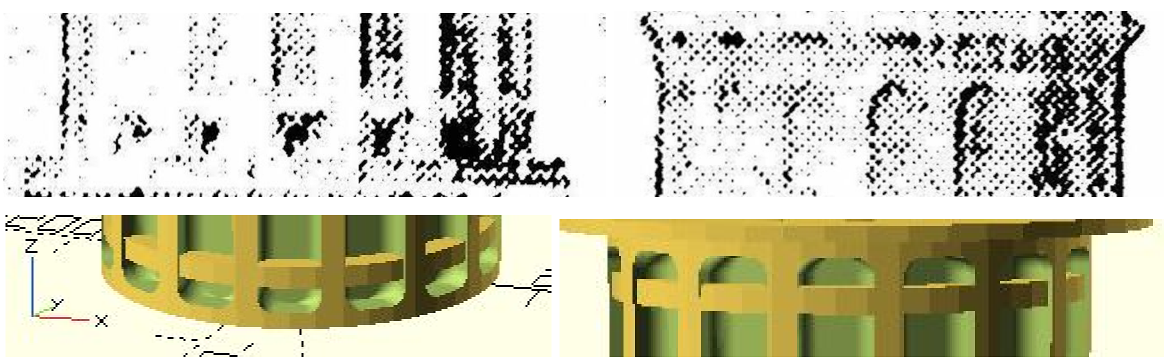
For the main, central column, I measured 377 x 910 pixels. As such, I'm estimating the radius as 189 pixels. As such, the height to radius ratio should be roughly 4.81. While prototyping, I used relative dimensions. With a radius of 160 (default unit is mm, but I'm not doing this to scale) that I already have, a height of 770 mm is logical and in line with this pixel-counting, which is what I will be using.

```
/*
    AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
                        CODE OF PERTINENCE TO SECTION A
    AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
*/
    sectionARadius = 160;
    sectionAHeight = 758;

```

Looking at the top and bottom, it seems reasonable to reason that the flutes are rounded here, so I use a geometric addition called a minkowski sum to round off the tops of each flute. I did my best to replicate the rounding, although it's a bit unclear how the rounding is done—I think the sum was more or less accurate, though. In addition, the amount of rounding left at the top versus

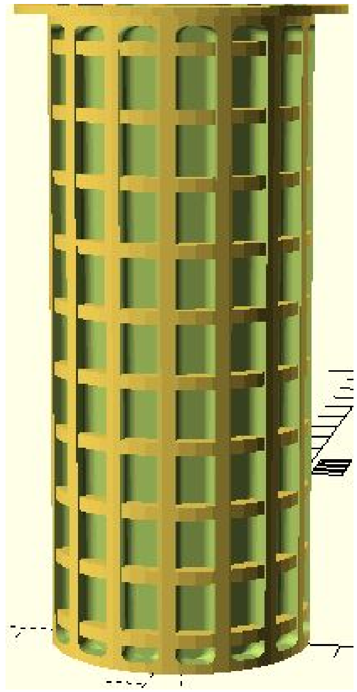
This is a potential point of ambiguity that the drawings do not shed a lot of light on, but I did my best to make them accurate.

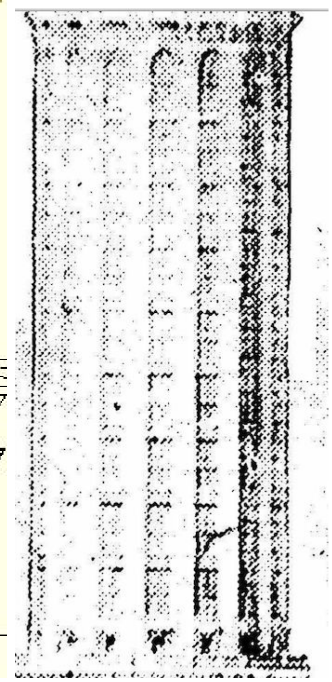


I counted about 19 pixels for each band which, relative to the height of 910 pixels, there should be a ratio of 47.9 pixels of height for each height of band width. As such, with my height of 770 mm, I will be using a height of 16 mm for each band. In addition, I counted 7ish flutes on the front, so, assuming it wraps around the back as well, put 15 flutes on the column.

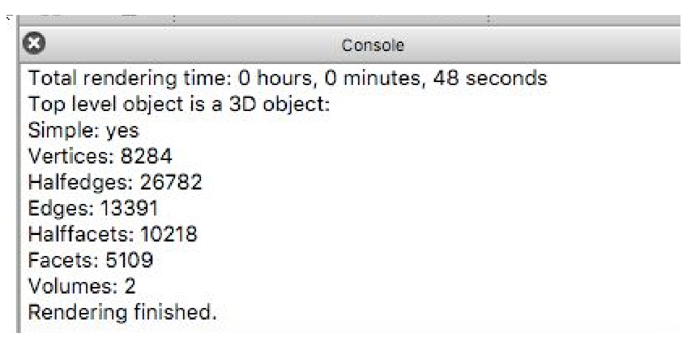
I counted 10 bands, so I'm using that for the number of bands on the column, and the bands will be evenly spaced. I did my best to arrange the the bands relative to the top correctly, by moving it down/up from the top/bottom by half of how each of the other bands was spaced. This felt like a reasonable way of going about this—it doesn't look perfect, but the ambiguity of the drawings makes it seem like this is a fairly reasonable leap.

As such, here is my rendering of the entire main base:

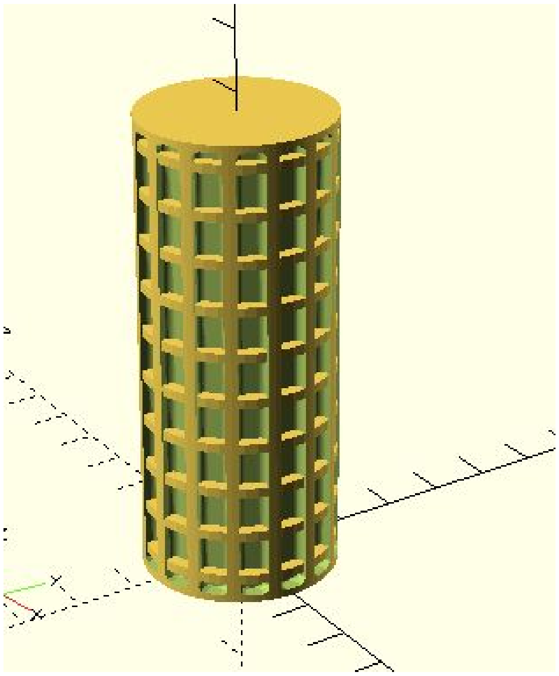


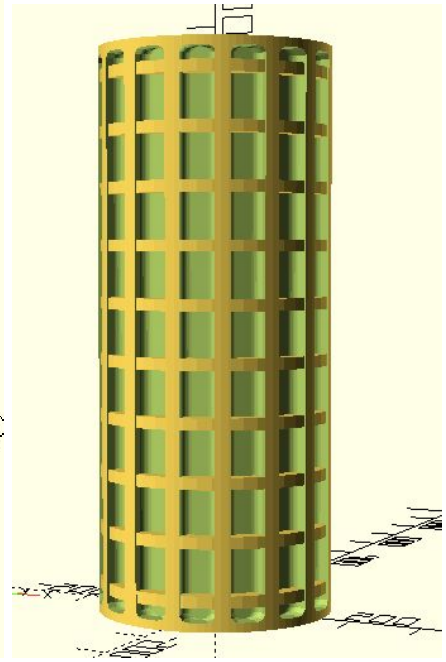


The program I used allows me to specify how many “sides” there are per circular bit—this is to say, how circular it is. For example, a circle of six sides would be a hexagon, a circle of eight sides would be an octagon. A circle with unlimited sides is an actual circle. Much to the chagrin of my low powered MacBook Air, I rendered the rounding on the top of the flutes with 10 sides, the rounding of the flutes themselves with 30 sides, each ring with 50 sides, and the large column with 100 sides (!!!) . While the 30 sides mean that there is a small amount of pointiness in the cylinders, because of the small size of the print, it shouldn’t be visible. My computer struggled with this, especially because of the minkowski sums on the top of the flutes. Check out how much geometry is here!

