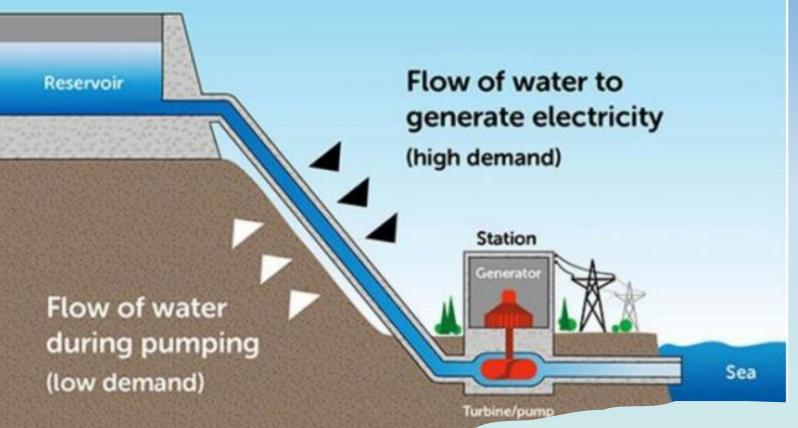
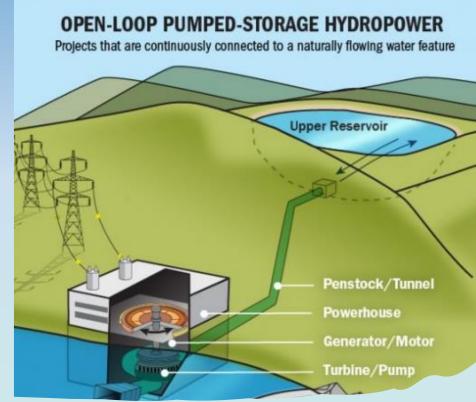


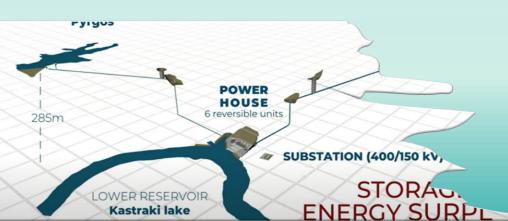
LOCATION

in the municipalities of Amfilochia and Agrinio, Aitoloakarnania Prefecture, Greece





Power facilities in turbine and pump mode



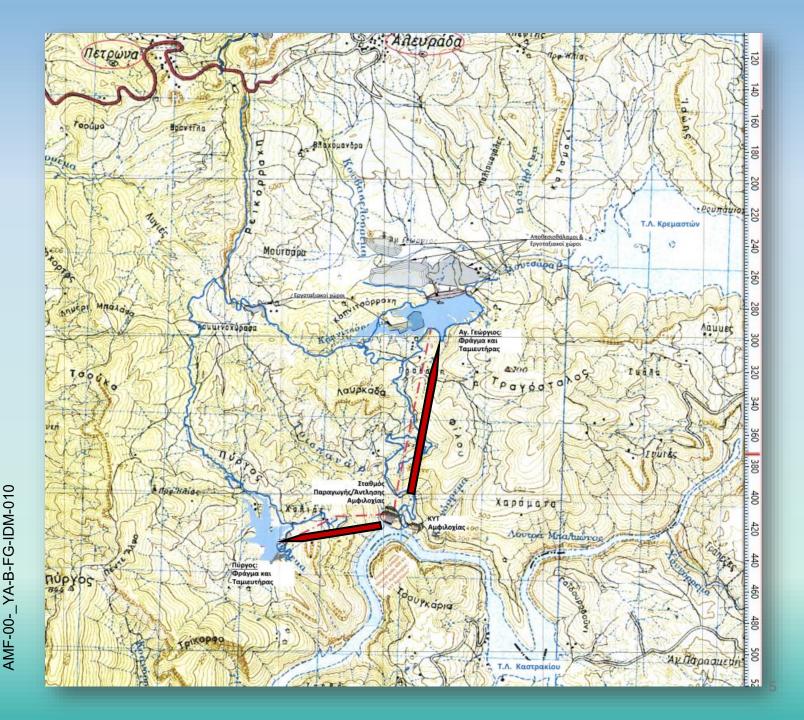
1. GENERAL INFO: HYDROPOWER PRINCIPLE

The new upper reservoirs
Agios Georgios and Pyrgos will
be connected to the lower
reservoir Kastraki Lake.

- 2 upper reservoirs, AG & PY
- 2 independent waterways and
- 1 powerhouse, discharge and
- 1 lower reservoir.

Power facilities will act in turbine and pump mode.

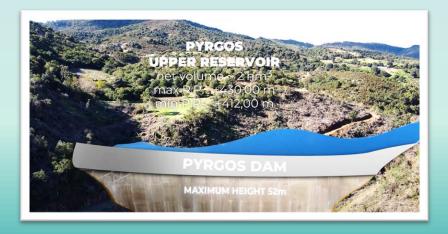
680 MW in turbine mode and 730 MW in pump mode

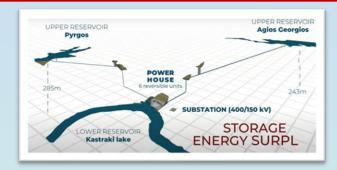


2 DAMS 2 new Upper Reservoirs at Agios Georgios and Pyrgos 6,70 and 2,01 million m3



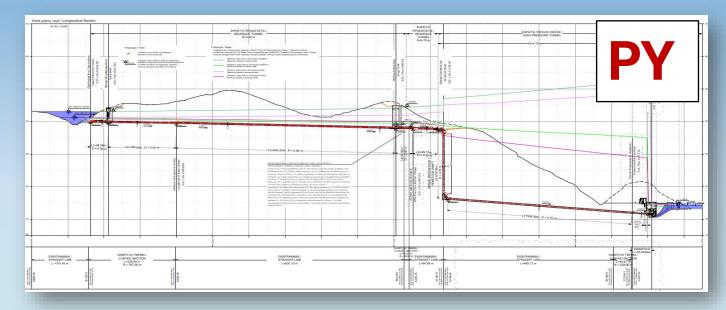






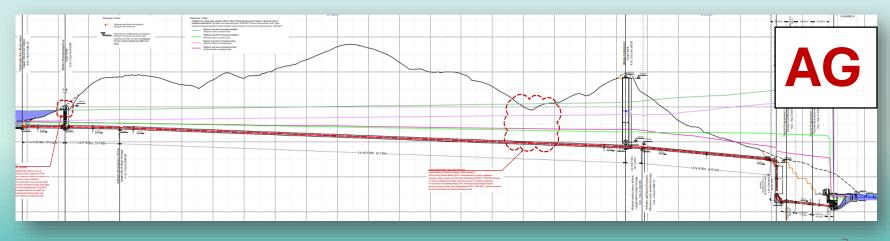
Both waterways have:

- Upper reservoir (AG & PY dams),
- Intake, Gate shaft & Surge tank,
- Low pressure penstock,
- Vertical shaft,
- High pressure penstock,
- and will share the powerhouse and the tailrace structures to reach the low reservoir.



PY (430-144,65=285,35 m)

- ☐ Pyrgos waterway 2 units each one with a nominal capacity of 110 MW / 117 MW
- □ Agios Georgios waterway 4 units, each with nominal capacity of 115 MW / 124 MW (generating/pumping)



Upper reservoir maximum (Agios Georgios)	EL. 388.0 m
Upper reservoir minimum (Agios Georgios)	EL. 359.5 m
Upper reservoir maximum (Pyrgos)	EL. 430.0 m
Upper reservoir minimum (Pyrgos)	EL. 412.0 m
Lower reservoir (Kastraki Lake) maximum	EL. 144.65 m
Lower reservoir (Kastraki Lake) minimum	EL. 140.65 m
OPERATIONAL TIME	

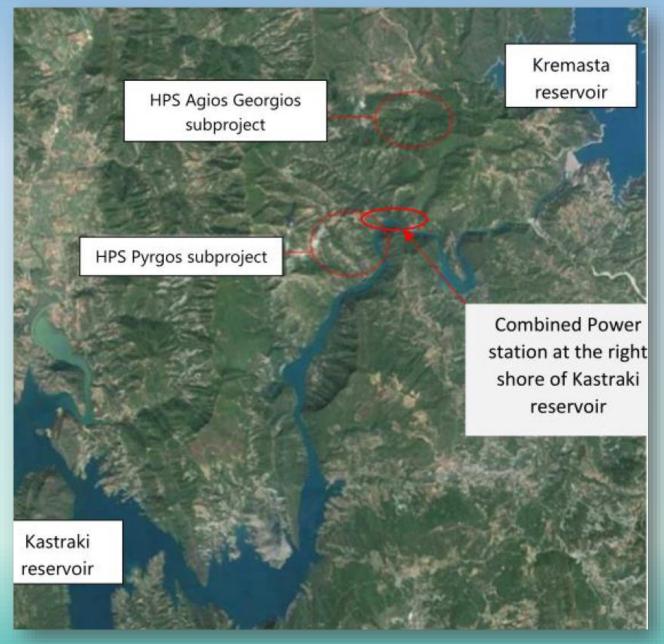
AG 388,0-359,5=28,5m FLUCTUATION IN RESERVOIR

WATER LEVELS

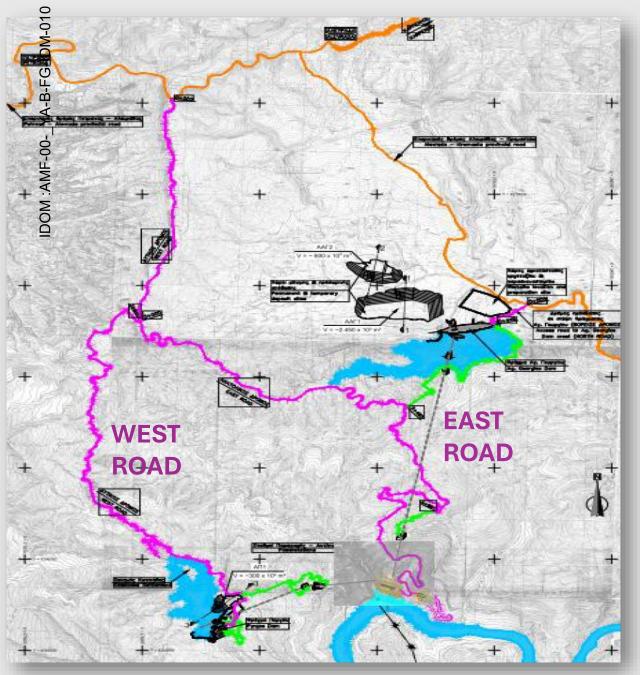
AG (388-144,65=243,35m)

PY 430,0-412,0=28,0m FLUCTUATION IN RESERVOIR

PY (430-144,65=285,35 m)

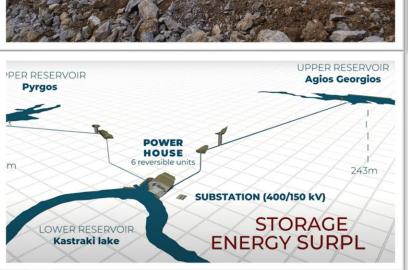


2. SITE ACCESS ROADWORKS

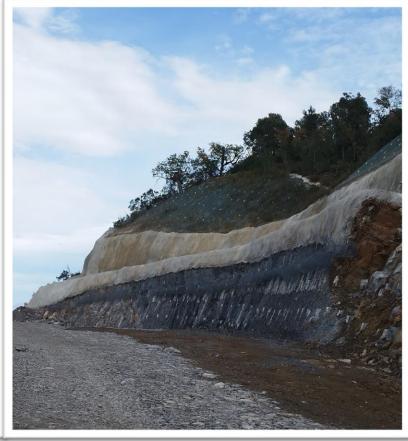












ROADWORKS

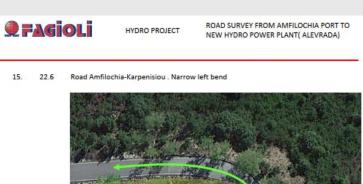
HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

TRANSPORT ROUTE

Detail the transport route and the relative critical points for delivery the oversize items from Amfilochia Port to the new Hydro Power Plant located near Alevrada

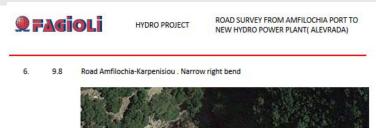
HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE















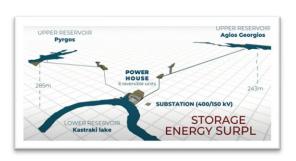
FAGIOLI	COMETTO 61MS	Date: Rev:	13/03/2 1
Trailer Name:	COMETTO 61MS		
Axles no. (ax):	6 (all steering axles, no driving axles, all Braking axles)		
Overall L. (L _n):	9380 mm		
Length (L):	9060 mm		
Width (B _o):	3000 mm		
Height (H):	1160 mm +260mm / -240mm		
Real Self weight:	21.0 t (Single Module) – 22.0 t (1/2 Module+1/2 Module)		
Ref. drawings <u>Single Module</u> :	179-COM-DP-1MS-130		
Ref. drawings 1/2 Module:	179-COM-DP-1MS-131		

Data sheet n.: DS - 2400



HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

3. DAMS





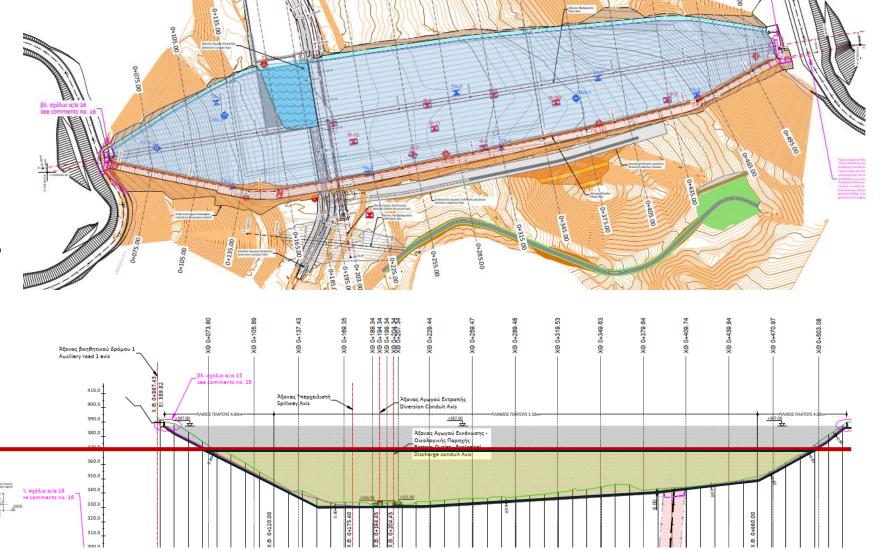
AGIOS GEORGIOS DAM

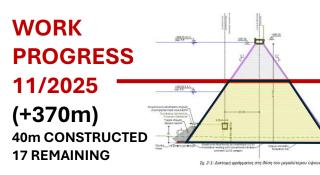
57m max height 550m long

TOP LEVEL +387 - FOUNDATION +330

The max and min levels of the upper reservoir are, respectively, +388/+359.5 MSL.

