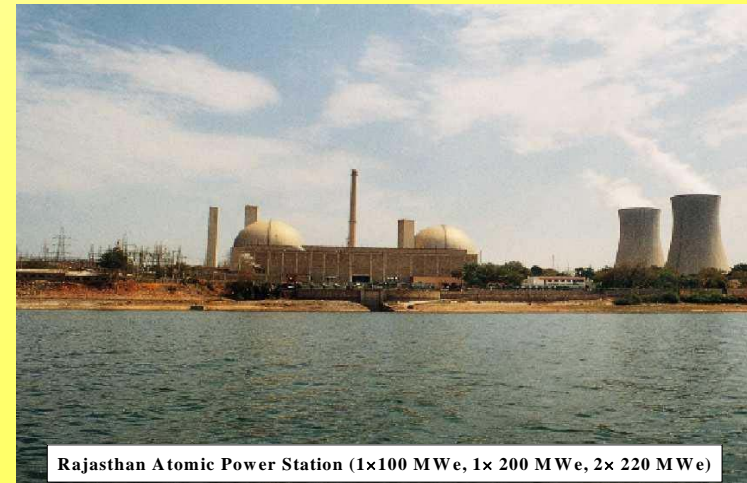
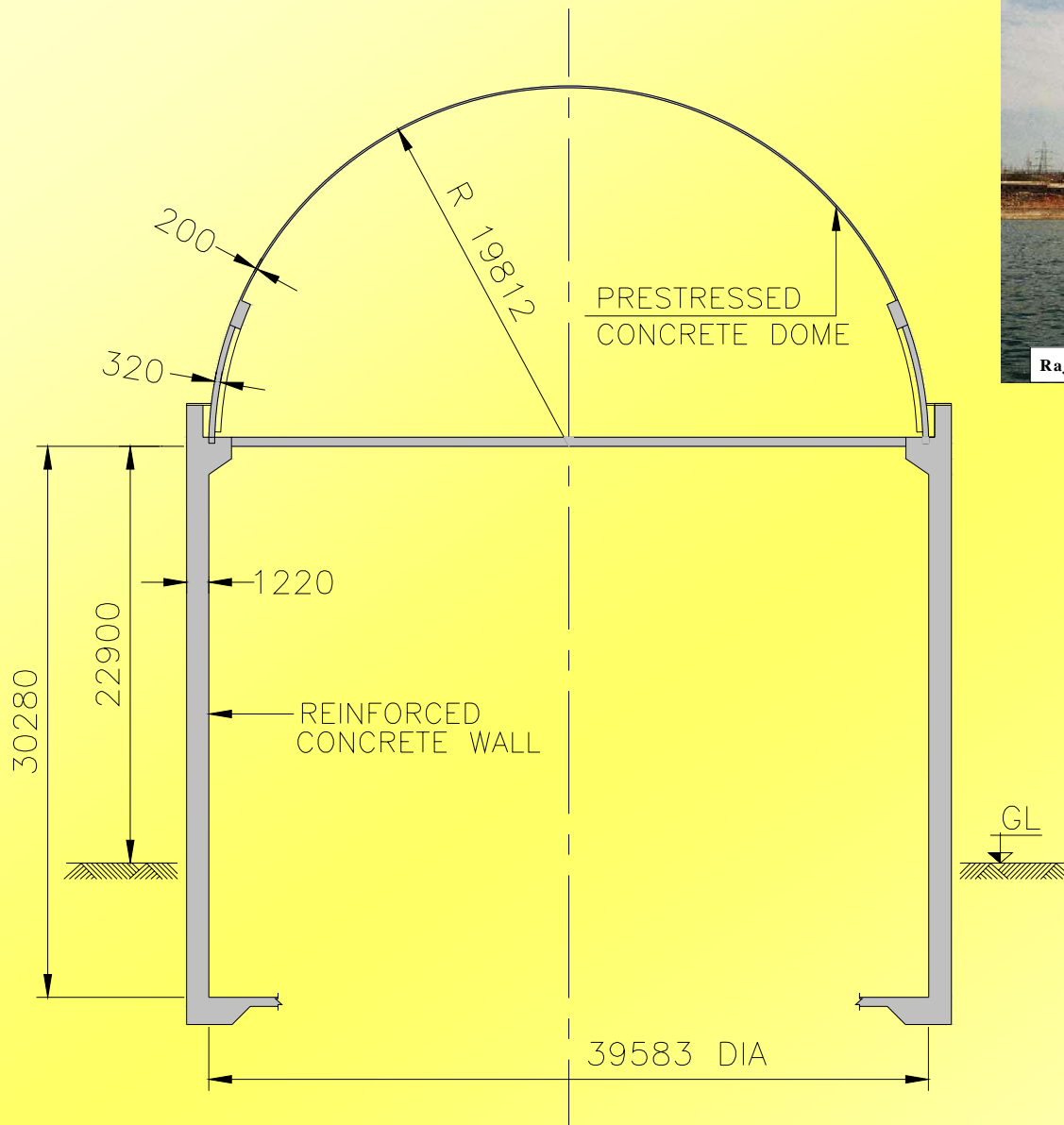