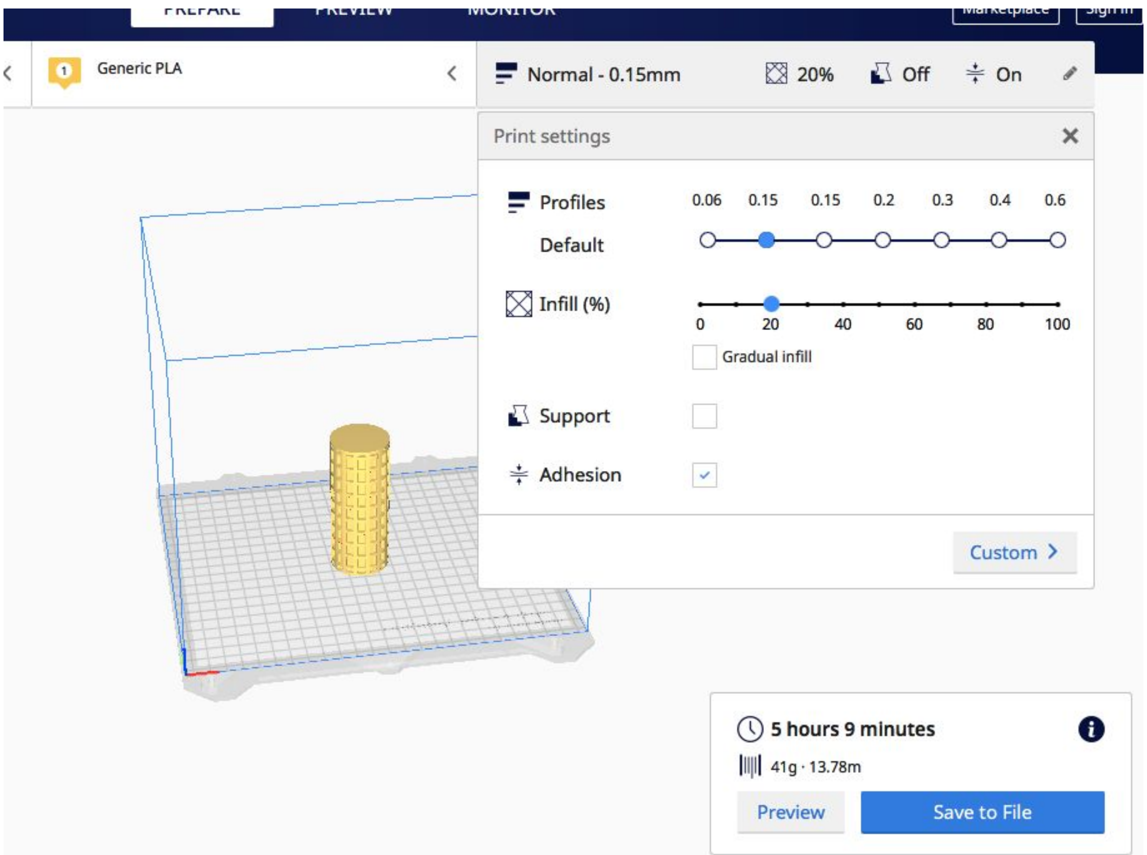


Here was the final render of this piece:

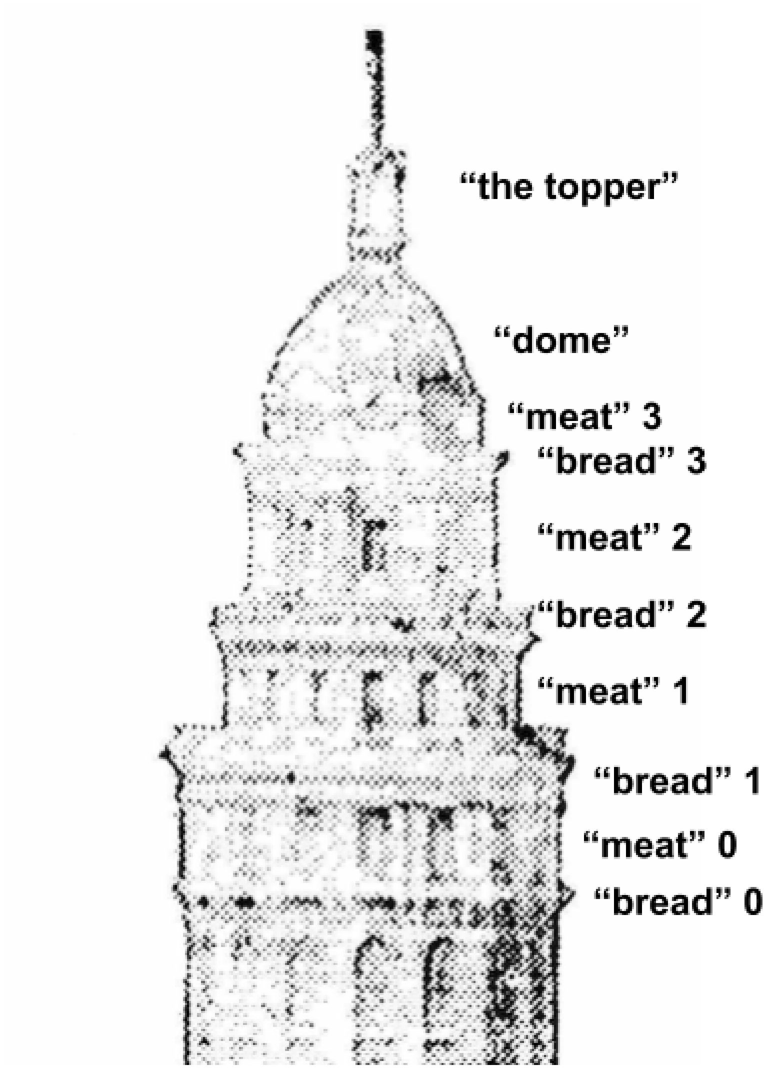




Here it is being sliced for the 3D printer:

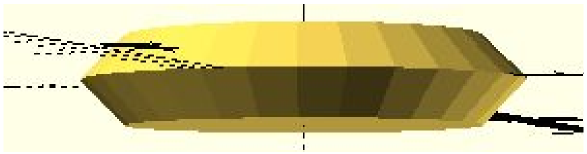
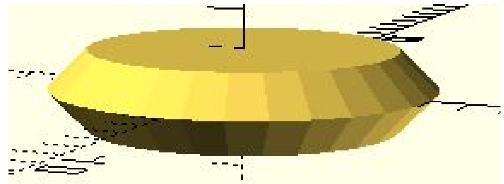


There are three levels on top that I call “cake toppers” in my code because they approximate layers of a wedding cake. Heres what it looks like in the drawing, including the top part of the main collumn:



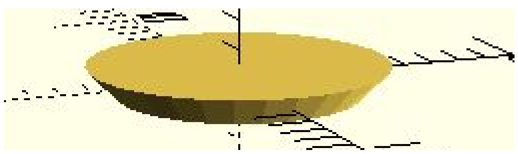
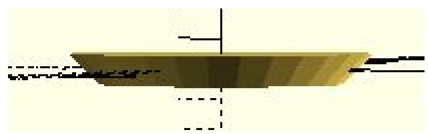
It looks as if there are rounded horizontal rings that sandwich these layers. Given Raymond Hood’s vocabulary, it would make sense if these three rings approximated the same shape. However, from what we can tell, they are inconsistent. I’m calling the middle layers “meat” and the bottom and top rings of each “bread,” and have labeled them above so I can efficiently reference them.

