

Wireless Survey Report

Node-4
Opera House, Manchester

09 AUGUST 2022

Meraki
Surveyor: Rory Wood

Wireless Survey Report

Opera House, Manchester.

Survey requirements

Opera House has multiple floors housing the auditorium, back of house, front of house and concessions areas. The auditorium houses 1920 guests when at full capacity.

The requirement was to survey the following: -

- A. Existing wireless coverage
- B. Complete coverage using additional access points (APs) except the auditorium
- C. Design a wireless solution within the auditorium

Client Discovery Conversation

A client discovery conversation was had before the survey to allow all current issues to be raised concerning the Wireless network:

- Full coverage is not currently provided throughout the theatre
- Sound and lighting engineers often come and set their own network up on a 2.4Ghz and 5Ghz Frequency during shows

Procedure

Initially we logged onto the current wireless network and performed a first pass survey. This showed us the coverage of the existing wireless network and allowed us to identify areas with zero or weak wireless coverage.

Once complete we resurveyed these areas using a test access point (AP) to give greater coverage. This was done by placing a test AP in various locations and taking numerous readings throughout the building. Prior to the survey we were escorted by an ATG rep who indicated all the areas that were accessible and required coverage and where he would allow AP's to be installed.

Within the auditorium we placed test AP in locations throughout and recorded the coverage.

Data is recorded from the survey and saved to show heatmaps showing signal coverage, SNR etc. To allow adequate resilience in these results areas of coverage is limited to a minimum of -65dB.

Results

From the first pass survey we found 25 existing Cloud AP's.

Currently the theatre uses:

- 25 APs on a Company and Guest network, transmitting on both 2.4 & 5Ghz frequencies

These do not provide full coverage of the theatre.

In total for full wireless coverage 48 APs are required, breakdown below:

All areas except the auditorium 37 APs were required.

Within the auditorium we propose 13 AP's be installed.

These are to be installed as below: -

No. APs	AP Name	Floor	Location
1	AP A2	Stalls	Orchestra Pit
2	AP A4	Stalls	Right wall
3	AP A6	Stalls	Right wall
4	AP A11	Stalls	Ceiling of Row U Seat 19
5	AP A12	Stalls	Left wall
6	AP A15	Stalls	Right wall
7	AP A19	Circle	Right wall
8	AP A20	Circle	Left wall
9	AP A28	Circle	Rear left wall
10	AP A29	Circle	Rear right wall
11	AP A30	Gallery	Left wall
12	AP A32	Gallery	Right wall
13	AP A40	Gallery	Centre of rear wall

Conclusion

To give full coverage throughout the building, 51 APs are required, this includes the auditorium.

Our Recommendations

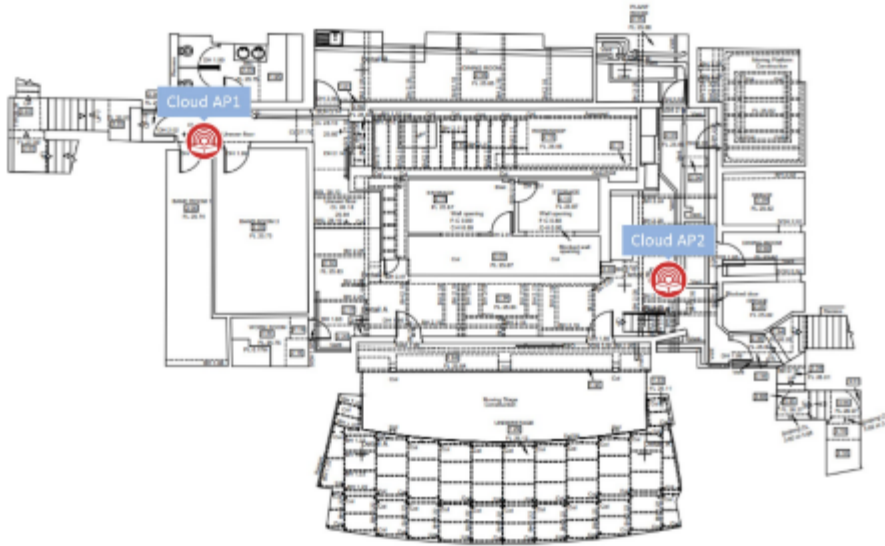
- Review the possible number of clients in each concession area to establish AP counts. Concession Locations highlighted in the table below.
- Monitor the concessions and auditorium APs during event times. This will allow a usage profile data to be collected and identify AP's that hit threshold levels. This information is crucial to locate areas requiring more bandwidth.
- Within the auditorium limit the APs transmitting 2.4Ghz to reduce co-channel interference
- Rewire all AP's using a Cat6a system to remove the bottleneck.

The concessions area includes 20 APs to support high volumes using the network. These need to be reviewed by the theatre to see possible amounts of clients for each location.

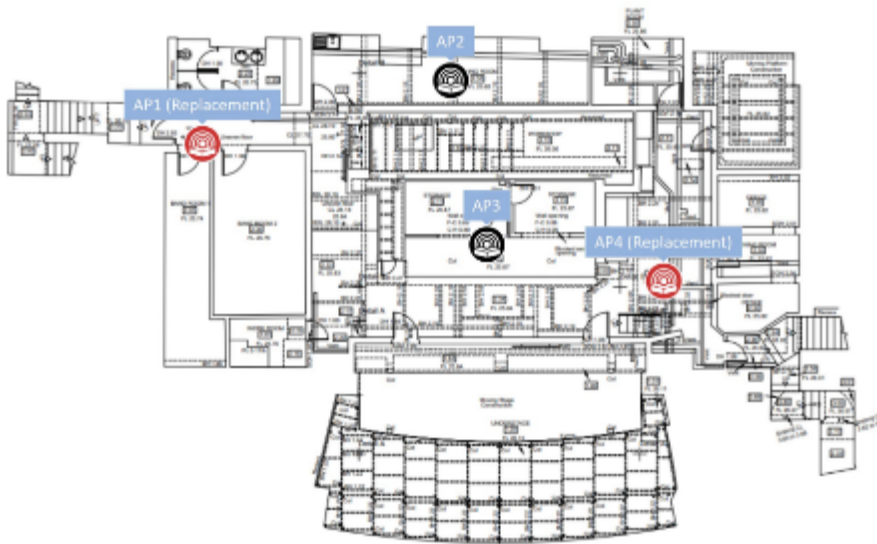
Area No	AP Name	Floor	Location	Possible clientele amount?
1	AP7	Stalls Floor	Stalls Bar	

2	AP8	Stalls Floor	Centenary Bar Lobby	
3	AP9	Stalls Floor	Centenary Bar	
4	AP10	Stalls Floor	Main Stairwell to Foyer	
5	AP12	Foyer Floor	Box One	
6	AP13	Foyer Floor	Foyer Lobby	
7	AP14	Foyer Floor	Foyer Lobby	
8	AP15	Foyer Floor	Box Office	
9	AP16	Foyer Floor	Foyer Lobby	
10	AP17	Foyer Floor	Foyer Bar	
11	AP18	Foyer Floor	Box two	
12	AP22	Circle Floor	Ambassador Lounge	
13	AP23	Circle Floor	Phantom Bar	
14	AP24	Circle Floor	Phantom Bar	
15	AP28	Gallery Floor	Bar	
16	AP29	Gallery Floor	Main Stairwell	
17	AP33	Lower Gallery Floor	Gallery Bar	
18	AP35	Lower Gallery Floor	Lobby	
19	AP36	Upper Gallery Floor	Main Stairwell	
20	AP37	Upper Gallery Floor	Main Stairwell	