Total reservoir volume 6.7 million m3





HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

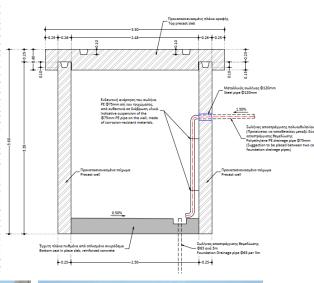
DRAINAGE GALLERIES

Roof levels +341,80,

+354,20

WORK PROGRESS

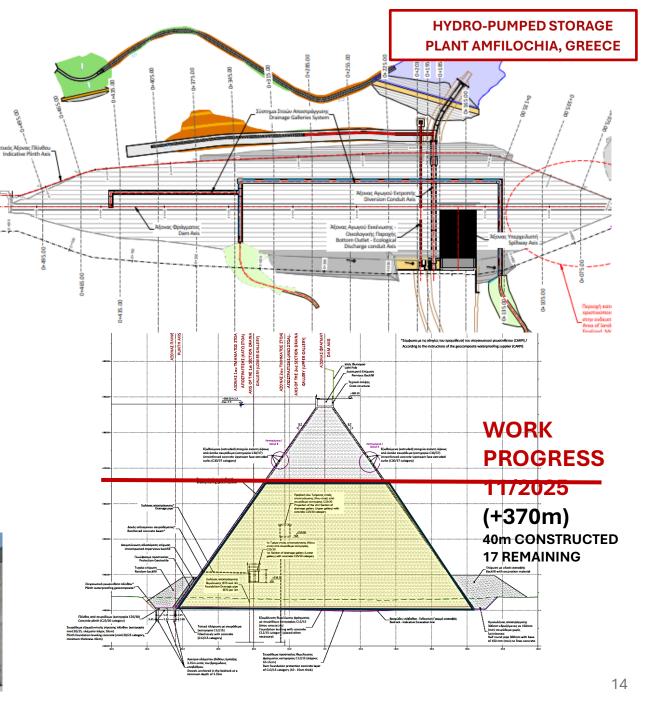
11/2025:100%







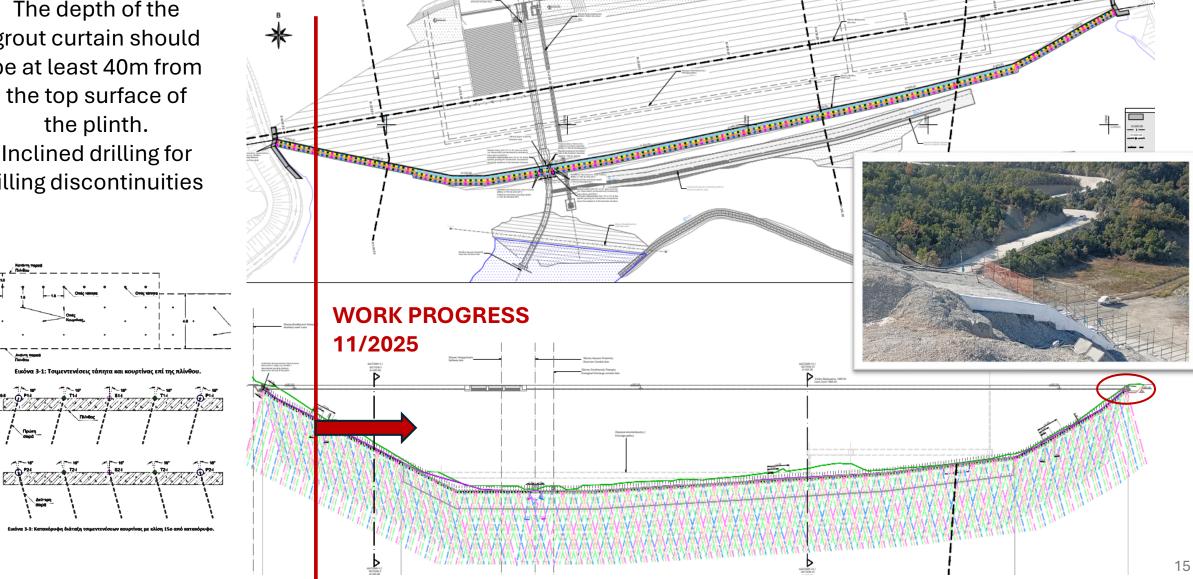




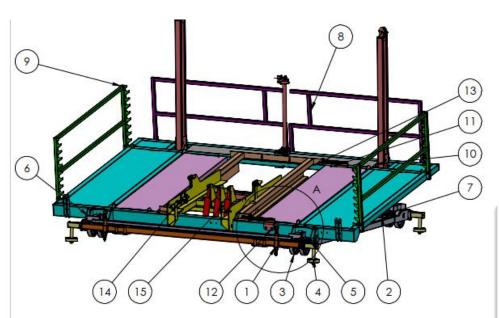
GROUTING at the plinth

HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

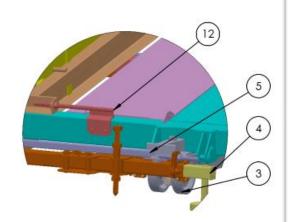
The depth of the grout curtain should be at least 40m from the top surface of the plinth. Inclined drilling for filling discontinuities



GROUTING DRILLING PLATFORM



ITEM NO.	PART NUMBER	QTY.
1	DPA FRONT	2
2	DPA SIDE	2
3	DPA WHEELS	4
4	DPA SIDE WHEELS	4
5	DPA STEERING	2
6	DPA PLATFORM	1
7	DPA LIFTING UNIT B	1
8	DPA RAIL A	2
9	DPA RAIL B	2
10	DPA COVER A	2
11	DPA COVER B	2
12	DPA ADJ	2



Drilling Platform for grouting at right dam abutment

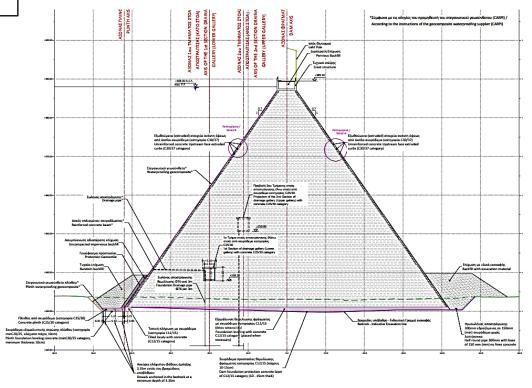




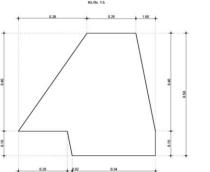
Drilling Platform for grouting at left dam abutment



EXTRUDED DAM ELEMENTS



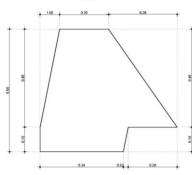
Λεπτομέρεια / Detail B Εξωθούμενο στοιχείο επένδυσης ανάντη πρανούς από άοπλο σκυρόδεμα κατηγορίας 20/37 opcrate extruded curb for unstream foae initing from unreinforced concrete C30/



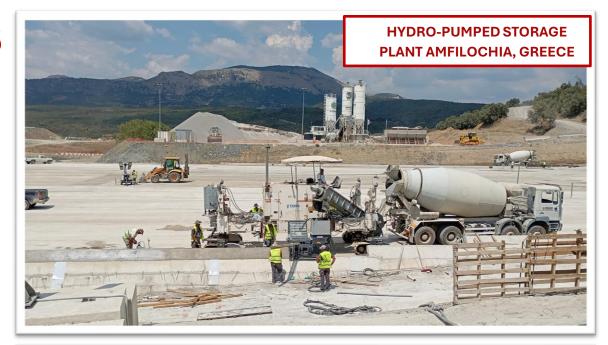
Λεπτομέρεια / Detail Α Εξωθούμενο στοιχείο επένδυσης κατάντη πρανούς από άσπλο σκυρόδεμα καπηγορίας C30/37

κατηγορίας C30/37

Concrete extruded curb for downstream face lining from unreinforced concrete C30/37 category



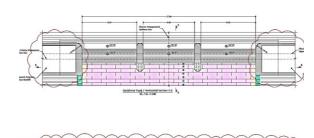
Use of
Wirtgen
for the
construction
of extruded
elements

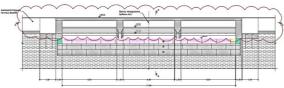




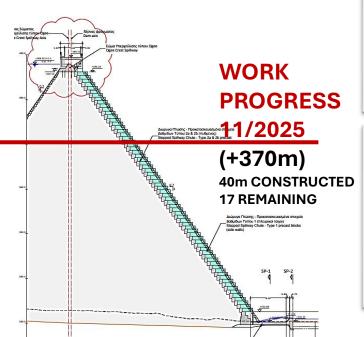
SPILLWAY

C. INCH

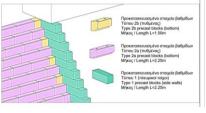


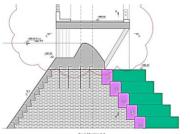


Placing the Spillway precast elements



HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE



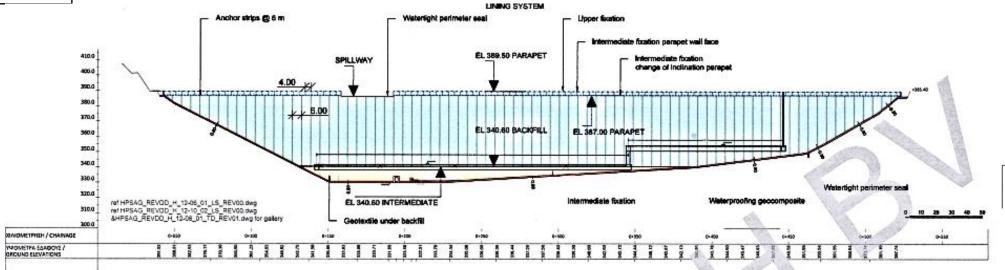


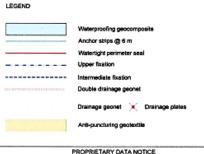




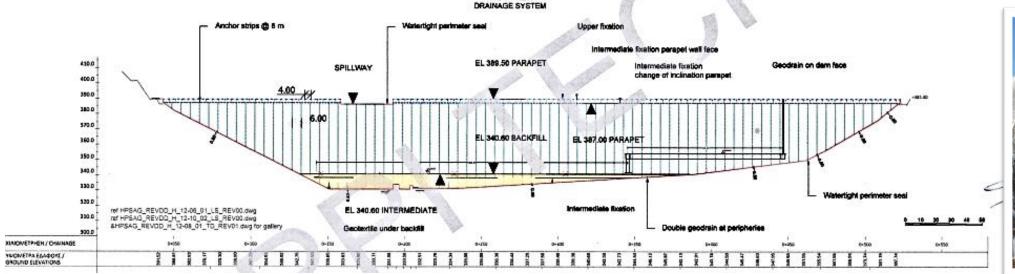
DAM WATERPROOFING (CARPITECH BV)

HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

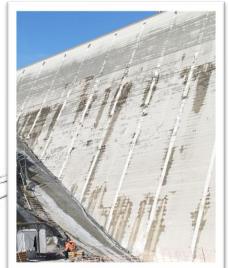




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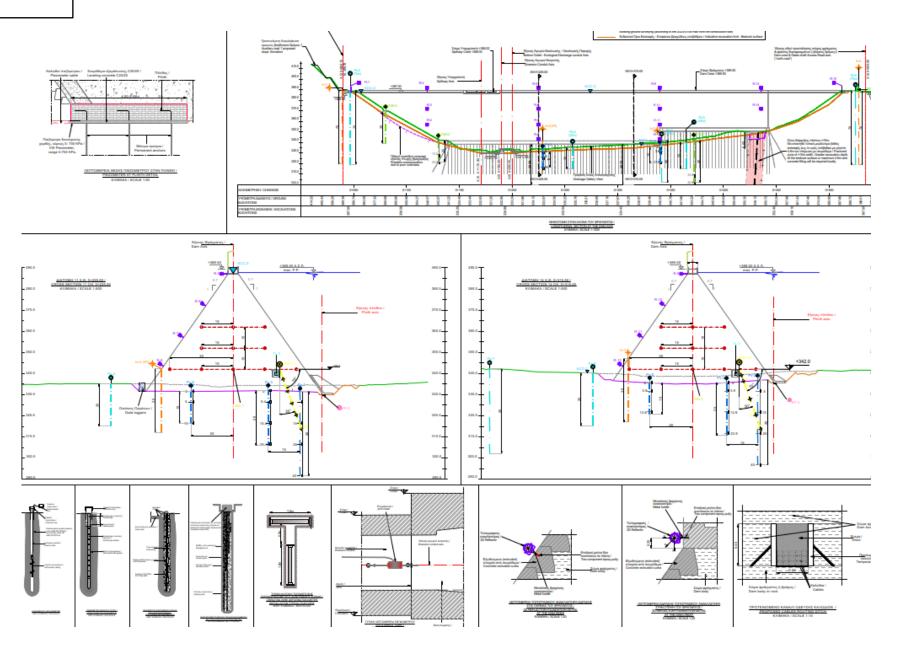


FRONT VIEW



DAM MONITORING LAYOUT

HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE





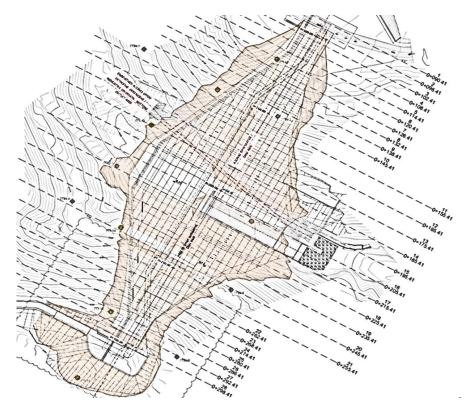
- 13 open standpipe piezometers
- 1 VW piezometer
- 6 multilevel VW piezometer
- 4 inclinometers
- Deformation meters
- Tiltmeters, Jointmeter
- 3D reflectors
- 22 thermocouple string lines
- 4 accelerometers

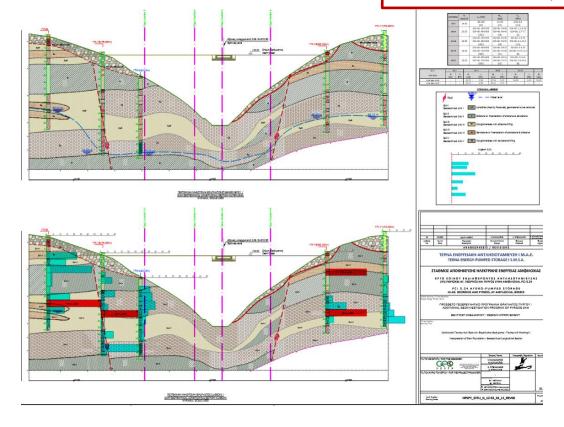


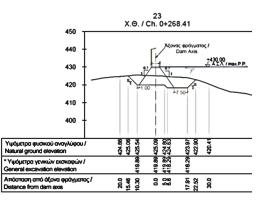
PYRGOS DAM 52m max height 300m long

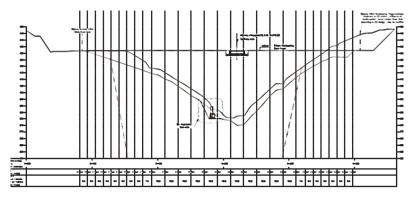
The maximum and minimum levels of the upper reservoir are, respectively, +430/+412 MSL.

