2023 08

1 1
2 5
3 6
4 7
5 8
6 9
7 11
8 15
9 18
10 24
11 34
12 49
13 54
14 57

1

					53687661
	20 5 8 8005				
	3 1				
	3000		600	/	20%
				m^2	400
			PET		
			/		

1.1

1.2

1.3

1.3.1

2021 12

5

2025

2025

75%

X

MLC

HK-X601 HK-X602

HK-X601 HK-X602

HK-X601

X

HK-X601

HK-X601

HK-X602 HK-X601

HK-X602

SBRT 2

1.3.2

3 1 1 2

1 2 X 6MV

1 2 1 6MV 1m

8Gy/min@ FFF ±185° CBCT 150kV/630mA

1-1

			X	
1	1	HK-X601	6MV 8Gy/min 1.0m :11.5cm×15cm 76.5cm×80.5cm ±185° CBCT 150kV/630mA/50kW	
2	2	HK-X602	6MV 8Gy/min 1.0m :11.5cm×15cm 76.5cm×80.5cm ±185° CBCT 150kV/630mA/50kW	

1.3.3

2019

5

2022

GB18871-2002

1.3.4

3 1

1

2

		Bq / **Bq ×**						
1								

n/s

3

				Bq	**Bq**	**Bq**				

4

						MeV	mA / Gy/h			
1		II	1	HK-X601		6MV X	1m 480Gy/h@ FFF		1	
2		II	1	HK-X602		6MV X	1m 480Gy/h @ FFF		2	

6

	1 2015 1 1 2 2018 12 29 3 2003 10 1 4 682 2017 6 21 2017 10 1 5 709 2019 3 2 6 2021 16 2020 11 30 2021 1 1 7 9 2019 9 20 2019 11 1 8 20 2021 1 4 9 18 2011 4 18 2011 5 1 10 66 2017 12 5 11 [2017]4 2017 11 20 12 [2018]24 2018 1 25 13 [2021]61 2021 9 24

14

2011 347

15 2020 2

16

2019 57 2019 12 24

17 2021

9 2021 3 11

1

7

7.1

7.1.1

2 2

7.1.2

HJ10.1-2016

50m

7-1 50m

50m

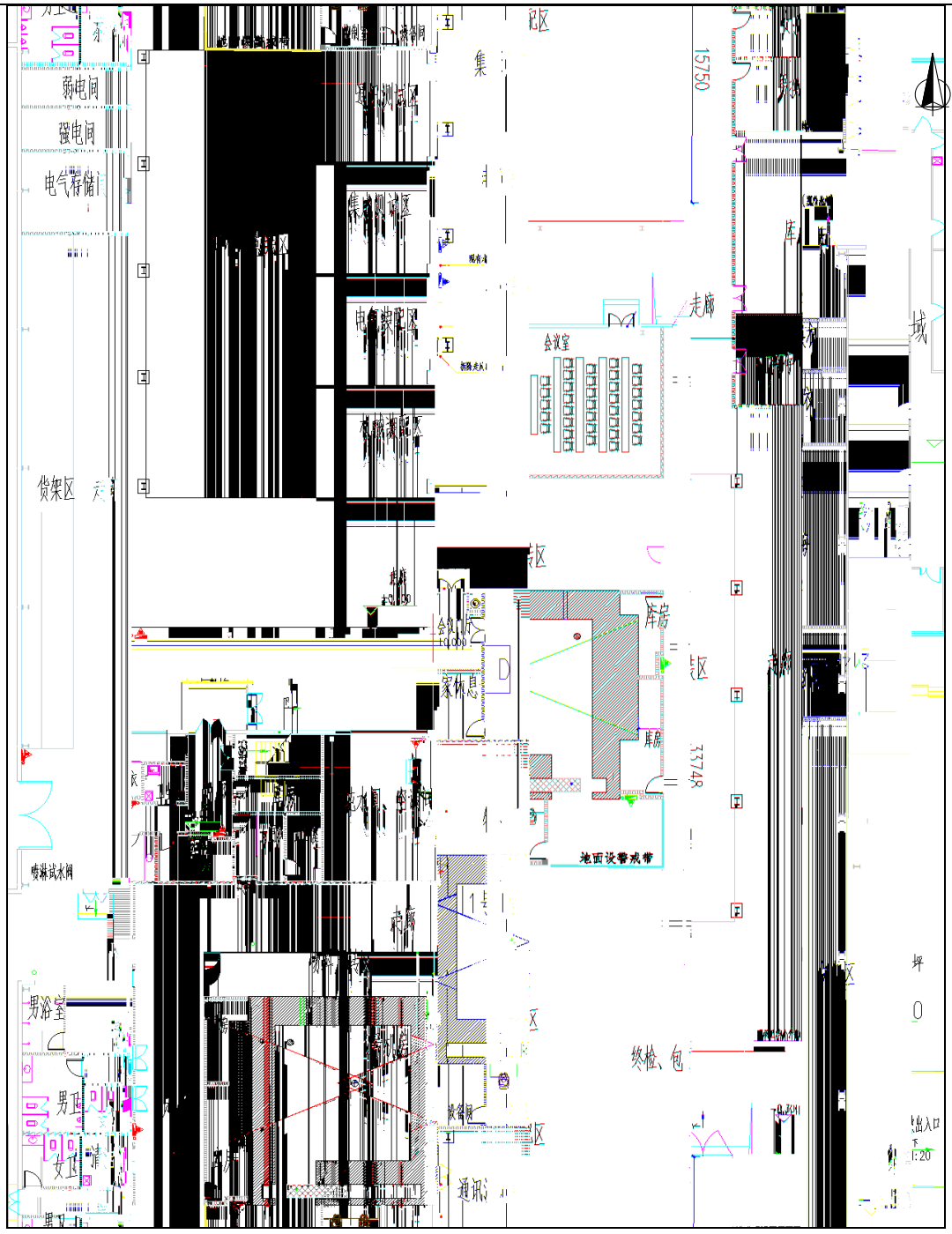
1 2

3

7-1

7.1.3

1



7-2 1

7.3.1

GB18871-2002

7-2

7-2 GB18871-2002

20mSv	1mSv

50mSv	1mSv 5mSv
150mSv/a 500mSv/a	12mSv/a 50mSv/a

GB18871-2002

7.3.2

2mSv

0.1mSv/a

7.3.3

HJ1198-2021

30cm

7.4

1

GBZ2.1-2019 O_3 NO_2 0.3mg/m^3 5mg/m^3

2

GB3095-2012

1 0.2mg/m^3 NO_2 1 0.2mg/m^3

8

8.1

2023 8 2

8.1.1

8.1.2

8-1

8.1.3

1

8-1

2

10 10

8-1

	/	/	
X	FH40G+FHZ672E-10 / FS-004	DLjl2023-00920 2023.2.1-2024.1.31	10nGy/h~100 /h 30keV~8MeV <±15%

