

CHALLENGES AND LESSONS LEARNED DREDGING PROJECT IN THE COMMON MARITIME PORT OF SAN ANTONIO, CHILE

by

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The Dredging Project of the sheltered waters of Puerto San Antonio (whose works were carried out between October 2015 and the same month of 2016, to complete the environmental process in June 2017), represents one of the most important initiatives of this type carried out in Chile. Due to its magnitude and technical complexity, the project sets a precedent in the national industry by granting a leading role to the relationship with the environment, complying with strict environmental standards and promoting the current and future development of Puerto San Antonio.

ABSTRACT

Within the framework of the development plans of the Port of San Antonio (Chile), managed by the Port Company of San Antonio (EPSA), projects were established that will generate sufficient port capacity to meet the demand for cargo during this decade.

In this sense, the project "Dredging in the common maritime zone of the San Antonio port" (the Project) consisted of executing a deepening dredging (745,793 m³ dredged finally) achieving probes between -15 and -16 m NRS in the maritime zone common (dock) of the pool of Puerto San Antonio.

The area used by the Project comprised, on the one hand, the common maritime zone of the port of 260,000 m² (26 Ha) and on the other, the dumping area of the dredged material of 1,125,000 m² (112.5 Ha), which It is located at an average distance of 5.6 nautical miles from the coast with depths between 100-150 meters NRS.

In Figure 1 we can see the common maritime zone of San Antonio port prior to the development of the projects of the concessionaires to meet the growing demand, and Figure 2 shows common maritime zone after the works of the concessionaires and the dredging project.



Figure 1: Port of San Antonio Common Maritime Zone, year 2008.

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Figure 2: Port of San Antonio Common Maritime Area, year 2018.

From the correlation of available background and terrain studies carried out prior to the development of the works determined the characteristics of the material to be dredged, its classification and with the bathymetry of the project area, different distributions of volumes of each material were obtained (NSPT between 0 and 30, 60% of the total volume to be dredged, NSPT between 30 and 50 with 26% and NSTP over 50 with 14%). Figure 3 shows images of the mechanical backhoe dredger used for the development of the works.



Figure 3: Backhoe Dredger "Cornelius, Boskalis".

During the execution of the project, this presented a series of challenges for the contractor (Boskalis International BV) that had to be addressed and solved. In this matter, the following challenges can be highlighted:

- a. Increase in extreme wave events due to swells in Chilean coasts; which led to the increase in port closures above what was estimated in the study phase of the project.
- b. Simultaneity of works; In parallel to the dredging project, the PCE concessionaries and San Antonio Terminal Internacional (STI) developed works to expand their capacity, which by virtue of the work methods caused an additional contribution to dredging of 88,971 m³.

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- c. The level of operation of the port, which normally operates during the entire period of execution of the project without stopping the regular transit attended by each concessionaire. This situation led to reprogramming the works not always fully respecting the initially pre-established zoning.
- d. Impossibility of a gangue sail that transported material to the area of discharge by wind speed greater than 15 knots.
- e. Non-compliance in the first months of execution of the project of the spill cycles, by virtue of the operation of the port and the hardness of the material found in the first strata to be dredged.
- f. Being an environmental project, it is public knowledge according to the Chilean legislation (http://seia.sea.gob.cl/expediente/ficha/fichaPrincipal.php?modo=ficha&id_expediente=8354678), which entails strict compliance with the commitments established in the EIA before the community's apprehensions.

These challenges led to the generation of a series of actions (lessons learned) aimed at finally achieving the final success of the project, such as:

- g. In addition to the establishment of a zoning of work areas, based on the use of the port, at least 2 additional buffer zones were defined so that, in the event of a possible change in shipping planning, the dredging equipment could be moved and continue with the works fulfilling the contract production cycles.
- h. Establishment of a strict work and maintenance plan. That is, take advantage of instances such as port closure (or other dead times) to perform equipment maintenance, or dredge adjacent to the docks.
- i. Advance discharges of material, not always at maximum capacity; When there are predictions of adverse oceanographic or meteorological conditions to develop this task, it was decided to dump the material, minimizing idle cycles.
- j. Boskalis daily participation in shipping planning meetings, optimizing with it the cut plan established by the contractor when knowing the shipping operation in advance.
- k. Coordinate execution of underwater work, spatially and temporarily, between the concessionaires and other contractors to avoid situations of material contribution or interference in the execution of the works, with different work methods.
- l. Build a close relationship of coordination and cooperation between the maritime and port authority, concessionaires, shipping agencies and Boskalis. As an example, based on this approach of the parties, it was possible to increase the maximum operating wave height of the dredge at the moment of going to pour, from 1 meter of maximum significant height to 2.5 meters.
- m. Establishment of a dissemination plan with the community and target audience, before, during and after the execution of the project, giving an account of the technical and environmental compliance of the works.