“Bread 1” looks like two sub sections of cones put together that get bigger as you go down. Something like this:

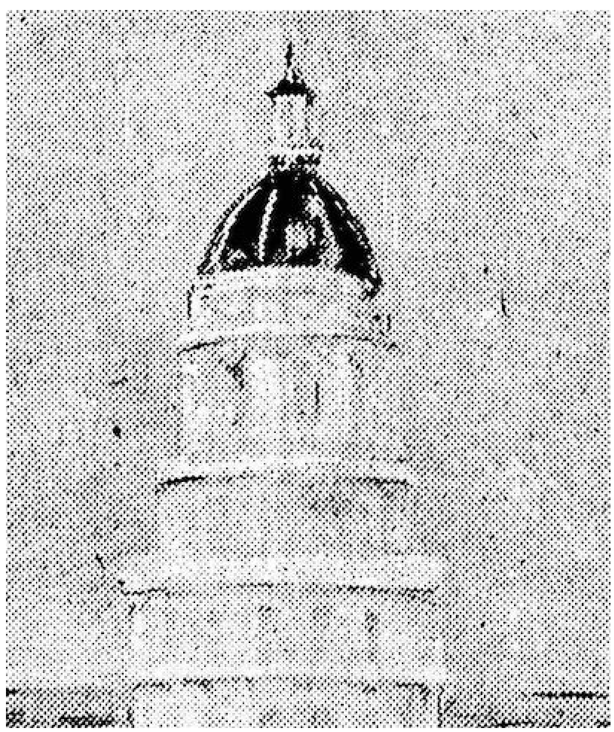



Bread 2 has a bulge in the middle but is confusing because there is an odd flat middle section that would seem inconsistent with this. Here’s a 3D sketch of what this might look like:


Bread 3 looks simply like one of these half cones upside down, like this:

The other main drawing of it does not add any more clarity, in fact muddying the story more.

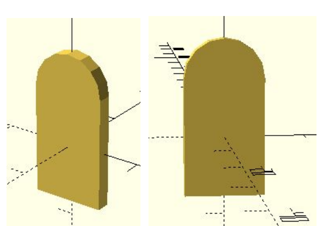


This looks like there are simply several unornamented, flat rings. While this does not properly square away with the drawing above, this is at least consistent with itself, which is why it will be what I am using. In addition, the rings are somewhat more visible.

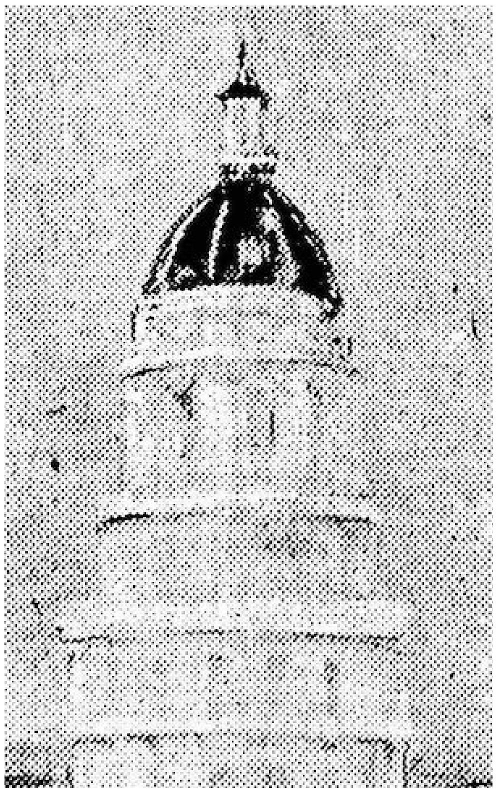
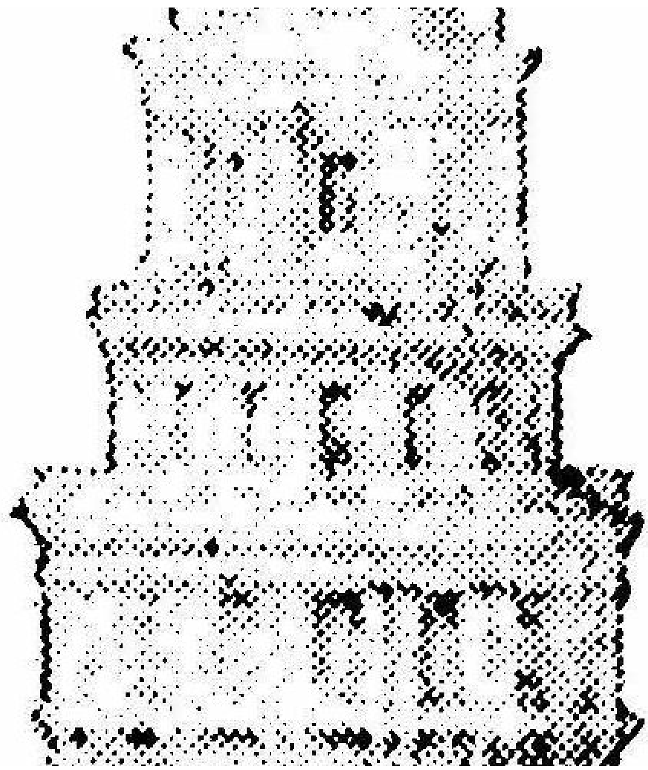
These cake toppers are quite confusing but, with my labeling, I looked at both the first drawing (the one straight on) and second drawing, counting the pixels of the diameters and heights of the main cylinder in the picture and comparing those to the diameters/heights of the rings and toppers. I calculated the ratios of these on both drawings, averaged the ratios, and then used those ratios with the radius and heights I'm using in the drawing to get a correct radius and height for each part of the topper. Calculations below:

	A	B	C	D	E	F	G	H	I
2		Drawing 1 Diameter	Feature Diameter (D1)	D1 Radius : Feature Ratio	Drawing 2 Diameter	Feature Diameter (D2)	D2 Radius : Feature Ratio	Average Ratio	
3	Bread 0	374	401	0.9326683292	426	434	0.9815668203	0.9571175747	167.1685948
4	Meat 0	374	383	0.9765013055	426	439	0.9703872437	0.9734442746	164.3648272
5	Bread 1	374	416	0.8990384615	426	444	0.9594594595	0.9292489605	172.1820597
6	Meat 1	374	380	0.9842105263	426	429	0.993006993	0.9886087597	161.8435993
7	Bread 2	374	332	1.126506024	426	358	1.189944134	1.158225079	138.1424068
8	Meat 2	374	248	1.508064516	426	350	1.217142857	1.362603687	117.4222568
9	Bread 3	374	276	1.355072464	426	293	1.453924915	1.404498689	113.9196506
10	Meat 3	374	221	1.692307692	426	272	1.566176471	1.629242081	98.20517271
11									
12									
13									Section A Height = 770
14		Drawing 1 Height	Feature Height (D1)	D1 Feature : Height Ratio	Drawing 2 Height	Feature Height (D2)	D2 Feature : Height Ratio	Average Ratio	
15	Bread 0	904	38	23.78947368	378	29	13.03448276	18.41197822	41.82060128
16	Meat 0	904	77	11.74025974	378	89	4.247191011	7.993725376	96.32555083
17	Bread 1	904	50	18.08	378	20	18.9	18.49	41.64413196
18	Meat 1	904	77	11.74025974	378	102	3.705882353	7.723071047	99.70127108
19	Bread 2	904	57	15.85964912	378	38	9.947368421	12.90350877	59.67369137
20	Meat 2	904	76	11.89473684	378	154	2.454545455	7.174641148	107.3224408
21	Bread 3	904	47	19.23404255	378	26	14.53846154	16.88625205	45.59922462
22	Meat 3	904	108	8.37037037	378	54	7	7.685185185	100.1927711

When looking at the drawings for both of these, it is difficult to see what is in the actual "bread" of the layers, although there appear to be cutouts surrounding the middles. It is difficult to tell whether the cutouts are rectangles or "kickboard" shapes. When I refer to kickboard from here forward, this is what I mean:



Here are the parts of the drawings which I am referring to:

Since I did this all in code, it was nice because I could simply write one method which would generate this for all four levels. I essentially could just plug in the values that I calculated above in to get the dimensions right. Here's all of my inputted values:

