ENERGY AND MINES

Ministry of Energy and Mines
Lao PDR
Department of Energy Management (DEM)

Topic: Dam safety Management in Lao PDR

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- Basic design stage
- Construction stage
- Operation stage
- Contract engineer (CE)
- Dam break analysis and Emergency action plan

Basic design stage

- Law on Electricity
- Lao Electric Power Technical Standard (LEPTS)
  - Civil
  - Powerhouse
  - Substation
  - Transmission line
  - Distribution line
  - User side
- ToR for Basic design

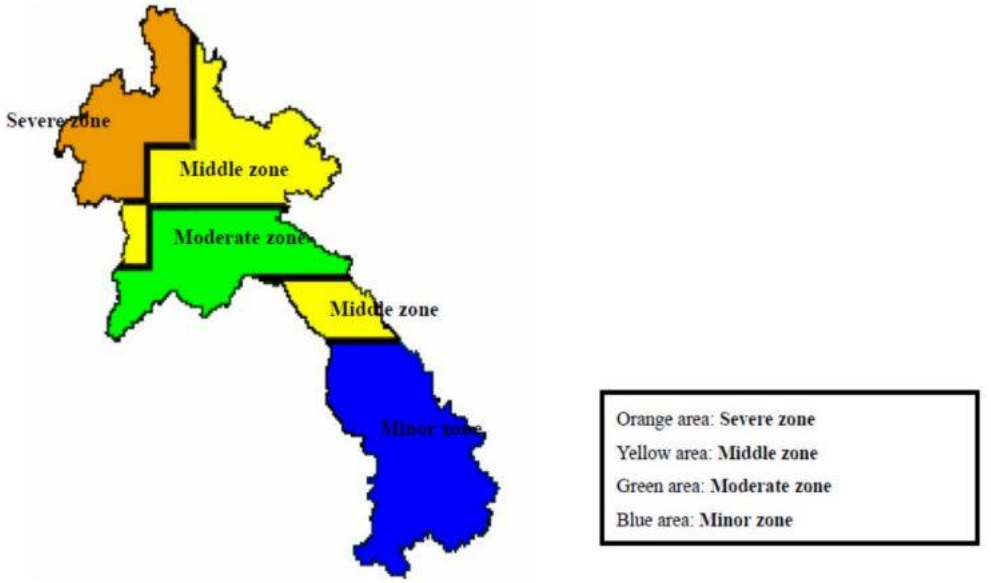


Table 20-2: Estimated Seismic coefficients (PGA for MCE condition)

Zones	Gravity Dam	Arch Dam	Fill Dam	
			Homogeneous Dam (Earth-fill dam)	Rock-fill dam
Severe	0.15	0.24	0.15	0.15
Middle	0.15	0.24	0.15	0.15
Moderate	0.1	0.2	0.12	0.1
Minor	0.07	0.12	0.1	0.1

Basic design stage

- Dam safety guidelines
  - Documentation
  - Training
  - Emergency action plan
  - Geology
  - Monitoring instrument
  - Quality control for the construction
  - Impounding
- Recommendation of CE for basic design
- Chief engineer of the developer for basic design stage

1. Initial stage selection

Selection of Inflow Design flood (IDF) and Check flood for a dam shall be set as follows, according to dam classification set in Paragraph 2:

SNo.	Risk Type	IDF	Check Flood
1	Low	100 year	200 to 500 year
2	Moderate	500 year	1000 to 5000 year
3	High	1000 year	5000 to 10000 year or PMF
4	Extreme	PMF	---

2. Dam Classification

The criteria for classification of the dams (hazard rating) will be based on the below risk considerations. Hence, for classification of the dams foregoing considerations for risk assessment shall be followed as given in table:

SNo.	Risk Factor	Low	Moderate	High	Extreme
1	Storage Capacity (Mm^3)	< 0.1	0.1-3	3-100	> 100
	Weighting points	0	4	6	8
2	Height (m)	< 15	15-30	30-45	> 45
	Weighting points	0	2	4	6
3	Population at Risk (No. of persons)	None	1-10	10-100	> 100
	Weighting points	0	4	8	12
4	Potential Downstream Damage (in terms of impact on economy, society and environment)	None	Low	Moderate	High
	Weighting points	0	4	8	12

