

基本聲學說明

1. 殘響時間量測(RT)
2. 語音清晰度(STI)

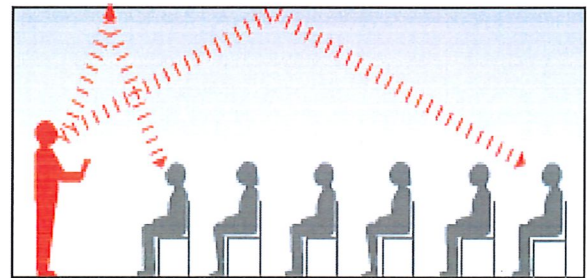
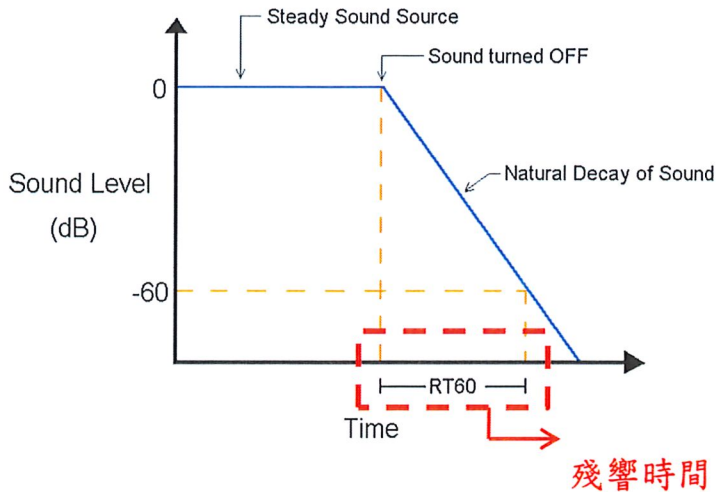
各項測試計劃說明

1. 殘響時間量測(RT)
2. 語音清晰度(STI)

基本聲學說明:

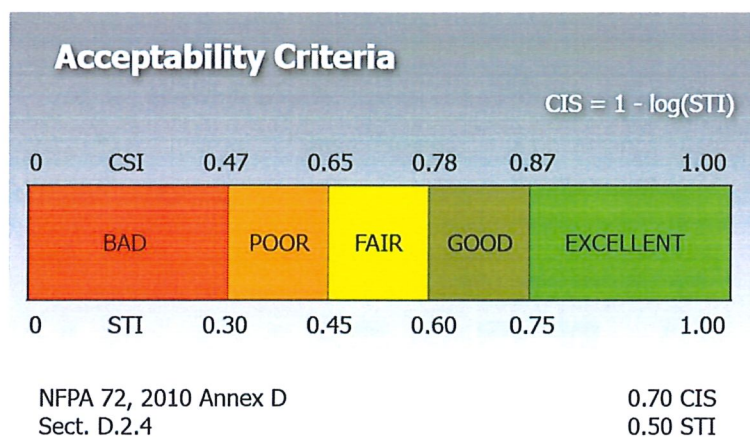
1. 殘響時間(RT60):

殘響時間(R. T. -Reverberation Time)或稱『迴響時間』,並可提升靜音值及語音清晰度,使演講、廣播或要音樂表演時獲得優質的音環境。一般而言,空間使用不同時,所設定之R. T. 值也不同。



2. 語音清晰度STI (Sound Transmission Index)

STI (Sound Transmission Index), 是用來界定空間語音清晰效果指標,以確認在室內空間是否有效控制殘響時間(RT),同時在觀眾聆聽可達到語音清晰效果。



1. 殘響時間量測(RT)

