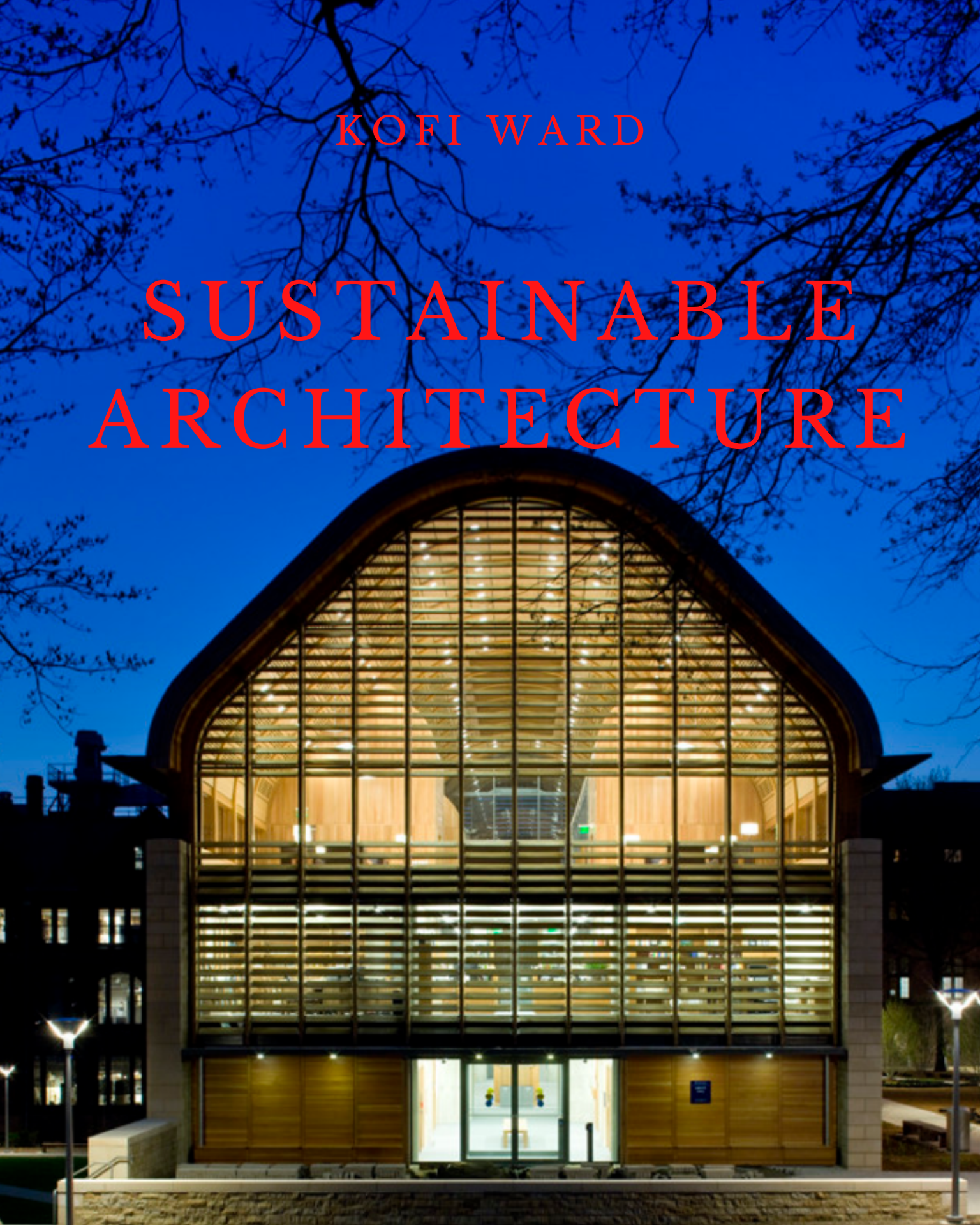


KOFI WARD

SUSTAINABLE ARCHITECTURE



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KOFI WARD

Intro

What does it mean for architecture to be sustainable? Well, for anything to be sustainable it must be able to be maintained for a long period of time, and/or, not having to use up the area's natural resources, therefore, it must maintain the ecosystem's ecological balance. So the same thing applies to buildings and more. For example, for a building to be sustainable, materials, energy consumption, and location must be taken into account while building.

