

# Hybrid Access Optional Study

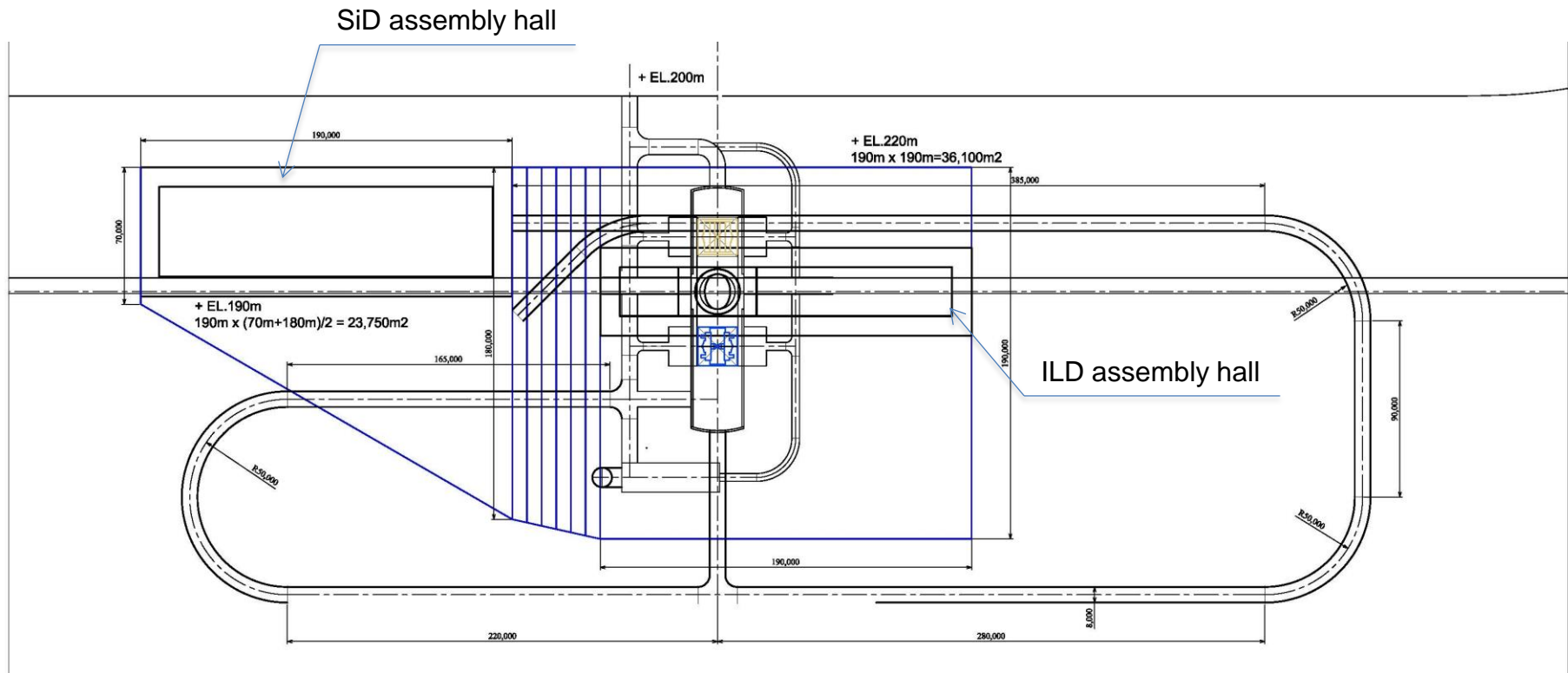
Baseline	Hybrid-A	Hybrid-Op (by AWLS2014)
<ul style="list-style-type: none"> <li>• 1 HT (11x11m grad 7%)</li> <li>• Detector assembling is inside of DH</li> </ul>	<ul style="list-style-type: none"> <li>• 1 HT (8.0x7.5m grad 7%)</li> <li>• 2 VS (D18m, D10m)</li> <li>• ILD assembly:on-g, SiD assembly:un-g.</li> </ul>	<ul style="list-style-type: none"> <li>• 1 HT (8.0x7.5m <u>grad 10%</u>)</li> <li>• 3 VS (D18m, D10m, D7.5m)</li> <li>• ILD assembly:on-g, SiD assembly:un-g..</li> </ul>
<ul style="list-style-type: none"> <li>• UT lines in DR/AT</li> </ul>	<ul style="list-style-type: none"> <li>• UT lines in UT shaft (N/A Main shaft)</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>
<ul style="list-style-type: none"> <li>• DH Excavated vol. 175,000m<sup>3</sup></li> <li>• L144m H42m W25m</li> </ul>	<ul style="list-style-type: none"> <li>• DH Excavated vol. <b>156,000m<sup>3</sup></b></li> <li>• L126m H42m W25m</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>
<ul style="list-style-type: none"> <li>• Detector parts are transported by Heavy weight transporter</li> </ul>	<ul style="list-style-type: none"> <li>• ILD is installed by Heavy lowering crane</li> <li>• SiD parts transported by HWT</li> </ul>	<ul style="list-style-type: none"> <li>• ILD is installed by Heavy lowering crane</li> <li>• SiD parts transported by crane</li> </ul>
<ul style="list-style-type: none"> <li>• Location of DH and assembly yd. can be selected individually.</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly hall is above D/H</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>
<ul style="list-style-type: none"> <li>• Human pass way : tunnel by vehicles</li> <li>• Machine and materials: tunnel by vehicles</li> </ul>	<ul style="list-style-type: none"> <li>• Human pass way :elevator in UT shaft</li> <li>• Machine and materials : Shaft and tunnel</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>
<ul style="list-style-type: none"> <li>• Environmental impact : smaller during construction.</li> </ul>	<ul style="list-style-type: none"> <li>• Need countermeasure for noise reduction of construction</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>
<ul style="list-style-type: none"> <li>• Emergency evacuation ways Main AT and DR AT.</li> </ul>	<ul style="list-style-type: none"> <li>• Emergency evacuation ways Main AT , DR AT , and shaft stair.</li> </ul>	<ul style="list-style-type: none"> <li>• Ditto</li> </ul>