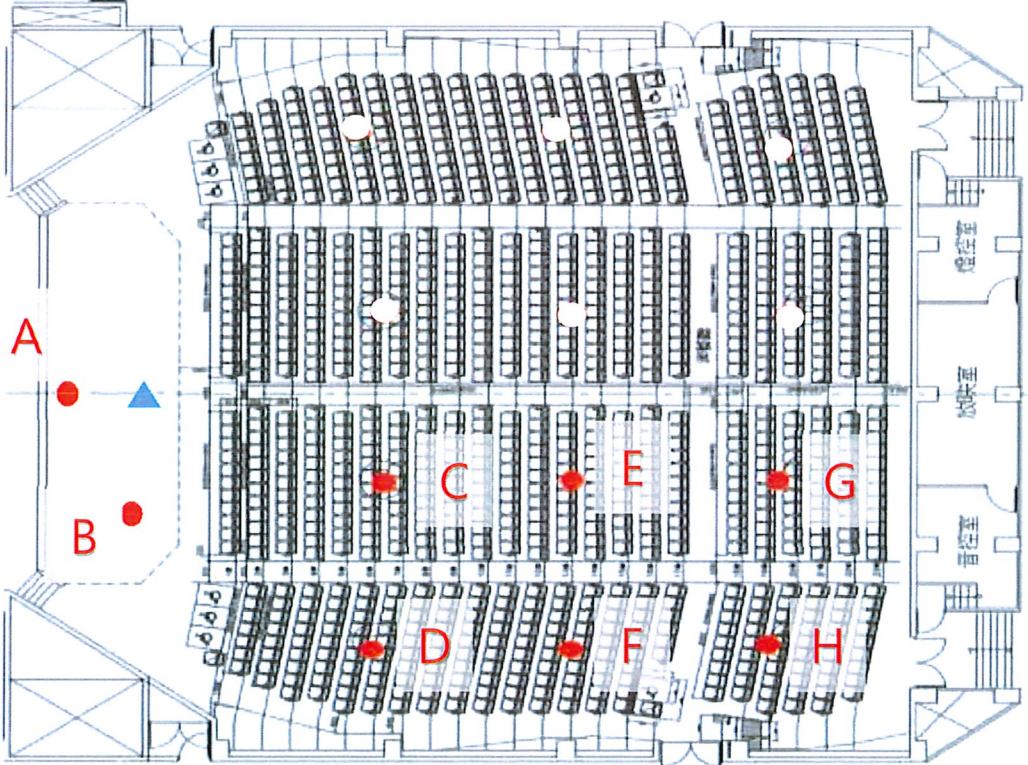
1.1量測說明：

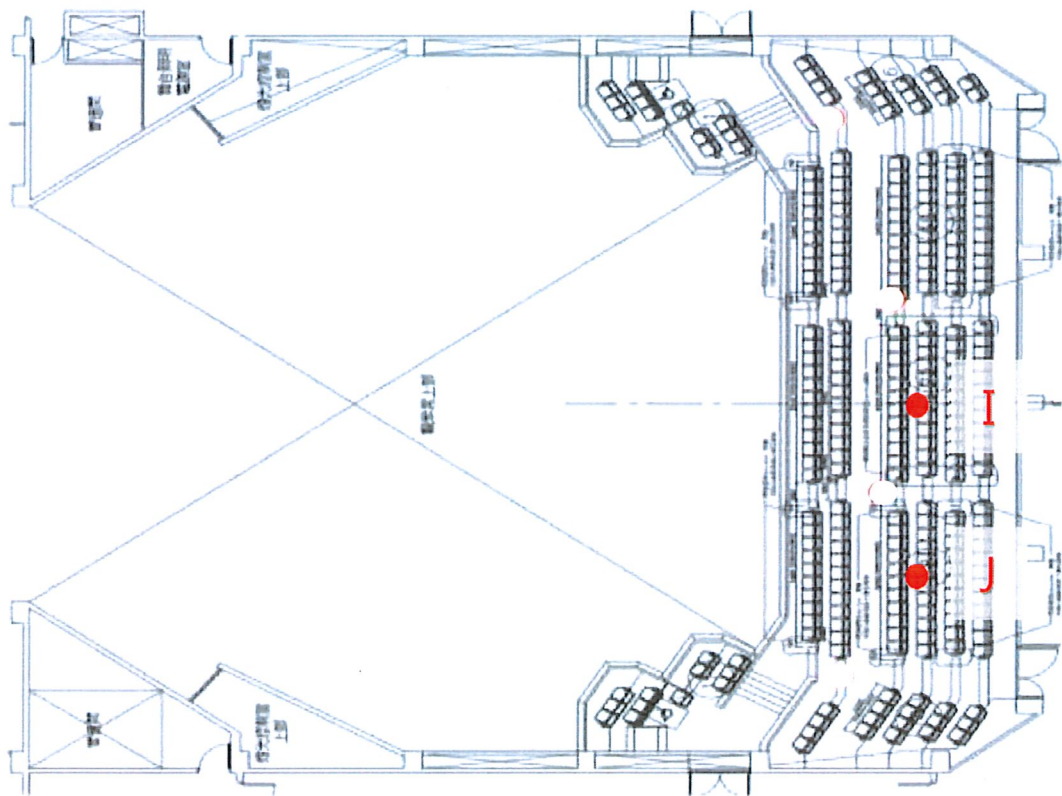
測試依據〈音響設備性能量測計劃〉標準：ISO 3382，所測點之250Hz~4000Hz及平均值殘響時間。

1.2測試儀器：

1. 無指向性揚聲器- B&K OmniPower Sound Source Type 4296
2. 精密級噪音頻譜分析儀-1/3 Octave Band Noise Analyzer B&K Type 2270
校正報告書 詳附件(一)
3. 功率擴大機-B&K Type 2716-C
4. 音場測試分析軟體-DIRAC 6 Type 7841