Total reservoir volume 2.01 hm3



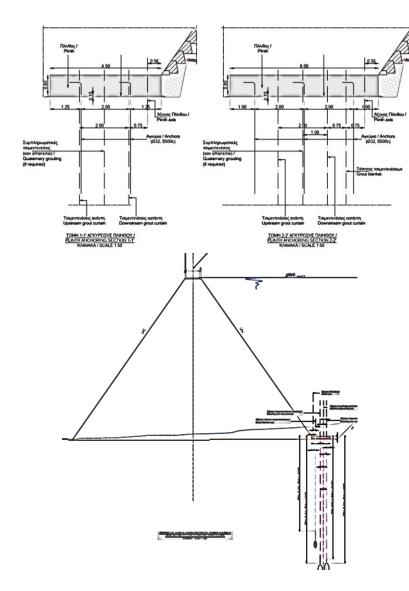


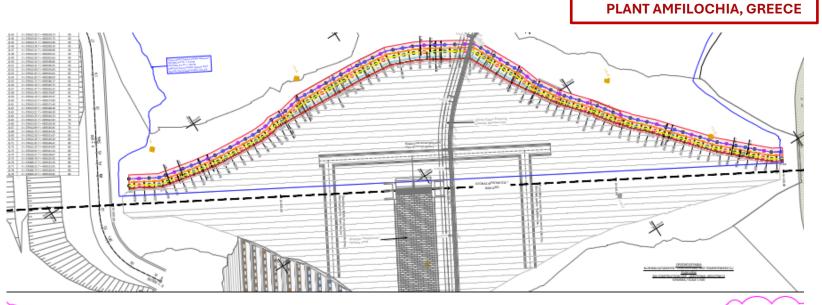




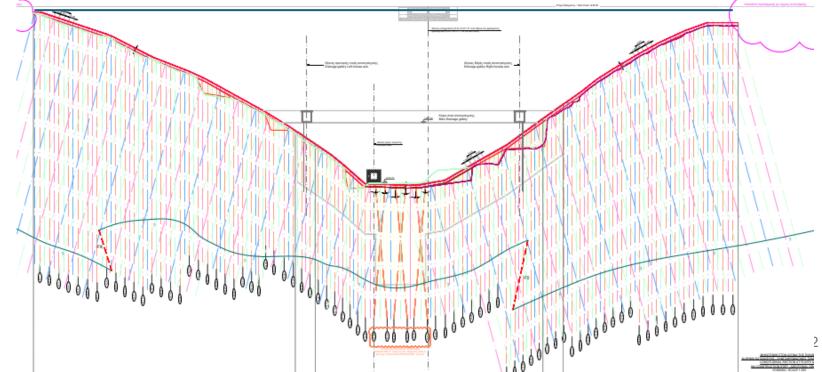
PYRGOS DAM

PLINTH & GROUTING





HYDRO-PUMPED STORAGE





PYRGOS DAM

HYDRO-PUMPED STORAGE
PLANT AMFILOCHIA, GREECE

EXCAVATION WORK PROGRESS 7/2025: 100%

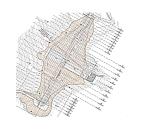


Removal works of loose materials, lean concrete, anchors & shotcrete at the Right Buttress, 7/2025



General View of Left Buttress , 7/2025

PYRGOS DAM



VARIOUS WORKS IN PROGRESS 10/2025







Excavation and removal works of loose materials of the bedrock on Dam's base, 10/2025

Installation of steel reinforcement for the stream's diversion & Outlet - Ecological Flow Conduit foundation, 10/2025

Installing anchors at Anchoring Bench (Downstream) at the Right Buttress, 11/2025

PYRGOS DAM

Installation of waterproofing



Installation of steel reinforcement for stream's diversion & Outlet - Ecological Flow Conduit

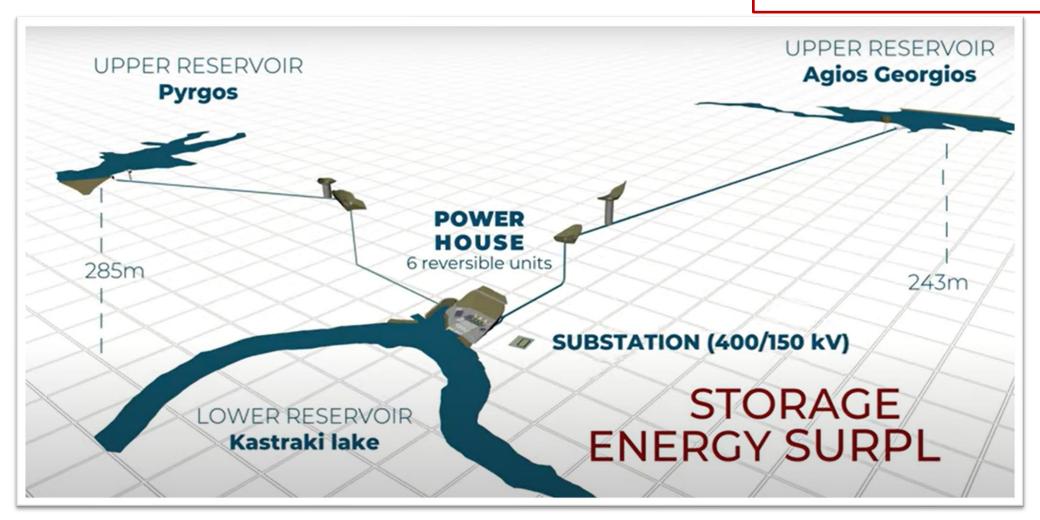
VARIOUS WORKS IN PROGRESS 11/2025

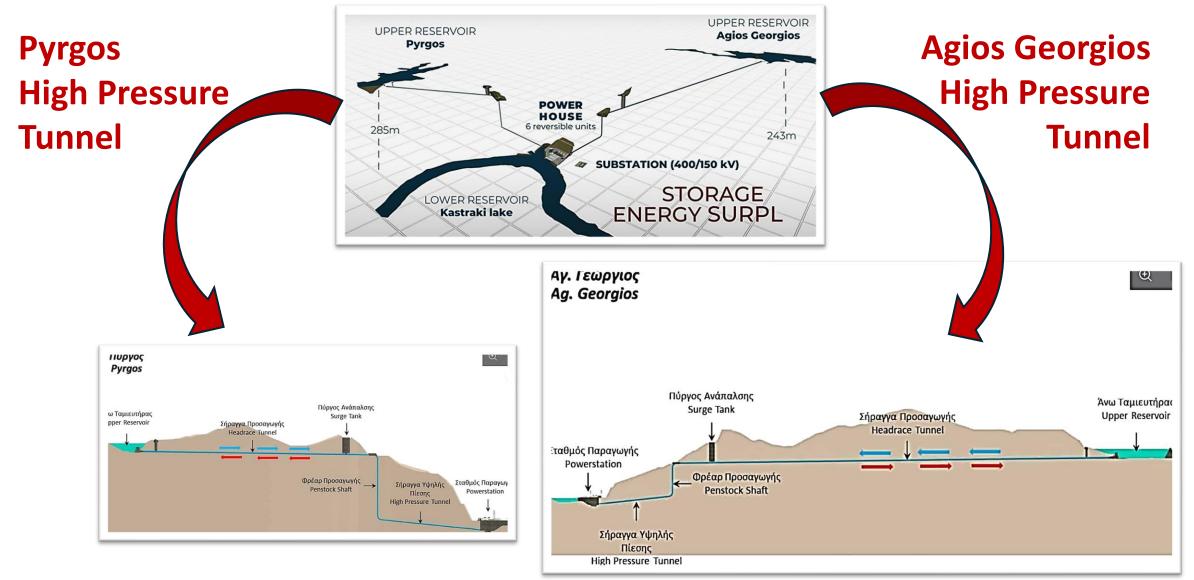
HYDRO-PUMPED STORAGE
PLANT AMFILOCHIA, GREECE



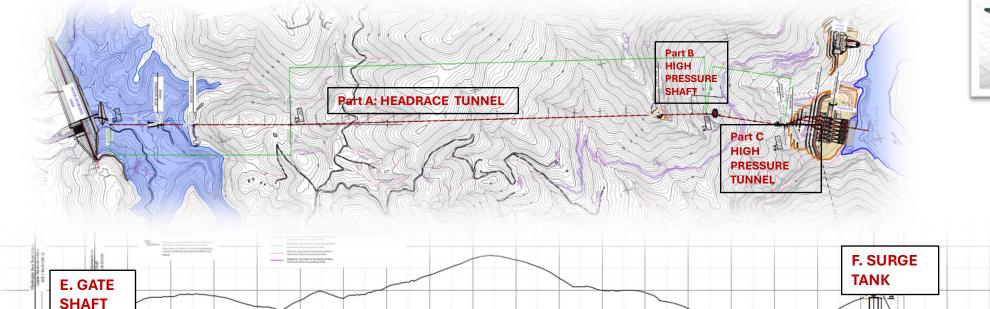
4. TUNNELS & SHAFTS

HYDRO-PUMPED STORAGE
PLANT AT "AG. GEORGIOS" AND
"PYRGOS", AMFILOCHIA,
GREECE





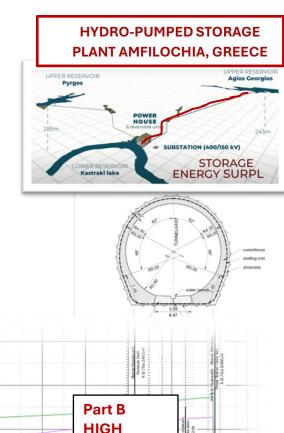
Agios Georgios waterway



Part A: HEADRACE TUNNEL



- A. HEADRACE TUNNEL TEMPORARY SUPPORT 100% & FINAL LINING 10%
- B. HIGH PRESSURE SHAFT: RAISE BORING 0%
- C. HIGH PRESSURE TUNNEL TEMP. LINING 100% & STEEL LINING 0%
- D. BIFURIVATION UNDER CONSTRUCTION
- E. GATE SHAFT Reinforcement embankment up to +389, Excavation 100%
- F. SURGE TANK Raise boring 100%



