



CEPC tunnel shafts arrangement discussion



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Content

- **通用设施布局及对竖井的需求**
 - **Power consumption**
 - **Colling system**
 - ...
 - **各区域竖井设置（管井/运输/通行） - CDR/TDR**
 - **讨论**
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Electric engineering

● Power supplies and schemes

● 220kV/110kV Master substation

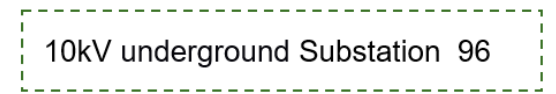
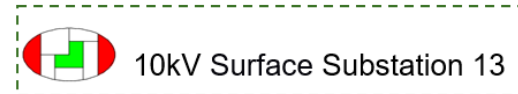
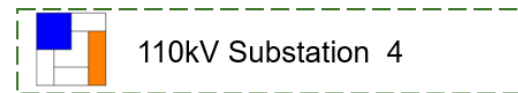
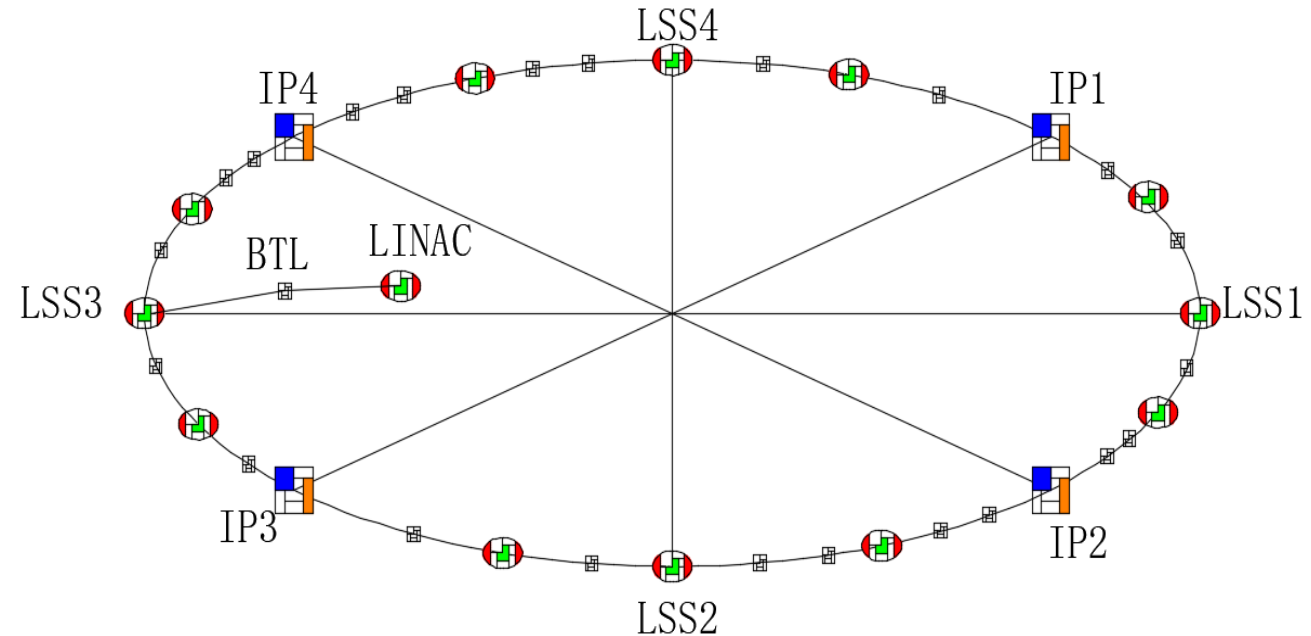
- 2 substations : 2*210MVA (220/110kV/10kV).
- **220kV feeds connected to grid station nearby** (State Grid Corporation of China).

● 110kV/10kV step-down substations

- 4 substations respectively located in IP1~IP4.

● 10kV step-down substations

- 10kV feeders from 110kV/10kV substation nearby.
- Surface 10kV loop : 36
- Underground 10kV loop
 - 96 substations (10/0.4kV) along the ring tunnel.
 - near the load points.