1.3殘響時間測試空間及標示：

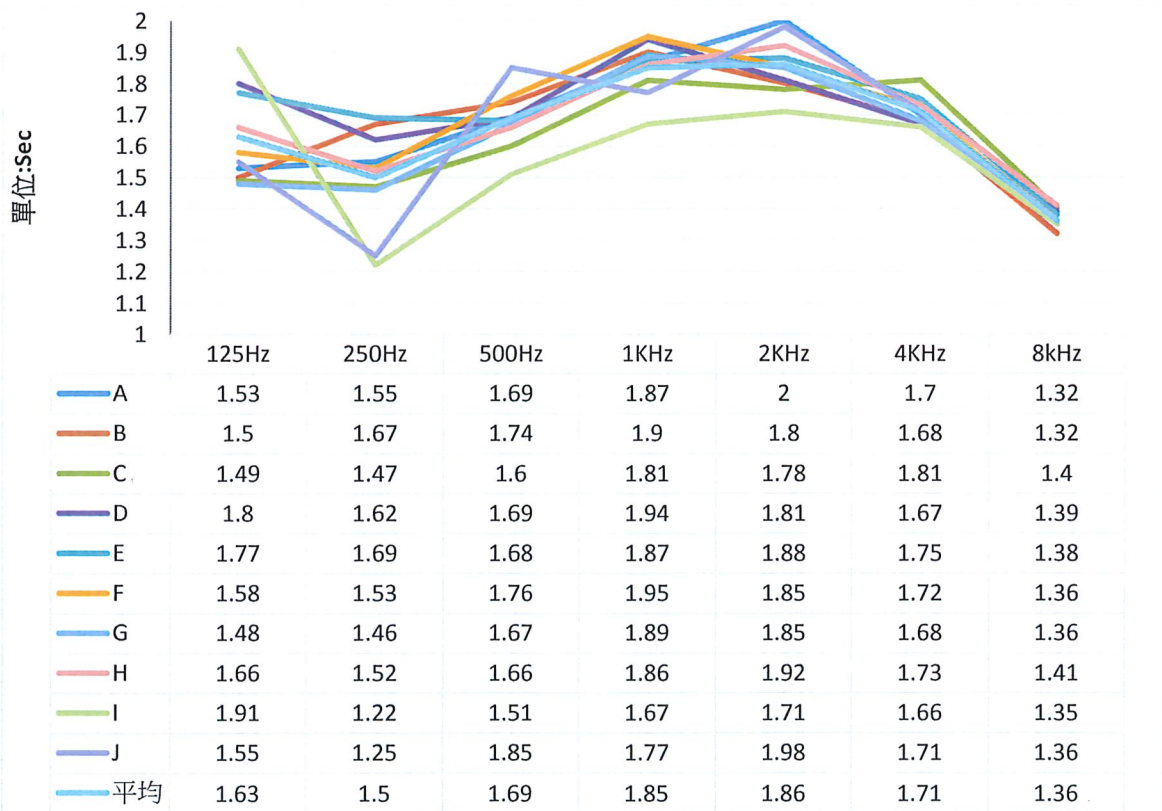
空間名稱	測量位置
	 <p>The diagram shows a floor plan of a lecture hall with rows of seats. Eight measurement points are marked with red dots and labeled A through H. Point A is on the left wall, B is in the aisle, and C through H are distributed across the seating area. A blue triangle on the left wall indicates the speaker location. On the right side, there are rooms labeled '音響室' (Acoustic Room) and '音控室' (Sound Control Room).</p>



- ▲ 音源點-共 1 點
- 接收點-共 10 點

1.4 測試結果

量測位置	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
A 點	1.53	1.55	1.69	1.87	2.00	1.70	1.32
B 點	1.50	1.67	1.74	1.90	1.80	1.68	1.32
C 點	1.49	1.47	1.60	1.81	1.78	1.81	1.40
D 點	1.80	1.62	1.69	1.94	1.81	1.67	1.39
E 點	1.77	1.69	1.68	1.87	1.88	1.75	1.38
F 點	1.58	1.53	1.76	1.95	1.85	1.72	1.36
G 點	1.48	1.46	1.67	1.89	1.85	1.68	1.36
H 點	1.66	1.52	1.66	1.86	1.92	1.73	1.41
I 點	1.91	1.22	1.51	1.67	1.71	1.66	1.35
J 點	1.55	1.25	1.85	1.77	1.98	1.71	1.36
平均	1.63	1.50	1.69	1.85	1.86	1.71	1.36