# Hybrid-A Example

## Function

- Main shaft : for ILD installation, and SiD heavy parts lowering.
- Access tunnel : for SiD parts transportation, and cavern construction.





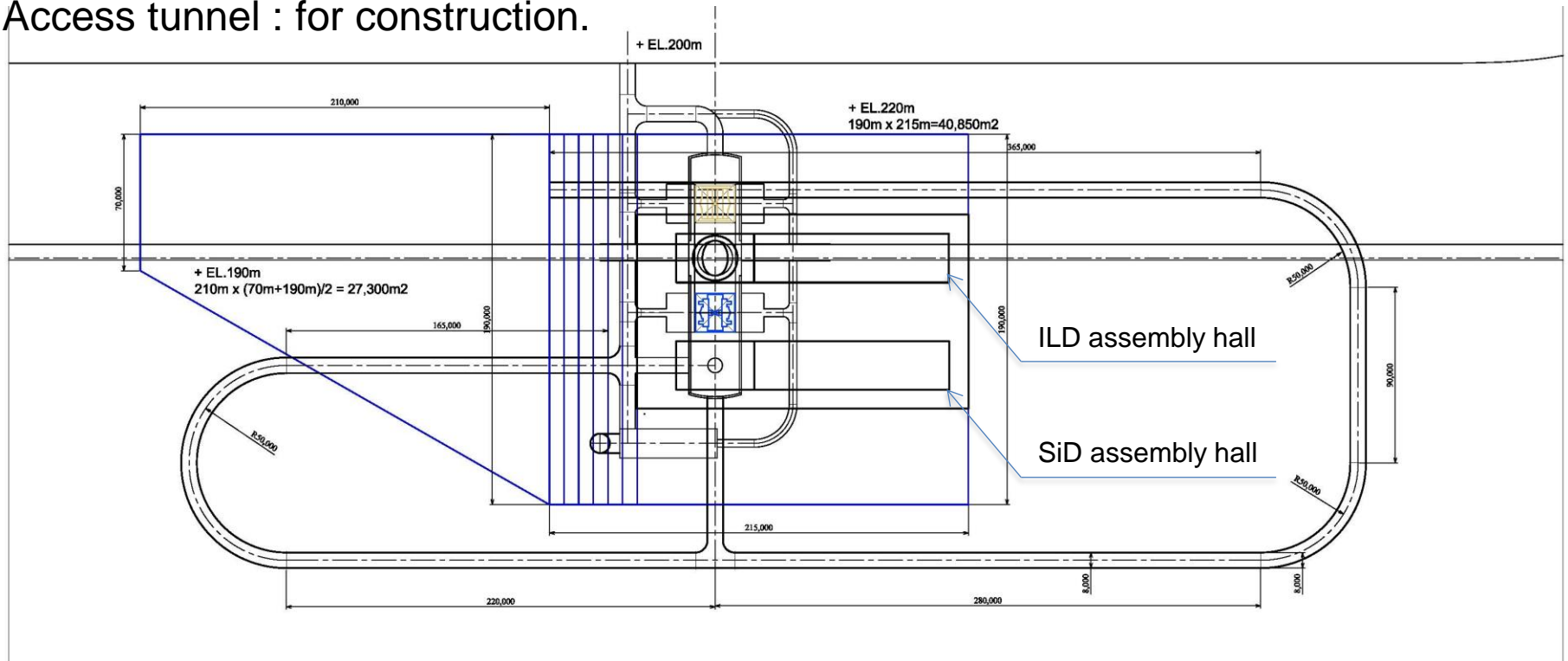
# Hybrid-Option Example (by AWLS2014)

## Assumption

- SiD shaft is located at the intersection point of DH and AT if located at SiD park position, assembly halls are too close each other.
- Inner diameter is assumed 7.5m

## Function

- Main shaft : for ILD installation and SiD heavy parts lowering.
- SiD shaft : for SiD parts transportation.
- Access tunnel : for construction.