Part C : HIGH
PRESSURE TUNNEL

PRESSURE SHAFT

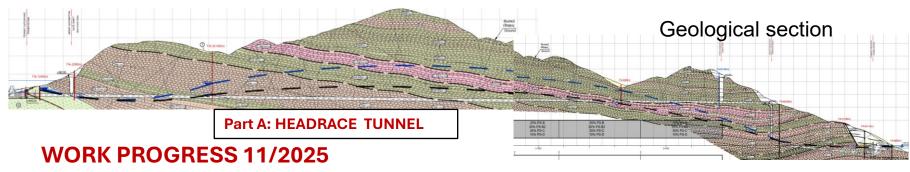
Part D

BIFURICATION



Agios Georgios waterway D=7,80m

HYDRO-PUMPED STORAGE
PLANT AMFILOCHIA, GREECE



sealing membrane
M 1,50

R4,30

R5,00

R5,00

R5,00

R5,00

Water trehibh, 1

precast element

mortar

TEMPORARY SUPPORT 100% & FINAL LINING 20%

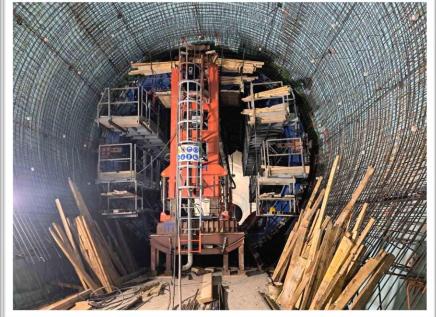
Tunnel Final Lining Works Ag. Georgios



Excavation works and implementation of the temporary support measures



Waterproofing membrane application



Reinforcement application

PERMANENT LINING OF AG CONCRETE

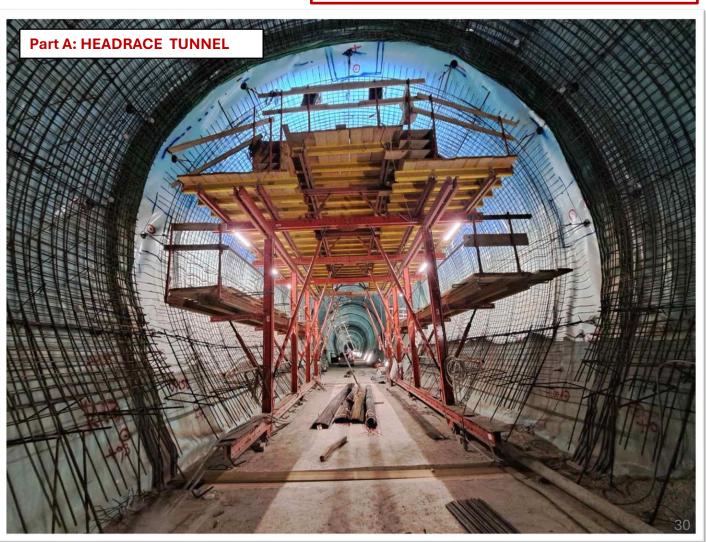
A: HEADRACE TUNNEL D=7,80m

HYDRO-PUMPED STORAGE
PLANT AT "AG. GEORGIOS" AND
"PYRGOS", AMFILOCHIA,
GREECE

FORMWORKS FULL ROUND

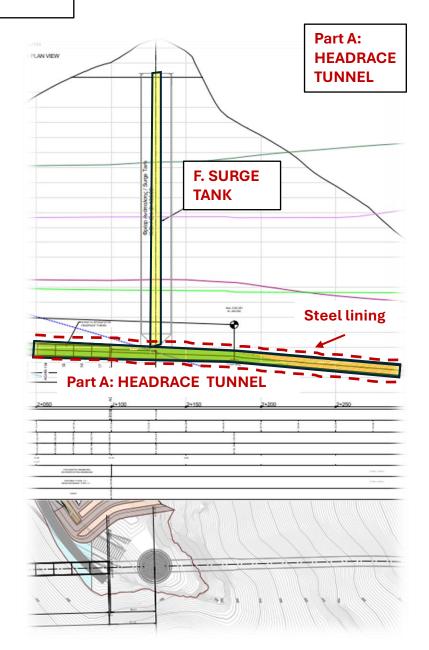
Ø7.8m for AG & Ø5.0 m for PY

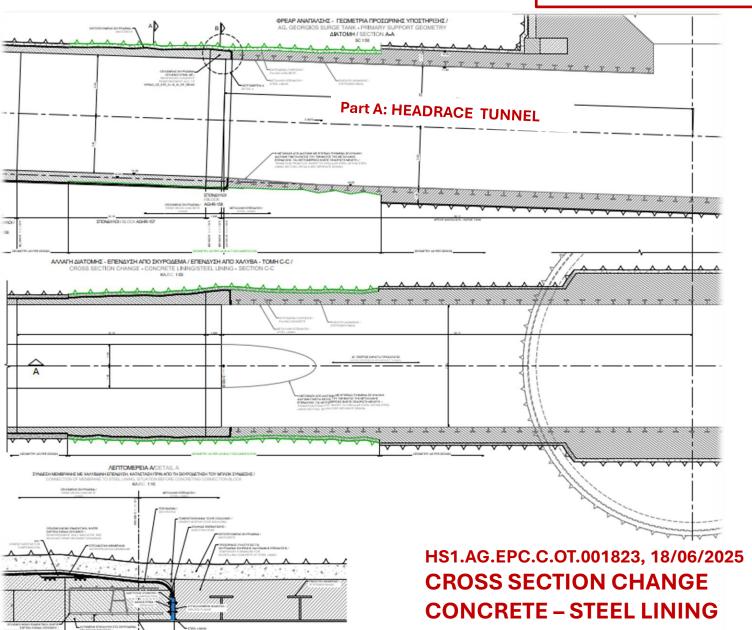




A: Agios Georgios waterway

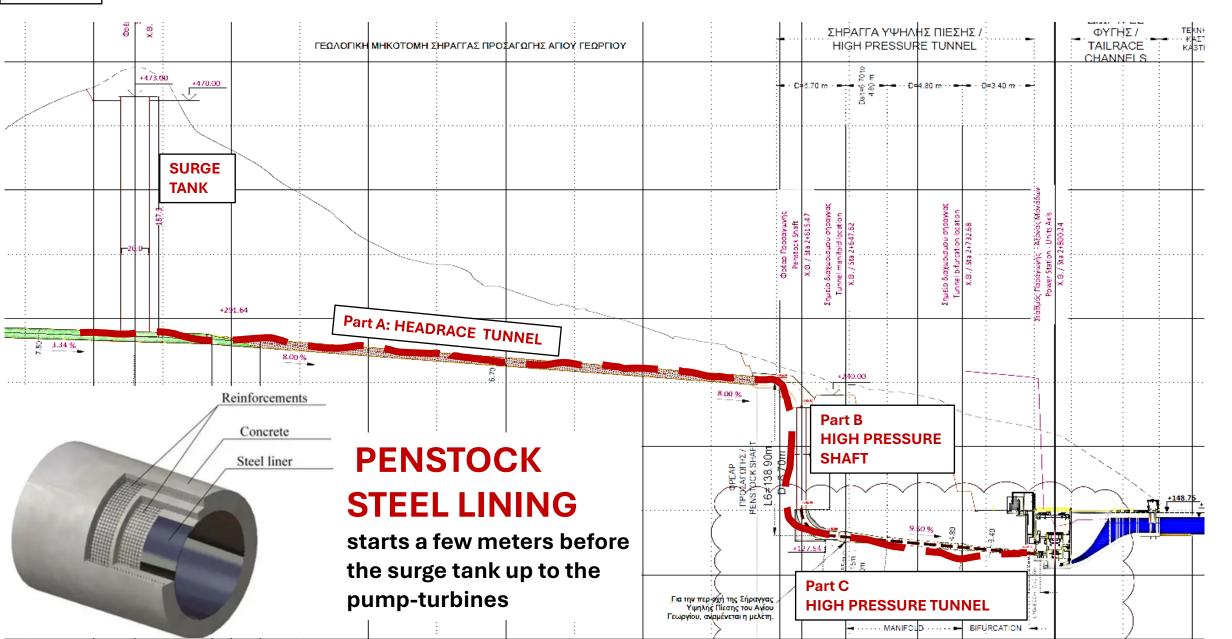
HYDRO-PUMPED STORAGE
PLANT AMFILOCHIA, GREECE





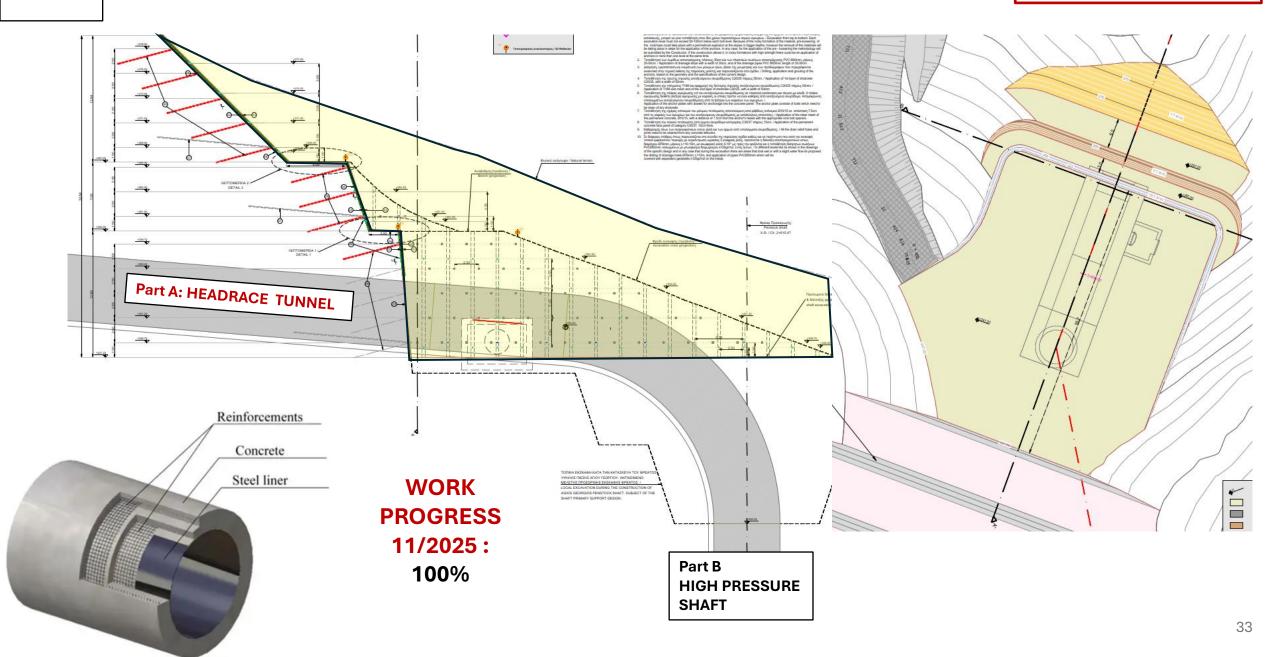
A: Agios Georgios waterway

HYDRO-PUMPED STORAGE
PLANT AMFILOCHIA, GREECE



A: HEADRACE TUNNEL EXIT EXCAVATION

HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

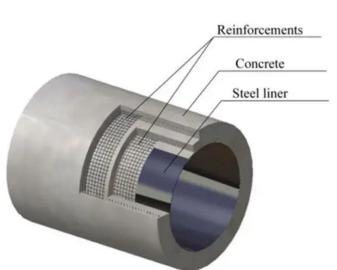


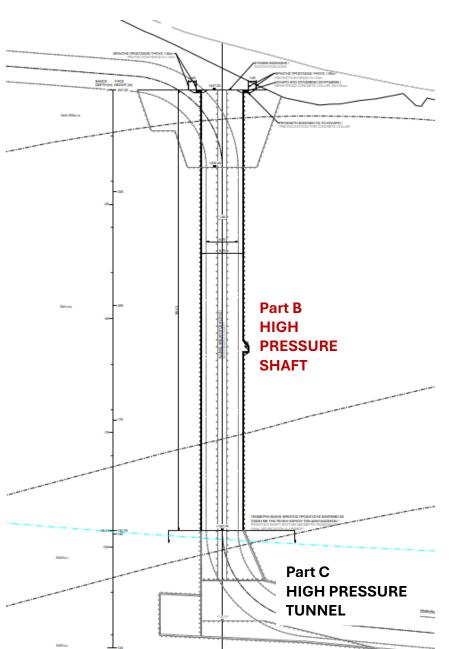
B: AG HIGH PRESSURE SHAFT Dext=8,70, Dint=6,70, H ~ 122 m

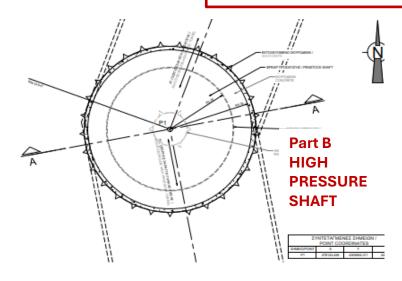
HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

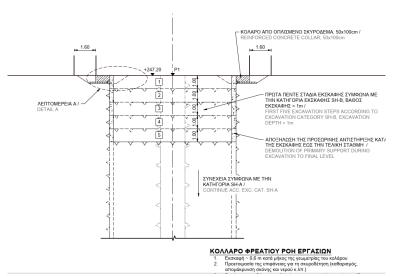


WORK
PROGRESS
11/2025
RAISE BORING
0%







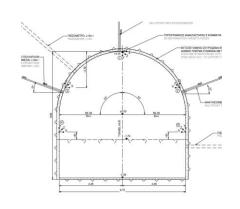


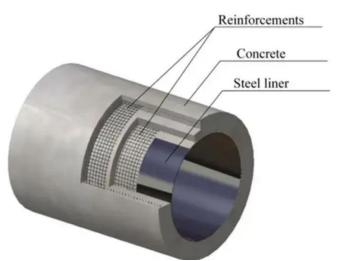
C: AG HIGH PRESSURE TUNNEL

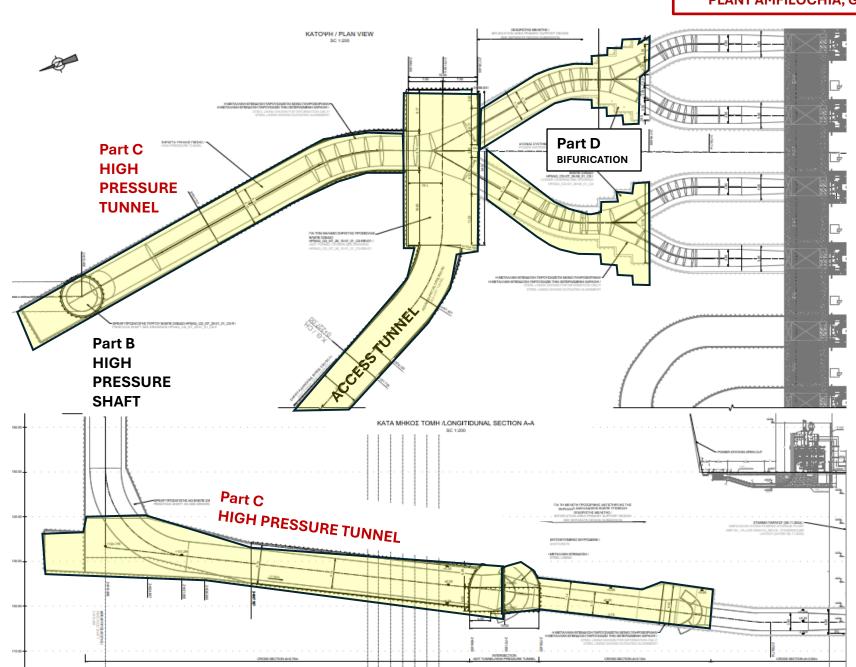
HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

WORK PROGRESS 11/2025

TEMPORARY WORKS 100%

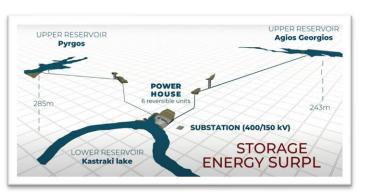






AG GATE SHAFT

Dext = 9,30m, Dint = 8,10m, H ~ 54 m







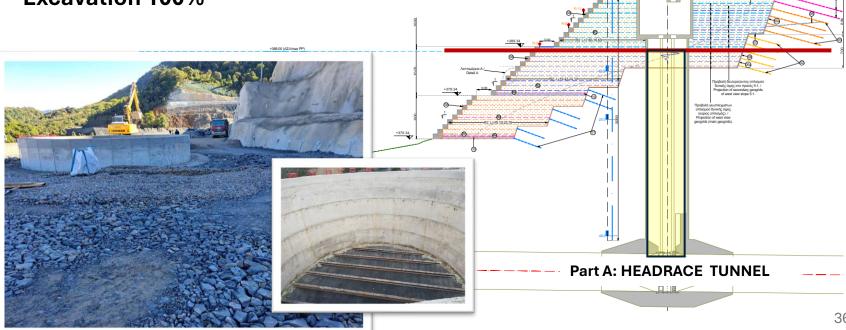
Excavation of gate shaft of Ag. Georgios,



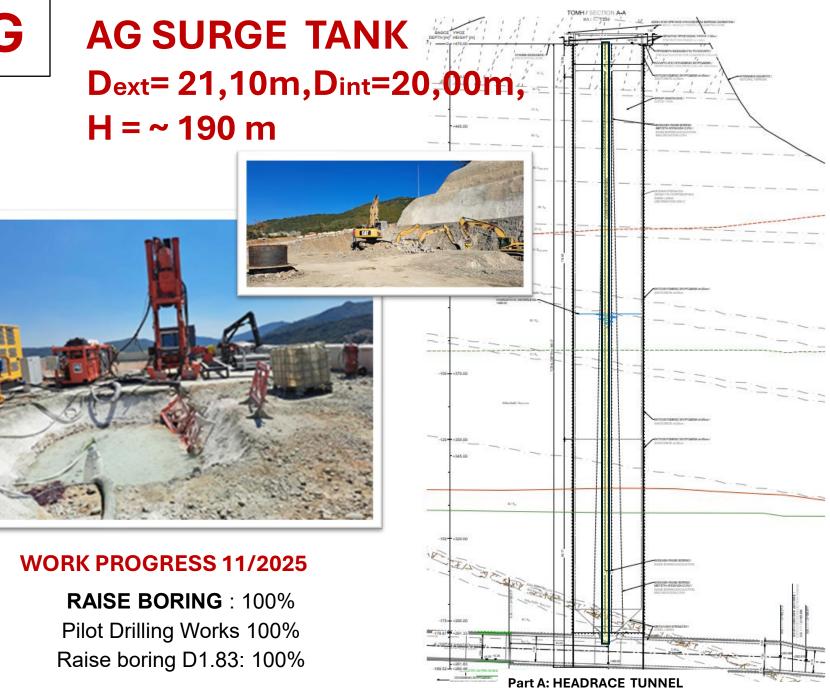
Construction of reinforced embankment with gabions

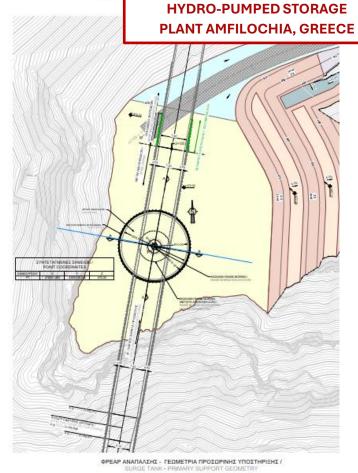


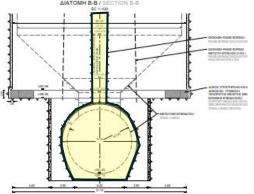
Reinf. embankment up to +389 Excavation 100%