附件一：演藝廳Dirac殘響時間實測數值

ISO3382							
File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\A.wav							
Date: 2019/12/12 下午 06:42:39							
	125	250	500	1000	2000	4000	8000
T20 [s]	1.674	1.496	1.638	1.858	1.842	1.647	1.280
T30 [s]	1.533	1.545	1.692	1.865	1.995	1.699	1.324
Ts [ms]	48.5	63.5	51.6	60.2	68.7	71.2	26.1
C80 [dB]	-2.82	7.14	6.88	5.79	5.10	4.36	9.92
D50 [-]	0.91	0.69	0.73	0.72	0.71	0.64	0.87
ISO3382							
File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\B.wav							
Date: 2019/12/12 下午 06:43:52							
	125	250	500	1000	2000	4000	8000
T20 [s]	1.428	1.652	1.753	1.906	1.807	1.692	1.251
T30 [s]	1.499	1.669	1.740	1.902	1.804	1.679	1.315
Ts [ms]	52.5	54.2	44.1	54.5	58.0	47.7	30.2
C80 [dB]	-4.35	7.66	7.44	6.40	5.98	6.99	9.24
D50 [-]	0.87	0.75	0.77	0.73	0.70	0.77	0.83
ISO3382							
File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\C.wav							
Date: 2019/12/12 下午 06:48:11							
	125	250	500	1000	2000	4000	8000
T20 [s]	1.483	1.439	1.527	1.751	1.778	1.784	1.387
T30 [s]	1.485	1.468	1.604	1.812	1.784	1.810	1.403
Ts [ms]	75.7	76.2	94.7	114.0	122.8	117.1	70.3
C80 [dB]	-4.02	4.10	2.58	0.99	0.44	1.01	4.22
D50 [-]	0.76	0.66	0.50	0.47	0.39	0.40	0.57
ISO3382							
File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\D.wav							
Date: 2019/12/12 下午 06:49:06							
	125	250	500	1000	2000	4000	8000
T20 [s]	1.639	1.558	1.672	1.929	1.886	1.738	1.339
T30 [s]	1.801	1.618	1.692	1.939	1.811	1.665	1.387
Ts [ms]	92.2	80.1	96.0	106.2	113.4	103.7	56.9
C80 [dB]	-6.51	3.42	2.69	1.71	1.16	1.71	5.44
D50 [-]	0.69	0.61	0.44	0.46	0.42	0.46	0.68

ISO3382

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\E.wav
Date: 2019/12/12 下午 08:52:01

	125	250	500	1000	2000	4000	8000
T20 [s]	2.019	1.703	1.679	1.847	1.915	1.725	1.406
T30 [s]	1.770	1.694	1.679	1.868	1.878	1.747	1.376
Ts [ms]	121.7	102.9	123.4	129.3	125.7	122.1	78.5
C80 [dB]	-6.29	0.73	-0.46	0.29	0.33	0.09	3.28
D50 [-]	0.42	0.44	0.22	0.40	0.35	0.37	0.49

ISO3382

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\F.wav
Date: 2019/12/12 下午 06:52:54

	125	250	500	1000	2000	4000	8000
T20 [s]	1.525	1.434	1.705	1.954	1.879	1.691	1.367
T30 [s]	1.575	1.525	1.756	1.949	1.850	1.723	1.363
Ts [ms]	124.1	96.6	125.9	144.9	147.4	142.7	96.7
C80 [dB]	-10.72	1.92	-0.69	-1.65	-1.59	-1.83	0.81
D50 [-]	0.41	0.48	0.36	0.33	0.26	0.26	0.41

ISO3382

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\G.wav
Date: 2019/12/12 下午 06:53:51

	125	250	500	1000	2000	4000	8000
T20 [s]	1.424	1.506	1.652	1.881	1.833	1.730	1.367
T30 [s]	1.484	1.459	1.668	1.894	1.853	1.678	1.364
Ts [ms]	118.6	101.2	113.4	114.2	100.8	107.5	81.3
C80 [dB]	-8.97	0.02	-0.66	0.62	1.76	0.44	2.12
D50 [-]	0.25	0.26	0.29	0.38	0.45	0.37	0.44

ISO3382

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\H.wav
Date: 2019/12/12 下午 06:54:39

	125	250	500	1000	2000	4000	8000
T20 [s]	1.619	1.545	1.720	1.818	1.913	1.722	1.308
T30 [s]	1.656	1.516	1.655	1.856	1.916	1.733	1.409
Ts [ms]	125.9	92.0	113.5	129.4	121.1	129.4	85.3
C80 [dB]	-16.88	3.59	1.52	-0.32	-0.23	-1.28	2.08
D50 [-]	0.51	0.59	0.41	0.33	0.38	0.30	0.49