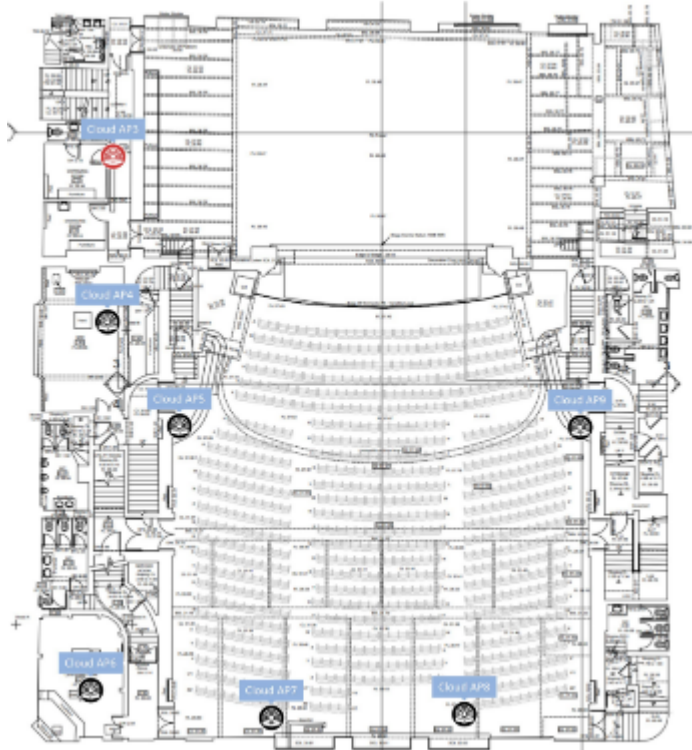
Existing Basement AP Locations



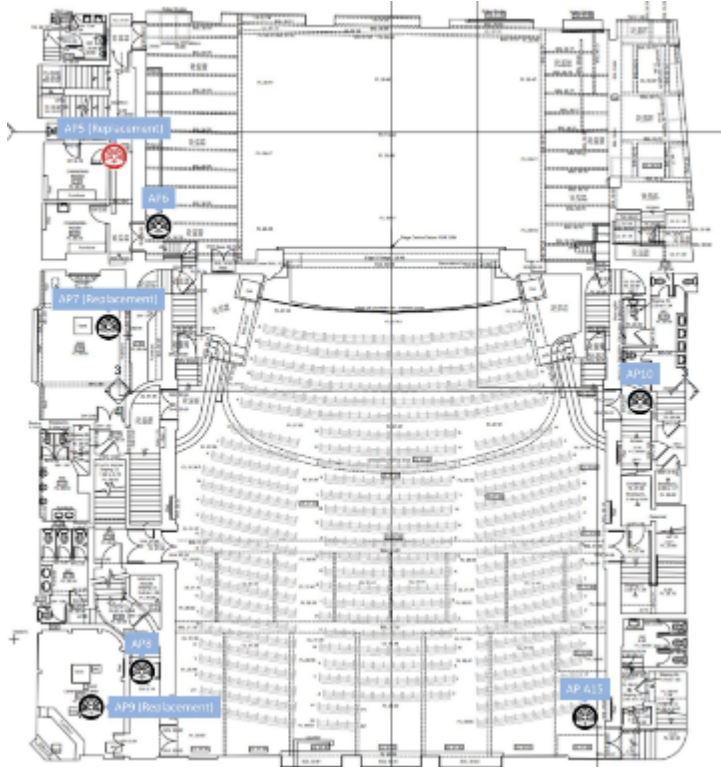
Proposed Basement AP Locations



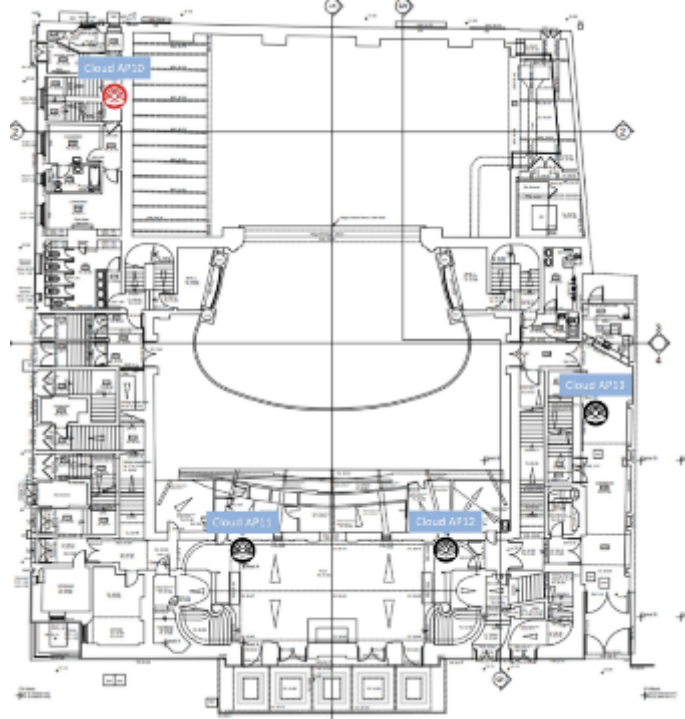
Existing Stalls Floor AP Locations



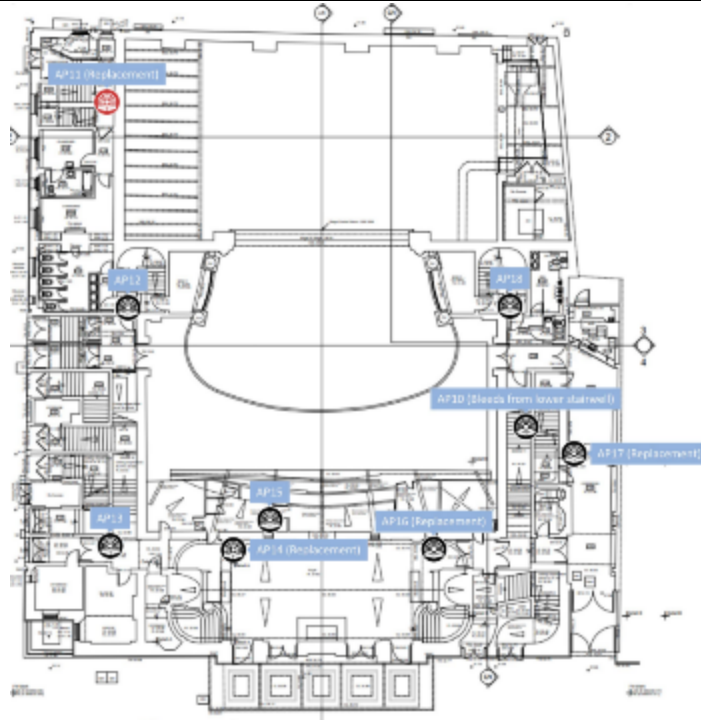
Proposed Stalls floor AP Locations



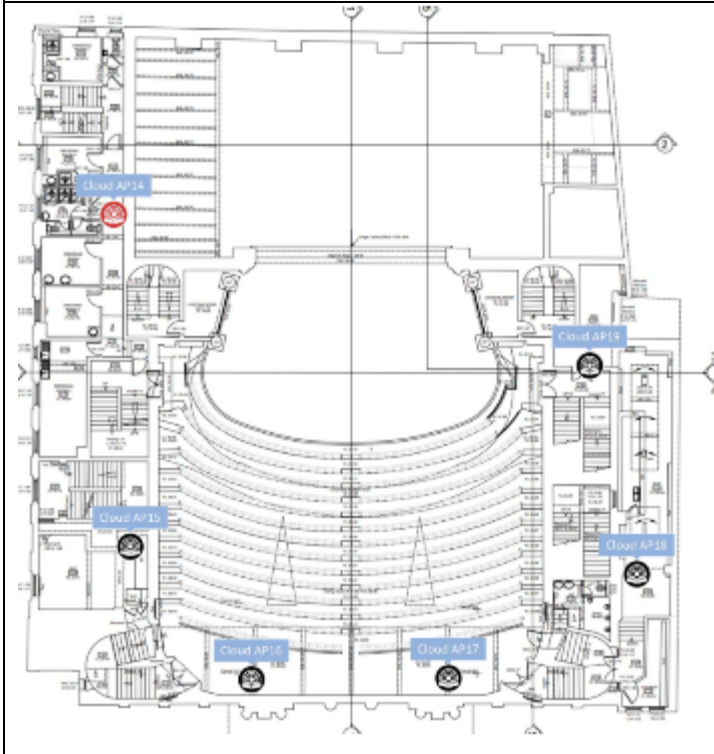