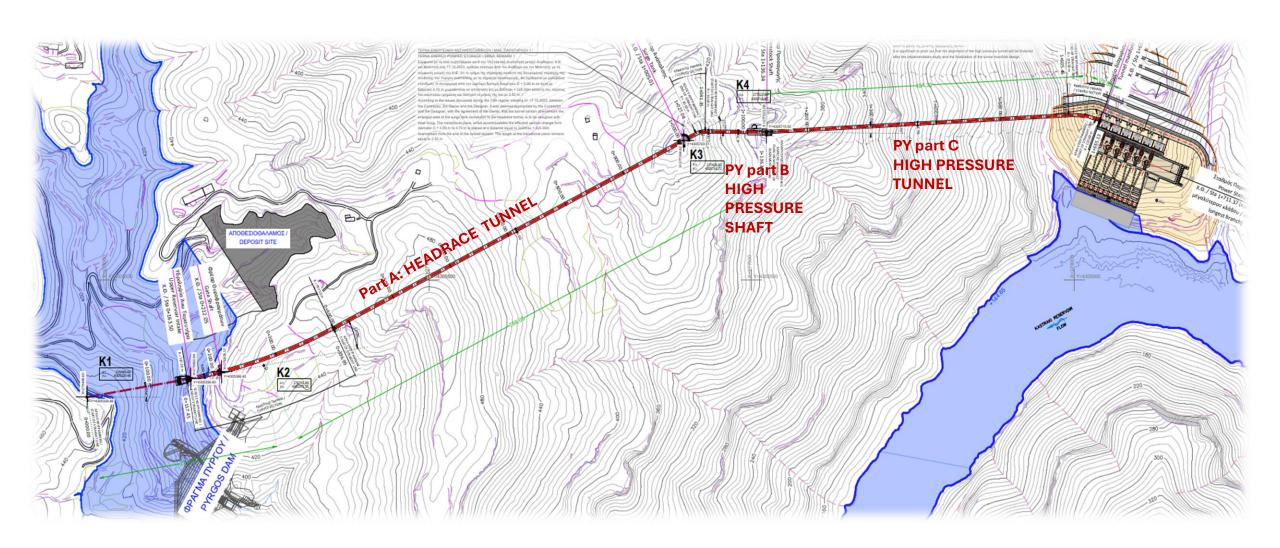
AG







Pyrgos waterway





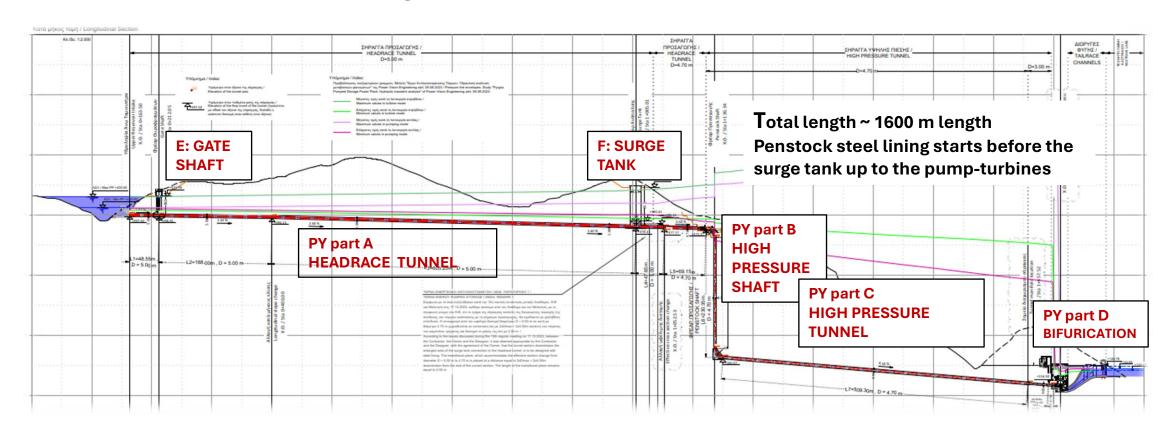
Pyrgos waterway

HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

WORK PROGRESS 11/2025

- A. HEADRACE TUNNEL FINAL LINING 100%
- B. HIGH PRESSURE SHAFT: RAISE BORING UNDER CONSTRUCTION
- C. HIGH PRESSURE TUNNEL TEMP. LINING b phase 100%
- D. BIFURIVATION UNDER CONSTRUCTION
- E. GATE SHAFT Excavation and temp. support 100%
- F. SURGE TANK Permanent Lining ~100%

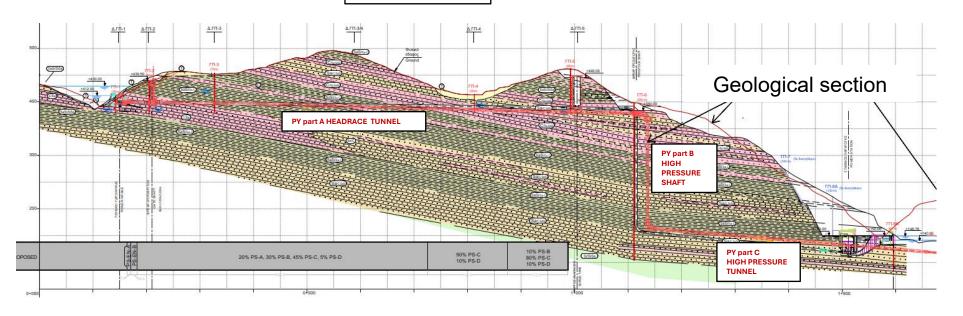


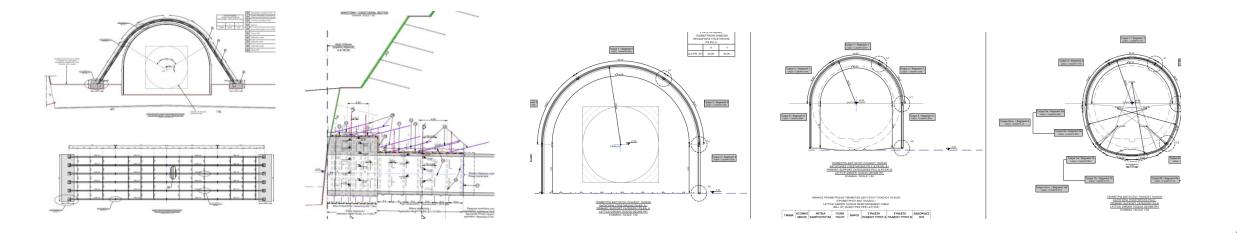


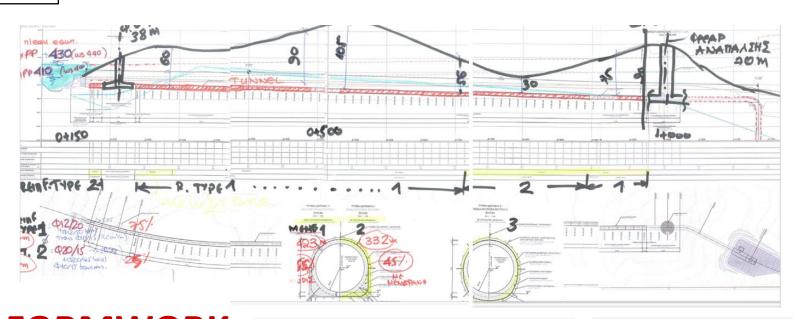


HEADRACE TUNNEL TEMPORARY SUPPORT

PY part A





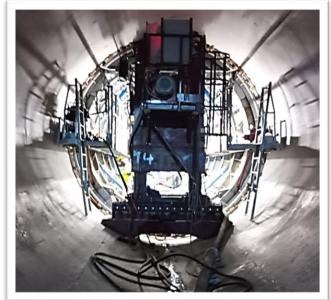




FORMWORK FULL ROUND

Ø5.0 m for PY and Ø7.80 for AG

WORK PROGRESS 11/2025 Final lining 100%

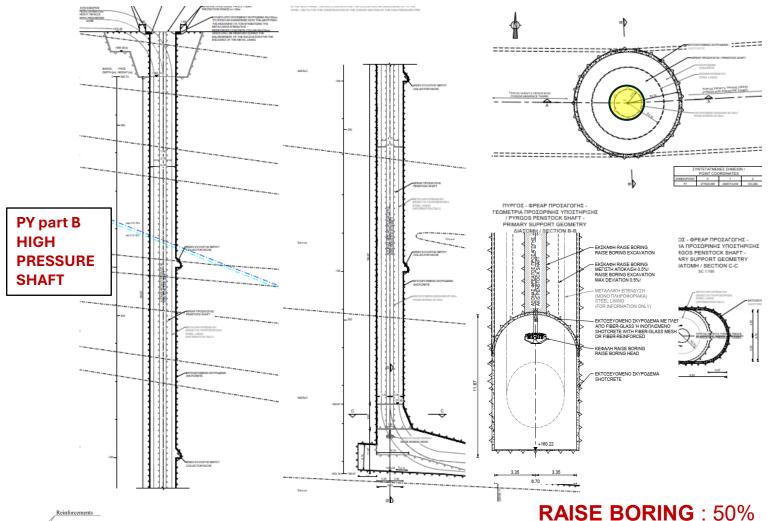




PY

PYRGOS HIGH PRESSURE SHAFT Dovt=6 70m Divt=4 70m H ~ 215m

Dext=6,70m, Dint=4,70m, H ~ 215m





Raise boring under construction

Pilot Drilling Works 100% Raise boring D1.83: 30%

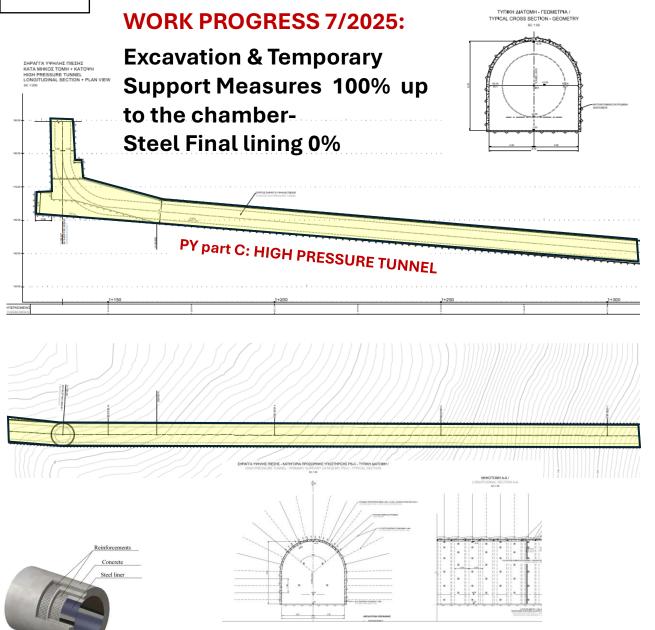






C: HIGH PRESSURE TUNNEL TEMPORARY SUPPORT

HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE







HYDRO-PUMPED STORAGE PYRGOS GATE SHAFT PLANT AMFILOCHIA, GREECE Dext= 8,60m Dint=7,60m H~35 m= **WORK PROGRESS 7/2025 Excavation & Temporary Support Measures 100%** Λεπτομέρεια 'A' / Detail 'A'



PYRGOS SURGE TANK

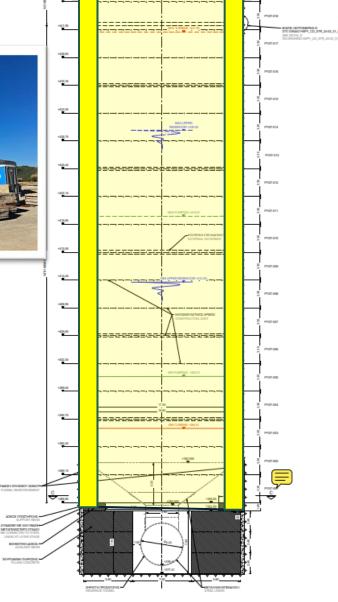
Dext= 18,60m, -Dint=17,50m, H 69 m

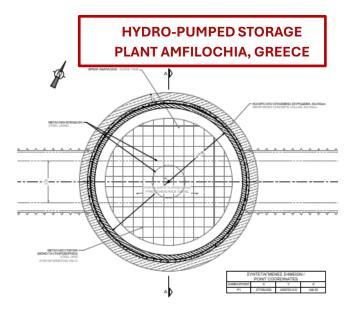


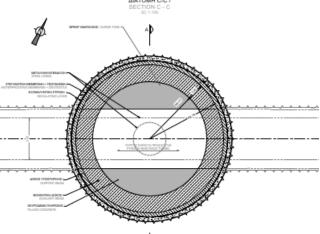




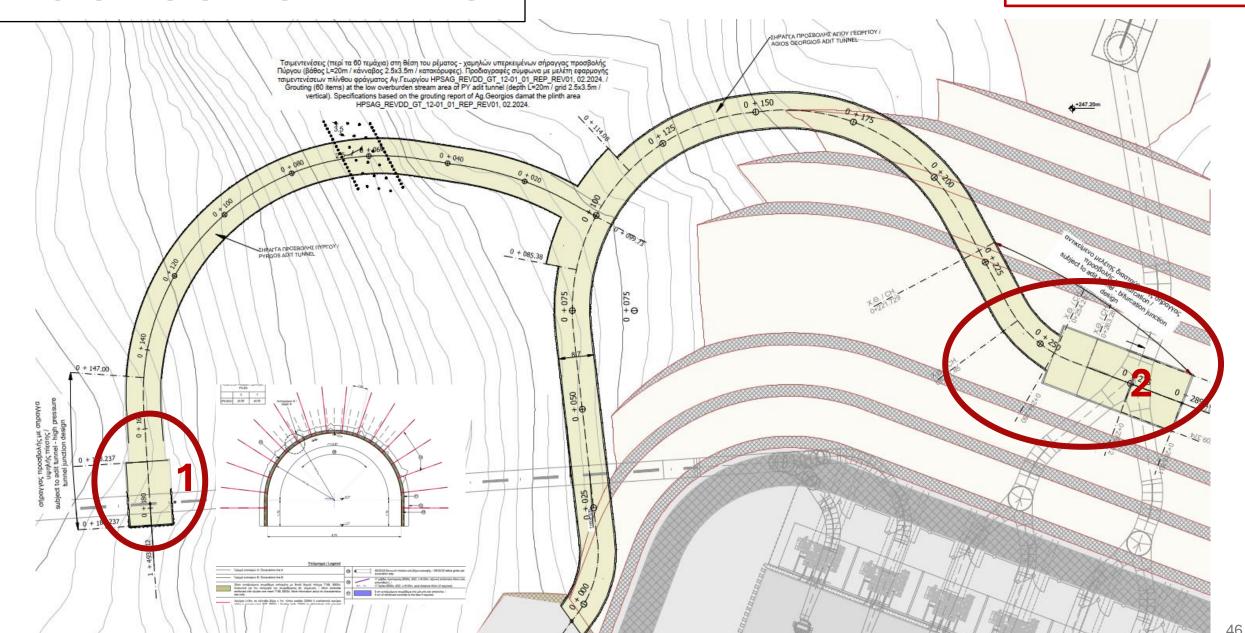
WORK
PROGRESS
11/2025
Concreting final lining from elevation + 447
(STREET LEVEL)