# Evolution of Indian Containment Structure

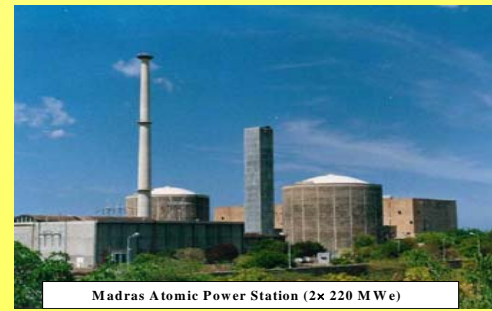
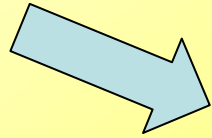
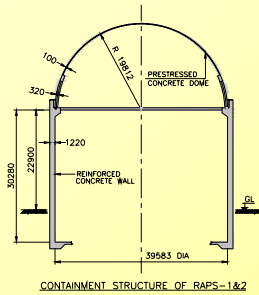
U. S. P. Verma, Executive Director (Civil & ES)  
Raghupati Roy, Additional Chief Engineer (Civil)  
Indrajit Ray, Deputy Chief Engineer (Civil)

**Nuclear Power Corporation of India Ltd., Mumbai**

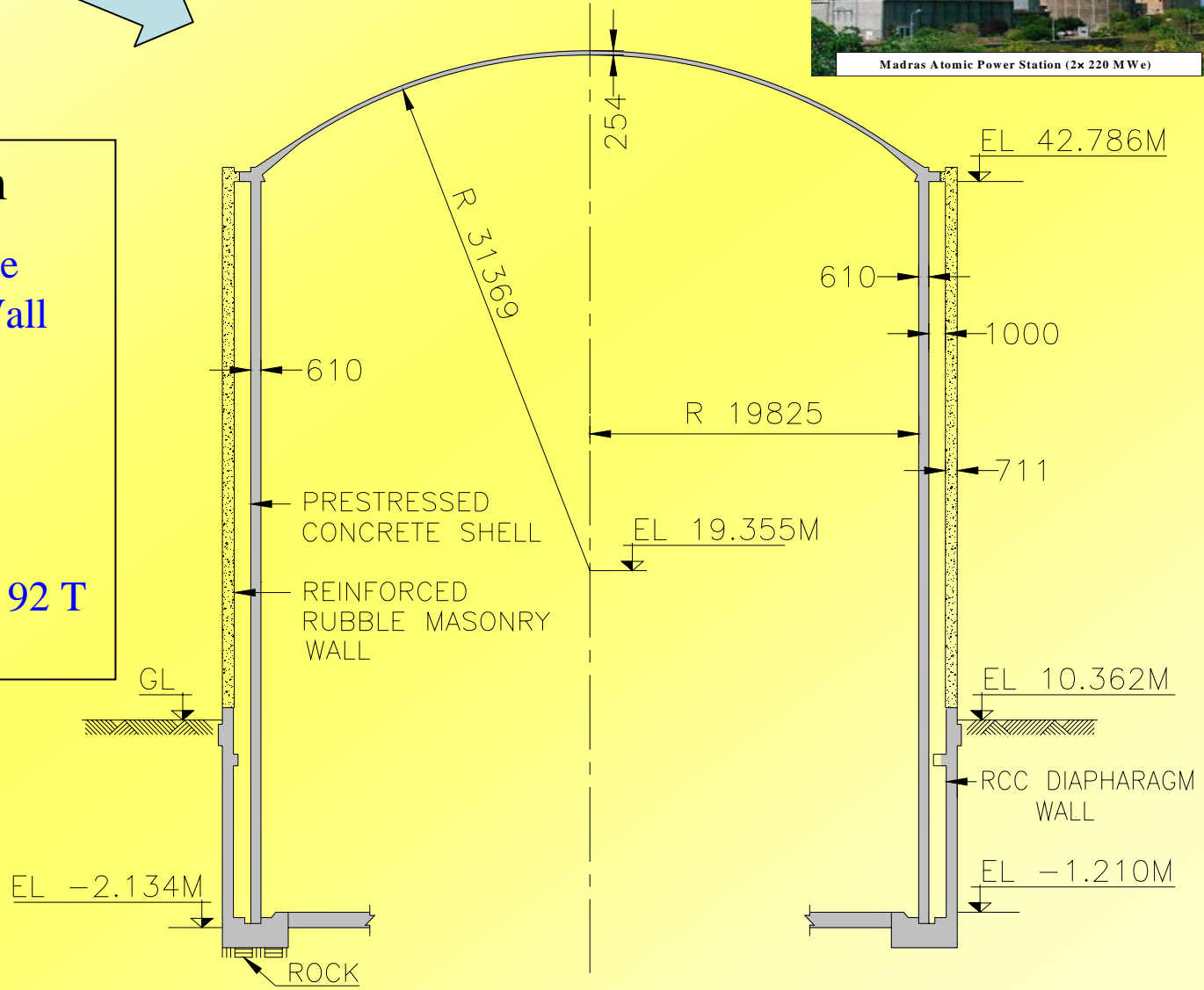


- 1.2m thick RCC Wall for shielding purpose
- Prestressed Dome
  - 12 $\phi$ 7 system with 74T capacity