Existing Foyer Floor AP Locations



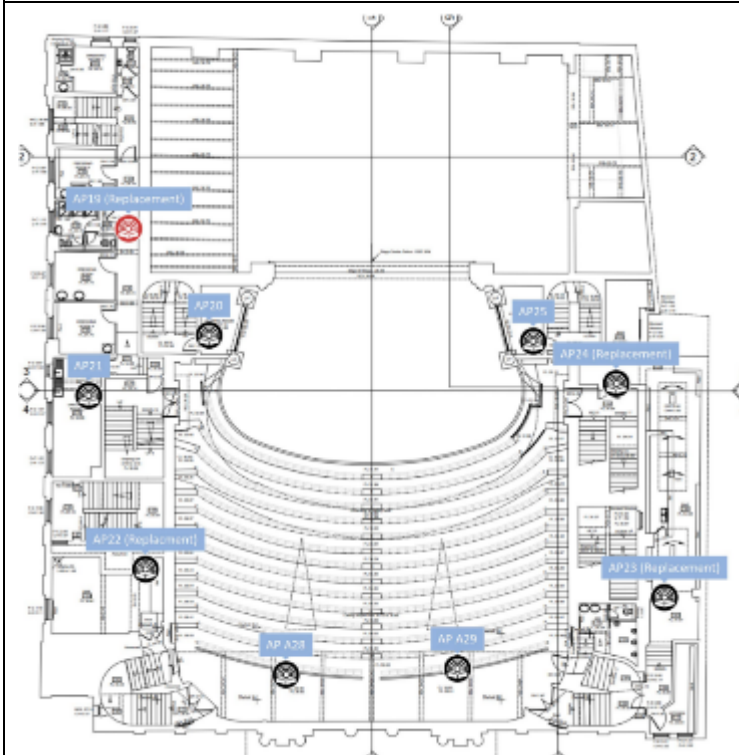
Proposed Foyer Floor AP Locations



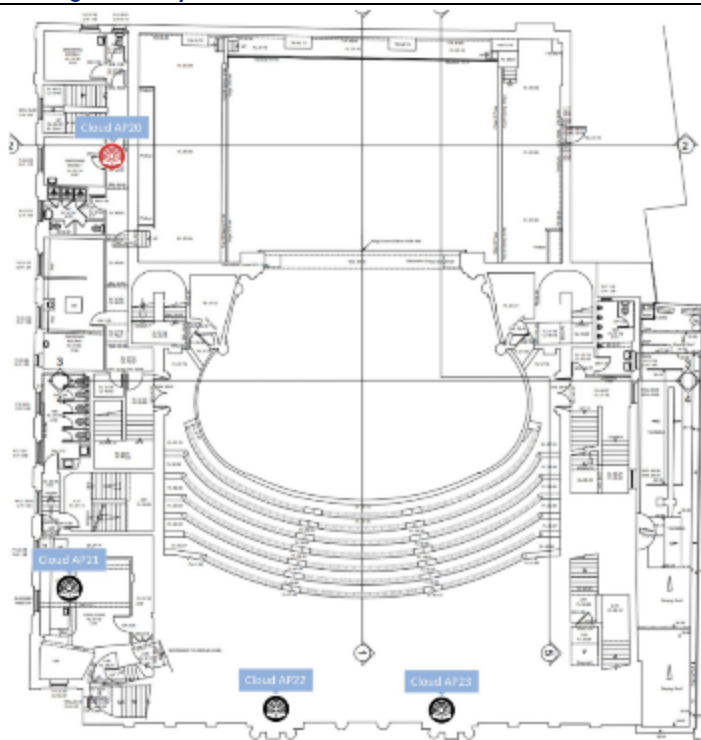
Existing Circle floor AP Locations



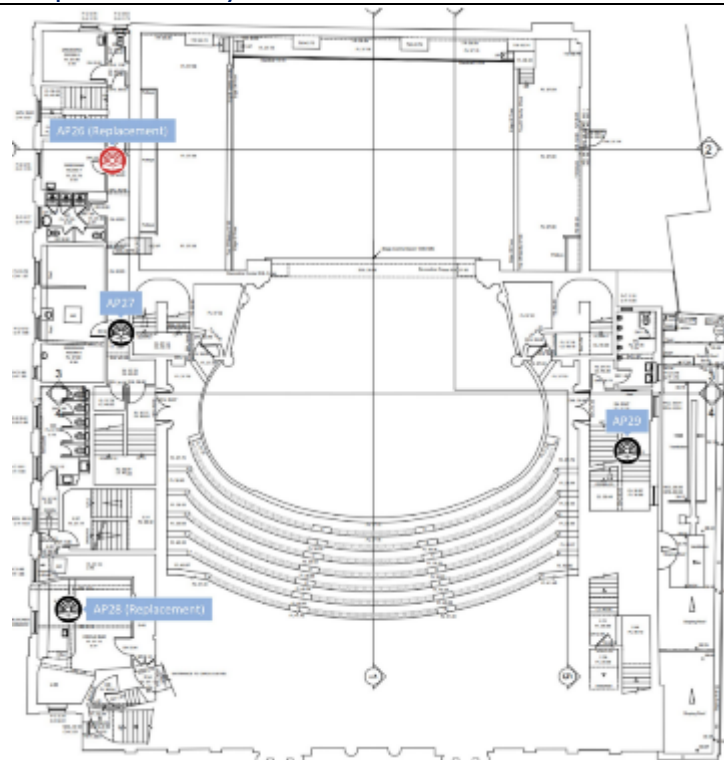
Proposed Circle floor AP Locations



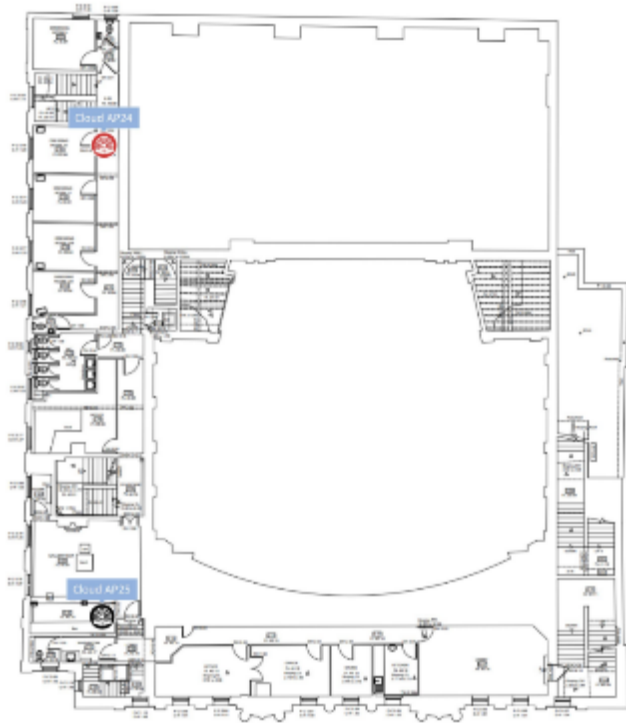
Existing Gallery floor AP Locations