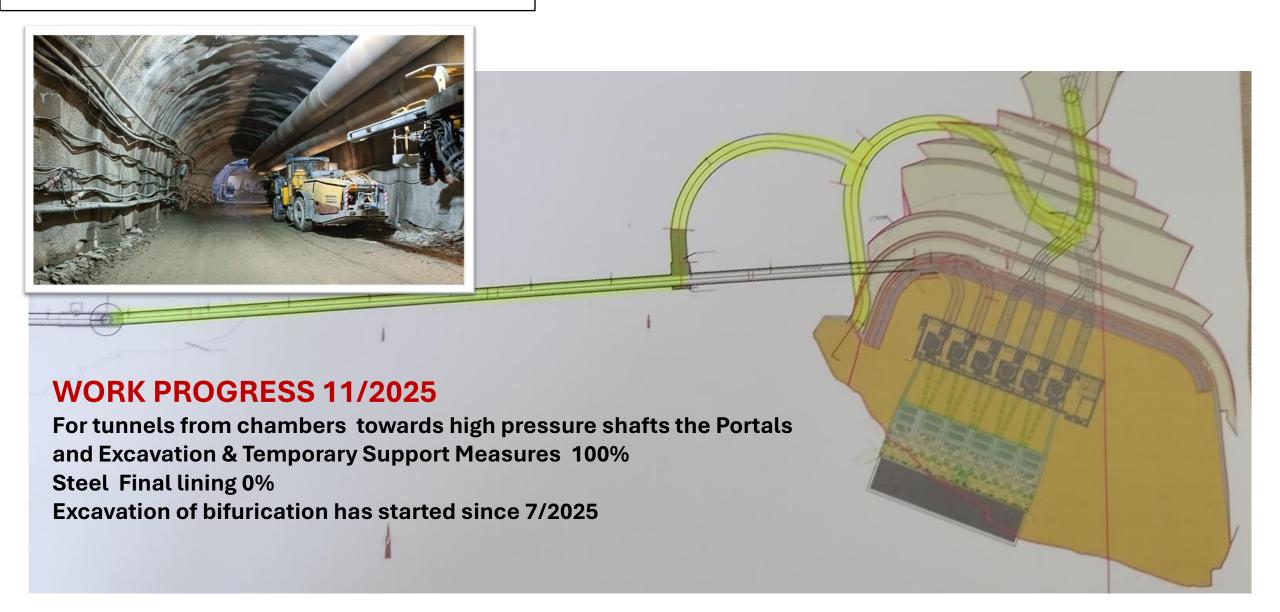




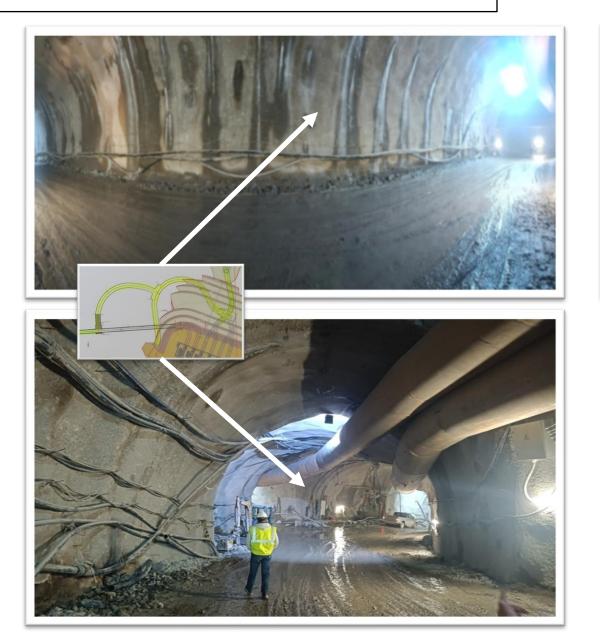


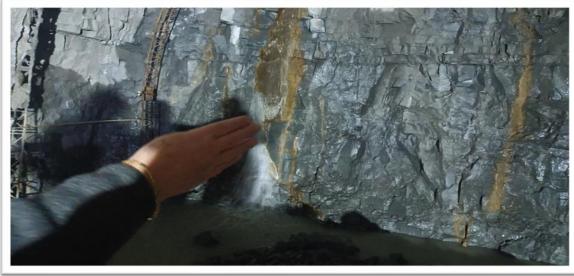


ACCESS TUNNELS



ACCESS TUNNELS





During the construction phase of the access tunnels, high flows of groundwater were observed, increasing as the tunnels were excavated to lower elevations.

Oxidation observed through drilled holes on the sidewalls of both tunnels, near the excavation faces. Presence of gas odors (hydrogen sulfide) has been detected inside the tunnel



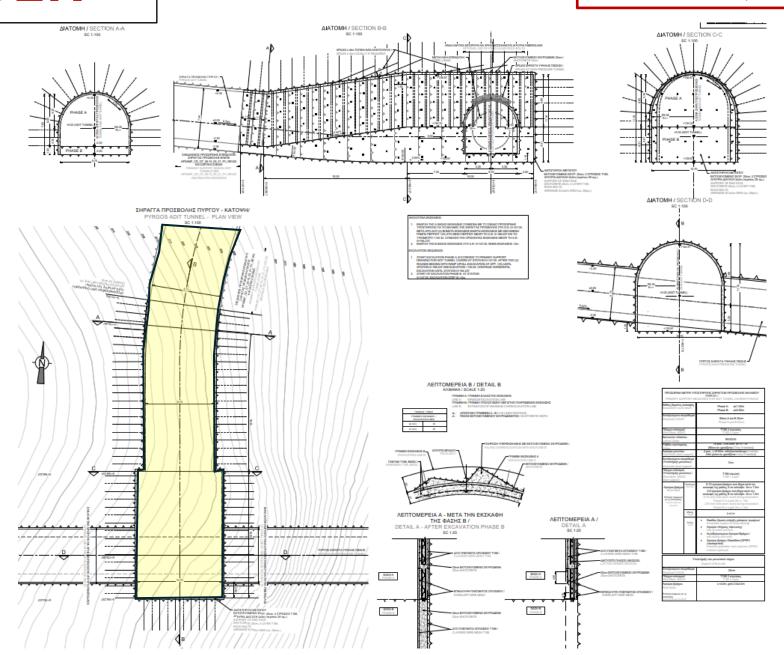
ACCESS CHAMBER

Chamber No.1

WORK PROGRESS 7/2025

Excavation & Temporary Support Measures 100%



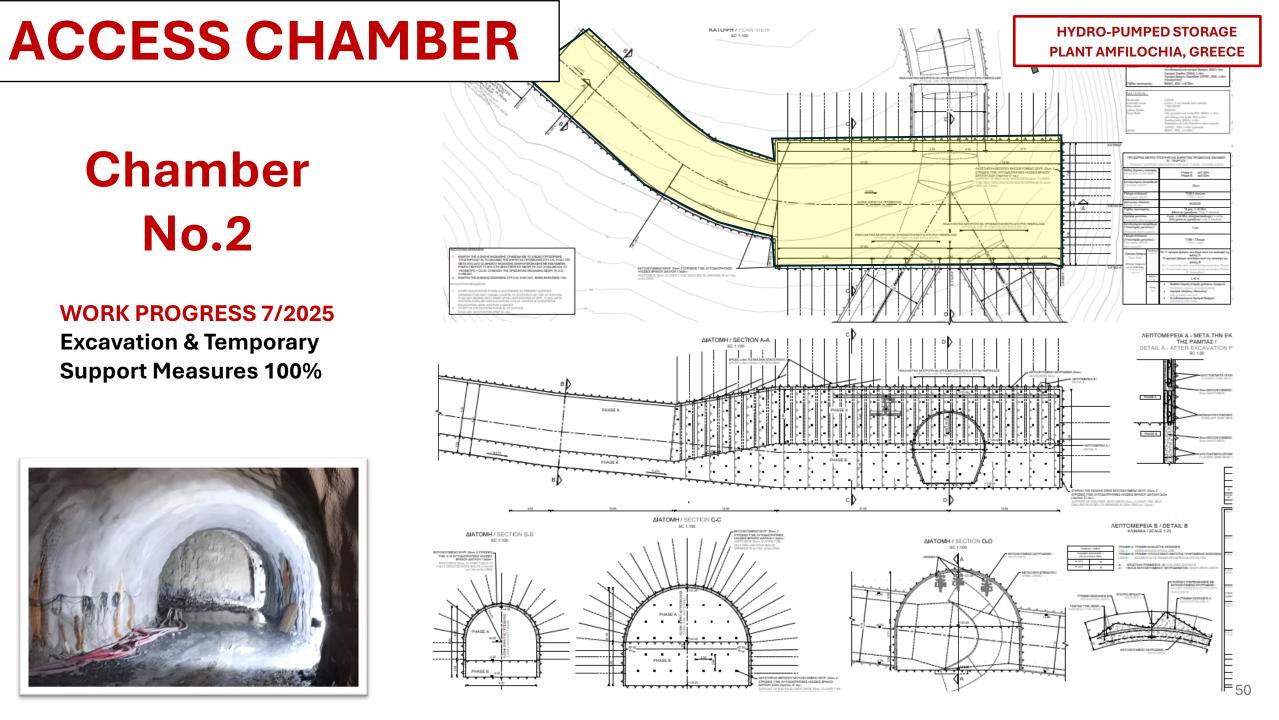


Chamber No.2

WORK PROGRESS 7/2025

Excavation & Temporary Support Measures 100%





AG BIFURICATION AREA

WORK PROGRESS 11/2025

Excavation & Temporary Support Measures

BRANCH 1-2: 100%,

BRANCH 3-4: 100%

TRANSITION 1-2:100%

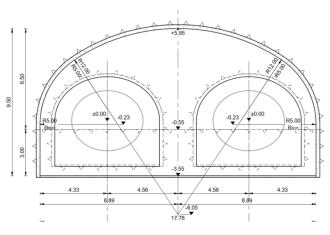
TRANSITION 3-4:100%

MANIFOLD 1: 0%

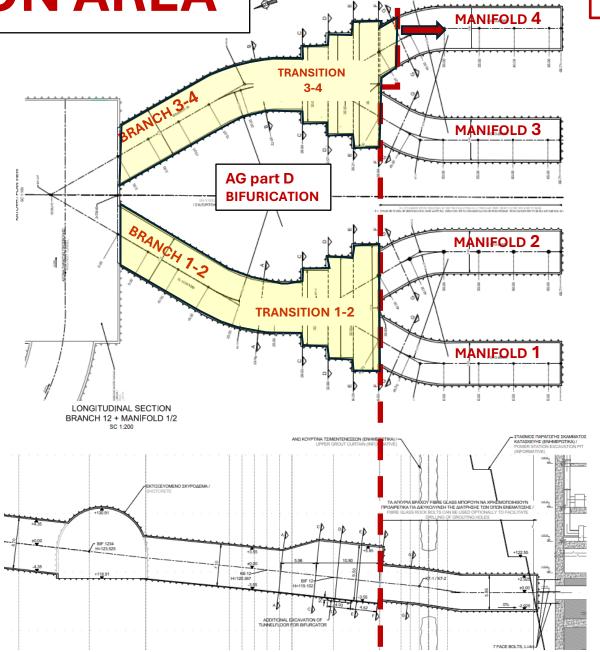
MANIFOLD 2: 0%

MANIFOLD 3: 0%

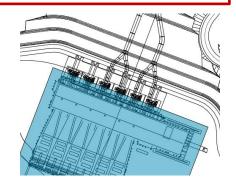
MANIFOLD 4: 15%



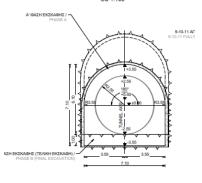
TRANSITION 1-2 / 3-4



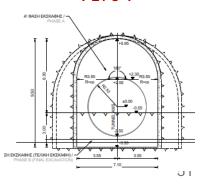
HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE



ΔIATOMH / SECTION C-C SC 1:100



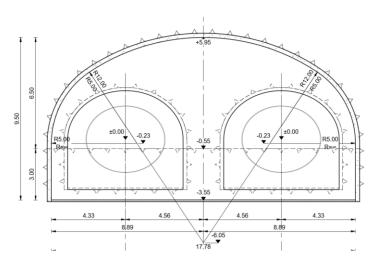
From transitions towards manifold 1-2 / 3-4

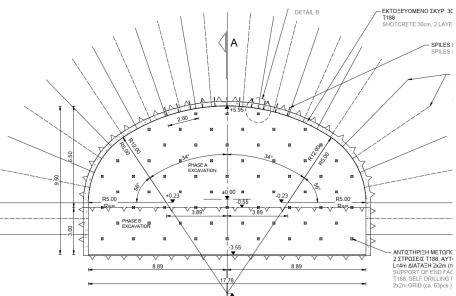


AG BIFURICATION AREA

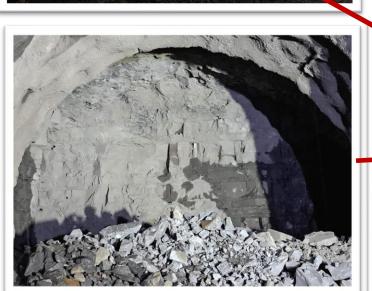
AG part D
BIFURICATION

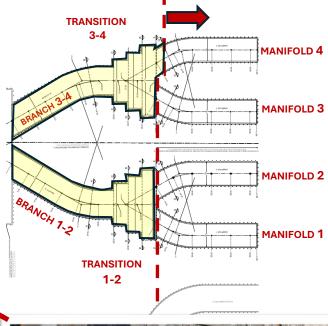
HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE













TRANSITION 3-4

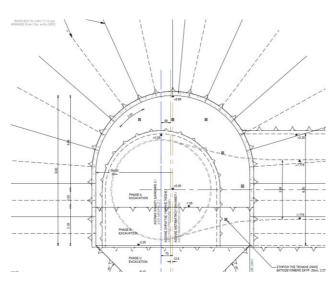
PYRGOS BIFURICATION AREA

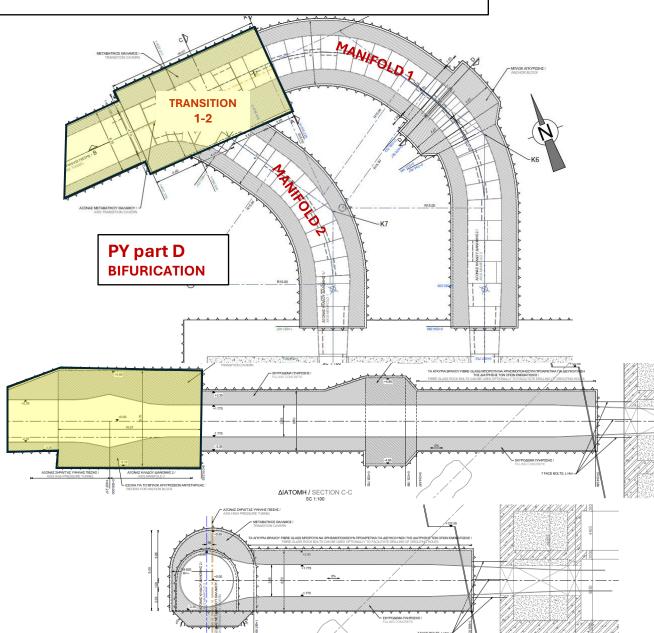
HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