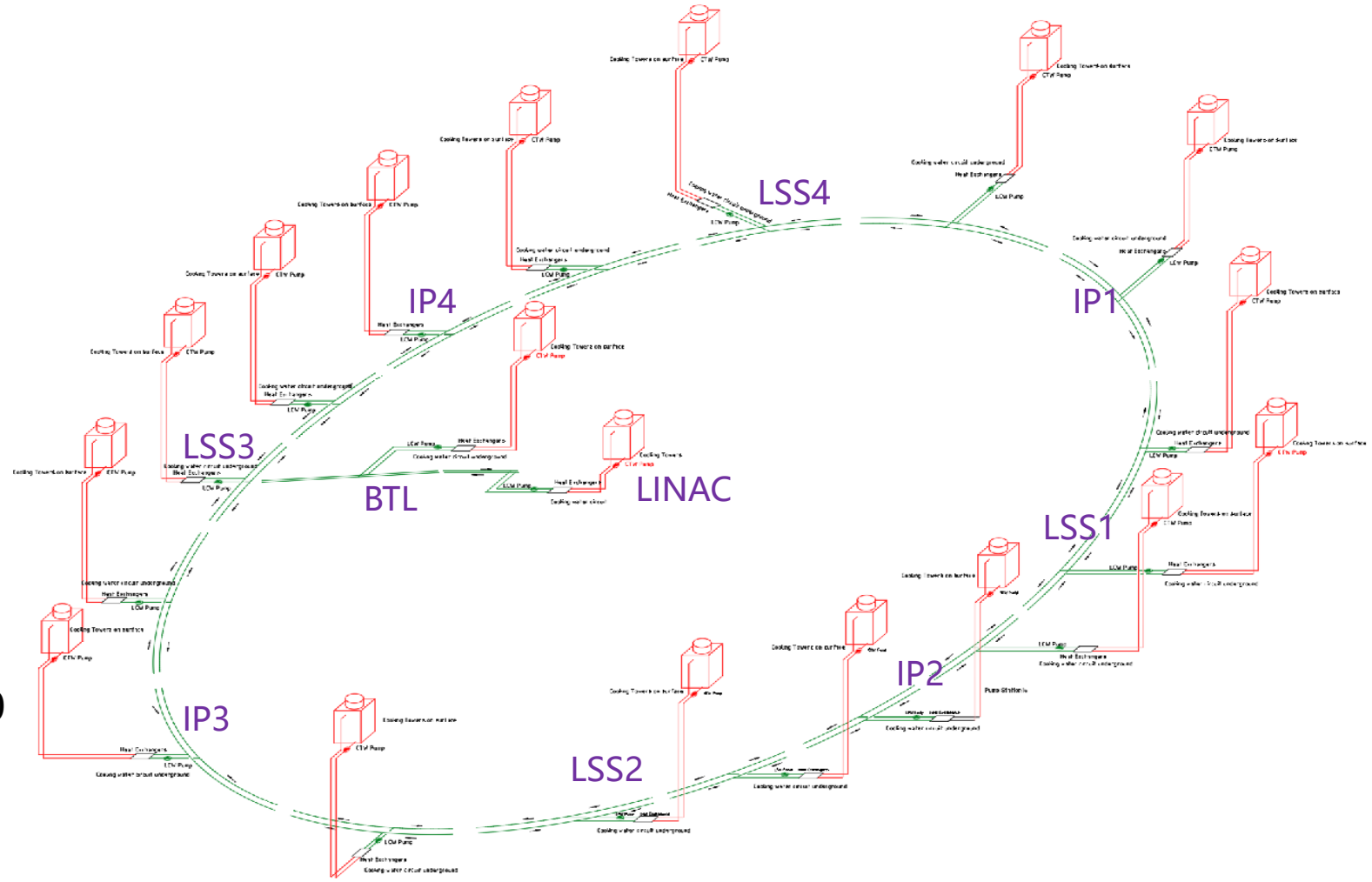
Cooling water system

● Principle of layout

- Close to the heat load center.
- Relatively concentrated.
- Reasonable water supply radius.
- Minimize operating pressure.