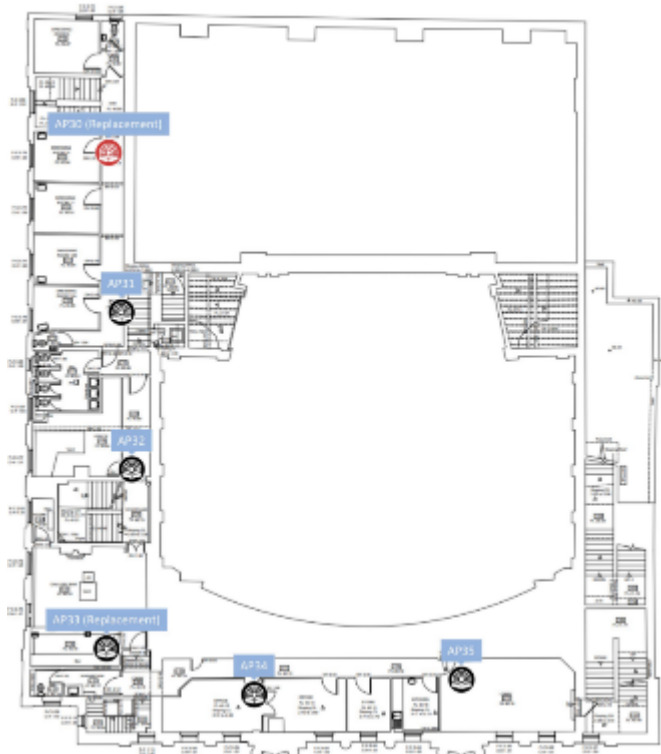
Proposed Gallery floor AP Locations



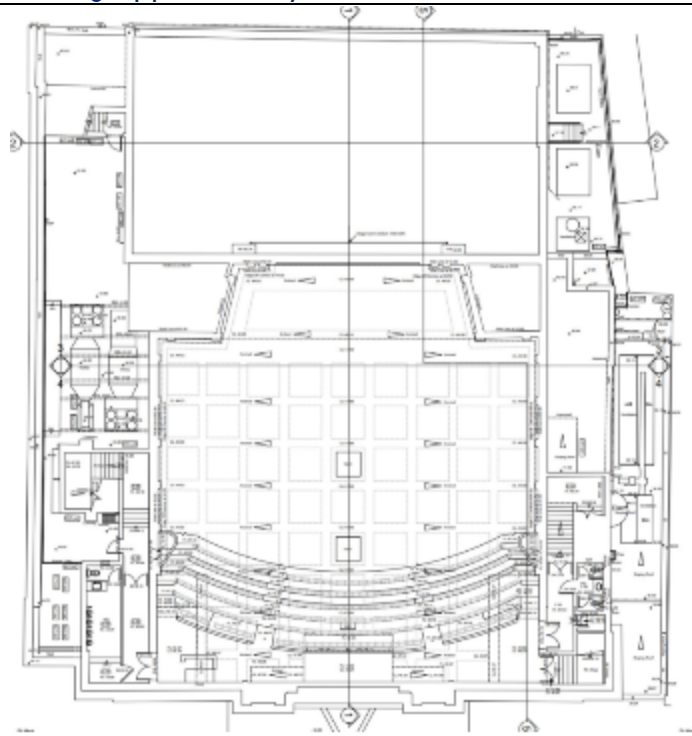
Existing Lower Gallery floor AP Locations



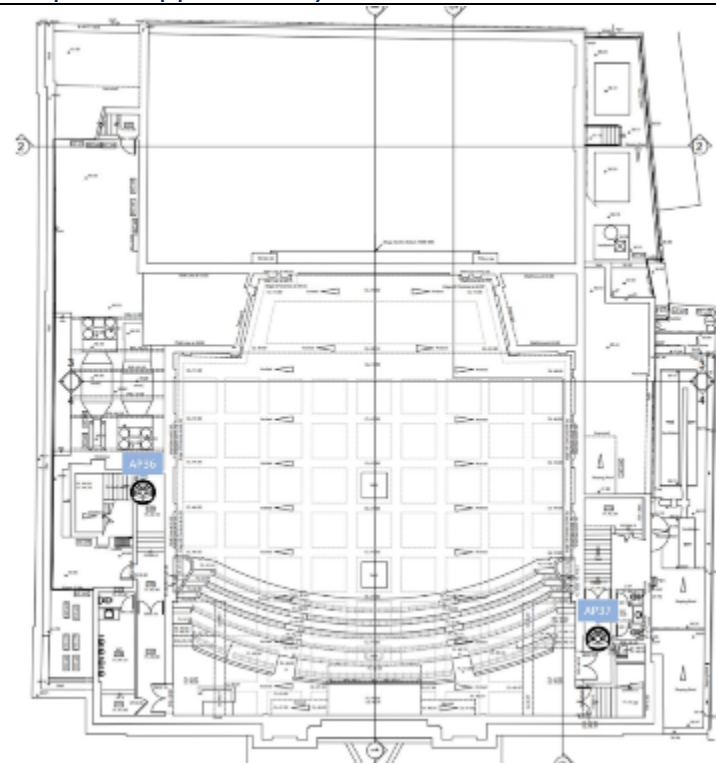
Proposed Lower Gallery floor AP Locations



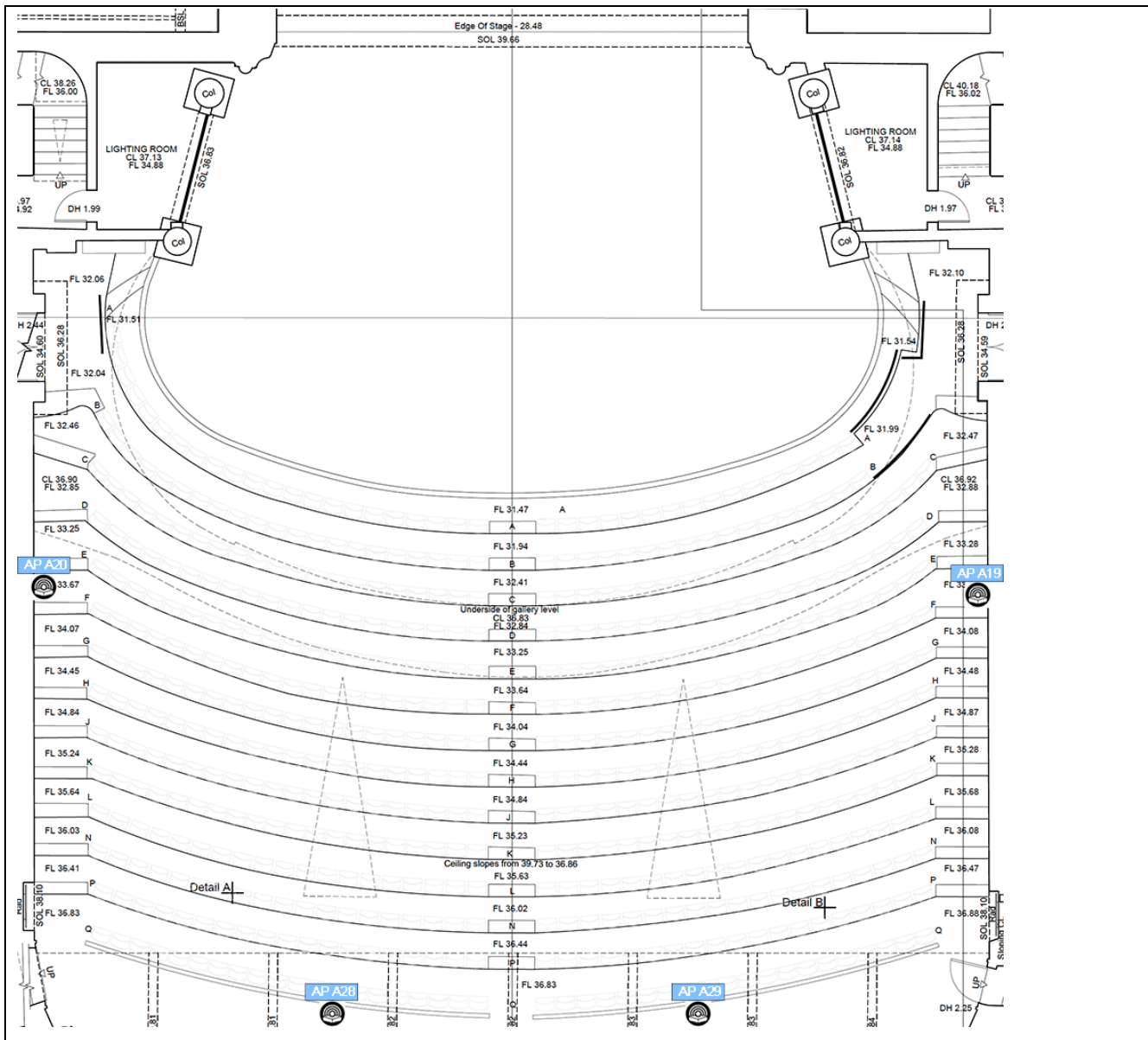
Existing Upper Gallery floor AP Locations



