

# CONCRETE DESIGN STRUCTURE

## GENERAL INFO:

DESIGNING AND OFFICE BUILDING TO MEET THE NEEDS OF CORPORATE AMERICA IS WHAT CONVINCED ME TO DESIGN THIS STRUCTURE. ALTHOUGH I HAVE LITTLE TO NO DESIGN EXPERIENCE THE FOUNDATION AND SPIRIT WAS THERE. IN DESIGNING THIS STRUCTURE I EMPHASIZED SAFETY AND RELIABILITY.

DESIGN: OFFICE BUILDING

HEIGHT: 90 FEET, 7 STORY BUILDING

FLOOR SIZES: 1<sup>ST</sup> FLOOR LOBBY IS 20 FEET, REST OF FLOORS ARE 10 FEET

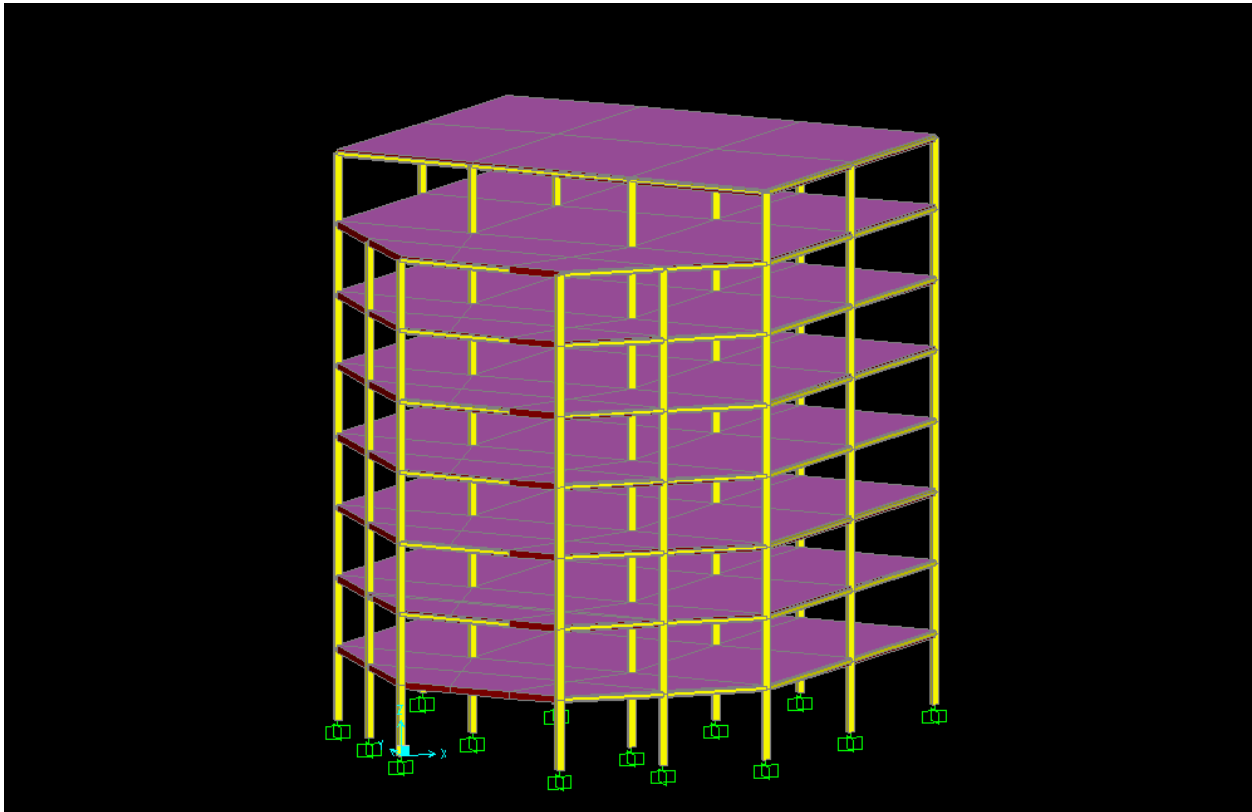
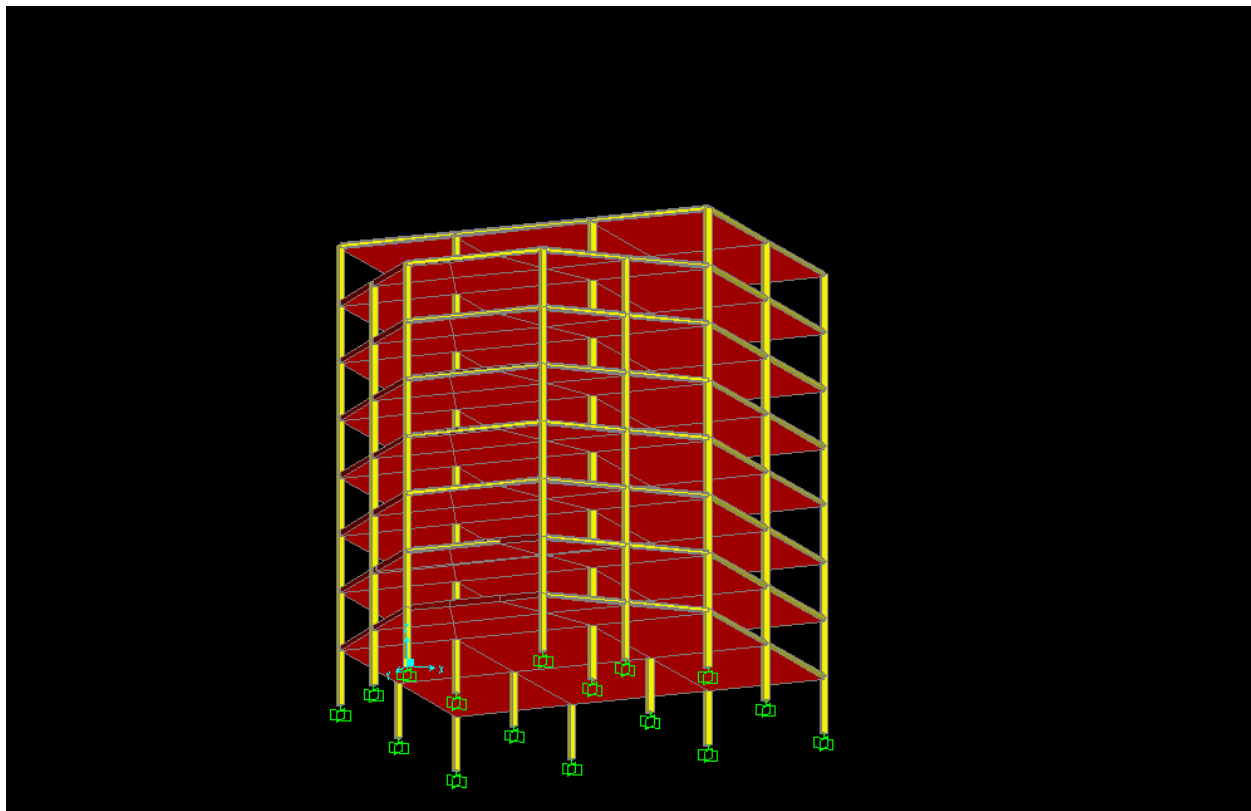