● Layout scheme

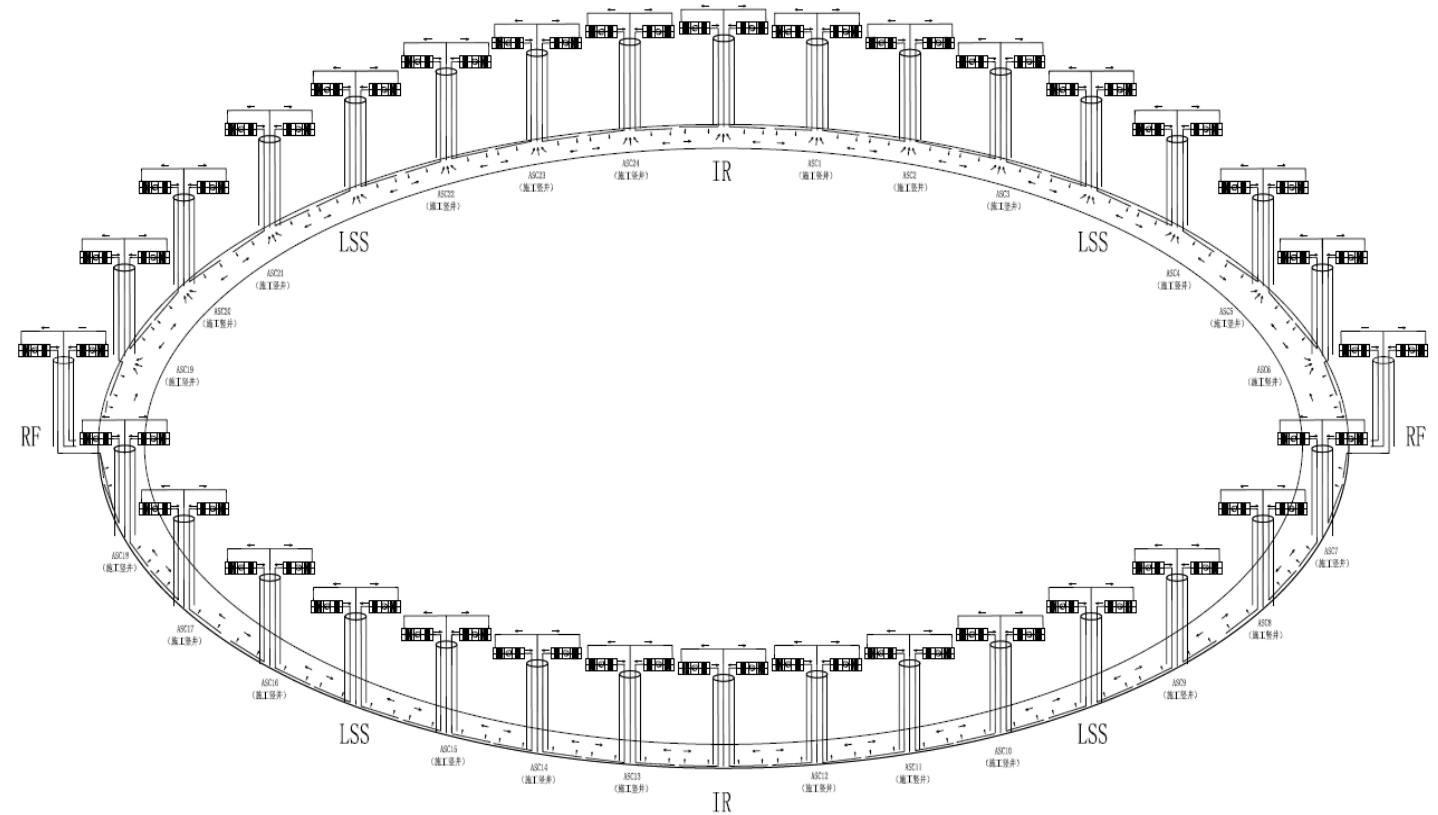
- CTW and DW on surface.
- LCW are underground.
- Centralized water supply station:20
 - Linac—1
 - BTL—1
 - Collide/Booster—16