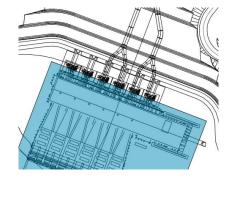
WORK PROGRESS 11/2025

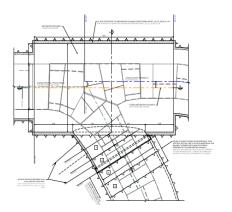
Excavation & Temporary Support Measures TRANSITION 1-2:100%

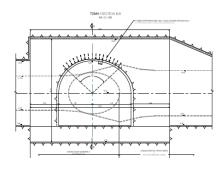
MANIFOLD 1: 0%, MANIFOLD 2: 0%





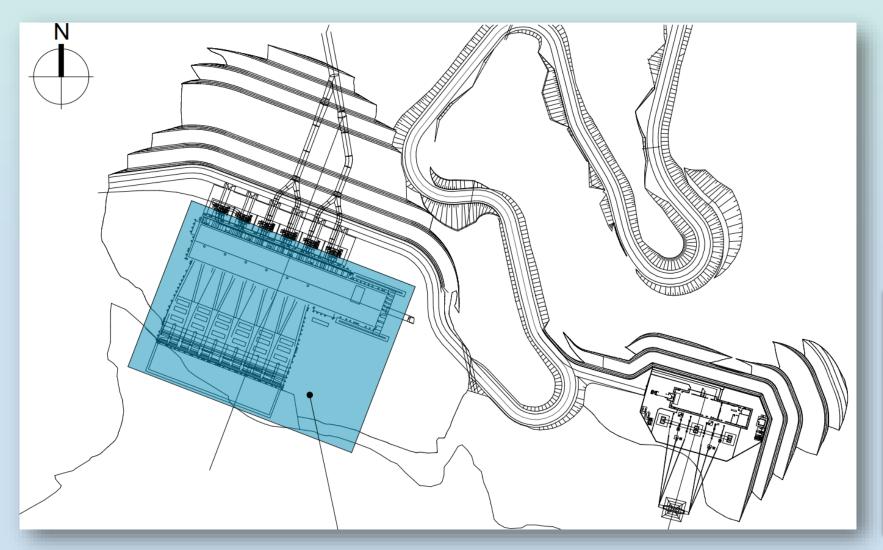








5. POWER STATION AREA







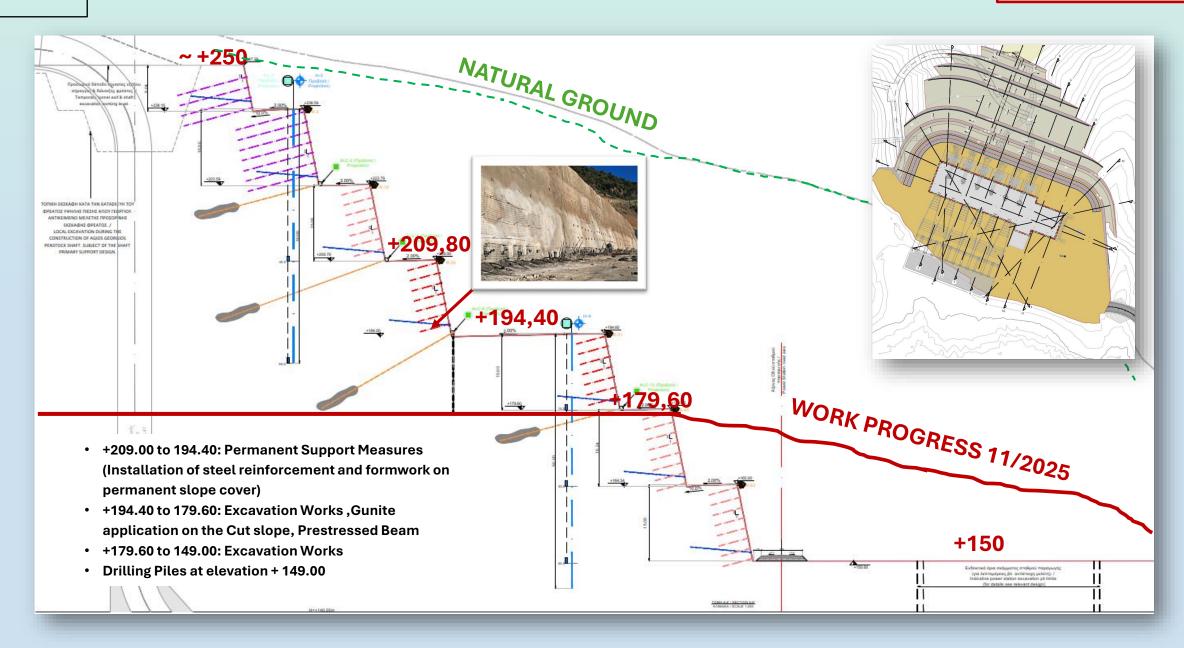


POWER STATION SLOPE EXCAVATION



PH

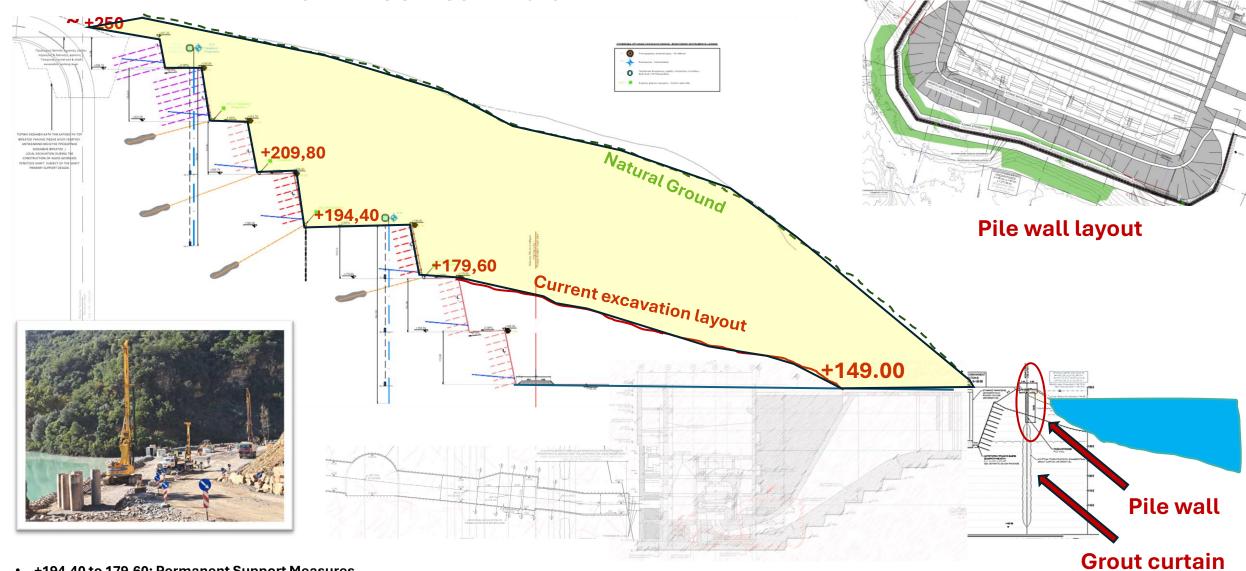
POWER STATION SLOPE EXCAVATION



POWER STATION - PILE WALL

HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

WORK PROGRESS 11/2025

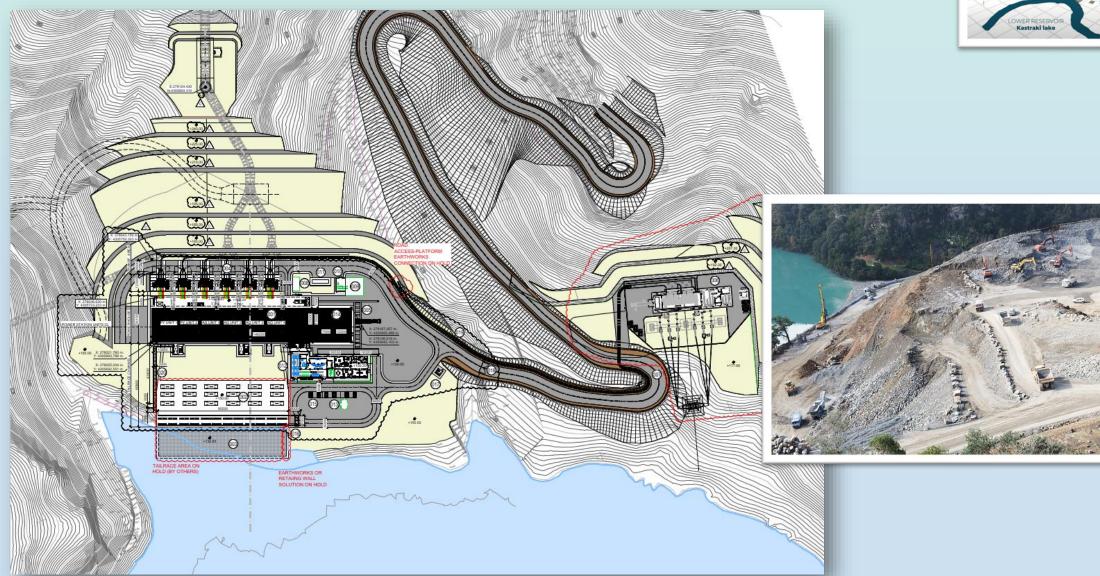


- +194.40 to 179.60: Permanent Support Measures
- +179.60 to 149.00: Excavation Works
- +149,00 Pile wall towards Kastraki



POWER STATION AREA LAYOUT

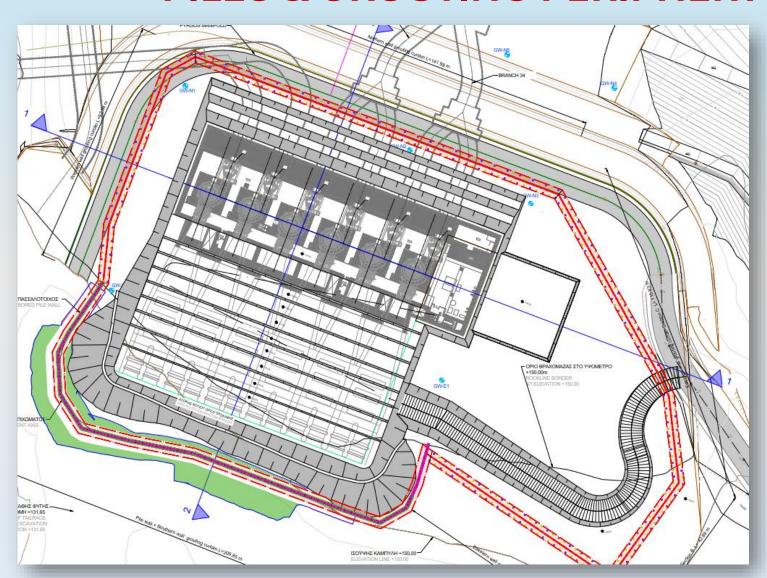




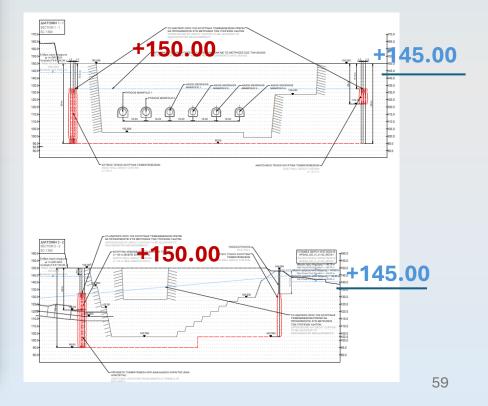
PH

POWERHOUSE CONSTRUCTION PIT PILES & GROUTING PERIPHERY



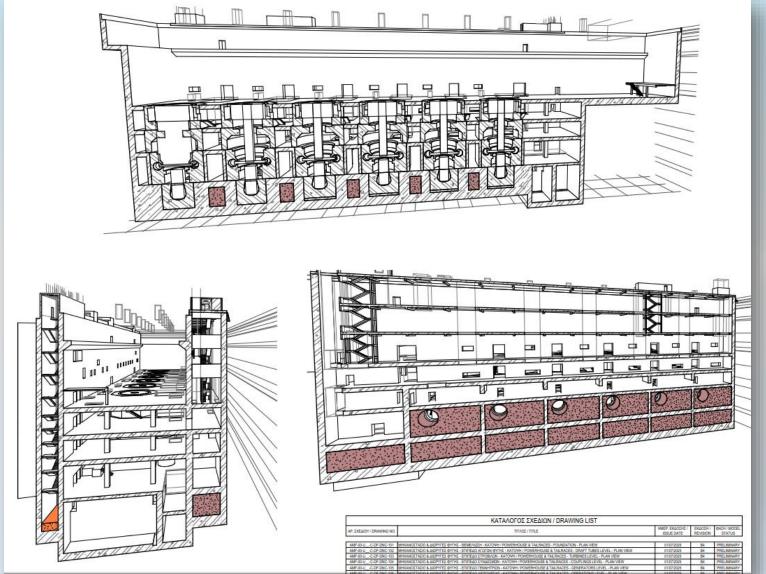


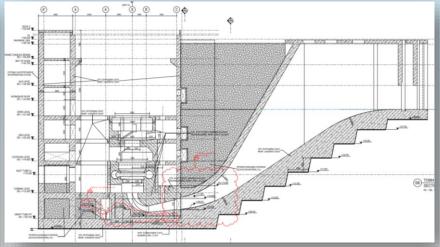
The groundwater level in this area is mainly controlled by the water level in the reservoir, which is around elevation +145.00 m

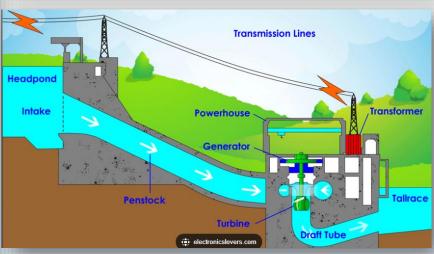




POWERHOUSE





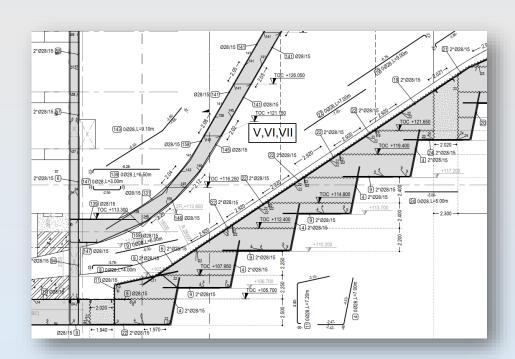


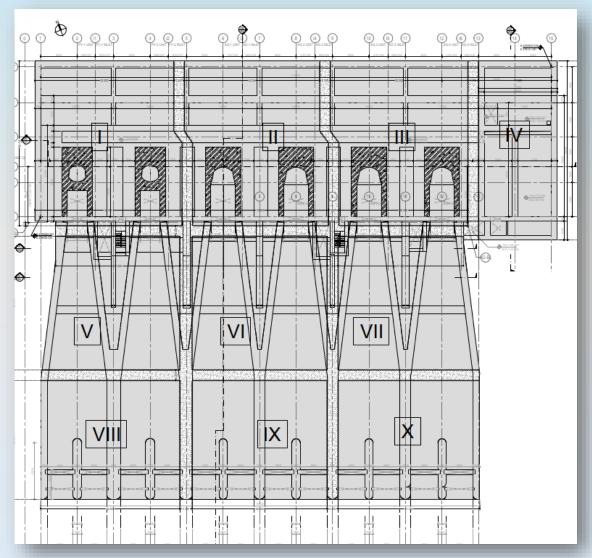


POWERHOUSE - NO EXPANSION JOINTS

ISSUE TO BE INVESTIGATED:

EXPANSION JOINTS: The overall dimensions of the station are in the order of 145X130, without expansion joints and not covered by any specification or code. Zones of 2.3 m. every 30m. are cast at a later stage (2 months later). Please discuss and provide info on similar constructions from international experience, if any.