FIGURE 1. IMAGE OF CONCRETE DESIGN STRUCTURE.

## DESIGN CRITERIA

	Item	Value
1	Design Code	ACI 318-05/IBC 2003
2	Time History Design	Envelopes
3	Number of Interaction Curves	24
4	Number of Interaction Points	11
5	Consider Minimum Eccentricity	Yes
6	Seismic Design Category	D
7	Phi (Tension Controlled)	0.9
8	Phi (Compression Controlled Tied)	0.65
9	Phi (Compression Controlled Spiral)	0.7
10	Phi (Shear and/or Torsion)	0.75
11	Phi (Shear Seismic)	0.6
12	Phi (Joint Shear)	0.85
13	Pattern Live Load Factor	0.75
14	Utilization Factor Limit	0.95



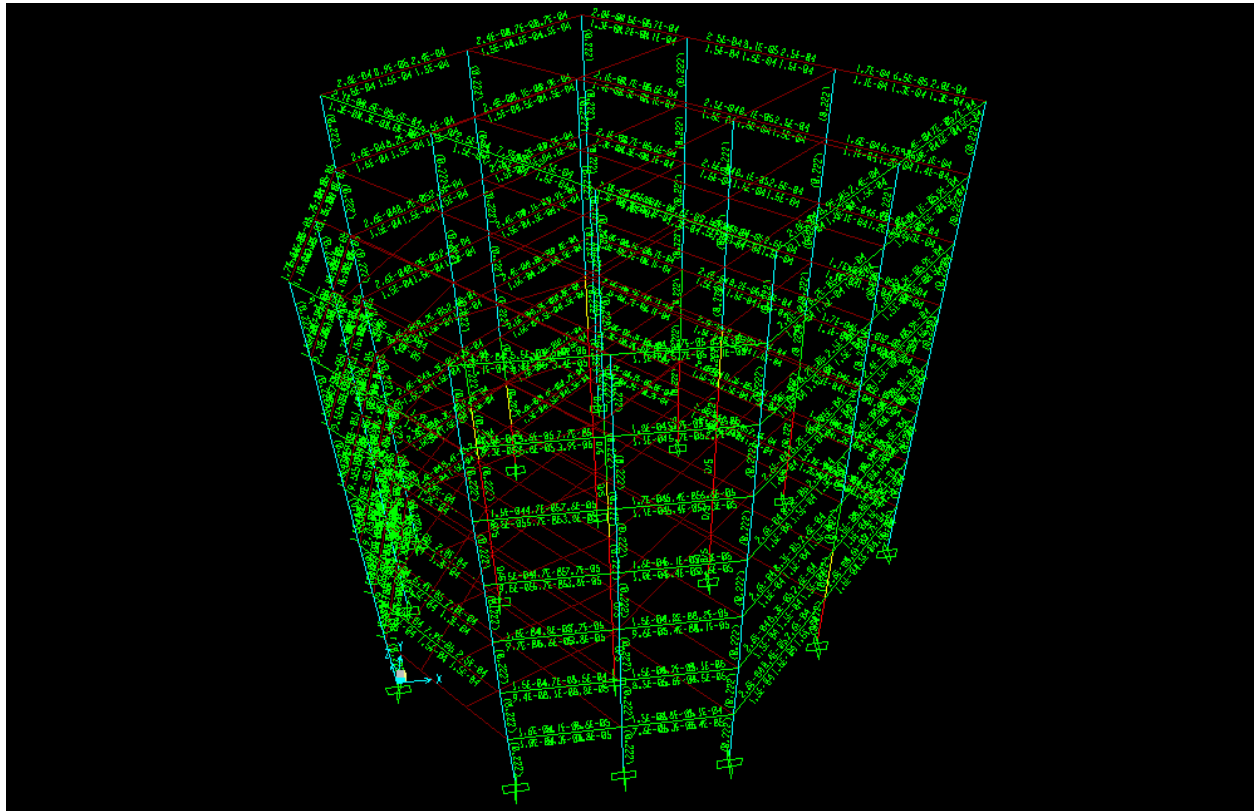
**FIGURE 2. IMAGE OF CONCRETE BUILDING.**