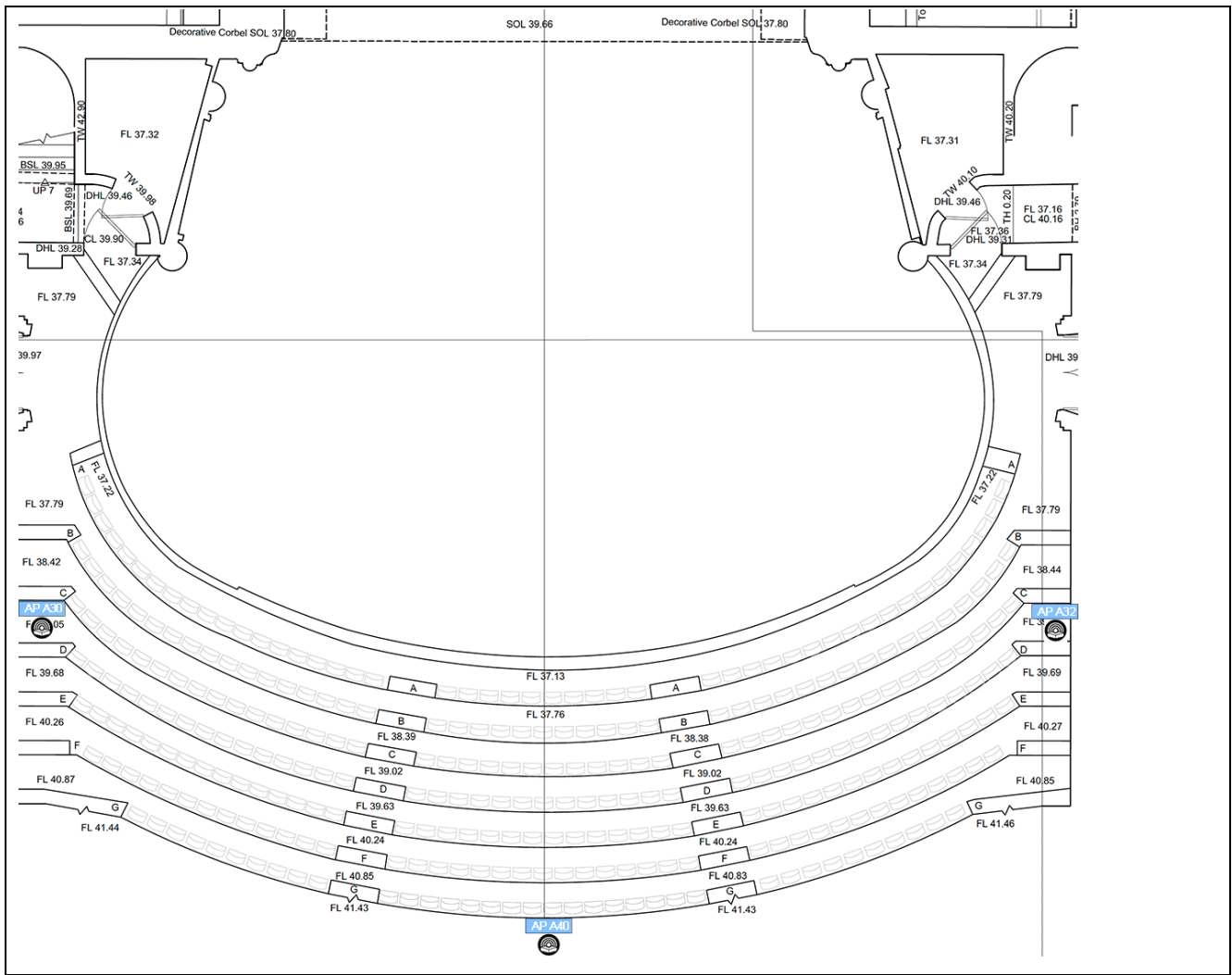
Proposed Upper Gallery floor AP Locations



Circle Auditorium



Gallery Auditorium



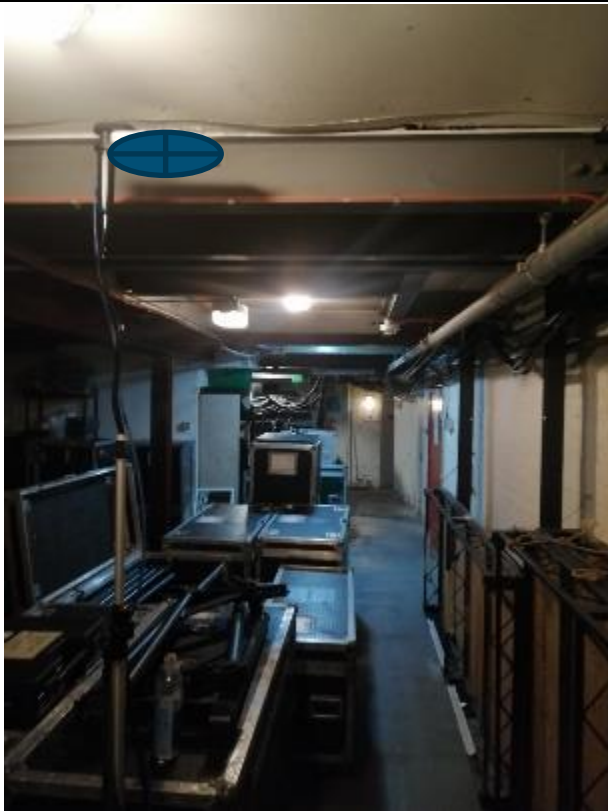
Proposed Location AP1 (Existing Cloud AP1)



Location AP2



Proposed location AP3



Proposed location AP4 (Existing Cloud AP2)



Proposed Location AP5 (Existing Cloud AP3)



Location AP6



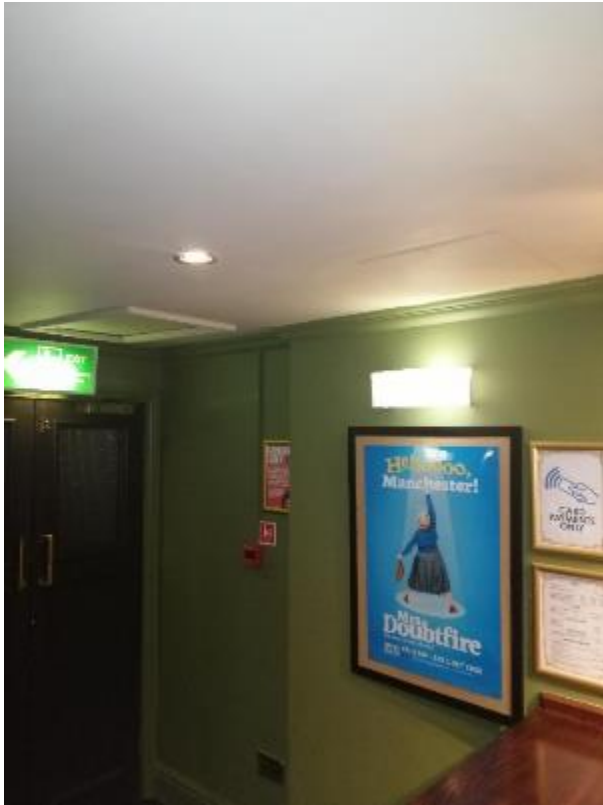
Proposed location AP7 (Existing Cloud AP4)



