UNDERSTANDING ARCHITECTURAL DETAILS - 3
CONCRETE & STEEL CONSTRUCTION

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FOUNDATIONS & FLOORS

SECTION 1
The four main types of foundations in steel and concrete construction are:

- Strip foundations
- Pad foundations
- Raft foundations
- Pile foundations

**STRIP FOUNDATIONS**

The strip foundation consists of a single strip of concrete, which provides a firm and level base for the construction of the walls above. Strip foundations spread the load from walls of brick, masonry or concrete to the subsoil. The foundation depth depends on strength of material, foundation loads and breading capacity of the subsoil.
If the subsoil is weak or susceptible to movement the foundation can be taken to a suitable depth where the strata is stronger and able to bear the loads of the proposed structure.

The width of the strip foundation must be adequate that there is room to lay walling material, and also able to spread the loads to a suitable area of subsoil. As a general rule, the projection of the strip each side of the wall should be no greater than the thickness of the concrete.

In other cases, a wide strip foundation may be used to spread the load of the foundation or the strip can be reinforced.

Strip foundations are more commonly used in domestic and residential construction, or more low rise construction.
PAD FOUNDATIONS

A pad foundation is generally a square of reinforced concrete, that takes the loading from the column above and transfers it to the ground. The column is positioned centrally on the foundation pad, which requires the pad to be sufficiently reinforced to avoid the point loading of the column punching through the foundation.

The column or pier that sits on the pad foundation can be brick, masonry, concrete or steel. Once again the area of the pad is dependent on strength of subsoil, and loading on the foundation material.

Ground beams are often used to span between the pads and transfer the load of the infill wall to the pads.

Pads can sometimes be linked with concrete strip when they are particularly close together, resulting from a frame that has close spacing.

Figure 1.3- Example of a pad foundation with ground beam
Detail G18 B - Raft foundation with toe - concrete frame - alternative detail
3D Detail G18 B - Raft foundation with toe - concrete frame - alternative detail
Detail G28 - Beam and block floor - beams parallel to wall, cast in situ concrete downstand
3D Detail G28 - Beam and block floor - beams parallel to wall, cast in situ concrete downstand
SECTION 1 - FOUNDATIONS AND FLOORS

Detail G36 - Solid concrete ground floor - insulation above slab, screed finish underfloor heating

3D Detail G36 - Solid concrete ground floor - insulation above slab, screed finish underfloor heating
TYPES OF FRAME

Skeleton Frame:
Conventional steel frames are constructed using hot rolled section beams and columns known as a skeleton frame. The skeleton frame supports the whole load of the building - floors, walling, wind pressure and so on. The most economic form of this frame is a standard grid pattern, with a 3m to 4m spacing between columns and floor beams spanning up to 7.5m.

Parallel beam structural steel frame:
This type of frame uses spine beams which are fixed on each side of the columns to support secondary beams that support the floor. This also is most economic when designed in a rectangular grid, and main advantages are the ability to integrate services in both directions within the structure.

Figure 3.8 - Example of structural steel skeleton frame
CLADDING DETAILS

**Detail W01 - Rainscreen cladding panels - steel frame infill**

**3D Detail W01 - Rainscreen cladding panels - steel frame infill**
Detail W02 - Rainscreen cladding steel frame infill - base detail
3D Detail W09 - Cladding panels on aluminium frame system - window head detail

3D Detail W08 - Cladding panels on aluminium frame system - window cill detail
3D Detail W17 - Render finish - window head detail
Standing Seam:
Standing seam roofs are becoming increasingly popular where concealed fixings and low roof pitches are required (see in industrial warehouses, long span frames and portal frames). The main advantage of the standing seam system over the profile metal roofs is that virtually no fixings pass through from the outside to the inside construction, thus giving a more aesthetically pleasing roof surface. These roofs are often made from prefabricated systems where the metal is pre-rolled and formed and clipped together on site.
Detail R15 - Extensive green roof - warm deck, edge detail

3D Detail R15 - Extensive green roof - warm deck, edge detail
Detail ICF02 - Strip foundation with ground bearing slab
3D Detail ICF02 - Strip foundation with ground bearing slab
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Note all insulation thicknesses should be calculated in order to achieve required u-values. All structural members should be calculated and assessed by a structural engineer. These drawings MUST NOT be used as construction drawings, and are purely an educational resource. These drawings are not finished or complete construction drawings and should not be used as such. This does not cover CDM regs, and these should always be consulted/considered when drawing up construction documents.