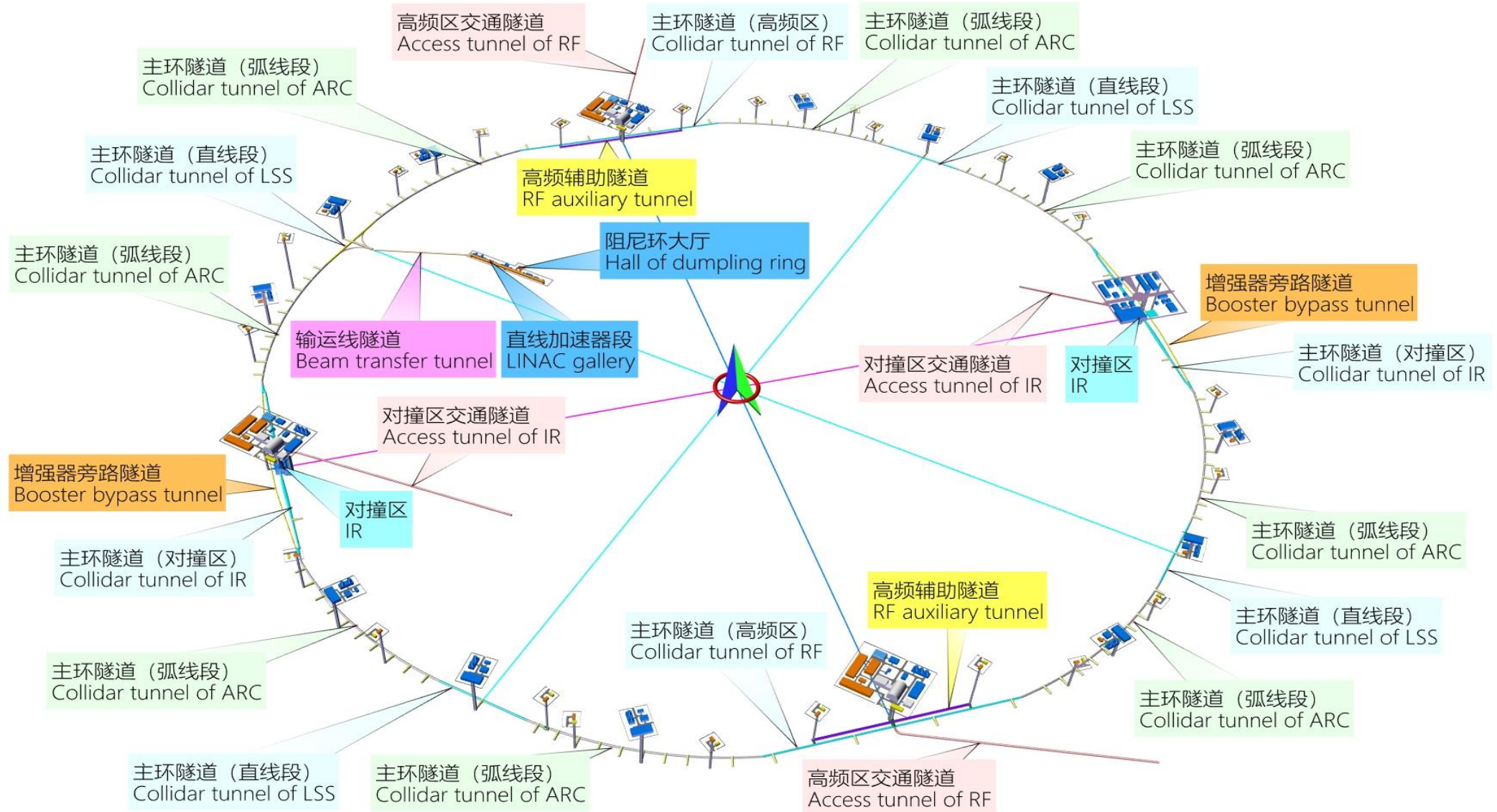
Cooling water system layout of CEPC

Heating Ventilation and Air Conditioning

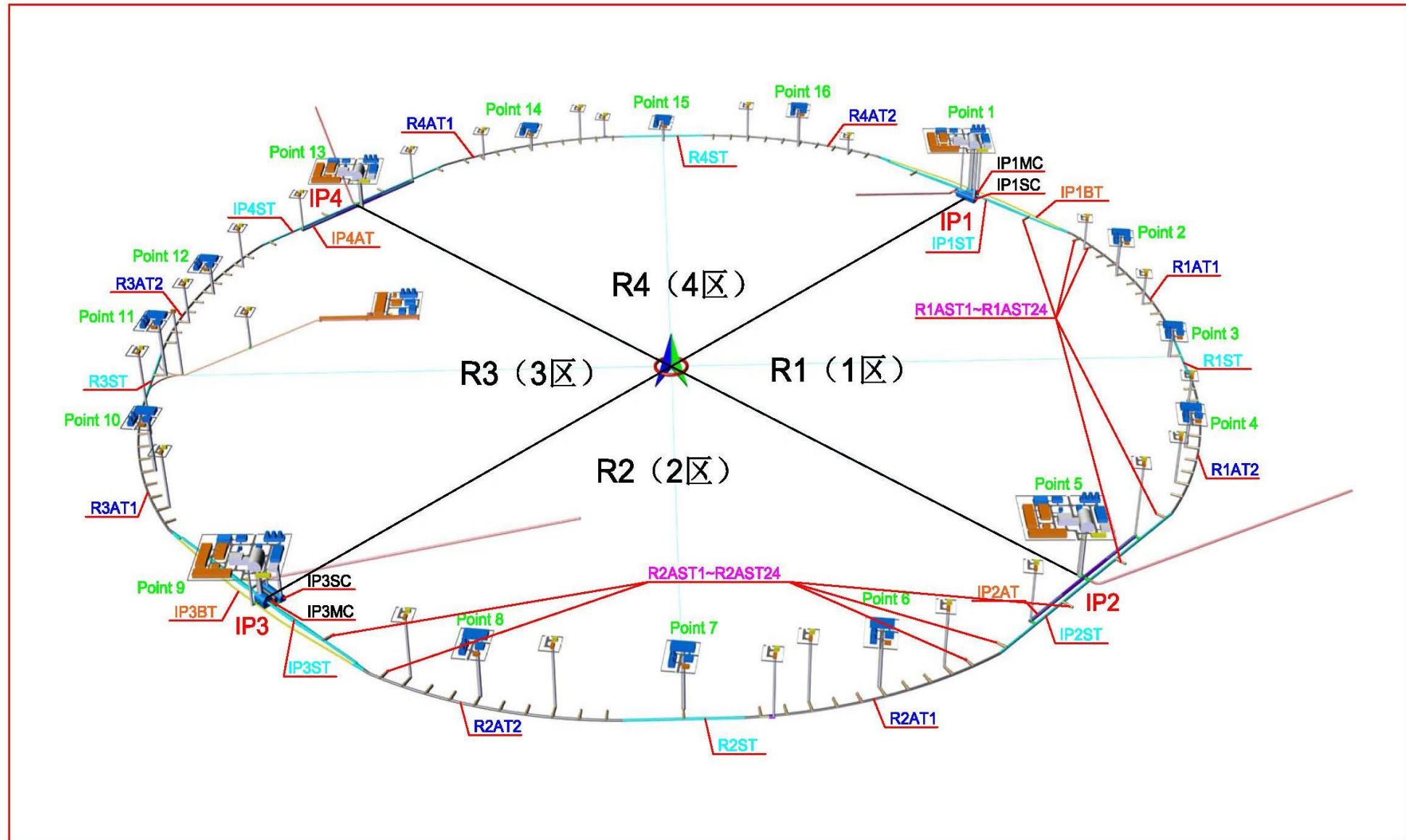
- Air-conditioning system in tunnel
 - Layout
 - The ring tunnel is divided into **32** independent sections.
 - Each shaft serves as a ventilation and exhaust channel for the underground main ring tunnel, and a ventilation pipe and a smoke exhaust pipe are arranged therein.