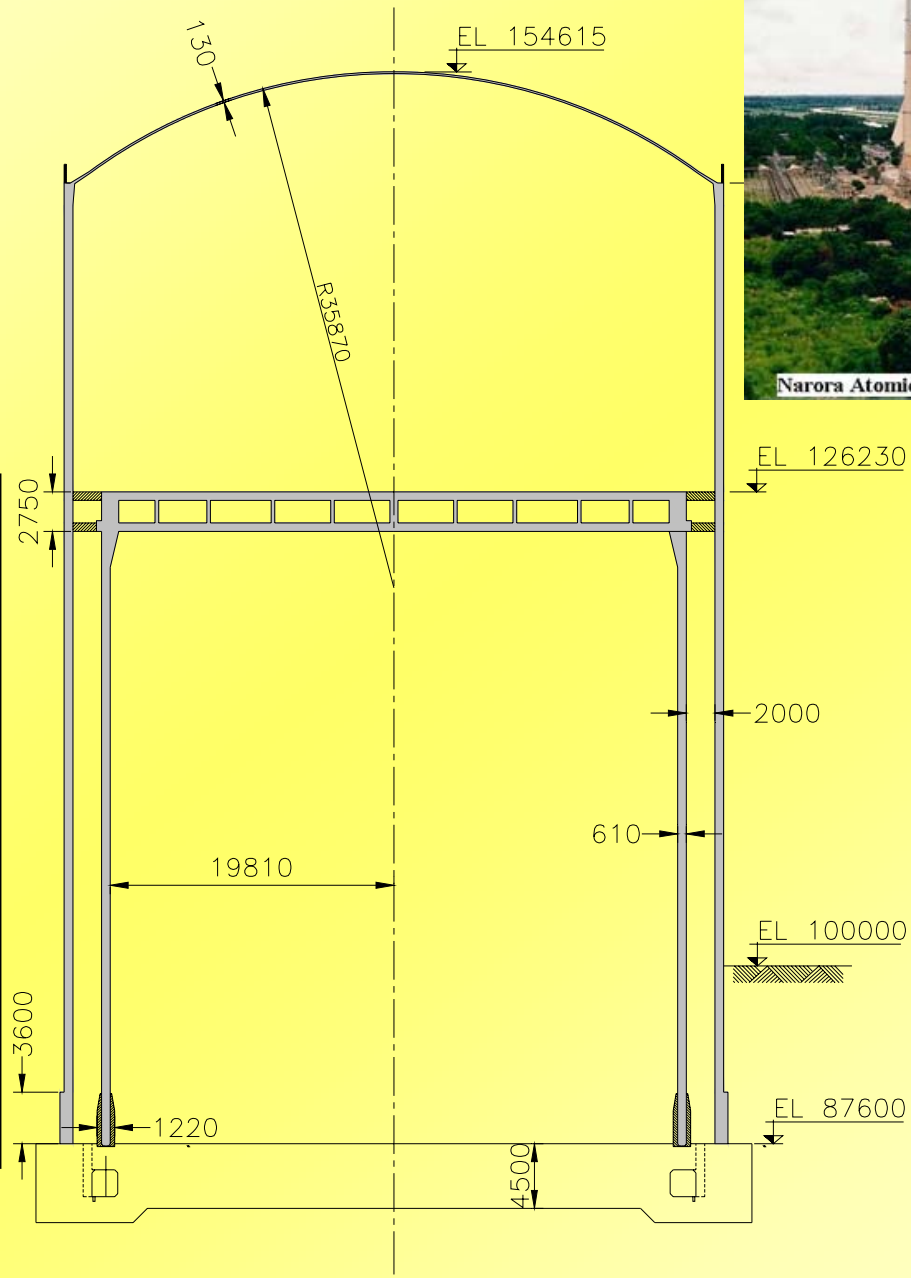
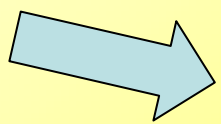
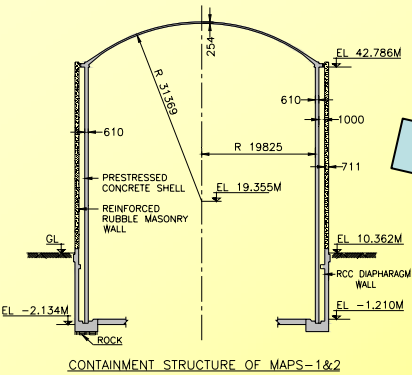
CONTAINMENT STRUCTURE OF RAPS-1&2



- Two Wall System
  - Reinforced Rubble Masonry Outer Wall above GL
- Prestressed Inner Containment
  - 12 $\phi$ 8 system with 92 T capacity