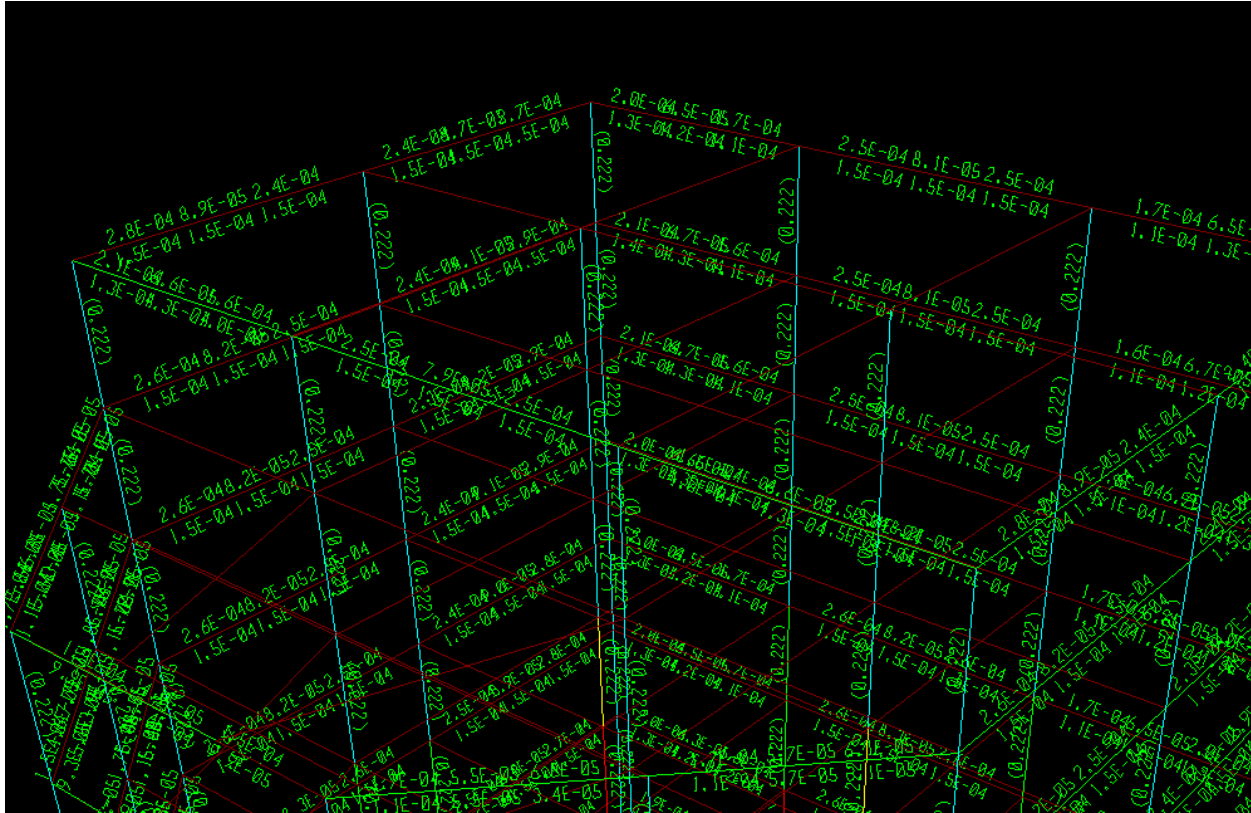
**DESIGN SPECIFICATIONS:**

**COLUMNS: 1 X 1 CONCRETE WITH 8 #8 REINFORCED STEEL BARS (CIRCULAR ORIENTATION)**

**BEAMS: 1/2 X 1/8 REINFORCED BEAMS**

**LOADS: THE LIVE LOAD FOR AN OFFICE BUILDING IS 80 PSF, DEPENDING ON WHETHER THERE ARE COMPUTERS AND OR FILE CABINETS. SINCE THERE WILL BE USE OF FILE CABINETS AND COMPUTERS THE APPLIED LIVE LOAD WAS SET TO 100 PSF FOR EACH FLOOR.**





THE DESIGN WAS MADE AS BEST AS POSSIBLE. WITH THE COLUMNS I WAS ABLE TO GET THE VALUES TO .222 WHICH IS REASONABLY CLOSE TO .8-.9. HOWEVER, THERE IS OVER DESIGN IN MY STRUCTURE, AFTER NUMEROUS TRIAL AND ERROR ITERATIONS .222 WAS THE CLOSEST I COULD GET WITHOUT HARMING MY STRUCTURE.

THE BEAMS WERE EVEN HARDER TO DESIGN. WITH THE BEAMS IT SEEMS THAT NO MATTER HOW SMALL OR HOW BIG I DESIGNED THEM THE VALUES JUST TENDED TO STAY WITHIN THE SAME RANGE. AGAIN, THIS IS AN OVER DESIGN PROBLEM THAT I DON'T EXACTLY KNOW HOW TO FIX. AS WITH THE COLUMN SELECTION, CONSTANT REDESIGNING OF THE BEAMS WAS DONE, UNFORTUNATELY THE VALUES REMAINED TOO SMALL.