8.1.4

1 GB18871-2002

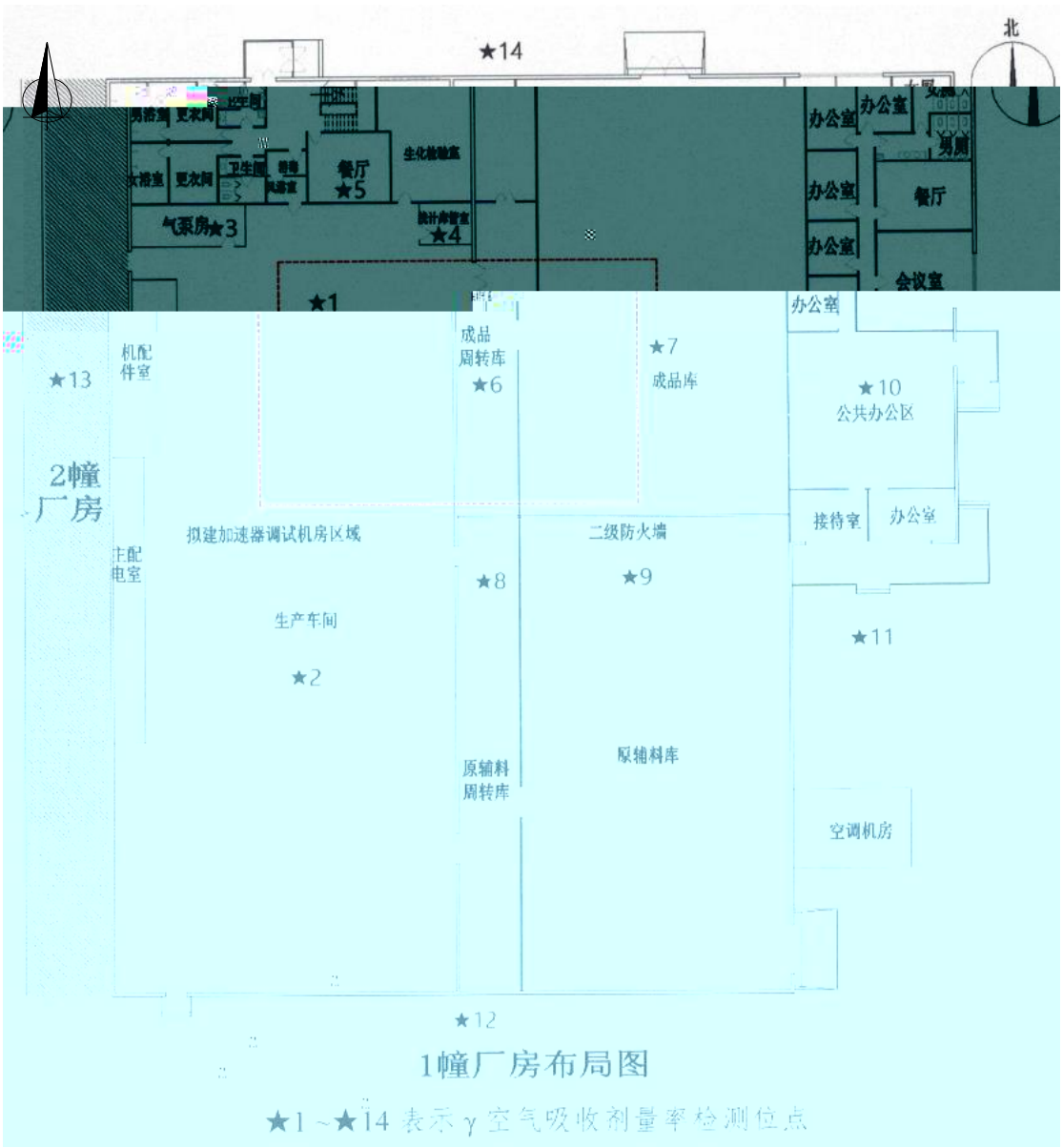
2 HJ1157-2021

8.1.5

8-2

8-2

	2		73.0±2.1	
	3		75.7±2.2	
	4		75.8±2.2	
	5		76.2±2.2	
	6		71.2±2.2	
	7		70.8±2.1	
	8		70.6±2.1	
	9		72.0±2.1	
	10		73.1±2.1	
	11	1	65.4±1.9	
	12	1	65.3±1.9	


北
★14
办公室
办公室
男厕
办公室
餐厅
办公室
会议室
餐厅
★5
生化检验室
气泵房★3
统计库管室
★4
★1
办公室
成品
周转库
★6
★7
成品库
★13
机配
件室
★10
公共办公区
2幢
厂房
拟建加速器调试机房区域
二级防火墙
接待室
办公室
注配
电室
★8
★9
生产车间
★11
★2
原辅料
周转库
原辅料库
空调机房
★12
1幢厂房布局图
★1～★14 表示γ空气吸收剂量率检测位点

8-1

9.1.2

HK-X601 HK-X602

6

X

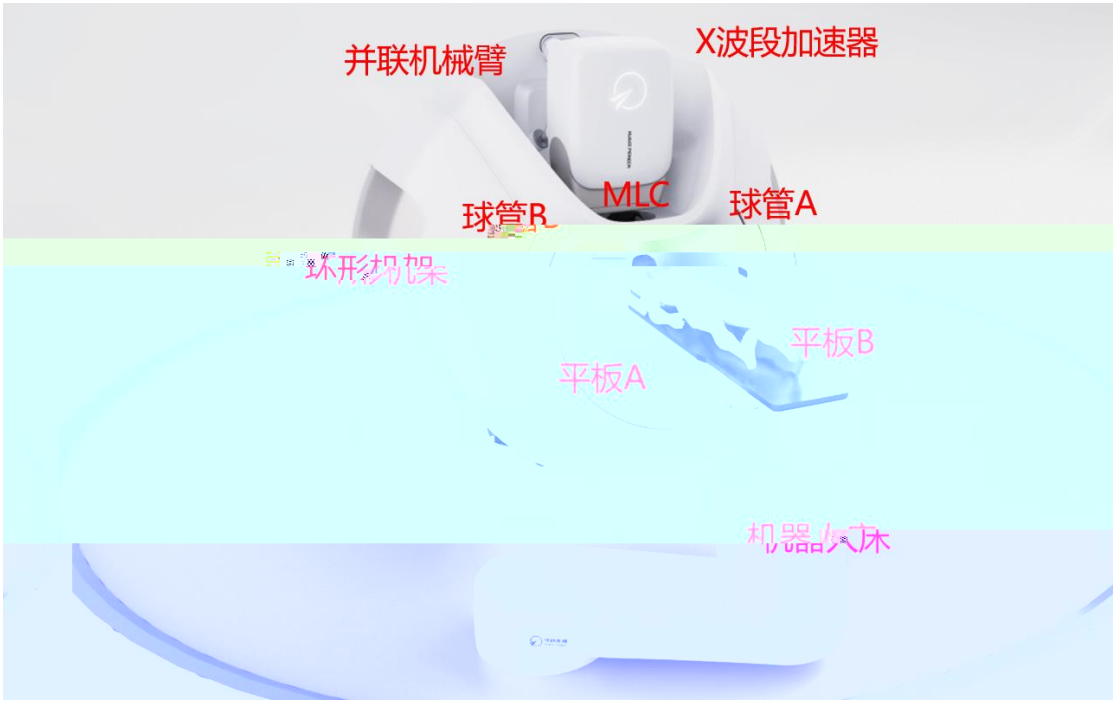
6MV MLC

CBCT

/

9-2

9-3 9-1

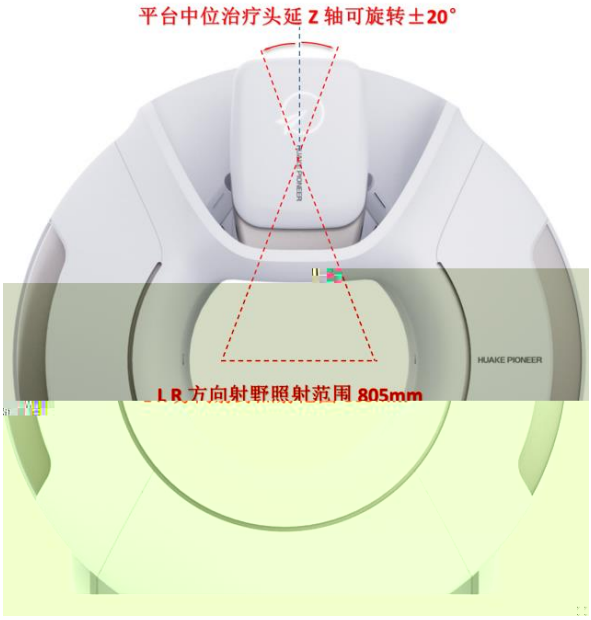


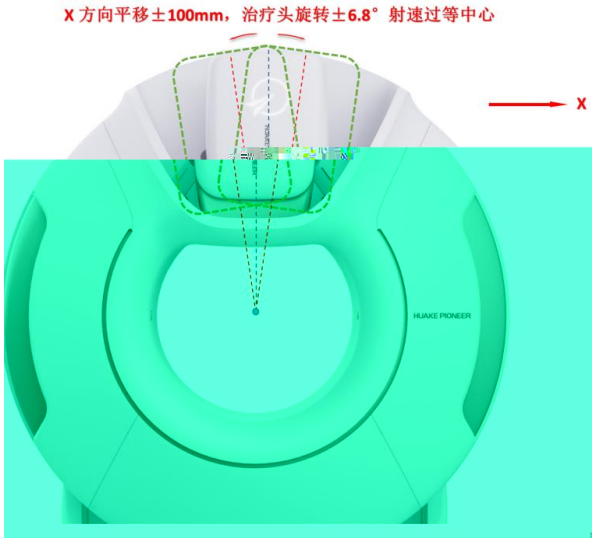
9-2

9-1

6MV		X SAD=1000mm 1m n@FFF 0.1% 6 X Y ±10 cm Z ±3 cm X Y Z

MLC		60 30 11.5cm×15cm 76.5cm×80.5cm 0.5 mm
	X X-	CBCT DRR +45°/-45° 900mm 1510mm
		6 ±12 cm 100cm 70cm 65 cm ±5° ±5° 0.2 mm 0.1°
		360° 20 15min