SNo.	Risk Type	Total Risk factor
1	Low	0-6
2	Moderate	7-18
3	High	19-30
4	Extreme	31 -38

Total risk factor can be calculated by following formula as

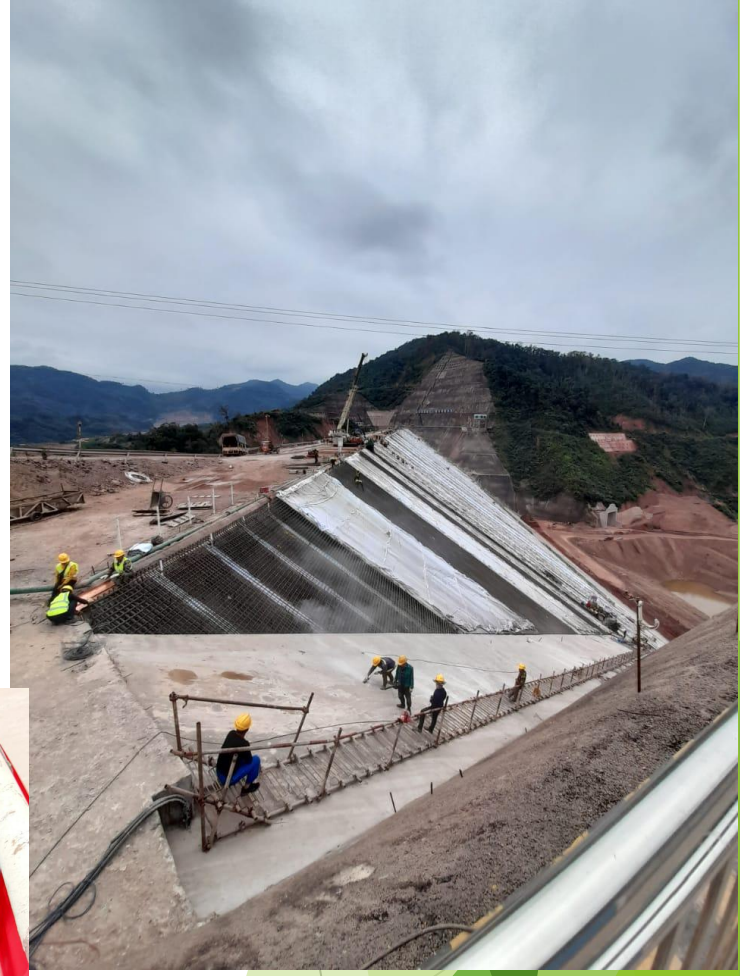
Total Risk Factor = Risk Factor (Capacity) + Risk Factor (Height) + Risk Factor (Evacuation Requirements) + Risk Factor (potential downstream damage)

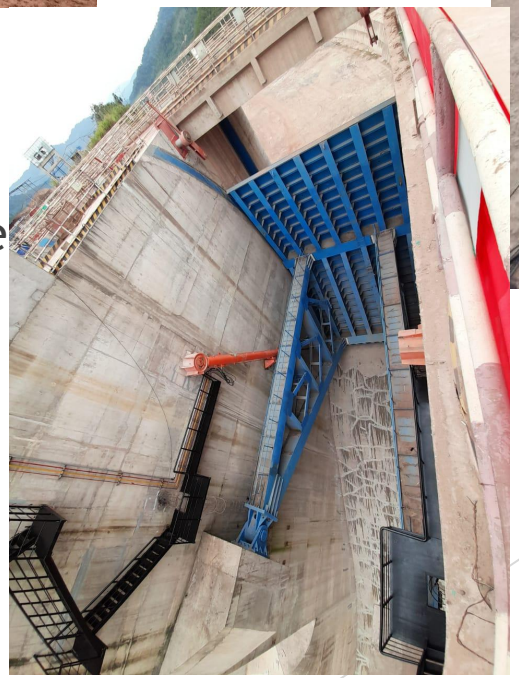
Construction stage

- Regular site inspection by DEM
  - Foundation of the dam
  - Before impounding
  - Before operation
- Random site inspection by DEM
- Safety rule for the construction
- Recommendation by CE during the construction
- Chief engineer of the developer for construction stage