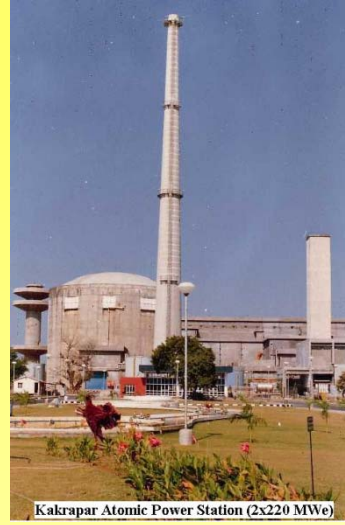
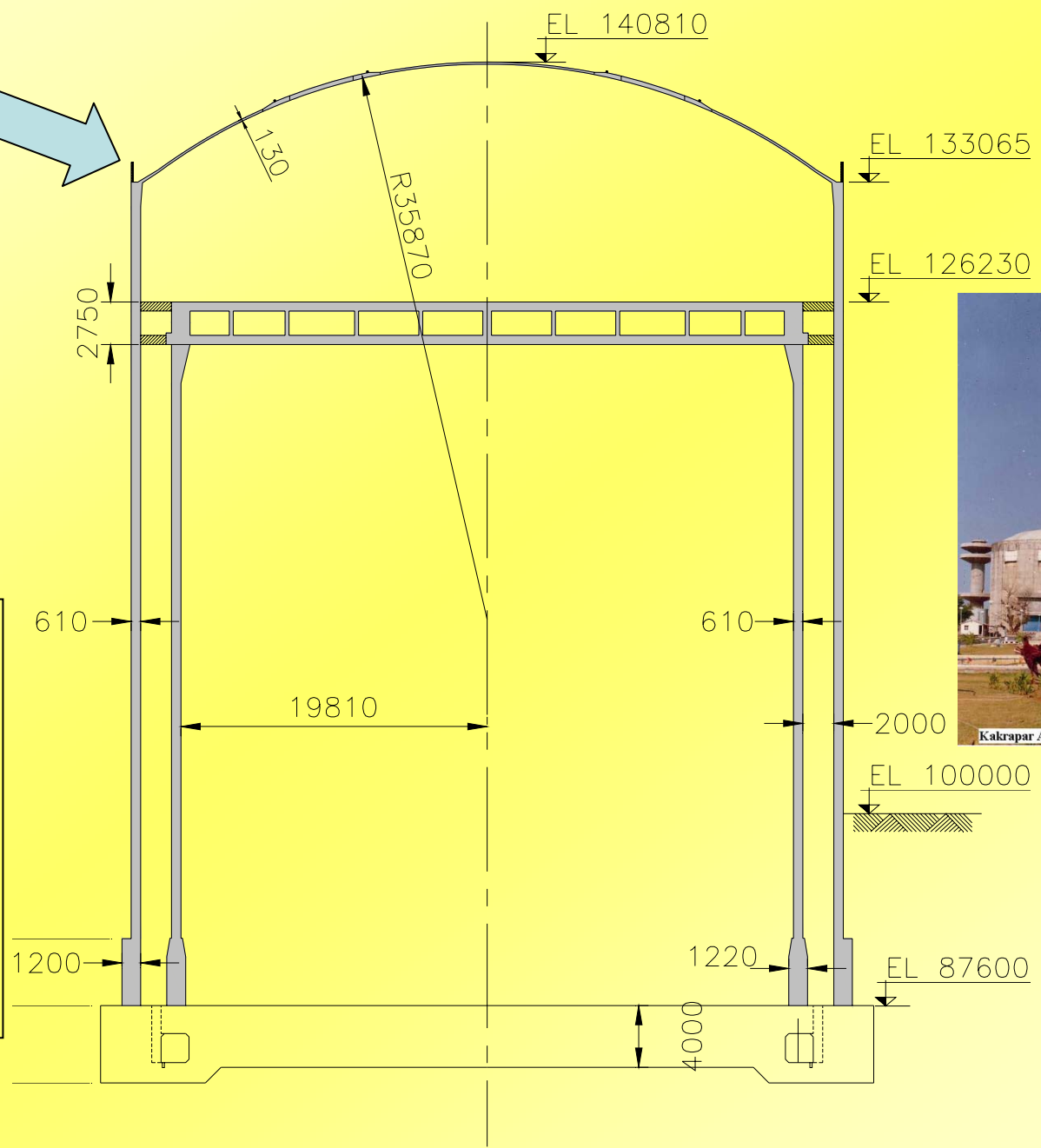
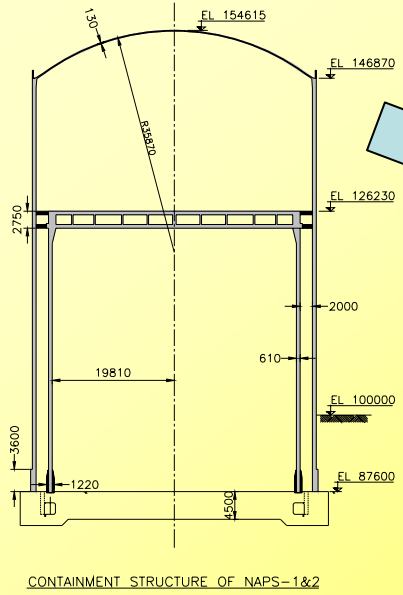