9-3

9.1.4

, ,

X

X

2 2

9-2

9-2

1		
2		
3		
4		
5		
6		
7		
8	MLC	
9		
10	TPS	

1.0h 250d

250h 50 20%

25 10% 175 70%

9.1.5

9-3

9-3

		1	**2**
1		HK-X601	K-X602

2		X	X
3	X	6MV	6MV
4		8Gy/min 1.0m	8Gy/min 1.0m
5		:11.5cm×15cm 76.5cm×80.5cm	:11.5cm×15cm 6.5cm×80.5cm
8	1m	0.1%	0.1%
9		1.0m	1.0m
10		±185°	
11		CBCT R 150kV/ 0kW	CBCT DRR 150kV/630mA/50kW

9.2

9.2.1

X X

9.2.2

9.2.2.1

1

8Gy/min

X X

10

10.1

10.1.1

2 3 1

2

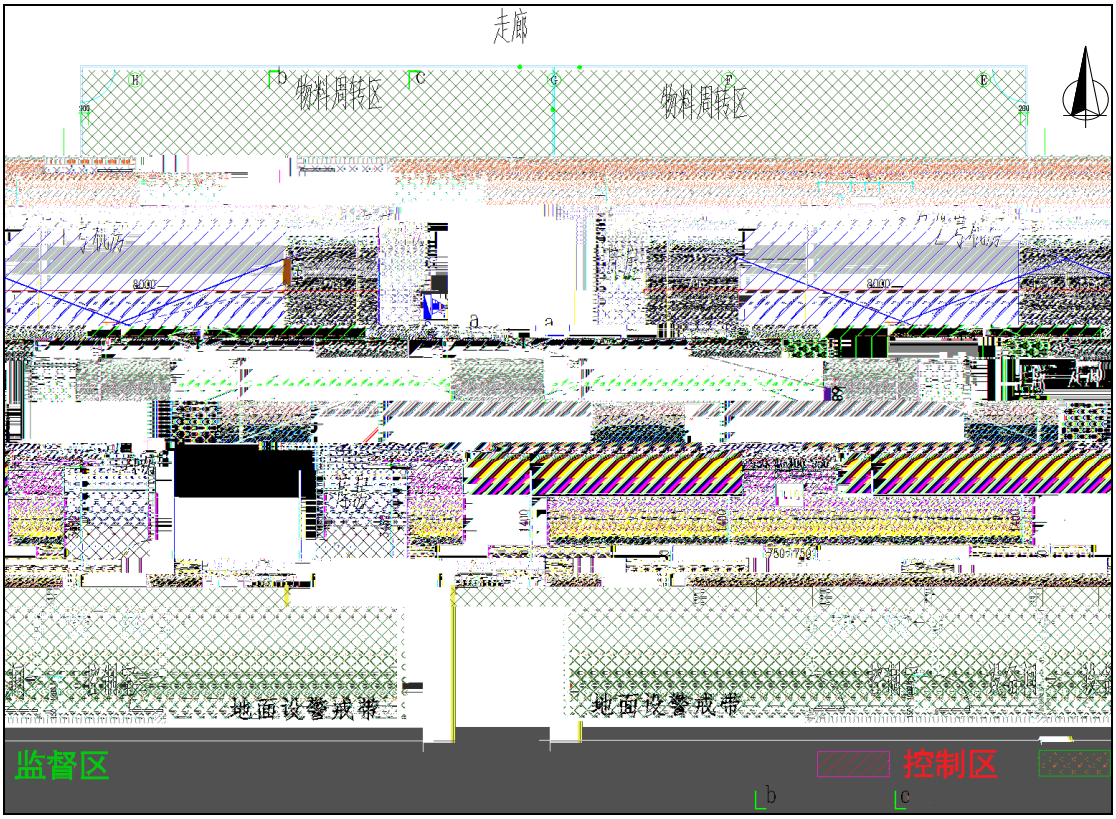
1 2 1

2

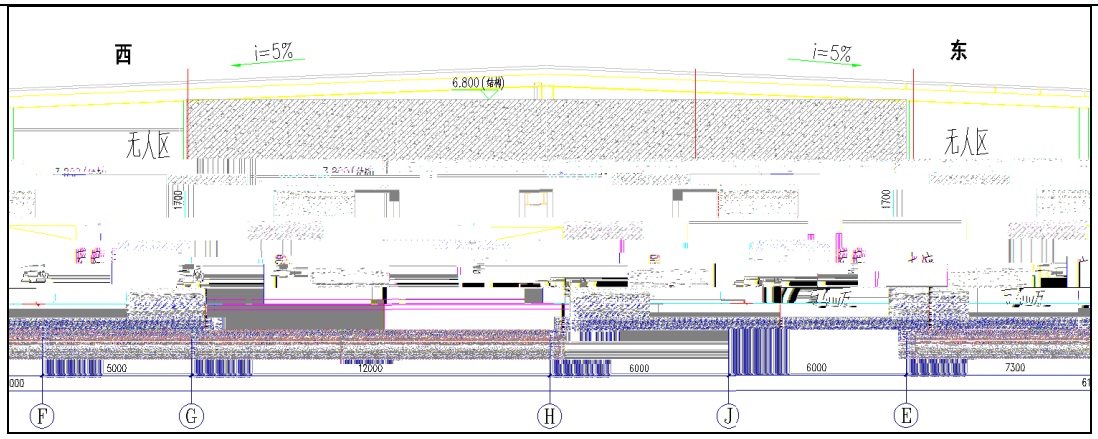
1 2

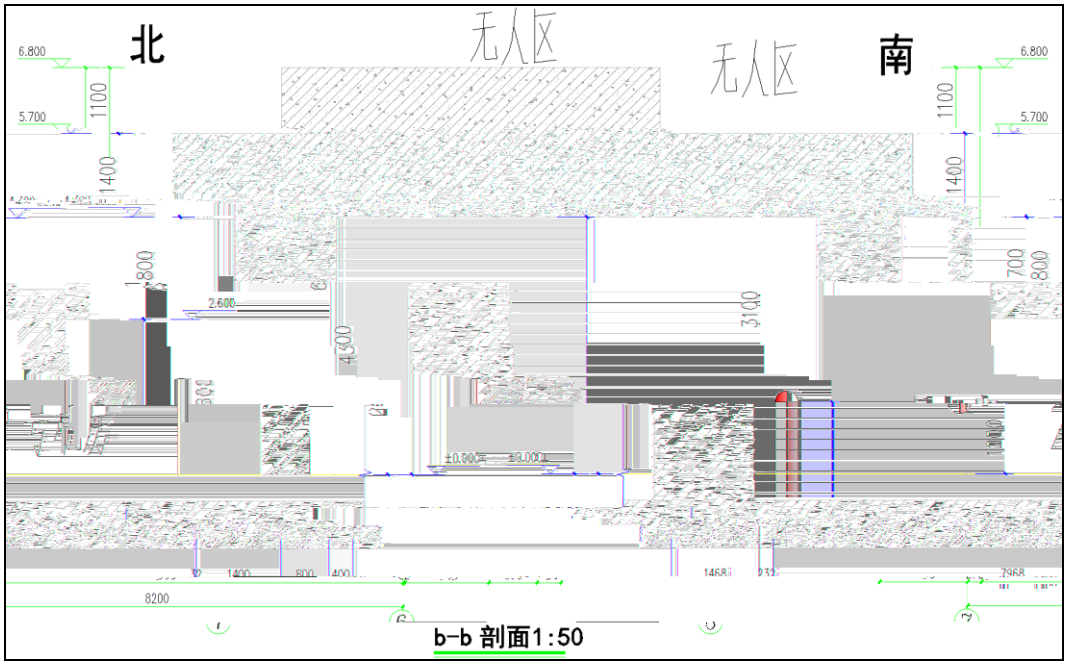
1 2

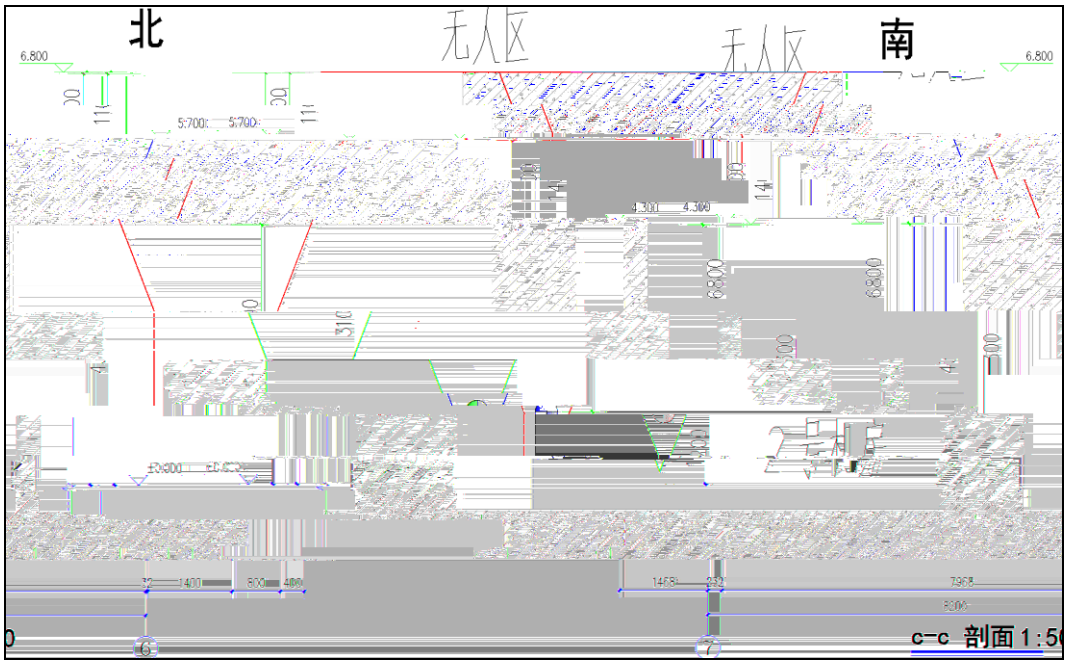
10-1 10-2



10-1


西
i=5%
i=5%
东
无人区
无人区
6.800
5000
12000
6000
6000
7300
F
G
H
J
E


北
无人区
无人区
南
6.800
5.700
1100
1400
1800
2600
4300
3100
700
800
8200
b-b 剖面1:50


北
无人区
无人区
南
6.800
4300
4300
6800
6800
c-c 剖面 1:5

10-2

10.1.2

1 2 1 6MV

360° 2

+

10-1 2

	2	**1**
	270cm	270cm 740cm
	270cm 190cm	160cm
	270cm 740cm	270cm
	160cm	270cm 190cm
	250cm	250cm
	140cm	140cm
	140cm +40cm	140cm +40cm
	170cm	170cm

