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ICOLD
27TH CONGRESS
90TH ANNUAL
MEETING



CIGB
27^{ÈME} CONGRÈS
90^{ÈME} RÉUNION
ANNUELLE



Embankment Dam Committee E

Cofferdam Types and Design Criteria

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Contents of presentation

- 1 Contents of Bulletin 48 and 48A
- 2 New Cofferdam types
- 3 Design criteria aspects



Contents of Bulletin 48 and 48A

¹ICOLD Bulletins 48 and 48A include the following on cofferdams:

- Mention Concrete, Rollcrete, Masonry Gravity and Arch Dams
- Embankment Dam Types:
 - With wide clay core, sometimes placed in water
 - With Central diaphragms constructed in dry or under water
 - With sheet pile curtains as seals or cut-offs
 - Reinforced rockfill
- Also mention overtopping of cofferdams, reinforced rockfill



Conventional Cofferdams for Polihali Weir in Lesotho



Polihali Crump Gauging Weir Cofferdam





Sheet piles used in cut-offs for cofferdams

1





Earth cofferdam with gunnited geotextile n upstream side for Psring Grove Dam in South Africa





Earth cofferdam with gunnited geotextile n upstream side for Spring Grove Dam in South Africa

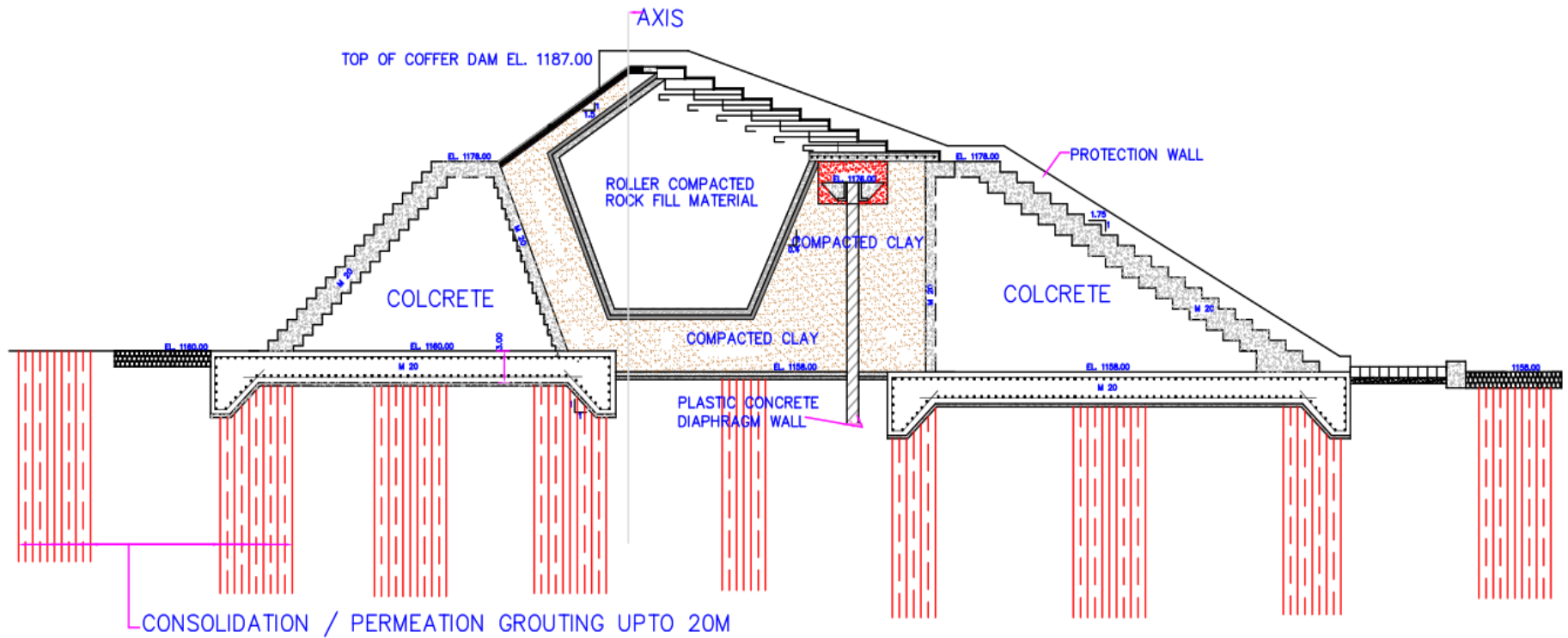




Upstream ECR Coffe Dam for CFR Mohale Dam Fuse plug spillway was used for filling the volume between dams before overtopping of ECR Coffe Dam