Layout of surface and underground structures



Layout of surface and underground structures



Layout of surface and underground structures

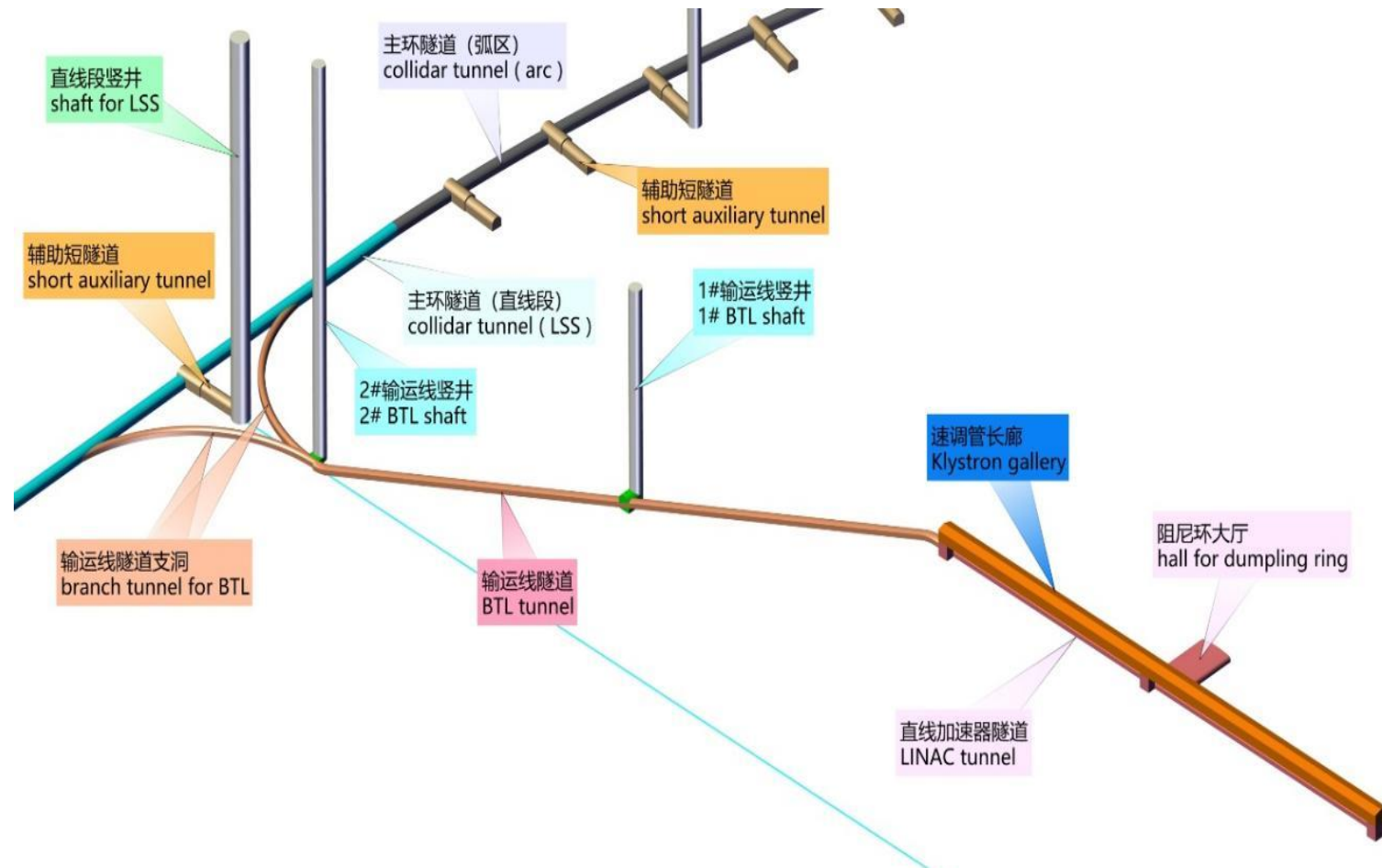
地面建筑物	Surface Structures	Point1	Point2	Point3	Point4	Point5	Point6	Point7	Point8	Point9	Point10	Point11	Point12	Point13	Point14	Point15	Point16	
地下建筑物	Underground Structures																	
对撞点	Interaction Point	IP1				IP2				IP3				IP4				Interaction Point对撞点
沿主环分为4个区域	Ring	R1(IP1~IP2)				R2(IP2~IP3)				R3(IP3~IP4)				R4(IP4~IP1)				Ring主环
实验大厅	Experimental Hall	IP1MC IP1SC								IP3MC IP3SC								Main Cavern主厅 Service Cavern配厅
主环隧道直线段	Collider ring tunnel-straight sections	IP1ST		R1ST		IP2ST		R2ST		IP3ST		R3ST		IP4ST		R4ST		Straight Tunnel主环直线段
主环隧道弧线段	Collider ring tunnel-arc sections		R1AT1		R1AT2		R2AT1		R2AT2		R3AT1		R3AT2		R4AT1		R4AT2	Arc Tunnel主环弧线段
加速器旁路隧道	Booster Bypass tunnel	IP1BT								IP3BT								Bypass Tunnel旁路隧道
高频辅助隧道	Radio Frequency Auxiliary Tunnel					IP2AT								IP4AT				Auxiliary Tunnel辅助隧道
辅助短隧道	Auxiliary Stub Tunnel	R1AST1~R1AST24				R2AST1~R2AST24				R3AST1~R3AST24				R4AST1~R4AST24				Auxiliary Stub Tunnel辅助短隧道
设备运输竖井	Access shafts to experimental caverns	IP1MCS IP1SCS				IP2ATS				IP2MCS IP2SCS				IP4ATS				Access Shafts to IP1/3 Main Caverns/Service Caverns, IP2/4 Auxiliary tunnels, used for the transfer of equipment
交通竖井	Access shafts	IP1SCS	R1AS1	R1AS2	R1AS3		R2AS1	R2AS2	R2AS3	IP3SCS	R3AS1	R3AS2	R3AS3		R4AS1	R4AS2	R4AS3	Access shafts of underground caverns for personnel only, with stairs and lift
旁路隧道竖井	Access Shaft for bypass channel	IP1BTS								IP2BTS								Access shafts of IP1BT/IP3BT for personnel only, with stairs and lift
高频辅助隧道竖井	Access shaft for Radio Frequency Auxiliary Tunnel					IP2ATS1 IP2ATS2								IP4ATS1 IP4ATS2				Access shafts of IP2AT/IP4AT for personnel only, with stairs and lift
直线加速器隧道	LINAC tunnel											LT						LINAC tunnel
输运隧道	Beam transfer line tunnel											BTL1 BTL2						Beam Transfer Line
直线加速器隧道竖井	Access shaft for LINAC											PTS1 LTS2 LTS3						Access shafts of LT for personnel only, with stairs and lift
输运隧道竖井	Access shaft for BTL											BTL1S1 BTL1S2						Access shafts of BTL1 for personnel only, with stairs and lift
施工兼通风竖井	Access shaft for construction and ventilation		R1CS1 R1CS2		R1CS3 R1CS4		R2CS1 R2CS2		R2CS3 R2CS4		R3CS1 R3CS2		R3CS3 R3CS4		R4CS1 R4CS2		R4CS3 R4CS4	Civil engineering Shaft used to carry out the underground works, and for ventilation
交通隧道	Access tunnel	IP1ACT				IP2ACT				IP3ACT				IP4ACT				Access Tunnel for IP1~IP4

