

What is a modern house, exactly? how will it address how we live today?

What type of foundation would you recommend for a modern house and why?

Strip

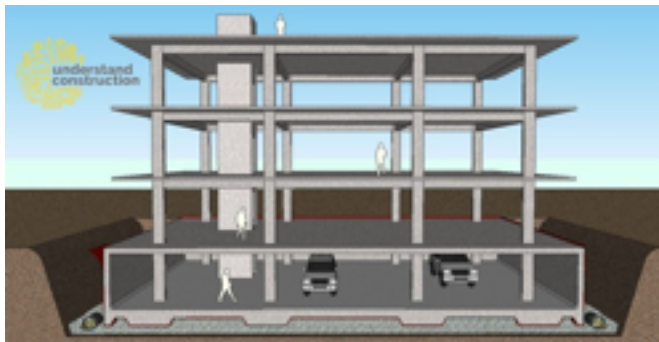
The strip foundation is the foundations below your typical brickwork and is 750 mm deep below the frost line. Typically this foundation is considered the best for two storey domestic buildings.

"commonly found in load-bearing masonry construction, and act as a long strip that supports the weight of an entire wall. These are used where the building loads are carried by entire walls rather than isolated columns, such as in older buildings made of masonry."(Understand Building Construction, 2019)

The issue with this foundation is that if the ground itself is not structurally sound the foundations can crack and in turn the building itself cracks. This foundation typically uses less concrete than the other foundation types which has a positive impact on the environment.

Raft

Raft foundations are typically used for buildings with basements or bigger non-domestic buildings.



(Understand Building Construction, 2019)

"Mat Foundations are used where the soil is weak, and therefore building loads have to be spread over a large area, or where columns are closely spaced, which means that if individual footings were used, they would touch each other."(Understand Building Construction, 2019)

The positives of this foundation is that if the ground is not structurally sound the building will sink but not crack therefore not compromising the structure. Unfortunately due to the foundations nature it requires a lot of concrete to construct.

Pile

Pile foundations are mostly used for high rise buildings therefore we wont consider this one.

If the ground is structurally sound then I would recommend the strip foundation as it uses the least amount of concrete and is used more for low bearing masonry like a house would typically have.

What will provide the occupants with a healthy environment in which to live?

For a healthy environment in a domestic building we must consider the principles of a house. Where we must keep the weather out and keep the inhabitants warm.

In a modern house we can use the best insulation available to ensure that we are keeping the building warm for the inhabitants, especially winter when it is cold outside and the property needs to retain its warmth.

While insulating the house we must also remember to make sure there is some sort of air flow to keep the air quality inside the building good for the inhabitants as it would be unhealthy to live in stagnant air.

Fire safety is also a big factor in house construction as so many risks come with domestic living. The majority of household appliances are a fire hazard and also things as simple as aerosol cans being left in the sunlight. There for we must fit the modern house with some precautions as “Internal fire spread linings” and internal fire spread structure”(cheshirefire.gov.uk, 2019). These should be in place so that in an event of a fire the fire will be slowed and ultimately it will give the fire fighters more time to evacuate people.

Finally, and one of the most important factors in domestic building, we must think about the weather. While building a modern house we must aim to keep the wind and the rain out of the property. We can do this by insulating well, using DPM and making sure the construction of the outer skin is built to standard. DPM or a Damp proof membrane can help with,

“ Damp patches.

Mould growth, which is a cause of respiratory allergies.

Mildew, salts, staining and ‘tide marks’.

Damage to surface finishes.

Corrosion and decay of the building fabric.

Slip hazards.

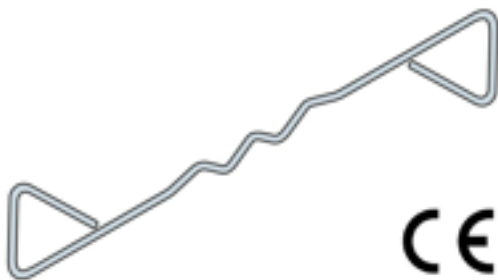
Frost damage.

