

RECLAMATION AND CONSTRUCTION OF BERTHING FACILITIES, PORT OF CULASI, ROXAS

BACKGROUND:

- The subject project was under contract with Golden City Engineering and Construction (GCEC) in the original amount of P106, 808, 035.90.
- Effectivity of the contract: December 28, 1999 and is programmed for completion on June 19, 2001.
- The original project calls for the following scope of works:
 - a. Demolition / disposal of existing r.c. curb;
 - b. Removal of existing wooden lighting post;
 - c. RC sheet piling, for contained structure;
 - d. Reclamation and paving works;
 - e. Construction of R.C. wharf; trestle on RC piles;
 - f. Fendering and mooring system;
 - g. Drainage system;
 - h. Port lighting system.
- Prior to the issuance of the Notice to Proceed (NTP) a preconstruction survey was conducted on December 1 - 5, 1999. Results of the survey show that the elevation of the existing seabed along the area to be reclaimed ranges from -0.72 to -2.54m elevation.
- At the same, time evaluation of bore hole data dated 1998 show the presence of soft soil/unsuitable materials at the proposed reclamation area.
- FCMD, in memorandum dated December 10, 1999 recommended that a re-study of the sheet pile design as well as the advisability of replacing part of unsuitable materials inside the reclamation area be undertaken.

ANNEX" A-1

- PPA Assistant General Manager for Engineering, in a meeting held on December 15, 1999, instructed FCMD to conduct soil investigation and drive test pile to confirm the borehole data gathered.
- Result of the investigation indicates the presence of unsuitable materials down to -12.50m elevations
- Project Development Department, therefore, revised the plans / estimate which was approved by AGME on February 24, 2001 which include the following scope of work;
 - a. *Construction of R.C. Wharf and trestle on Tubular Piles,*
 - b. *Construction of Containment Bulkhead in lieu of the original R.C. Sheet Pile,*
 - c. *Reduction of reclamation area.*
- Further, AGME directed HMD to include the dredging of the proposed reclamation area up to design depth of -7.0m. Dredging was completed on May 22, 2001 and a joint hydrographic survey was conducted thereafter.
- Further, provision of RORO ramp was included as requested by PMO-Iloilo.
- On May 08, 2000, thru representation of City Mayor of Roxas City, Secretary Mar Roxas of DTI, Port Manager of PMO-Iloilo and Arrastre Operator of Culasi Port. The plans were again revised as follows;
 - a. *Deletion of trestle,*
 - b. *Widening of reclamation area,*
 - c. *Rehabilitation of damaged breakwater.*
- The project was finally completed and turned over on 25 November 2001.

ANALYSIS AND EVALUATION

- Based on the borehole data gathered and confirmed by the soil investigation conducted, the whole reclamation area up to -12.50 meter elevation has unsuitable materials.
- Based on Section 8 paragraph 3.1 of approved Bid Document stated that:

Prior to construction, all necessary clearing and grubbing in that area shall have been performed in conformity with specifications for Clearing and Grubbing

Granular fill construction shall consist of constructing reclamation area, including preparation of the areas upon which they are to be placed; the compaction of dikes within or adjacent to it. The placing and compacting of approved materials at areas where unsuitable materials has been removed; and placing and compaction of fill material in holes, pits, and other depression within the reclamation.

- However, the Engineering Office had opted not to remove all the unsuitable materials in view of the cost involve.
- Some of the alternatives/schemes that PPA may undertake considering the result of the bore holes are as follows:

A. Dredging the whole reclamation area up to -12.50m

- Dredging the whole reclamation area up to -12.5 meter elevation will necessitate the revision in design/plans.
- Driving of sheet piles will no longer be possible due to hard estrata -12.50m; hence provision of rock bulkhead maybe used.
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- This revision will entail additional cost of P46.1M, breakdown as follows:

*Can be done from PPA's fund
made of
P46.1M
Sufficient to
make
in
P46.1M
P46.1M*

SCOPE OF WORK	ADDITIONAL COST	REMARKS
1. Rock Bulkhead	P 35.9M	This is in addition from the revised contract amount. If we excavated/dredged the area from -7.00m up to -12.50m elev. (See Annex 1 - Detailed Estimate)
2. Granular Fill	P 6.8M	
3. Excavation/Dredging	P 3.4M	
TOTAL	P 46.1M	0,000.00 0,000.00

B. Soil Stabilization Technology using (PVD) Prefabricated Vertical Drain)

- Still the driving of Sheet Pile will not be possible due to hard strata below -12.50m elevations.
- With the collection of pore water, no additional dredging is required and settlement will be negligible.
- Since the revision in the design/plan is already covered by EWO No.1/CO No.1 and Supplemental Agreement No. 1.
- Cost involved will only be P8.2M for soil improvement using pre-fabricated vertical drain, based on the proposal of the Geowork International Corporation
- Additional 90 c.d. is needed before all the pore water can be collected.

C. Normal Settlement

- Still the driving of Sheet Pile will not be possible, hence revision in the design plan covered by CO/EWO No. 1 and Supplemental Agreement was approved.

- An abrupt settlement is expected for the first two (2) years depending on the utilization of the area.
- The settlement will gradually be reduced until such time the area has stabilized.
- The probable settlement/cost per year is shown below:

YEAR	SETTLEMENT (ASSUMED)	COST OF REPAIR
1 st year	0.4m	1,000,000.00
2 nd year	0.4m	1,000,000.00
3 rd year	0.3m	750,000.00
4 th year	0.2m	500,000.00
5 th year	0.1m	250,000.00
Total Cost		3,500,000.00

- The comparative cost analysis of the different schemes/alternative that may be undertaken is tabulated below.

Particular	Settlement per year	Cost of Repair	Remarks
1. Excavation/Dredging of whole area up to -12.5m elevation	Negligible	P46.20M	Additional cost if we excavated from -7.0m to -12.5m
2. Use of soil stabilization technology	Negligible	P 8.2M	
3. Normal Settlement		P 3.5M	Repair the area twice a year for every 0.2m settlement. Assumption: 5 years

CONCLUSION

- Therefore, considering the above analysis/evaluation and cost consideration the decision of the Engineering Office to adopt the Normal Settlement Scheme in the reclamation area is the most economical.