**TABLE: ASSEMBLED JOINT MASSES**

<b>JOINT</b>	<b>U1</b>	<b>U2</b>	<b>U3</b>	<b>R1</b>	<b>R2</b>	<b>R3</b>
<b>TEXT</b>	<b>KIP-S2/FT</b>	<b>KIP-S2/FT</b>	<b>KIP-S2/FT</b>	<b>KIP-FT-S2</b>	<b>KIP-FT-S2</b>	<b>KIP-FT-S2</b>
1	0.91	0.91	0.91	0	0	0
2	0.15	0.15	0.15	0	0	0
3	0.16	0.16	0.16	0	0	0
4	0.16	0.16	0.16	0	0	0
5	0.27	0.27	0.27	0	0	0
6	0.91	0.91	0.91	0	0	0
7	0.67	0.67	0.67	0	0	0
8	0.41	0.41	0.41	0	0	0
9	0.17	0.17	0.17	0	0	0
10	0.91	0.91	0.91	0	0	0
11	1.29	1.29	1.29	0	0	0
12	0.67	0.67	0.67	0	0	0
13	1.4	1.4	1.4	0	0	0
14	1.4	1.4	1.4	0	0	0
15	0.67	0.67	0.67	0	0	0
16	1.29	1.29	1.29	0	0	0
17	0.91	0.91	0.91	0	0	0
18	0.41	0.41	0.41	0	0	0
19	0.17	0.17	0.17	0	0	0
20	0.17	0.17	0.17	0	0	0
21	0.41	0.41	0.41	0	0	0
22	0.91	0.91	0.91	0	0	0
23	1.29	1.29	1.29	0	0	0
24	0.67	0.67	0.67	0	0	0
25	1.4	1.4	1.4	0	0	0
26	1.4	1.4	1.4	0	0	0
27	0.67	0.67	0.67	0	0	0
28	1.29	1.29	1.29	0	0	0
29	0.91	0.91	0.91	0	0	0
30	0.41	0.41	0.41	0	0	0
31	0.17	0.17	0.17	0	0	0
32	0.17	0.17	0.17	0	0	0
33	0.41	0.41	0.41	0	0	0
34	0.91	0.91	0.91	0	0	0
35	1.29	1.29	1.29	0	0	0
36	0.67	0.67	0.67	0	0	0
37	1.4	1.4	1.4	0	0	0
38	1.4	1.4	1.4	0	0	0
39	0.67	0.67	0.67	0	0	0
40	1.29	1.29	1.29	0	0	0
41	0.91	0.91	0.91	0	0	0
42	0.41	0.41	0.41	0	0	0
43	0.17	0.17	0.17	0	0	0
44	0.17	0.17	0.17	0	0	0
45	0.41	0.41	0.41	0	0	0
46	0.91	0.91	0.91	0	0	0

47	1.29	1.29	1.29	0	0	0
48	0.67	0.67	0.67	0	0	0
49	1.4	1.4	1.4	0	0	0
50	1.4	1.4	1.4	0	0	0
51	0.67	0.67	0.67	0	0	0
52	1.29	1.29	1.29	0	0	0
53	0.91	0.91	0.91	0	0	0
54	0.41	0.41	0.41	0	0	0
55	0.17	0.17	0.17	0	0	0
56	0.17	0.17	0.17	0	0	0
57	0.41	0.41	0.41	0	0	0
58	0.91	0.91	0.91	0	0	0
59	1.29	1.29	1.29	0	0	0
60	0.67	0.67	0.67	0	0	0
61	1.4	1.4	1.4	0	0	0
62	1.4	1.4	1.4	0	0	0
63	0.67	0.67	0.67	0	0	0
64	1.29	1.29	1.29	0	0	0
65	0.91	0.91	0.91	0	0	0
66	0.41	0.41	0.41	0	0	0
67	0.17	0.17	0.17	0	0	0
68	0.15	0.15	0.15	0	0	0
69	0.39	0.39	0.39	0	0	0
70	0.91	0.91	0.91	0	0	0
71	1.29	1.29	1.29	0	0	0
72	0.67	0.67	0.67	0	0	0
73	1.4	1.4	1.4	0	0	0
74	1.4	1.4	1.4	0	0	0
75	0.67	0.67	0.67	0	0	0
76	1.29	1.29	1.29	0	0	0
77	0.91	0.91	0.91	0	0	0
78	0.39	0.39	0.39	0	0	0
79	0.15	0.15	0.15	0	0	0
80	0.65	0.65	0.65	0	0	0
81	1.38	1.38	1.38	0	0	0
82	1.38	1.38	1.38	0	0	0
83	0.65	0.65	0.65	0	0	0
84	1.27	1.27	1.27	0	0	0
85	0.65	0.65	0.65	0	0	0
86	1.27	1.27	1.27	0	0	0
87	0.65	0.65	0.65	0	0	0
88	0.67	0.67	0.67	0	0	0
89	1.4	1.4	1.4	0	0	0
90	1.4	1.4	1.4	0	0	0
91	1.38	1.38	1.38	0	0	0
92	1.38	1.38	1.38	0	0	0
93	1.29	1.29	1.29	0	0	0
94	0.27	0.27	0.27	0	0	0
95	1.29	1.29	1.29	0	0	0
96	1.9	1.9	1.9	0	0	0