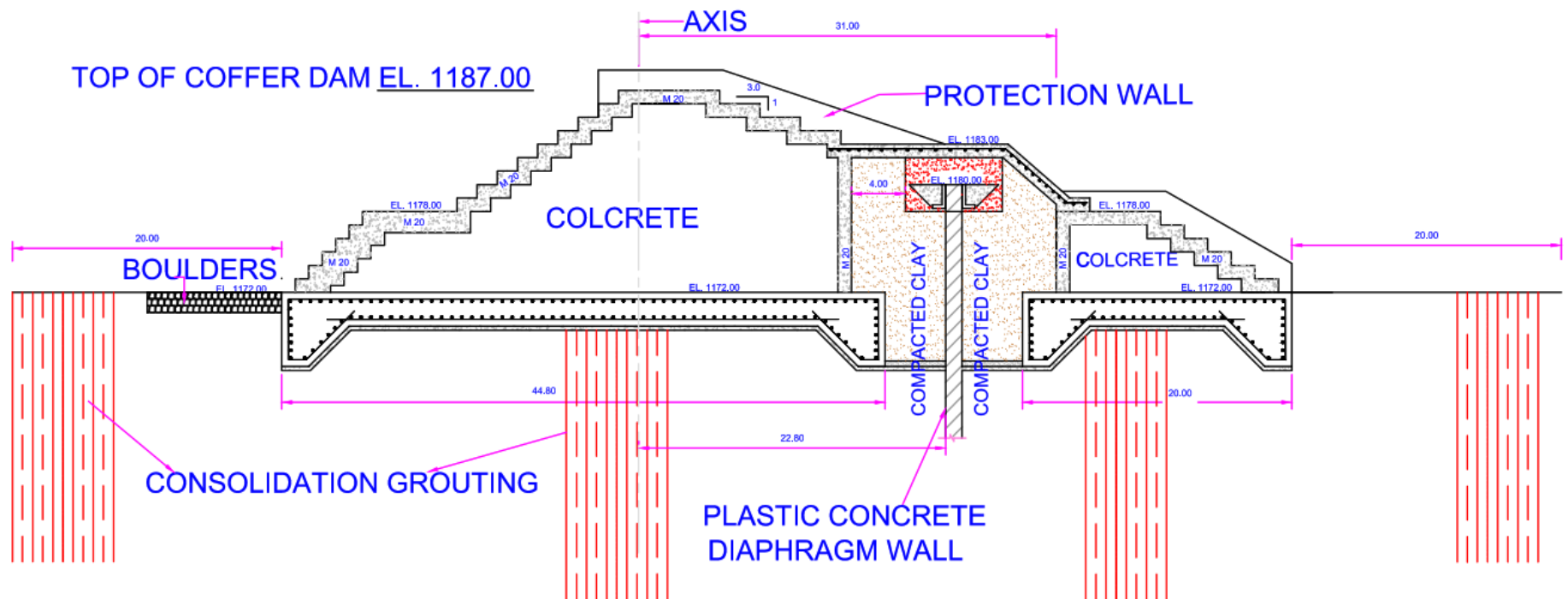


PUNATSANGCHHU-I H.E. PROJECT BHUTAN

