

## **ABSTRACT**

**“Civil engineering construction project management: La Cerrada – Boo de Guarnizo”.**

**Author:** Silvia Cameno Ibeas.

**Director:** Luis Manuel Acebes Escudero.

**Keywords:** Management, construction, comparative, improvement

### **ABSTRACT**

On 12 March, 2008, TUE Acciona S.A – SEOP S.L. signed the awarding contract of the work “new road section CA-144, Boo de Guarnizo – Cianca, from P.K 0,700 to P.K 0,000 stretch la Cerrada interchange road – Boo de Guarnizo”. Since this work has already been done, this project studies the management of the works assuming that they are currently being executed.

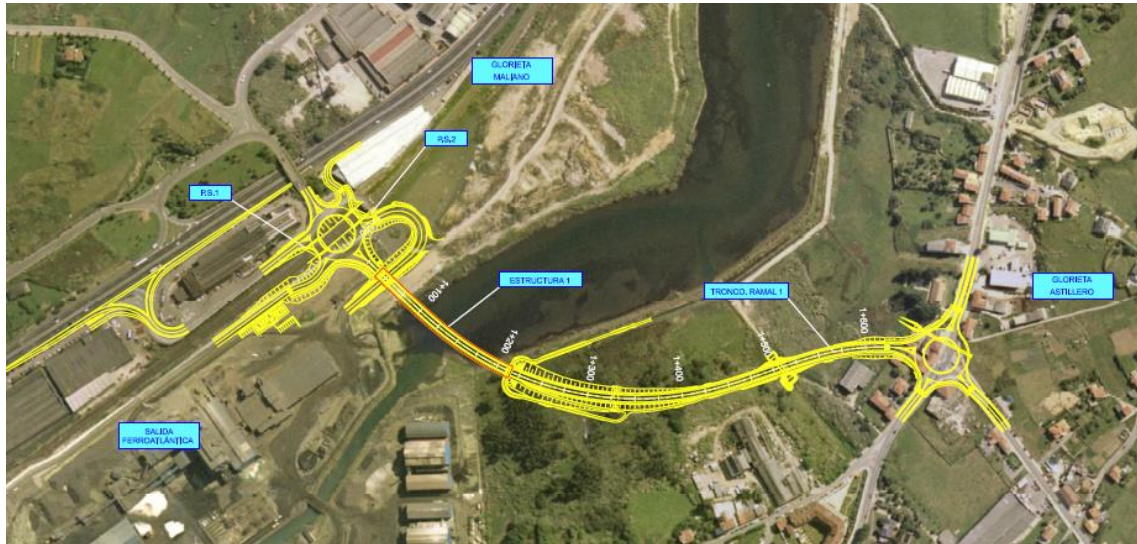
The current paper consists of developing the constructive memory described below, identifying the machinery and personnel required in each unit, as well as the planning and economic study. Any improvement applicable to this project is also studied in order to reduce the economic risk.

The work connects la Cerrada interchange road and the locality of Boo de Guarnizo through the construction of two roundabouts connected to the branch that cross Maliaño's estuary through a composite bridge of 174 metres distributed in 4 spans.

Maliaño's roundabout is located above the railroad track, leading to the necessity of building two 1-span structures. This roundabout interconnects six bidirectional branches. Branch 1 connects with Astillero's roundabout, branch 2 connects with the structure above the highway, branch 3 provides access to Roper facilities, branch 4 grants access to Ferroatlántica buildings and branch 6 provides access from S-10 expressway.

Astillero's roundabout splits into four more branches, one to Astillero through N-635, another one to Boo de Guarnizo moving on to CA-144 and finally, the one granting access to San Camilo district.

The described work is shown on the map below:



Works are located in a marisma area, so ground isn't resistant and can not be used to form the embankments. To minimize costs, two landfills are set, one on each edge of the estuary, really close to the works.

Materials will be obtained from CANDESA, La Verde, Hongomar, SENOR S.A y Arruti S.A, quarries and concrete plants located in Herrera de Camargo and Revilla de Camargo.

Structures foundation must be deep, in this case piles, due to the null resistance of the mud and to protect the railways. Also mechanically stabilized earth walls are built to sustain the embankments.

There are two traffic categories depending on the roundabouts' branches, categories T1 and T41. To obtain category T1, 70 cm of rockfill, 35 cm of graded aggregate and 25 cm of hot mixed asphalt mixes are set. To get category T41: 50 cm of rockfill, 25 cm of graded aggregate and 10 cm of hot mixed asphalt mixes are set.

Works planning is distributed in 19 months of the project duration, being the construction of the composite structure the most critical path, as previously explained, the ground is muddy and to execute the abutment number 2 of the composite structure is necessary to set a preload combine with vertical drains to speed up the consolidating process. Waiting time is established to 4 months.

To analyze the risk when UTE Acciona S.A – SEOP S.L went to construction bidding is necessary to compare the construction budget with the direct costs. The obtained data are shown below:

CHAPTER	CONSTRUCTION BUDGET	DIRECT COSTS
EARTHWORKS	724.985,79	1.248.781,94
DRAINAGE	186.585,82	206.260,66
PAVEMENT	517.243,63	659.087,22
STRUCTURES	2.826.746,71	2.696.672,84
ROAD SIGNS	91.990,14	73.592,11
ENVIRONMENT	73.359,96	51.351,97
SERVICES REPLACEMENTS	158.413,63	158.413,63
LIGHTING	100.601,94	80.481,55
PROVISIONAL DETOURS	42.114,56	42.114,56
VARIOUS	15.000	15.000
HEALTH AND SAFETY	40.189,47	40.189,47
TOTAL	4.777.231,65	5.270.945,97
SALE VALUE		4.653.095,29 €
CONSTRUCTION COSTS		5.745.945,97 €
TOTAL COSTS		6.1871.538,25 €
RISK		-1.528.442,96

To reduce this risk, several improvements are considered to save money, but never decreasing quality or safety. The improvements are resumed in the table below:

IMPROVEMENTS	DIRECT COSTS	PEM
Rent sheet piles	-124.560 €	-49.051,73 €
Modificate pavement	-82.426,34 €	0 €
Vertical drain	+72.366 €	+217.098 €
Concrete wall	-	-
Compensation piles' material	-	+158.999,88 €
Unify piles construction	-6.000 €	-5.565 €
Material reutilitation	-158.033,26 €	-29.143,80 €
Increase preload	0 €	0 €

Comparing the costs with those obtained applying the improvements mention above, the risk goes down to 1.157.430,84 €. Doesn't seem coherent that a construction company want to do a work risking losing money, but thats the only way to win the bidding.