List of shafts

区域	名称	数量 (分区*个数)	尺寸(m)	
LIANC	运输竖井	1*3	6*6	
	LINACE通用设施/低温管井	1*1		
BTL	BTL运输竖井	1*2	7	
	BTL通用设施管井	1*1		
Collider and booster	RF	高频运输竖井	2*1	15
		交通竖井	2*2	6
		高频通用设施/低温管井	2*2	
	IR	主厅运输竖井	2*1	16
		配厅运输竖井	2*1	9
		旁路隧道竖井	2*1	7
		配厅交通竖井	2*1	6
		IR通用设施/低温管井	2*2	
	直线段	运输竖井	4*1	10
		通风管井	4*2	7
	弧线段	运输竖井	8*1	10
		交通竖井	8*1	6
		通风管井	8*2	7

Layout of the tunnel in Linac and BTL

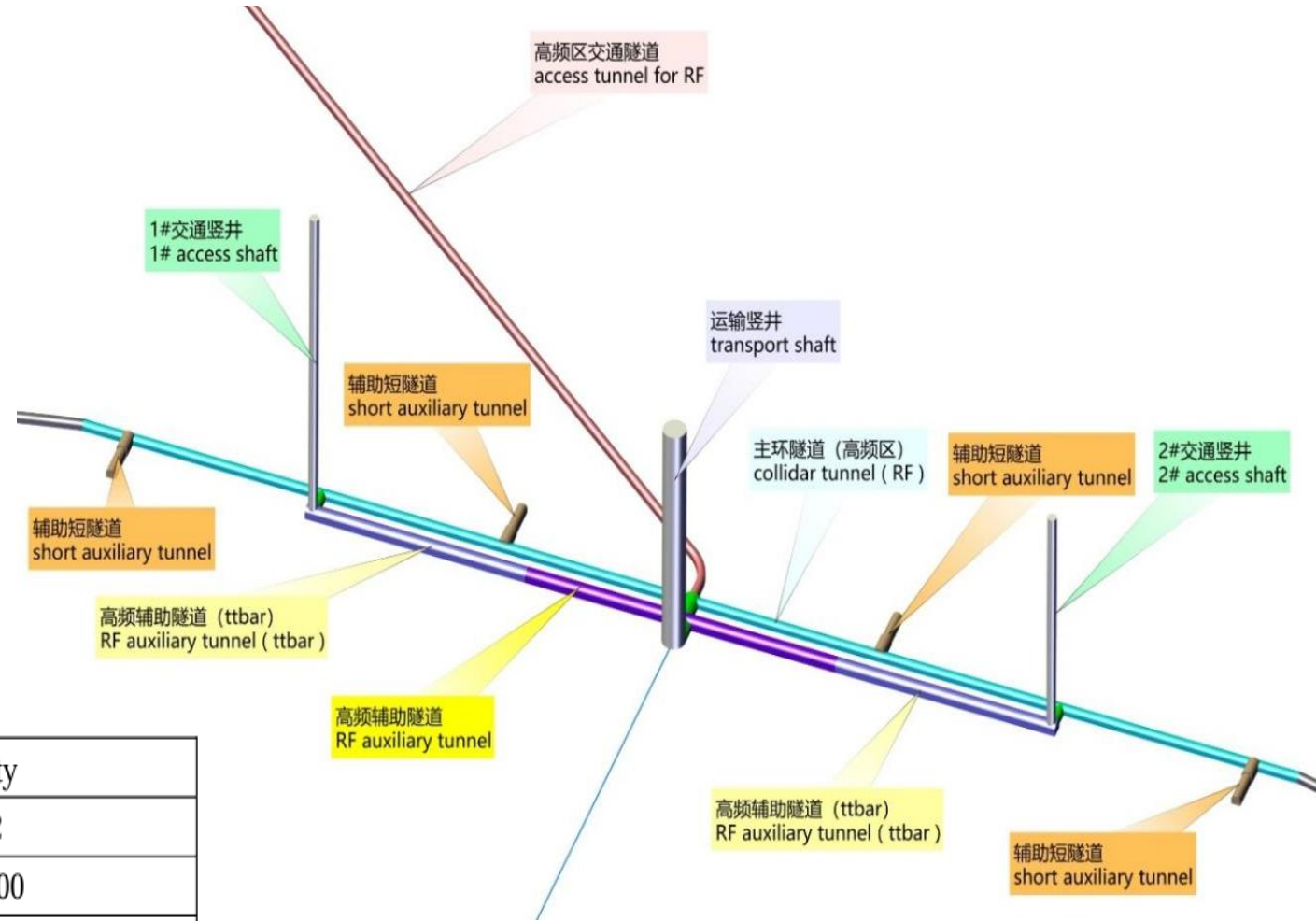
- 直线设备运输: 6m*6m
- 直线通用设施 / 低温管井
- BTL1#竖井: 7m
- BTL 2#竖井: 7m
- BTL通用设施管井



