ON THE ATTENDANCE OF THE BLM DEMONSTRATION JUNE 7 2020 COPENHAGEN – AN ESTIMATE OF THE NUMBER OF PEOPLE AT CHRISTIANSBORG SLOTSPLADS

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1 Introduction and Scope

On Sunday, June 7, 2020, a Black Lives Matter demonstration was held in Copenhagen. The protest ended in front of the Danish Parliament building where the protesters gathered.

The police claim that 15,000 people attended. Some demonstrators claim the number was closer to 40,000 or even as much as 60,000.

This study focusses on the number of people present at the final assembly point, Christiansborg Slotsplads.

The primary resources for the study:

- 1. The provided drone footage:
 - From Mr. Andreas Oved Askjaer
 - Indland_drone_demo_HQ (io Preview).mp4 (Video 01)
 - From Ms. Sofie Frokjaer
 - o Soff_A_Indland_Drone_Demo-16.23.51.14-16.24.18.06.mxf (Video 02)
 - o Soff_A_Indland_Drone_Demo-16.24.57.11-16.25.55.23.mxf (Video 03)
 - o Soff_A_Indland_Drone_Demo-16.27.48.08-16.28.10.13.mxf (Video 04)
 - o Soff_A_Indland_Drone_Demo-16.31.16.15-16.32.12.10.mxf (Video 05)
- 2. <u>https://www.youtube.com/watch?v=4AArSrej53I&fbclid=IwAR04M7wT9haDngqufiSP</u> <u>SnWLPStQz_B37Rt-sZzcA4YqHAI_j2pDciSVBOU</u>

2 Approach and scientific background

2.1 Measurements and maps

Plans and measurements are obtained from Google Maps and Google Earth Pro.

2.2 Crowd Dynamics

Wherever people gather, there is a dynamic between the area they occupy, both as an individual and as a crowd, the actual number of people, their flow rate, and their physical environment.

Crowd density and flow rate are key elements relating not only to the size of the crowd but also to facilities, site design and a moment in time. Crowd density must be considered separately for static or moving crowds as they each have their limits. Effects of (high)density are not only physical - in dense crowds, people are also forced to enter each other's personal or even intimate zone (Hall, 1974). The flow rate is of importance for moving crowds. Crowd density and flow rate are related as from three people per square meter flow rates tend to drop, often leading to congestion and high crowd density (Still, 2014).

2.3 Crowd Density

The crowd density scale in this report finds its origin in Fruin's Level of Service (LOS) for waiting areas (Fruin, 1987). Fruin expressed these Levels of Service (LOS) as feet per person. This square measure is converted into the more comprehensible "people per square meter".

Fruin assigns an upper and lower value per LOS; this implies that evenly coloured areas do not necessarily have the same density. The scale is shown in figure 1.

LOS STATIC AREAS				Conversion sq ft per person to people per sq m		
LOS	ft²/p	ft²/p		p/m²	p/m²	Remarks
Α		13	· · · ·		0.83	Free circulation
В	13	10	6 22 0 0 0 22 0	0.83	1.08	Restricted Circulation
С	10	7	0 4 0 H	1.08	1.54	Personal Comfort Zone
D	7	3	2 4 4 4 4 2 4 4 4 4 2 4 4 4 4 2 4 4 4 4 2 4 4 4 2 4 4 4 2 4 4 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1.54	3.59	No Touch zone
Е	3	2		3.59	5.38	Touch Zone
F	2		20110	5.38		The Body Ellipse

Figure 1 Density Scale - LOS for waiting areas (p/m²)

It is essential to understand that the density is always expressed as an average for the entire area. Prof. Dr G. Keith Still produced a series of drawings for comparison purpose (Still, 2019). These drawings are used for comparison with the available footage (Figure 2-4; all drawings are obtained from Prof. Stills website <u>www.gkstill.com</u>).



3 Assessment of the number of attendees for the defining areas

3.1 Crowd occupancy

The demonstration started at the U.S. Embassy and assembled in front of Danish parliament at Christiansborg Slotsplads, the route to the square leads the crowd over the bridge in the bottom right corner of figure 6.

The available video footage gives a good visual of the assembly at Christiansborg Slotsplads at its peak, just before dispersion, at 17:10 in Video 01. Figure 6, below, shows the still image at 17:10 of the video.



Figure 6: Screenshot at 17:10

The next figure shows the main area occupied by the crowd in green and represents an area of approximately 12.300 square meters.

From 17:10 the crowd starts to disperse to the left and right of the parliament building. People keep on entering the square from the bridge.



Figure 7: Area occupied by the crowd (green)

From 17:39, the camera angle changes, and the video shows a little part of the arriving side of the bridge. However, not enough to get a full view. The area used by the crowd on that end of the bridge represents an area of about 900 square meters (figure 8 – amber).



Figure 8: Area occupied (green) and assumed (amber)

3.2 Crowd density

Based on the video and the still, at 17:10 (Figure 9) the centre of the main body of the crowd, next to the stage truck, LoS D, close but not touching. A more detailed view can be seen at 15:41 in Video 01 (Figure 10), density increases towards the sides of the area and is looser at the backside, next to the parliament building.



Figure 9: Topview at 16:01



Figure 10: Screenshot Video 01 - 15:41

The figure below shows the differentiation in density on the Christiansborg Slotsplads, more dense towards the stage truck, decreasing towards the outside.



Figure 11: Christianborg Slotsplads Density differentiation

Zone	Area	Densi	ty p/m²	#	#
	(m²)			People	People
		Lower	Upper		
Α	3493	0	0,5	0	1.747
В	1868	0,5	1	934	1.868
С	2913	1	1	2.913	2.913
D	1970	1	2	1.970	3.940
E	1848	2	2,5	3.696	4.620
				9.513	15.088

The table below shows the density for each area.

For the assumed area of 900 square meters on the other side of the bridge (figure 8) an average density between 0,5 and 1,0 is considered.

Density	Area	Occupancy		
0,50	900	450		
1,00	900	900		
1,50	900	1.350		
2,00	900	1.800		
2,50	900	2.250		

Tabel 2: Assumed Area - Occupancy

4 Conclusion

Based on the provided video, the crowd at Christiansborg Slotsplads, as seen on the footage (Table 1), and the assumption for the assumed area (Table 2) the estimated number of people is set at a maximum of about 16.000, with a margin of 10%.

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Tabel 1: Christiansborg Slotsplads - Occupancy

5 References

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