CONTAINMENT STRUCTURE OF MAPS-1&2



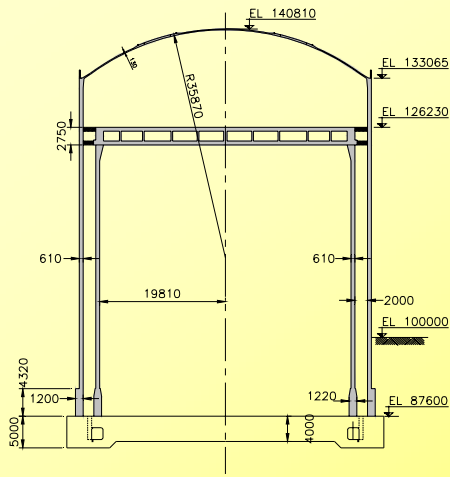
- Evolving Towards Double Containment Concept
  - Prestressed Inner Containment with Cellular Containment Slab
- 12T13 system with 200T capacity

CONTAINMENT STRUCTURE OF NAPS-1&2



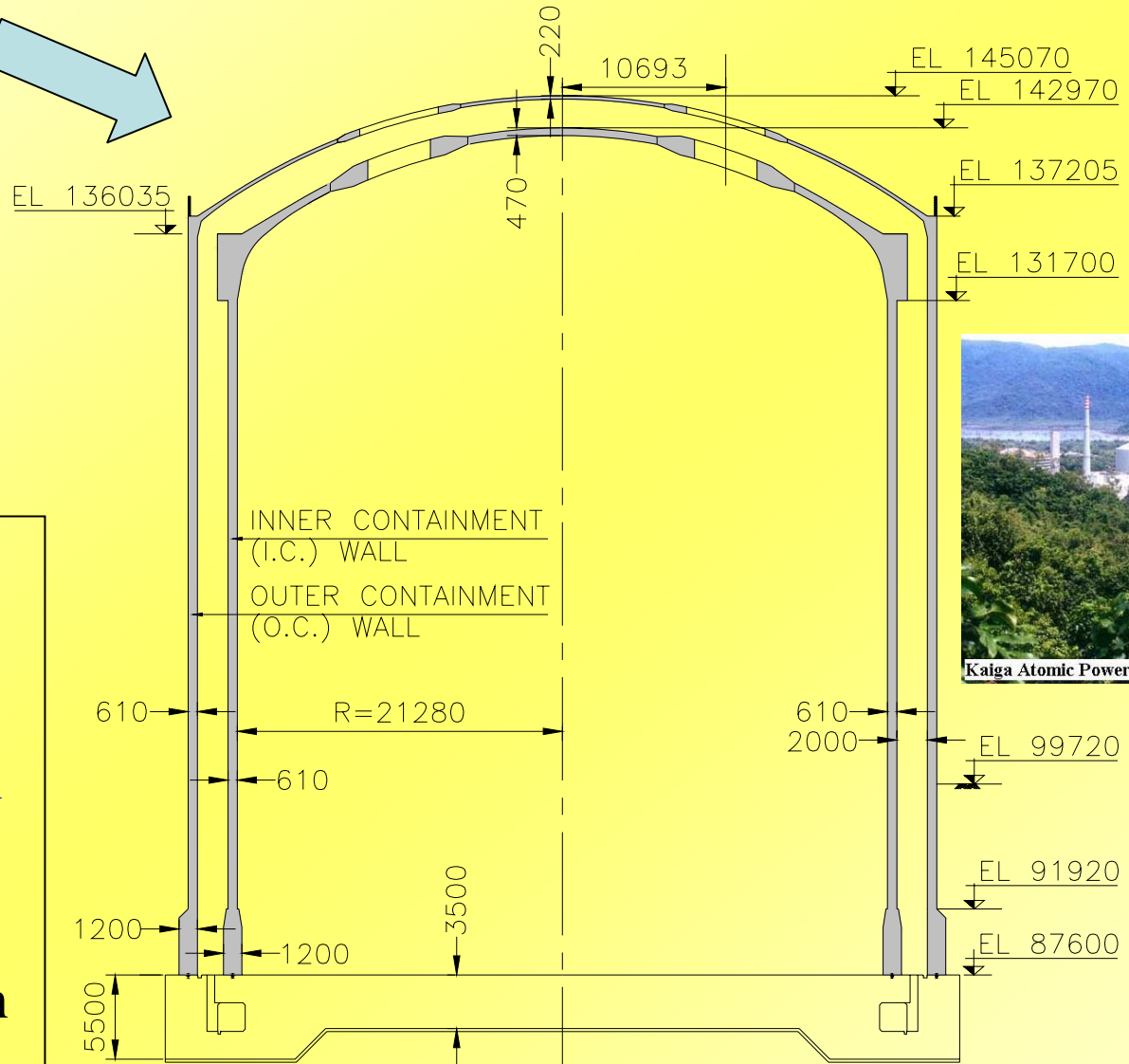
- Introduction of 4 SG Openings in OC Dome
- Reduced Containment Height