5

6

7

8

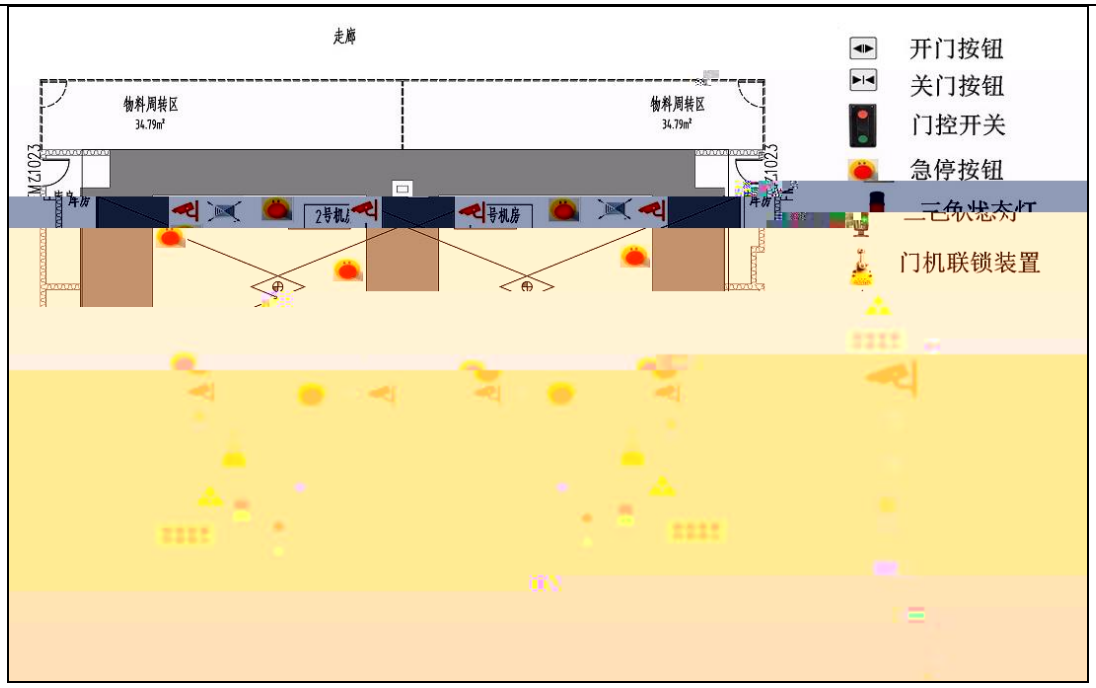
9 5

1 1 1

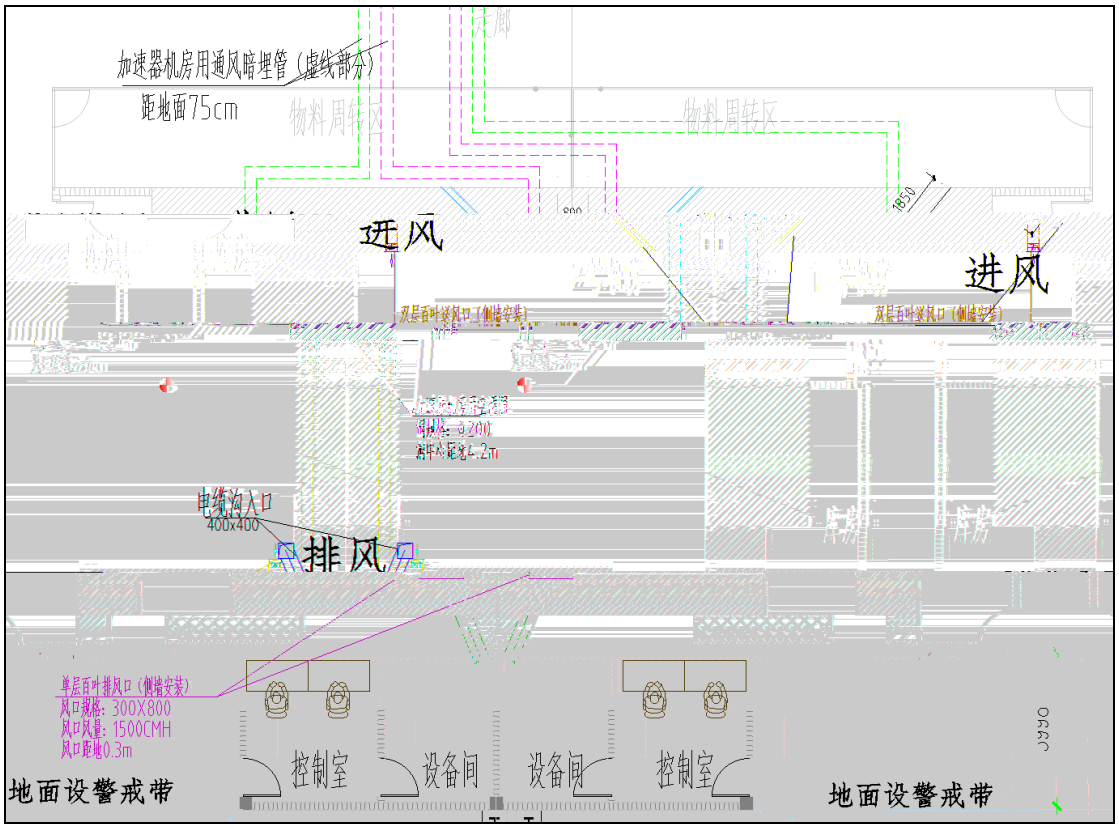
10 1

30

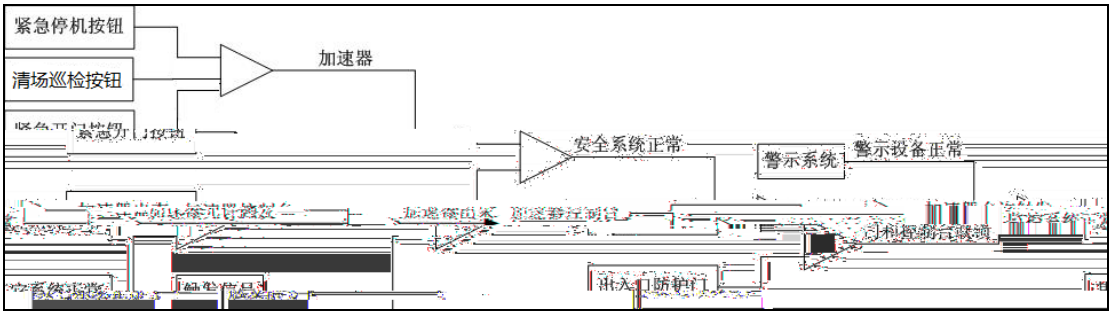
11


走廊
物料周转区
34.79m²
物料周转区
34.79m²
2号机房
1号机房
开门按钮
关门按钮
门控开关
急停按钮
三色状态灯
门机联锁装置

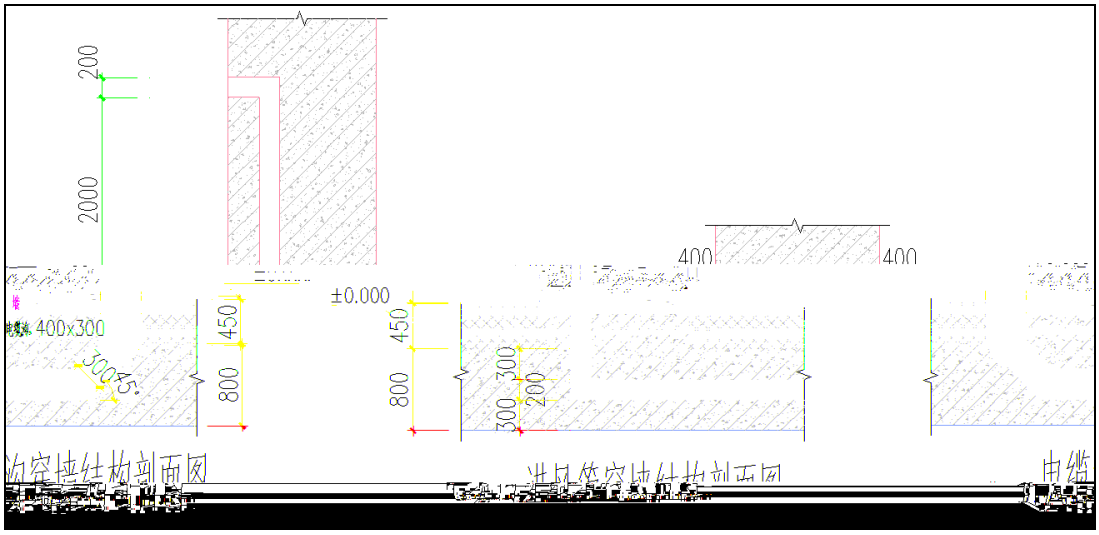
10-3


加速器机房用通风暗埋管（虚线部分）
距地面75cm
物料周转区
物料周转区
进风
进风
双层百叶送风口（侧墙安装）
电缆沟入口
400x400
排风
单层百叶排风口（侧墙安装）
风口规格：300X800
风口风量：1500CMH
风口距地0.3m
控制室
设备间
设备间
控制室
地面设警戒带
地面设警戒带

10-4



10-4



10-5

10-2

1*	A			
2*				1
3*				1
4*				
5*	B			
6*				
7*				
8*	C			
9				
10*				

11*				5
12*				2
13	D			1
14*				1
15*				4
16*				1
17*	E			/
18				

* × /

10.2

10-3 10-4

10.2.1

10-3

10-3

1	1		
2		8	
3			/

4			
5		u 1 9 4 2	

6

3

1 31

6MV

11

11.1

1

2

3

4

11.2

11.2.1

1

2 3 1 2

1 2 11-1

11-1 2

1			2			
2	1					

2

11-2

11-2

		X	**SAD**			*****