ISO3382

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心M.wav

Date: 2019/12/12 下午 07:00:41

	125	250	500	1000	2000	4000	8000
T20 [s]	1.884	1.174	1.555	1.820	1.958	1.696	1.339
T30 [s]	1.914	1.223	1.514	1.671	1.709	1.662	1.348
Ts [ms]	128.3	98.1	103.5	128.4	122.2	105.5	81.1
C80 [dB]	-6.51	0.35	1.01	-0.31	-0.38	1.28	3.06
D50 [-]	0.34	0.52	0.56	0.48	0.48	0.57	0.67

ISO3382

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心J.wav

Date: 2019/12/12 下午 07:01:33

	125	250	500	1000	2000	4000	8000
T20 [s]	1.505	1.334	1.747	1.833	1.890	1.682	1.350
T30 [s]	1.553	1.250	1.853	1.774	1.977	1.709	1.360
Ts [ms]	130.9	76.3	117.2	134.9	137.5	120.6	96.0
C80 [dB]	-5.95	4.51	0.05	-0.08	-1.16	0.06	1.73
D50 [-]	0.40	0.63	0.33	0.24	0.20	0.31	0.37

2. 語音清晰度量測(STI)

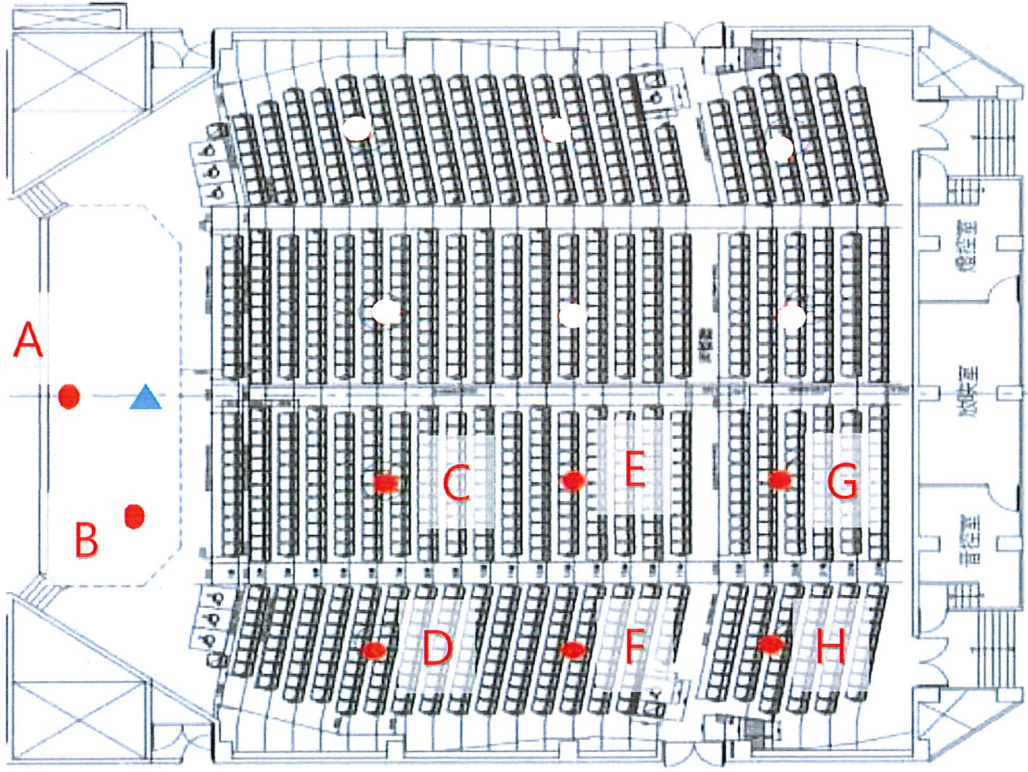
2.1 量測說明

於演藝廳廳內量測各位置之語音清晰度(STI)。

2.2 測試儀器：

1. 無指向性揚聲器- B&K OmniPower Sound Source Type 4296
2. 精密級噪音頻譜分析儀-1/3 Octave Band Noise Analyzer B&K Type 2270校正報告書 詳附件(一)
3. 功率擴大機-B&K Type 2716-C
4. 音場測試分析軟體-DIRAC 6 Type 7841

2.3 測試空間及標示：

空間名稱	測量位置
	 <p data-bbox="1201 1787 1401 1818">▲ 音源點-共 1 點</p> <p data-bbox="1201 1832 1401 1863">● 接收點-共 10 點</p>

