

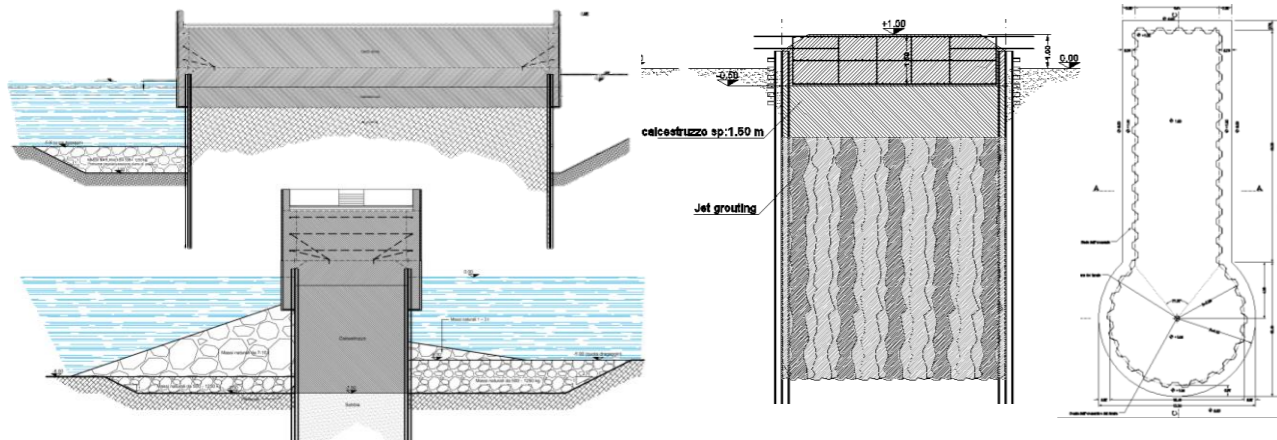
## FEATURE OF TECHNICAL SERVICE

<b>Subject</b>	Variant Executive design and Detailed Executive design of the maritime works of touristic port of Marina di Pisa, related to the works of the project «Piano di recupero dell'area ex Motofides»	
<b>Carried out by</b>	SGAI Srl di E. Forlani & C.	
<b>Client</b>	Cooperativa Muratori & Cementisti - CMC di Ravenna Soc.Coop	
<b>Service length</b>	2010 - 2012	
<b>Value of works</b>	€ 32'000'000,00	
<b>Categories value</b>	D.01	€ 1'635'767,00
	S.05	€ 1'542'758,58

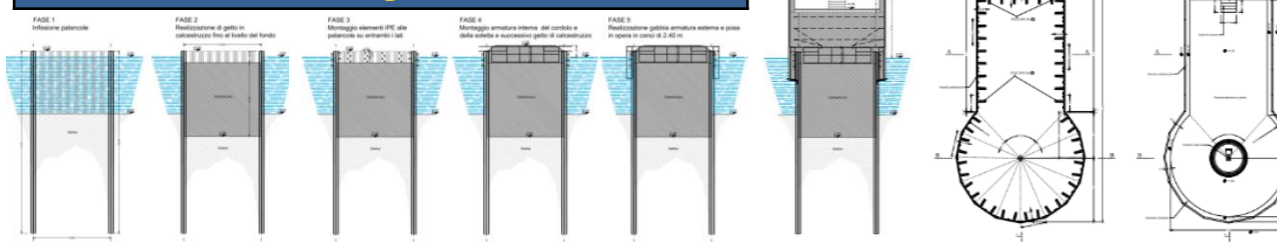
## PIER NORTH AND SOUTH - Computational aspects - Simulation, results and checks

The analysis and study of the static and dynamic behavior of foundation structures was conducted by simulating the structure with 2D and 3D finite element numerical model, solved with PRO SAP and PLAXIS calculation code. In detail, several numerical models and checks were carried out in the different stages of construction:

- Push of the swell in the sea off and close to the piers;
- Calculation of water push in the ridge and cable stages;
- Stability checks for sliding, tilting, seismic and resistance to serviceability and ultimate limit state SLE - SLU.



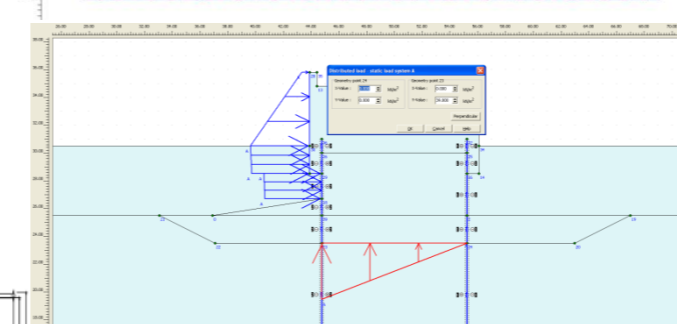
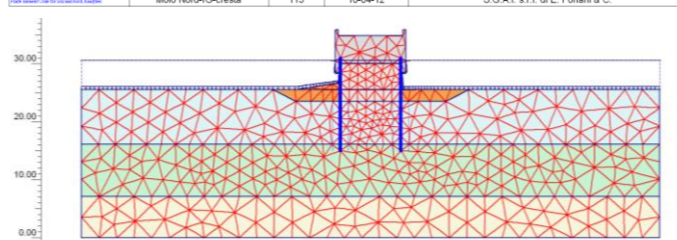
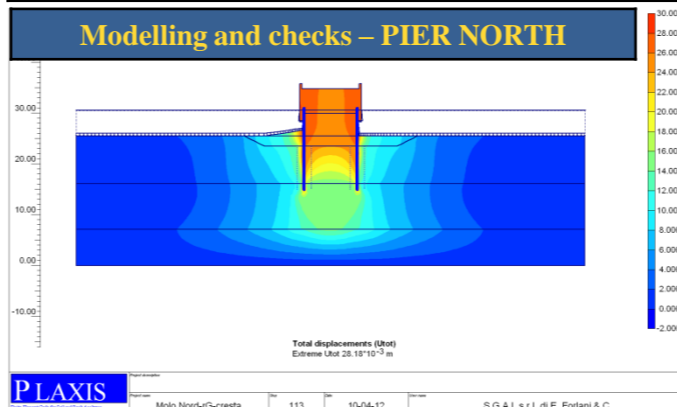
### Pier construction stages – PIER NORTH