Specifically, let's examine materials. Materials are very important in terms of sustainability, as well as just for plain building. You wouldn't want to build an air raid bunker out of wood. So determining the best material for a building depends on where you are, and what you are building. There are a lot of materials that can be used to make a structure and they all have their pros and cons.

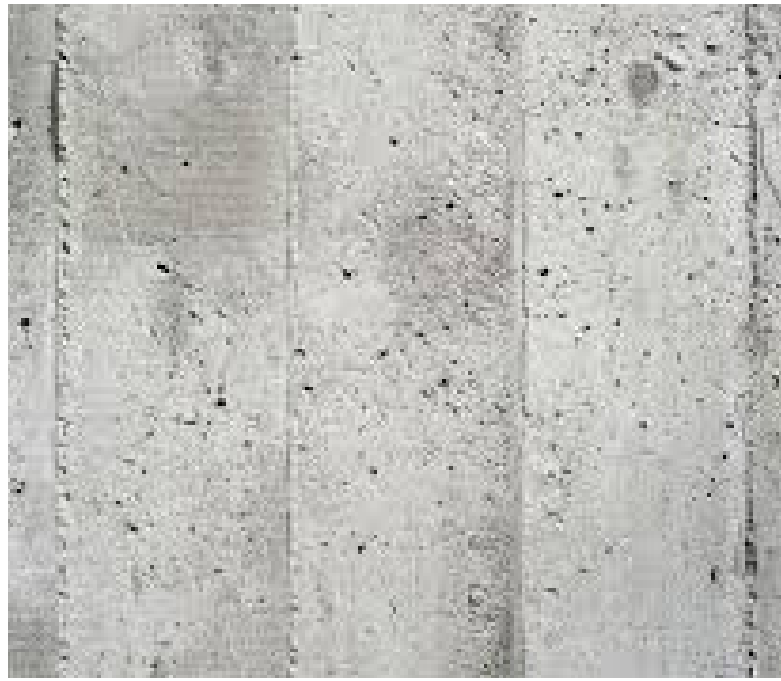
The most commonly used building materials are steel, concrete, and wood. These are the structural materials, and they are used for the framing of the building, not the shell. This is important because it is inefficient to build the walls of a building with steel, and it is expensive. Someone is more likely to build walls out of bricks or stone, it's less expensive, and also insulates better. This is more or less how each material is made and their pros and cons.

Steel

Steel is a building material that is a product of iron. And as a product of iron it takes a lot of energy to manufacture. Steel is used primarily as reinforcement for a building in two ways: in girder form, and in the form of reinforced concrete. Steel is made through a process where iron is melted and the impurities are removed. First, raw iron ores are mined from the ground. Iron ores are stones and rocks from which iron metal can be 'easily' extracted. Then, the ores are put into a blast furnace along with coke (a form of carbon from roasted coal) and limestone to separate the iron from the stone. After that, the molten iron (pig iron) is put in another furnace in which scrap steel is added to take some of the impurities out of it, and oxygen is blown over it to remove some of the carbon. The pros and cons of steel are these: steel is recyclable, the steel framework of a building can be taken out and used somewhere else. It is durable. Steel can be made corrosion and rust resistant by adding chromium, making stainless steel. The cons of using steel as a building material are varied too. For starters, steel production ravages the area around it. Iron mines need huge areas of land to dig up. Furthermore, the cost of maintaining steel is high. To repair a steel girder sometimes big chunks of the building have to be removed to get to it. And, if a fire starts inside a building, it can get so hot that the building becomes like a furnace and heats up the steel framework and bends, it can cause a building to collapse.