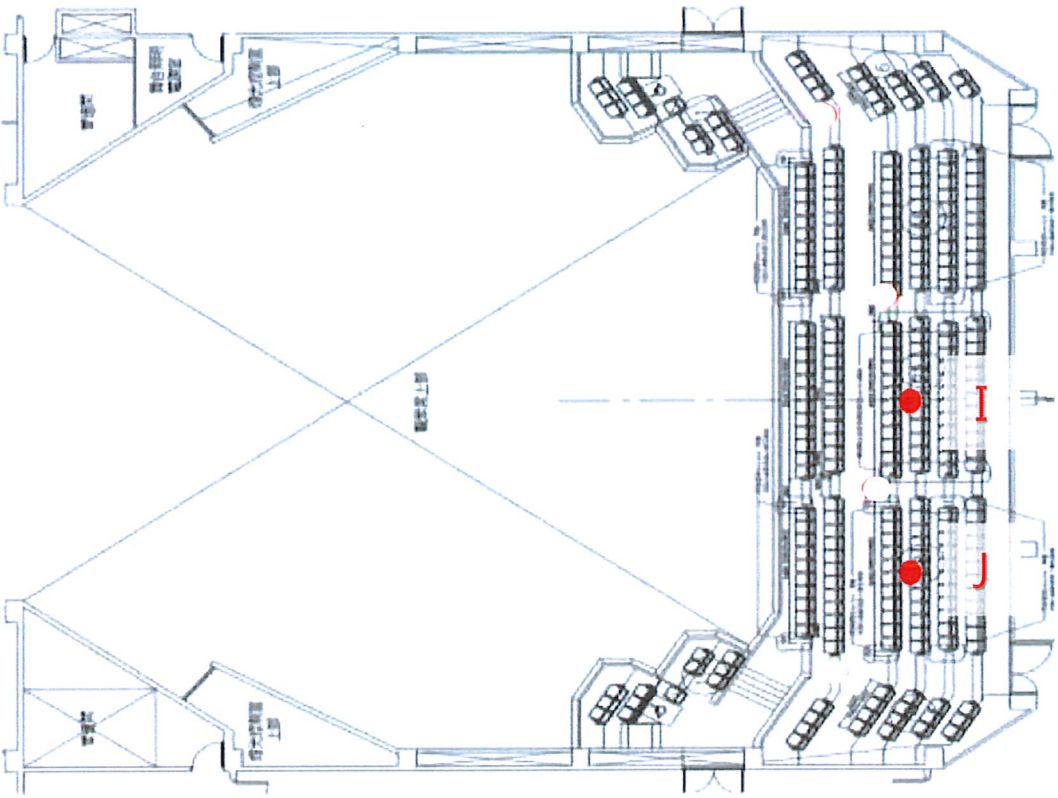


图 1-1-1 观众席平面布置图

3.4 測試結果:

量測位置	A 點	B 點	C 點	D 點	E 點	F 點	G 點	H 點	I 點	J 點	平均
STI	0.63	0.64	0.51	0.51	0.48	0.45	0.51	0.49	0.49	0.48	0.52