Item	Qty	Unit	Qty	Remarks
Linear booster tunnel	Qty	Nos.	1	Local width 5.5 m
	length of individual tunnel	m	1200	
	Dimension (∩-shaped)	m	3.50 × 3.50	
Klystron gallery	Qty	Nos.	1	
	length of individual tunnel	m	1200	
	Dimension	m	6.00 × 8.00	
Damper ring cavern	Qty	Nos.	1	
	length of individual tunnel	m	40	
	Dimension (∩-shaped)	m	20.00 × 3.50	
BTL tunnel before branch tunnel	Qty	Nos.	1	
	length of individual tunnel	m	1825	
	Dimension (∩-shaped)	m	4.50 × 3.50	
Branch tunnel of BTL	Qty	Nos.	2	2 branch lines
	length of individual tunnel	m	459	
	Dimension (∩-shaped)	m	3.00 × 3.00	
Transport shaft for LINAC	Qty	Nos.	3	Transport shaft for LINAC shows a square shape for connecting the LINAC tunnel to klystron gallery
	Dimension	m	6.00 × 6.00	
Shaft for BTL	Qty	Nos.	2	
	Diameter	m	7.00	

Layout of the tunnel in the RF area

- 高频运输竖井: 15m
- 1#交通竖井: 6m
- 2#交通竖井: 6m
- 高频通用设施管井

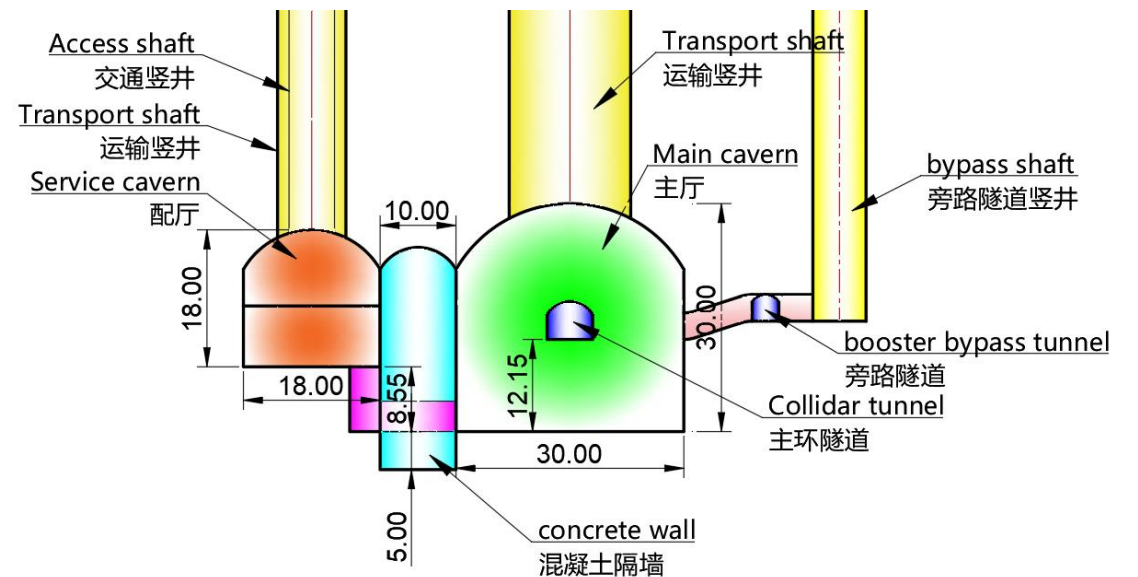
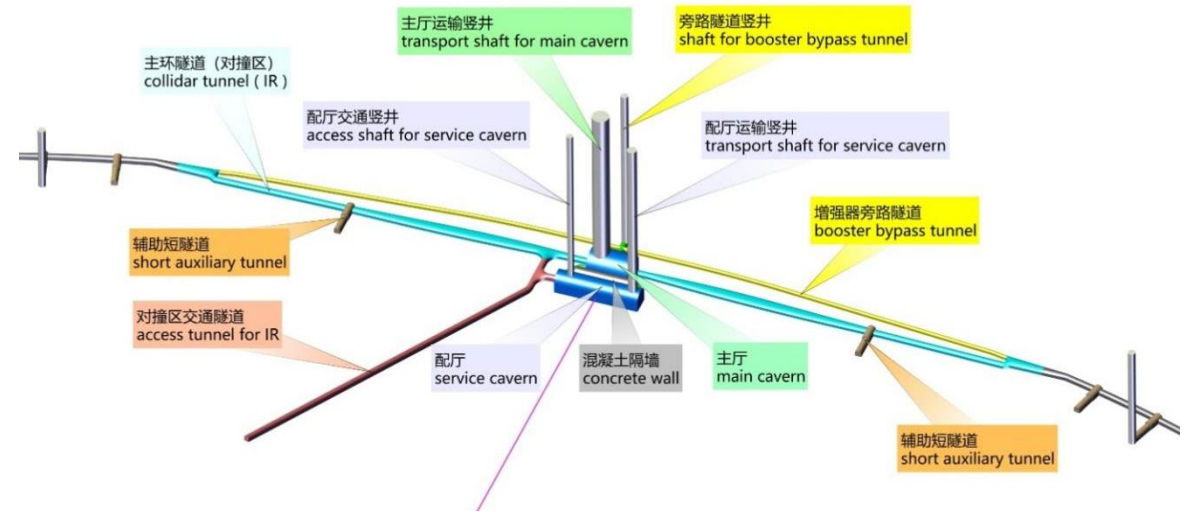