CONTAINMENT STRUCTURE OF KAPS-1&2

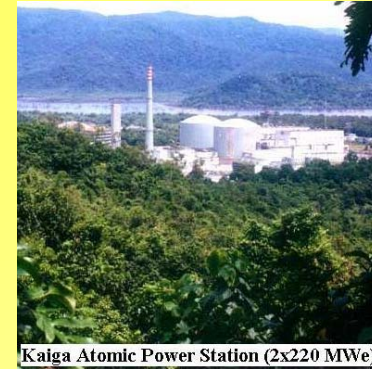


CONTAINMENT STRUCTURE OF KAPS-1&2

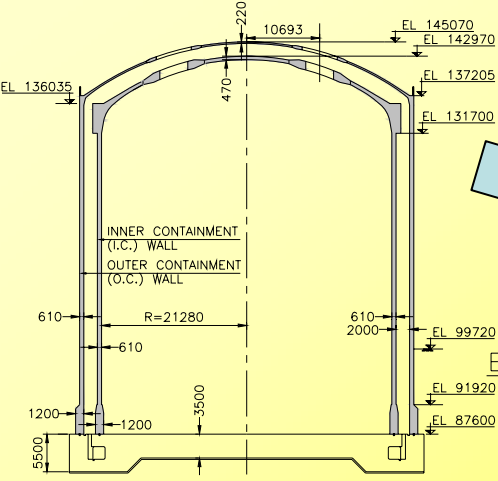
- Double Containment Concept
  - 4 SG Openings in OC & IC Domes
- Prestressed Inner Containment with
  - 19K13 system with 355 T capacity



CONTAINMENT STRUCTURE OF KAIGA-1&2/RAPP-3&4

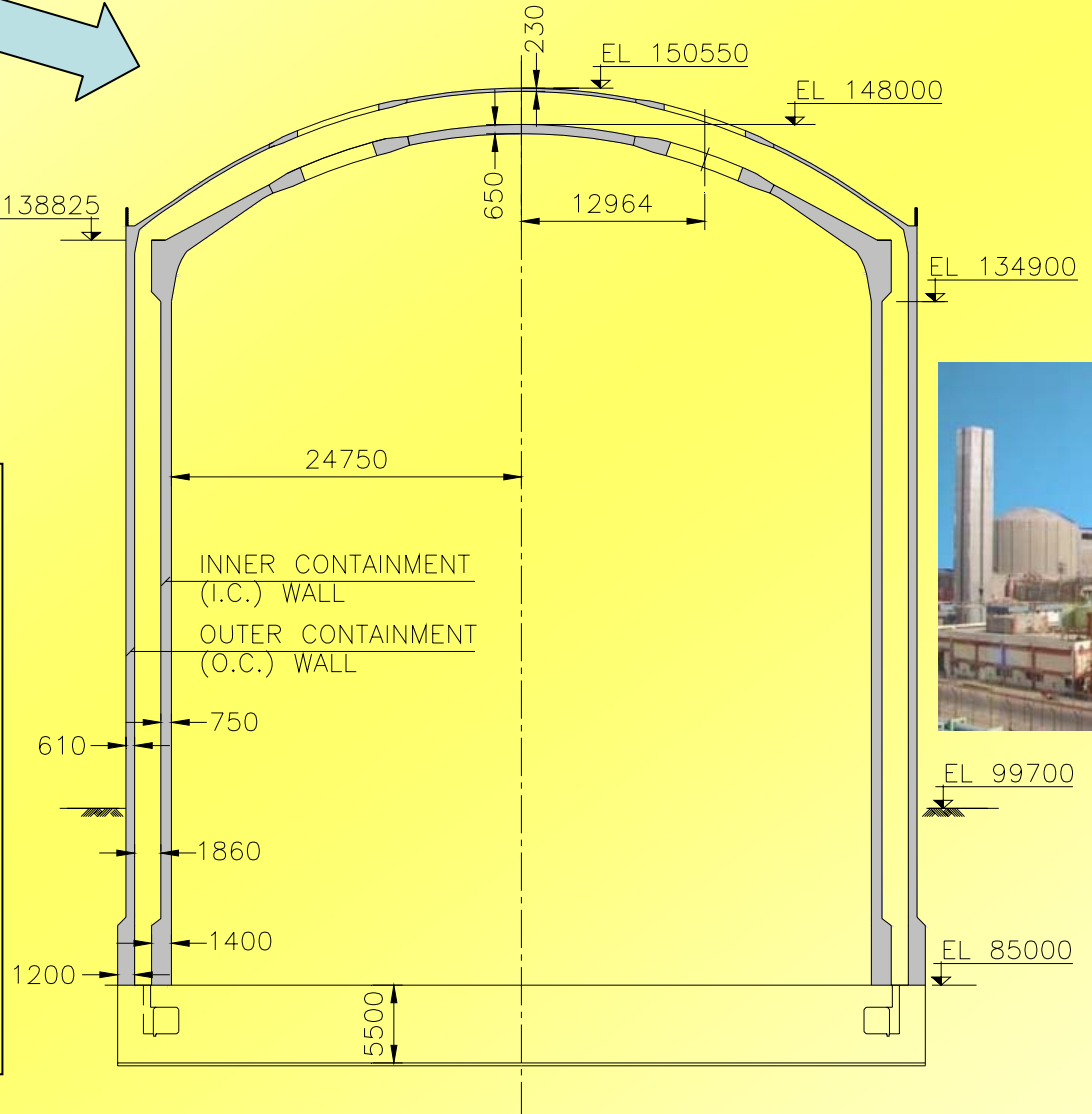


Kaiga Atomic Power Station (2x220 MWe)

