

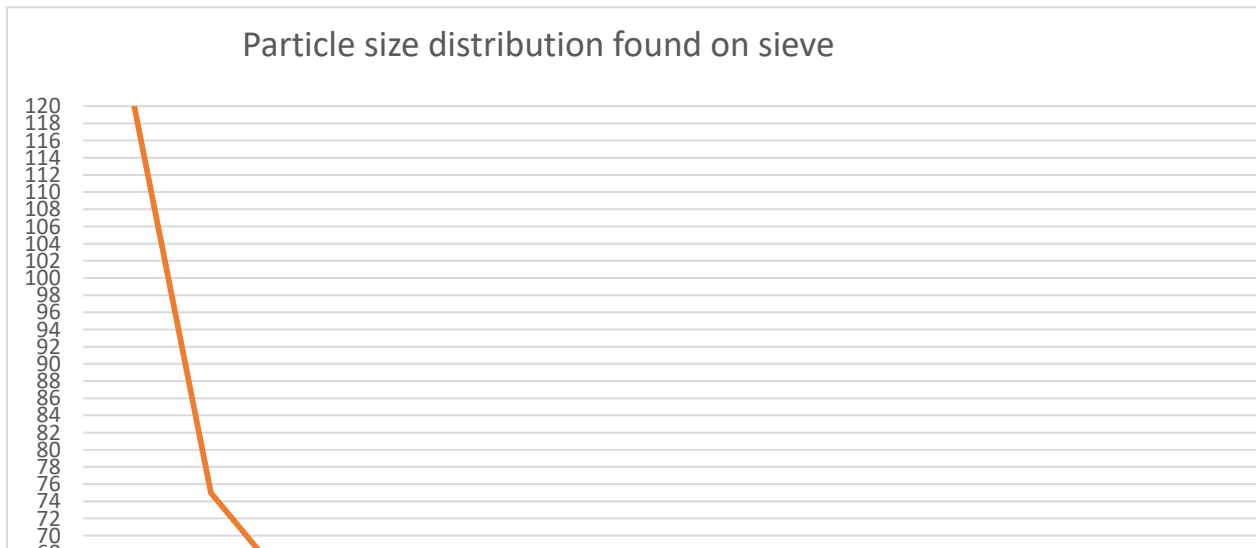
Construction Materials Assignment: Question 4

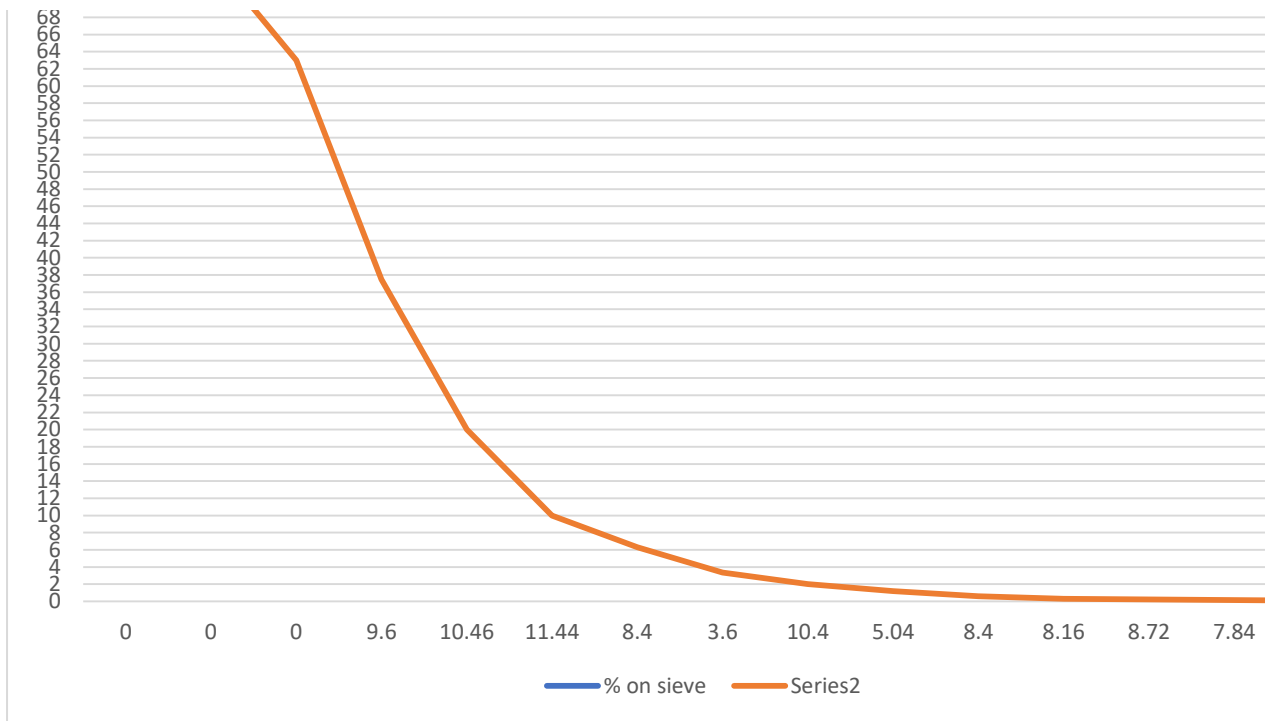
Question 4(a)