Proposed location AP8



Proposed location AP9 (Existing Cloud AP6)



Proposed location AP10



Proposed location AP11 (Existing Cloud AP10)



Proposed location AP12



Proposed location AP13



Proposed location AP14 (Existing Cloud AP11)



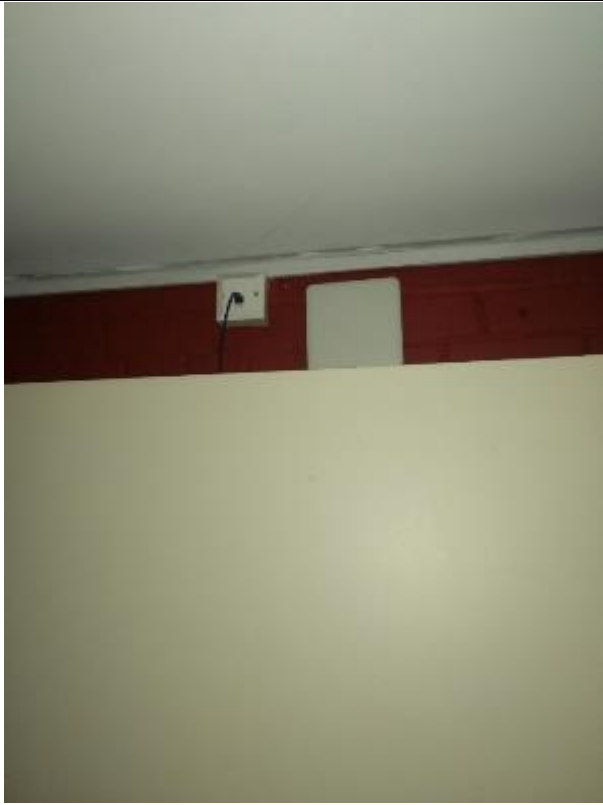
Proposed location AP15



Proposed location AP16 (Existing Cloud AP12)



Proposed location AP17 (Existing Cloud AP13)



Proposed location AP18

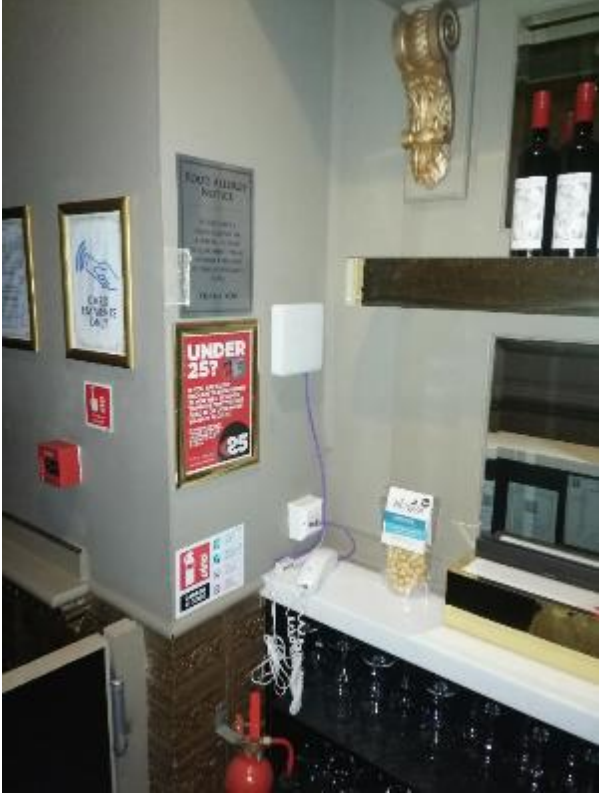


Proposed location AP19 (Existing Cloud AP14)



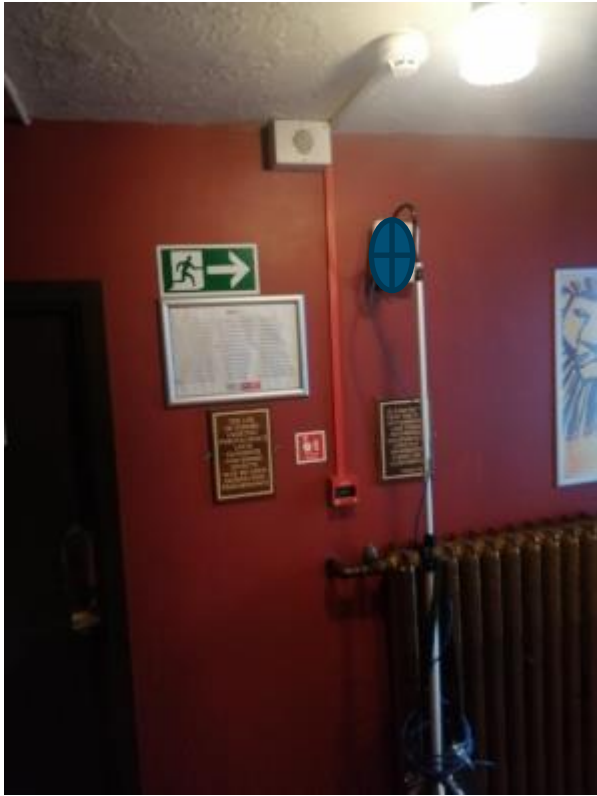
Proposed location AP20



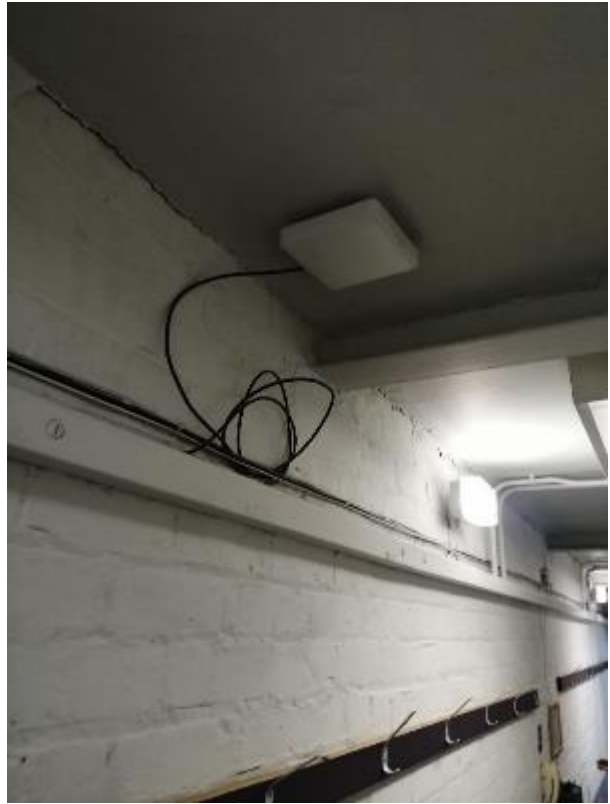
<p>Proposed location AP21</p> 	<p>Proposed location AP22 (Existing Cloud AP15)</p> 
<p>Proposed location AP23 (Existing Cloud AP18)</p> 	<p>Proposed location AP24 (Existing Cloud AP19)</p> 

Proposed Location AP25	Proposed location AP26 (Existing Cloud AP20)
	
Proposed location AP27	Proposed location AP28 (Existing Cloud AP21)
	