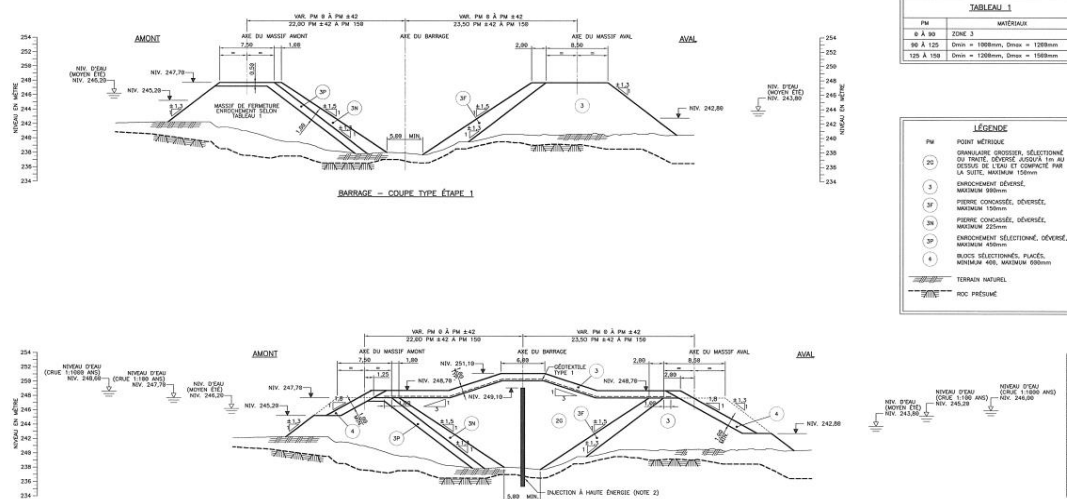
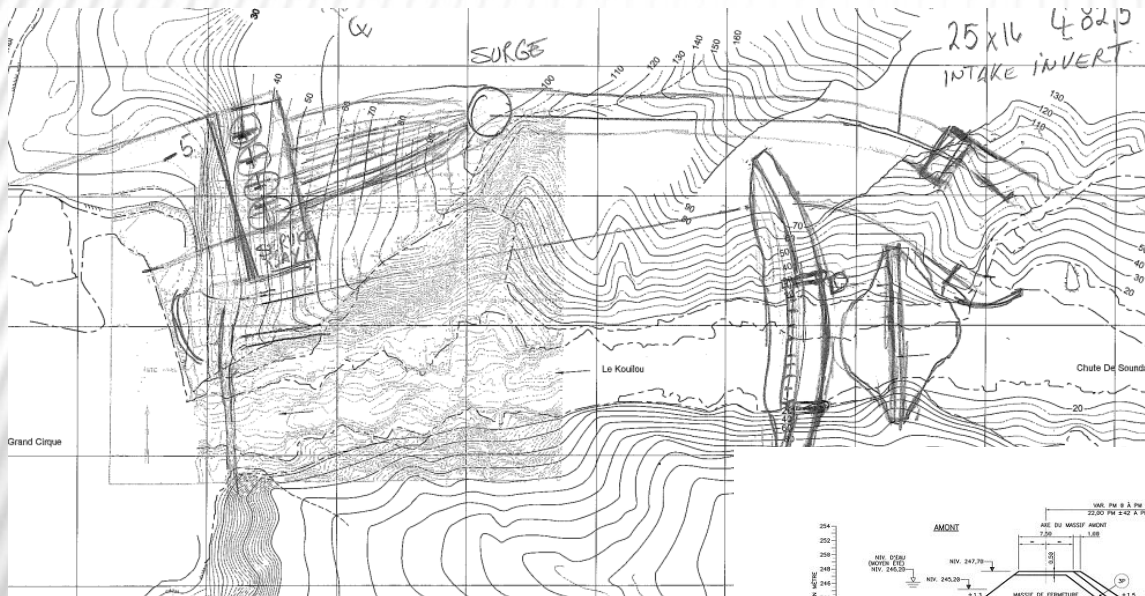