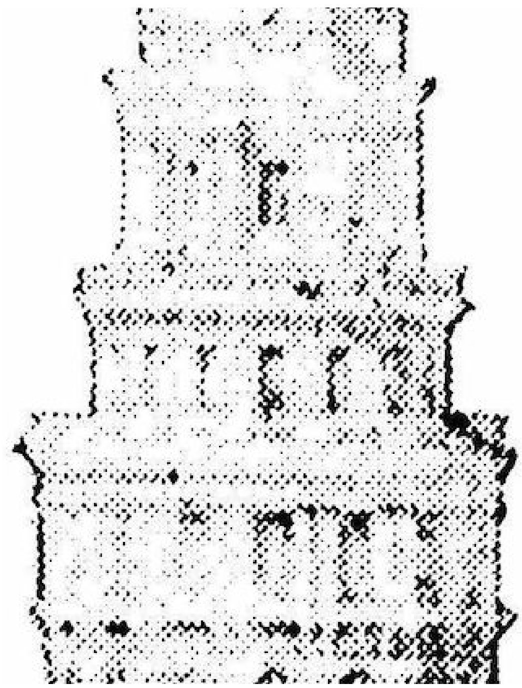
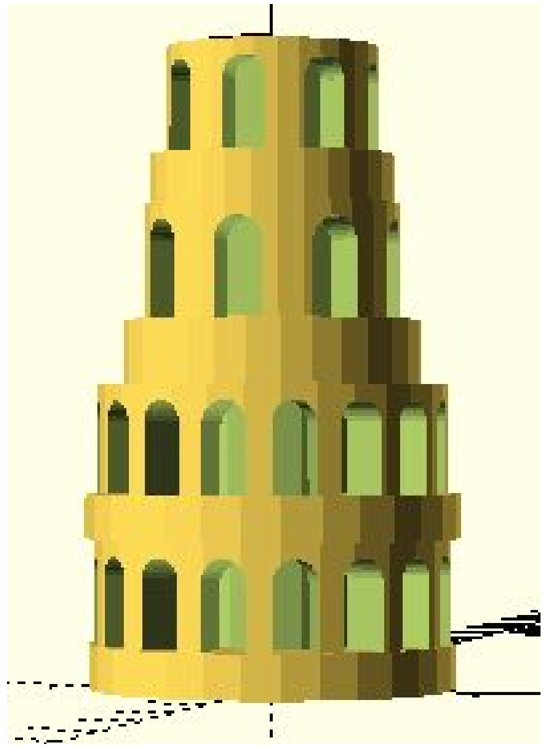
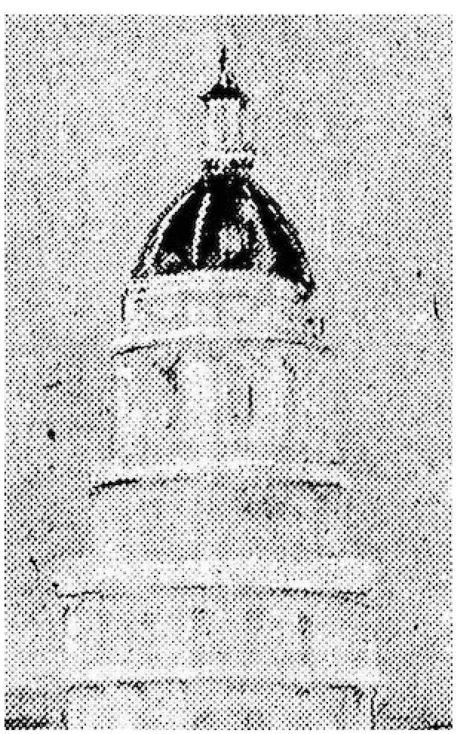
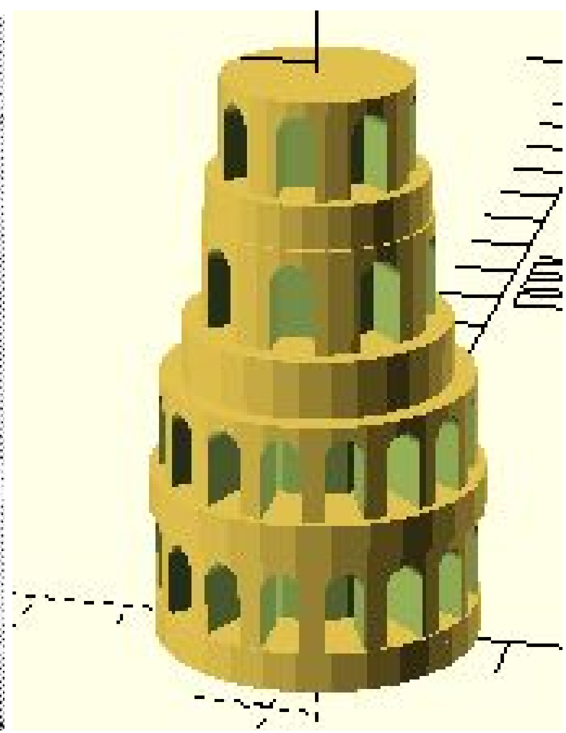
```
//level 0
numberOfBoardsLevel0 = 16;
kickboardWidthLevel0 = 40;

bread0Radius = 167;
bread0Height = 41;
meat0Radius = 164;
meat0Height = 96;

//level 1

numberOfBoardsLevel1 = 16;
kickboardWidthLevel1 = 40;

bread1Radius = 172;
bread1Height = 41;
meat1Radius = 161;
meat1Height = 99;

//level 2

numberOfBoardsLevel2 = 8;
kickboardWidthLevel2 = 45;

bread2Radius = 138;
bread2Height = 59;
meat2Radius = 117;
meat2Height = 107;

//level 3

numberOfBoardsLevel3 = 6;
kickboardWidthLevel3 = 40;

bread3Radius = 113;
meat3Radius = 98;
bread3Height = 45;
meat3Height = 100;
```

My code actually looked quite nice because it was just repeating things and referencing variables from above (this is a short aside and will not make a lot of sense if you are not familiar with coding):

```
module sectionB() {
    rotate([0,0,0]) {
        createWindowedCylinder(
        numberOfBoardsLevel0,
        bread0Radius,
        bread0Height,
        meat0Radius,
        meat0Height,
        kickboardWidthLevel0,
        bread0Radius * sectionBWaferCut);
    }
    translate([0, 0, meat0Height + bread0Height]) {
        rotate([0, 0, 0]) {
            createWindowedCylinder(
                numberOfBoardsLevel1,
                bread1Radius,
                bread1Height,
                meat1Radius,
                meat1Height,
                kickboardWidthLevel1,
                bread1Radius * sectionBWaferCut);
        }
        translate([0,0,meat1Height + bread1Height]) {
            rotate([0,0,0]) {
                createWindowedCylinder(
                numberOfBoardsLevel2,
                bread2Radius,
                bread2Height,
                meat2Radius,
                meat2Height,
                kickboardWidthLevel2,
                bread2Radius * sectionBWaferCut);
            }
            translate([0,0,meat2Height + bread2Height]) {
                    rotate([0,0,0]) {
                        createWindowedCylinder(
                        numberOfBoardsLevel3,
                        bread3Radius,
                        bread3Height,
                        meat3Radius,
                        meat3Height,
                        kickboardWidthLevel3,
                        bread3Radius * sectionBWaferCut);
                }
            }
        }
    }
}
```

I did my best to count around and approximate how many of these little indentations there were on each and used approximations of the above calculated values for the levels.

