

King Kong enjoys climbing the real Empire State Building in New York City to relax after a long shoot, but prefers to spend summers in temperate San Francisco. San Francisco plans to build a to-scale Lincoln Log replica of The Empire State Building as a thank you for King Kong's many years of B-Movie service. They want you to figure out how many Lincoln Logs it would take. Describe each step in your thought process.

So! We're going to build a replica of the Empire State Building! There are a few ways to think about this and we'll take a look at a few of 'em. But before we do, let's put down some basic information about the target structure, the Empire State, and our materials. Good old Lincoln logs.

First some basic stats. The Empire State building stands 1454 feet from base to antenna with the 102 floor Observatory at 1250 ft. At its base it sits on 79,288 square feet. With an astonishing 2.7 million square feet of usable office space. Crazy! Volume wise, the building occupies 37 million cubic feet.

Lincoln logs, on the other hand, come in a few different shapes and sizes. Since we're looking at building something rather big, we're going to focus on the larger 10 1/2 inch size. Almost a foot, but not quite. Each one of these has four notches in them. Best way to stack them is with the smaller, single notched, pieces for stability between levels.

So let's start simple. Just to set up a base for our grand tower to sit on, we'll take the square root of our base area which results in 281.58 ft for one side of a square tower. Next, we can either convert the measurement into inches for the logs. Or the logs into units of feet so that we can compare them. Each of our large logs ends up being .875 feet in length. So end to end, it would take roughly 321.81 logs. To bridge that lil gap we'll round it up one to account for using a smaller log to bridge that lil gap. So 322 logs... For one side. Makes it 1,288 to make a square base. Great! But at only 3/4 inches tall, we still have a long way to go. Adding in the small one notch support bumps up our total by roughly 4 for each piece. Once we add those, we get to 5152 total. For our small base.

The simplest solution we just build up from the base, making a huge rectangle of a building. So at 1454 ft total, it ends up at 17,448 inches. So with a base height of .75 inches we'll need a total of 23,264 levels of our base to build the rectangle facade. Multiply that by the number of pieces used for each level... And we end up with 119,856,128. Plus we won't need those single notch pieces for our top. So let's just remove 3864 pieces. That leaves us with 119,852,264 to total our Empire State rectangle... With no roof. Let's fill in our roof with some levitating logs for grins.

To fill out the base roof we'll have to take our 3/4 in blocks and extend them out across the 281.58 ft length. We already know that one leg takes about 322 logs. So, taking our inch measurement, changing it to a measurement of .0625 ft, and dividing it by 281.58, we end up needing exactly 4500 full legs to get back cross. So let's then multiply that by our number of side and it would take 1,449,000 to make a full floor in our square tower. Minus the sides we're already accounting for brings us to 1,448,356 to add in a roof.

Bringing our grand total off...! Approximately 121,300,620 Lincoln Logs to build a square based building to the same height of the Empire State Building. Complete with a roof to keep pigeons out. We can even add in the number need to build out the total number of floors in the building. Accounting up to the second observation deck on the 102nd floor, we would need an additional 147,732,312 logs for each floor (including the first). Bringing our grand total up to 269,032,932 logs.

Obviously, if we wanted to recreate the exact facade of the building we're going to trim down on that number. But build it back up with the necessary supports for each floor. But that starts getting into some hard core engineering with stability and wind in mind. And that's a bit above my pay grade at the moment.

Lets look at volume next. We have the exact amount of cubic space that the building occupies, 37 million cubic feet. Looking at our large logs we can determine that it takes up roughly 5.90625 cubic inches. Or 0.4921875 cubic feet. Pretty easy from this point, we just divide our total volume by our material volume and we end up with 75,174,603.175. Again, we'll round up to account for a smaller piece being used to fill that lil gap. So for pure pile of Lincoln Logs to fill the space our grand total comes to 75,174,604.

Granted, this is going to just be packed full of Lincoln Log with no thought to stability. Nor any floor space for people to occupy. But I imagine it'll make for a fun one to smash should he get a little moody. It's interesting just how smaller the number is compared to the basic build that at least gives some thought to stability with building out the walls. Of course, in this case most strong winds in San Fran will end up blowing over either build. But, a fictional building for a fictional movie character!