Concrete



Concrete is another common building material. Concrete is a mixture of three things: aggregate (sand/gravel), water, and Portland cement. The Portland cement acts as a glue for the water and the aggregate. This mixture hardens into a durable material. It is commonly reinforced with steel. Cement is made primarily out of limestone, combined with shale, clay, slate, blast furnace slag, silica sand, and iron ore. It is ground into a fine powder that is poured into a cylindrical kiln and heated up to more or less 2,700°F. It is then poured out in the form of clinker. These gray balls of clinker are about the size of marbles. The clinker is cooled to a manageable level, then it is crushed to a powder and gypsum is added. It is then shipped to a concrete plant. Like steel, concrete has pros and cons. One advantage of concrete is that it is long lasting. However, unlike steel, concrete is brittle. During the making of the cement there is some toxic output, e.g. nitrogen oxide and carbon dioxide.

Wood



A third common building material is wood. In the making of lumber, a tree is cut down and then the wood is stripped, cut, and then dried. The drying process can take from a few days to a few years depending on the method of drying and the kind of wood. There are three categories of wood: hardwood, softwood, and engineered wood. Hardwood is deciduous trees (trees that lose their leaves in the fall) like oak, ash, and beech. Softwoods are coniferous (trees with needles for leaves) trees like pine, spruce, and fir. Engineered woods are man-made products made out of wood like plywood, fibreboard, and particle board. Of all of those, the most sustainable wood is softwood because it grows the fastest. The pros and cons of wood are: pros, if a forest is managed right the wood can be a renewable resource. A tree breathes in carbon dioxide and when it is chopped down and used for building it stores that carbon, so that is less carbon in the air. Wood is lightweight, but strong. Wood can be recycled in the form of reclaimed lumber (wood that has been taken from things that are unneeded such as factories and old barns). The cons are: One, wood rots. Two, if not covered in paint or with certain types of insulation, wood is flammable. Three, trees only grow to a certain height, so the timber that can be used for building can only be so long. And four, there are a lot of pests like termites or fungi that like to eat some woods.

Field Trip

Sometime a few months ago, my tinkering teacher Kyle, and I, went on a field trip to the new Common Ground High School building.



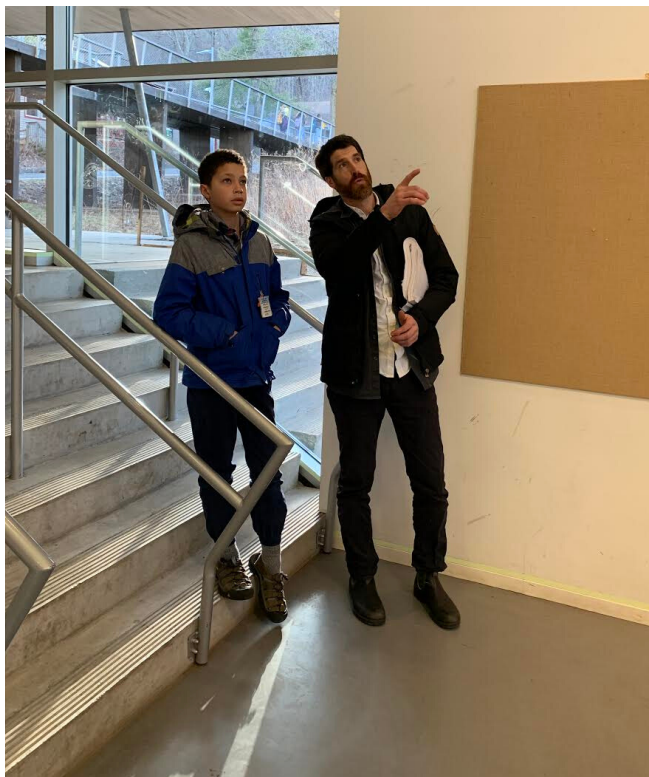
Then newest Common Ground building



Me talking to one of the staff



Taking pictures with Kyle



Kyle is explaining something to me



I am looking at the building plans for the newest Common Ground building

Conclusion

So this concludes my paper. About which one is best, I would usually say wood but it depends on what you're doing or where you are. What other aspects of sustainable architecture are there? Why should architecture be sustainable in the first place?