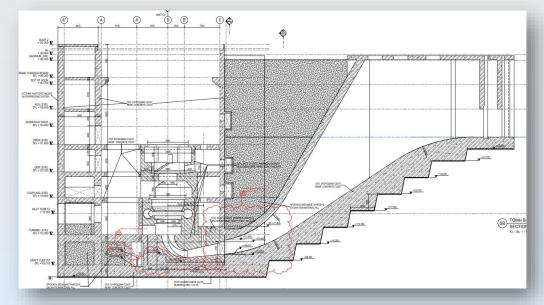


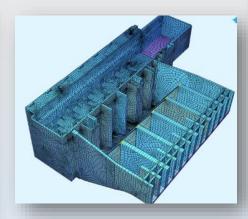
POWERHOUSE – ISSUES TO BE INVESTIGATED:

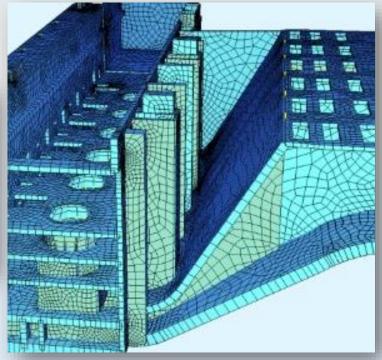
Partial submission of the Structural Design initial presentation of the assumptions and the calculation method of the station building and the tail race area. It is rather a design methodology and not the Structural Design of the station.

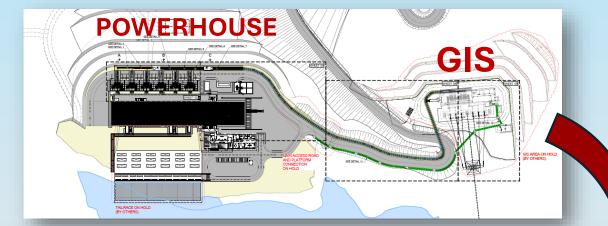
GLOBAL BEHAVIOUR OF THE SYSTEM: STATION and TAILRACE. The 2 parts are connected only at the bottom of the tailrace (see graphs in the Technical report (AMF-00-U__-C-CS-DNC-901) Please discuss Global behavior of the structural system

- •GLOBAL UPLIFT BEHAVIOR RELATIVE TO DISTRIBUTION OF STIFFNESS IN PLAN
- •DYNAMIC ANALYSIS MACHINERY VIBRATIONS -ANTRITZ Operating scenarios, in agreement with the PROJECT OWNER to be examined relatively to the stress distribution in the structure (e.g. all machines in pumping mode, all in production mode, some in pumping and some in production simultaneously),.
- •LOAD & SAFETY FACTORS FOR BUOYANCY CHECK
- •NO DISK STRUT AT ROOF LEVEL. Only a free standing steel roof provided
- •NO EARTH PRESSURE CONSIDERED: There is no geotechnical design available to verify this assumption.

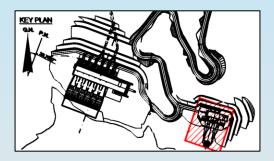


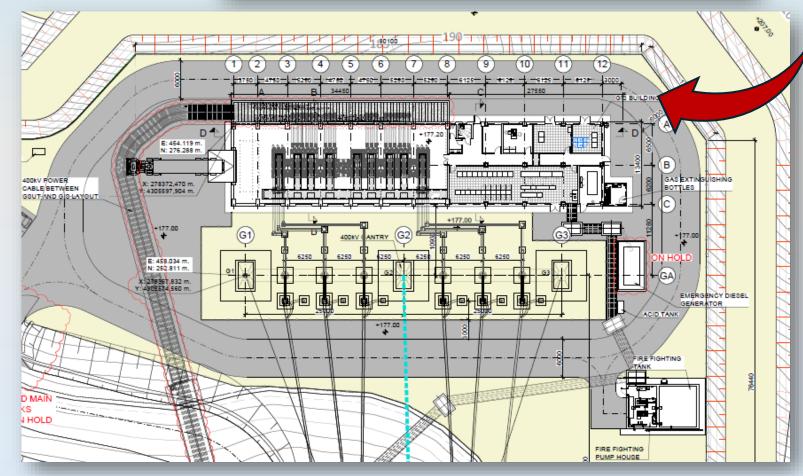


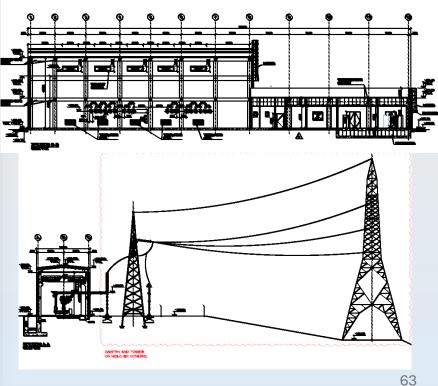




HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE

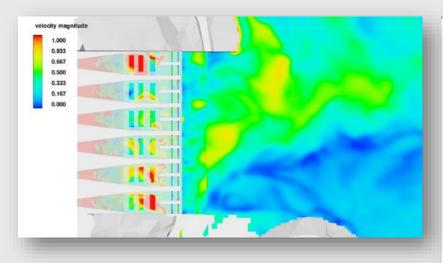


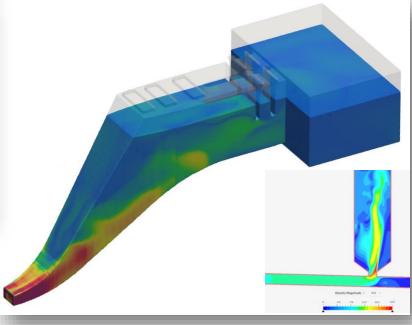


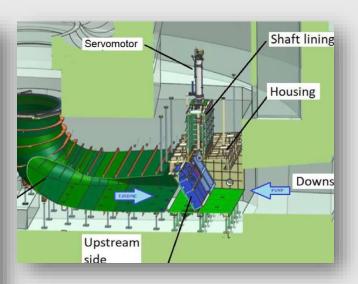




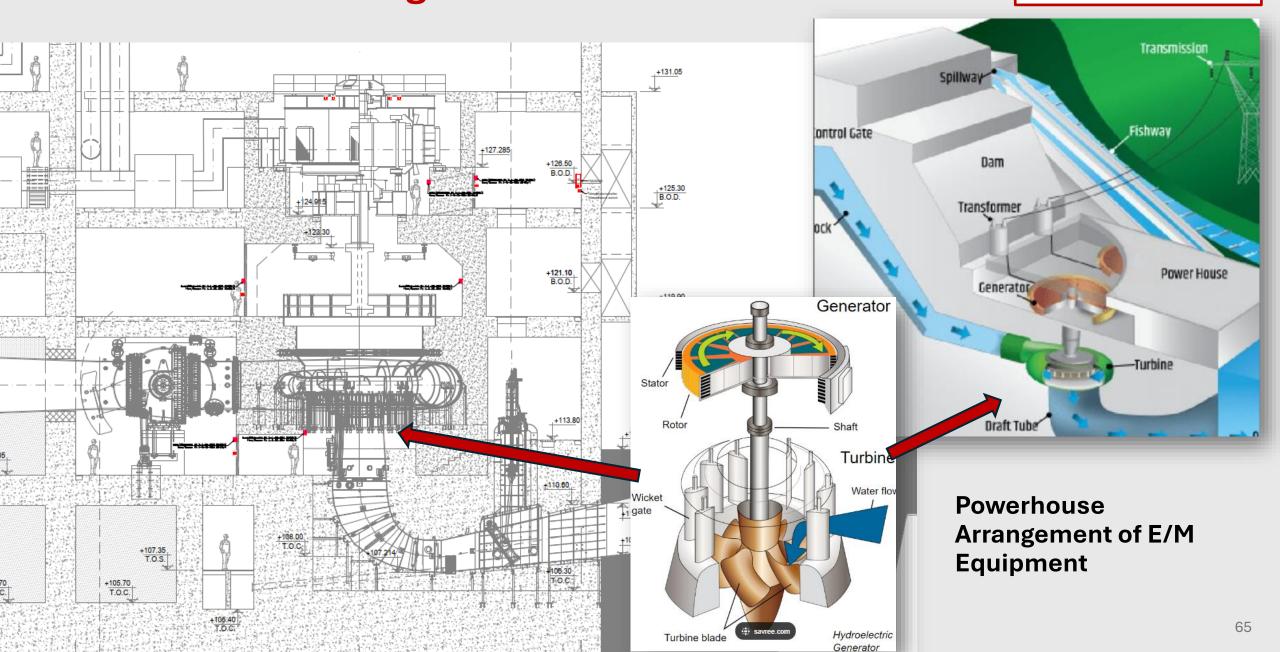
6. E/M PROGRESS UPDATE





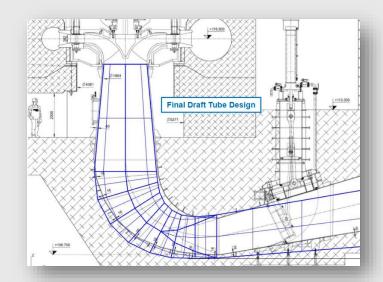


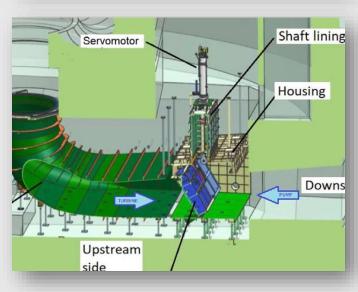
HYDRO-PUMPED STORAGE PLANT AMFILOCHIA, GREECE





E/M PROGRESS UPDATE 11/2025



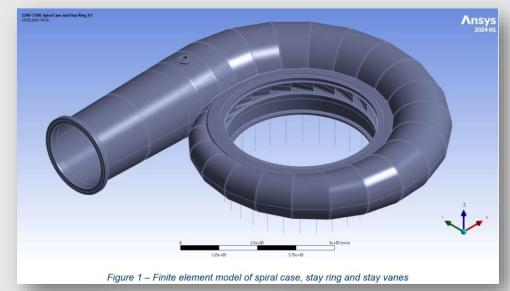


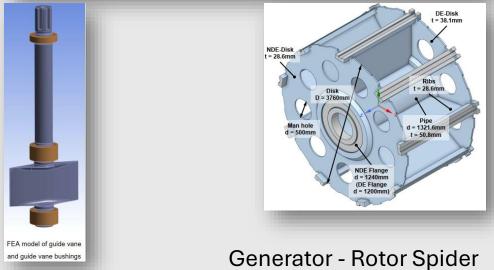
- ❖ Numerous ITPs and Quality Dossiers have been submitted and acknowledged regarding the main E/M Equipment components (MIVs, Draft tube, Francis runner, SFC, etc.).
- ❖ Several submissions of **Hydromechanical equipment ITPs** have been made (service/maintenance gates, etc).
- ❖ As per E/M Progress Update monthly meetings:
 - The Main E/M Equipment contract has been amended twice.
 - Various Main E/M Equipment components are in the fabrication stage.
 - Auxiliary E/M equipment is at contract award and/or signing stage.
 - Steel lining final design is currently being finalized. Related contract award is expected.
 - Main step-up transformers contract award is delayed due to design omissions with their procurement. New round of proposals has been made and an award is imminent.
 - Gantry cranes, generators, circuit breakers and isolated phase bus bars sub-contractors' contract awards are also imminent.
 - Storage space options for the equipment scheduled to arrive on site are currently being licensed.
 - The Contractor is striving to re-arrange all critical Project timelines to align with the current status of the Project e.g. Andritz on-site personnel to be delayed.
- Design submittals are as shown in tables 1 & 2.

E/M EQUIPMENT PROGRESS UPDATE 11/2025

Main E/M Equipment Design	Status	Feedba ck	Notes
Draft Tube Gates Documents & Drawings	Reviewe d	N/A	Manufacturing drawings.
Motor-Generator Documents & Drawings	Reviewe d	N/A	Manufacturing drawings.
Pump-Turbine Documents & Drawings	Reviewe d	N/A	Manufacturing drawings.
MIV Documents & Drawings	Reviewe d	N/A	Manufacturing drawings.
SFC System Documents & Drawings	Reviewe d	N/A	

Table 1. Main E/M Equipment Component Design Submissions to date.





Powerhouse & GIS E/M Design **PROGRESS UPDATE** 11/2025

Powerhouse & GIS E/M Design	Status	Feedback	Notes		
General Arrangement Drawings (4 revisions) – Powerhouse	Ongoing	N/A	Currently only for information.		
General Arrangement Drawings – GIS Layout	Reviewed	Revised design to be submitted.	The Project Owner added remarks of their own.		
BOP Piping Networks Drainage & Dewatering PIDs, System Descriptions & Calculation Reports	Reviewed	Revised design to be submitted.			
BOP Piping Networks Cooling Water PID, System Description & Calculation Report	Reviewed	Revised design to be submitted.			
BOP Piping Networks LP Compressed Air PID, System Description & Calculation Report	Reviewed	Revised design to be submitted.			
Power Plant Fire Fighting System	Reviewed	N/A			
Power Plant Service Water System & Potable Water System	Reviewed	N/A			
Powerhouse Elevator	Reviewed	N/A			
Powerhouse Architectural Design, Coverage Diagrams and Passive Fire Protection	Reviewed	N/A	Deemed Good for Construction. The Project Owner added remarks of their own.		
General Single Line Diagram and Symbology Submissions	Reviewed	Complete electrical installations design pending submittal.			
CFD Study: Pyrgos Tailrace Channel	Reviewed	N/A			
CFD Study: Modelling of the Tailrace Channel	Reviewed	N/A			
CFD Study: Surge Tanks – CFD Study Surge Tank Conjunction with the headrace tunnel – Calculation of Throttle coefficients	Reviewed	N/A			
Design Criteria	Reviewed	N/A	To be utilized in the IECC's design review.		
Table 2. E/M Design Submissions to date.					