Operation stage

- Operation manual
- As build drawing
- Dam break analysis
- Emergency action plan
- Safety rule
- Chief engineer of the developer for operation stage



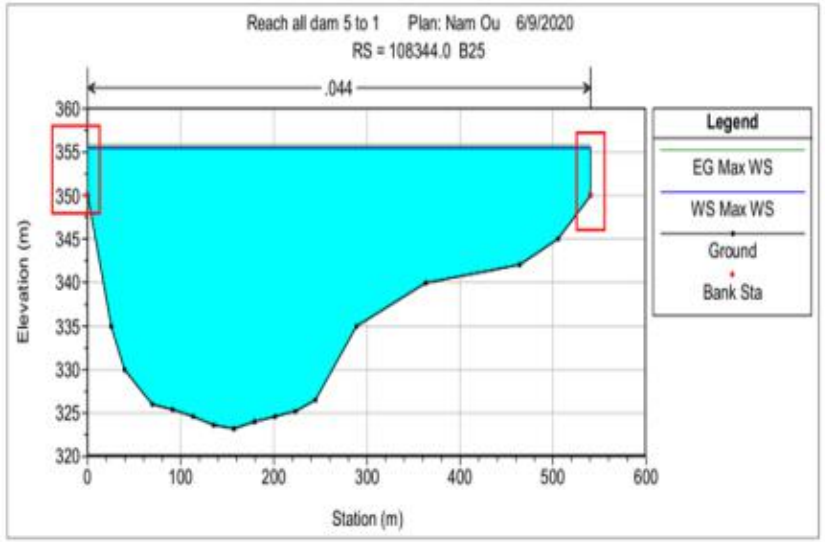


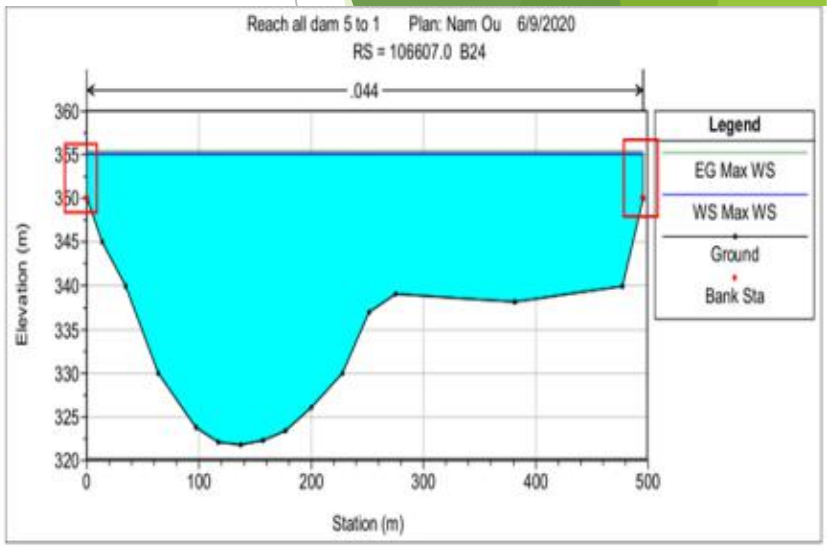
Contract engineer (CE) on behalf of Lao government

- Right to recommendation, examination, inspection and monitoring
  - Basic design
  - Detail design
  - Foundation of the dam
  - How to treatment of the foundation of the dam
  - How to grouting
  - How to treatment of fault
  - Quality control of the construction

Dam break analysis (DBA) and Emergency action plan (EAP)

- ToR for dam break analysis
- ToR for emergency action plan
- DBA for construction stage
- DBA for impoundment stage
- DBA for operation stage
- All of the DBA report shall be the basic information of EAP
- EAP during the operation stage shall be update yearly





Establishment of dam safety management center

- GoL need to have dam safety management center
- Our pleasure to have founding support from China government and international organization to implementation of dam safety program in Lao PDR
- Thanks for Chinese companies to investment on hydropower project in Lao PDR a lot.

Thank you for your kind attention