1	HK-X601	6MV 8Gy/min@ FFF	100cm	76.5cm×80.5cm	±185°	
2	HK-X602	6MV 8Gy/min@ FFF	100cm	76.5cm×80.5cm	±185°	

3

11-3

11-3

		h	**h/**
1	HK-X601	1	250
2	HK-X602	1	250

1 2 50 20%

25 10% 175 70%

11.2.2

1 NCRP151 GBZ/T201.2-2011

NCRP151 GBZ/T201.2-2011 6MVX

2 2

kV 150kV/630mA X

MV X MV

11.2.3

1

1 2 28 11-1

d=2[*SAD* *R* ×*F*/2+0.3] 11-1

d m *SAD* 1m *F*

GT 76.5cm *R*

m

1 2 11-1 11-1 11-4

11-4

	R m	**m**	**m**	
1	7.385	7.01	7.40	
1	5.60	5.65	6.30	
2	7.385	7.01	7.40	
2	5.60	5.65	6.30	

2

30cm

11.2.4

11.2.4.1

1

$$H = H_0 \times B_{pri}/R^2 \qquad 11\text{-}2$$

$$B_{pri} = 10^{-\left[1+\frac{t-TVL_1}{TVL_e}\right]} \qquad 11\text{-}3$$

H_0 1m 4.8×10^8 ^{2}/h

B_{pri}

R

t

TVL_e TVL_1 cm 11-5

11-5 TVL

						15°
		TVL_1	TVL_e	TVL_1	TVL_e	TVL
cm	6MV	37	33	34	29	34
cm	6MV	5.7	5.7	5.7	5.7	/
cm	6MV	10	10	10	10	/