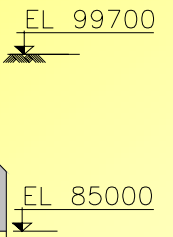


CONTAINMENT STRUCTURE OF KAIGA-1&2/RAPP-3&4

- No. of SG Opening Reduced from 4 to 2
- Prestressed Inner Containment with
  - 19K13 system with 355 T capacity



CONTAINMENT STRUCTURE OF TAPP-3&4



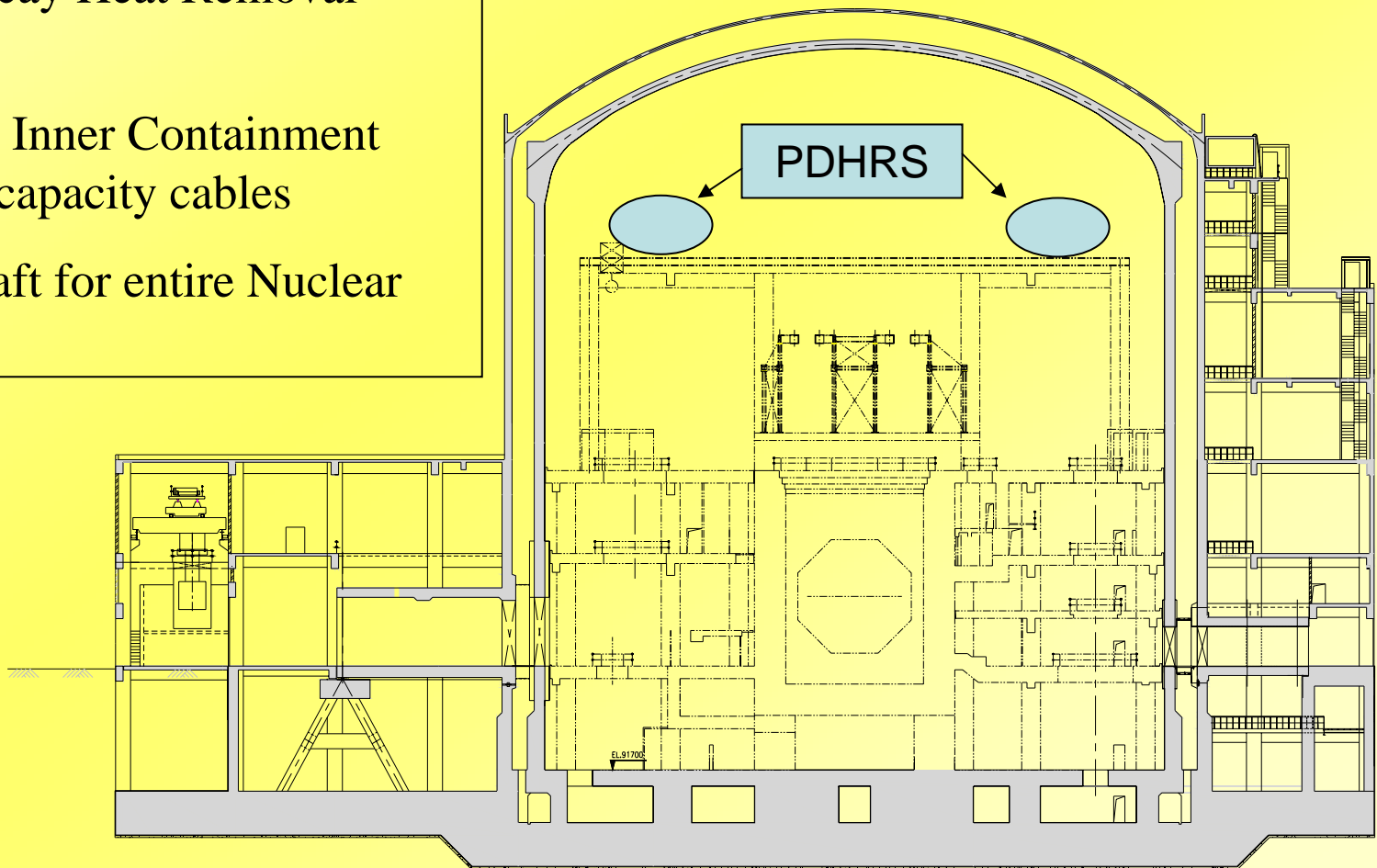
## Details of Containment Structures of Indian PHWRs