Column1	Column2	Column3	Column4
Sieve Size(mm)	Mass(g)	% on sieve	% Passing
125	0	0	100
75	0	0	100
63	0	0	100
37.5	120	9.6	90.4
20	137	10.46	79.44
10	143	11.44	68
6.3	105	8.4	59.6
3.35	45	3.6	56
2	130	10.4	45.6
1.18	63	5.04	40.56
0.6	105	8.4	32.16
0.3	102	8.16	24
0.212	109	8.72	15.28
0.15	98	7.84	7.44
0.063	55	4.4	3.04

Question 4(b): Course aggregate mass is retained on sieves that are larger than 5mm sieves therefore= $0+0+120+137+143+55$. Therefore 455g is total course aggregate. $(455/1250) \times 100 = 36.4\%$ is the course aggregate and therefore $100\% - 36.4\% = 63.6\%$ is fine aggregate. Fine aggregate= 63.6% and Coarse aggregate= 36.4%.

Particle size distribution found on sieve





ctors that make this aggregate sample a good aggregate include the gradual decrease in aggregate size there



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University of Wales Trinity Saint David

**The analysis of the design, construction method and
framing material of Trellick Tower**

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Course: Quantity Surveying (K241)

Module: Construction Materials

Lecturer: Alan Nantel

Due Date: 26/03/2026

Declaration: Throughout the assignment I have not used
any Artificial Intelligence to aid me.

Question 1:

The first question of this task requires you to select a concrete framed building and after the selection you are required to report on the elements of its original design and the method of its construction. The concrete framed build I have chosen is Trellick Tower. Trellick tower is a residential building. Trellick Tower is situated in West London, Kensal town. Trellick Tower was design by Erno Goldfinger. Trellick tower started construction in 1968 and finished its construction in 1972. Trellick tower contains two separate towers that are connect by corridors. Trellick Tower featured 7 main design elements that the design process followed. These elements include a separate service tower, corridors every third floor, the brush hammered concrete walls, the number of houses, the balconies and light, plant room at the top and interior detailing (admin, 2025). The separate service tower is one of the most distinctive elements of the design as the service tower stands at 120 meters if you include the communications mast that sits on the service tower and just over 98 meters without the communication mast. The service tower was created to reduce the noise of the elevator and foot traffic that the residence may experience. The corridors every third floor are due to the service building and main residential building being separated, the towers are connected by every third story to reduce noise and foot traffic. Another stunning design feature that is very visible is the brush hammered concrete that was design in that manner to stay true to the designers preferred designing style of brutalist architectural design. Brutalist design is design that is true to the materials qualities the qualities are also visualised. Trellick tower was one of the biggest residential buildings at the time of its resurrection and therefore boast 217 residential buildings. The balconies and light that each house receives is also a notable design feature as every house boasts a balcony and large windows to allow for maximum amount of light to enter the houses. The plant room at the top of the service build is a room that is responsible for the heat of the residential building, it was place in the service building to maximize the space allocated for the residential area. The last notable feature is the interior detailing that the original designer commission other designer to design. The specially designed features include sliding doors; light switches built into door surrounds with varied layouts, so the rooms are not identical. So now that the design elements were highlighted the construction process can be highlighted. The primary frame of the building was built by poured into casts on site (Architectuul, n.d.). The concrete that was poured was reinforced with steel rebar. Although the exact foundation isn't known the speculated foundation used is cast-in-situ piles. The main building used slabs for the floor, and the finish was brush hammered concrete. The service building used small slabs to allow for the elevators to fit and was also finished with brush hammered concrete. These were the main notable touch points of the design and the construction process.