Poor performance of insulation.

Damage to equipment, or electrical failure”(Designingbuildings.co.uk, 2019)

and so can keep out the unwanted condensation.

With the rain you will need a well constructed roof with big enough eaves so that the rain can fall off the building instead of finding a way into the construction. In cavity wall construction you also have wall ties,



As you can see the dip in the middle of the wall tie ensures that any rain that penetrates the outer brickwork can travel to the dip then fall to the bottom of the cavity and not enter the structure.

What is your understanding of the terms ‘sustainable’ and ‘sustainability’ in terms of domestic construction?

Sustainability in domestic construction comes in many forms as we use a lot of energy to live, from heating our homes to having long showers we need to consider using less to benefit our planet.

A sustainable home would probably use less harmful materials like natural insulation, better situated windows to use the sunlight more efficiently and in general cutting down on time spent in the shower. Typically you would probably move to timber frame construction as the trees can be planted and stock can be replenished and maybe move towards lime concrete as “Free lime absorbs carbon dioxide in the setting process of carbonation.” (Building Limes Forum, 2019). Therefore lime used in concrete can also help with the ever growing problem of carbon emissions in our atmosphere.

What materials do you consider sustainable in the construction of these houses and why?

I would consider timber frame construction to be sustainable in the construction of these houses as you can replant trees to produce more for timber frame construction. You can also recycle steel but you would have to re melt and mould the steel again which will take more energy leading to higher carbon emissions which isn't helping the problem.

As I have mentioned previously lime concrete can absorb carbon and hold it and also has "Lime has less embodied energy than cement"(Building Limes Forum, 2019) so this is more sustainable than regular concrete. Also using less concrete where we can can also have a positive impact on the environment and is more sustainable in itself.

What form of energy for heating and power would you suggest for a modern house?

Solar panels

The availability of solar panels are ever growing and the technology is improving all the time so it can be used quite easily in domestic houses and if they are situated efficiently they can be very beneficial to the homeowner by cutting down the costs on energy bills and ultimately lessen the demand for energy directly from the grid.

"The sunlight that hits the earth in an hour has more energy than the people of the world use in a year"(Hantula, 2010)

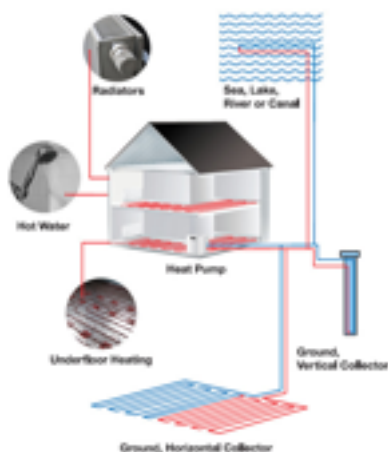
By looking at this quote alone we can see that the possibilities are endless with solar energy.

Ground source heat pumps

Ground source heat pumps are growing in popularity due to the numbers that support this technology,

"a well installed Ground Source Heat Pump can be 300-400% efficient in terms of its use of electricity. At this efficiency level there will be 70% lower carbon dioxide emissions than for a gas boiler heating system."(Gshp.org.uk, 2019)

As you can see the stats are staggering and the potential these heat pumps have are incredible.



(Gshp.org.uk, 2019)

As you can see in the diagram it works just like a refrigerator and extracts the heat from the ground and simply pumps it into the home.

Insulation

Finally insulation is key part to the warmth of a house and you can use many different eco friendly insulations such as sheep wool, hemp insulation and thermolite blocks. The best considered insulation is cellulose insulation and "Modern **cellulose insulation** is made from either 75 to 85 percent ground up recycled paper or recycled denim." (Inc, 2019) so it is mostly made out of recycled materials which again is helping global warming. I would also recommend using thermolite blocks as the inner skin of the cavity wall construction on these houses as it is an insulated block and also helps the U value of the house.

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