附件二：演藝廳Dirac語音清晰度實測數值

<p>Speech</p> <p>File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心A.wav Date: 2019/12/12 下午 06:42:39</p> <table border="1"> <thead> <tr> <th>Frequency [Hz]:</th> <th>125</th> <th>250</th> <th>500</th> <th>1000</th> <th>2000</th> <th>4000</th> <th>8000</th> </tr> </thead> <tbody> <tr> <td>INR [dB]:</td> <td>40</td> <td>42</td> <td>41</td> <td>39</td> <td>35</td> <td>35</td> <td>36</td> </tr> <tr> <td>EDT [s]:</td> <td>0.325</td> <td>0.780</td> <td>0.912</td> <td>1.405</td> <td>1.569</td> <td>1.520</td> <td>0.642</td> </tr> <tr> <td>D50</td> <td>0.88</td> <td>0.68</td> <td>0.73</td> <td>0.72</td> <td>0.71</td> <td>0.64</td> <td>0.87</td> </tr> <tr> <td>Measured SNR [dB]:</td> <td>26</td> <td>29</td> <td>27</td> <td>25</td> <td>22</td> <td>22</td> <td>21</td> </tr> <tr> <td>Calc. SNR [dB]:</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> </tr> </tbody> </table> <table border="1"> <tbody> <tr> <td>STI female</td> <td>:0.62 (Good)</td> </tr> <tr> <td>% ALC</td> <td>:15.96</td> </tr> <tr> <td>STI male</td> <td>:0.62 (Good)</td> </tr> <tr> <td>% ALC</td> <td>:16.07</td> </tr> <tr> <td>STIPA</td> <td>:0.63 (Good)</td> </tr> <tr> <td>% ALC</td> <td>:15.73</td> </tr> <tr> <td>STITEL</td> <td>:0.63 (Good)</td> </tr> <tr> <td>% ALC</td> <td>:15.53</td> </tr> </tbody> </table>	Frequency [Hz]:	125	250	500	1000	2000	4000	8000	INR [dB]:	40	42	41	39	35	35	36	EDT [s]:	0.325	0.780	0.912	1.405	1.569	1.520	0.642	D50	0.88	0.68	0.73	0.72	0.71	0.64	0.87	Measured SNR [dB]:	26	29	27	25	22	22	21	Calc. SNR [dB]:	--	--	--	--	--	--	--	STI female	:0.62 (Good)	% ALC	:15.96	STI male	:0.62 (Good)	% ALC	:16.07	STIPA	:0.63 (Good)	% ALC	:15.73	STITEL	:0.63 (Good)	% ALC	:15.53	<p>Speech</p> <p>File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心B.wav Date: 2019/12/12 下午 06:43:52</p> <table border="1"> <thead> <tr> <th>Frequency [Hz]:</th> <th>125</th> <th>250</th> <th>500</th> <th>1000</th> <th>2000</th> <th>4000</th> <th>8000</th> </tr> </thead> <tbody> <tr> <td>INR [dB]:</td> <td>39</td> <td>43</td> <td>44</td> <td>41</td> <td>39</td> <td>39</td> <td>39</td> </tr> <tr> <td>EDT [s]:</td> <td>0.602</td> <td>0.863</td> <td>0.940</td> <td>1.117</td> <td>1.327</td> <td>1.059</td> <td>0.660</td> </tr> <tr> <td>D50</td> <td>0.84</td> <td>0.75</td> <td>0.77</td> <td>0.73</td> <td>0.70</td> <td>0.77</td> <td>0.83</td> </tr> <tr> <td>Measured SNR [dB]:</td> <td>25</td> <td>29</td> <td>31</td> <td>29</td> <td>26</td> <td>26</td> <td>29</td> </tr> <tr> <td>Calc. SNR [dB]:</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> </tr> </tbody> </table> <table border="1"> <tbody> <tr> <td>STI female</td> <td>:0.63 (Good)</td> </tr> <tr> <td>% ALC</td> <td>:15.46</td> </tr> <tr> <td>STI male</td> <td>:0.63 (Good)</td> </tr> <tr> <td>% ALC</td> <td>:15.53</td> </tr> <tr> <td>STIPA</td> <td>:0.64 (Good)</td> </tr> <tr> <td>% ALC</td> <td>:15.46</td> </tr> <tr> <td>STITEL</td> <td>:0.63 (Good)</td> </tr> <tr> <td>% ALC</td> <td>:15.61</td> </tr> </tbody> </table>	Frequency [Hz]:	125	250	500	1000	2000	4000	8000	INR [dB]:	39	43	44	41	39	39	39	EDT [s]:	0.602	0.863	0.940	1.117	1.327	1.059	0.660	D50	0.84	0.75	0.77	0.73	0.70	0.77	0.83	Measured SNR [dB]:	25	29	31	29	26	26	29	Calc. SNR [dB]:	--	--	--	--	--	--	--	STI female	:0.63 (Good)	% ALC	:15.46	STI male	:0.63 (Good)	% ALC	:15.53	STIPA	:0.64 (Good)	% ALC	:15.46	STITEL	:0.63 (Good)	% ALC	:15.61
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Speech

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\G.wav
Date: 2019/12/12 下午 06:53:51

Frequency [Hz]:	125	250	500	1000	2000	4000	8000
INR [dB]:	37	39	36	34	33	33	33
EDT [s]:	1.032	0.971	1.262	1.666	1.594	1.505	1.165
D50	: 0.23	0.26	0.29	0.38	0.45	0.37	0.44
Measured SNR [dB]:	23	25	22	21	20	20	19
Calc. SNR [dB]:	--	--	--	--	--	--	--

STI female :0.49 (Fair)
% ALC :11.90

STI male :0.49 (Fair)
% ALC :12.08

STIPA :0.51 (Fair)
% ALC :10.94

STITEL :0.50 (Fair)
% ALC :11.14

Speech

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\H.wav
Date: 2019/12/12 下午 06:54:39

Frequency [Hz]:	125	250	500	1000	2000	4000	8000
INR [dB]:	40	42	42	39	36	36	36
EDT [s]:	1.615	1.446	1.618	1.767	1.712	1.760	1.172
D50	: 0.51	0.70	0.59	0.49	0.49	0.43	0.62
Measured SNR [dB]:	26	28	29	26	24	22	21
Calc. SNR [dB]:	--	--	--	--	--	--	--