Question 2:

In question two we are tasked with analysing the framing material of the build we had chosen in part one. I had chosen Trellick tower in part one. Trellick Tower is a concrete framed build, therefore we have to analyse the concrete. It would be best to analyse the concrete in its strength durability and climatic resistance given the weather conditions. Trellick tower is a well-built building that has survived the harsh rain filled winters of the UK. This is due to the type of concrete mix used and the maintenance. Although the exact concrete mix used was not publicised the most likely ratio used would have been 1:2:4 in terms of cement, aggregate and water. It would have been the most used type of concrete from the 1960s to the 1970s (demoadmin, 2024). This type of concrete is durable in the rain if maintenance is continued and the curing process is fast and bubbles within the mixture are easily removed with compaction therefore making the whole structure more durable. This type of concrete is often considered moderate strength concrete however with the rebar within the concrete reinforcing the concrete the concrete remains durable and strong.

Another factor to consider about the framing material is the time, and cost of the project due to the framing material. The time and cost of Trellick Tower were mainly based around the framing material as the framing was cast in place and this process was extremely labour intensive and time intensive. The project took 4 years to complete and had a total cost of 2.4 million pounds. If we were comparing this budget to a budget for a steel framed tower of the same period, the period that it would have taken to build a similar sized would have been shorter as the build would not have to wait on the curing process of the concrete thereby shortening the process however the cost would have been a lot more due to the price of steel being a lot larger than the price of concrete.

When analysing the framing, the ease of assembly and the potential adaption of its shape is something that should be considered. The frame for Trellick Tower was poured and cast on site with no pre-cast concrete in the build this meant that assembly was complicated as each layer had to set before more concrete could be added to the build and therefore the process was very time consuming. This means that potential adaptation of the building would be difficult as the shape has been cast in place and therefore any shape changes would affect the whole frame structure and potentially make the building less stable.

Another problem when analysing the frame is the integration of the services provisions this process was seamless as there was a separate team of designers that design the water, heat and lighting systems to effortlessly fit into the empty frame of the building. The services building next to the main residential building was also used exclusively for services provisions therefore making the integration of these services even more seamless.

The last thing that needs to be considered is the potential problems that come along with the potential demolition at the end of the building's life cycle. The concrete frame is very thick and very large so traditional wrecking balls would not work for the

demolition process and since the frame was cast in place the building cannot be systematically dismantled therefore the only option would be strategically implosion inwards. The implosion would have to be sectioned as to not cause any damage to the surrounding area as Trellick tower is in the middle of the city. These were the issues to be analysed.

Question 3:

The task in question 3 is to discuss the negative impact of the concrete production process in terms of the community and the environment. The concrete production process consists of 6 main steps, these steps include batching, mixing, transporting, placing, compaction and finally curing (Standard Materials Group, 2024). Batching is the process of measure the cement, aggregate and water needed for the concrete mix. These components need to be measured exactly to the desired specification during the batching phase. During the mixing phase the previously measured components are mixing in mixers by hand or by mechanical process to achieve the correct consistency. The transporting phase is when the mixture is transported from the mixers to a transporting truck and is then delivered to site and unloaded. The placing phase is when the concrete is poured wherever it is needed on site. The compaction phase is when the concrete is stamped down to remove any air bubbles to and prevent any internal flaws. The final phase is when the concrete is allowed to cure and harden and thus producing the final product. Before this entire process starts the raw materials needed for this process are excavated from quarries and mines so they are ready to be introduced to this process. These processes cause many negative impacts to the community and environment. One of these negative impacts include greenhouse gas emission and an example from this process is the decomposition of limestone which is a major component of cement. When limestone is excavated and processed this process emits a lot of carbon dioxide, accounting for 8% for total carbon emissions worldwide (Standard Materials Group, 2024). The process of digging quarries that can produce enough raw materials to complete the concrete production process requires large amount of land to be cleared, this causes loss of habitat for many local animals. The same processes produce

a lot of chemical waste that is detrimental to the environment by physically harming the environment through eutrophication and similar such processes. The concrete production process all negatively impacts the community and one of the ways it impacts this is by causing large levels of noise pollution through the mining process for the raw materials and as well in the batching phase this thereby disturbing people's day to day life. The other way the concrete production process effects the community is when cured concrete traps heat and causes it's surrounding to overheat; in cities this process effects the day to day lives of many people by creating a large amount of heat that makes people uncomfortable. These were the main negative impacts cause by the concrete production process.

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