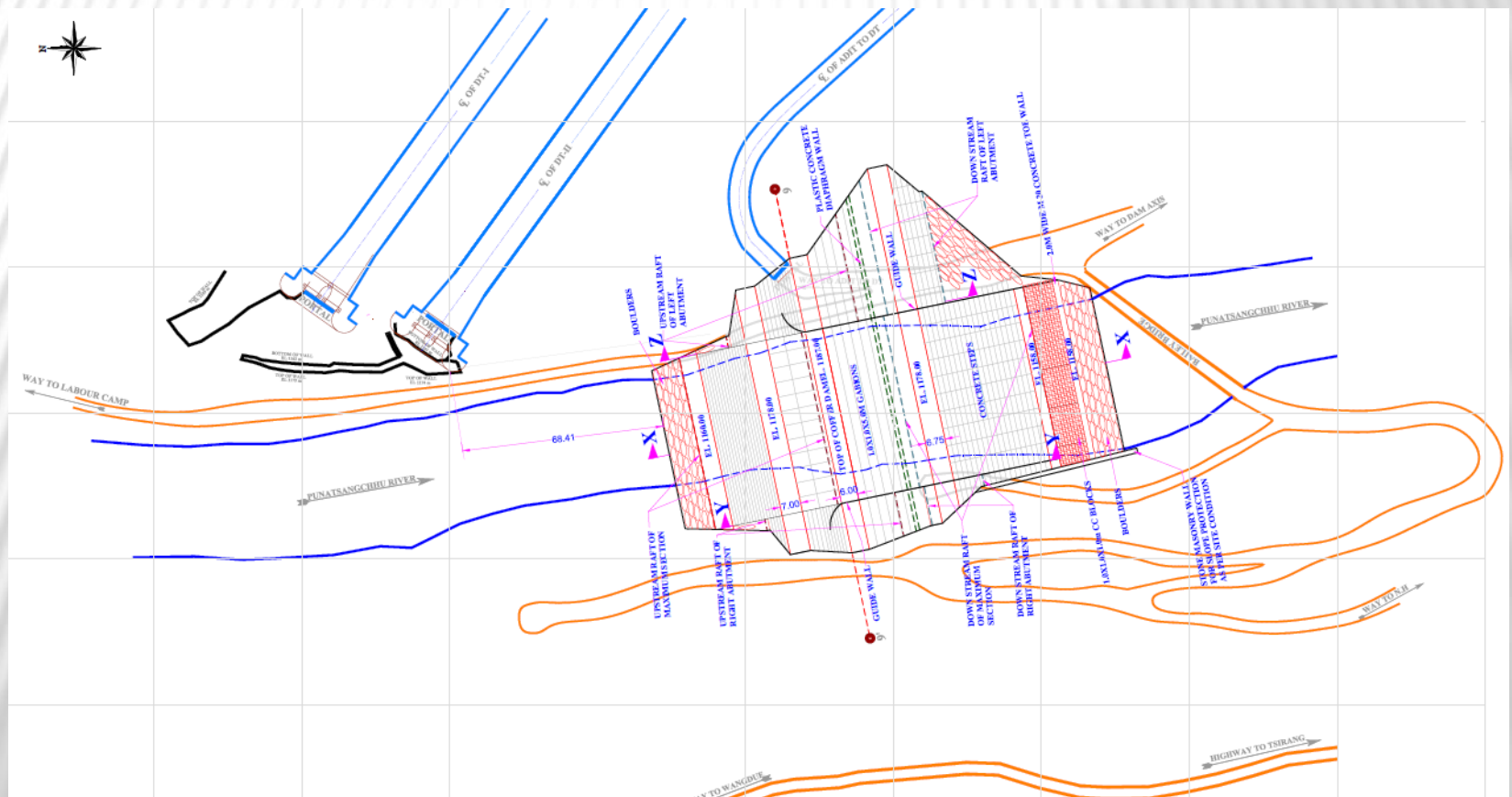
**Maximum Section of Upstream Cofferdam at centre (colcrete type)
with clay and plastic cut off wall**

Section of Upstream Cofferdam at abutments (colcrete type) with clay and plastic cut off wall: PUNATSANGCHHU-I H.E. PROJECT BHUTAN