Item	Unit	Qty
Service tunnels in the RF zone	Qty	Nos. 2
	length of individual tunnel	m 1800
	Dimension	m 8.00 × 7.00

Layout of the tunnel in the IR area

- 主厅运输竖井: 16m
- 配厅运输竖井: 9m
- 旁路隧道竖井: 7m
- 配厅交通竖井: 6m
- 通用设施管井

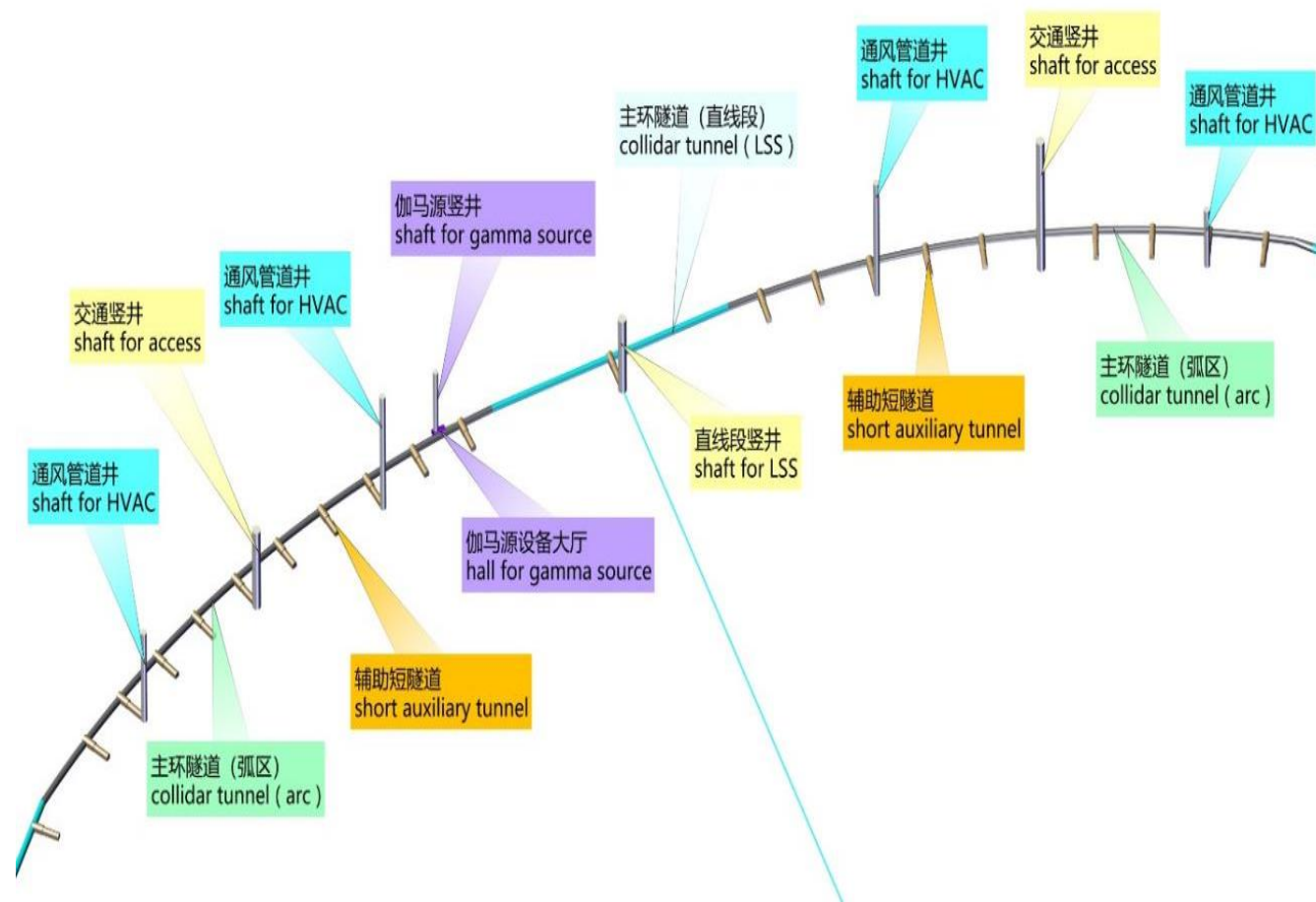
Item		Unit	Qty
Cavern Qty		Nos.	2
Main cavern	Dimension (L×W×H)	m	50 × 30 × 30
Service cavern	Dimension (L×W×H)	m	80 × 18 × 18



Layout of the Collider ring tunnel

- 直线段运输竖井：10m
- 弧区运输竖井：10m
- 弧区通风管井：7m

Item		Unit	Qty			Remarks
Linear section	Qty	Section	2	2	4	IR = 3337.13 m RF = 3776.90 m LS = 986.84 m Width varies from 6.00 to 11.40 m. H is 4.5 m
	Length	m	3337.13	3776.90	986.84	
	Dimension (∩-shaped)	m	6.00	×	5.00	
Arc section	Qty.	Section	4	4		IR-LSS = 10270.44 m LSS-RF = 10185.70 m
	Length	m	10270.44	10185.70		
	Dimension (∩-shaped)	m	6.00	×	5.00	
Collider ring diameter		m	31831			
Total length of tunnel		km	100.00			
Longitudinal gradient of tunnel			0.30%			



Continuing the work progress

- 继续收集EDR阶段工艺需求
- 阶段性调整和完善通用设施设计方案
- 规划通用设施从地面到隧道的路由