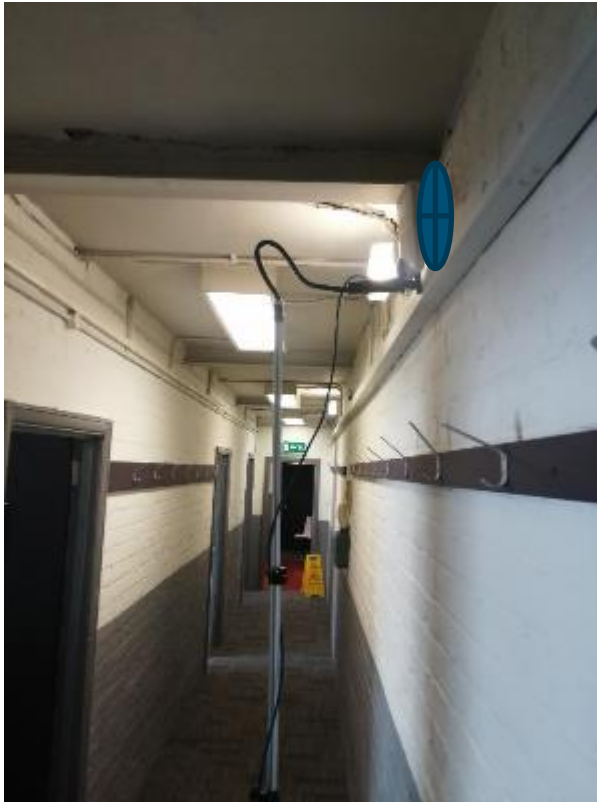
Proposed Location AP29



Proposed location AP30 (Existing Cloud AP24)



Proposed location AP31



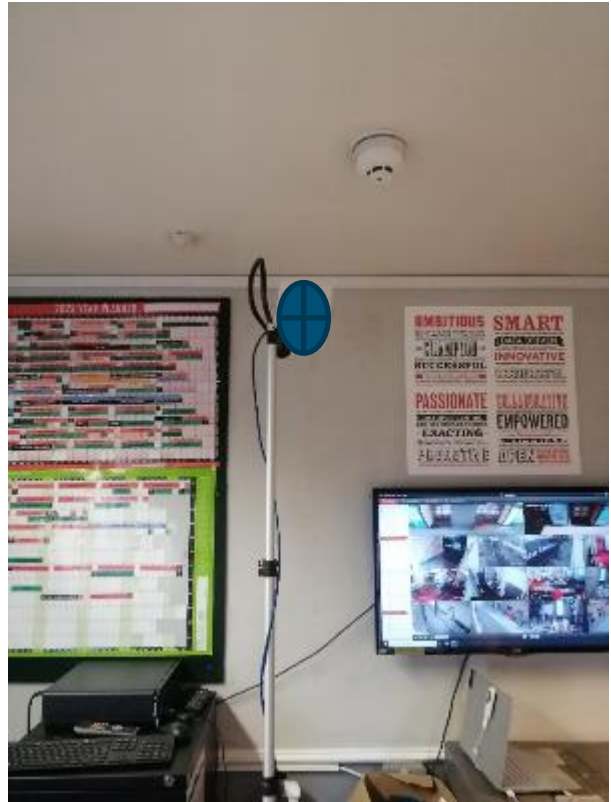
Proposed location AP32



Proposed Location AP33 (Existing Cloud AP25)



Proposed location AP34



Proposed location AP35



Proposed location AP36



Proposed Location AP37	
	

Proposed location AP A2

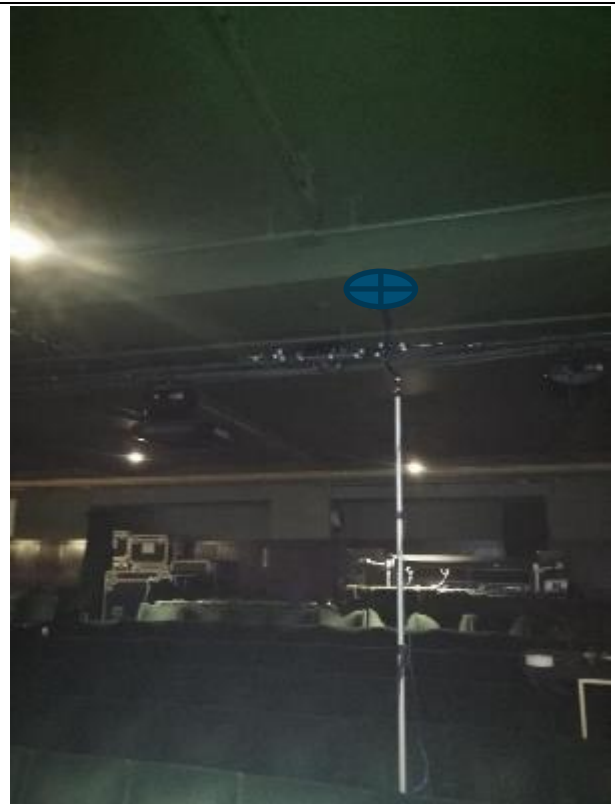


Proposed location AP A4



Proposed location AP A6

Proposed location AP A11



Proposed location AP A12



Proposed location AP A15



Proposed location AP A19	Proposed location AP A20
<p>Moved to right wall</p> <p>No image available</p>	<p>Moved to left wall</p> <p>No image available</p>

Proposed location AP A30	Proposed location AP A32
<p>Moved to left wall</p> <p>No image available</p>	<p>Moved to right wall</p> <p>No image available</p>

Proposed location AP A40
<p>Moved to centre of rear wall</p> <p>No image available</p>

Existing Location Cloud AP1 (Hidden in Ceiling)	Existing Location Cloud AP2
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Existing Location Cloud AP3