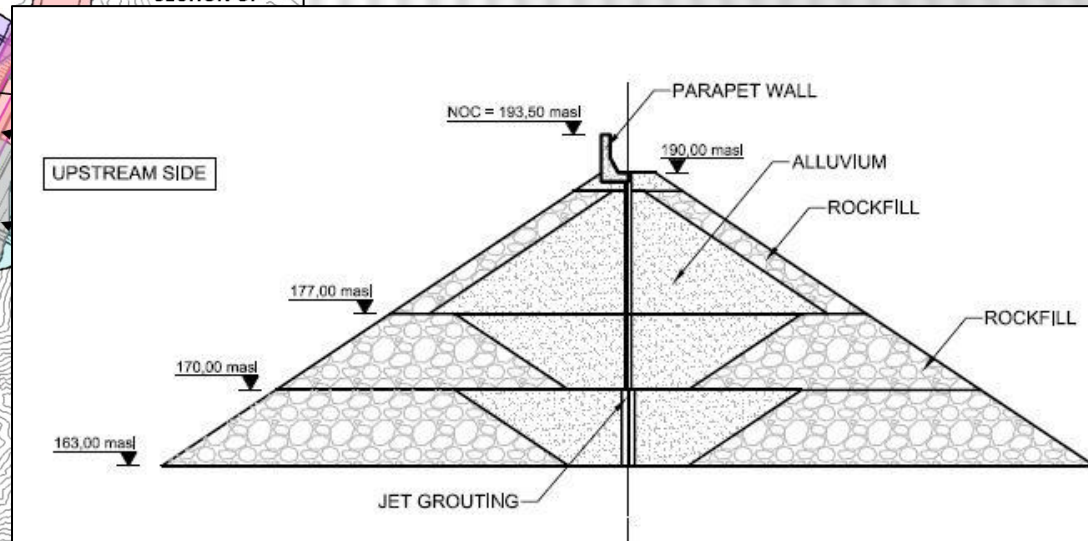
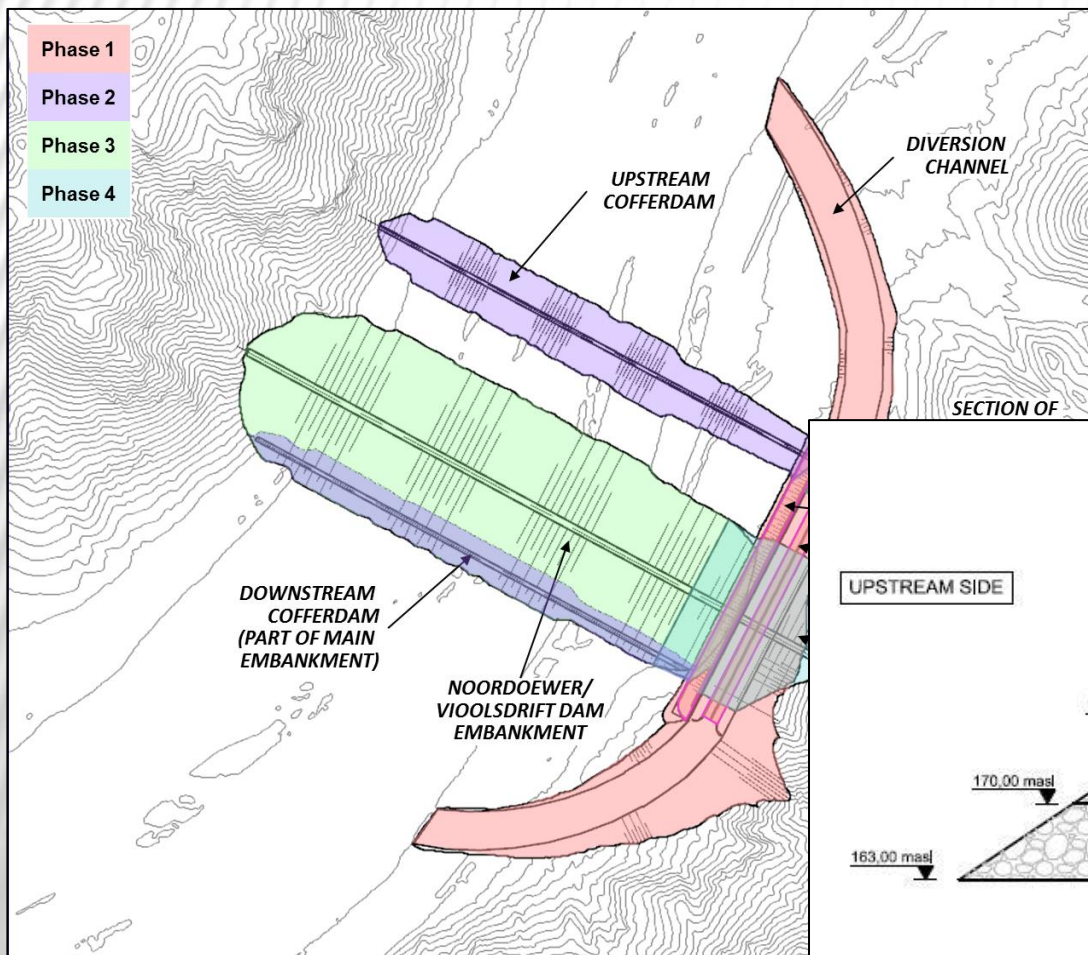