Design Parameter	RAPS-1&2	MAPS-1&2	NAPS-1&2 / KAPS-1&2	KGS-1to4 / RAPS-3to8	TAPS-3&4
Containment Volume (m <sup>3</sup> )	40286	47784	32200	54000	82267
Test Pressure [ Kg/cm <sup>2</sup> (g) ]	0.55	1.44	1.44	1.73	1.44
Design Pressure [ Kg/cm <sup>2</sup> (g) ]	0.42	1.16	1.25	1.73	1.44
Peak Ground Accl <sup>n</sup> (PGA)	0.05g	0.1g	0.3g / 0.2g	0.2g / 0.1g	0.2g
Temperature due to Design Basis Accident	71°C	96°C	120°C	153°C	125°C
Prestressing System & Capacity	12 $\phi$ 7 74T	12 $\phi$ 8 92T	12 T 13 200T / 220T	19K13 355T	19K13 355T

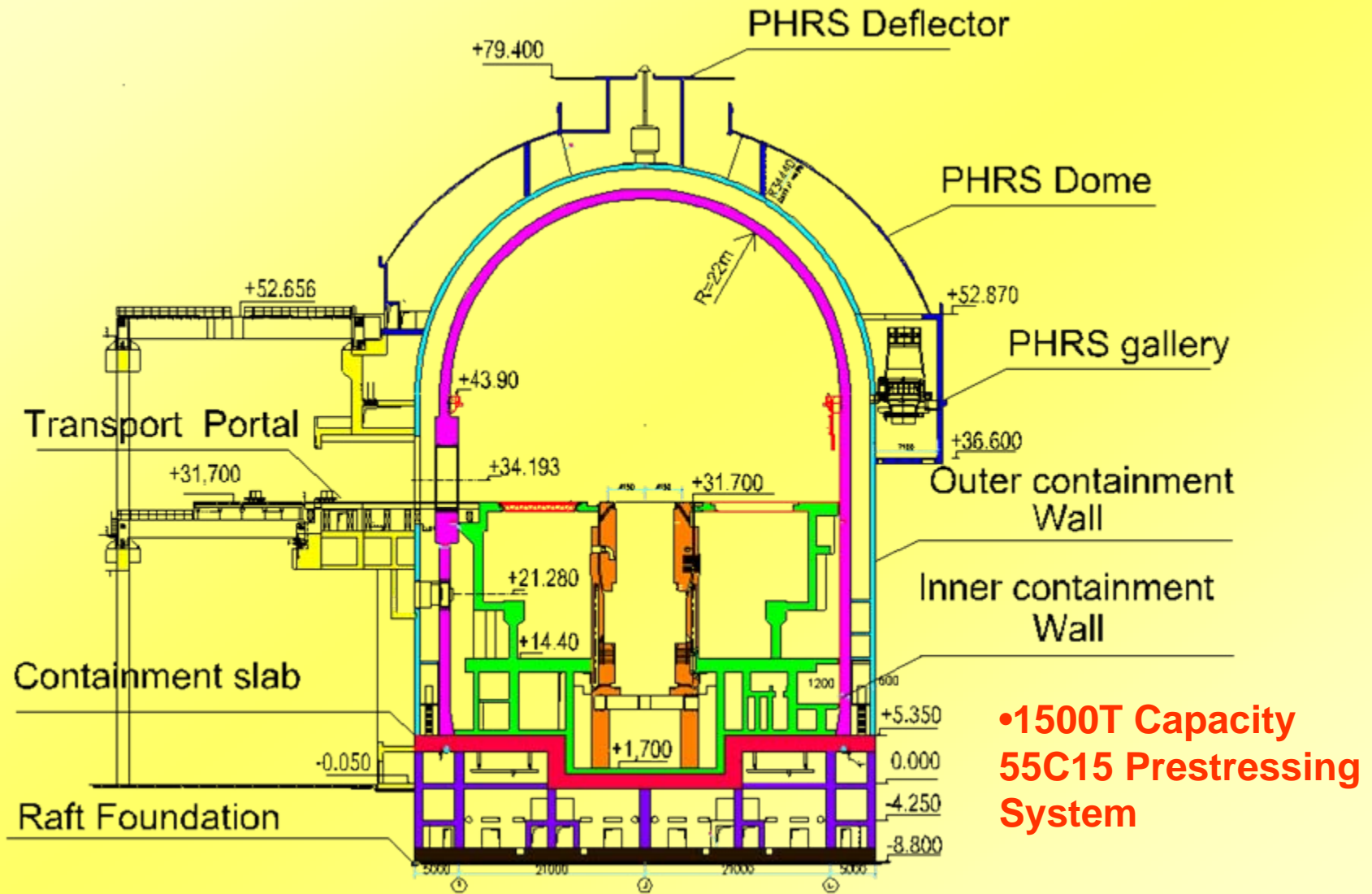


## 700 MWe Project (PHWR)

- Dry Containment
- Containment spray system
- Metallic liner for IC
- Passive Decay Heat Removal System
- Prestressed Inner Containment with 500T capacity cables
- Common raft for entire Nuclear Building



# Containment Structure of KKNPP (VVER)



**•1500T Capacity  
55C15 Prestressing  
System**

REACTOR BUILDING - E- W CROSS SECTION