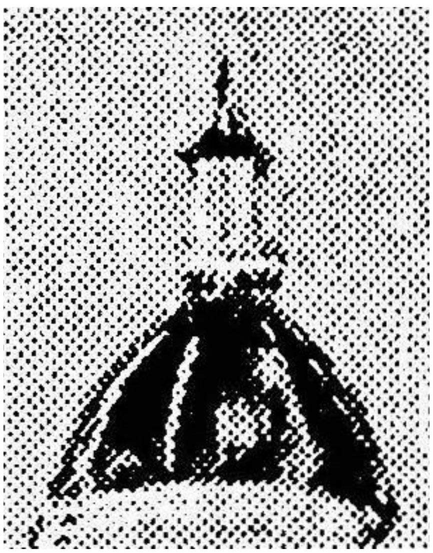
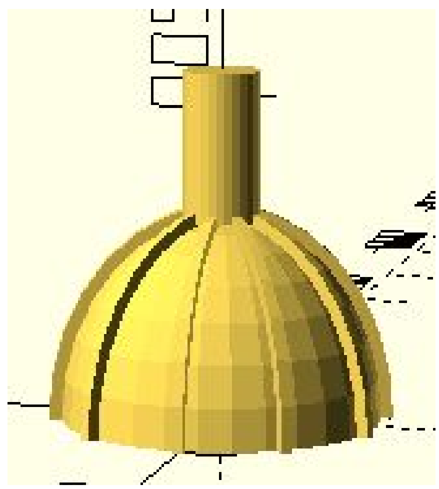
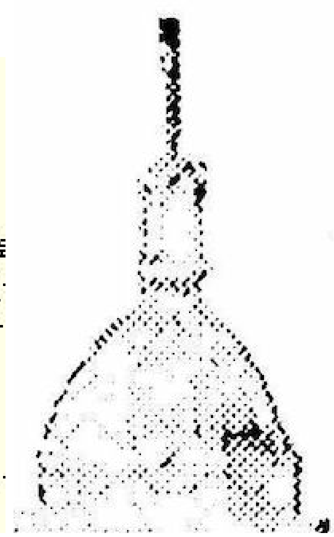
Here’s my version next to two drawings of the real:

On top of that, I added the topper. I assumed it was the top half of a sphere that was scaled to be larger vertically than a perfect square would be.

I kept the radius of the top "meat" because that seemed more important than keeping the (unreliable) pixel measuring ratios intact, but I did measure the ratio between the height of the dome and its radius roughly on the first drawing, which doesn't suffer from unreliability due to perspective because it is a straight on photo. I ended up with a ratio of 227 to 143 for diameter to height or about 113:143 for radius to diameter, meaning I scaled the radius by 1.27.

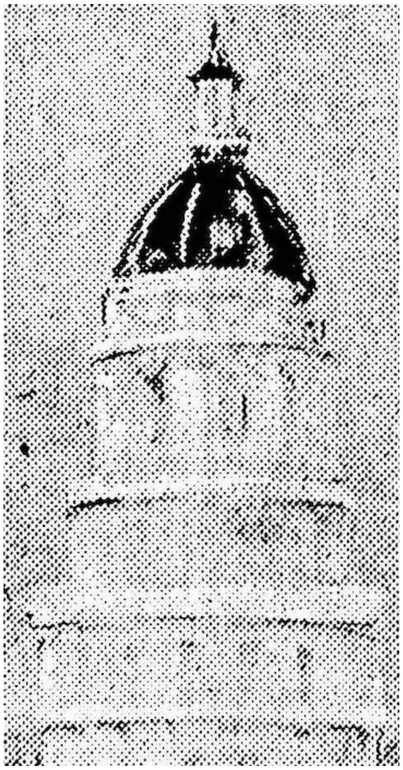
There are also rings surrounding the dome—in the second drawing, they are about 8 pixels wide, while the dome's diameter is about 247. I applied this ratio to the sizing, about a 1:15 ratio of radius to the rings. I counted five-ish rings on the front so I did 10 rings surrounding it.

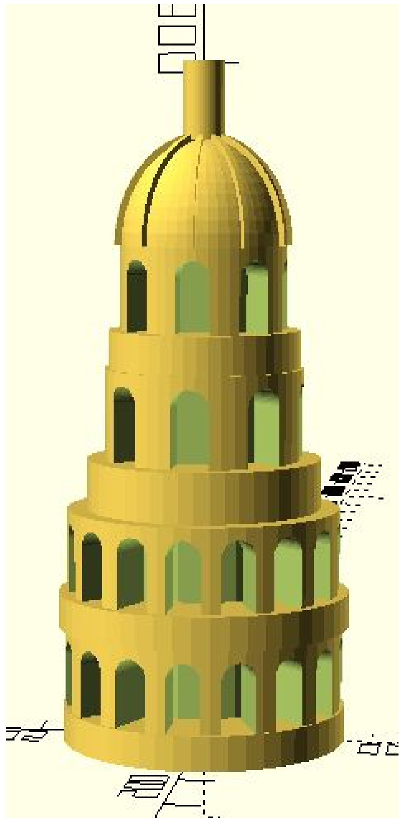




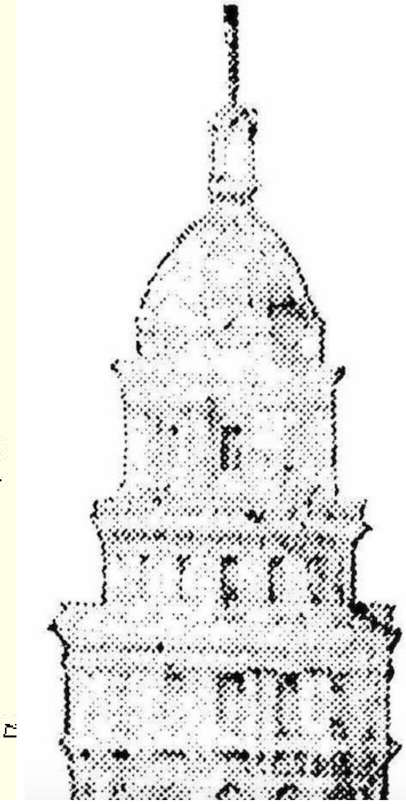
The pixels are about 114 for the radius of the dome and about 28 for the small portion. The small portion is also 107 pixels tall, which I scaled for.

The top part of the topper will not feasibly print, but I used relative point for the smaller part of the topper to get it. Above is the toppers versus mine.

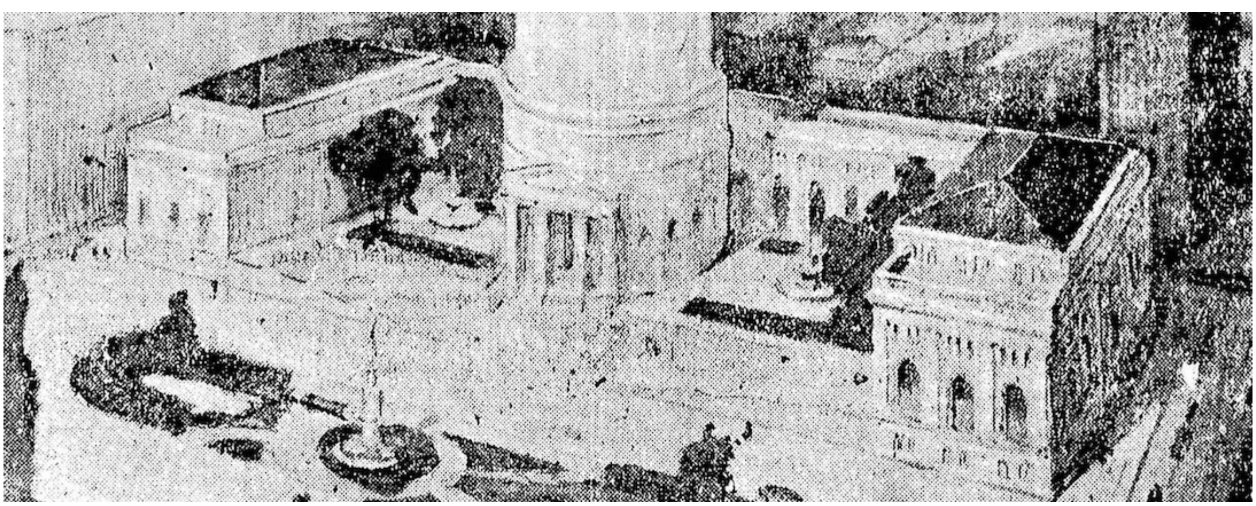
I'll note that this section is the longest because it is one of the most complicated bits AND because I think it is where I stray furthest away from the original in spite of trying ABSURDLY hard to be faithful to the dimensions and ornamentation. There is a shocking amount that is unresolved and that conflicts in the drawings so I did my best to make the fewest artistic leaps and justify all of the choices I made in addition to all of the pixel counting. All that said, below is the final render of this section next to the two versions from the drawing.