Sounda Gorge Cofferdam section

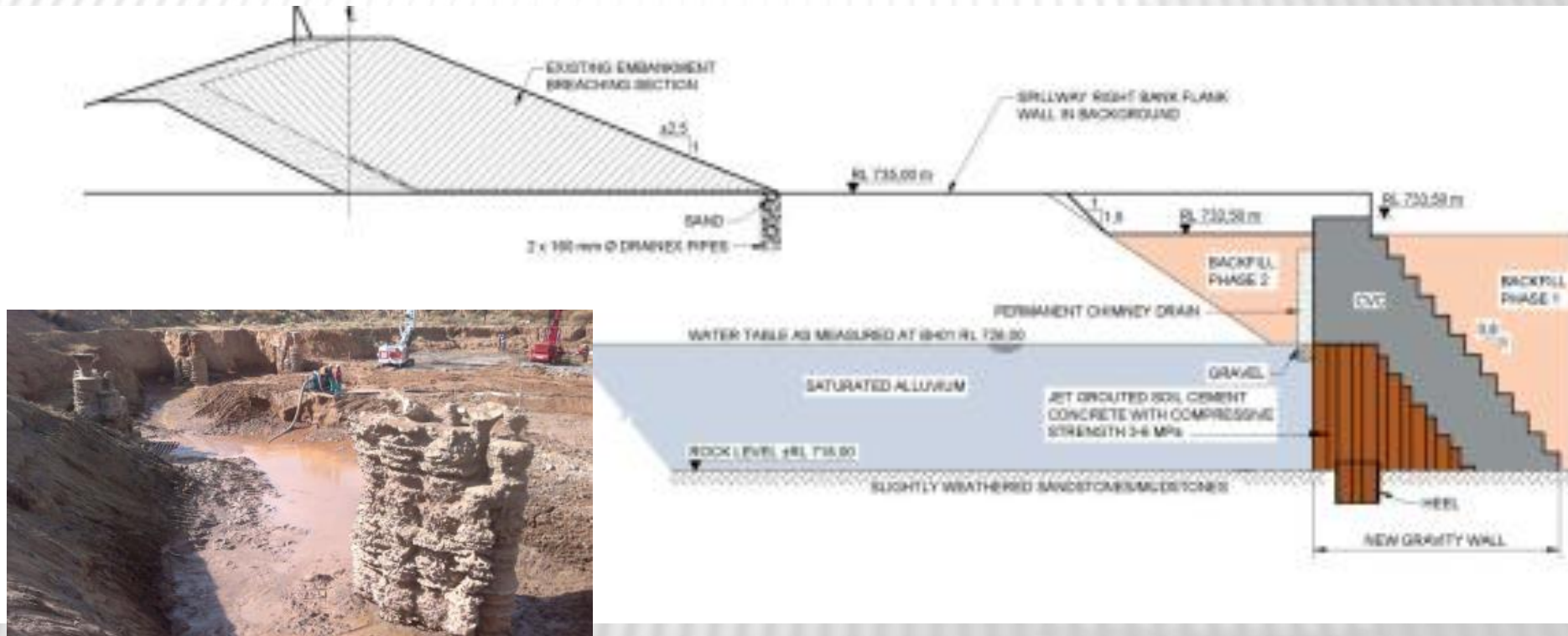




Noordoewer/Vioolsdrift Cofferd dam (Jet grouting)



Elandsdrift Cofferdam as part of the new dam (Jet grouting)





Elandsdrift Cofferdam as part of the new dam (Jet grouting)





Design criteria

- Classification
- Consequences of partial/total failure
- Overtopping
- Freeboard
- Design flood (Attenuation, Climate change?)
- Design for not clogging of inlet of diversion channel
- Dam axis and conduit alignments
- Flood peaks and hydrographs – (hurricanes, global warming, cyclones, seasonal affects)
- Flood recurrency interval for Cofferdam and Main Dam
- Flood routing in cofferdam reservoir
- Overtopping failure and risk
- Level of protection selected



Design Criteria Issues

- Classification
- Consequences of partial/total failure
- Overtopping
- Freeboard
- Design flood (Attenuation, Climate change?)
- Design for not clogging of inlet of diversion channel
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Design Criteria

- Cofferdam reservoir backwater effects
- Accommodating practical aspects like tree trunks blocking the conveyance structure inlet. (Unexpected condition – may be add more)
- Merging the Cofferd Dam with the Main Dam
- Foundation/construction material borrow area evaluation
- Stability of dam
- Design for filling the area in between the cofferdam and the main dam like a CFRD using a fuse plug spillway, before the Cofferdam is overtopped.



Design Criteria

- Interfaces of coffer dams to permanent dam infrastructure
- Erosion of earthfill against flowing water of the river
- Specifications Drawings, specifications and design memoranda
- Environmental requirements
- Water quality requirements



Thank you