2

$$H_{PS} = \frac{aH_0B_{ps}\frac{F}{400}}{{d_{sca}}^2\times{d_{sec}}^2} \qquad 11\text{-}4$$

$$B_{ps} = 10^{-t/TVL_{sca}} \qquad 11\text{-}5$$

H_L d_Lm

B_L

d_L m

TVL_e TVL_1 cm 11-5

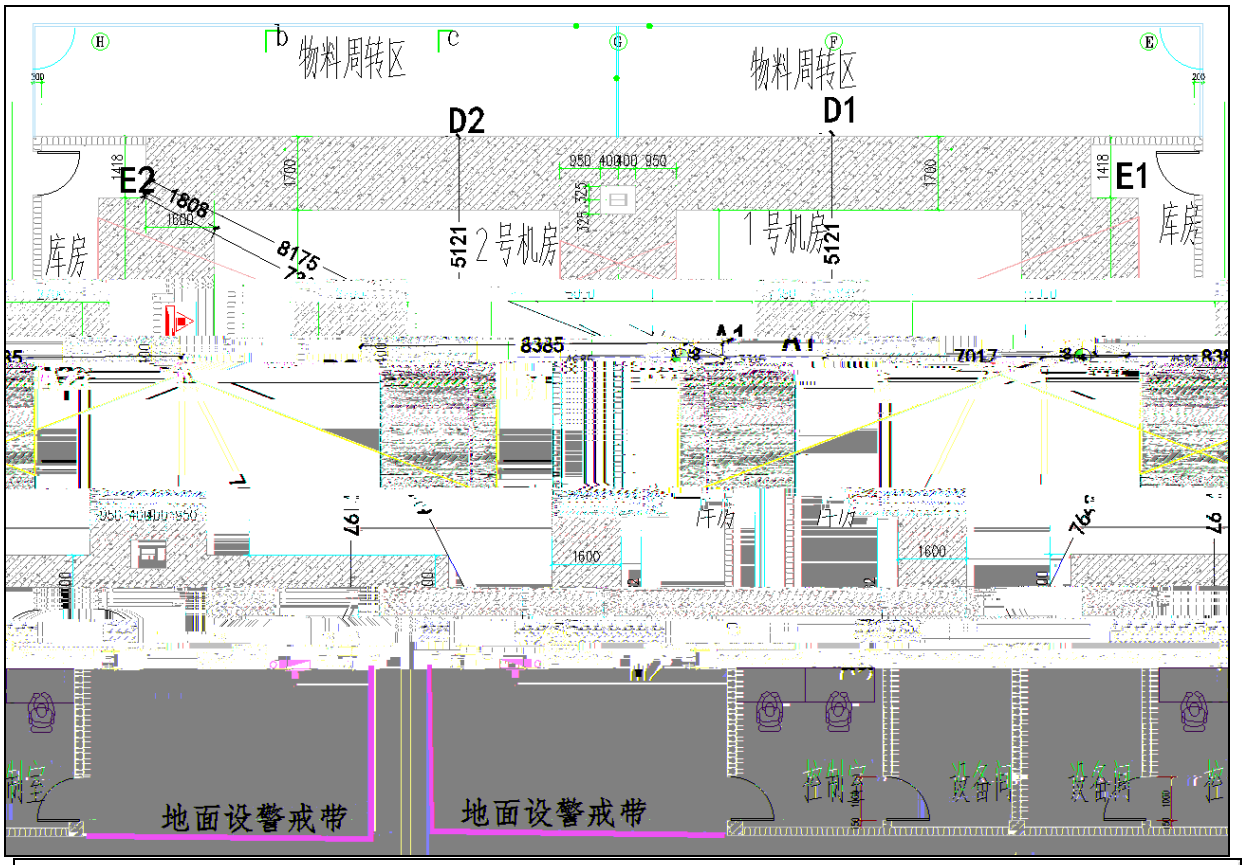
t 11-2 11-3 H_0 4.8×10^8 ^{2}/h

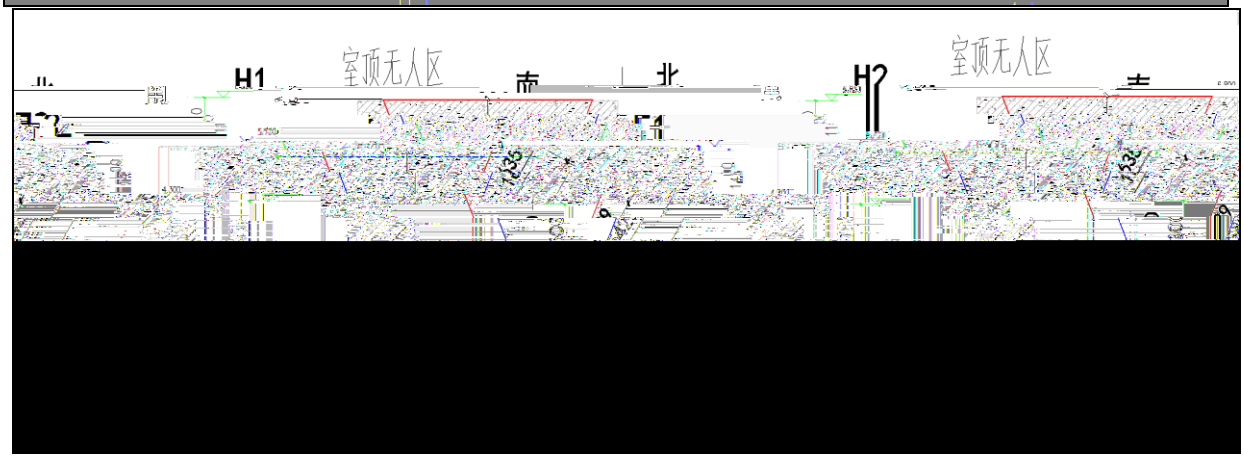
11.2.4.2

1 1

1 11-6 1 11-2

11





11-1

2 2

2 11-7 2 11-3

H2	6.9		250cm	3.51E-08	1.01E+07	3.54E-01	
C2	7.5		180cm	9.24E-07	8.53E+03	7.88E-03	
D2	5.4		170cm	2.04E-06	1.65E+04	3.36E-02	
E2	8.5		180cm	9.24E-07	6.64E+03	6.14E-03	
	7.6			6.26E-07	3.72E+04	2.33E-02	
I2	6.6		163cm	3.56E-06	1.10E+04	3.93E-02	
	5.7			1.61E-05	6.62E+04	1.06E+00	
M2	7.9		20cm +15cm	2.34E-05	7.69E+03	1.80E-01	

1 2.35t/m^3 11.34t/m^3 7.87t/m^3 2 6MVX

1m 4.80×10^{8} 3 6MVX 10^{o}

1.04×10^{-2} 4 5 6

30cm

11-6 11-7 1 2

v/h

11.2.4.3

GBZT 201.2-2011 6MV

1

a H_s

b H_{PS}

c

1 H_s

$$H_S = \frac{H_0}{{d_0}^2} \times \frac{a_0 A_0}{{d_r}^2} \times 10^{-t/TVL}$$ 11-8