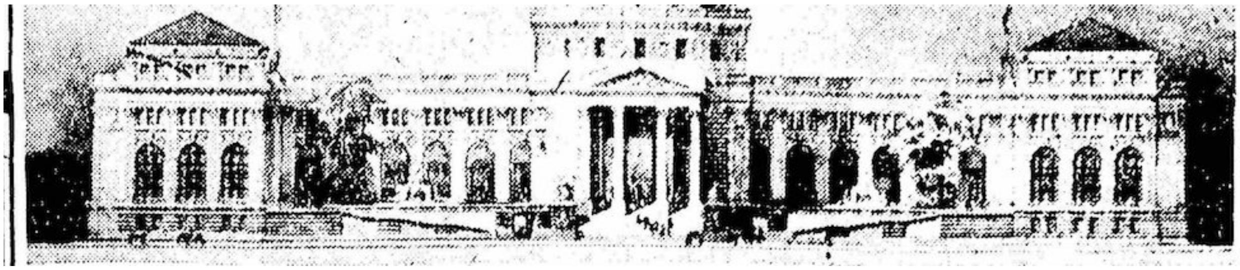






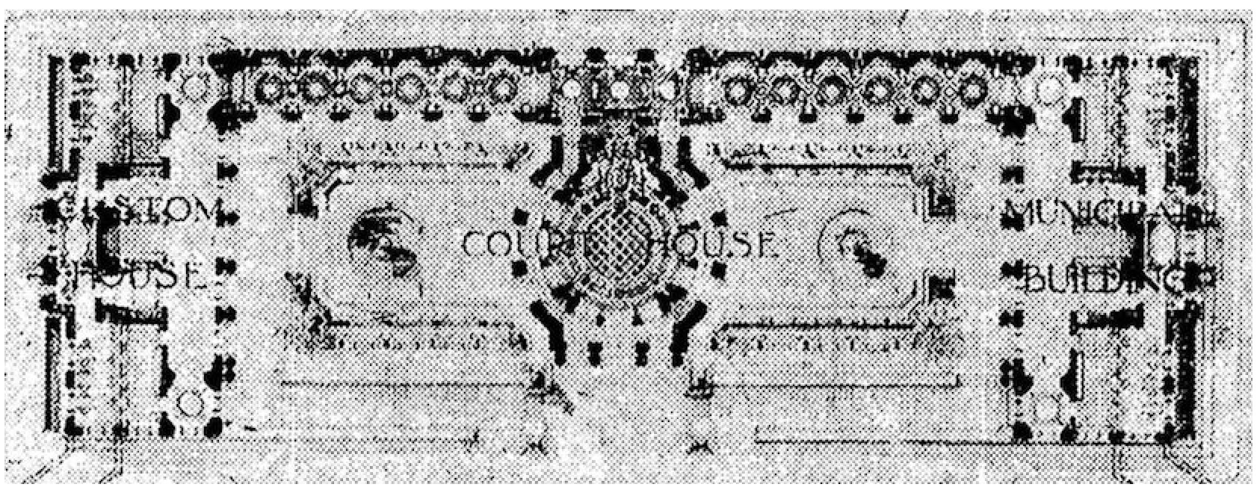
Perhaps the next most difficult part of this project was the whole section (looks like a closed arcade) below the tower. Here is what it looks like:



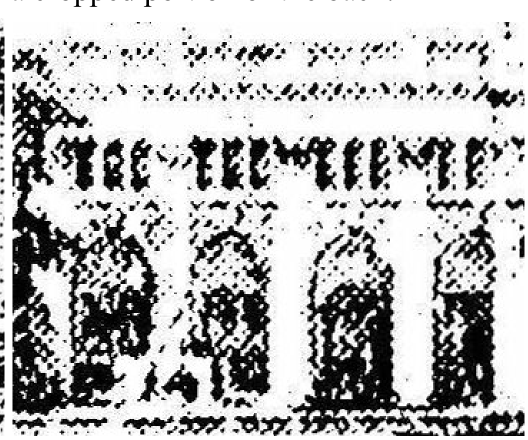


Here's a few of my takeaways from these photos:

The back part essentially forms a C with the front two bits around the tower, as we can see from an alternate view of it. The arcade doesn't intersect with the central piece, this is to say.



This is a repeating pattern—above each arch (each arch having a kickboard on it) there are three little circular windows. There is also a small edge above the three windows-section. Because both the back section and the two little bits up toward the front are connected, we can assume they more or less use the same architectural vocabulary and have the same dimensions. On the left is one of the side bits, and on the right is a cropped portion of the back.

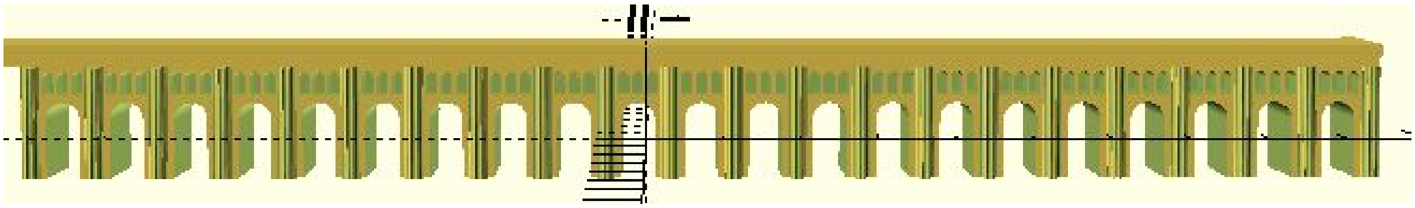
Because of the use of fluted columns throughout the project, we can assume that each of the divisions in these windows is a fluted column, and because this was a plan for Providence which gets quite cold, it is unlikely an open arcade.

In terms of pixel measuring:

- the inner portion (each ‘kickboard’ window) is 59 x 147 pixels, with the actual window portion being 122 pixels tall.
- Each fluted column is 25 pixels in diameter or 12 pixels in radius.
- The top windows are 15 pixels x 35 pixels. There are three of them.
- There are about 23 pixels of vertical space above the windows.
- The overhang appears to be about 25 pixels high.
- The windows ABOVE on the side pieces are only two per section and are about the same dimensions as those below it.

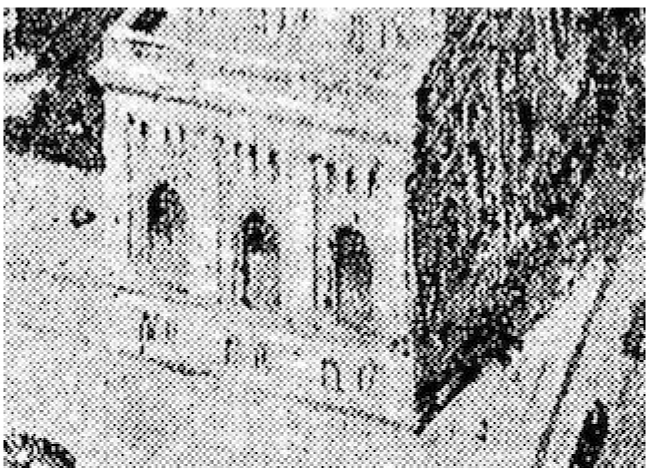
My pixels ended up being almost the exact size as the dimensions I had for this in the program, so I plugged them in and ended up with this module which I could easily copy elsewhere. I actually think it looks quite accurate considering how low the resolution of the scans are and how much had to be assumed here.

