil movement and the depths to which this movement extends. The soil classification is used to form a site classification which is used to allow the selection of standard footing designs or for footing systems designed by engineering principles.

Boundary line

An adjacent building built hard up to the boundary on one part of the site will cause the issues of

- The architect will need to ensure there is space to move materials around the site. As there is a building sitting on top of the boundary line, the architect would need to consider about the location of the building as the moving of materials is important, if a crane is required to move materials from one area of the site to another, this will result in a higher costs and time being taken.
- In Melbourne, planning regulations highlight a minimum street setback, the regulation state that if there is an existing building on either side of the site being built on, the average distance of the setback should be the same as that of the front walls of the existing building. The architect must adhere by this regulation to get approval for their design.

The remanent of an old wall on the boundary of another part of the site will cause the issues of

Ensuring the wall is not heritage listed. The architect will need to consider if this is a heritage listed wall if it has not already been taken down. If the wall is heritage listed,

- The classification can also give an indication of what type of surrounding environment surrounds and thus an indication of types of materials to use.
- For example, a site classification 'P' which is soft soils, such as loose sand may indicate a coastal region the site is located in, this indicated it would not be a good idea to design the building out of steel as salt and water corrodes the steel.

| Explanatory information: | |
|------------------------------------|---|
| Table 3.2.4.1 | |
| GENERAL DEFINITION OF SITE CLASSES | |
| Class | Foundation |
| A | Most sand and rock sites with little or no ground movement from moisture changes |
| S | Slightly reactive clay sites with only slight ground movement from moisture changes |
| M | Moderately reactive clay or silt sites which can experience moderate ground movement from moisture changes |
| H | Highly reactive clay sites which can experience high ground movement from moisture changes |
| E | Extremely reactive clay sites which can experience extreme ground movement from moisture changes |
| A to P | Filled sites (see AS 2870 and Part 3.2.2) |
| P | Sites which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise |

Excavation Angles

Angle of repose: angle with the horizontal which the sloping face of a bank of loose material will remain in place without sliding.

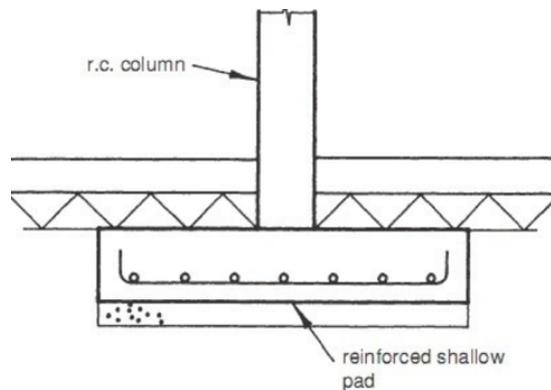


Abnormal ground conditions

Footings will have a higher probability of damage where:

- Existing building removal modifies soil moisture conditions
- Unusual moisture conditions caused by drains, channels, tanks maintained or removed from site.
- Recent removal of large trees
- Tree growth too close to a footing
- Excessive or irregular watering adjacent to house
- Lack of maintenance of site drainage
- Failure to repair plumbing leaks

Pad footing



- Supports a point load. Square or rectangular in plan, supporting a single column.
- Area is a factor of the load and the bearing capacity.
- Depth is a factor of shear (column can't punch through) and bending (dishing of side, tensile stress at the bottom).
- Reinforcement critical at base not at top, reaction of the ground acts upwards on all sides of the columns- counteracts the upward pressure exerted by the soil and downward pressure exerted by the column.
- Reinforcement needs to be equal in both directions for square, rectangle need to check bending in both directions.
- Greatest bending and shear under the column (in theory pad have less depth as move away from column).
- Reinforcement often turned up to embed the steel to add greater resistance to bending and cupping of the pad.
- Can be founded in any type of subsoil, but most suitable for soils which is of relatively good bearing capacity, mass concrete or concrete blinding may be required to achieve adequate bearing capacity.