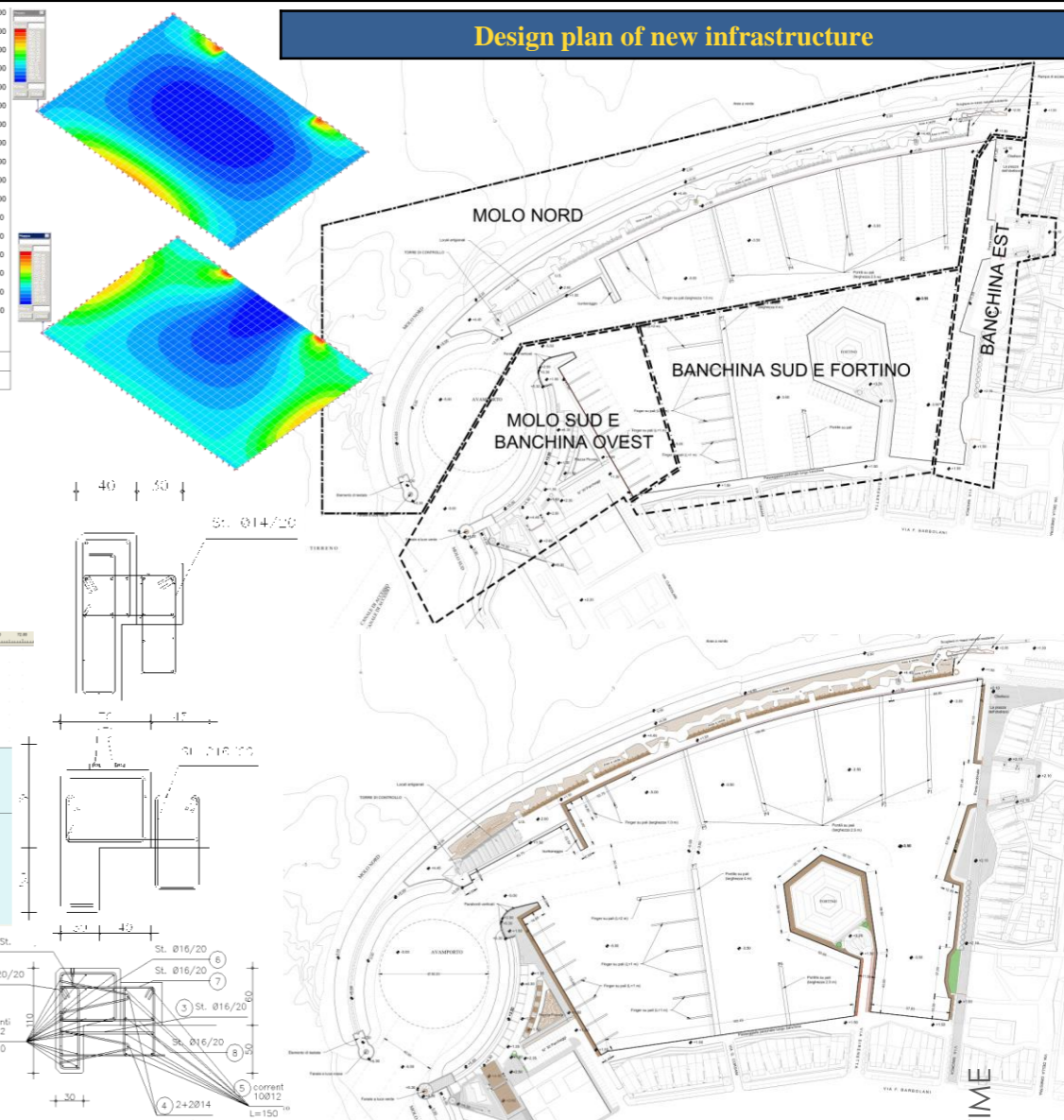
## TOURISTIC PORT OF MARINA DI PISA - Design issues and their resolution

The project consists in the construction of the new port of Marina di Pisa, at the same time recovering a degraded industrial area located at the outlet of the Arno River. The design area of the port has been fully within the current shape of the coastal protection works, for an overall extension of the water mirror enclosed by the port works equal to 73'254m<sup>2</sup>. The project has seen the execution of numerous maritime works, such as: docks, piers, wharf, service facilities and underground car parks. The greatest design and executive difficulties were encountered in sizing and verifying the foundation structures of the piers and the docking warheads at the North and South piers, for which the study of specific variant solutions was required. To ensure greater monolithic behaviour of the structures, consolidations have been planned, at the base of the bins and the sheet piling, using jet-grouting columns up to 9.00m deep. To facilitate the construction phases of the superstructure, reinforcements and solidifications of the various prefabricated elements for anchoring mooring bits have been planned.

### Modelling and checks – PIER NORTH



### Design plan of new infrastructure



### Aerial view of the infrastructure during the works



### Aerial view of the infrastructure at the end of the works



### Photomontage of the project