# Civil work break down

Items	Unit	Baseline		Hybrid-A		Hybrid-Op (AWLC2014)	
		Spec	Qt.	Spec	Qt.	Spec	Qt.
Portal work	LS	W11.0 H11.0	1	W8.0, H7.5	1	W8.0, H7.5	1
Main A/T D2	m	W11.0 H11.0	150	W8.0, H7.5	150	W8.0, H7.5	150
Main A/T	m	W11.0 H11.0	610	W8.0, H7.5	780	W8.0, H7.5	510
Upper A/T	m	W8.0, H7.5	100	W8.0, H7.5	100	W8.0, H7.5	100
Lower A/T	m	W11.0 H11.0	540	W8.0, H7.5	540	W8.0, H7.5	360
Main Shaft D18m	LS			Portal	1	Portal	1
	LS			Shelter	1	Shelter	1
	m			Soil	20	Soil	20
	m			Rock	61.6	Rock	61.6
UT Shaft D10m	LS			Portal	1	Portal	1
	LS			Shelter	1	Shelter	1
	m			Soil	20	Soil	20
	m			Rock	88.6	Rock	88.6
SiD Shaft D7.5m	LS					Portal	1
	LS					Shelter	1
	m					Soil	20
	m					Rock	61.6
EH	m3	W25.0, H42.0, L144	157,560	W25.0, H42.0, L126	137,900	W25.0, H42.0, L126	137,900
EH ILD Alcove	m3	W20.0, H19.6, L12.5	9,000	W20.0, H19.6, L12.5	9,000	W20.0, H19.6, L12.5	9,000
EH SiD Alcove	m3	W20.0, H18.0, L12.5	9,200	W20.0, H18.0, L12.5	9,200	W20.0, H18.0, L12.5	9,200
Drainage for Hall	m	@10m mesh	910	@10m mesh	630	@10m mesh	630
PS Anchor	pcs		1,850		1,640		1,640
Based Concrete	m3	t=1.0	4,550	t=1.0	4,100	t=1.0	4,100
Side Wall Concrete	m3	t=1.0 h30m	13,020	t=1.0 h30m	11,940	t=1.0 h30m	11,940



# Architectural and Mechanical facility

Architectural		Spec	Unit	Baseline	Hybrid-A	Hybrid-Op (AWLC2014)
A/T	DH-A/T Evac. pass way	H2.5 x W2.0m	m	1,285	1,470	1,470
	DH-A/T Doors	4.5 m2	pcs	20	20	20
	DR-A/T Evac. pass way	H2.5 x W2.0m	m	1,000	1,000	1,000
	DR-AT Doors	4.5 m2	pcs	20	20	20
Shaft	Elevator	17 psn 150m/min	set	-	1	1
	Evacuation Stair	140m	set	-	1	1
	Evacuation Doors	4.5 m2	pcs	-	55	55
Assembly Hall			m2	ILD 46m x 170m SiD 46m x 170m 15,600	ILD 46m x 170m SiD 25m x 190m 12,600	ILD 25m x 190m SiD 25m x 190m 12,600

Mechanical	Spec	Unit	Baseline	Hybrid-A	Hybrid-Op (AWLC2014)
LCW	φ750mm CS 2way	m	2,000	260	260
ChW	φ200mm CS 2way	m	2,000	260	260
Pipes for supply	φ100mm SUS	m	1,000	130	130
Pipes for return	φ200mm SUS	m	1,000	130	130
Ducts	2.6m × 2.0m 2way	m	2,000	260	260



# Handling equipment

## Permanent crane

Items	Specifications	Unit	Baseline	HB-A	HB-Op (AWLC2014)
DH Main/H Crane	250t S25m h35m	pcs	2		
	215t S25m h35m	pcs			
	80t S25m h35m	pcs	2		
	40t S25m h35m	pcs		2	2
DH Alcove Hoist Crane	2.5t S25m h25m	pcs	4	4	4
Assembly Hall	250t S25m h35m	pcs	2	1 S	
	250t S25m h130m	pcs		1 L	2 L,S
	215t S25m h35m	pcs			
	80t S25m h35m	pcs	2	2	2

## Heavy equipment transportation

Items	Specifications	Unit	Baseline	HB-A	HB-Op (AWLC2014)
Tunnel heavy transporter	220 t carrier	times	12	5	
Shaft Lowering system	4100t h130m gantry crane	pcs		1	1