97	0.02331	0.02331	0.02331	0	0	0
98	2.74	2.74	2.74	0	0	0
99	0.02331	0.02331	0.02331	0	0	0
100	2.74	2.74	2.74	0	0	0
101	0.02331	0.02331	0.02331	0	0	0
102	1.9	1.9	1.9	0	0	0
103	0.02331	0.02331	0.02331	0	0	0
104	0.02331	0.02331	0.02331	0	0	0
105	0.02331	0.02331	0.02331	0	0	0
106	0.02331	0.02331	0.02331	0	0	0
107	0.02331	0.02331	0.02331	0	0	0
108	0.02331	0.02331	0.02331	0	0	0
109	0.02331	0.02331	0.02331	0	0	0
110	0.02331	0.02331	0.02331	0	0	0
111	0.02331	0.02331	0.02331	0	0	0
112	0.02331	0.02331	0.02331	0	0	0
113	0.02331	0.02331	0.02331	0	0	0
114	0.02331	0.02331	0.02331	0	0	0
115	0.02331	0.02331	0.02331	0	0	0
116	1.9	1.9	1.9	0	0	0
117	1.9	1.9	1.9	0	0	0
118	1.9	1.9	1.9	0	0	0
119	1.9	1.9	1.9	0	0	0
120	1.9	1.9	1.9	0	0	0
121	1.9	1.9	1.9	0	0	0
122	1.9	1.9	1.9	0	0	0
123	1.9	1.9	1.9	0	0	0
124	1.9	1.9	1.9	0	0	0
125	1.9	1.9	1.9	0	0	0
126	1.9	1.9	1.9	0	0	0
127	1.9	1.9	1.9	0	0	0
128	2.74	2.74	2.74	0	0	0
129	2.74	2.74	2.74	0	0	0
130	2.74	2.74	2.74	0	0	0
131	2.74	2.74	2.74	0	0	0
132	2.74	2.74	2.74	0	0	0
133	2.74	2.74	2.74	0	0	0
134	2.72	2.72	2.72	0	0	0
135	2.74	2.74	2.74	0	0	0
136	2.74	2.74	2.74	0	0	0
137	2.74	2.74	2.74	0	0	0
138	2.74	2.74	2.74	0	0	0
139	2.74	2.74	2.74	0	0	0
140	2.74	2.74	2.74	0	0	0
141	2.72	2.72	2.72	0	0	0
142	0.78	0.78	0.78	0	0	0
143	0.78	0.78	0.78	0	0	0
144	0.27	0.27	0.27	0	0	0
145	0.27	0.27	0.27	0	0	0
146	0.78	0.78	0.78	0	0	0

147	0.78	0.78	0.78	0	0	0
148	0.27	0.27	0.27	0	0	0
149	0.27	0.27	0.27	0	0	0
150	0.78	0.78	0.78	0	0	0
151	0.78	0.78	0.78	0	0	0
152	0.27	0.27	0.27	0	0	0
153	0.27	0.27	0.27	0	0	0
154	0.78	0.78	0.78	0	0	0
155	0.78	0.78	0.78	0	0	0
156	0.27	0.27	0.27	0	0	0
157	0.27	0.27	0.27	0	0	0
158	0.78	0.78	0.78	0	0	0
159	0.78	0.78	0.78	0	0	0
160	0.27	0.27	0.27	0	0	0
161	0.27	0.27	0.27	0	0	0
162	0.49	0.49	0.49	0	0	0
163	0.49	0.49	0.49	0	0	0
164	0.15	0.15	0.15	0	0	0
165	0.33	0.33	0.33	0	0	0
166	0.33	0.33	0.33	0	0	0
167	0.24	0.24	0.24	0	0	0
168	0.24	0.24	0.24	0	0	0
169	0.78	0.78	0.78	0	0	0
170	0.78	0.78	0.78	0	0	0
171	0.27	0.27	0.27	0	0	0
172	0.27	0.27	0.27	0	0	0