H_0 1m 4.8×10^{8} ^{2}/h

0 A_0 NCRP REPORT 151 TableB.8a

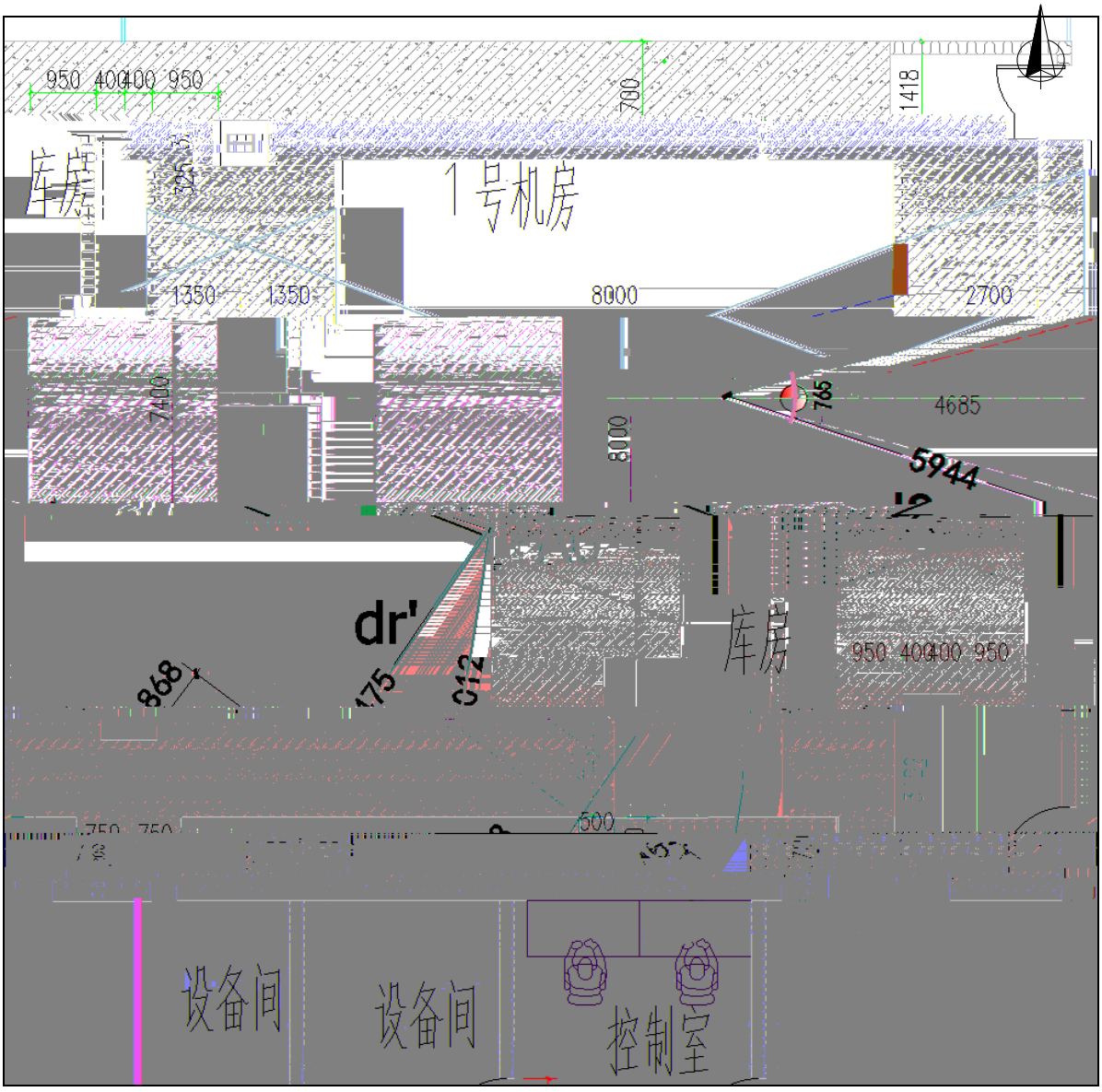
A_0 1.0m $0.684\times0.892m^2$

d_0 5.9m

dr 30cm 5.3m 6.8m

t

TVL cm



11-2

2 H_{Ps}

$$H_{PS} = \frac{a_{(\theta)} H_0 (\frac{F}{400})}{{d_{sca}}^2 \times {d_{sec}}^2} \times 10^{-t/TVL} \qquad 11\text{-}9$$

38° NCRP

REPORT 151 TableB.4 2.77×10^{-3} =30°

H_0 4.8×10^8 ^{2}/h

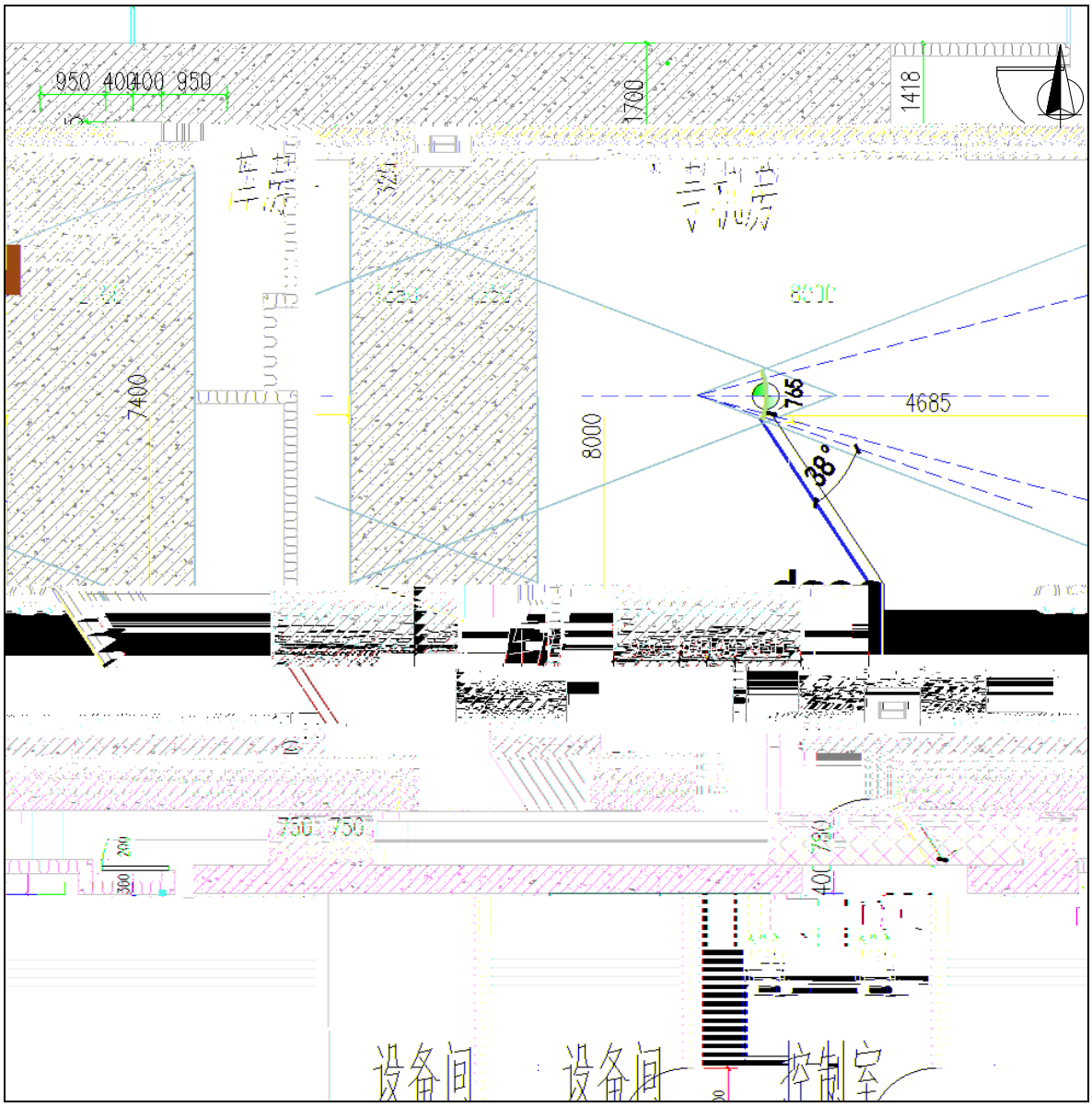
F 172.5cm^2 11.5cm×15cm

d_{sca} 1.0m

d_{sec} 8.0m

t

TVL cm



11-3

3

11-6

4 X

11-8~ 11-9 11-2~ 11-3

11-10 2

11.2.4.2

11-10 1

E--

D--

t-- h/a

K-- Sv/Gy 1.0

T--

5.25E-04mSv/a 2mSv/a 0.1mSv/a

50m 5.25E-04mSv/a

0.1mSv/a

11.2.6 O_3 NO_X

X X 6MV

1 O_3

O_3

$$P = 2.43D_0(1-\cos\theta)RG \qquad 11\text{-}11$$

P O_3 mg/h

D_0 1m Gy·m^2/min

R m

G 100eV O_3 G=10

O_3

O_3 10% O_3 P mg/h

$$P = 3.32\times10^{-3}D_0GV^{1/3} \qquad 11\text{-}12$$

V m^3 11-11

2 O_3

O_3 t_d 0.83h

t_V h

O_3 mg/h

$$Q = \frac{P}{V}\overline{T} \qquad 11\text{-}13$$

V m^3

T O_3 h

$$\overline{T} = \frac{t_v \times t_d}{t_v + t_d} \qquad 11\text{-}14$$

3

GBZ121-2020 4 /h

4 /h

275m^3 8m×8m×4.3m 1500m^3/h t_V=0.183h 11-14

T =0.15h O_3 11-13

11-13 O_3

	D_0 Gy·m^2/min	°	R m	V m^3	P mg/h	Q mg/m^3
1	8	4.5	5.6	275	5.1	2.8E-03
2	8	4.5	5.6	275	5.1	2.8E-03