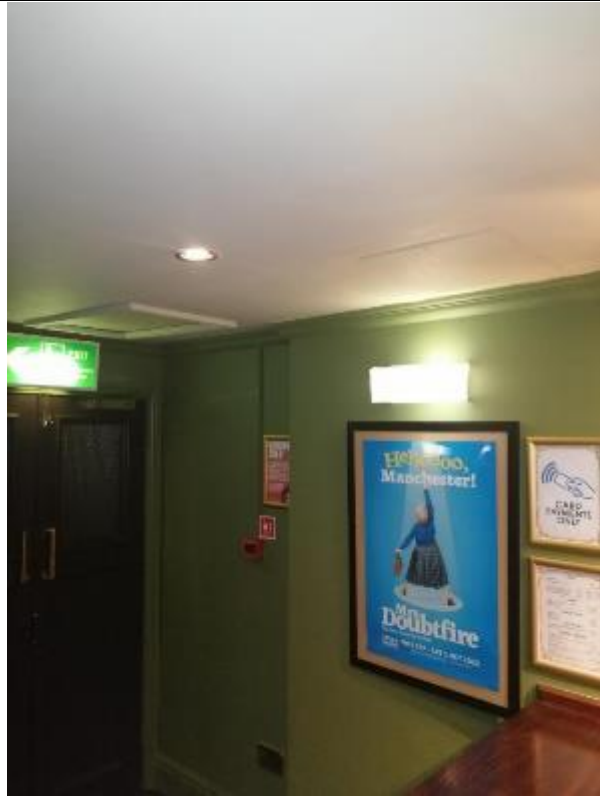
Existing Location Cloud AP4



Existing Location Cloud AP5



Existing Location Cloud AP6



Existing Location Cloud AP7



Existing Location Cloud AP8



Existing Location Cloud AP9



Existing Location Cloud AP10



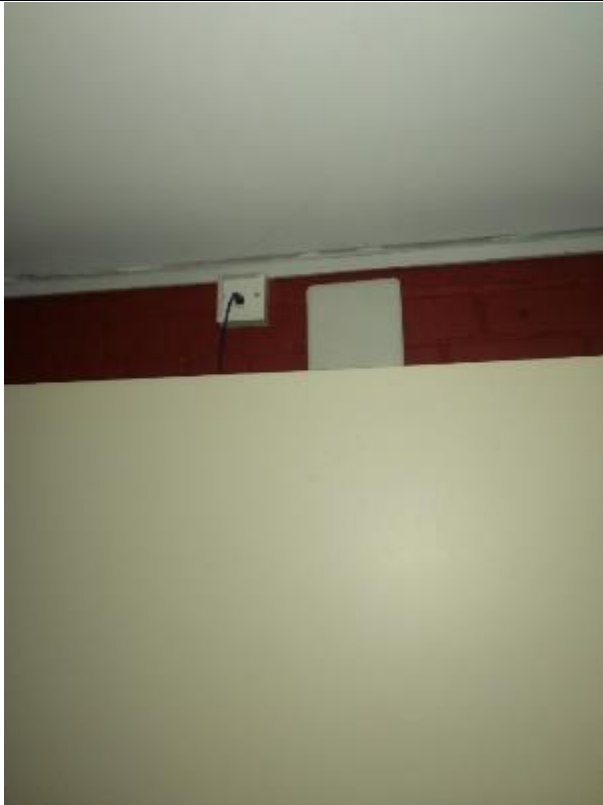
Existing Location Cloud AP11



Existing Location Cloud AP12



Existing Location Cloud AP13



Existing Location Cloud AP14



Existing Location Cloud AP15



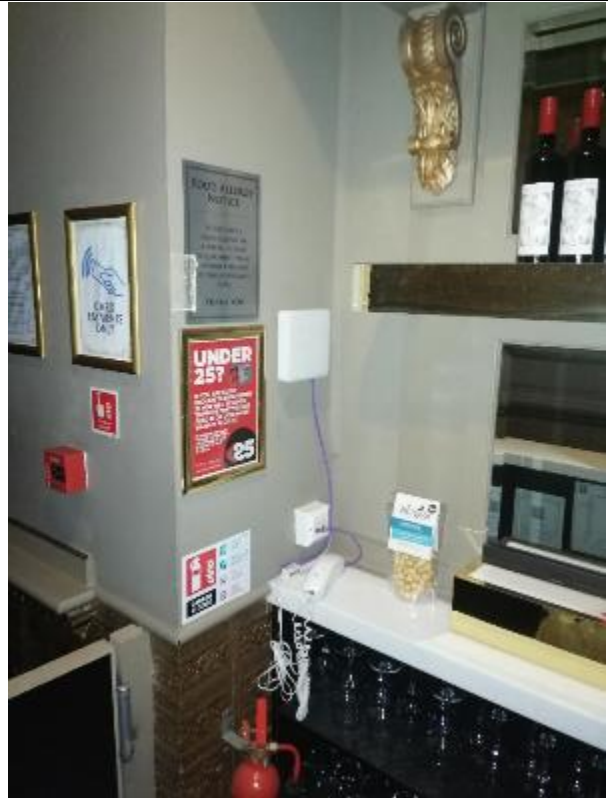
Existing Location Cloud AP16



Existing Location Cloud AP17



Existing Location Cloud AP18



Existing Location Cloud AP19



Existing Location Cloud AP20



Existing Location Cloud AP21



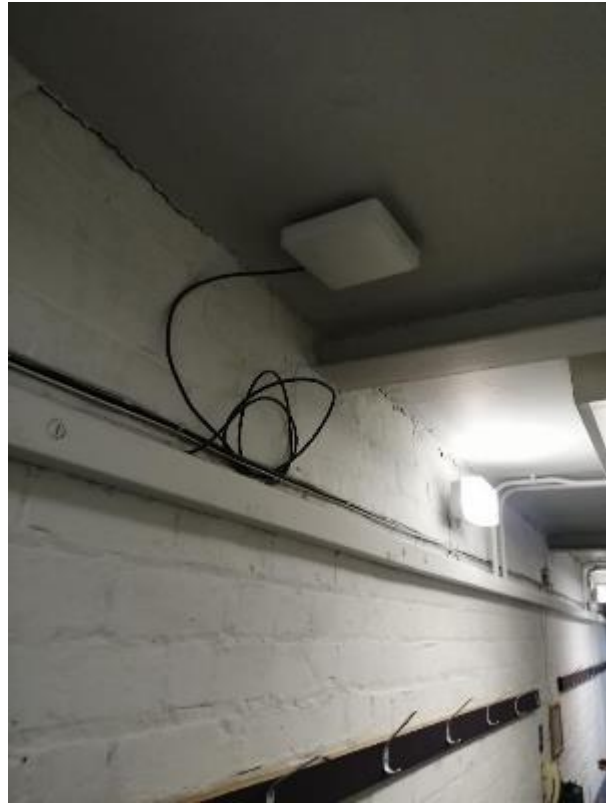
Existing Location Cloud AP22



Existing Location Cloud AP23



Existing Location Cloud AP24



Existing Location Cloud AP25



Existing AP 1-9 Mac Addresses			Existing APs 10-19		
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44 (44...	☒ Cloud AP1	F0:3E:90:69:20:4D	1	☐ Cloud AP10	F0:3E:90:69:32:39
116 (1...	☒ Cloud AP2	F0:3E:90:69:34:0D	136 (1...	☒ Cloud AP11	84:18:3A:50:03:BD
13	☐ Cloud AP2	F0:3E:90:69:34:09	7	☐ Cloud AP11	84:18:3A:50:03:89
1	☐ Cloud AP3	F0:3E:90:69:68:F9	36 (36...	☒ Cloud AP12	6C:AA:03:6D:1E:DD
48 (44...	☒ Cloud AP3	F0:3E:90:69:68:FD	1	☐ Cloud AP12	6C:AA:03:6D:1E:D9
1	☐ Cloud AP4	84:18:3A:5C:A8:09	1	☐ Cloud AP13	84:18:3A:5C:55:69
132 (1...	☒ Cloud AP4	84:18:3A:5C:A8:0D	136 (1...	☒ Cloud AP13	84:18:3A:5C:55:6D
64 (60...	☒ Cloud AP5	84:18:3A:73:88:FD	1	☐ Cloud AP14	F0:3E:90:69:33:79
12	☐ Cloud AP5	84:18:3A:73:88:F9	104 (1...	☐ Cloud AP14	F0:3E:90:69:33:7D
56 (52...	☒ Cloud AP6	6C:AA:03:6D:A0:6D	7	☐ Cloud AP15	6C:AA:03:6C:C2:D9
7	☐ Cloud AP6	6C:AA:03:6D:A0:69	52 (52...	☐ Cloud AP15	6C:AA:03:6C:C2:DD
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100 (1...	☒ Cloud AP7	84:18:3A:73:6D:8D	104 (1...	☐ Cloud AP16	84:18:3A:73:AC:ED
7	☐ Cloud AP8	84:18:3A:73:8A:79	7	☐ Cloud AP17	84:18:3A:73:AD:49
108 (1...	☒ Cloud AP8	84:18:3A:73:8A:7D	64 (60...	☐ Cloud AP17	84:18:3A:73:AD:4D
124 (1...	☒ Cloud AP9	2C:5D:93:51:90:ED	1	☐ Cloud AP18	84:18:3A:5C:51:F9
13	☐ Cloud AP9	2C:5D:93:51:90:F9	64 (60...	☐ Cloud AP18	84:18:3A:5C:51:FD
			52 (52...	☐ Cloud AP19	84:18:3A:5C:5A:1D
			1	☐ Cloud AP19	84:18:3A:5C:5A:19
Existing AP 20-25 Mac Addresses					
1	☐ Cloud AP20	84:18:3A:5C:4C:A9			
104 (1...	☒ Cloud AP20	F0:3E:90:69:36:AD			
64 (60...	☒ Cloud AP21	84:18:3A:5C:76:6D			
1	☐ Cloud AP21	84:18:3A:5C:76:69			
136 (1...	☒ Cloud AP22	84:18:3A:73:AE:6D			
1	☐ Cloud AP22	84:18:3A:73:AE:69			
7	☐ Cloud AP23	84:18:3A:73:AC:99			
128 (1...	☒ Cloud AP23	84:18:3A:73:AC:9D			
7	☐ Cloud AP24	F0:3E:90:69:35:E9			
124 (1...	☐ Cloud AP24	F0:3E:90:69:35:ED			
1	☐ Cloud AP25	F0:3E:90:69:36:A9			
36 (36...	☐ Cloud AP25	84:18:3A:5C:4C:AD			