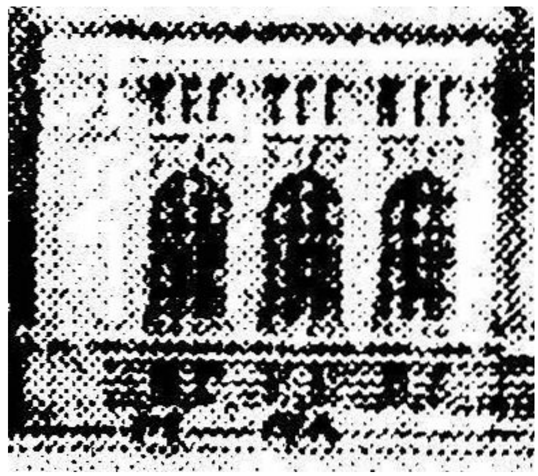
I made a module to deal with this so that I could copy it over for the back portion and the front portions. In looking at the aerial diagram above, we can clearly count six windowed bits on each side (not counting the side portions, each of which has three) in addition to three in the middle. As such, including the side bits, we’d have a total of 21.



Here is what the back section looks like.

Regarding the bottom section, the two drawings once again disagree. Here are how both are depicted:

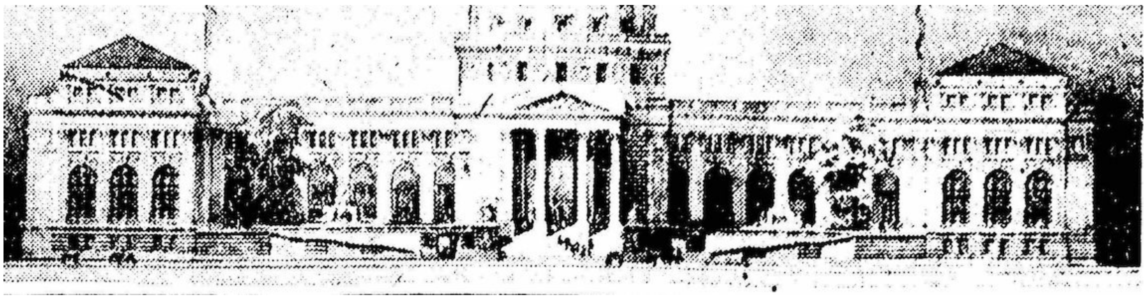


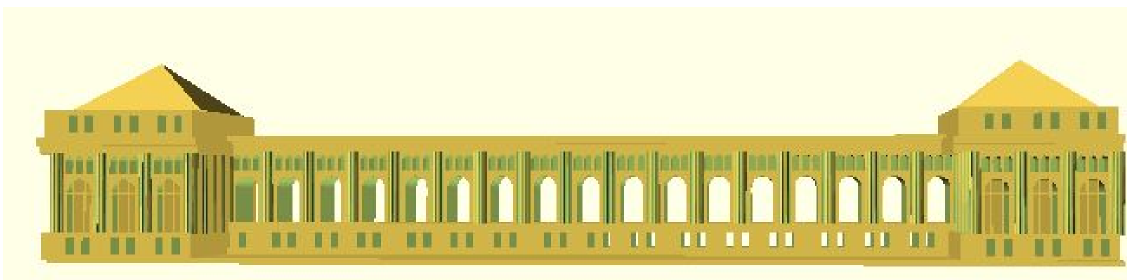


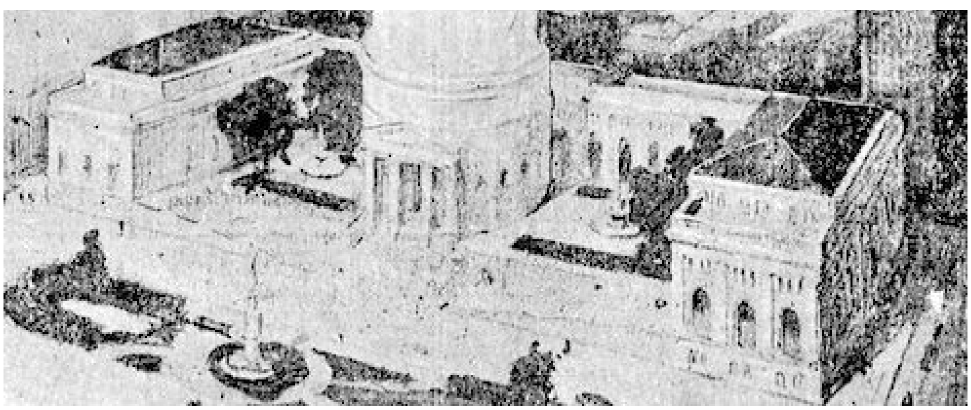
The left version makes it appear that there is a foundation below it that has small “kickboard” shape openings, where the version on the left makes it appear that there are capitals for the columns under it. Because both drawings hold essentially equal weight here, I chose to follow in the spirit of the left drawing, adding a foundation with small holes below. I think this makes sense firstly because there do not appear to be capitals elsewhere in the building and, as a practical concern (because artistic concerns make this choice a tossup), the column version would mean a much less stable 3D print, compromising the model. Later in my research, I found this photo as well:

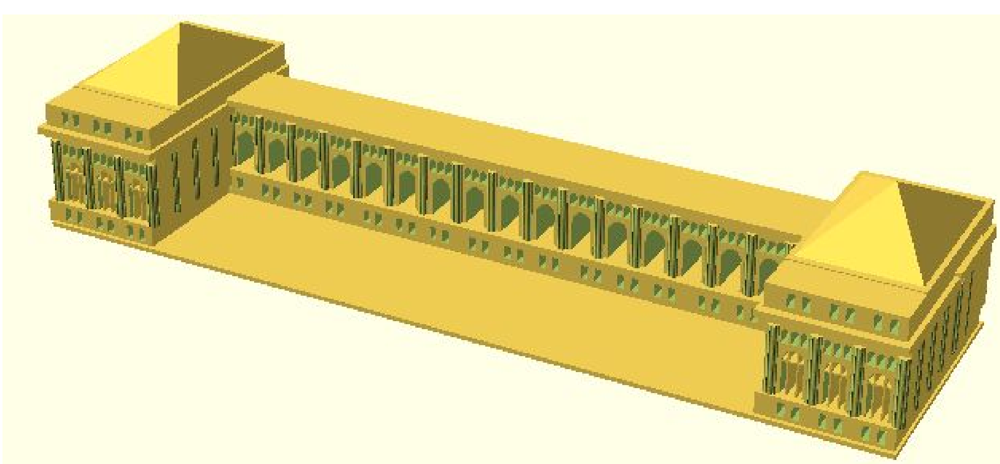
This depicts kickboard-style cutouts, so it is what I did.

If you look in the left picture, the cutouts are sort of clumped together in clusters and spread throughout more or less evenly. Because of the angle it would be almost impossible to count pixels here, but I think my estimations are pretty accurate. Here's some comparison photos.







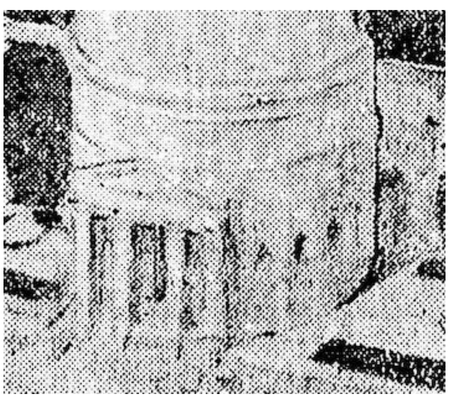
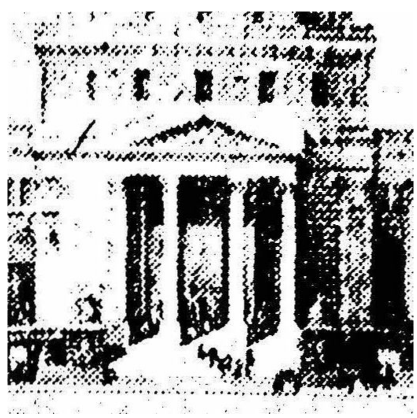


Obviously the middle part isn’t in here, but I think I did pretty well considering the lack of good pixel measurements. Note the lip on mine at the top that mirrors the lip shown by the shadow, although it is hard to see in my model).