STI female :0.49 (Fair)
% ALC :11.72

STI male :0.50 (Fair)
% ALC :11.65

STIPA :0.49 (Fair)
% ALC :12.12

STITEL :0.51 (Fair)
% ALC :10.61

Speech

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\I.wav
Date: 2019/12/12 下午 07:00:41

Frequency [Hz]:	125	250	500	1000	2000	4000	8000
INR [dB]:	37	35	32	32	31	31	32
EDT [s]:	1.234	1.154	1.264	1.709	1.612	1.393	1.049
D50	: 0.34	0.52	0.56	0.48	0.48	0.57	0.67
Measured SNR [dB]:	22	20	19	19	18	17	17
Calc. SNR [dB]:	--	--	--	--	--	--	--

STI female :0.49 (Fair)
% ALC :12.25

STI male :0.49 (Fair)
% ALC :12.16

STIPA :0.49 (Fair)
% ALC :12.31

STITEL :0.50 (Fair)
% ALC :11.17

Speech

File: C:\Users\Lenovo\Desktop\108.12.12台東縣文化藝文中心\J.wav
Date: 2019/12/12 下午 07:01:33

Frequency [Hz]:	125	250	500	1000	2000	4000	8000
INR [dB]:	39	41	36	34	32	32	33
EDT [s]:	1.392	1.233	1.460	1.798	1.679	1.547	1.174
D50	: 0.24	0.63	0.33	0.24	0.20	0.31	0.37
Measured SNR [dB]:	25	26	23	21	19	18	18
Calc. SNR [dB]:	--	--	--	--	--	--	--

STI female :0.48 (Fair)
% ALC :12.73

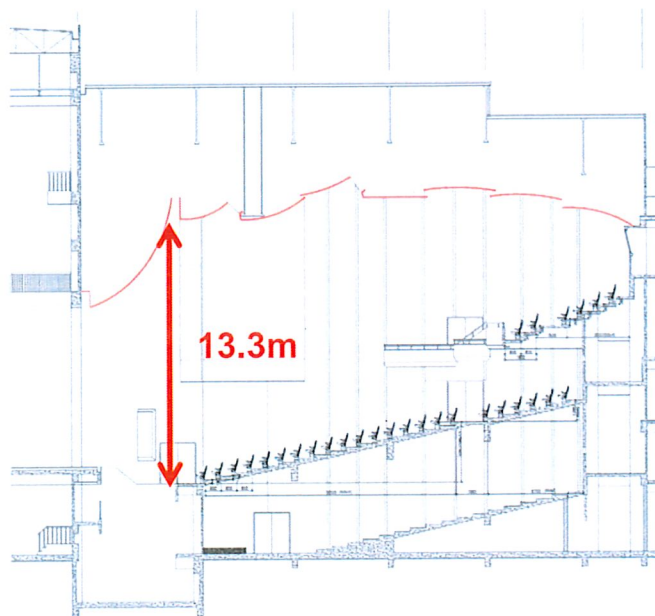
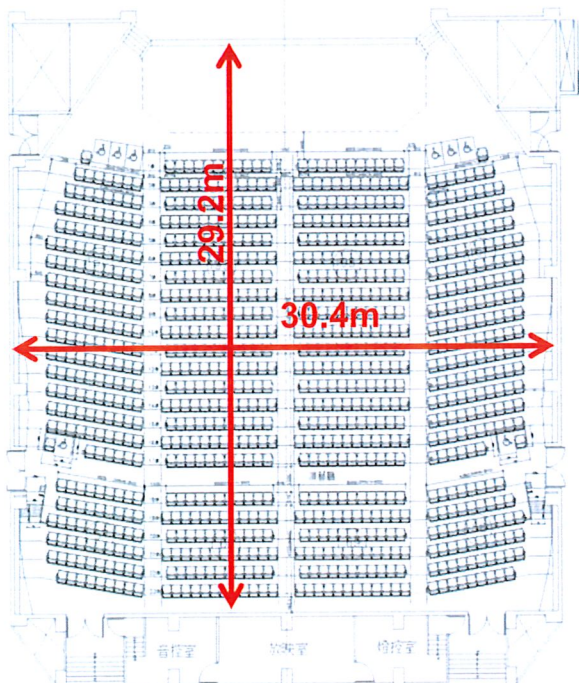
STI male :0.46 (Fair)
% ALC :12.44

STIPA :0.48 (Fair)
% ALC :12.88

STITEL :0.52 (Fair)
% ALC :10.19

附件三：演藝廳室容積對照表

依據本空間之室容積約 10875m³



依照室容積與空間殘響對應比照表如下：