2.55g O_3

2.8×10^{-3}mg/m^3 0.3mg/m^3 O_3

NO_x NO_2 O_3

O_3 16.7 GB3095-2012 NO_2 O_3

NO_x

11.2.7

1

10s 124 4.46E+4×10/3600

2

X

1

2

3 ,

4

<2006>145

2

11.3

11-15

11-15

	GB18871-2002 0.1mSv/a 2mSv/a

	GB18871-2002
	30cm
	1 4 2

12

12.1

12.1.1

12-1

					/

1

2

3

4

5

6

7

8

12.1.2

8

12.2

12.3

12.3.1

TLD 3

GBZ128-2019

18

12.3.2

18 1

2

1 4

2

1 X

2 X-

3 2

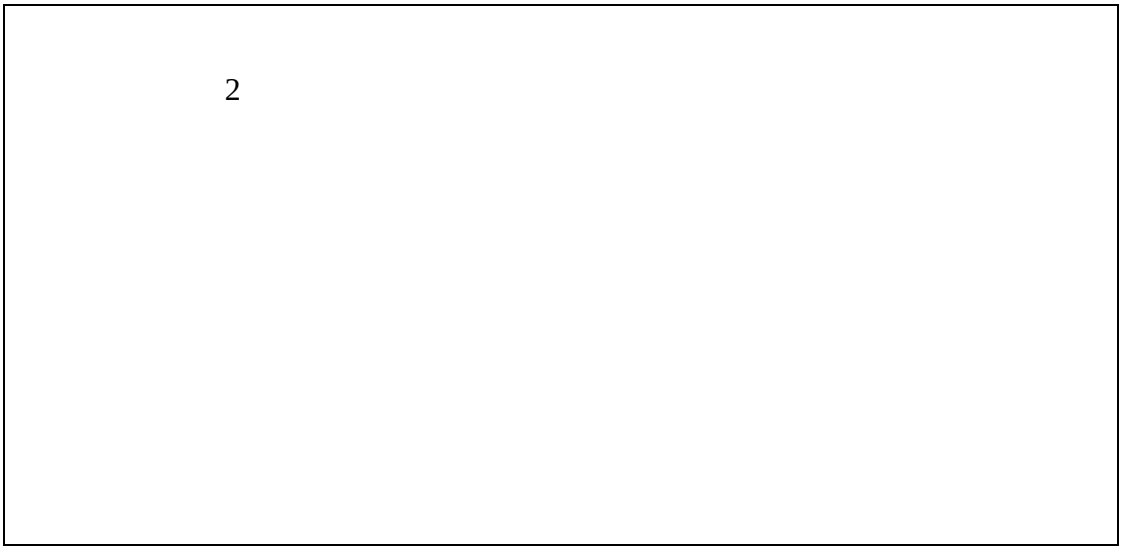
4

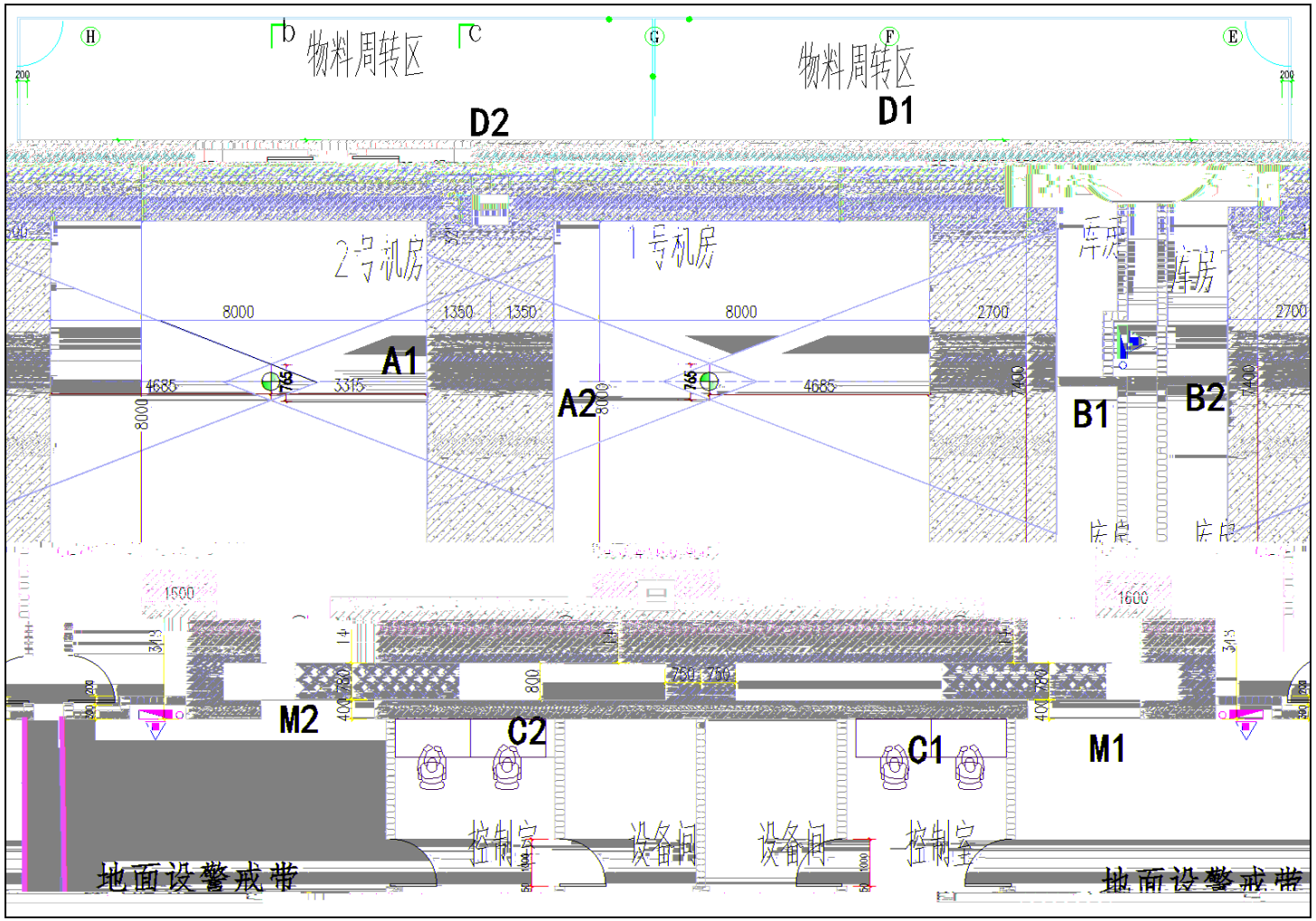
12-1 12-1

12-1

1	A1	2		2 /
	B1			2 /
	C1			2 /
	D1			2 /
	E1			2 /
	M1			2 /
2	A2	1		2 /
	B2			2 /
	C2			2 /
	D2			2 /
	E2			2 /
	M2			2 /

12.4


2


物料周转区
物料周转区
D2
D1
2号机房
1号机房
A1
A2
B1
B2
M2
C2
C1
M1
控制室
设备间
设备间
控制室
地面设警戒带
地面设警戒带

12-1

13

13.1

13.1.1

3 1 1 2

1 2 X 6MV

13.1.2

2

GB18871-2002

13.1.3

50m

50m

13.1.4

13.1.5

1

2mSv/a

100 v/a GB18871-2002

2

3

1

4

5

13.1.6

13.2

1

2

3

4

5