It was interesting doing this part because, although there was much more about it that was ambiguous because I couldn’t get strong pixel counts (well, I got them for the individual bits, but for some of the specifics, the perspectives were off) and had to use a lot more creative license in terms of the shapes I used, it looks arguably more like the actual version than the other things.

Also, regarding what I suppose are balconies on the top of this, they would not print well, so I have left them out.

For the part that connects this bottom arcade and the tower above it:

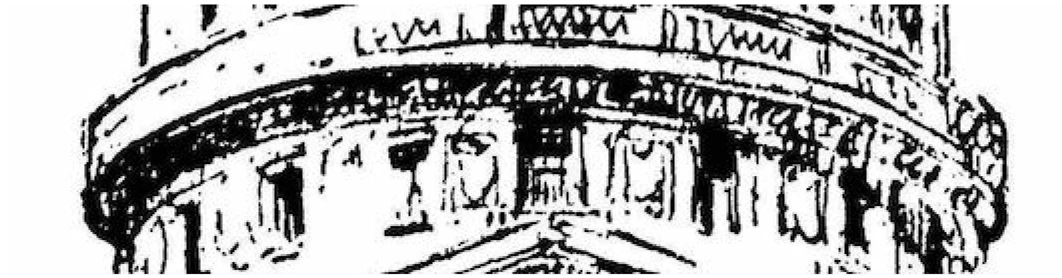




Evidently, we have a cylinder with some cutouts in it, a ring above it, and then this opening with four columns and a triangular roof that protrudes.

Using the central image, I measured the whole bottom part with a diameter of 417 pixels x 421 pixels tall, and the whole ring as 437 x 37 pixels. The part with the cutouts is 376 pixels from the bottom and 55 pixels thick. Scaling this to the size of my other variables:

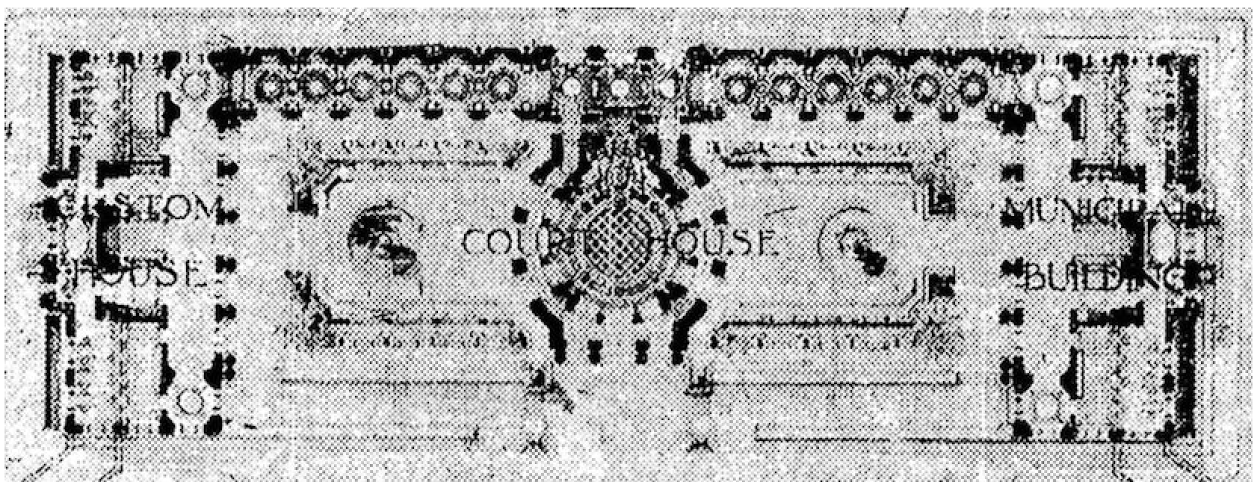
- Bottom part has a radius of 178 and a height of 359. The part with the cutouts makes up the top part, 23 pixels worth.
- The ring on top has a radius of 186 and a height of 32.

On closer inspection, these cutouts appear to be square, so I have modeled them as such.



In each of the above I can count about 7 cutouts, so I'm using 14 all around.

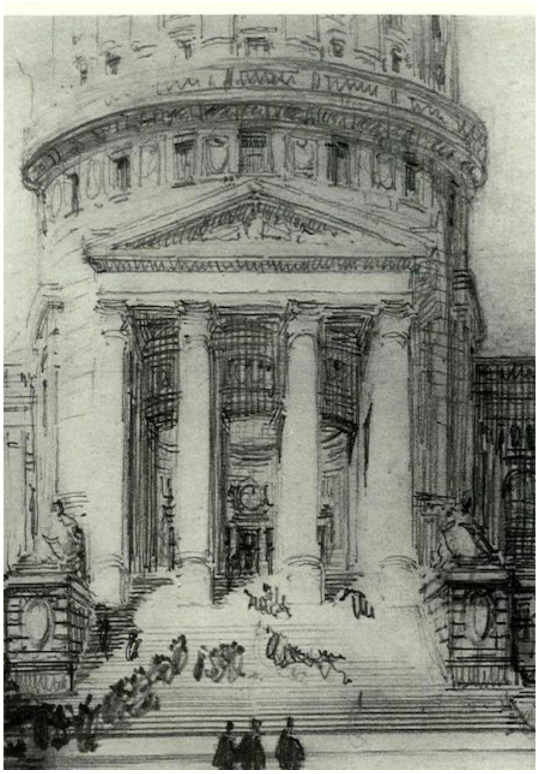
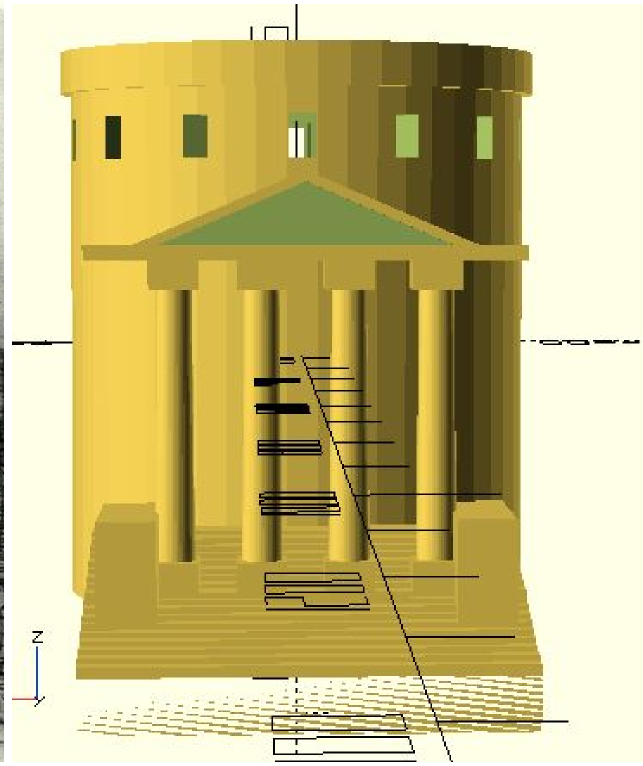
How the actual back portion (the arcade) connects to this base remains unresolved in the design.



This is the closest we have, but these square connector-type pieces do not shed much light on what is actually happening, so I am just leaving the two unconnected and putting the base in front of the arcade.

In counting the stairs, I estimated 18.

Because the only detailed drawings I had of this were quite stylized, I'll admit I took a lot of creative liberties with this one. I think I stayed quite faithful to the design—here's a comparison.

Anyways, because this was paper architecture I really struggled with getting the dimensions correct and hope I didn't take an unreasonable amount of leaps (or at least justified the leaps that I made). Thank you for reading all the way through this and for a great year—sorry my documentation was so long!